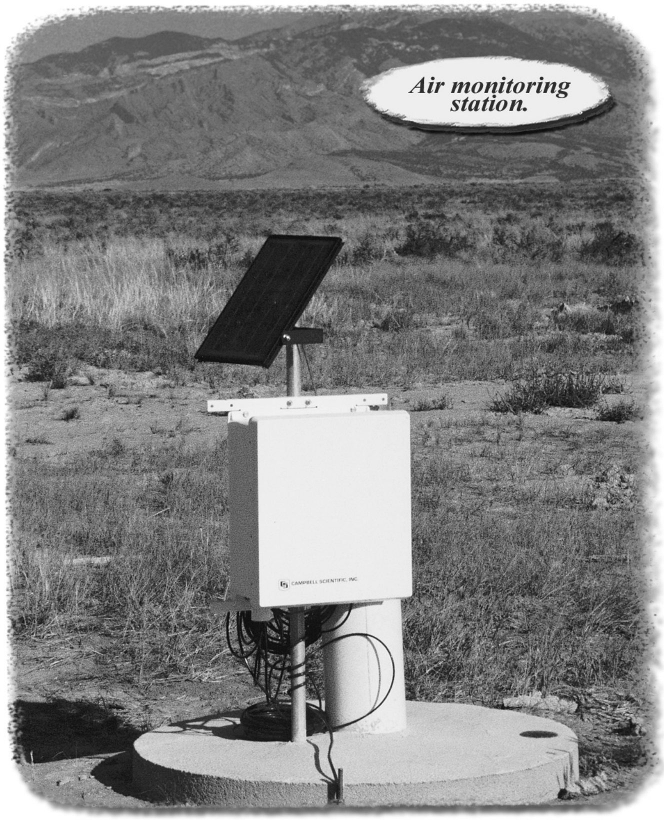


5.2.6 AIR RESOURCES

Air pollutant emissions associated with construction and operation of facilities to support the waste processing alternatives could affect the air resources in the region of the INEEL. DOE characterized air emission rates and calculated maximum consequences at onsite and offsite locations from projects associated with proposed waste processing alternatives. The assessments include emissions from stationary sources (facility stacks); fugitive sources from construction activities; and mobile sources (trucks, cranes, tractors, etc.) that would operate in support of projects under each waste processing alternative. The types of emissions assessed are the same as those in the baseline assessment in Section 4.7, Air Resources, namely, radionuclides, criteria pollutants (carbon monoxide, nitrogen dioxide, sulfur dioxide, respirable particulate matter, and lead), and toxic air pollutants. In addition, DOE characterized emissions of volatile organic compounds (which can lead to the formation of ozone), carbon dioxide (which has been implicated in potential global warming) and fluorides (which can accumulate in forage and feed products).

This section summarizes the assessment methodology and describes the potential effects of construction activities and the operation of proposed facilities on air quality at and around the INEEL. Results of air quality assessments are presented in terms of expected radiation dose and nonradiological pollutant concentration levels which are compared to applicable standards. This section also discusses related impacts, such as potential for visibility degradation and air quality impacts due to project-induced secondary growth. Appendix C.2 contains additional details on assessment methods, assumptions, and related information.

Appendix C.8 describes the potential emissions and impacts that would occur at the Hanford Site as a result of the Minimum INEEL Processing Alternative. For purposes of comparison, the listings of emissions and impacts by alternative presented in this chapter also include the emissions and impacts that would be incurred at the Hanford Site. Unless otherwise indicated, however, the discussions of methodology, emissions and impacts presented in this chapter specifically apply to projected conditions at the INEEL.

5.2.6.1 Methodology

DOE assessed the consequences of air pollutant emissions using methods and data that are considered acceptable for regulatory compliance determination by Federal and State agencies and are designed to allow for a reasonable prediction of the impacts of proposed facilities. For the most part, the methodology parallels that used in the SNF & INEL EIS (DOE 1995). In a few cases, however, it was necessary to employ more current methods (e.g., use of more recent versions of computer codes). The principal components of the air resource assessment methodology include source term estimation and characterization of release parameters, which are used in conjunction with local meteorological data and computerized dispersion modeling codes to simulate transport and dispersion of air contaminants. The radiological assessments were performed using the GENII computer code, Version 1.485 3-Dec-90 (Napier et al. 1998).

For the nonradiological assessments, DOE used two primary atmospheric dispersion models: Industrial Source Complex - Short Term (ISCST-3) (EPA 1995) and CALPUFF (Scire et al. 1999). DOE used the ISCST-3 model (Version 99155) to predict concentrations of criteria and toxic air pollutants at locations extending to 50 kilometers from INTEC. These assessments used hourly meteorological data collected at the INEEL during the period 1996-1998. In response to recommendations made by the U.S. National Park Service, DOE assessed impacts at Class I areas (Craters of the Moon National Wilderness Area, and Yellowstone and Grand Teton National Parks) using the CALPUFF model, which is better suited for simulating dispersion over greater distances (e.g., beyond 50 kilometers from the release point). As recommended by the National Park Service, the CALPUFF simulations used meteorological data measured at the Pocatello Airport for the years 1986 to 1991, coupled with upper air data taken at Salt Lake City Airport over the same period. Additional information on the assessment methodology is presented in Appendix C.2.

5.2.6.2 Construction Emissions and Impacts

This section describes the emission rates and impacts that are expected to result from construction of facilities associated with waste processing alternatives. Construction emissions would result primarily from the disturbance of land, which generates fugitive dust, and from the combustion of fossil fuels in construction equipment. As specified by Sections 650 and 651 of Rules for the Control of Air Pollution in Idaho (***IDEQ 2001***), all reasonable precautions would be taken to prevent the generation of fugitive dust. Dust generation would be mitigated by the application of water, use of soil additives, and possibly administrative controls, such as halting construction during high-wind conditions.

Table 5.2-6 presents construction-related emissions estimated for each waste processing alternative at the INEEL and the Hanford Site. These emissions are presented as total tons and tons per year. The total ton value represents emissions over the entire construction period of each project associated with a given alternative. The tons per year value is the sum of annual emission rates for each project associated with an alternative. No correction has been applied to account for the fact that not all projects would occur simultaneously; thus, the annual emission rates specified are inherently conservative. These emissions do not include those from construction activities associated with facility disposition (for example, placement of landfill caps), which are addressed in Section 5.3.4.

The primary impact of construction activities involves the generation of fugitive dust, which includes respirable particulate matter. While dust generation would be mitigated ***as described above***, relatively high levels of particulates could still occur in localized areas. Emissions of other criteria pollutants from construction-related combustion equipment may also result in localized impacts to air quality.

Among the alternatives, the highest construction emissions are associated with the Full Separations Option. Under this option, DOE estimates that annual average concentrations of respirable particulate matter ***(PM-10)*** would be approximately 1 and 5 percent of the applicable standard at the maximum INEEL boundary and public road locations, respectively. Over shorter periods (24-hour averaging time), respirable particulate levels could reach about 55 percent of the standards at the INEEL boundary. However, it is typical of major construction activities to intermittently produce relatively high levels of fugitive dust in the vicinity of the activity, and short-term, localized levels of particulate matter, which, if not mitigated, could exceed applicable standards. Levels of other criteria pollutants are predicted to be a small fraction of applicable standards. Portions of Bannock and Power counties in Idaho, near the region of influence, are in a non-attainment area for particulate matter.

Construction activities at the Hanford Site (for the Minimum INEEL Processing Alternative) are estimated to produce nitrogen dioxide levels which are about 8 percent of the Federal and State of Washington ambient air standard. All other pollutants would be less than 1 percent of

Table 5.2-6. Total and annualized construction-related criteria air pollutant emissions and fugitive dust generation for waste processing alternatives.

				Separations Alternative			Non-Separations Alternative				Minimum INEEL Processing Alternative		***Direct Vitrification Alternative***	
Pollutant	Units	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	***Steam Reforming Option***	At INEEL	At Hanford	***Vitrification without Calcine Separations Option***	***Vitrification with Calcine Separations Option***
Fossil fuel combustion														
Carbon monoxide	tons	7.8	27	350	330	360	280	330	260	***150***	210	120	***270***	***340***
	tons/year	1.6	8.1	110	110	110	82	91	72	***47***	54	20	***69***	***97***
Sulfur dioxide	tons	1.2	4.3	55	53	58	44	52	41	***25***	34	0.16	***43***	***54***
	tons/year	0.2	1.3	18	17	17	13	14	11	***7.5***	8.6	0.027	***11***	***16***
Particulate matter	tons	0.4	1.5	20	19	20	16	19	15	***8.7***	12	110	***15***	***19***
(PM-10)	tons/year	0.1	0.5	6.4	6.1	5.9	4.6	5.1	4.0	***2.7***	3.0	19	***3.9***	***5.5***
Nitrogen dioxide	tons	6.7	23	300	290	310	240	280	220	***130***	180	120	***230***	***290***
	tons/year	1.3	6.9	97	93	90	70	78	61	***40***	46	20	***59***	***84***
Volatile organic compounds	tons	1.4	4.9	62	60	65	50	59	47	***28***	38	NA[a]	***48***	***61***
	tons/year	0.3	1.4	20	19	19	15	16	13	***8.5***	9.7	NA	***12***	***17***
Fugitive dust generation														
Particulate matter (dust)	tons	110	210	2,800	680	2,600	670	910	550	***240***	2,600	1,300	***630***	***850***
	tons/year	22	46	490	200	430	190	240	150	***83***	420	220	***160***	***210***

a. NA = Not analyzed in the Tank Waste Remediation System EIS.

the applicable standard. Respirable particulate matter would not exceed 16 percent of federal or state standards.

5.2.6.3 Radionuclide Emissions and Impacts from Operations

Waste processing and related activities would result in releases of small quantities of radionuclides to the atmosphere at INTEC. For waste processing, these releases would occur in a controlled fashion through filtered exhaust release points. Radionuclide emission rates have been estimated for facilities needed to support waste processing alternatives on the basis of process design, proposed operations, and radionuclide concentrations in the waste to be treated or stored. The specific methods and assumptions used are documented in the Project Data Sheets prepared for each facility (referenced in Appendix C.6). Appendix C.2 provides a description of the general methods used for emissions estimation. The emission rates for individual projects are itemized in Appendix C.2 and summarized by alternative in Table 5.2-7.

