sets. This alternative would require some topsoil for revegetation, but would require minimal amounts of soil for backfilling.

5.3.4 AIR RESOURCES

Activities associated with the ultimate disposition of HLW ***management*** facilities would result in potential impacts on air resources in the INEEL region. Two categories of disposition are considered. The first involves the dispositioning of the various proposed new facilities that are required to support the waste processing alternatives. The second category embraces all the existing facilities as grouped in Table 3-***3***. For each category, DOE has characterized impacts that would result from the dispositioning of each facility according to candidate cleanup criteria. These impacts are described in terms of total airborne emissions, radiation dose to onsite and offsite receptors, and maximum nonradiological pollutant concentrations at onsite and offsite locations. This section presents summaries of emissions estimates and impact assessments. Additional detail, including emissions of individual facilities (or groups of similar facilities), is provided in Appendix C.2. The methods used to estimate emissions are consistent with those used for operational and construction emissions, and are described Appendix C.2.

5.3.4.1 Proposed New Facilities Associated with Waste Processing Alternatives

DOE has estimated the radionuclide and nonradiological pollutant emissions that would result from the dispositioning of proposed new facilities required to support the waste processing alternatives. These emissions are temporary in nature and would persist for a few (1 to 4) years following the operating lifetime of individual facilities. Table 5.3-4 summarizes the annual and cumulative release estimates by waste processing alternative (see Appendix C.2 for emissions for individual projects). ***Table 5.3-5*** compares criteria pollutant and fugitive dust emissions by alternative. In general, radionuclide emission levels from dispositioning of facilities would be much lower than those that would result from operating the involved facilities. Exceptions would be those facilities that process or store waste in sealed form (such as packaging or interim storage facilities), which would have little or no operational emissions. Figure 5.3-***1*** summarizes the radiation doses that would be associated with these emissions. In all cases, doses would be exceedingly low and very small fractions of natural background levels and applicable standards. ***(The applicable offsite dose limit is 10 millirem per year, as specified in 40 CFR 61.92; the occupational standard that applies to onsite doses is 5,000 millirem per year, as specified in 10 CFR 835.202.)*** Nonradiological impacts are illustrated in Figures 5.3-***2*** (for criteria pollutants) and 5.3-***3*** (for toxic air pollutants). When baseline levels are added to projected nonradiological impacts, criteria pollutant levels would remain well below applicable standards ***(IDAPA 58.01.01.577)*** for all alternatives. Toxic air pollutant levels would also well below reference levels ***(IDAPA 58.01.01.585-586)*** for all alternatives.

Table 5.3-4. Summary of annual and cumulative emissions from disposition of facilities that would be constructed under the waste processing alternatives.

	Maximum annual emission rate and total project emissions [a]									
	Radionuclides [b]		Criteria pollutants [c]		Toxic air pollutants		Carbon dioxide[d]		Fugitive dust	
Alternative	Curies per year	Curies	Tons per year	Tons	Pounds per year	Pounds	Tons per year	Tons	Tons per year	Tons
No Action Alternative	–	–	–	–	–	–	–	–	–	–
Continued Current Operations Alternative	1.2×10^{-7}	2.3×10^{-7}	150	200	170	230	3.3×10^{3}	4.4×10^{3}	35	51
Separations Alternative										
Full Separations Option[e]	3.5×10^{-7}	8.2×10^{-7}	490	1.1×10^{3}	550	1.3×10^{3}	1.1×10^{4}	2.5×10^{4}	480	1.1×10^{3}
Planning Basis Option[e]	4.1×10^{-7}	1.1×10^{-6}	590	1.3×10^{3}	680	1.4×10^{3}	1.3×10^{4}	2.8×10^{4}	190	480
Transuranic Separations Option[f]	2.9×10^{-7}	5.9×10^{-7}	410	840	460	960	9.0×10^{3}	1.8×10^{4}	420	890
Non-Separations Alternative										
Hot Isostatic Pressed Waste Option	2.3×10^{-7}	7.0×10^{-7}	430	900	490	1.0×10^{3}	9.4×10^{3}	2.0×10^{4}	180	650
Direct Cement Waste Option	2.3×10^{-7}	5.8×10^{-7}	480	990	550	1.1×10^{3}	1.1×10^{4}	2.2×10^{4}	230	610
Early Vitrification Option	1.9×10^{-7}	5.4×10^{-7}	390	1.1×10^{3}	440	1.3×10^{3}	8.5×10^{3}	2.4×10^{4}	140	460
Steam Reforming Option	2.5×10^{-7}	4.1×10^{-7}	***160***	***250***	***190***	***290***	3.6×10^{3}	5.5×10^{3}	***83***	***160***
Minimum INEEL Processing Alternative[g]	3.5×10^{-7}	8.1×10^{-7}	450	820	510	940	9.9×10^{3}	1.8×10^{4}	410	860
Direct Vitrification Alternative										
Vitrification without Calcine Separations Option	2.9×10^{-7}	7.3×10^{-7}	***360***	1.1×10^{3}	***410***	1.2×10^{3}	8.0×10^{3}	2.4×10^{4}	***160***	***510***
Vitrification with Calcine Separations Option	4.0×10^{-7}	1.1×10^{-6}	***490***	1.4×10^{3}	***560***	1.6×10^{3}	1.1×10^{4}	3.1×10^{4}	***210***	***650***

a. Maximum annual emissions represent the highest emission rate for any single year; total emissions value is the product of annual emissions for each decontamination and decommissioning project and the duration (in years) of that project. Source: Project Data Sheets (Appendix C.6).

b. Radionuclide emissions would consist primarily of strontium-90/yttrium-90 and cesium-137, with much smaller amounts of transuranic isotopes (plutonium, americium, etc.).

c. See ***Table*** 5.3-***5*** for emissions of individual criteria pollutants.

d. Carbon dioxide is listed because this gas has been implicated in global warming.

e. Assumes disposal of low-level waste Class A type grout either offsite or in new INEEL landfill facility; impacts of disposal in Tank Farm and bin sets are addressed in Table 5.3-***6***.

f. Assumes disposal of low-level waste Class C type grout in new facility; impacts of disposal in Tank Farm and bin sets are addressed in Table 5.3-***6***.

g. Assumes "just-in-time" shipping scenario; nonradiological emissions impacts of the interim storage shipping scenario would be somewhat less.

Table 5.3-5. Comparison of criteria pollutant emission rates (tons/year) for disposition of facilities associated with the waste processing alternatives.

Alternative	Sulfur dioxide	Particulate matter	Carbon monoxide	Nitrogen dioxide	Volatile organic compounds
No Action Alternative	0	0	0	0	0
Continued Current Operations Alternative	10	3.7	66	56	12
Separations Alternative					
Full Separations Option	34	12	220	190	39
Planning Basis Option	42	15	260	230	47
Transuranic Separations Option	29	10	180	160	32
Non-Separations Alternative					
Hot Isostatic Pressed Waste Option	30	11	190	160	34
Direct Cement Waste Option	34	12	210	180	38
Early Vitrification Option	27	10	170	150	31
Steam Reforming Option	12	4.1	73	63	13
Minimum INEEL Processing Alternative	24	8.3	150	130	27
Direct Vitrification Alternative					
Vitrification without Calcine Separations Option	25	9.0	160	140	29
Vitrification with Calcine Separations Option	35	12	220	190	39

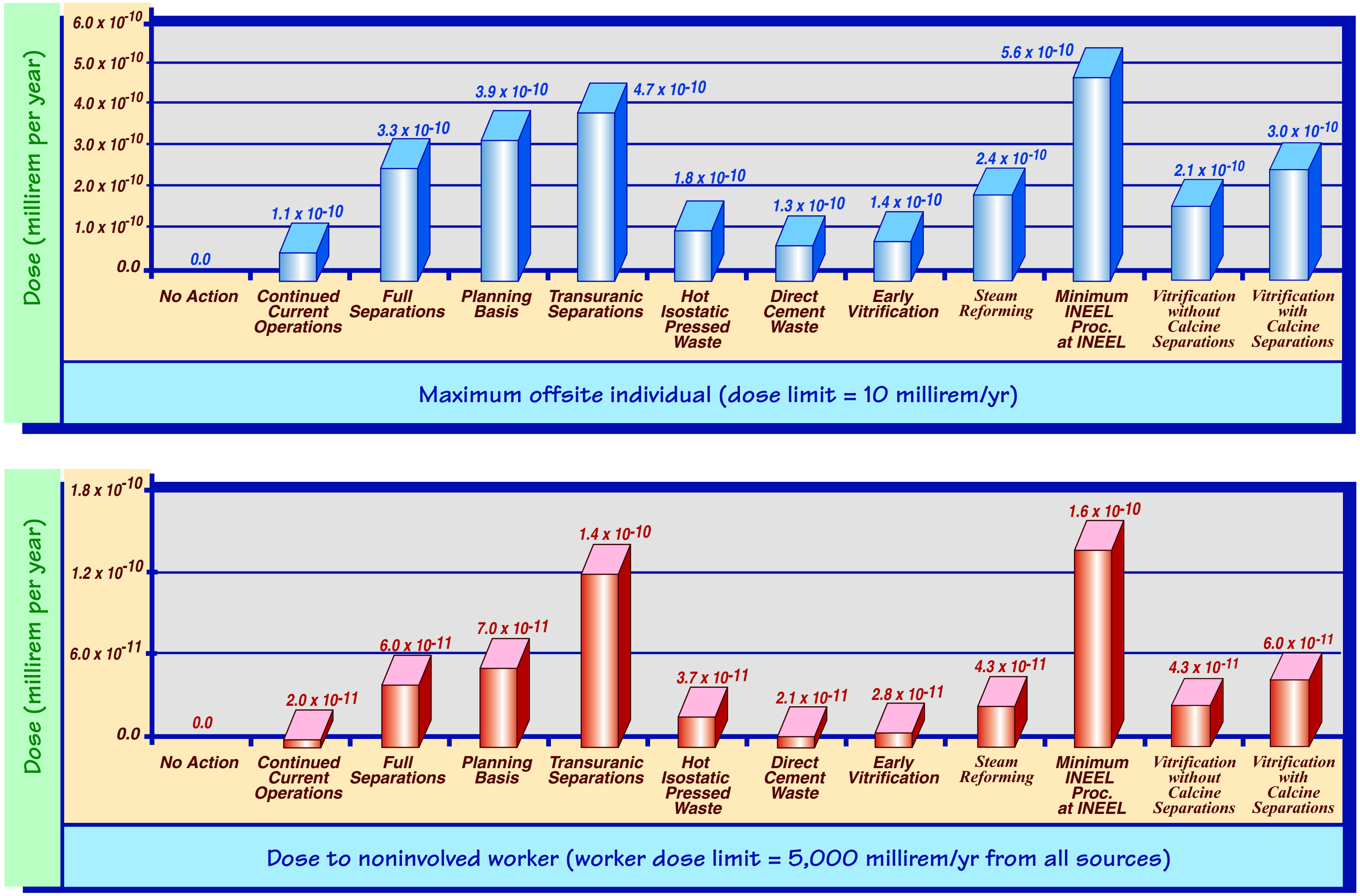


FIGURE 5.3-*1*. (1 of 2)
Comparison of air pathway doses for disposition of facilities associated with waste processing alternatives.

