Table 3.6. Estimated Volumes of WTP Waste Streams Through 2046

Waste Streams	No Action (cubic meters)[(a)]	Action Alternatives (cubic meters)[(a)]
ILAW	350,000	211,000
WTP Melters	6,825	6,825
Total WTP waste	356,825	217,825
(a) To convert to cubic feet, multiply by 35.3.		

volume of ILAW generated by the WTP, however, may vary depending on the waste form produced. For the No Action Alternative, ILAW would be produced in a cullet form and packaged in containers for retrievable disposal in vaults as outlined in the TWRS EIS for the preferred alternative (Phased Implementation). The EIS analysis assumed 140,000 containers would be required, or an equivalent volume of approximately 350,000 m^3. For the action alternatives, ILAW was assumed to be in a monolithic form, packaged in 2.6-m^3 containers for disposal in trenches. Approximately 81,000 containers would be required, or an equivalent volume of approximately 211,000 m^3 (Burbank 2002).

3.4 Comparison of Environmental Impacts Among the Alternatives

For purposes of comparison of impacts among the alternatives in this section, impacts associated with alternative treatment, storage, and disposal actions for each waste type have been combined to provide a consolidated analysis of HSW management operations. These consolidated analyses are referred to as alternative groups, which were described in Section 3.1. The No Action Alternative analysis consists of the No Action activities for each waste type. This approach facilitates comparative presentation of impacts for all Solid Waste Program operations evaluated in this EIS and is necessary where analyses are performed for facilities that are used to manage more than one type of waste. In the alternative group analyses, each of the waste types and activities necessary to manage those wastes are considered. In addition, within the analyses for each alternative group, three alternative waste volume scenarios were considered as described in Section 3.2, namely the Hanford Only, Lower Bound, and Upper Bound waste volumes.

Summary comparisons of impacts among the alternative groups during the operational period and during the long term (10,000 years) after disposal facility closure are presented in Tables 3.7 and 3.8, respectively. The environmental consequences presented in this section represent the incremental impacts from implementing the alternatives for solid waste management described in Section 3.1. The cumulative impacts described in Section 3.4.12 present the proposed action and alternatives in the context of other past, present, and reasonably foreseeable activities to which the waste management operations discussed in this EIS might contribute.

Potential environmental impacts resulting from implementing any of the alternatives are compared in somewhat more detail in the sections that follow. Further details and the supporting analyses for the material presented in this section are provided in Section 5 and its appendixes.

Table 3.7. Summary Comparison of Impacts Among the Alternatives During Operational Period (Present to 2046)

Hanford Only to Upper Bound Waste Volume - Alternative Groups A-E[(a)]															
Hanford Only and Lower Bound Waste Volume for No Action Alternative[(b)]															
	Facility Operations – Direct Radiation and Emissions to Atmosphere						Transportation [(d)]								
	Normal Operations				Fatalities from Operational Accident Having Largest Consequences: Beyond-Design- Basis Earthquake at CWC[(c)]		Routine	# Accidents/# Fatalities from Trauma							
	Chances of Latent Cancer Fatality: Lifetime Exposure of Maximally Exposed Individual														
Alternative	**Public**	**Non-Involved Workers**	**Latent Cancer Fatalities (LCFs) Among Population within 80 km Lifetime Exposure**	**Latent Cancer Fatalities (LCFs) from Collective Radiation Exposure of Workers**	**Public**	**Non-Involved Workers[(e)]**	**Onsite & for Offsite Treatment: Includes Transport Crew, Public, and Non-Involved Workers, Fatalities[(f)]**	**Onsite & for Offsite Treat-ment**	**Incoming LLW, MLLW & TRU Waste Within Oreg. State Only**	**Incoming LLW, MLLW & TRU Waste Within Wash. State Only**	**TRU Waste to WIPP**	**Shrub-Steppe Habitat Disturbed, ha**	**Geologic Resources Committed (sand, gravel, silt/loam, and basalt), millions of m³**	**Diesel Fuel Committed Thousands of m³**	**Cost in Billions of 2002 Dollars**
Group A	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	32	2.4 -2.5	133 - 134	3.7 - 4.0
Group B	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	0	1/0	2-4/0	1/0	18/3	0	2.6 - 2.8	137 - 141	3.8 - 4.2
Group C	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	14	2.2 - 2.3	66 - 67	3.5 - 3.9
Group D_1	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	19 - 25	2.2 - 2.3	66 - 67	3.2 - 3.5
Group D_2	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	0	2.2 - 2.3	66 - 67	3.2 - 3.5
Group D_3	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	0	2.2 - 2.3	66 - 67	3.2 - 3.5
Group E_1	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	0	2.2 - 2.3	66 - 67	3.4 - 3.8
Group E_2	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	5 - 11	2.2 - 2.3	66 - 67	3.4 - 3.8
Group E_3	<1/million	<1/million	0 (<0.001)	0 (<0.50)	30	1	1	20/1	2-4/0	1/0	18/3	14	2.2 - 2.3	66 - 67	3.4 - 3.8
No Action	<1/million	<1/million	0 (<0.001)	1 (0.52)	30	1	0	1/0	0	0	9/1	10	1.4	187	3.5 - 3.5

(a) Where a single value is given, the value applies to both Hanford Only and Upper Bound waste volumes.
(b) Where a single value is given, the value applies to both Hanford Only and Lower Bound waste volumes.
(c) Unlike the Alternative Groups where the risk of this accident would be over about 43 years, the risk would continue as long as waste is stored in CWC.
(d) Excludes transport in general of wastes from offsite generators, the impacts for which the PEIS should be consulted.
(e) For the "involved" worker(s) that might be in a CWC building during such an event the consequences could range from none to several fatalities from collapse of the building.
(f) Includes inferred fatalities from radiation exposure and vehicular emissions.

Table 3.8. Summary Comparison of Long-Term (10,000 years) Impacts Among the Alternatives