DOE calculated radiation doses associated with radionuclide emissions from the proposed waste ***processing*** projects for (a) the maximally exposed individual at an offsite location; (b) the offsite entire population (adjusted for future growth) within a 50-mile radius of the INTEC; and (c) onsite workers at the INEEL areas of highest predicted radioactivity level. The term "noninvolved worker" is used hereafter to describe the worker who is incidentally exposed to the highest onsite concentrations (see Appendix C.2 for further explanation of this receptor). Figure 5.2-2 presents the results of this dose assessment according to alternative. The annual doses presented represent the maximum value calculated over any one year that waste processing occurs.

In all cases, the dose to the maximally exposed offsite individual is a very small fraction of that received from natural background sources and is well below the EPA airborne emissions dose limit of 10 millirem per year (40 CFR 61.92). The highest predicted noninvolved worker doses would occur at the Central Facilities Area and would represent a very small fraction of the occupational dose limit of 5,000 millirem per year (10 CFR 835.202). No applicable standards exist for collective population dose; however, DOE policy requires that doses resulting from radioactivity in effluents be reduced to the levels which are as low as reasonably achievable. The radiological health effects associated with these doses are presented in Section 5.2.10, Health and Safety.

The highest dose to the maximally exposed offsite individual would be about 0.002 millirem per year, which would occur under the Continued Current Operations Alternative, Planning Basis Option, Hot Isostatic Pressed Waste Option, or Direct Cement Waste Option. The highest collective dose to the surrounding population would be about ***0.11*** person-rem per year and would also occur under the Continued Current Operations Alternative, Planning Basis Option, Hot Isostatic Pressed Waste Option, or Direct Cement Waste Option. Doses for all other options would be lower. Offsite doses would be mainly attributable to intake of iodine-129 through the food-chain pathway. Emissions of this isotope would result primarily from the calcining of mixed transuranic waste/SBW and management of mixed transuranic waste (newly generated liquid waste and Tank Farm heel waste). The noninvolved worker would receive about 1.0×10^{-4} millirem per year under the Planning Basis Option or Minimum INEEL Processing Alternative. This dose would be primarily attributable to inhalation of plutonium and americium released from ion exchange treatment of mixed transuranic waste (SBW and newly generated liquid waste), as well as calcine retrieval operations. When added to doses from existing INEEL sources and other foreseeable projects, both onsite and offsite doses remain a small fraction of applicable standards. The highest dose to an offsite individual at the Hanford Site (for the Minimum INEEL Processing Alternative) would be about 1.7×10^{-5} millirem per year.

When the cumulative effects of baseline sources, foreseeable increases to the baseline, and sources associated with waste processing alternatives are considered, onsite and offsite doses remain very small fractions of applicable limits.

Table 5.2-7. Radionuclide emission rates (curies per year) for waste processing alternatives.[a]

			Separations Alternative			Non-Separations Alternative				Minimum INEEL Processing Alternative		***Direct Vitrification Alternative***	
Radionuclide	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	***Steam Reforming Option***	At INEEL	At Hanford[b]	***Vitrification without Calcine Separations Option***	***Vitrification with Calcine Separations Option***
Americium-241	–	–	1.6×10^{-8}	1.6×10^{-8}	1.6×10^{-8}	–	–	–	–	2.0×10^{-5}	1.5×10^{-7}	–	–
Cobalt-60	1.3×10^{-7}	1.2×10^{-6}	2.9×10^{-8}	***1.3×10^{-6}***	8.2×10^{-9}	1.2×10^{-6}	1.2×10^{-6}	1.3×10^{-7}	***1.3×10^{-7}***	9.9×10^{-6}	–	***1.3×10^{-7}***	***1.6×10^{-7}***
Cesium-134	8.2×10^{-8}	6.3×10^{-6}	3.7×10^{-9}	***6.3×10^{-6}***	4.8×10^{-8}	6.3×10^{-6}	6.3×10^{-6}	9.3×10^{-8}	***1.5×10^{-7}***	1.0×10^{-7}	–	***9.3×10^{-8}***	***9.3×10^{-8}***
Cesium-137	2.4×10^{-4}	2.7×10^{-3}	2.3×10^{-3}	***4.9×10^{-3}***	2.3×10^{-3}	***0.096***	4.9×10^{-3}	2.5×10^{-3}	***2.5×10^{-3}***	2.5×10^{-3}	1.2×10^{-4}	***2.5×10^{-3}***	***2.5×10^{-3}***
Europium-154	2.0×10^{-7}	1.1×10^{-6}	1.1×10^{-9}	***1.2×10^{-6}***	1.0×10^{-9}	1.1×10^{-6}	1.1×10^{-6}	2.0×10^{-7}	***2.1×10^{-7}***	1.0×10^{-5}	–	***2.0×10^{-7}***	***2.0×10^{-7}***
Europium-155	–	–	4.9×10^{-10}	4.9×10^{-10}	4.9×10^{-10}	–	–	–	–	1.8×10^{-9}	–	–	–
Hydrogen-3 (tritium)	9.0	23	45	68	45	23	23	54	***54***	32	–	***54***	***54***
Iodine-129	0.031	0.089	1.5×10^{-3}	***0.090***	4.2×10^{-4}	0.089	0.089	0.032	***0.031***	0.031	9.1×10^{-11}	***0.032***	***0.033***
Nickel-63	–	–	6.9×10^{-12}	6.9×10^{-12}	6.9×10^{-12}	–	–	–	–	2.6×10^{-10}	–	–	–
Promethium-147	–	–	–	–	–	–	–	–	–	5.2×10^{-5}	–	–	–
Plutonium-238	6.2×10^{-6}	1.1×10^{-5}	3.2×10^{-5}	***4.4×10^{-5}***	3.2×10^{-5}	4.3×10^{-5}	4.3×10^{-5}	3.8×10^{-5}	***3.9×10^{-5}***	9.1×10^{-5}	1.8×10^{-7}	***3.8×10^{-5}***	***3.8×10^{-5}***
Plutonium-239	1.0×10^{-7}	6.7×10^{-7}	2.4×10^{-10}	***6.7×10^{-7}***	2.2×10^{-10}	6.7×10^{-7}	6.7×10^{-7}	1.1×10^{-7}	***1.1×10^{-7}***	3.2×10^{-6}	2.6×10^{-8}	***1.1×10^{-7}***	***1.1×10^{-7}***
Plutonium-241	–	–	5.6×10^{-8}	5.6×10^{-8}	5.6×10^{-8}	–	–	–	–	2.3×10^{-9}	8.6×10^{-8}	–	–
Ruthenium-106	2.4×10^{-6}	6.6×10^{-5}	1.6×10^{-6}	***6.7×10^{-5}***	4.6×10^{-7}	7.7×10^{-5}	6.6×10^{-5}	2.5×10^{-6}	***2.4×10^{-6}***	2.4×10^{-6}	–	***2.5×10^{-6}***	***4.1×10^{-6}***
Antimony-125	1.5×10^{-6}	1.2×10^{-5}	7.4×10^{-7}	***1.3×10^{-5}***	5.5×10^{-7}	1.2×10^{-5}	1.2×10^{-5}	1.5×10^{-6}	***1.5×10^{-6}***	5.3×10^{-6}	–	***1.5×10^{-6}***	***2.3×10^{-6}***
Samarium-151	–	–	2.0×10^{-7}	2.0×10^{-7}	2.0×10^{-7}	–	–	–	–	2.8×10^{-5}	–	–	–
Strontium-90/ Yttrium-90	2.1×10^{-5}	3.3×10^{-4}	5.8×10^{-3}	***6.2×10^{-3}***	5.8×10^{-3}	6.2×10^{-3}	6.2×10^{-3}	5.8×10^{-3}	***5.9×10^{-3}***	7.5×10^{-3}	8.0×10^{-5}	***5.8×10^{-3}***	***5.8×10^{-3}***
Technetium-99	–	–	1.8×10^{-5}	1.8×10^{-5}	1.8×10^{-5}	1.7×10^{-4}	–	–	–	8.0×10^{-7}	6.0×10^{-8}	–	***1.8×10^{-5}***

a. This table lists only those radionuclides that contribute materially to the total radiation dose associated with airborne radionuclide emissions. Trace quantities of other radionuclides (including carbon-14 and some isotopes of uranium) could also be emitted in some options; however, they would not contribute significantly to the radiation dose. See Appendix C.2 for basis of emissions estimates.

b. Values adapted from Project Data Sheets in Appendix C.8. Emissions of specific radionuclides listed for the Calcine Dissolution Facility were increased by a factor of 2 to account for total radioactivity of calcine (including activity of unspecified radionuclides).