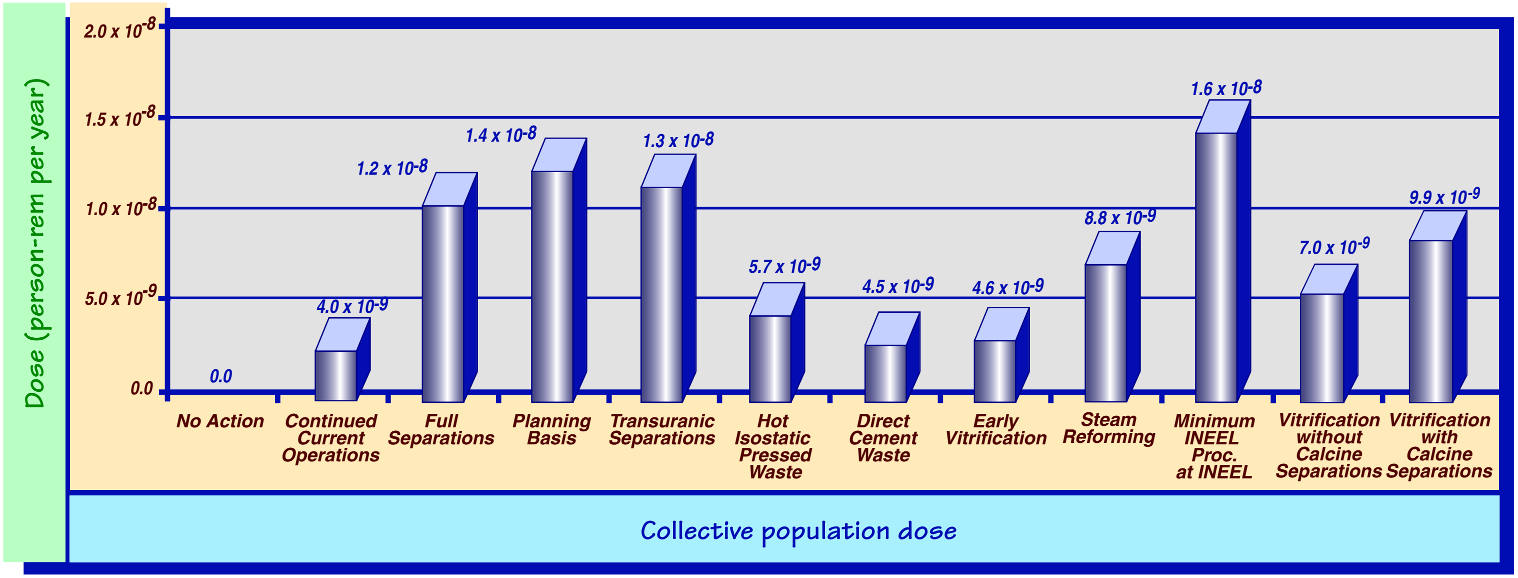
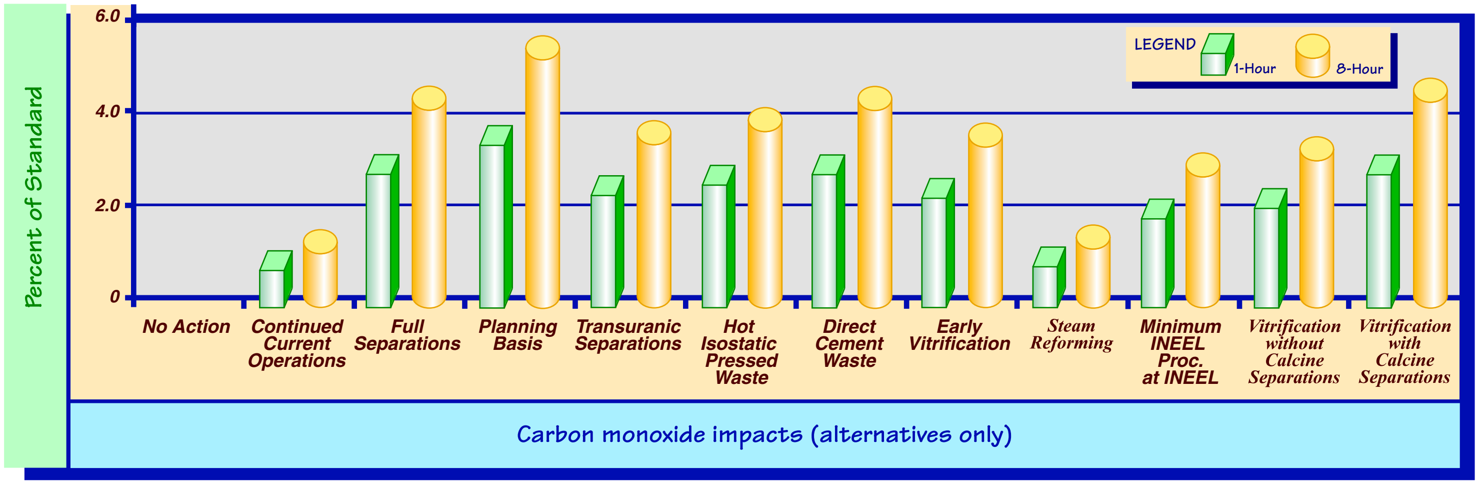


FIGURE 5.3-1. (2 of 2)
Comparison of air pathway doses for disposition of facilities associated with waste processing alternatives.



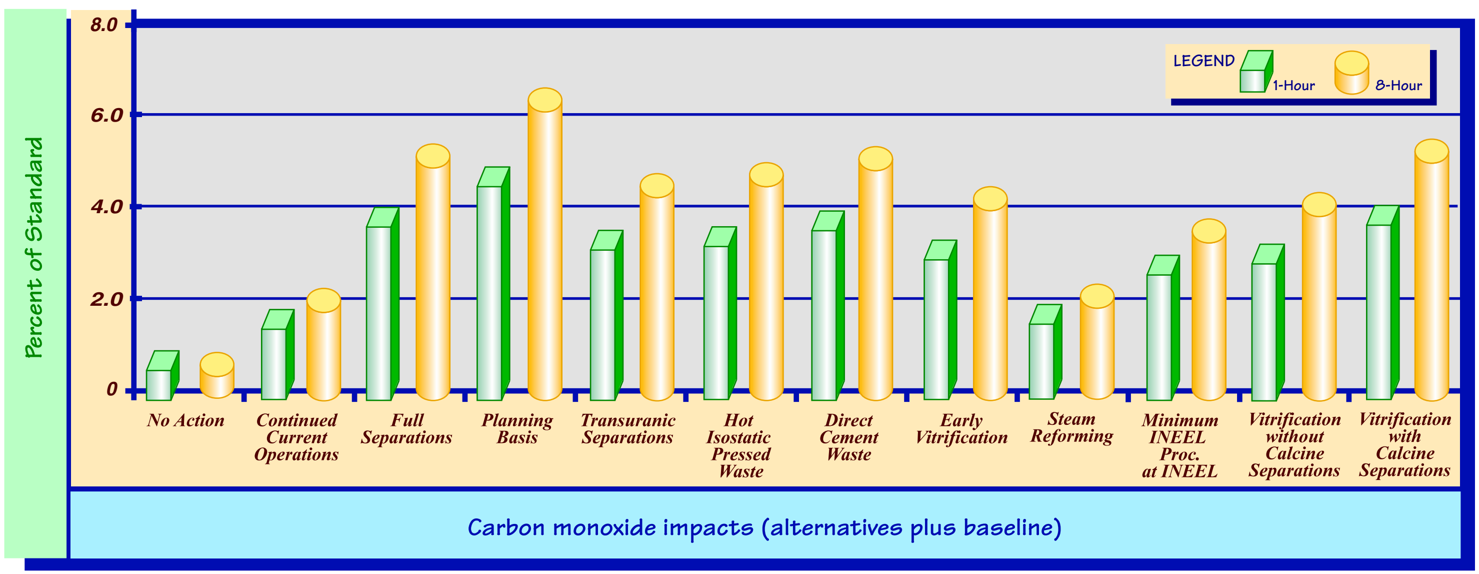
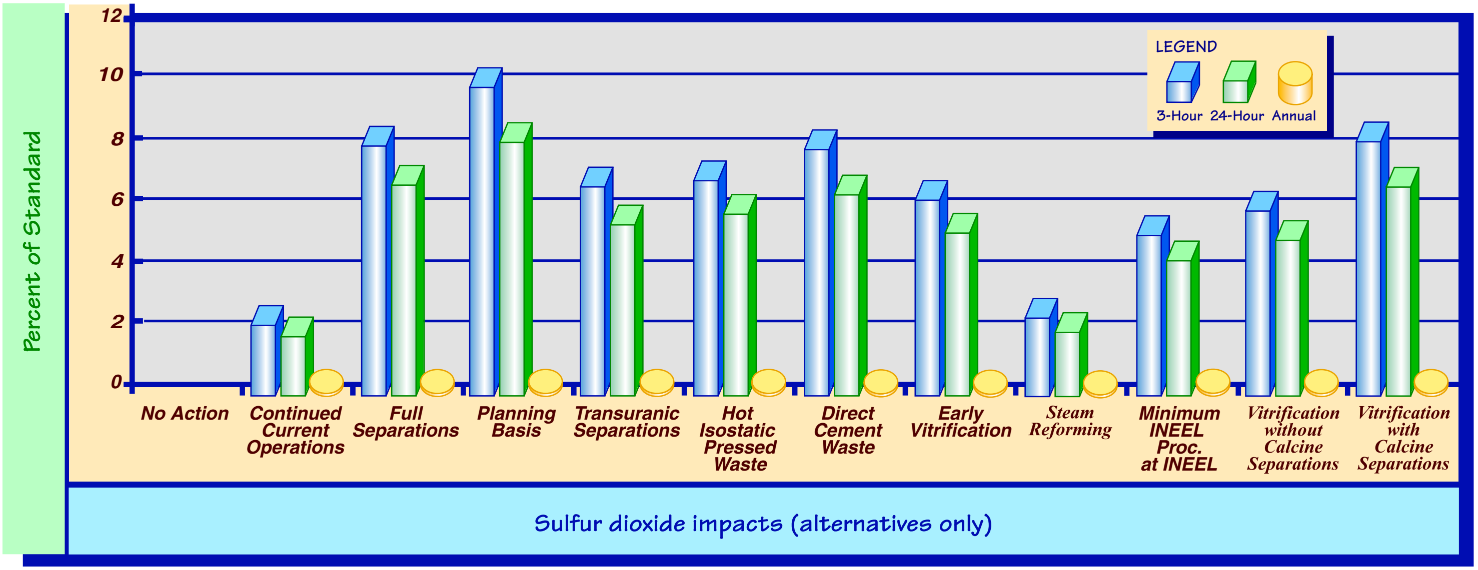


FIGURE 5.3-2. (1 of 4)
Comparison of criteria air pollutant impacts for disposition of facilities associated with waste processing alternatives.



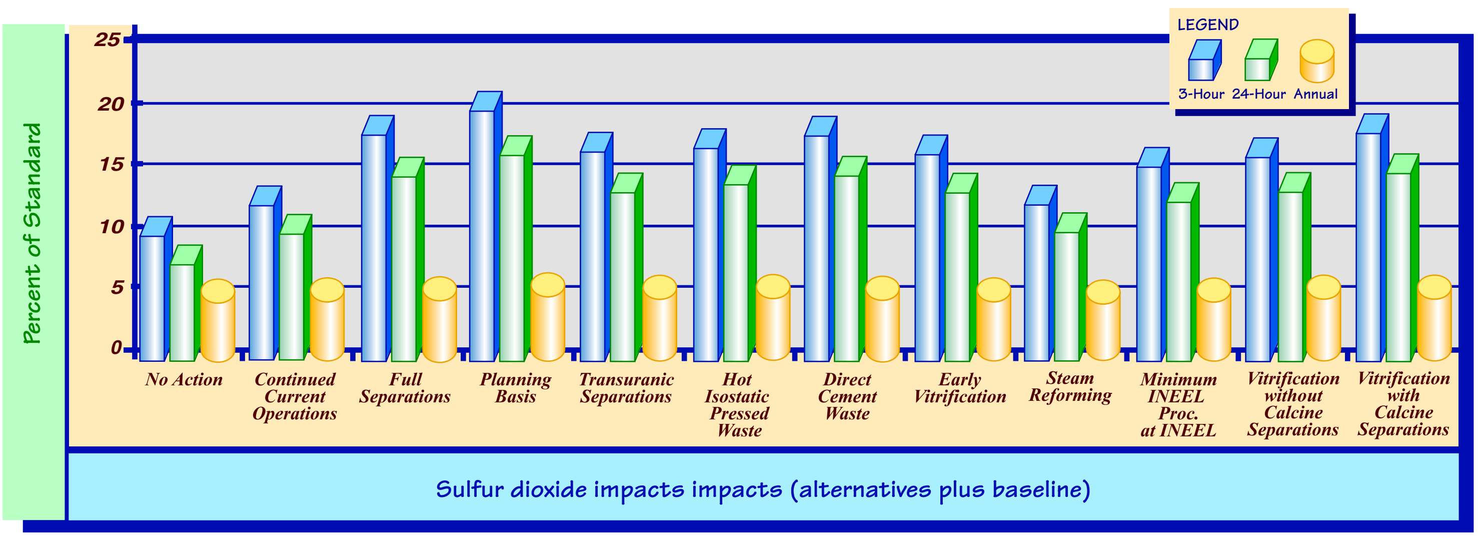
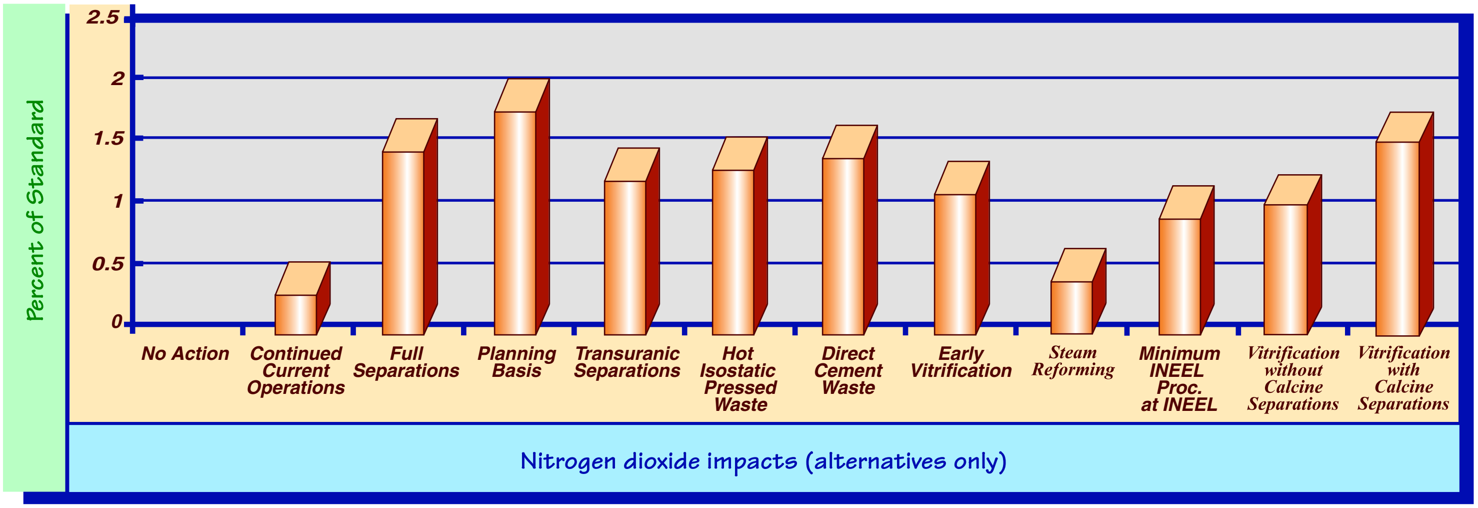


FIGURE 5.3-2. (2 of 4)
Comparison of criteria air pollutant impacts for disposition of facilities associated with waste processing alternatives.