Hanford Only to Upper Bound Waste Volume - Alternative Groups A-E[(a)]											
Hanford Only and Lower Bound Waste Volume for No Action Alternative[(b)]											
Alternative	**Additional Land Permanently Committed to Disposal, ha**	**Exposure to Radionuclides Via Groundwater Pathway**								**Maximum Waste Site Intruder Risk of Fatality at 100 Years After Closure[(e)]**	
		Maximum Annual Drinking Water Dose, mrem		**Chances in a <u>Million</u> of Fatality (LCF) to Lifetime Onsite Resident Gardener**		**Chances of Fatality (LCF) for Lifetime Onsite Resident Gardener <u>with Sauna/Sweat Lodge</u>**		**Fatalities (LCFs) in Populations over 10,000 years[(d)]**			
		200 Areas	Near River	200 Areas[(f)]	Near River	200 Areas[(g)]	Near River	Tri-Cities	Portland	Drilling	Excavation
Group A	38 - 47	0.46 - 2.2	0.05 - 0.09	65 - 120	7	1 in 400 - 1 in 10	1 in 4000 - 1 in 300	0	0	4 in 100	Precluded
Group B	56 - 80	0.46 - 2.4	0.12 - 0.21	64 - 130	13 - 15	1 in 100 - 1 in 10	1 in 200 - 1 in 100	0	0	4 in 100	Precluded
Group C	20 - 29	0.46 - 2.2	0.05 - 0.09	65 - 120	7	1 in 400 - 1 in 10	1 in 4000 - 1 in 300	0	0	4 in 100	Precluded
Group D_1	19 - 25	0.26 - 2.2	0.06 - 0.09	37 - 120	8 - 9	1 in 400 - 1 in 10	1 in 2000 - 1 in 300	0	0	4 in 100	Precluded
Group D_2	19 - 25	0.34 - 2.3	0.08 - 0.09	45 - 120	11	1 in 200 - 1 in 10	1 in 2000 - 1 in 300	0	0	4 in 100	Precluded
Group D_3	19 - 25	0.46 - 2.3	0.06 - 0.09	63 - 120	8	1 in 400 - 1 in 10	1 in 2000 - 1 in 300	0	0	4 in 100	Precluded
Group E_1	19 - 25	0.34 - 2.3	0.08 - 0.09	45 - 120	11	1 in 400 - 1 in 10	1 in 2000 - 1 in 300	0	0	4 in 100	Precluded
Group E_2	19 - 25	0.21 - 0.26	0.05 - 0.10	28 - 29	6 -7	1 in 400 - 1 in 10	1 in 2000 - 1 in 200	0	0	4 in 100	Precluded
Group E_3	19 - 25	0.27 - 2.3	0.06 - 0.09	39 - 120	8	1 in 400 - 1 in 10	1 in 2000 - 1 in 300	0	0	4 in 100	Precluded
No Action	86 - 95[(c)]	0.51-0.99	0.04	43	6	1 in 50	1 in 800	0	0	4 in 100	Likely a Fatality[(g)]

(a) Where a single value is given the value applies to both Hanford Only and Upper Bound waste volumes.
(b) Where a single value is given the value applies to both Hanford Only and Lower Bound waste volumes.
(c) Includes land for storage of waste in CWC.
(d) Zero inferred latent cancer fatalities. Constant populations; Tri-Cities -113,000; Portland 510,000.
(e) Risk value given assumes that the event takes place.
(f) Location within the 200 Areas having the highest results.
(g) Very high dose would possibly lead to fatality.

3.4.1 Land Use

Land permanently committed to HSW disposal includes about 130 ha (320 ac) already occupied by waste previously disposed of in LLBGs. Disposal of the Hanford Only waste volume would increase land permanently committed for disposal from a low of 19 ha (47 ac) for Alternative Groups C through E, to a high of 56 ha (140 ac) for Alternative Group B (Land Use values are rounded and may not add or convert exactly). Similarly the increases for the Lower Bound waste volume would range from 20 ha (49 ac) to 59 ha (150 ac) for the same alternative groups. The increases for the Upper Bound waste volume would range from 25 ha (62 ac) to 80 ha (200 ac) for the same alternative groups. In the No Action Alternative the increase in land permanently committed to disposal would be 28 ha (69 ac), which**,** however**,** does not take into account an increase in land usage of 66 ha (160 ac) for facilities committed to storage of LLW, MLLW, and TRU waste. The areas of land to be committed are shown for comparison among the alternatives in Table 3.9.

Table 3.9. Comparison of Land Area Permanently Committed in the Various Alternatives as of 2046, ha[(a)]

Alternative	Hanford Only Waste Volume			Lower Bound Waste Volume			Upper Bound Waste Volume		
	LLW & MLLW Increase	ILAW Increase	Total Land Committed[(b)]	LLW & MLLW Increase	ILAW Increase	Total Land Committed[(b)]	LLW & MLLW Increase	ILAW Increase	Total Land Committed[(b)]
Alternative Group A	12	26	**168**	13	26	**170**	21	26	**178**
Alternative Group B	30	26	**187**	33	26	**189**	54	26	**210**
Alternative Group C	12	8	**151**	13	8	**152**	21	8	**160**
Alternative Groups D & E	11	8	**150**	12	8	**150**	17	8	**155**
No Action Alternative	17	10	**274[(c)]**	19	10	**275[(c)]**	Not applicable		

(a) One hectare (ha) = about 2.5 acre (ac). Values may not add exactly due to rounding.
(b) Includes 130 ha already committed for HSW previously disposed of in the LLBGs.
(c) Includes 116 ha for storage of waste in CWC buildings.

3.4.2 Air Quality

Air quality impacts are based on estimated concentrations of criteria pollutants: particulate matter (PM_{10}), sulfur dioxide (SO_2), carbon monoxide (CO), and nitrogen dioxide (NO_2) at points of public occupancy. Table 3.10 presents the largest potential impacts calculated for each alternative group in comparison to Air Quality Standards. Air quality impacts for obtaining capping materials are presented separately following the table. Impacts from releases of radioactive material and chemicals to the atmosphere are addressed in Section 3.4.11 and 5.11, Human Health and Safety.

Table 3.10. Comparison Among the Alternative Groups of Estimated Criteria-Pollutant Impact Maximums for Solid Waste Operations in the 200 Areas, Percent of Air Quality Standards[a]

Alternative	Hanford Only and Lower Bound Waste Volumes				Upper Bound Waste Volume			
	24-Hour PM_{10}	1-Hour SO_2	8-Hour CO	Annual NO_2	24-Hour PM_{10}	1-Hour SO_2	8-Hour CO	Annual NO_2
Alternative Group A, %	46	8.1	4.7	0.84	49	9.8	5.9	0.8
Alternative Group B, %	47	13	8	1.0	60	18	11	1.1
Alternative Group C, %	40	7.9	4.6	0.79	41	8.0	4.7	0.78
Alternative Group D, %	41	8.4	5.0	0.91	41	8.4	5.0	0.98
Alternative Group E, %	40	9.3	5.3	0.84	41	9.5	5.3	0.97
No Action Alternative, %	38	8.6	4.6	0.93	Not applicable			

(a) (24-Hour PM_{10} = 150 μg/m^3, 1-Hour SO_2 = 1,000 μg/m^3, 8-Hour CO = 10,000 μg/m^3, Annual NO_2 = 100 μg/m^3)

Maximum air quality impacts from operating the Area C borrow pit would amount to 14 percent of the 24-Hour Standard for PM_{10}, 26 percent of the 1-Hour Standard for SO_2, 36 percent for the 8-Hour Standard for CO, and 0.16 percent of the Annual Standard for NO_2, but would be common to all alternatives.

For the most part the impacts on air quality are essentially the same for all alternatives. An exception is Alternative Group B where the impacts for some pollutants are below standard values, but noticeably higher than for the other alternatives due to the increased excavation required for construction of disposal trenches.

3.4.3 Water Quality

As a result of wastewater management activities during past Hanford Site operations, groundwater beneath the 200 Areas has been contaminated with radionuclides and non-radioactive chemicals. The contaminants emanating from the 200 Areas are moving toward the Columbia River. None of these contaminants are thought to have originated from existing LLBGs or other waste management facilities being considered in the HSW EIS. Uncertainties regarding levels of chemicals previously disposed of in LLBGs are discussed in Section 3.5.