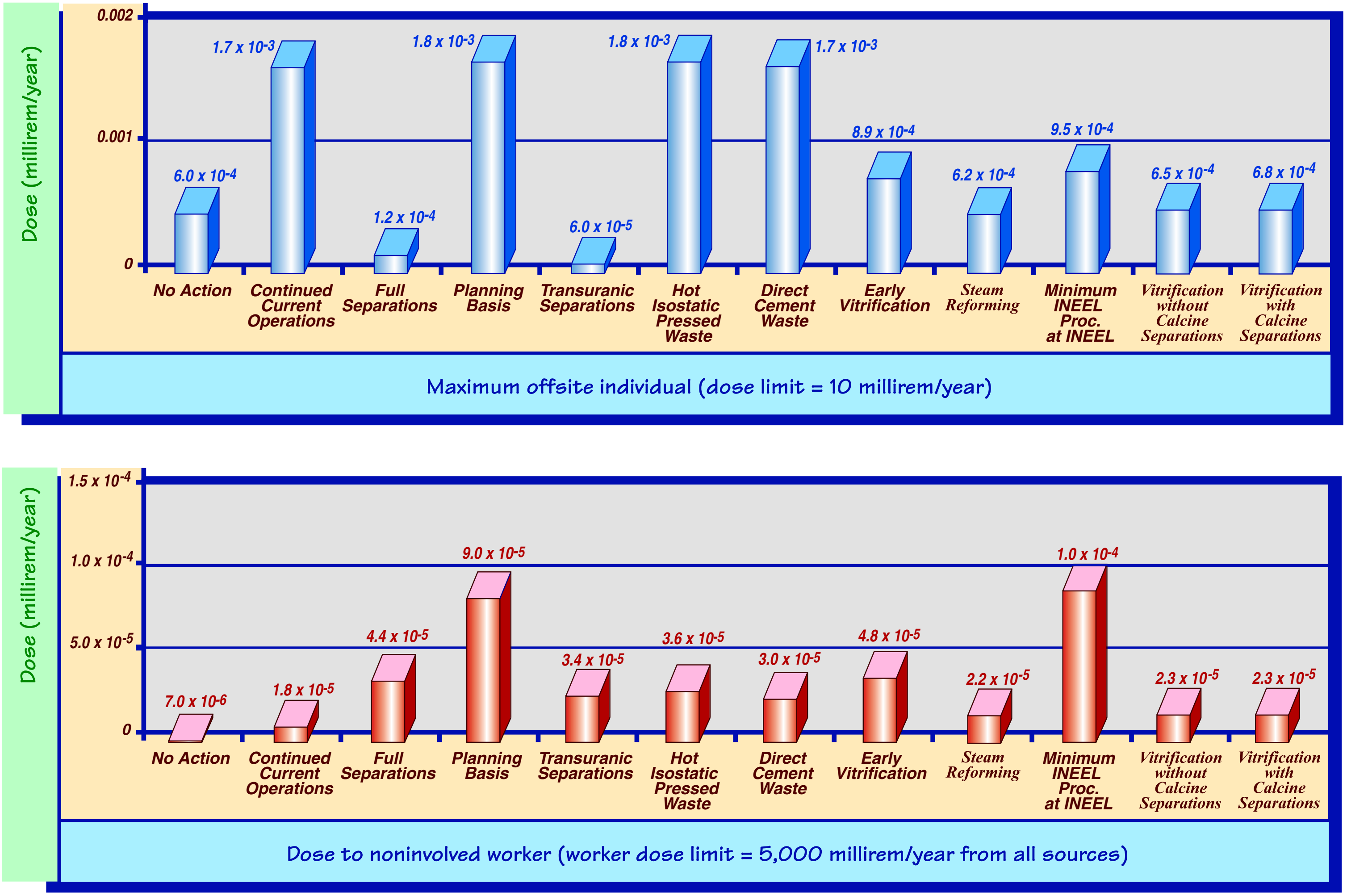


FIGURE 5.2-2. (1 of 2)
Comparison of air pathway doses by alternative.

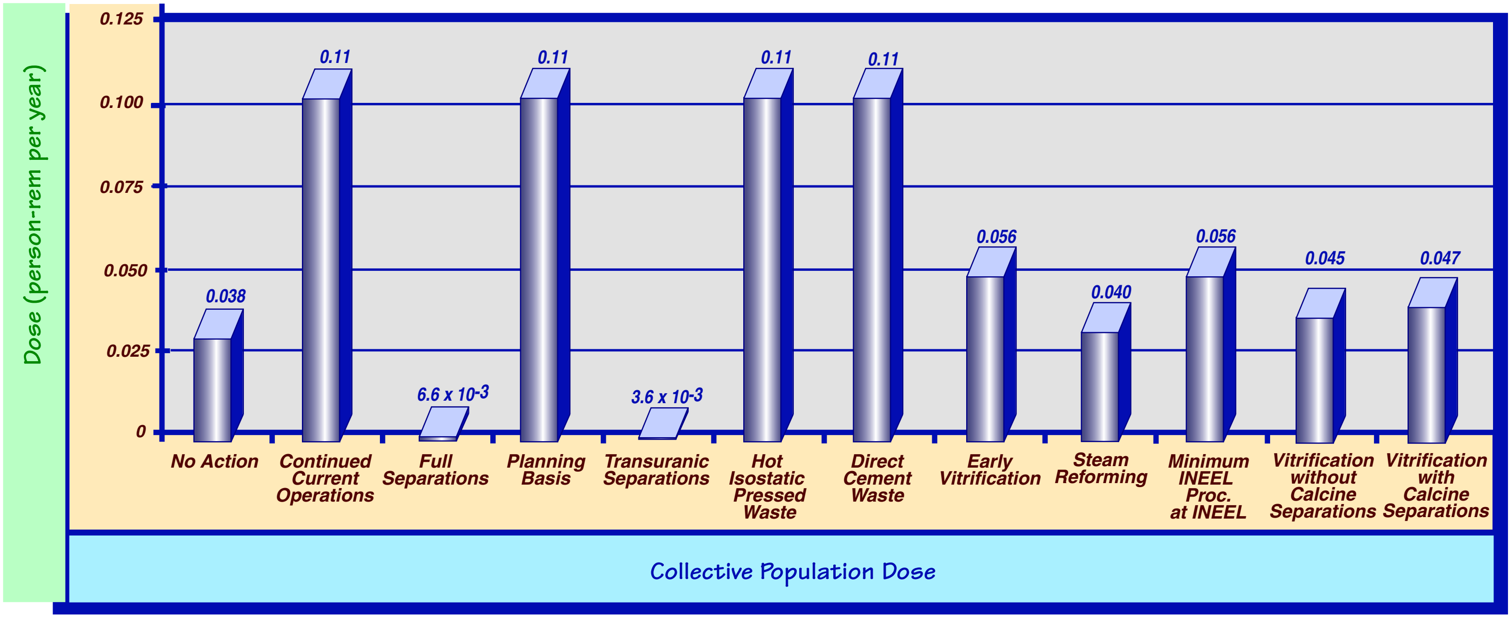


FIGURE 5.2-2. (2 of 2)
Comparison of air pathway doses by alternative.

5.2.6.4 Nonradiological Emissions and Impacts from Operations

Nonradiological pollutants would be emitted by major facilities and by fossil fuel-burning support equipment (such as boilers, water heaters, and diesel-fueled generators). Criteria and toxic air pollutant emissions have been estimated for each project based on the amount of fossil fuel that would be burned to meet the anticipated energy requirements and the characteristics of chemical processing materials and systems. Emissions are estimated from fuel consumption rates using emission factors recommended by the EPA for fuel-burning equipment (EPA 1998). Fuel usage estimates and chemical process emissions are documented in the Project Data Sheets and supporting Engineering Data Files for each project (referenced in Appendix C.6). The emission rates for individual projects estimated in this fashion are itemized in Appendix C.2, Air Resources, and are summarized in this section by alternative.

Estimated criteria and toxic air pollutant emission rates by alternative are presented in Table 5.2-8. Criteria air pollutant emission rates are presented as tons per year and are compared to the "significance level" threshold specified by the State of Idaho and the EPA. These emissions result primarily from fossil fuel combustion to produce steam needed for chemical processes and building heating, ventilation and air conditioning. Additionally, emissions result from operation of equipment with internal combustion engines, and from some chemical processing steps. In general, these emissions are lower than those required for steam production. ***In the past, a notable exception was the emission of substantial amounts of nitrogen dioxide as a byproduct of the waste calcining process; however, the waste calciner has been removed from service and would not, under the alternatives analyzed in this EIS, resume operation without upgraded emission controls.*** Although fossil fuel emissions from steam production are assigned to the specific projects which comprise the various alternatives, they would actually occur at the steam production facility. For current operations, the primary steam-producing facility is the ***CPP-606*** Service Building Power House. ***This facility, which was recently upgraded by replacing the older boilers with newer, more efficient ones with enhanced emission control, would also provide the steam required by the waste processing alternatives.***

Toxic air pollutants are produced both by fossil fuel combustion and as byproducts of chemical processing operations. DOE estimated principal carcinogenic (cancer-causing) and noncarcinogenic emissions from fuel burning using the EPA-recommended emission factors listed in Appendix C.2, Table C.2-4. Emissions from chemical processing were estimated by analyzing the material flow through processes associated with each of the alternatives (Kimmitt 1998). Toxic emission rates are listed in Appendix C.2, Tables C.2-12 and C.2-13.

DOE has performed quantitative air quality impact assessments for sources of nonradiological air pollutants, and the impacts are reported below as concentrations at a reference location, averaged over timeframes (hourly, annual, etc.) that correspond to the averaging times specified by regulatory standards. Other potential nonradiological consequences, including the potential for ozone formation, visual resource impairment, climate change (global warming), stratospheric ozone depletion, acidic deposition, and impacts on soils and vegetation are described qualitatively later in this chapter.

The primary goal of the nonradiological impact assessment is to present information which will define the maximum expected impacts while at the same time facilitate comparisons of impacts between waste processing alternatives. Toward this end, only summary information is presented, and minimal emphasis is placed on the contributions of baseline conditions which could obscure the relative impacts of alternatives. Impact results of a more comprehensive and detailed nature can be found in Appendix C.2. The results described in this section focus on the predicted maximum impacts on or around the INEEL (in terms of percentage of applicable standard) for each alternative/option. These impacts include:

- The maximum predicted criteria air pollutant concentrations at ambient air locations (INEEL boundary, public roads, and Craters of the Moon Wilderness Area), which are compared to State of Idaho Ambient Air Quality Standards

Table 5.2-8. Projected nonradiological pollutant emission rates (tons per year) for the proposed waste processing alternatives.