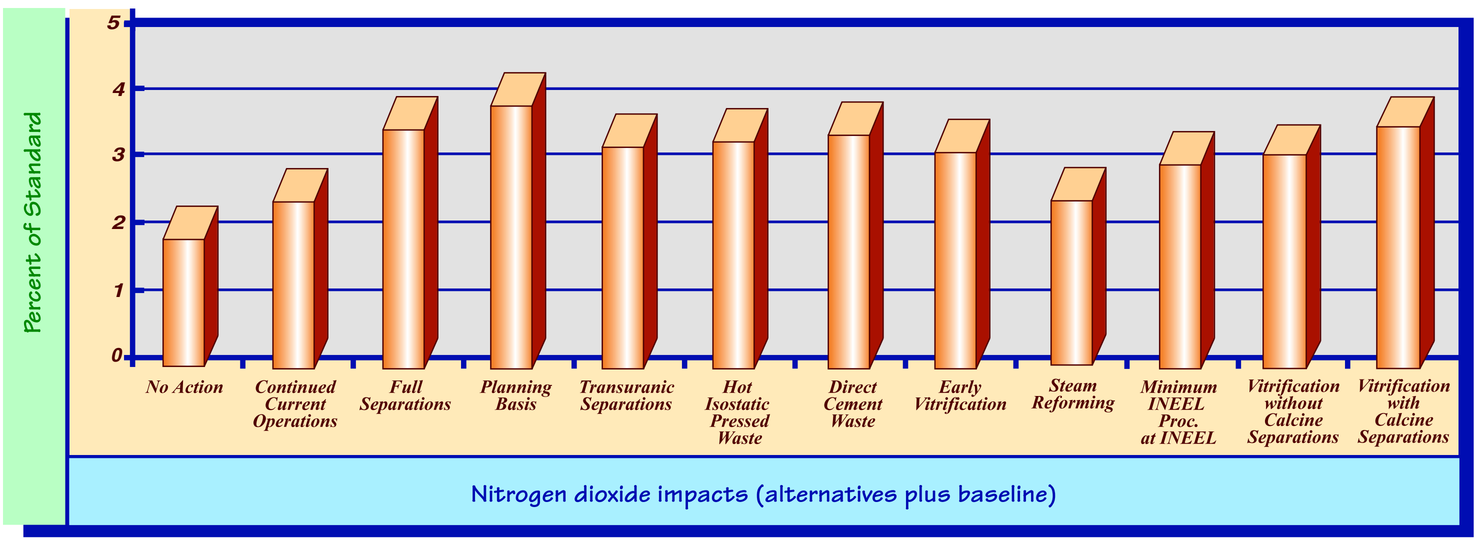
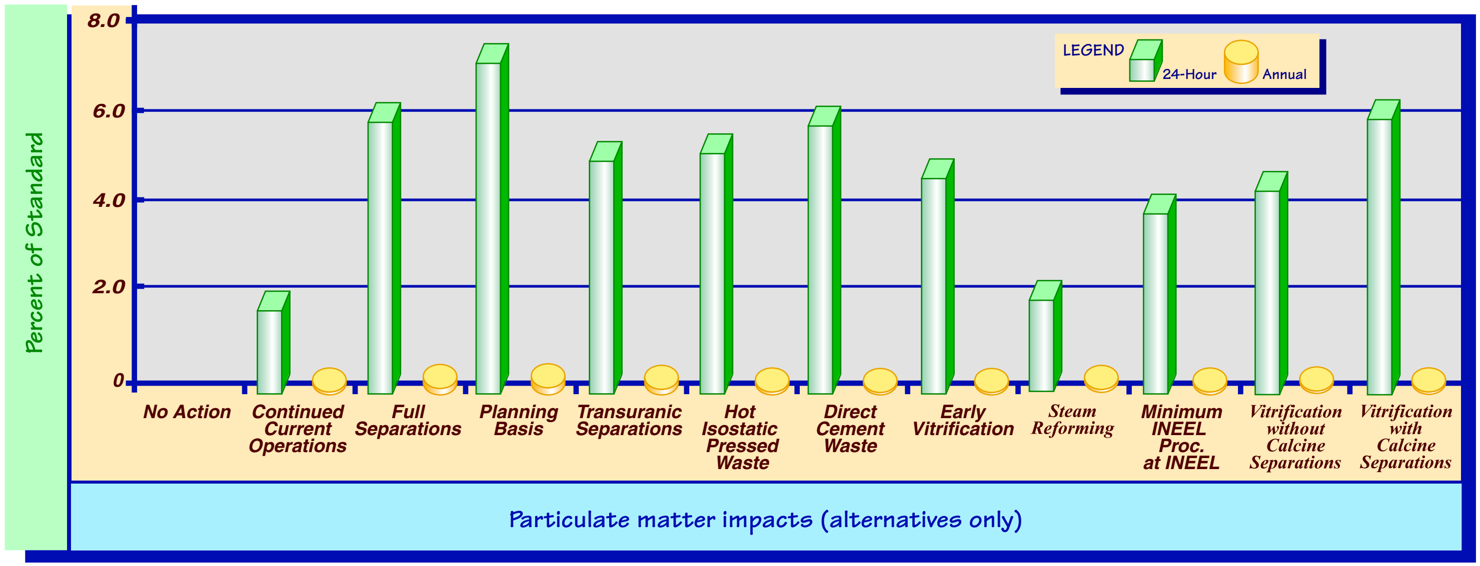


FIGURE 5.3-2. (3 of 4)
Comparison of criteria air pollutant impacts for disposition of facilities associated with waste processing alternatives.



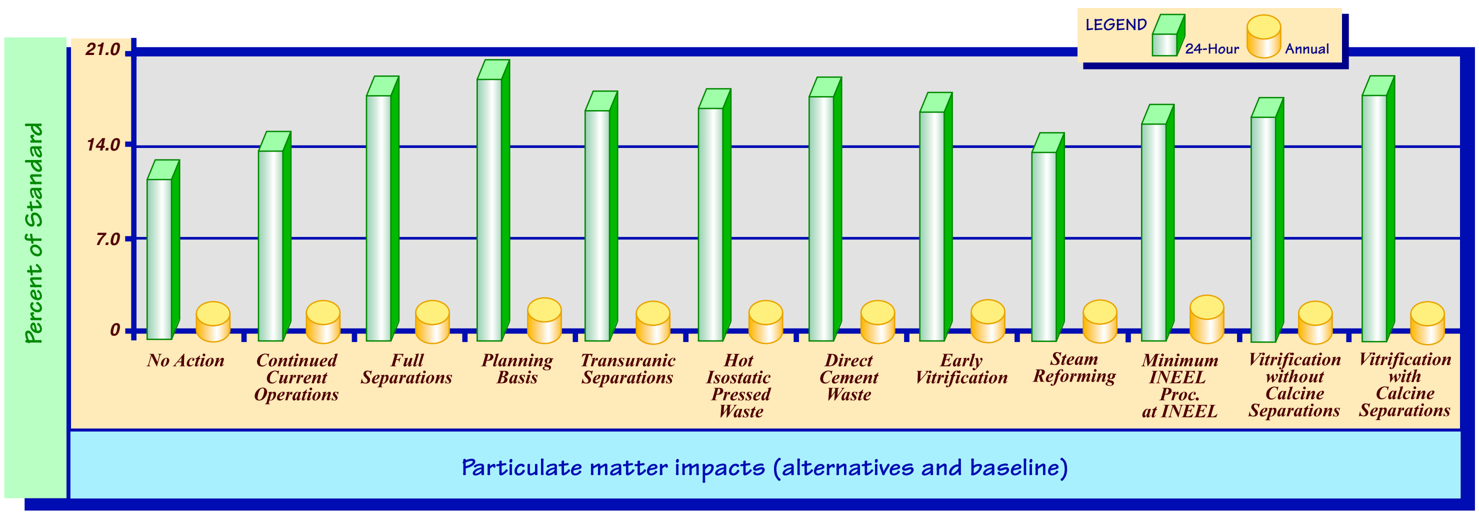
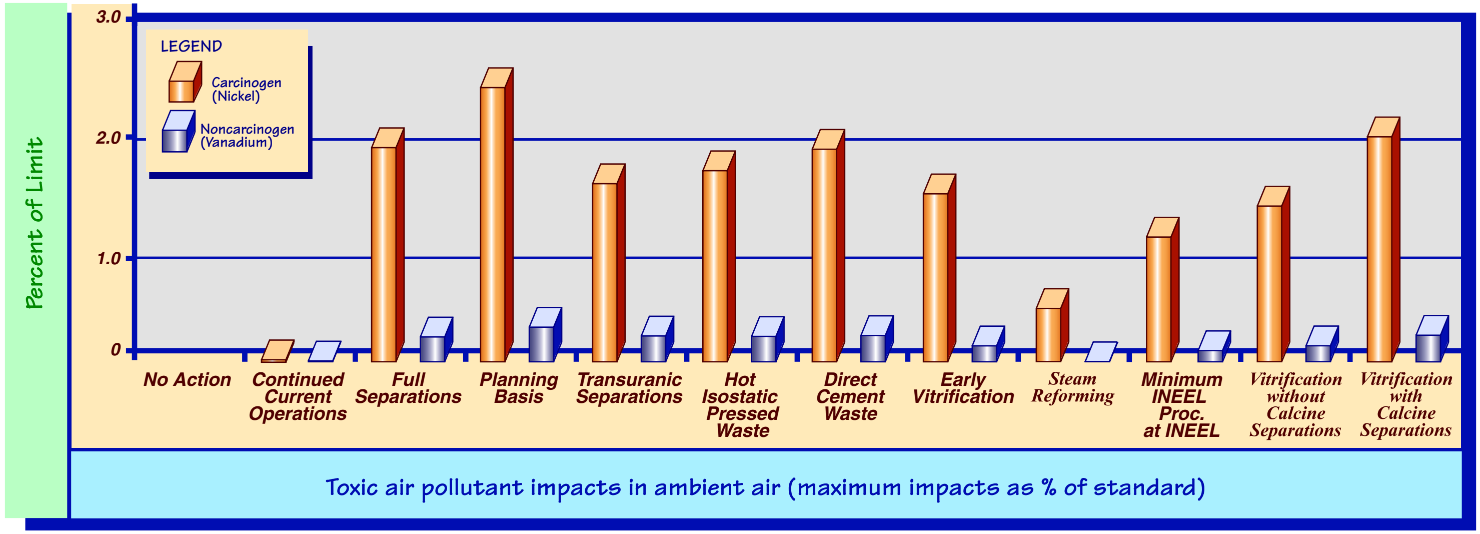


FIGURE 5.3-2. (4 of 4)
Comparison of criteria air pollutant impacts for disposition of facilities associated with waste processing alternatives.



