5.2 Air Quality

Air quality impacts covered in this section focus on four criteria pollutants[(a)]—nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), and particulate matter with aerodynamic diameters of 10 µm or smaller (PM_{10}). Hanford Solid Waste Program activities would emit criteria pollutants as a result of the operation of diesel-fired and propane-fueled equipment. Construction, earthmoving, and transportation activities would also result in fugitive dust emissions. Major program activities that would be substantial sources of criteria pollutants include:

- construction of waste-disposal trenches (for example, LLW, MLLW, ILAW)
- waste-disposal operations
- excavation of backfill and capping materials at the borrow pit
- transportation of backfill and capping materials from the borrow pit to the disposal trenches
- backfill and capping activities at the disposal trenches
- leachate drying operations.

The air quality impacts to the public from these and related program activities are presented in this section, and additional supporting information is provided in Appendix E. The air quality impacts from criteria pollutants emitted during the transportation of waste materials are not included in this section, but are instead addressed in Section 5.8. The potential consequences to workers and the public of the releases from radiological and hazardous chemicals are addressed in Section 5.11.

In calculating air quality impacts for criteria pollutants, data on pollutant emissions was derived from the Hanford Solid Waste Technical Information Document (FH 2003). Detailed assessments of pollutant emissions were developed for each major program element. To compute maximum air quality impacts, emissions were combined from all activities that could potentially occur at the same time. Because only 22 percent of the LLW and essentially none of the MLLW would be from offsite sources, the air quality impacts for the Hanford Only waste volume under each Alternative Group were conservatively modeled as being equivalent to those for the Lower Bound waste volume under the same Alternative Group.

The approach used to estimate pollutant emission rates and emission schedules for all Hanford Solid Waste Program activities are addressed in detail in Appendix E.

The maximum air quality impacts that would result from the emission of criteria pollutants from Hanford Solid Waste Program activities were calculated using the Industrial Source Complex Short-Term (ISCST3) Dispersion Model (EPA 1995). The ISCST3 model has been approved by the U.S. Environmental Protection Agency (EPA) for the calculation of the maximum, time-averaged air concentrations at user-specified receptor locations. The model provides results for averaging periods of 1 hour, 3 hours, 8 hours, 24 hours, and 1 year to correspond to the time periods specified in national and

(a) The Clean Air Act authorizes the U.S. Environmental Protection Agency to set permissible levels of exposure for selected air pollutants using health-based criteria. These selected pollutants are called "criteria pollutants," and their permissible exposure levels are defined in 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards."

state ambient air quality standards. Four years of hourly Hanford Site meteorological data were used in modeling atmospheric dispersion. The ISCST3 model and the data used in model runs are discussed in more detail in Appendix E.

In modeling air quality impacts for the public, the following conservative assumptions were made to maximize impact estimates:

- Although Hanford Solid Waste Program activities would occur at numerous locations in and around the 200 Areas and Area C, program activities were conservatively modeled by collocating their emissions into three small area sources. These area sources were situated in the 200 West Area (near the southwestern edge of project activities), 200 East Area (near the northwestern edge of project activities), and Area C (at a site close to State Route [SR] 240). The location of each area source was set to correspond to the project work site in the associated major operating area that could generate the greatest air quality impacts to the public.

- When a project activity could potentially occur at more than one source location, the activity was conservatively assumed to occur at the location that would generate the greatest air quality impact. For example, the Lined Modular Facility proposed in Alternative Group D could be sited at locations in or near the 200 East or 200 West Areas, depending on the sub-alternative selected. After assessing impacts from both potential source locations, the 200 West source location was used in the air quality analysis because it generated the greatest air quality impacts.

- Even though the maximum air quality impacts to the public from the 200 West and 200 East source locations would occur at markedly different locations (as discussed later in this section), it was conservatively assumed that the maximum pollutant concentrations associated with these two source locations could be summed to compute total maximum air quality impacts for emissions from both 200 Area source locations.

- Chemical decay and deposition processes were not explicitly modeled for any criteria pollutant. Neglecting these removal mechanisms would increase estimates of maximum pollutant concentrations (especially in the case of particulate matter) at publicly accessible locations.

- Pollutant emission rates from diesel-fueled engines were only assumed to comply with current emissions standards. No credit was taken for the substantial reduction in the sulfur content of diesel fuel (from a 500-ppm to a 15-ppm limit) scheduled to be phased in beginning in June 2006 or a tightening of the emission standards for nitrogen dioxide and particulate matter scheduled to be phased in beginning in 2007 (EPA 2000).

As a result of these and other conservative assumptions, the estimates of short-term and long-term maximum air quality impacts presented in this section should be substantially greater than what would actually be experienced during program implementation.

To meet regulatory requirements, emissions from program activities must not result in air concentrations of criteria pollutants that exceed regulatory limits. The ISCST3 model predicted the locations of the maximum air quality impacts to the public from emissions at the 200 East Area, 200 West Area, and Area C source locations. These are provided in Table 5.3 for 200 East and 200 West and in Table 5.4 for Area C (borrow pit). The location of maximum impact varies based on the averaging period of exposure. The maximum shorter-term air quality impacts (for example, 1 hour and 3 hours) generally occur at or near the closest point of public access. The locations of the longer-term maximum air quality impacts (for example, 24 hours and annual) are heavily dependent on local, prevailing wind directions and other meteorological conditions. Dispersion factors are also provided in Tables 5.3 and 5.4 to provide relative estimates of the maximum impacts from a unit release (for example, one unit of mass emitted per second) of a generic pollutant.