				Separations Alternative			Non-Separations Alternative				Minimum INEEL Processing Alternative		***Direct Vitrification Alternative***	
Pollutant	Significance Threshold[a] (tons/yr)	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	***Steam Reforming Option***	At INEEL	At Hanford	***Vitrification without Calcine Separations Option***	***Vitrification with Calcine Separations Option***
Carbon monoxide	100	1.7	8.1	21	***27***	13	10	***9.4***	***3.4***	***2.3***	***3.5***	300	***2.8***	***20***
Sulfur dioxide[b]	40	***14***	***65***	***130***	***190***	***84***	***81***	***75***	***38***	***8.7***	11	27	***28***	***150***
Particulate matter (PM-10)	25	***0.64***	1.3	4.7	***6.0***	***2.6***	***2.0***	***1.7***	***0.82***	***0.47***	***0.61***	NA[c]	***0.82***	***5.3***
Oxides of nitrogen	40	6.4	31	62	***94***	***41***	***91***	36	12	***5.1***	***6.8***	18	***9.9***	***68***
Volatile organic compounds	40	***0.093***	1.0	2.4	***3.0***	1.6	1.1	1.1	***0.15***	***0.28***	***0.48***	NA	***0.14***	***1.9***
Lead	0.6	***4.8×10^{-4}***	***7.7×10^{-4}***	***3.1×10^{-3}***	4.0×10^{-3}	***1.7×10^{-3}***	***1.3×10^{-3}***	***1.1×10^{-3}***	***6.1×10^{-4}***	***3.1×10^{-4}***	***3.7×10^{-4}***	NA	***6.1×10^{-4}***	***3.7×10^{-3}***
Total toxic air pollutants	–	***0.19***	***0.67***	***1.3***	***2.0***	***0.68***	0.90	***0.81***	***0.68***	***0.29***	***0.20***	NA	***0.48***	***1.7***

a. Significance level specified by State of Idaho ***(IDAPA 58.01.01.006.92) (IDEQ 2001)*** and the EPA ***(40 CFR 52.21(b)(23))***; net emissions increases above this level are considered "major" and are subject to additional analyses and air pollution control requirements.

b. The Draft EIS assumed 0.5 percent sulfur content of diesel boiler fuel. The Final EIS assumes 0.3 percent sulfur (as required by permit).

c. NA = Not analyzed in the TWRS EIS.

- The maximum predicted carcinogenic air pollutant concentrations at the INEEL boundary and Craters of the Moon Wilderness Area, which are compared to State of Idaho Acceptable Ambient Concentrations for Carcinogens

- The maximum predicted noncarcinogenic toxic air pollutant concentrations at ambient air locations (INEEL boundary, public roads, and Craters of the Moon Wilderness Area), which are compared to State of Idaho Acceptable Ambient Concentrations

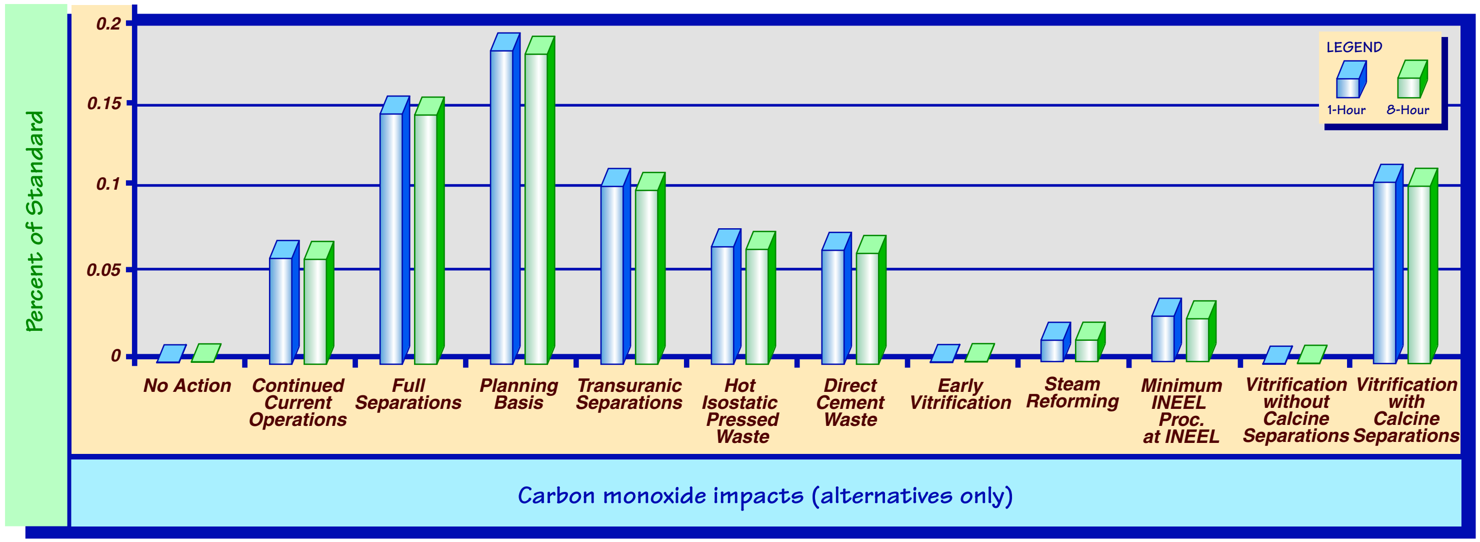
- The maximum predicted toxic air pollutant concentrations at major INEEL facility areas (e.g., INTEC and Central Facilities Area), which are compared to occupational exposure limits.

Information related to impacts at Hanford is presented in Appendix C.8. Other impacts, including regulatory compliance evaluations of the Prevention of Significant Deterioration increment consumption, impacts on visibility and vegetation, and other air quality-related values are described in Sections 5.2.6.5 and 5.2.6.6. The human health risks associated with these impacts are discussed in Section 5.2.10, Health and Safety. Cumulative impacts that consider projected future changes in air resources (i.e., in addition to baseline levels and alternative impacts), as well as impacts over the entire life cycle of the waste processing alternatives, are described in Section ***5.4.3.3.***

The analysis of waste processing alternatives assumes ***that new oil-fired boilers in the CPP-606 Power House would provide all the steam required by the waste processing alternatives. It is also assumed that the maximum sulfur content of the fuel would be 0.3% (as required by the CPP-606 permit), and that the Coal-Fired Steam Generating Facility, which is currently shut down. It should be noted that the ambient concentrations that result from criteria pollutant emissions are bounded in all cases by the maximum baseline conditions described in Section 4.7.4.2. The maximum baseline case (performed for the SNF & INEL EIS) assumes that all INEEL sources are operating, including the Coal-Fired Steam Generating Facility, the New Waste Calcining Facility and the CPP-606 Power House, emit pollutants at maximum operating capacity or at limits allowed by permits. Since the maximum steam demand projected for any of the alternatives is below the operational capacity of CPP-606, and since other major sources included in the baseline would not operate under the waste processing alternatives, the criteria pollutant emission rates and ambient concentrations are expected to be well below the maximum baseline levels described in Section 4.7.4.2. The New Waste Calcining Facility, as analyzed in this EIS, would be upgraded*** to comply with the Maximum Achievable Control Technology rule. The Maximum Achievable Control Technology upgrades are expected to reduce nitrogen dioxide emission rates to less than 1 percent of previously observed levels (Kimmitt ***1998***; DOE 1998).

Nevertheless, DOE has assessed the combined effects of emissions from existing facilities and facilities required to support the waste processing alternatives. These evaluations were performed using actual facility emissions data for 1997 and projected emission rates for facilities required to support the waste processing alternatives (Table 5.2-8)***, except that emissions from the Coal-Fired Steam Generating Facility and the New Waste Calcining Facility (without upgrades) are not included in the inventory of existing facilities.*** The projected criteria pollutant impacts are presented graphically in Figure 5.2-***3***. The charts on the top of the page show that these impacts, without consideration of baseline levels, vary somewhat by alternative but are small fractions of applicable standards in all cases. The charts on the bottom show that when the predominant effects of baseline sources are considered, there is little difference between alternatives and all levels remain well below standards.

Figure 5.2-***4*** illustrates the projected impacts of toxic air pollutant emissions. The highest impacts are projected for those options which involve the greatest amount of fossil fuel combustion, most notably those under the Separations Alternative ***as well as the Vitrification with Calcine Separations Option.***



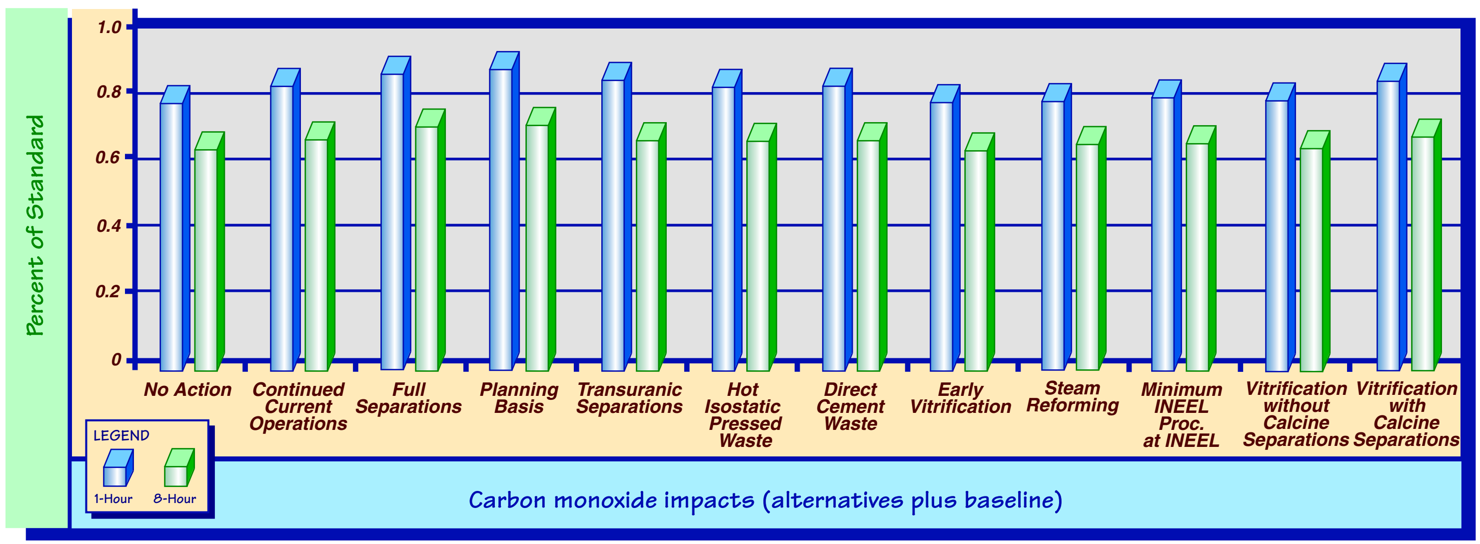
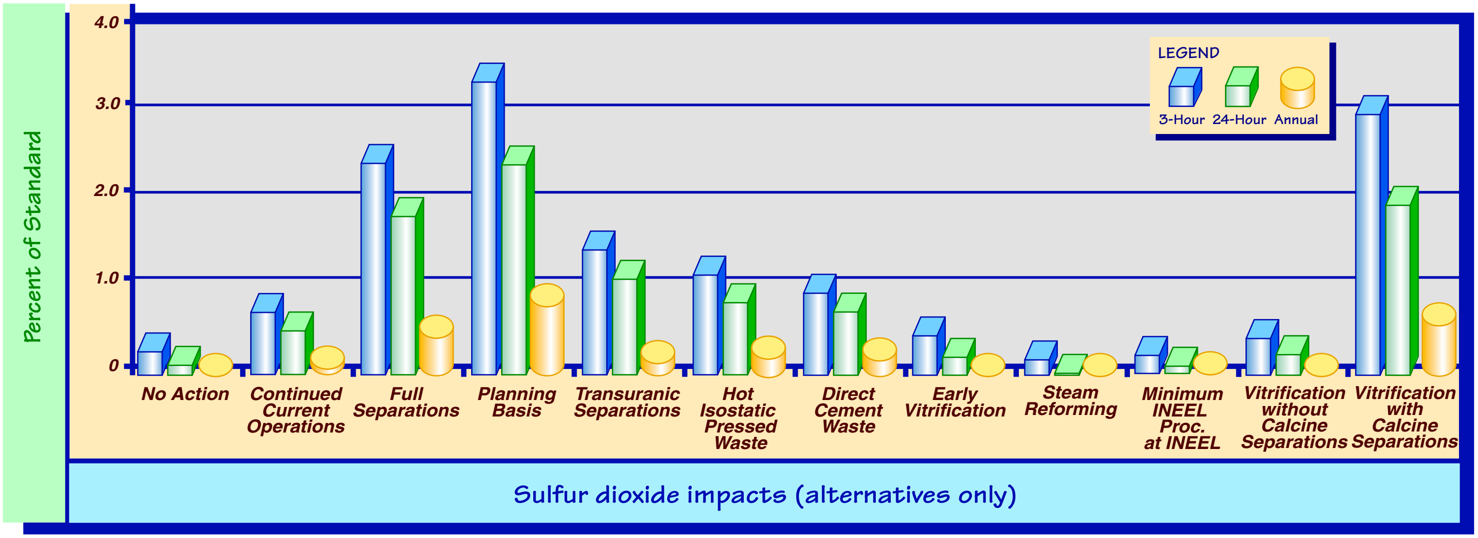