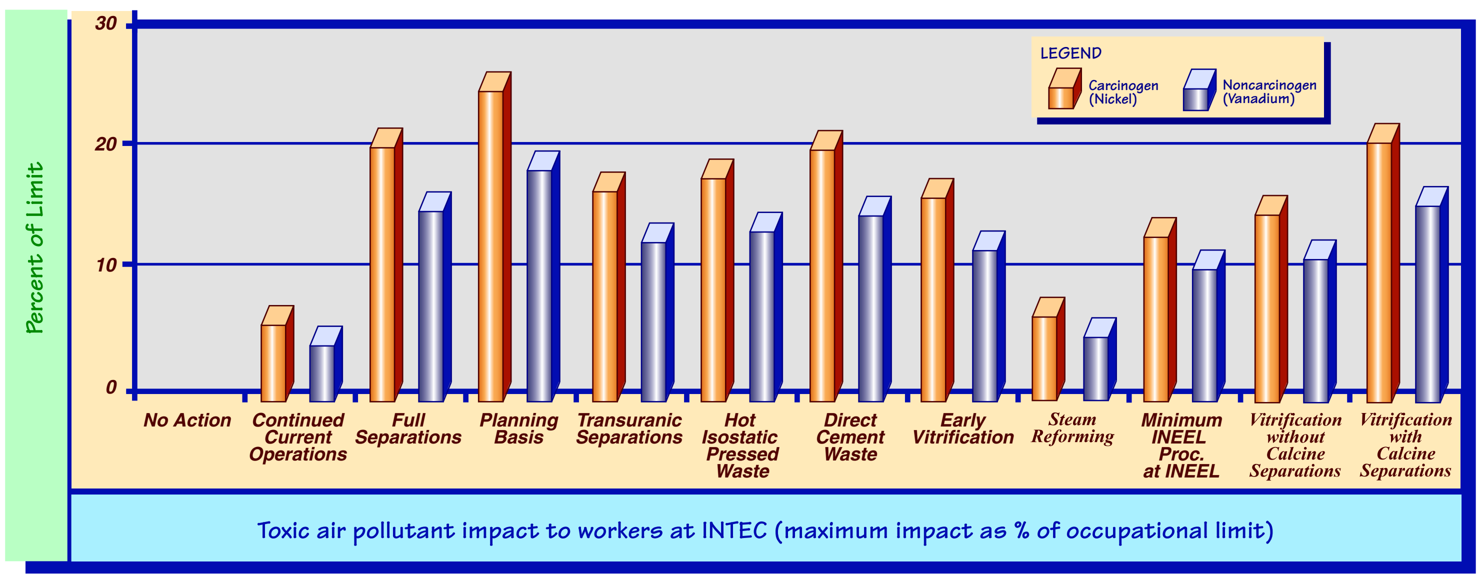


FIGURE 5.3-3.
Toxic air pollutants impacts for disposition of facilities associated with waste processing alternatives.

5.3.4.2 Existing Facilities Associated with High-Level Waste Management

The facilities in this group are those that have historically been used at the INTEC to generate, treat, and store HLW. Because of the number of facilities involved, DOE has grouped them in functional groups for purposes of analysis (see Table 3-***3***). DOE analyzed the HLW tanks and bin sets for closure under all five disposition scenarios; however, facilities that support the Tank Farm and bin sets were analyzed under a single disposition alternative. As shown in Table 3-***3***, the facility disposition alternative for most supporting facilities is Closure to Landfill Standards. (Two exceptions are the Liquid Effluent Treatment and Disposal Building and the West Side Waste Holdup projects, which would be dispositioned by Clean Closure. Emissions from disposition of the Tank Farm and bin sets are shown in Table 5.3-***6***. DOE estimated emissions from all other facilities for the one or two closure scenarios as identified in Section 3.2; the results are in Table 5.3-*7*.

DOE estimated emissions for the maximum year and over the entire duration of each project. Radionuclide emissions would result primarily from the mechanical disturbance of contaminated surfaces. These emissions would be minimized by the use of control systems such as enclosures with high efficiency particulate air filtration systems, and would be discharged through controlled release points (such as the INTEC Main Stack). Use of fuel-burning equipment (e.g., cranes, trucks) is the primary source of nonradiological pollutants, which would be released near ground-level. The disturbance of ground surfaces by vehicles would also result in the generation of fugitive dust. As a result of differences in release conditions, the location of maximum impact is different for radiological than for nonradiological impacts.

DOE also assessed the radiation doses and nonradiological impacts that would be associated with dispositioning the Tank Farm, bin sets, and other facilities. Figures 5.3-***4*** through 5.3-***6*** compare the results of the assessments for the Tank Farm, bin sets, and related facilities under the alternative closure scenarios. Figures 5.3-*7* through 5.3-***9*** show the radiological and nonradiological impacts of dispositioning other existing facilities. All radiological and nonradiological ambient air impacts would be well below applicable standards.

Table 5.3-6. Summary of annual and cumulative emissions from disposition of the Tank Farm and bin sets under alternative closure scenarios.

			Maximum annual and total emissions [a]			
Facility	Pollutant	Units	Clean closure	Performance-based closure	Closure to landfill standards	Performance-based closure with Class A or C grout disposal
Tank Farm	Radionuclides[b]	Curies per year	8.6×10^{-7}	1.1×10^{-7}	7.8×10^{-7}	1.1×10^{-7}
		Total curies	1.5×10^{-5}	1.8×10^{-6}	1.3×10^{-5}	2.5×10^{-6}
	Criteria pollutants[c]	Tons per year	43	8.5	6	5.3
		Total tons	730	140	100	110
	Toxic air pollutants	Tons per year	0.024	4.8×10^{-3}	3.4×10^{-3}	3.0×10^{-3}
		Total tons	0.41	0.081	0.057	0.06
	Carbon dioxide[d]	Tons per year	1.5×10^{3}	180	130	110
		Total tons	2.6×10^{4}	3.0×10^{3}	2.1×10^{3}	***2.2×10^{3}***
	Fugitive dust	Tons per year	130	19	19	37
		Total tons	2.2×10^{3}	150	***150***	670
Bin Sets	Radionuclides[b]	Curies per year	1.3×10^{-7}	1.7×10^{-7}	1.2×10^{-6}	1.7×10^{-7}
		Total curies	2.6×10^{-6}	3.4×10^{-6}	$2.4\text{x}10^{-5}$	2.5×10^{-6}
	Criteria pollutants[c]	Tons per year	2.1	1.8	1.8	2.7
		Total tons	42	36	36	33
	Toxic air pollutants	Tons per year	1.2×10^{-3}	1.0×10^{-3}	1.0×10^{-3}	1.5×10^{-3}
		Total tons	0.024	0.02	0.02	0.015
	Carbon dioxide[d]	Tons per year	44	37	38	55
		Total tons	870	740	760	680
	Fugitive dust	Tons per year	53	33	33	66
		Total tons	***1.1×10^{3}***	660	660	860

a. Maximum annual emissions represent the highest emission rate for any single year; total emissions value is the product of annual emissions for each activity (project) required to support the closure alternative and the duration (in years) of that activity.

b. Radionuclide emissions would consist primarily of strontium-90/yttrium-90 and cesium-137, with small amounts of transuranic isotopes (plutonium, americium, etc.). For Tank Farm waste, the assumed fractions are 48.6 percent strontium-90/yttium-90; 51.1 percent cesium-137; and 0.33 percent transuranics; for bin set waste, the assumed values are 89.7 percent strontium-90/yttrium-90; 10.3 percent cesium-137; and 0.003 percent transuranics.

c. The specific pollutants and approximate relative percentages are as follows: carbon monoxide - 45 percent; sulfur dioxide - 7 percent; nitrogen dioxide - 38 percent; particulate matter - 2 percent; and volatile organic compounds - 8 percent.

d. Carbon dioxide is listed because this gas has been implicated in global warming.

Table 5.3-7. Summary of maximum annual and cumulative emissions from decontaminating and decommissioning other existing facilities associated with HLW management.

	Maximum annual emission rate and total emissions[a]									
	Radionuclides[c]		Criteria pollutants[d]		Toxic air pollutants		Carbon dioxide[e]		Dust	
Facility Group[b]	Curies per year	Curies	Tons per year	Tons	Tons per year	Tons	Tons per year	Tons	Tons per year	Tons
Tank Farm-related (ancillary) facilities	***7.3×10^{-8}***	3.8×10^{-7}	***65***	***340***	***0.036***	***0.19***	***1.3×10^{3}***	***6.7×10^{3}***	0.72	4.3
Bin set-related (ancillary) facilities	8.7×10^{-8}	5.2×10^{-7}	450	2.7×10^{3}	0.25	1.5	9.3×10^{3}	5.6×10^{4}	0	0
Process Equipment Waste Evaporator and Related Facilities	***1.0×10^{-7}***	***5.5×10^{-7}***	***440***	2.5×10^{3}	***0.25***	1.4	***8.8×10^{3}***	***5.0×10^{4}***	***66***	390
Fuel Processing Building and Related Facilities										
Performance-based closure	1.7×10^{-7}	1.7×10^{-6}	150	1.5×10^{3}	0.084	0.84	***3.0×10^{3}***	***3.0×10^{4}***	71	710
Closure to landfill standards	1.7×10^{-7}	1.7×10^{-6}	150	1.5×10^{3}	0.084	0.84	***3.0×10^{3}***	***3.0×10^{4}***	71	710
FAST and Related Facilities	5.8×10^{-8}	3.5×10^{-7}	50	300	0.028	0.17	1.1×10^{3}	***6.0×10^{3}***	120	690
Transport Lines Group	–	–	36	36	-	-	750	750	7.2	7.2
New Waste Calcining Facility[f]										
Performance-based closure	5.8×10^{-8}	1.7×10^{-7}	50	150	0.028	0.84	***1.0×10^{3}***	3.1×10^{3}	63	190
Closure to landfill standards	5.8×10^{-8}	1.7×10^{-7}	50	150	0.028	0.84	***1.0×10^{3}***	3.1×10^{3}	63	190
Remote Analytical Laboratory	2.9×10^{-8}	1.7×10^{-7}	33	200	-	-	680	***4.1×10^{3}***	8.6	52

a. Maximum annual emissions represent the highest emission rate for any single year and are the sum of annual emission rates for each activity within a group that may occur during a common year; total emissions value is the product of cumulative emissions (annual rate multiplied by duration in years) for each individual activity within a group.
b. See Table 3-***3*** for facility disposition alternatives that apply to each group. The Fuel Processing Building and Related Facilities and the New Waste Calcining Facility could be dispositioned by either performance-based closure or closure to landfill standards. Individual facilities within all other groups would be dispositioned according to a single closure method.
c. Radionuclide emissions would consist primarily of strontium-90/yttrium-90 and cesium-137, with much smaller amounts of transuranic isotopes.
d. The specific pollutants and approximate relative percentages are as follows: carbon monoxide – 45 percent; sulfur dioxide - 7 percent; nitrogen dioxide - 38 percent; particulate matter - 2 percent; and volatile organic compounds - 8 percent.
e. Carbon dioxide is listed because this gas has been implicated in global warming.
f. The decontamination and decommissioning of this facility is also included in some of the waste processing alternatives presented in Table 5.3-4.

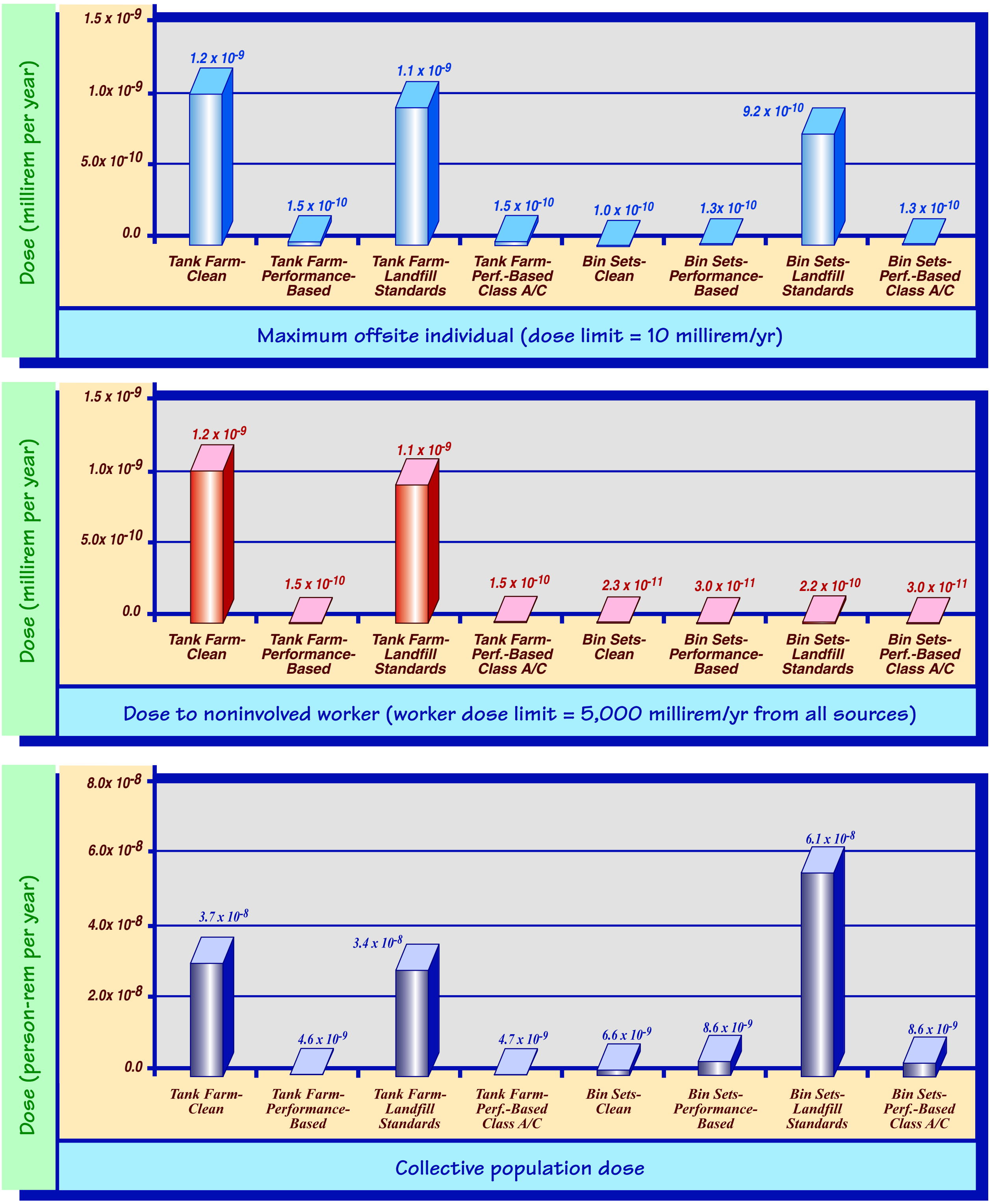
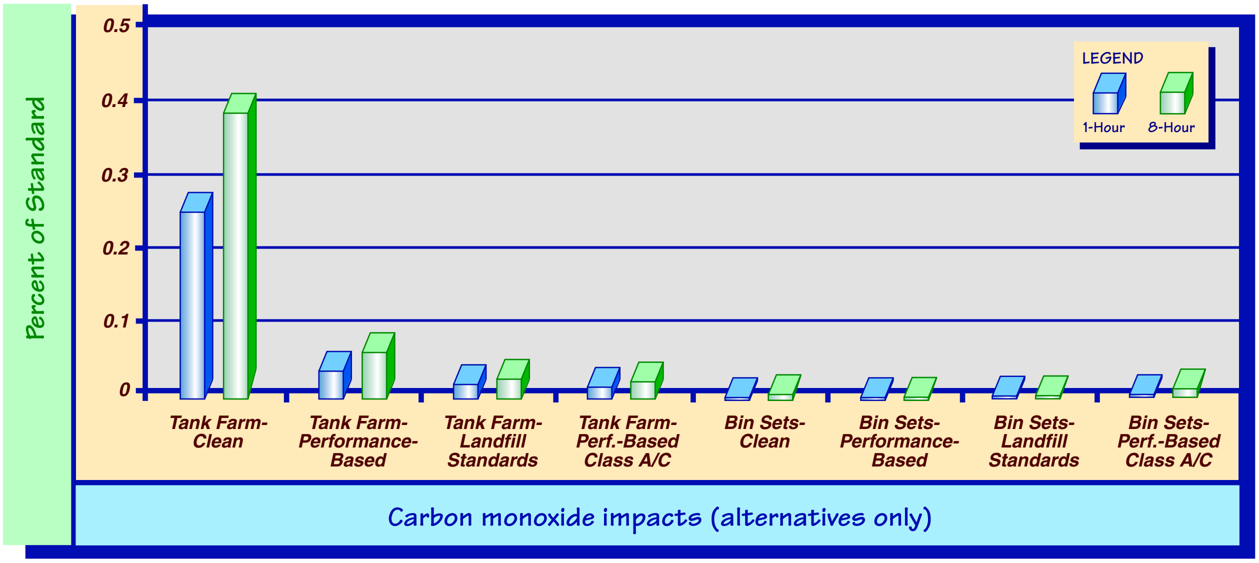