One benchmark measure of water quality for purposes of comparison among the alternatives is taken as the percentage of Maximum Contaminant Levels (MCLs)[a] in groundwater. The percentage of MCLs

(a) Maximum Contaminant Levels (MCLs), defined in 40 CFR 141, apply to drinking water supplies. Although groundwater beneath the Hanford Site is not a drinking water supply the MCLs provide a useful benchmark against which to compare contaminant levels.

is calculated for hypothetical wells intercepting maximum cumulative concentrations of radionuclides in predicted plumes along several lines of analysis downgradient from the HSW disposal facilities. These lines of analysis were positioned at a distance to capture contributions from all HSW disposal facilities within 200 West Area, at the ERDF, and 200 East Area including possible contributions from the 200 West Area and ERDF sources. The specific lines of analysis considered in this assessment are as follows:

- a line of analysis 1 km downgradient from waste disposed of in the 200 West Area LLBGs or the ILAW waste disposal facility near CWC (referred to as the 200 West Line Of Analysis [LOA] in Section 5.3 and Appendix G).

- a line of analysis about 1 km downgradient to the northwest from the 200 East LLBGs (referred to as the 200 East NW LOA in Section 5.3 and Appendix G). This LOA was used to evaluate concentrations in groundwater migrating northwest of the 200 East Area.

- a line of analysis about 1 km downgradient to the southeast from a new disposal facility near the PUREX Plant (referred to as the 200 East SE LOA in Section 5.3 and Appendix G). This LOA was used to evaluate concentrations in groundwater migrating southwest of the 200 East Area.

- a line of analysis about 1 km downgradient from the ERDF location (referred to as the ERDF LOA in Section 5.3 and Appendix G).

- a line of analysis along the Columbia River (referred to as the Columbia River LOA in Section 5.3 and Appendix G).

The highest percentages of MCLs together with the time of occurrence are given in Table 3.11 for the period ending in about 10,200 AD. In that time period technetium-99 and iodine-129 are the principal contaminants of interest. After about 10,200 AD uranium begins to dominate as the principal contaminant in groundwater. The highest percentages of the MCL for uranium are given in Table 3.12.

Another benchmark measure of water quality for purposes of comparison among the alternatives is taken as the dose to an individual from drinking 2 liters per day of groundwater from the hypothetical wells described above. These doses are based on inventories by activity presented in Appendix B, groundwater transport analysis as described in Section 5.3 and Appendix G, and dose conversion factors based on Federal Guidance Reports 11 and 12, details of which are presented in Appendix F. The latter are Plots of maximum annual drinking water dose as a function of time are provided in Figures 3.4 to 3.8.[a]

(a) The period of analysis is 10,000 years after 2046 and the plots would end at 12,046, however the plots are constrained by the software to the next whole millennium.

Table 3.11. Highest Percentage of Maximum Concentration Levels (MCLs) to the Year 10,200 AD[(a,b)]

Hanford Only Waste Volume																				
Alternative	**200 W Well Location**				**ERDF Well Location**				**200E NW Well Location**				**200 E SE Well Location**				**River Well Location**			
	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD	**I-129**	**Tc-99**	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD
Group A	57	1	**58**	2270	Not applicable				84	1	**85**	3400	2	3	**5**	12050	14	4	**18**	3680
Group B	57	1	**58**	2250	Not applicable				84	1	**85**	3400	Not applicable				15	3	**18**	3490
Group C	57	1	**58**	2270	Not applicable				84	1	**85**	3400	2	3	**5**	12050	14	4	**18**	3680
Group D_1	57	1	**58**	2250	Not applicable				56	2	**58**	2100	63	0.1	**63**	2420	7	4	**11**	3560
Group D_2	57	1	**58**	2250	Not applicable				86	15	**100**	3400	Not applicable				14	4	**18**	3660
Group D_3	57	1	**58**	2250	93	24	**117**	3790	56	2	**58**	2090	Not applicable				12	3	**15**	4060
Group E_1	57	1	**58**	2250	22	27	**49**	12050	86	15	**100**	3400	Not applicable				14	4	**18**	3650
Group E_2	57	1	**58**	2250	22	27	**49**	12050	56	2	**58**	2100	63	0.1	**63**	2420	8	3	**11**	3580
Group E_3	57	1	**58**	2250	92	23	**115**	3790	56	2	**58**	2080	2	3	**5**	12050	11	3	**15**	3710
No Action	80	2	**82**	2080	Not applicable				56	2	**58**	2080	Not applicable				4	2	**6**	4020
Upper Bound Waste Volume																				
Alternative	**200 W Well Location**				**ERDF Well Location**				**200E NW Well Location**				**200 E SE Well Location**				**River Well Location**			
	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD	I-129	Tc-99	**Total**	Yr AD
Group A	57	1	**58**	2270	Not applicable				93	10	**103**	3390	2	3	**5**	12050	14	4	**18**	3650
Group B	57	1	**58**	2250	Not applicable				123	13	**136**	3290	Not applicable				17	4	**21**	3480
Group C	57	1	**58**	2270	Not applicable				93	10	**103**	3390	2	3	**5**	12050	14	4	**18**	3650
Group D_1	57	1	**58**	2250	Not applicable				56	2	**58**	2090	72	16	**88**	3380	10	5	**14**	3540
Group D_2	57	1	**58**	2250	Not applicable				95	16	**111**	3380	Not applicable				15	5	**19**	3630
Group D_3	57	1	**58**	2250	95	25	**120**	3800	56	2	**58**	2090	Not applicable				12	4	**16**	4050
Group E_1	57	1	**58**	2250	22	27	**49**	12050	95	16	**111**	2690	Not applicable				14	4	**18**	3670
Group E_2	57	1	**58**	2250	22	27	**49**	12050	56	2	**58**	2090	72	16	**88**	3340	8	3	**11**	3580
Group E_3	57	1	**58**	2250	93	23	**116**	3800	56	2	**58**	2090	2	3	**5**	12050	12	4	**15**	3730
No Action	Not applicable																			

(a) MCL for Tc-99 is 900 pCi/L and for I-129 is 1 pCi/L.
(b) Some of the numbers do not add exactly due to rounding.

Table 3.12. Highest Percentage of Maximum Concentration Levels (MCLs) from 10,200 to 12,050 AD - All Due to Uranium[(a)]

	Hanford Only Waste Volume					Upper Bound Waste Volume				
Alternative	200 W Well	ERDF Well	200E NW Well	200 E SE Well	River Well	200 W Well	ERDF Well	200E NW Well	200 E SE Well	River Well
	%	%	%	%	%	%	%	%	%	%
Group A	<0.1		0.1	1	<0.1	<0.1		55	1	2
Group B	3		3	NA	3	4		58	NA	5
Group C	<0.1	NA	0.1	1	<0.1	<0.1	NA	55	1	<0.1
Group D_1	<0.1		0.1	0.1	1	0.1		55	1	3
Group D_2	<0.1		2.0		<0.1	0.1		56		2
Group D_3	<0.1	4	0.1	NA	<0.1	0.1	4	55	NA	2
Group E_1	<0.1	4	0.3		<0.1	0.1	4	55		2
Group E_2	<0.1	4	0.1	0.1	0.1	0.1	4	55	<0.1	2
Group E_3	<0.1	<0.1	0.1	1	<0.1	<0.1	0	55	1	2
No Action	<0.1	NA	13	NA	0.3	Not applicable				

(a) MCL for uranium is 30 micrograms per liter.