FIGURE 5.2-3. (1 of 4)
Comparison of criteria air pollutant impacts by alternative.



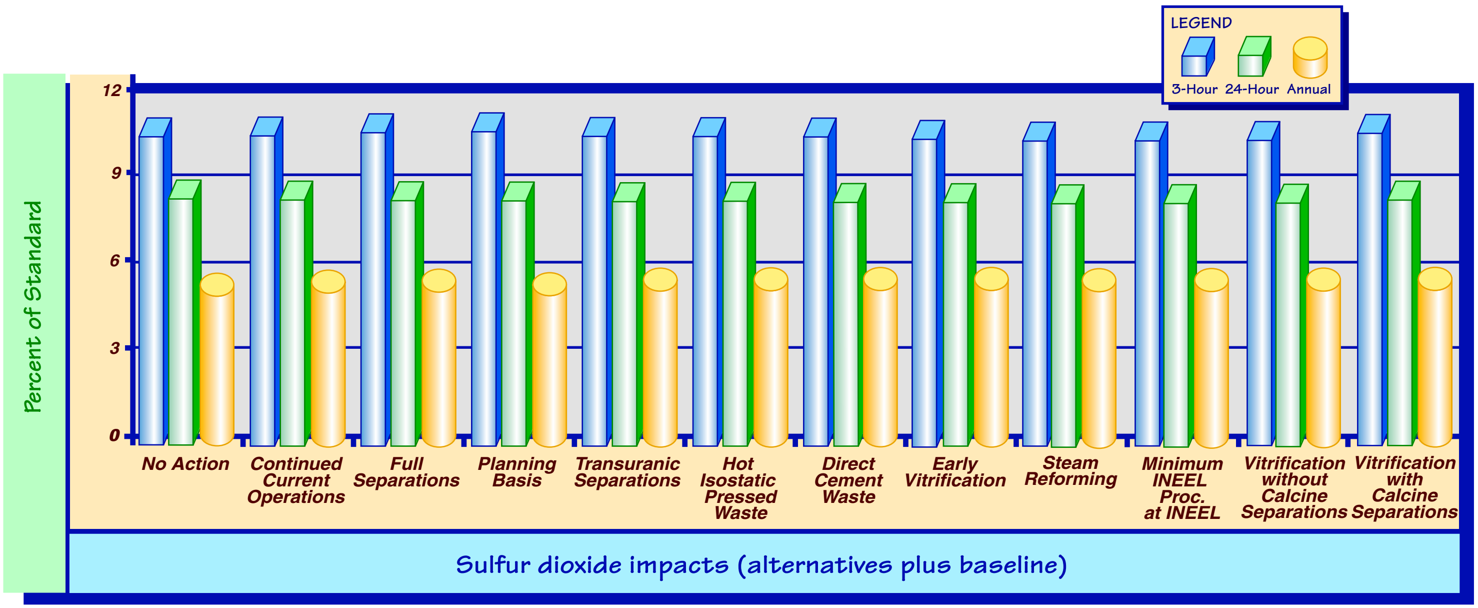


FIGURE 5.2-3. (2 of 4)
Comparison of criteria air pollutant impacts by alternative.

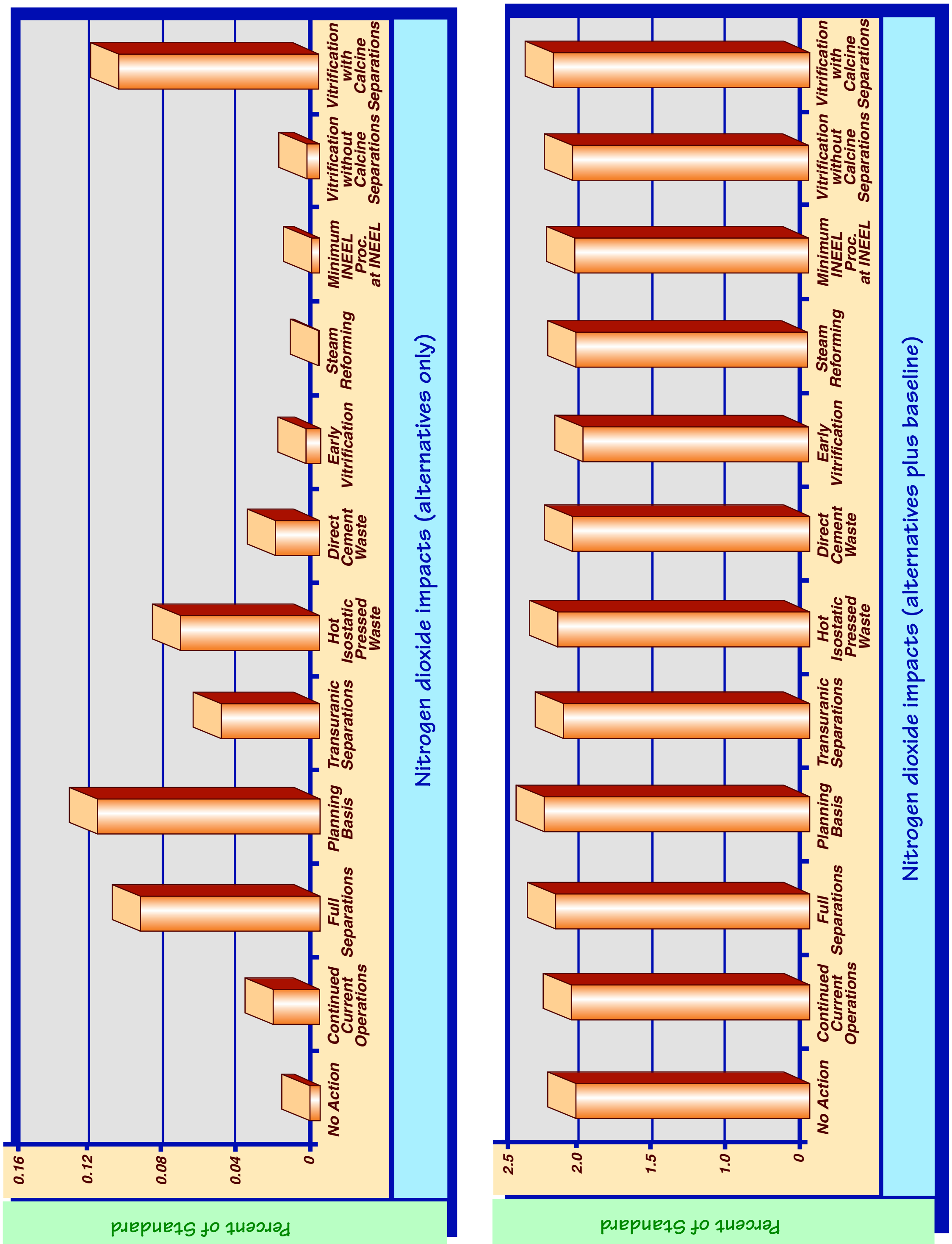
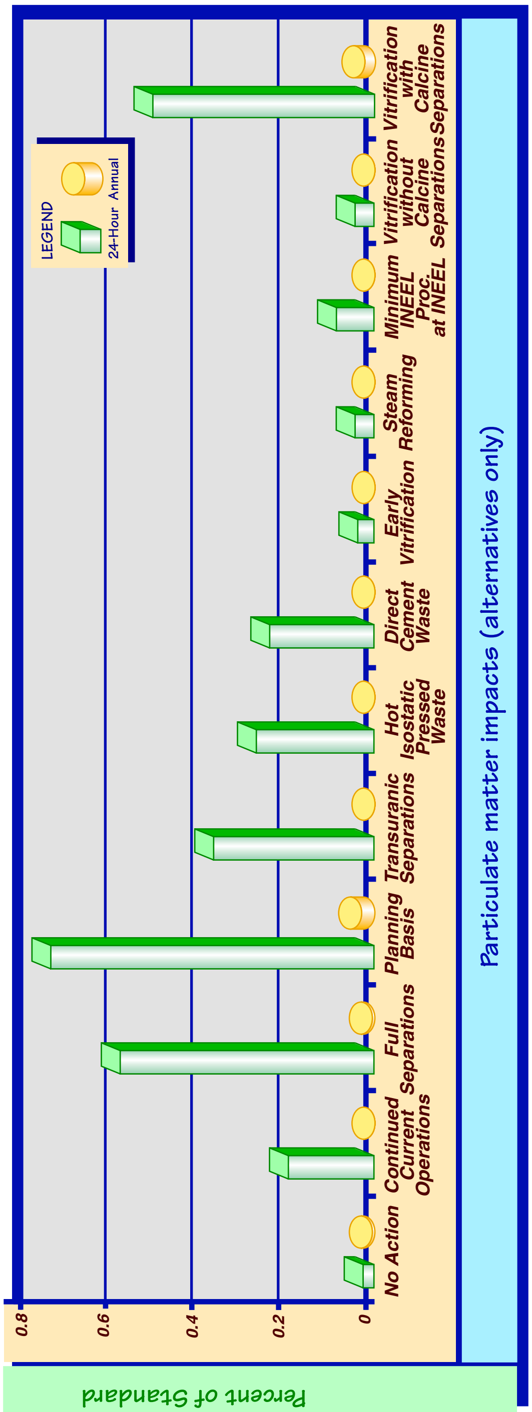


FIGURE 5.2-3. (3 of 4)
Comparison of criteria air pollutant impacts by alternative.