FIGURE 5.3-4.
Air pathway doses by Tank Farm and bin set closure option.



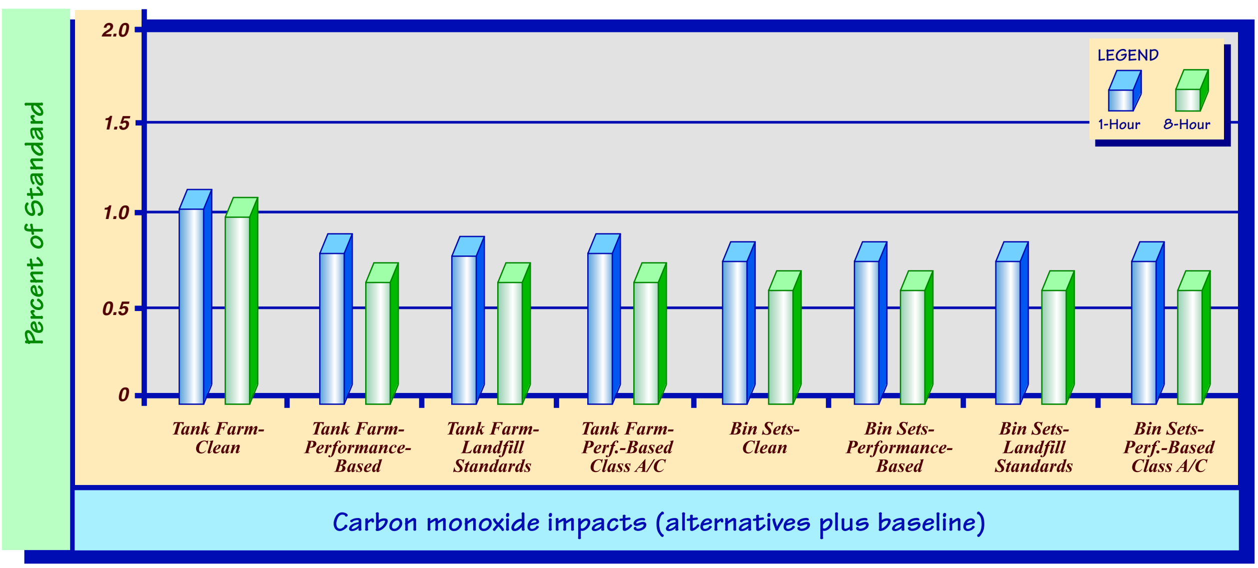
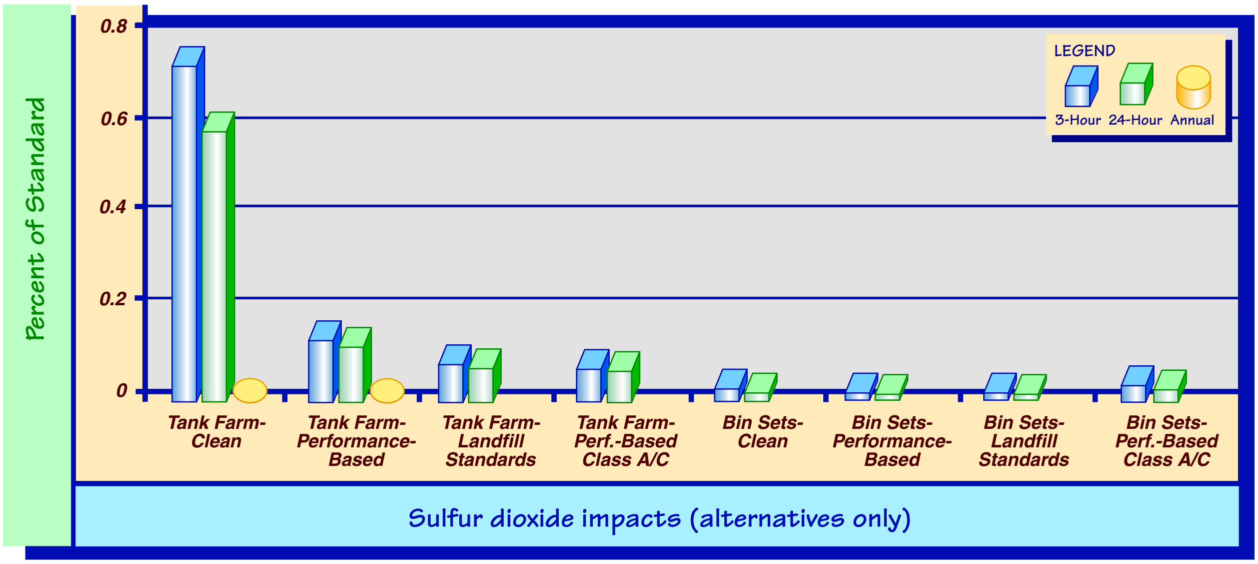


FIGURE 5.3-5. (1 of 4)
Criteria air pollutant impacts by Tank Farm and bin set closure alternative.



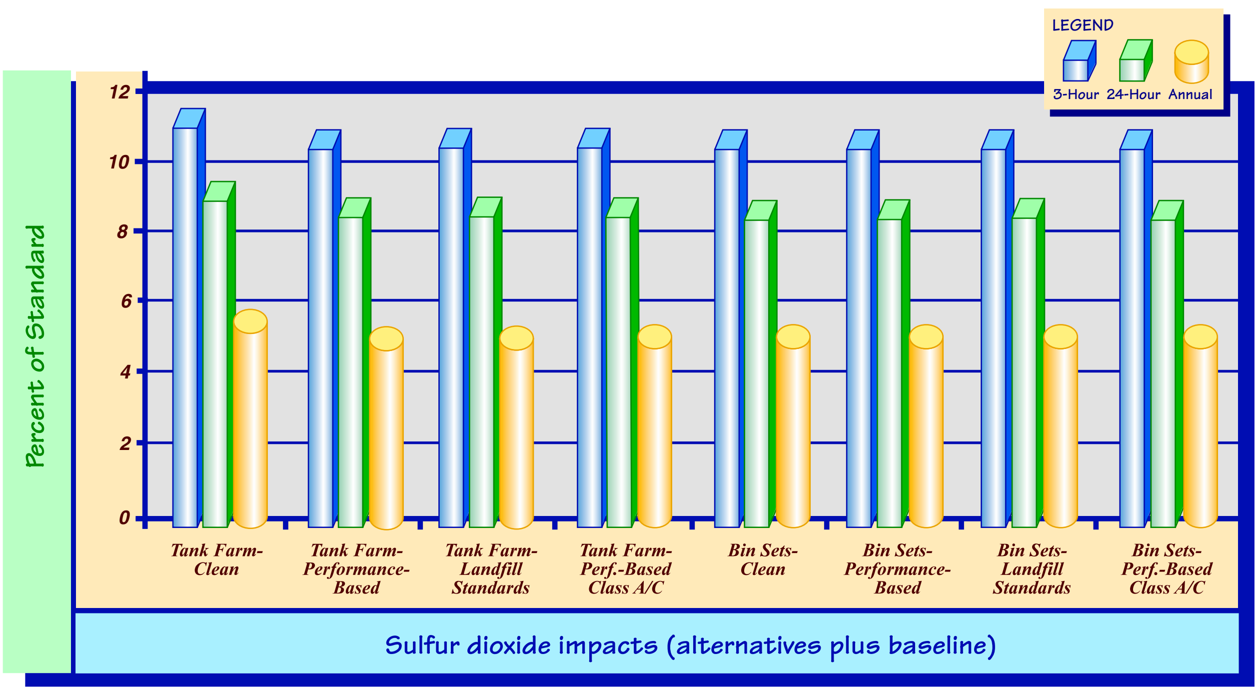
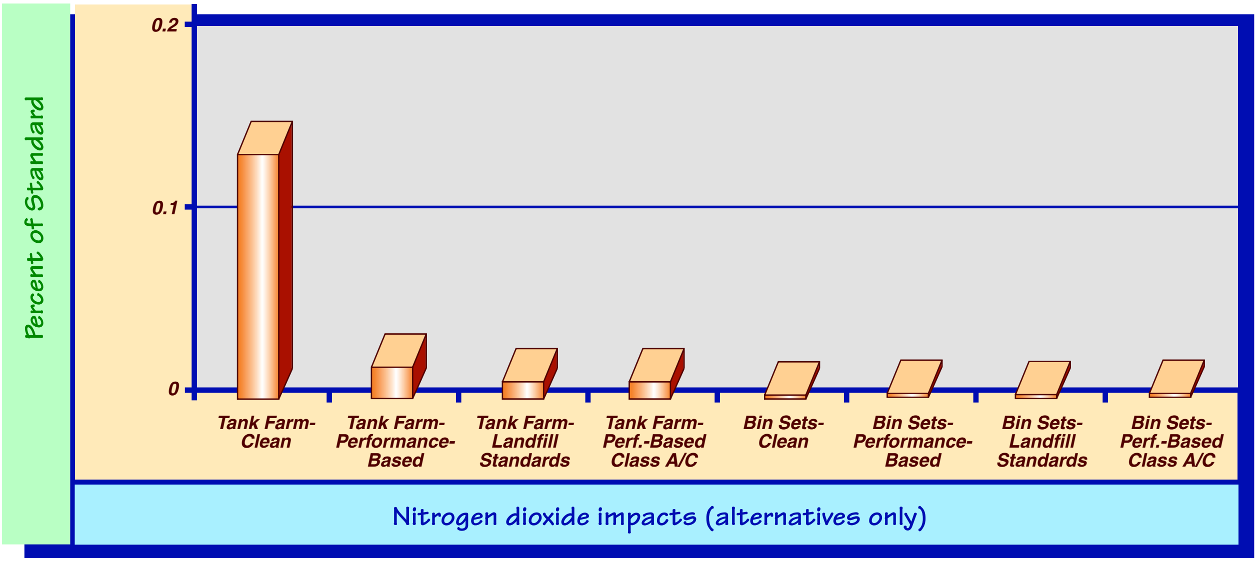


FIGURE 5.3-5. (2 of 4)
Criteria air pollutant impacts by Tank Farm and bin set closure alternative.