Maximum doses from drinking water containing combined radionuclide concentrations predicted at all lines of analysis in groundwater for any of the alternatives and waste volumes fall below 1 mrem/yr for the first 1,000 years after disposal, and below the 4 mrem/yr drinking water standard,[(a)] that is used as a benchmark for performance, for the entire 10,000-year period of analysis. The combined dose from drinking maximum radionuclide concentrations predicted adjacent to the Columbia River is less than 0.1 mrem/yr for about 9,000 years and does not exceed 1 mrem/yr for the 10,000-year period of analysis. Results from modeling indicate potential increases in the dose near the end of the 10,000-year period because of the arrival of uranium in groundwater.

LLW disposed of prior to September 1987 may contain hazardous chemical constituents, but no specific requirements existed to account for or report the content of hazardous chemical constituents in this category of LLW. As a consequence, analysis of these constituents and estimated impacts based on the limited amount of information on estimated inventories and waste disposal locations would be subject to substantial uncertainty at this time. (Additional discussion on uncertainties is presented in Section 3.5.) Regardless the fate of these chemical-bearing wastes would be capped under all of the alternative groups. A distinction as to their fate would, however, be made for the No Action Alternative where the LLBGs would not be capped.

(a) Drinking water standards promulgated by the EPA as Primary Drinking Water Standards (40 CFR 141) under the Safe Drinking Water Act are applicable to treated water at the tap, and therefore are not directly applicable to groundwater quality. However, the 4 mrem/yr standard provides a benchmark against which to compare the values shown in the figures.

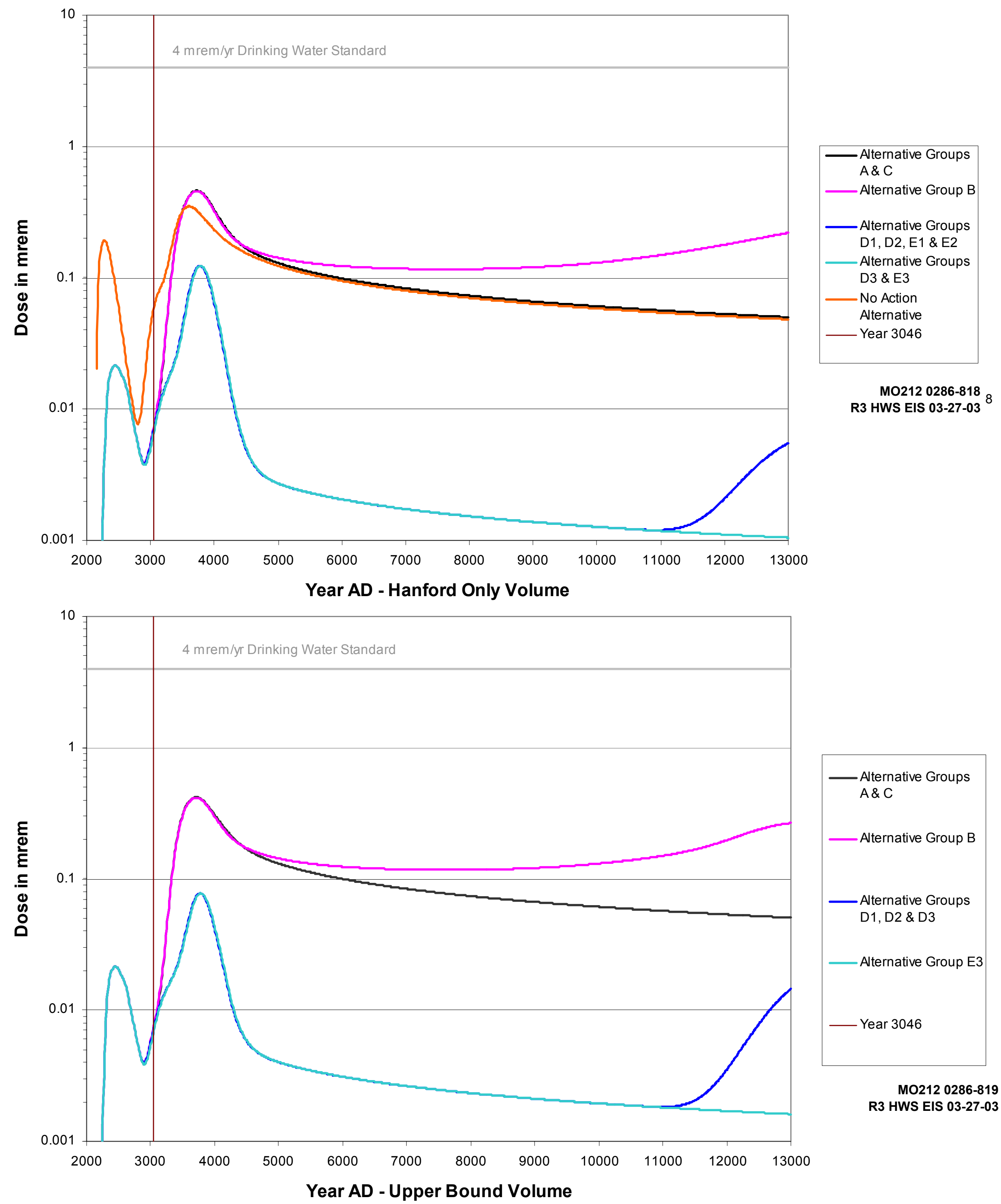

Figure 3.4. Annual Dose from Drinking Water Containing Maximum Concentrations of Radionuclides in Groundwater at 1 km Downgradient from the 200 West Area Disposal Facilities as a Function of Calendar Year, Hanford Only and Upper Bound Waste Volumes