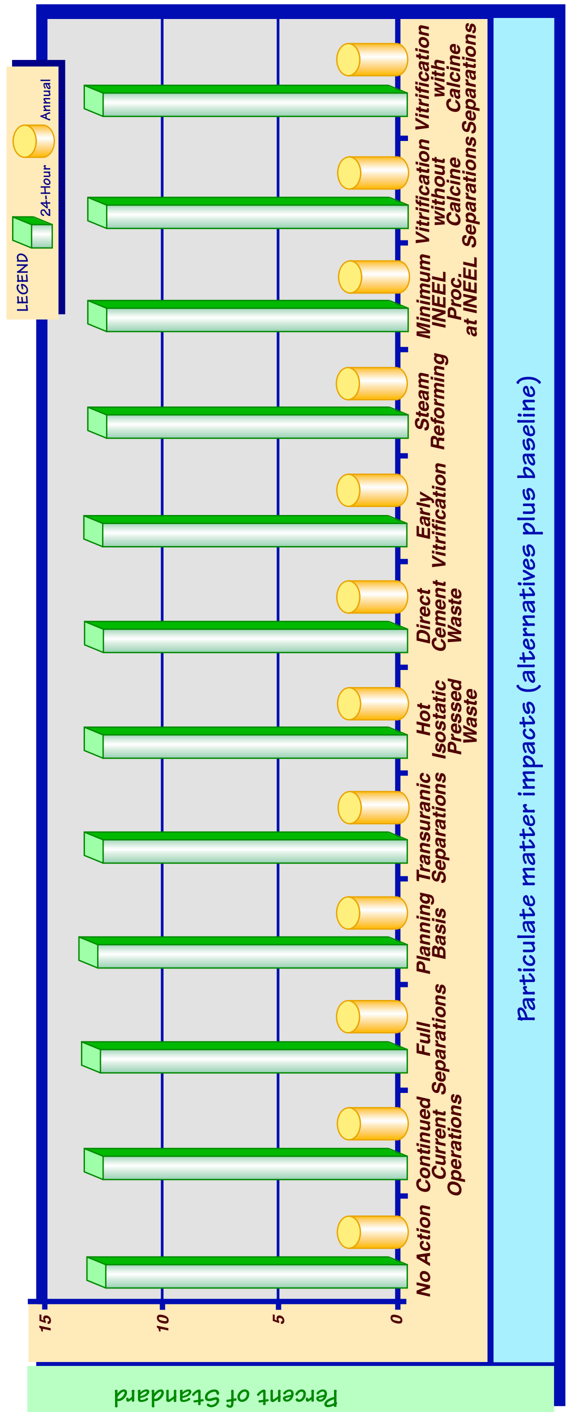


FIGURE 5.2-3. (4 of 4)
Comparison of criteria air pollutant impacts by alternative.

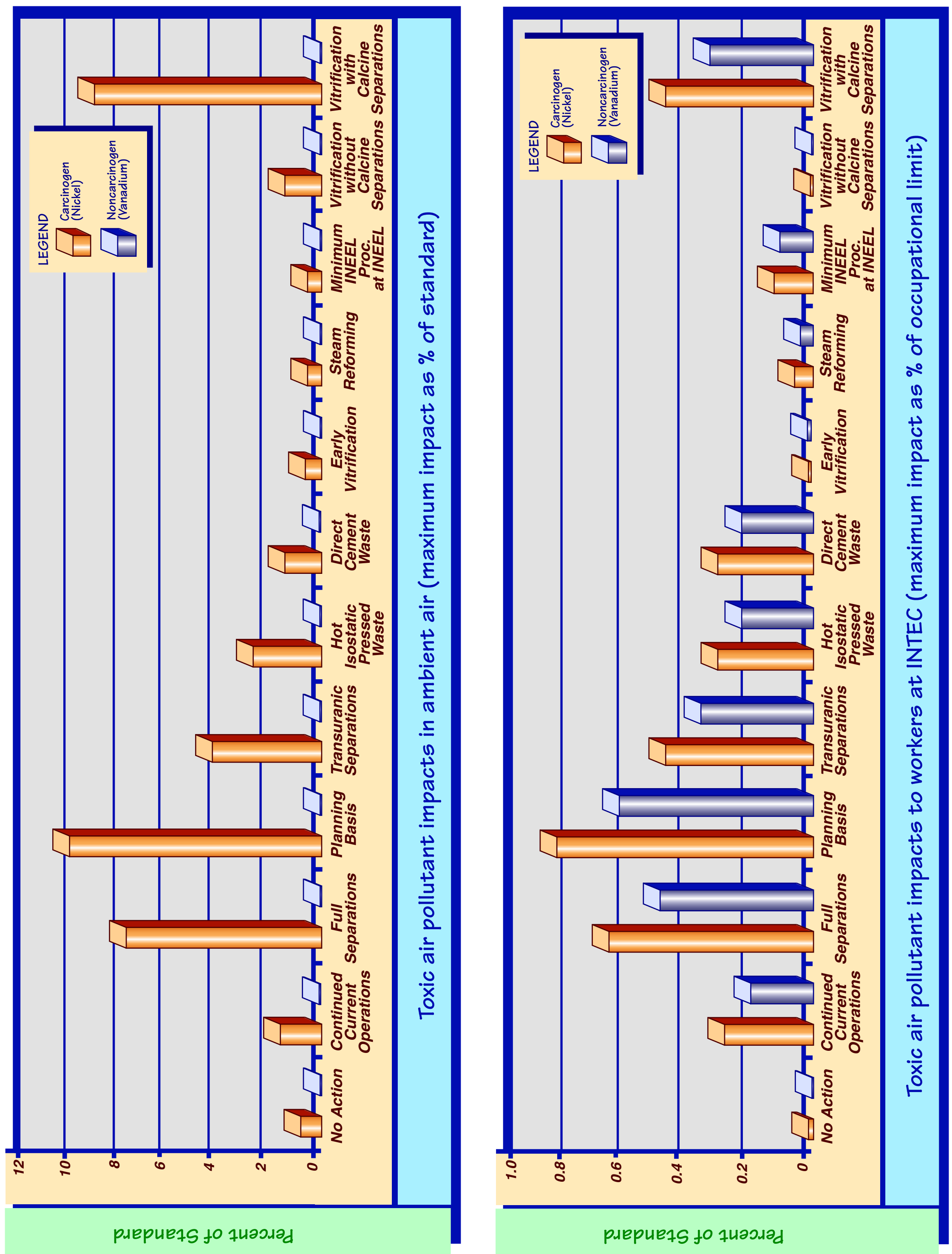


FIGURE 5.2-4.
Comparison of toxic air impacts by alternative.

The maximum carcinogenic impacts are for nickel while the highest noncarcinogenic impacts are for vanadium. Both of these substances are produced by fuel oil combustion. All levels at ambient air locations are well below applicable standards, and levels to which noninvolved INEEL workers would be exposed are small fractions of occupational exposure limits.

5.2.6.5 Prevention of Significant Deterioration Increment Consumption

Prevention of Significant Deterioration regulations (commonly referred to as PSD) require that proposed major projects or modifications, together with minor sources that become operational after PSD regulatory baseline dates are established, be assessed for their incremental contribution to increases of ambient pollutant levels. PSD regulatory requirements for the State of Idaho are specified in IDAPA 58.01.01.579-581. In essence, a proposed major project, when considered with other regulated sources in the general impact area, may not contribute to increases in pollutant levels above specified "increments." Increments for EPA Class I and II areas have been established for specific averaging times associated with concentrations of nitrogen dioxide, sulfur dioxide, and particulate matter. The INEEL area is designated Class II by PSD regulations, while the nearest Class I area is Craters of the Moon Wilderness Area. Previous PSD regulations permits for INEEL site projects have consumed a portion of the available Class I and II increments (see Section 4.7).

The degree to which waste processing options would consume additional PSD increment depends primarily on the amount of fossil fuel burning that is needed to meet project energy requirements. DOE projects that there will be negligible change in increment consumption above the levels described in Section 4.7. The levels described in Section 4.7 assume that the newly installed CPP-606 boilers operate continuously at maximum capacity; however, the energy requirements for the alternatives would not require full-time, maximum-level operation. Nevertheless, DOE has quantitatively evaluated the amount of increment consumption for the alternatives. As in the baseline PSD evaluations, DOE conducted these evaluations using both the ISCST and CALPUFF models (see Section 4.7). ISCST modeling was performed for each of the waste processing alternatives, whereas a CALPUFF simulation was performed only for a bounding case (the Planning Basis Option, which is the option with the highest projected emission rates).