Table 5.3. 200 East and 200 West Area Emissions: Location and Dispersion Factors Used to Determine Maximum Air Quality Impacts to the Public

Area	Averaging Time Period	Maximum Impact Location and Corresponding Public Access	Distance and Direction from Pollutant Release Location to Maximum Public Impact Location[(a)]	Dispersion Factor for Maximum Impact Location (s/m^3)[(b)]
200E	1 hr	SR 240	8.5 km – SW	8.4E-5
	3 hr	SR 240	9.0 km – SSW	3.3E-5
	8 hr	SR 240	9.0 km – SSW	2.2E-5
	24 hr	Hanford Site boundary	15.3 km – WNW	9.3E-6
	Annual	Hanford Site boundary	13.9 km – WNW	8.9E-8
200W	1 hr	SR 240	4.0 km – S	1.6E-4
	3 hr	SR 240	4.0 km – S	7.4E-5
	8 hr	SR 240	4.0 km – S	5.1E-5
	24 hr	Hanford Site boundary	8.5 km – WNW	1.6E-5
	Annual	Hanford Site boundary	11.5 km – W	1.5E-7

(a) Distance and direction determined by dispersion modeling. Pollutant transport direction is reported using 16 compass sectors—starting with N (North) and continuing clockwise with NNE, NE, ENE, E (East), ESE, SE, SSE, S (South), SSW, SW, WSW, W (West), WNW, NW, and NNW.

(b) Values computed by the ISCST3 model. To convert to a concentration estimate ($\mu g/m^3$), a dispersion factor (s/m^3) is multiplied by the estimated pollutant release rate ($\mu g/s$).

In the following sections, the results of the air quality analysis are presented for Alternative Groups A through E and the No Action Alternative. Separate results are provided for the maximum air quality impacts to the public from emissions in the 200 Areas and emissions in Area C.

A Clean Air Act General Conformity Review analysis is presented in Appendix E. Based on this analysis, it was concluded that a General Conformity Determination would not be needed.

Table 5.4. Area C (Borrow Pit) Emissions: Location and Dispersion Factors Used to Determine Maximum Air Quality Impacts to the Public

Averaging Time Period	Maximum Impact Location and Corresponding Public Access	Distance and Direction from Pollutant Release Location to Maximum Public Impact Location[(a)]	Dispersion Factors for Maximum Impact Location (s/m^3)[(b)]
1 hr	SR 240	<150 m NE	3.3E-3
3 hr	SR 240	<150 m NE	2.5E-3
8 hr	SR 240	<150 m NE	1.9E-3
24 hr	Hanford Site boundary	14.4 km WNW	1.0E-5
Annual	Hanford Site boundary	13.8 km WNW	9.2E-8

(a) Distance determined by dispersion modeling. Pollutant transport direction is reported using 16 compass sectors—starting with N (North) and continuing clockwise with NNE, NE, ENE, E (East), ESE, SE, SSE, S (South), SSW, SW, WSW, W (West), WNW, NW, and NNW.

(b) Values computed by the ISCST3 model. To convert to a concentration estimate ($\mu g/m^3$), the dispersion factor (s/m^3) is multiplied by the estimated pollutant release rate (μg/s).

5.2.1 Alternative Group A

Project activities that would generate air quality impacts under Alternative Group A include the use of diesel-fueled equipment to construct new trenches of deeper and wider design than current trenches, construction of the ILAW and melter trenches, backfilling of trenches, capping the LLBGs and the ILAW trench at closure, performing routine CWC and T Plant operations, modifying T Plant to achieve waste processing capability, and the excavation and transportation of materials from the borrow pit. In addition, propane-fueled pulse driers would be used to treat leachate from the MLLW trenches beginning in 2026. Fugitive dust emissions would be associated with many major construction, transportation, and operation activities.

For Alternative Group A (Hanford Only and Lower Bound waste volume), the largest air quality impacts would occur during two different periods of project operation. In 2006, ILAW trench construction and MLLW capping and backfill operations would be underway. The heavy use of construction equipment for short periods of time would produce the maximum 24-hour and shorter term average concentrations for SO_2 and CO. After disposal operations cease, LLBG and ILAW capping operations would be in full swing. This sustained activity would produce the maximum 24-hour and annual concentrations of PM_{10} and maximum annual concentrations of NO_2 and SO_2.

For Alternative Group A (Upper Bound waste volume), the largest air quality impacts would occur during three different periods of project operation. In 2006, the heavy use of construction equipment would produce the maximum concentrations over all averaging periods for CO, SO_2, and NO_2. In 2018, LLW and ILAW trench construction, coupled with MLLW melter capping and backfilling operations, would generate the maximum 24-hour PM_{10} concentrations. After disposal operations cease, LLBG and ILAW capping operations would be in full swing. This sustained activity would produce the maximum annual concentrations of PM_{10}.