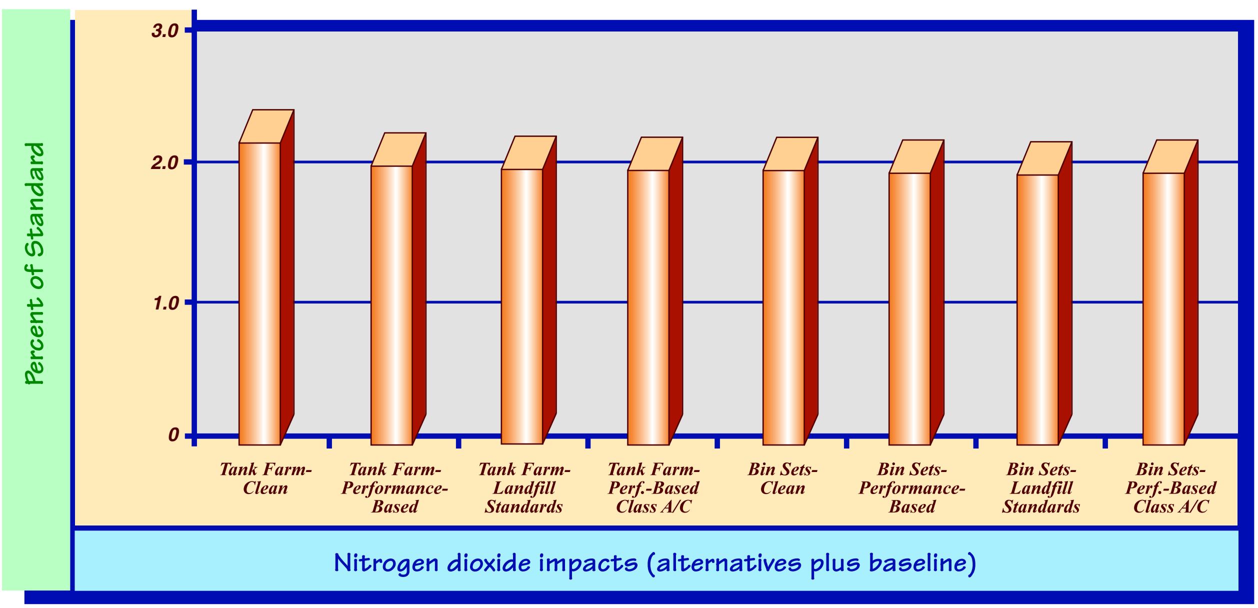
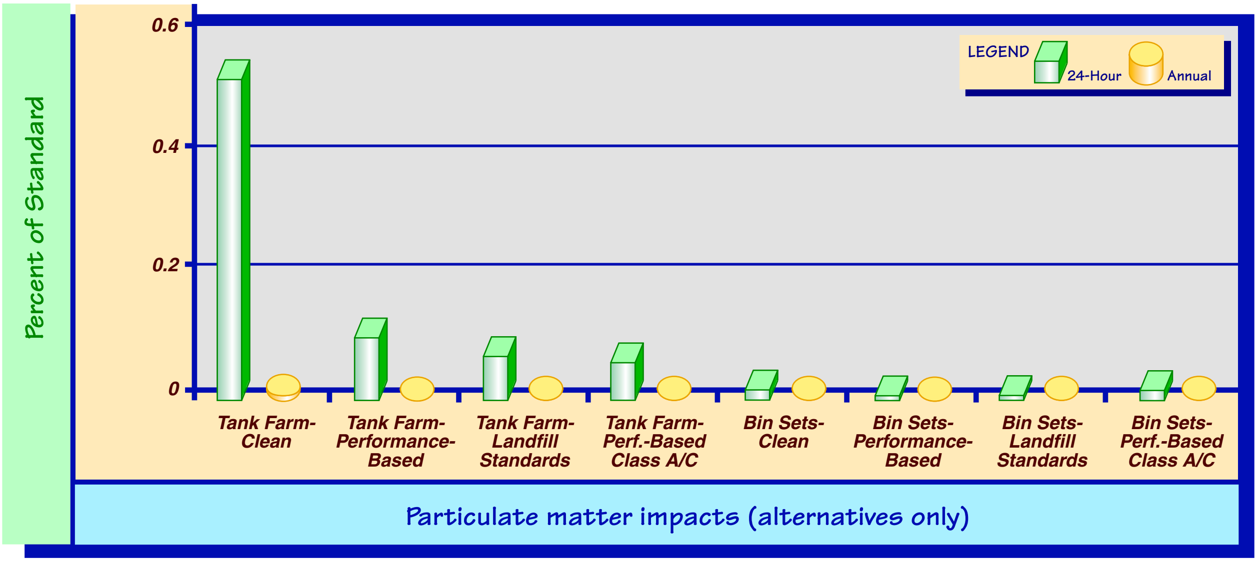


FIGURE 5.3-5. (3 of 4)
Criteria air pollutant impacts by Tank Farm and bin set closure alternative.



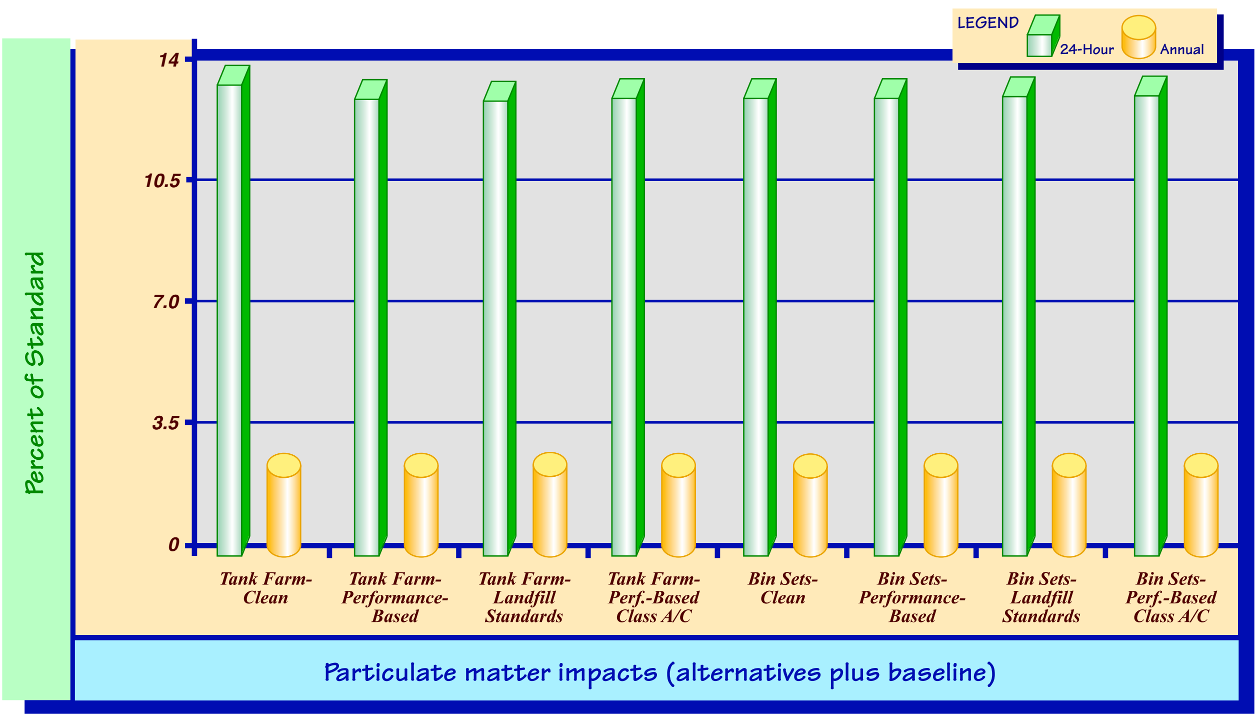
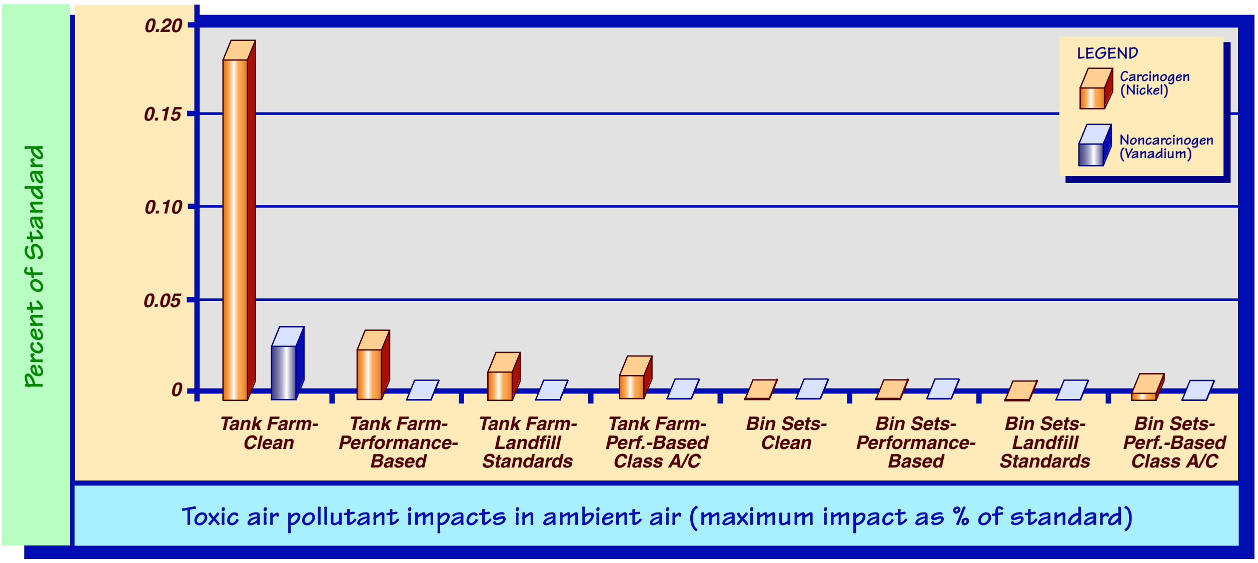


FIGURE 5.3-5. (4 of 4)
Criteria air pollutant impacts by Tank Farm and bin set closure alternative.



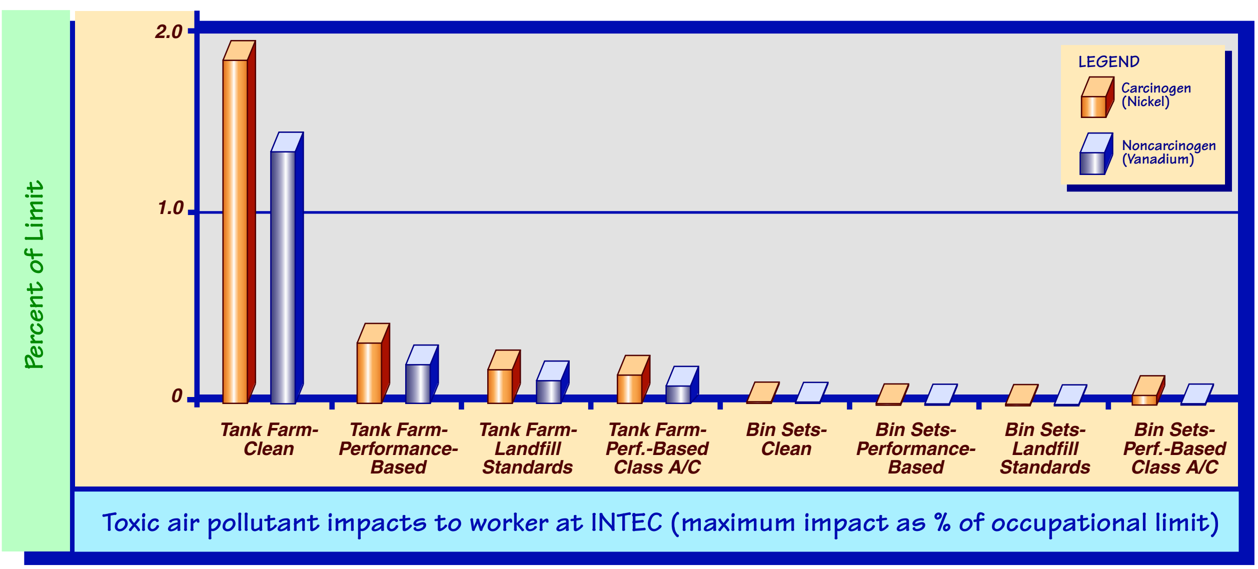


FIGURE 5.3-6.
Toxic air pollutant impacts for Tank Farm and bin set closure options.