Figure 5.2-5 illustrates the receptor "rings" used in the CALPUFF simulations. DOE developed the receptor rings in consultation with the National Park Service. Each ring is set at a distance from INTEC that corresponds to a portion of a Class I area of interest (Craters of the Moon Wilderness Area and Yellowstone and Grand Teton National Parks). Results for PSD increment consumption estimated by the ISCST modeling are presented in Table 5.2-9, while the CALPUFF simulation results are presented in Table 5.2-10. All projected concentrations at INEEL road and boundary locations, Craters of the Moon Wilderness Area, and Yellowstone and Grand Teton National Parks are well within allowable increments. Despite the differences between these two models, the results obtained for Craters of the Moon (the only area assessed by both models) are similar.

For Class II areas (ISCST results), there are only very minor differences between the alternatives. There are no noticeable differences, for example, in sulfur dioxide increment consumption between the alternatives. That is because most of the sulfur dioxide increment consumption to date is associated with projects in the vicinity of Test Area North and these locations are only minimally affected by emissions from sources at INTEC. It should also be noted that nitrogen dioxide increment consumption for the alternatives is less than the baseline level reported in Table 4-14. This is due to the inclusion of the New Waste Calcining Facility calciner emissions in the baseline. The calciner, which is by far the largest source of nitrogen dioxide emissions at the INEEL, is currently in standby. Nevertheless, it was included in a recent air quality permitting action, which is used as the PSD baseline in this EIS.

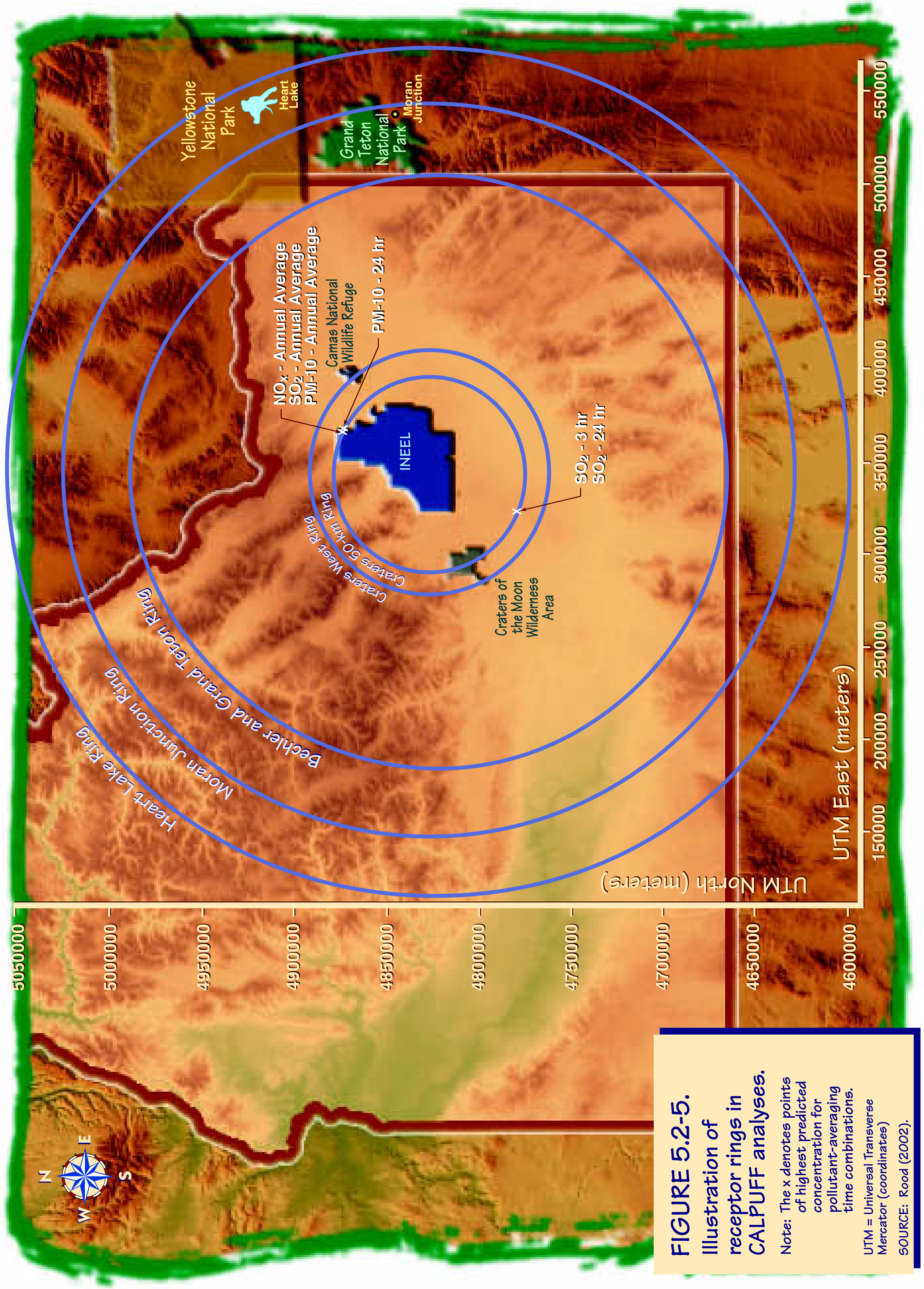


FIGURE 5.2-5.
Illustration of receptor rings in CALPUFF analyses.

Note: The x denotes points of highest predicted concentration for pollutant-averaging time combinations.

UTM = Universal Transverse Mercator (coordinates)

SOURCE: Rood (2002).

Table 5.2-9. PSD increment consumption for the combined effects of baseline sources, waste processing alternatives, and other planned future projects.[a,b]

		Highest percentage of allowable PSD increment consumed												
				Separations Alternative			Non-Separations Alternative				Minimum INEEL Processing Alternative		Direct Vitrification Alternative	
Pollutant	Averaging time	No Action Alternative	Continued Current Operations Alternative	Full Separations Option	Planning Basis Option	Transuranic Separations Option	Hot Isostatic Pressed Waste Option	Direct Cement Waste Option	Early Vitrification Option	Steam Reforming Option	At INEEL	At Hanford	Vitrification without Calcine Separations Option	Vitrification with Calcine Separations Option
Class I area (Craters of the Moon)[c]														
Sulfur dioxide	3-hour	26%	27%	29%	31%	28%	28%	27%	26%	26%	26%	NA	26%	29%
	24-hour	34%	35%	38%	40%	36%	36%	36%	34%	34%	34%	NA	34%	38%
	Annual	4.1%	4.3%	4.9%	5.2%	4.5%	4.5%	4.4%	4.2%	4.0%	4.1%	NA	4.2%	5.1%
Particulate matter	24-hour	6.9%	6.9%	7.0%	7.0%	6.9%	6.9%	6.9%	6.9%	6.9%	6.9%	NA	6.9%	7.0%
	Annual	0.42%	0.43%	0.44%	0.44%	0.43%	0.43%	0.43%	0.42%	0.42%	0.42%	NA	0.42%	0.44%
Nitrogen dioxide	Annual	5.0%	5.1%	5.3%	5.5%	5.2%	5.6%	5.2%	5.0%	5.0%	5.0%	NA	5.0%	5.3%
Class II area (INEEL boundary and public roads)														
Sulfur dioxide	3-hour	31%	31%	31%	32%	31%	31%	31%	31%	31%	31%	NA	31%	32%
	24-hour	38%	38%	38%	38%	38%	38%	38%	38%	38%	38%	NA	38%	38%
	Annual	21%	21%	21%	21%	21%	21%	21%	21%	21%	21%	NA	21%	21%
Particulate matter	24-hour	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%	NA	39%	39%
	Annual	2.5%	2.5%	2.5%	2.6%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	NA	2.5%	2.6%
Nitrogen dioxide	Annual	7.3%	7.4%	7.8%	8.0%	7.6%	7.7%	7.6%	7.4%	7.3%	7.4%	NA	7.3%	7.9%

a. Assumes that steam for operation of projects associated with the waste processing alternatives is provided by recently installed CPP-606 boilers that are regulated under PSD; baseline emissions do not include those from the Coal-Fired Steam Generating Facility, which would not operate under this scenario.

b. Assessed using ISCST-3.

c. Includes the eastern boundary of Craters of the Moon Wilderness Area, which is the portion of the Class I area located closest to INTEC.

PSD = Prevention of Significant Deterioration; NA = Not analyzed in the TWRS EIS.

Table 5.2-10. PSD increment consumption at Class I Areas beyond 50 kilometers from INTEC for the combined effects of baseline sources and the Planning Basis Option.[a,b]

	Highest percentage of allowable PSD increment consumed					
	Sulfur dioxide			*Particulate matter*		*Nitrogen dioxide*
	3-hour	*24-hour*	*Annual*	*24-hour*	*Annual*	*Annual*
Craters of the Moon[c]	*29*	*45*	*10*	*5.5*	*0.75*	*6.2*
Yellowstone National Park	*9.2*	*10*	*1.3*	*1.7*	*0.11*	*0.29*
Grand Teton National Park	*8.9*	*10*	*1.3*	*1.7*	*0.11*	*0.29*

a. Source: Rood (2002).
b. Assessed using CALPUFF.
c. Includes only that part of Craters of the Moon National Monument and Wilderness Area that is 50 kilometers or more from INTEC.
PSD = Prevention of Significant Deterioration.

It should be noted that the CALPUFF results represent the maximum values at any point on the receptor ring, regardless of direction. As Figure 5.2-5 shows, the maximum amount of 3-hour sulfur dioxide increment is consumed within Craters of the Moon; however, maximum consumption of other increments occurs in directions that do not correspond to Class I area locations.

For radiological PSD assessments, the projected radiation dose to the maximally exposed offsite individual is about 0.002 millirem per year for the options involving calcining of mixed transuranic waste/SBW and management of mixed transuranic waste (newly generated liquid waste and Tank Farm heel waste). In all cases, the projected dose is well below the significance level of 0.1 millirem per year.

5.2.6.6 Other Air-Quality-Related Values

The air resources assessments of waste processing alternatives included an evaluation of projected impacts with respect to other air quality related values, including (a) potential for ozone formation, (b) degradation of visibility at Craters of the Moon Wilderness Area and Fort Hall Indian Reservation, (c) impacts to soil and vegetation, (d) impacts due to secondary growth (indirect or induced impacts), (e) stratospheric ozone depletion, (f) acidic deposition, (g) global warming, and (h) secondary particulate matter formation. The findings of these assessments are identified below and detailed in Appendix C.2.