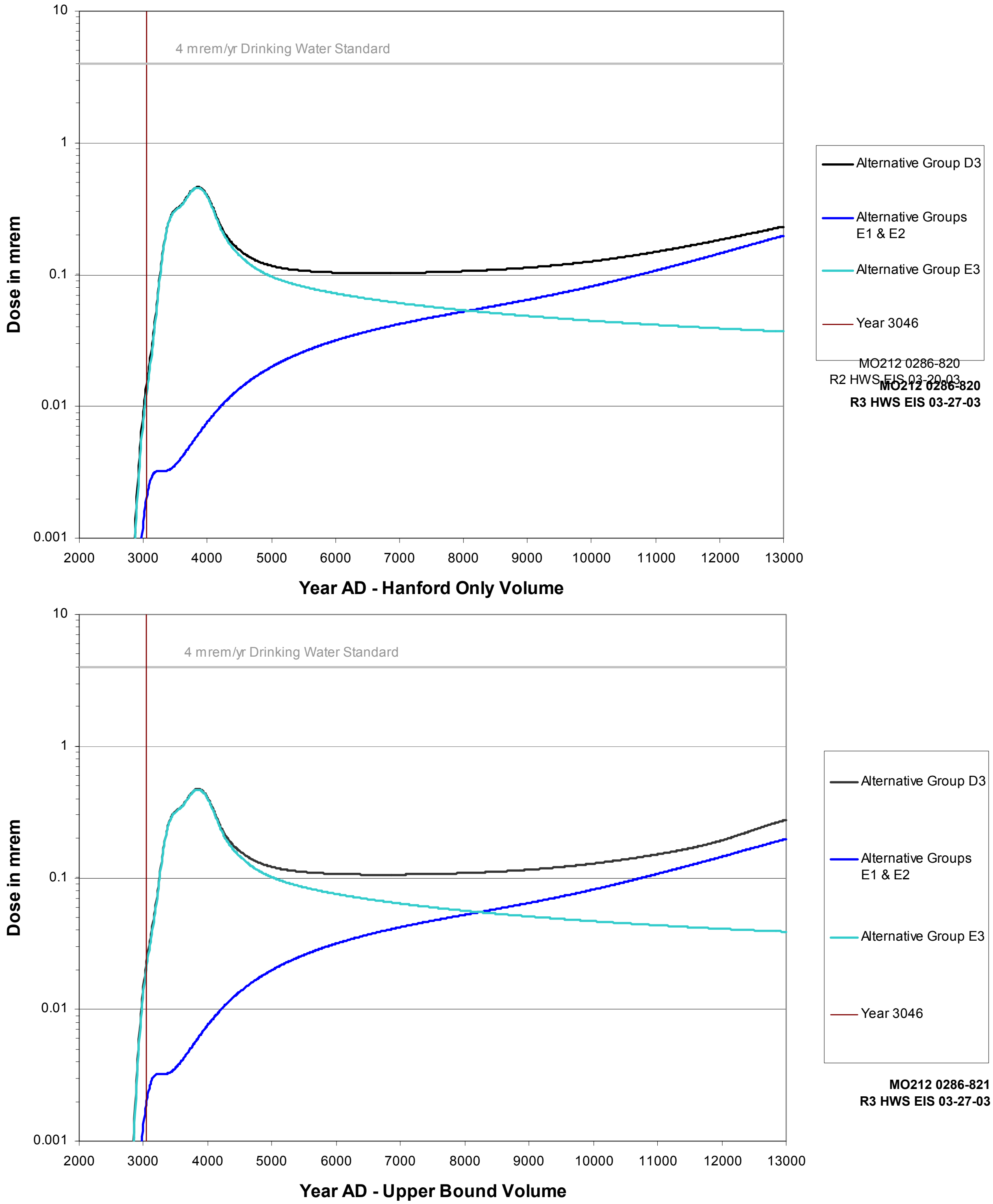

Figure 3.5. Annual Dose from Drinking Water Containing Maximum Concentrations of Radionuclides in Groundwater at 1 km Downgradient from ERDF as a Function of Calendar Year, Hanford Only and Upper Bound Waste Volumes

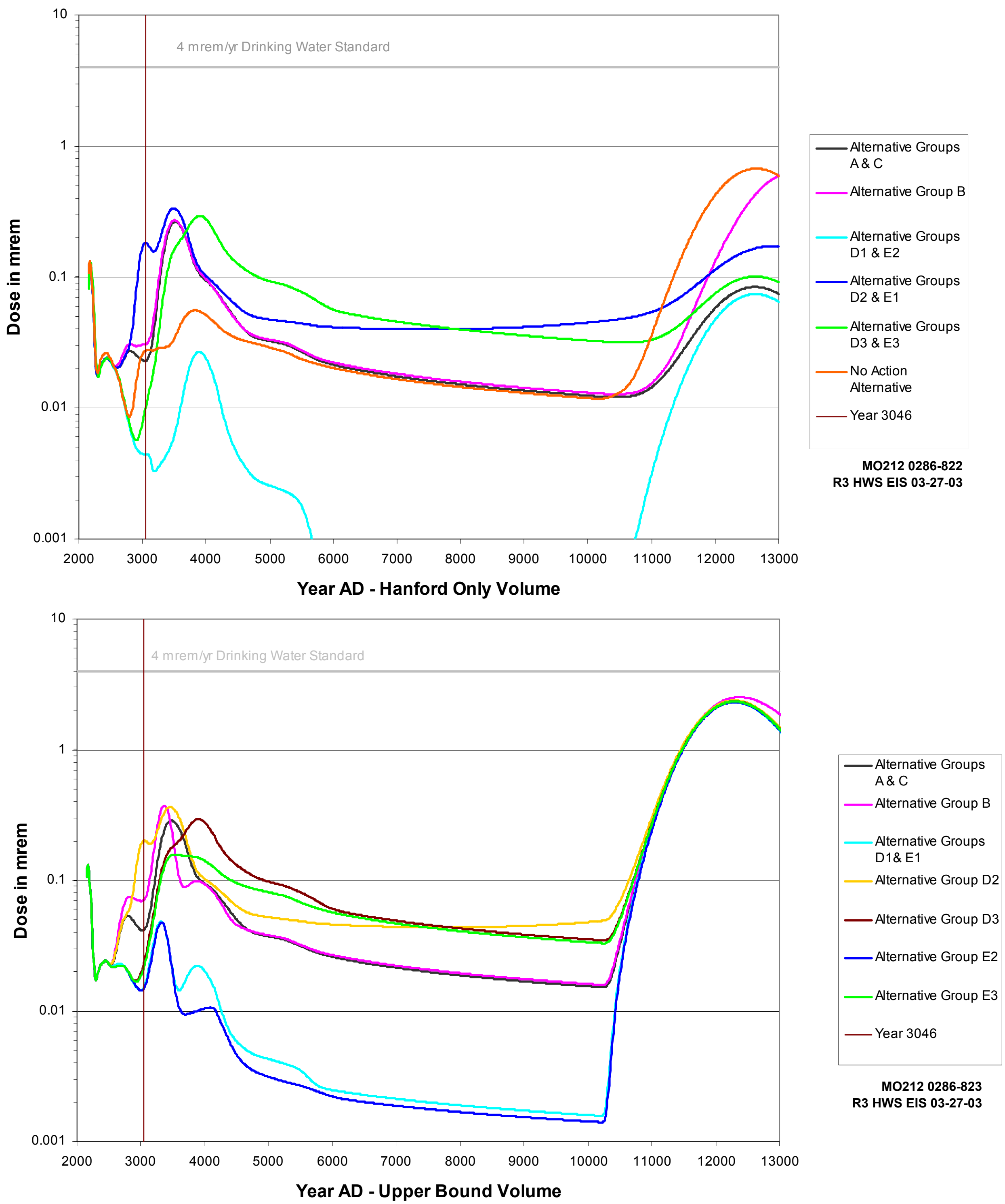

Figure 3.6. Annual Dose from Drinking Water Containing Maximum Concentrations of Radionuclides in Groundwater at 1 km Northwest Downgradient from the 200 East Area as Disposal Facilities as Function of Calendar Year, Hanford Only and Upper Bound Waste Volumes