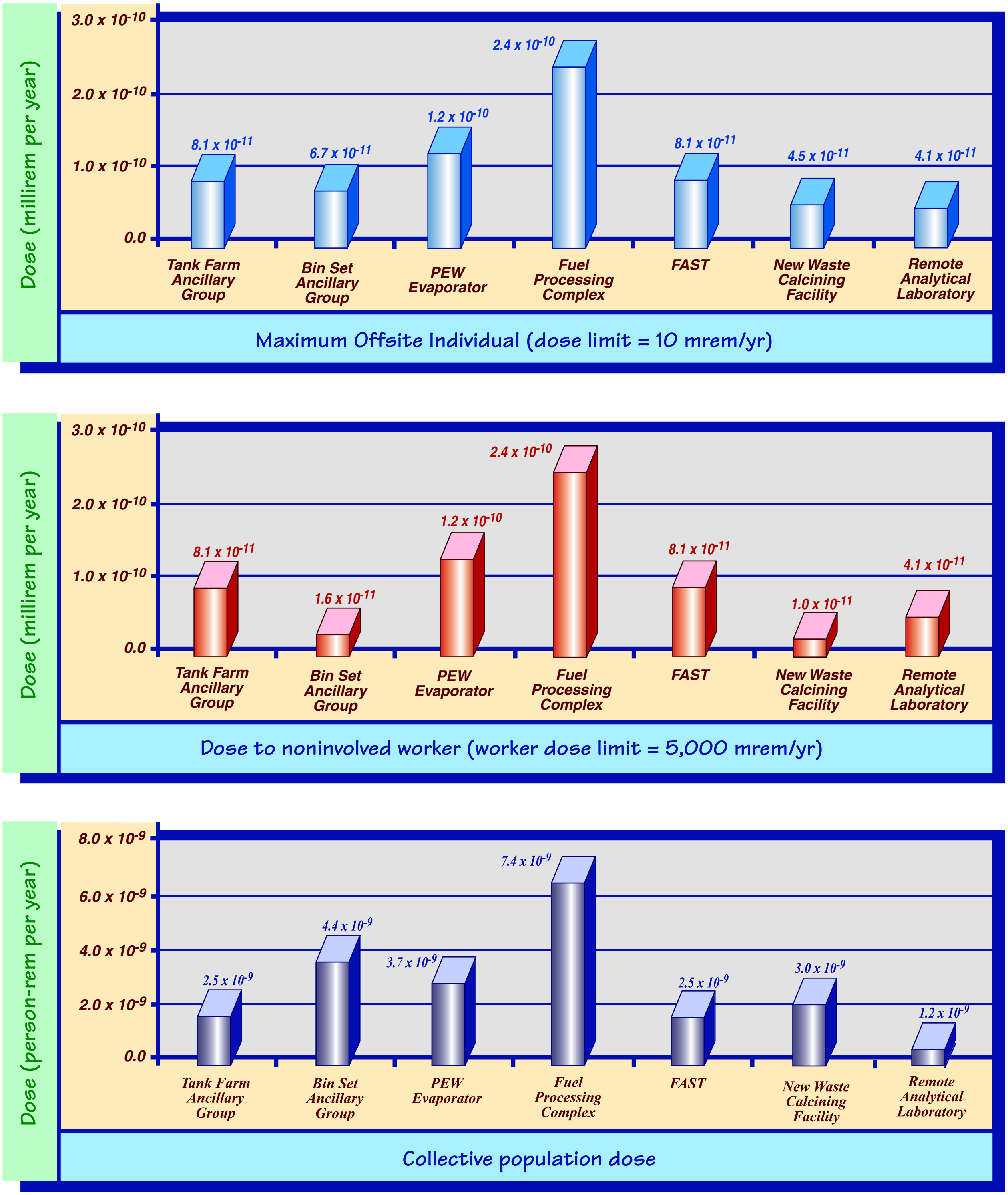
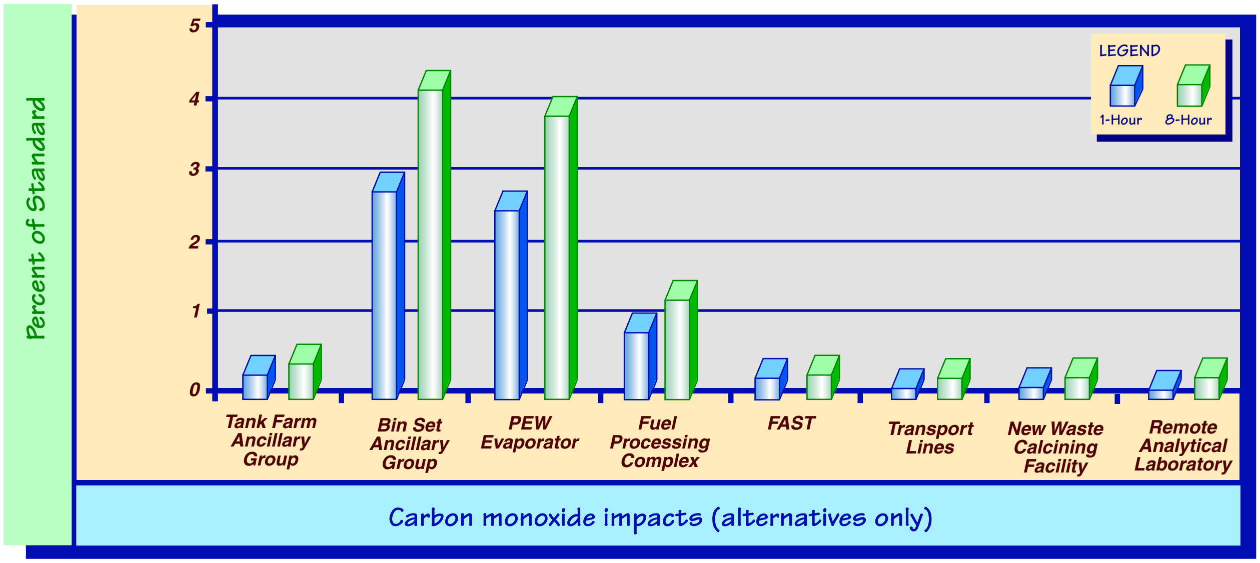


FIGURE 5.3-7.
Air pathway doses for disposition of existing INTEC facilities associated with HLW management.



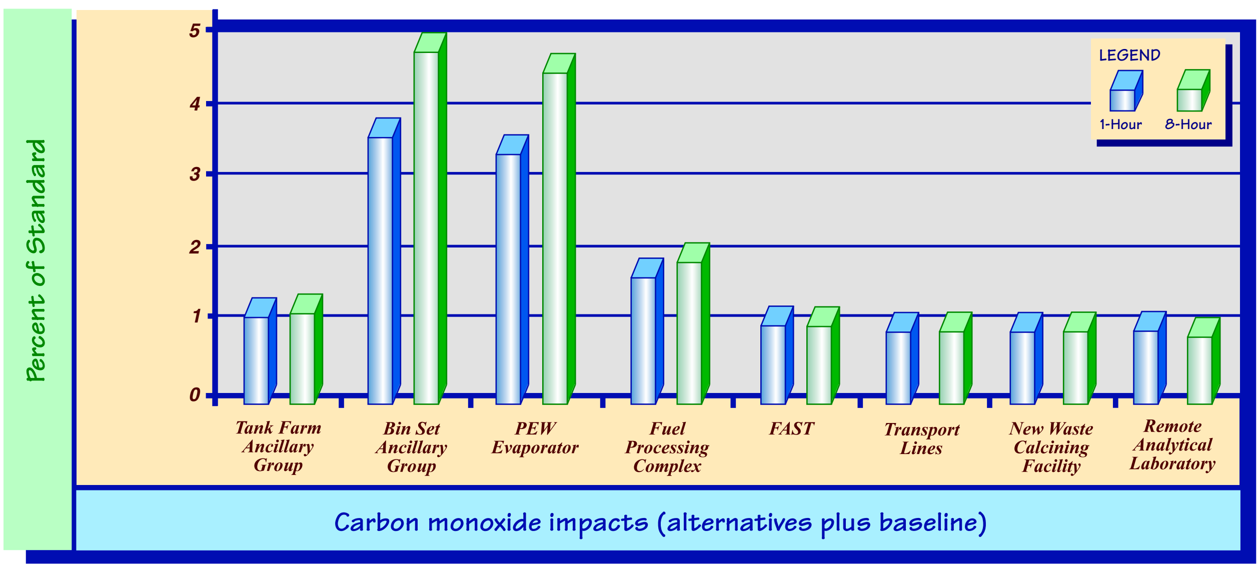
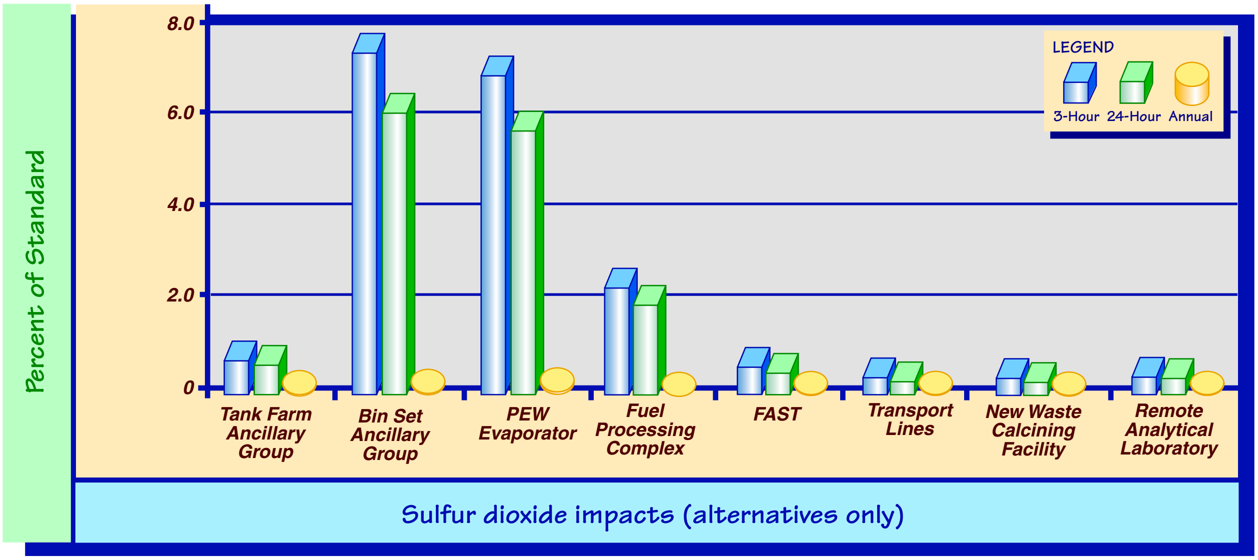


FIGURE 5.3-8. (1 of 4)
Comparison of criteria air pollutant impacts for disposition of existing INTEC facilities associated with HLW management.



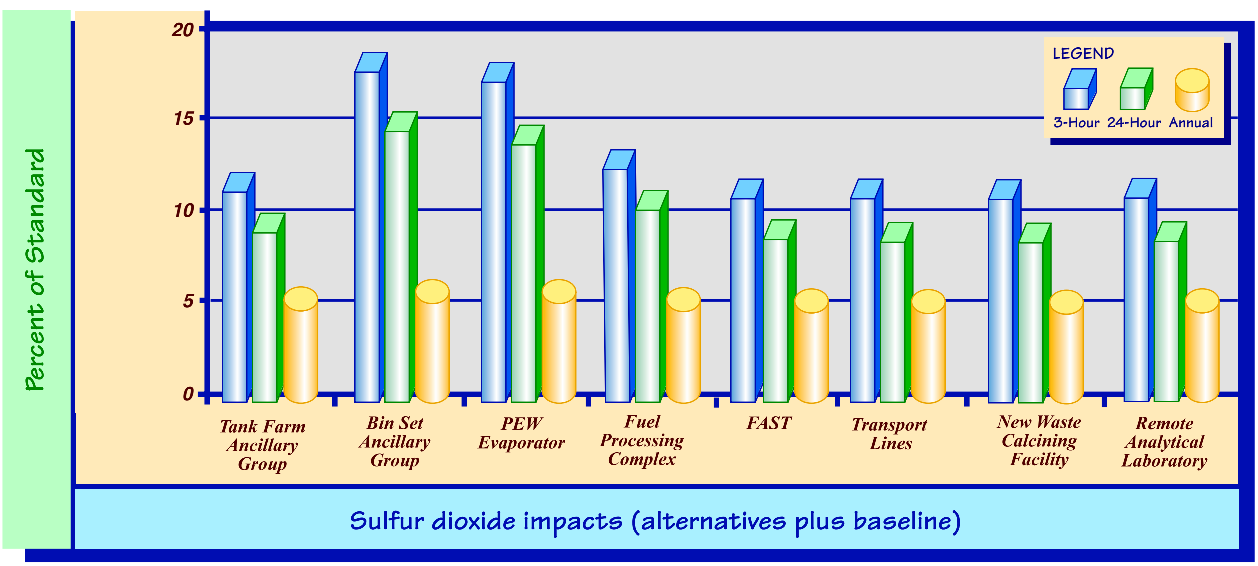
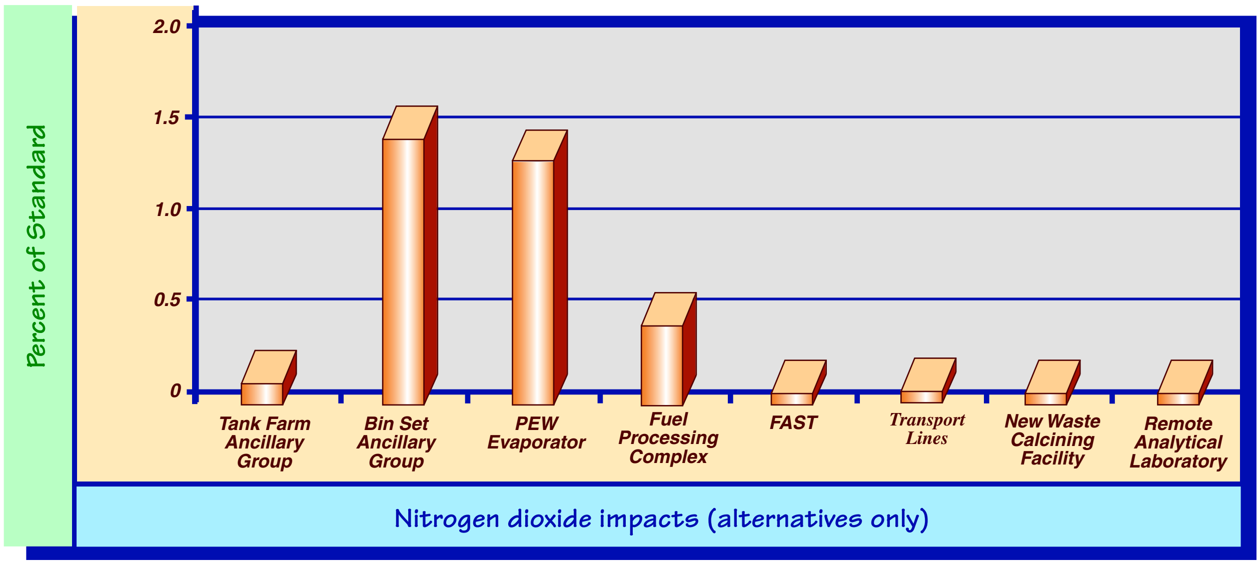


FIGURE 5.3-8. (2 of 4)
Comparison of criteria air pollutant impacts for disposition of existing INTEC facilities associated with HLW management.