Ozone Formation - The Clean Air Act designates ozone as a criteria air pollutant and establishes a National Ambient Air Quality Standard of 0.12 parts per million (235 micrograms per cubic meter) for a 1-hour averaging period. Recently, a more restrictive ozone standard of 0.08 parts per million for an 8-hour averaging time has been promulgated, and this new standard will apply at the INEEL. Ozone, unlike the other criteria pollutants, is not emitted directly from facility sources but is formed in the atmosphere through photochemical reactions involving nitrogen oxides and volatile organic compounds (also referred to as non-methane hydrocarbons). Therefore, the regulation of ozone is affected by the control of emissions of ozone-producing compounds or precursors, that is, nitrogen oxides and volatile organic compounds. Under the fuel-burning scenario assumed for air analysis, some of the waste ***processing alternatives*** would exceed the non-methane volatile organic compound significance level established by the State of Idaho.

Visibility Degradation - ***Emissions of fine particulate matter, sulfur dioxide and nitrogen dioxide can result in an impairment of visual resources. For this EIS, DOE used the VISCREEN program (a conservative, screening-level model) to evaluate the relative potential for visibility impacts between waste processing alternatives. That analysis includes a quantitative assessment of contrast and color shift parameters and comparison of results against numerical criteria which define potential objectionable impacts. The views analyzed were at Craters of the Moon Wilderness Area and Fort***

Hall Indian Reservation. The results of the visibility analysis indicate that emissions from each of the waste processing alternatives would not result in deleterious impacts on scenic views at Craters of the Moon Wilderness Area or Fort Hall Indian Reservation.

DOE also conducted evaluations using the CALPUFF model (Scire et al. 1999). This model is especially well suited for impact evaluations involving distances greater than 50 kilometers, and is specifically recommended by the National Park Service for impact studies at Class I areas. DOE used CALPUFF in the screening mode of operation to estimate visibility degradation at Yellowstone National Park, Grand Teton National Park, and that portion of Craters of the Moon National Monument and Wilderness Area that is more than 50 kilometers from INTEC. The CALPUFF model is more comprehensive than VISCREEN in that it includes algorithms to model the chemical conversion of SO_2 and SO_4, and also accounts for the effects of relative humidity. The CALPUFF visibility model estimates maximum 24-hour average light extinction changes. The acceptability criterion for this parameter is 5 percent.

As with the PSD increment consumption analysis described previously, DOE conducted CALPUFF visibility analysis only for the Planning Basis Option, which is the bounding case. Under this option, the maximum 24-hour light extinction change is 8.4 percent during eight days in the 5-year modeling period, which exceeds the 5 percent acceptance criterion. These conditions occurred in the Craters of the Moon Receptor Ring, with two of the eight occurrences within or in close proximity to Craters of the Moon National Monument and Wilderness Area. There were no exceedances of the 5 percent acceptance criterion at the Yellowstone or Grand Teton National Park receptor rings.

Impacts to Soils and Vegetation - Due to the relatively minor increases in ambient criteria pollutant concentrations, no impacts to local soils or vegetation, including the local sagebrush vegetation community, grazing habitats, or distant agricultural areas, are expected. The National Park Service has issued interim guidelines for protection of sensitive resources relative to air quality concerns (DOI 1994). ***For the combined effects of the Planning Basis Option and existing INEEL sources, the projected concentrations of sulfur dioxide and nitrogen dioxide at Craters of the Moon National Monument and Wilderness Area would not exceed 3 percent of the National Park Service guidelines.***

The State of Idaho has established air quality standards intended to limit the concentration of fluoride in vegetation used for feed and forage. Monitoring of fluoride levels would be required unless analysis shows that fluoride concentrations in ambient air, averaged over 24-hour periods, would not exceed 0.25 micrograms per cubic meter. Fluoride emission rates would be highest under the Planning Basis Option. The maximum 24-hour averaged level at any grazing area within or beyond the INEEL boundary is estimated at less than 0.003 micrograms per cubic meter, or about 1 percent of the monitoring threshold. ***Although*** these levels do not include contributions from baseline or other sources, it can be reasonably concluded that fluoride levels in feed and forage would be within the Idaho standards for any of the alternatives. The state may or may not require monitoring to ensure compliance with these standards.

Impacts Due to Secondary Growth - Only minor growth in employee population would result from the construction and operation of the facilities associated with the proposed waste processing alternatives/options. This growth is not expected to be of a magnitude which could result in any air quality impacts due to general commercial, residential, industrial, or other growth.

Stratospheric Ozone Depletion - The 1990 amendments to the Clean Air Act address the protection of stratospheric ozone through a phaseout of the production and sale of certain stratospheric ozone-depleting substances. Ozone-depleting substances would be produced or emitted by the proposed waste processing facilities in very small quantities, and there would be no effect on stratospheric ozone depletion.

Acidic Deposition - Emissions of sulfur and nitrogen compounds and, to a lesser extent, other pollutants including volatile organic compounds, contribute to a phenomenon known as acidic deposition. One form of acidic deposition is commonly referred to as acid rain. Under the Planning Basis Option, emissions of sulfur dioxide from combustion of fuel oil (with an assumed sulfur content of ***0.3*** percent by weight) could reach levels of about ***190*** tons per year, while emissions of nitrogen dioxide could reach about 90 tons per year. Emissions would be similar or less under other options (***Table 5.2-8***). These estimates do not represent net increases in emissions; rather, they are based on the assumption that No. 2 diesel fuel would be burned to produce steam at ***the CPP-606 boiler facility***. Minor amounts of sulfuric and nitric acids would also be emitted. Emissions of the magnitude projected are not expected to contribute significantly to acidity levels in precipitation in the region nor would they have effects over greater distances, such as may occur with very tall stacks associated with large utility power plants. ***DOE used CALPUFF simulations to estimate the maximum amount of total sulfur and nitrogen deposition that would occur at Craters of the Moon National Monument and Wilderness Area under the bounding case. The National Park Service interim guidelines for total sulfur deposition is 20 milli-equivalents per square meter per year, which is about 3 kilograms per hectare per year. Under the bounding case of the Planning Basis Option plus existing sources, total sulfur deposition at Craters of the Moon is estimated at 1 kilogram per hectare per year, or about one-third the guideline value (Rood 2002). A similar guideline of 3 kilograms per hectare per year has been used by the U.S. Forest Service (USDA 1992) for total nitrogen deposition in Class I areas. The nitrogen deposition at Craters of the Moon for the bounding case described above is estimated at 0.15 kilograms per hectare per year, or about 5 percent of the guideline (Rood 2002). Thus, the amount of acidic deposition that would result under any of the alternatives is well below the levels established for protection of sensitive plant species.***

Global Warming - Emissions of carbon dioxide, methane, nitrogen oxides, and chlorofluorocarbons (commonly known as greenhouse gases) are associated with potential for atmospheric global warming. Of these, carbon dioxide is by far the most significant greenhouse gas emitted in the U.S. The greatest carbon dioxide emission rates for waste processing alternatives – about ***6***0,000 tons per year – would be experienced for operation of facilities under the Planning Basis Option. This level represents a very small part (***roughly*** 0.001 percent) of total U.S. carbon dioxide emissions, which are over 5.5 billion tons per year (USA 1997). Methane, which is present in emissions of unburned hydrocarbons, is also an important greenhouse gas. As in the case of carbon dioxide, maximum annual methane emissions under any of the waste processing alternatives would be a small part of the annual U.S. emissions (about 0.1 tons vs. 34 million tons).

Secondary Particulate Matter Formation - The emissions data and evaluation results presented earlier in this section included data and results for particulate matter. Those data and results apply only to "primary" particulate matter, which refers to particles directly emitted to the atmosphere in particulate form. Particulate matter may be formed in the atmosphere from reactions between gas-phase precursors in the exhaust stream, and this is referred to as "secondary" particulate matter. This secondary particulate matter can either form new particles or add particulate matter to pre-existing particles. Secondary particulate matter is usually characterized by small particle sizes and thus can make up a significant fraction of very fine particulate matter (i.e., particulate matter with a particle size less than 2.5 microns, for which standards ***have not yet*** been implemented).

Predicting the amount of secondary particulate matter formation is difficult. Secondary particulate matter usually takes several hours or days to form, and the resultant concentrations are not necessarily proportional to the amount of precursors emitted (STAPPA and ALAPCO 1996). Of the pollutants that are expected to exist in waste processing facility exhaust streams, sulfur dioxide and nitrogen oxides are precursors for some types of secondary particles. Air pollution program officials have used values of 10 percent for the conversion of gaseous sulfur dioxide into secondary sulfate aerosol, and 5 percent for conversion of gaseous nitrogen oxides into secondary nitrate aerosol (STAPPA and ALAPCO 1996). If conversion values of this magnitude are assumed for projected waste management alternatives, considering the relatively long time required for conversion, the previously described particulate matter-related impacts (i.e., consumption of PSD regulations increment at Craters of the Moon or around the INEEL, and compliance with 24-hour and annual average ambient standards) would increase by no more than a few percent. Since all projected concentrations are well below applicable ambient air quality standards, increases of this magnitude would not alter the regulatory compliance status of ***the proposed waste processing*** alternatives.

5.2.6.7 Air Resource Impacts from Alternatives Due to Mobile Sources

The ambient air quality impacts at offsite receptor locations due to the INEEL bus fleet operations, INEEL fleet light- and heavy-duty vehicles, privately owned vehicles, and heavy-duty commercial vehicles servicing the INEEL site facilities were assessed in the SNF & INEL EIS. The mobile source impacts associated with the proposed waste processing alternatives are bounded by those associated with the Preferred Alternative described in the SNF & INEL EIS. The assessment in that EIS indicated that the Preferred Alternative would result in some minor increase in service vehicles and employee vehicles, especially during construction activities. The peak cumulative impacts (baseline plus future projects) were due almost entirely to existing traffic conditions and were found to be well below applicable standards. The proposed waste processing alternatives in the Idaho HLW & FD EIS are expected to have little or no impact on traffic volume at the INEEL and would produce only a small increase in vehicular-induced air quality impacts.