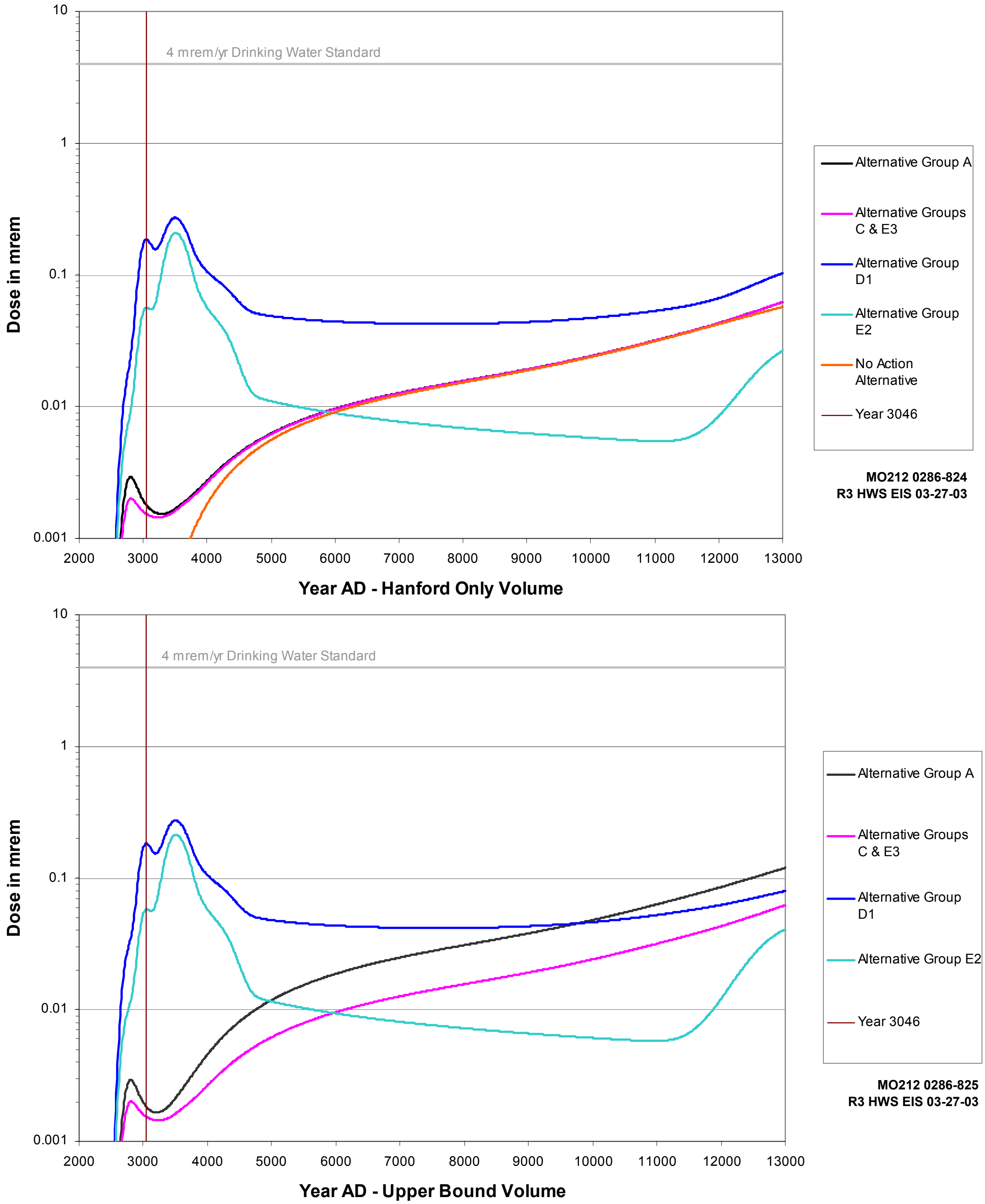

Figure 3.7. Annual Dose from Drinking Water Containing Maximum Concentrations of Radionuclides in Groundwater at 1 km Downgradient Southeast from the 200 East Area Disposal Facilities as a Function of Calendar Year, Hanford Only and Upper Bound Waste Volumes

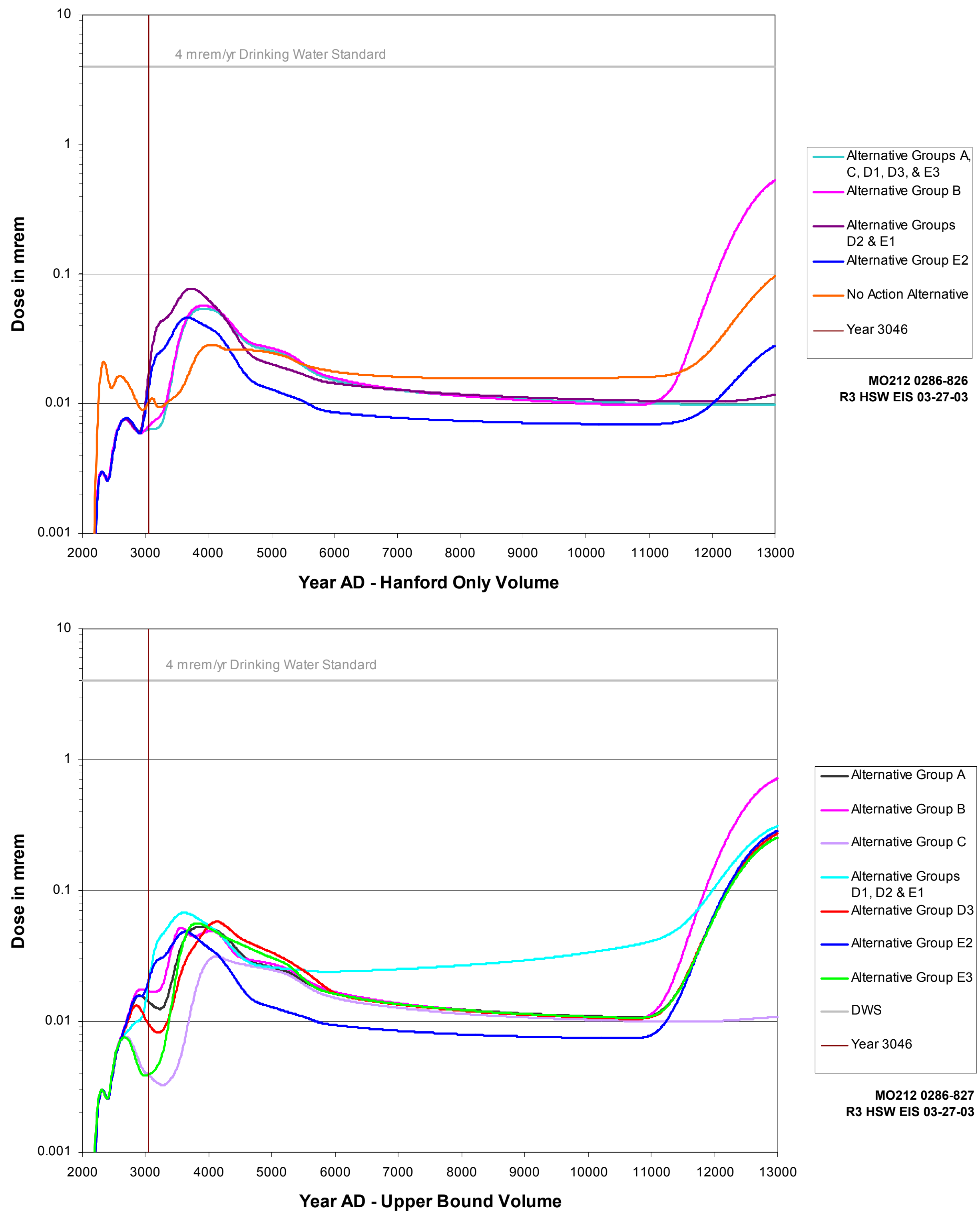

Figure 3.8. Annual Dose from Drinking Water Containing Maximum Concentrations of Radionuclides in Groundwater Near the Columbia River as a Function of Calendar Year, Hanford Only and Upper Bound Waste Volumes

Estimated inventories of hazardous chemical constituents associated with LLW and MLLW disposed of after 1988 being considered under each alternative group would be expected to be found at trace levels. MLLW, which would be expected to contain the majority of hazardous chemical constituents, would undergo predisposal solidification to stabilized waste forms and containment and thermal treatment to remove organic chemical components of the MLLW. This waste treatment would be done to meet current waste acceptance criteria and land disposal restrictions before being disposed of in permitted MLLW facilities. Consequently, groundwater quality impacts from these constituents would not be expected to be substantial.