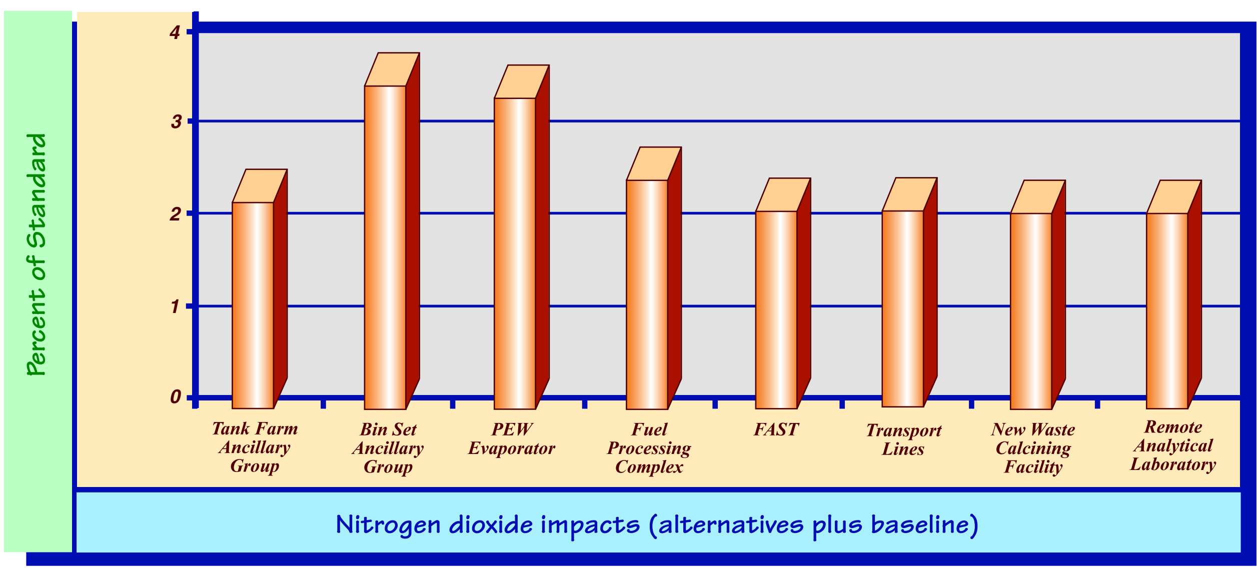
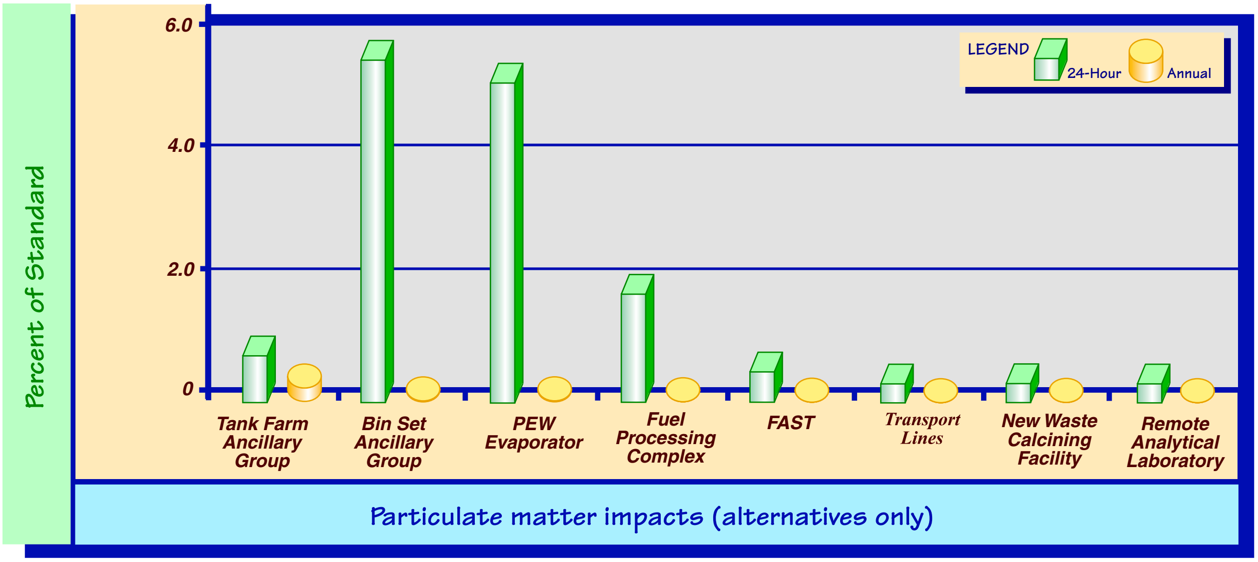


FIGURE 5.3-8. (3 of 4)
Comparison of criteria air pollutant impacts for disposition of existing INTEC facilities associated with HLW management.



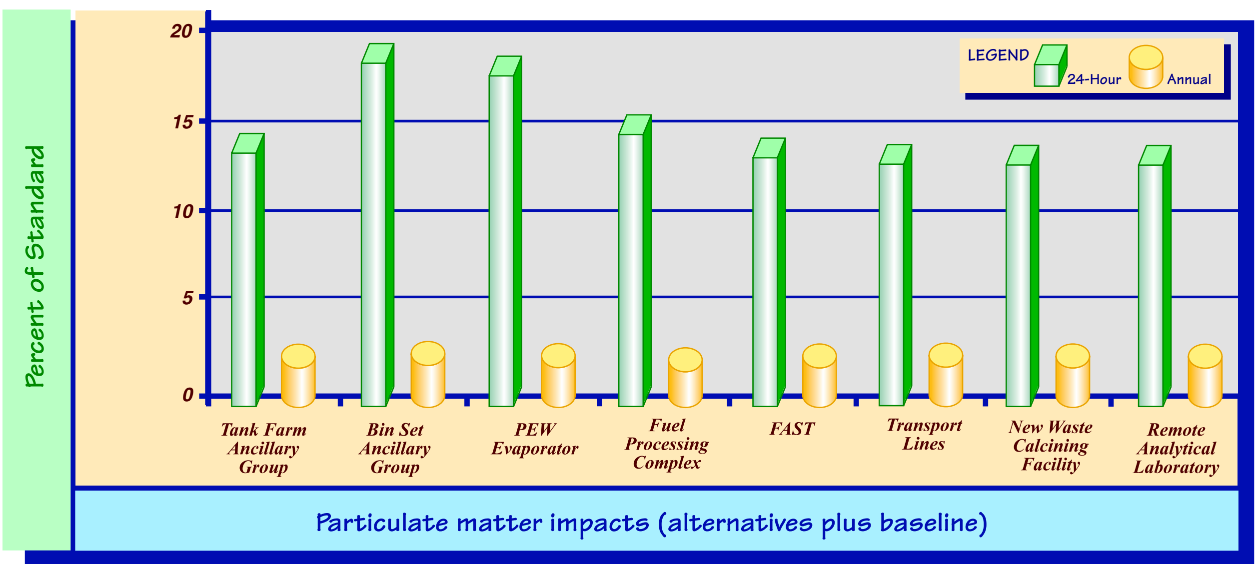


FIGURE 5.3-8. (4 of 4)
Comparison of criteria air pollutant impacts for disposition of existing INTEC facilities associated with HLW management.

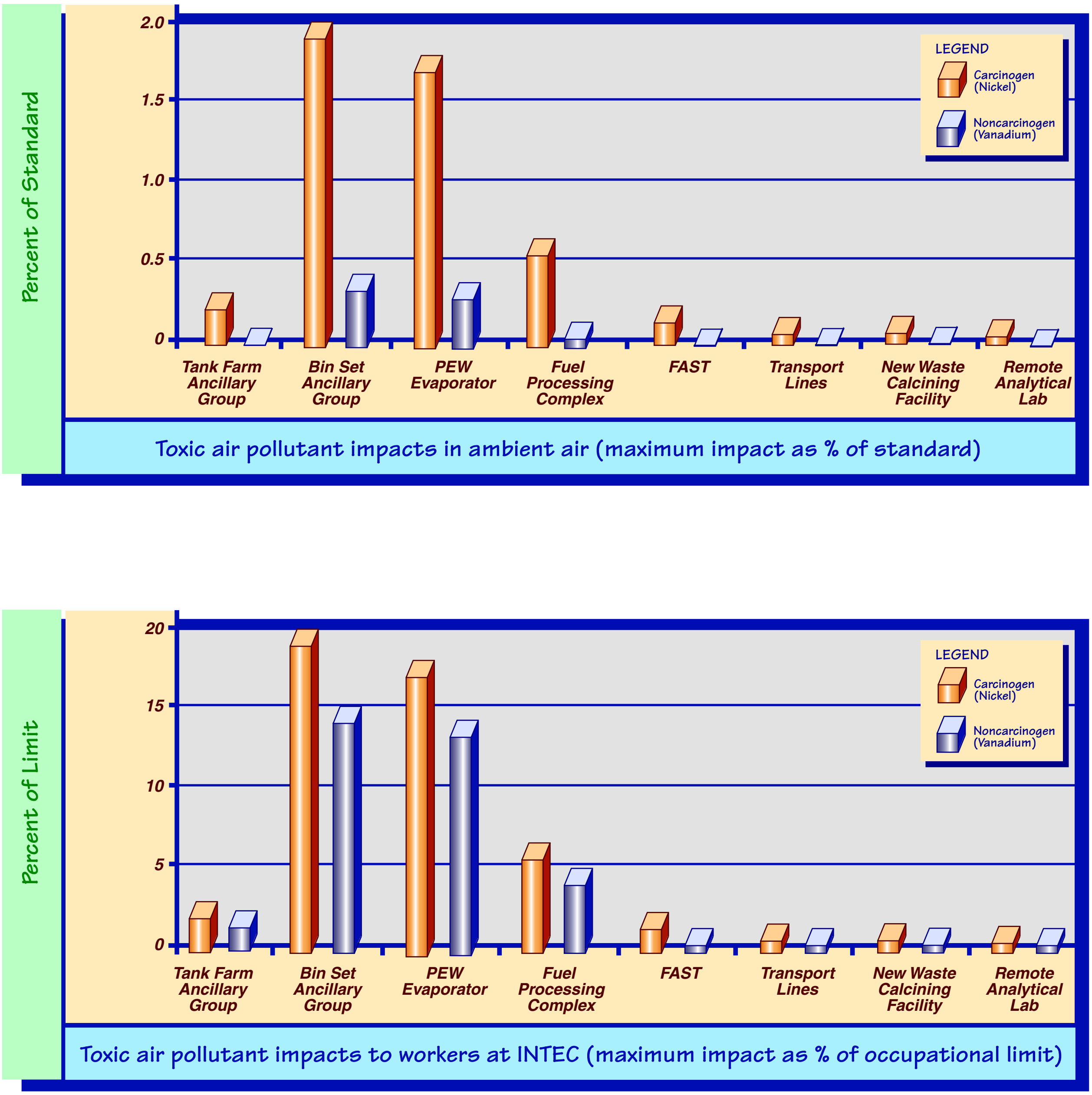


FIGURE 5.3-9.
Comparison of toxic air impacts for disposition of existing INTEC facilities.