Based on the analysis presented in Section 5.3 and Appendix G, Alternative Groups D and E tend to be the most protective.

3.4.4 Geologic Resources

Although large quantities of gravel, silt/loam, and basalt would be needed for capping waste disposal facilities upon closure, these resources are readily available in the Area C borrow pit. A comparison among the alternatives of quantities that would be needed is shown in Table 3.13.

Table 3.13. Comparison of Commitments of Geologic Resources, Millions of $m^{3(a)}$

Alternative	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume
Alternative Group A	2.4	2.4	2.5
Alternative Group B	2.5	2.6	2.8
Alternative Group C	2.2	2.2	2.3
Alternative Group D	2.2	2.2	2.3
Alternative Group E	2.2	2.2	2.3
No Action Alternative	1.4	1.4	Not Applicable
(a) 1 m^3 = about 1.3 yd^3.			

3.4.5 Ecological Resources

Impacts on ecological resources, other than disturbance of shrub-steppe habitat, were determined to be low and sufficiently similar among the alternative groups and the No Action Alternative that they would not be expected to be an important discriminator in the alternative selection process. Disturbance of shrub-steppe habitat would be related to alternative groups making use of the near PUREX disposal facility, which is in an area that was not burned over in the 24 Command Fire of June 2000. There, the area of disturbance ranged from zero in the case of Alternative Group**s** B, D_2, D_3, and E_1 to 32 ha (79 ac) for Alternative Group A. Other alternative groups and the No Action Alternative were intermediate with 5–25 ha (12-62 ac) of disturbance depending on waste volume disposed of (see Table 3.4). Conclusions regarding potential impacts on terrestrial biota at the disposal facility near PUREX were based on spring/summer surveys conducted from 1998 to 2002. Conclusions regarding potential impacts on aquatic and riparian biota near and in the Columbia River were based on an ecological risk assessment of potential future releases from waste sites through groundwater to the river. Details of the analysis are presented in Section 5.5 with additional information in Appendix I.

3.4.6 Socioeconomics and Environmental Justice

Implementation of any of the HSW EIS alternative groups or the No Action Alternative would have small and barely differentiable impacts on local socioeconomic infrastructure, including housing, schools, medical support, traffic, etc. Details of the analysis are presented in Section 5.6. No particular distinction was made among any of the alternatives for impacts on environmental justice (see Section 5.13).

3.4.7 Cultural, Aesthetic, and Scenic Resources

The principal potential for impacts on cultural resources in implementing any of the alternative groups or the No Action Alternative would be associated with disturbance of the surface and near surface portions of the Area C borrow pit. Although archeological sites might be found in Area C, a recent field reconnaissance failed to reveal any archeological sites or artifacts on the surface. Because construction would be halted in the event that an artifact of possible cultural significance is found and will remain so until a professional evaluation is made, it is unlikely that impact to cultural resources would be an important discriminator among the alternatives. Details of the analysis are presented in Sections 5.7 and Appendix K.

No particular distinction was made among any of the alternative groups for impacts on aesthetic and scenic resources; the most noticeable change would be the potential impact on the viewshed from nearby prominences as a result of obtaining capping materials from Area C (see Section 5.12).

3.4.8 Transportation

The measure of impacts from transportation for comparison among the alternatives was taken as the number of fatalities resulting from transport of wastes and construction materials for the Hanford Only waste volume. Those impacts include offsite transport of MLLW for treatment in all Alternative Groups except B. These values are presented in Table 3.14. Details of the transportation analysis are presented in Section 5.8 and Appendix H.

Transport of wastes from offsite is the same for all alternative groups. The potential impacts of offsite transportation were previously evaluated in the WM PEIS and the WIPP SEIS-2 and are incorporated by reference (DOE 1997b and DOE 1997a, respectively). Impacts within the states of Oregon and Washington that might occur from shipping waste to and from the Hanford Site were analyzed and are summarized in Table 3.15.

Table 3.14. Summary Comparison of Radiological and Non-Radiological Transportation Impacts – Hanford Only Waste Volumes

Alternative	Radiological			Non-radiological		
	Incident-free		Accidents			
	Crew - Fatalities	Public - Fatalities	Accidents Fatalities	Number of Accidents	Accident Fatalities	Emissions Fatalities
Alternative Groups A, C, D, and E[(a)]	**0** (0.45)	**0** (0.15)	**0** (0.027)	**20**	**1** (0.52)	**0** (0.38)
Alternative Group B[(b)]	**0** (0.068)	**0** (0.055)	**0** (0.027)	**1** (0.78)	**0** (0.049)	**0** (0.28)
No Action Alternative[(c)]	**0** (0.075)	**0** (0.047)	**0** (0.024)	**1** (1.2)	**0** (0.055)	**1** (0.27)

Note: Public includes non-involved workers. Numbers in parentheses are the calculated values. Accidents and fatalities occur as whole numbers and calculated values are rounded to whole numbers.

(a) The impacts in these Alternative Groups are for the Hanford Only waste volume case. The differences between this case and the Upper and Lower Bound waste volume case of additional offsite-generated waste are shown in Table 3.15., for Oregon and Washington only. Impacts of nation-wide transport of wastes were discussed previously in the PEIS.

(b) Offsite shipments are minimal in Alternative Group B for all waste volume cases.

(c) There are no offsite shipments associated with the No Action Alternative.

Table 3.15. Impacts in Oregon and Washington from Offsite Shipments of Solid Wastes to and from Hanford

Shipping Segment	Radiological Impacts			Non-radiological Impacts		
	Incident Free Worker Fatalities	Incident Free Public Fatalities	Accident Fatalities	Number of Accidents	Accident Fatalities	Emissions Fatalities
Lower Bound Waste Volume						
Oregon	0.054	0.042	0.0017	2.2	0.0031	0.025
Washington	0.013	0.0093	0.00040	0.52	0.0080	0.0025
Total	**0** (0.067)	**0** (0.051)	**0** (0.0021)	**3** (2.7)	**0** (0.039)	**0** (0.031)
Upper Bound Waste Volume						
Oregon	0.17	0.11	0.10	3.6	0.063	0.047
Washington	0.039	0.024	0.026	0.85	0.015	0.011
Total	**0** (0.21)	**0** (0.13)	**0** (0.13)	**5** (4.5)	**0** (0.078)	**0** (0.058)

As shown in the Table 3.15 transport of waste from offsite generators might result in two accidents in Oregon and 1 in Washington for the Lower Bound waste volume and 4 accidents in Oregon and one in Washington for the Upper Bound waste volume. No fatalities were forecast in either case.

Transport of TRU waste to WIPP for Alternative Groups A through E might result in 18 accidents and 3 fatalities, and for the No Action Alternative, 9 accidents and 1 fatality, although not predicted to occur in the states of Oregon or Washington.

One to four accidents were calculated to occur during transport of construction and capping materials for Alternative Groups A – E, and four accidents were estimated for the No Action Alternative. No fatalities were forecast in any case.

3.4.9 Noise

Since all alternatives would involve essentially the same activities, noise levels produced by those activities at any given point in time would be essentially the same. Noise was not considered to be an important impact element, because of distance to public receptors. Wildlife that might be disturbed by noise near the Area C borrow pit would likely move to more acceptable locations. Details of the analysis of noise are presented in Section 5.9 and Appendix J. Based on the level of activity associated with waste management operations and their location within the Hanford Site, noise levels are predicted to be well within allowable limits at locations occupied by members of the public.

3.4.10 Resource Commitments

Resources committed to implementing the various alternative groups and the No Action Alternative would include land, the vadose zone beneath the disposal facilities, groundwater beneath the disposal sites and on to where it empties into the Columbia River, various amounts of fossil fuel, electricity, steel, concrete, gravel, sand, gravel, silt/loam, basalt, water and other materials. Land Use and geologic resources have been described previously (Tables 3.9 and 3.13). Comparison of fossil fuel commitments among the alternatives is provided in Table 3.16. Alternative Groups A and B, and the No Action Alternative have generally higher demand for fossil fuels than the other alternatives because of additional construction and operation required. Details of the analysis of resource commitments are presented in Section 5.10.

3.4.11 Human Health and Safety

Comparison of human health and safety among the alternatives is expressed in terms of worker dose, dose to the public from atmospheric releases, accidents during the operational period, and long-term impacts via the groundwater pathway in the post-closure period. Details of the analyses are provided in Section 5.11 and Appendix F. Intruder scenarios and consequences are essentially the same for all alternative groups. The exception would be for the basement excavation scenario in the No Action Alternative where only the Trenches 31 and 34 containing MLLW are capped. The depth of capping material would be expected to preclude the occurrence of that scenario for those wastes.

Table 3.16. Comparison of Fossil Fuel Commitments Among the Alternatives[(a)]

Alternative	Diesel, m$^{3(b)}$			Gasoline, m^3			Propane, tonnes		
	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume
Alternative Group A	132,900	132,900	133,700	260	260	270	12,700	12,700	19,300
Alternative Group B	136,600	136,700	140.600	340	340	430	23,500	23,500	38,300
Alternative Group C	65,900	65,900	66,700	260	260	270	12,700	12,700	19,300
Alternative Group D	65,900	65,900	66,700	260	260	270	18,800	20,300	27,800
Alternative Group E	65,900	65,900	66,700	260	260	270	18,800	20,300	27,800
No Action Alternative	188,600	188,700	Not Applicable	48	50	Not Applicable	3,560	3,560	Not Applicable

(a) 1 tonne = about 1.1 ton.
(b) Includes 120,100 m^3 for ILAW in Alternative Groups A and B, 53,100 m^3 for ILAW in Alternative Groups C, D, and E, and 183,400 m^3 for ILAW in the No Action Alternative.

3.4.11.1 Operational Period – Normal Operations

Radiological impacts to workers from air emissions and routine occupational radiation exposure through 2046 are compared among the alternatives in Table 3.17. No latent cancer fatalities (LCFs) would be expected from doses associated with any of the action alternatives; however, one LCF might be inferred from the No Action Alternative.

Radiological impacts on the public from the release of radioactive material to the atmosphere during routine operations through 2046 are compared among the alternatives in Table 3.18. (For more details, see Section 5.11.) No latent cancer fatalities would be expected from the doses presented.

3.4.11.2 Operational Period – Accidents

The consequences of industrial accidents on workers through 2046 are compared among the alternatives in Table 3.19.

Impacts on public health and safety from processing chemicals through 2046 are compared among the alternatives in Table 3.20.

For chemicals, there is no difference in impacts between the Hanford Only and the Lower Bound Volume cases because the difference in MLLW processing is small (0.4 percent volume difference).

Table 3.17. Comparison of Worker Health Impacts

Alternative	Non-Involved Worker, mrem[a]			Occupational Exposure, person-rem[b]		
	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume
Alternative Group A	0.48	0.58	0.89	765	766	774
Alternative Group B	0.51	0.60	0.92	772	773	786
Alternative Group C	0.48	0.48	0.89	765	765	773
Alternative Groups D and E	0.48	0.58	0.89	767	767	778
No Action Alternative	0.48	0.58	Not Applicable	873	873	Not Applicable

(a) Lifetime dose to the hypothetical maximally exposed individual (MEI) based on the industrial worker scenario
(b) Work force external exposure from proximity to wastes

Table 3.18. Comparison of Public Health Impacts from Emissions of Radioactive Material to the Atmosphere During Routine Operations

Alternative	Population Dose, person-rem[a]			MEI Lifetime Dose, mrem[b]		
	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume	Hanford Only Waste Volume	Lower Bound Waste Volume	Upper Bound Waste Volume
Alternative Groups A, C, D, and E	0.11	0.13	0.27	0.0016	0.0018	0.0038
Alternative Group B	0.15	0.17	0.22	0.0021	0.0023	0.0032
No Action Alternative	0.078	0.094	Not Applicable	0.0011	0.0013	Not Applicable

(a) Collective population dose within 80 km (50 mi) based on the offsite resident gardener scenario as applied to average individuals in the population (see Appendix F).
(b) Lifetime dose to the hypothetical MEI based on the offsite resident gardener scenario.

Table 3.19. Comparison of Consequences of Industrial Accidents on Workers Among the Alternatives

Alternative	Total Recordable Cases		Lost work-day Cases		Lost Work Days	
	Hanford Only and Lower Bound Volume Cases	Upper Bound Volume Case	Hanford Only and Lower Bound Volume Cases	Upper Bound Volume Case	Hanford Only and Lower Bound Volume Cases	Upper Bound Volume Case
Alternative Groups A, C, D, and E	620	640	260	260	8900	9200
Alternative Group B	640	660	260	270	9000	9300
No Action Alternative	770	NA	320	Not Applicable	10,900	Not Applicable

Table 3.20. Comparison of Health Impacts on the Public from Routine Atmospheric Releases of Chemicals

Alternative	Hazard Quotient[(a)]		Cancer Incidence[(b)]	
	Hanford Only and Lower Bound Waste Volumes	Upper Bound Waste Volume	Hanford Only and Lower Bound: Waste Volumes	Upper Bound Waste Volume
Alternative Groups A, C, D, and E	1.1E-5	5.0E-5	1.2E-10	4.2E-10
Alternative Group B	3.8E-4	4.2E-4	7.0E-9	7.3E-9
No Action Alternative	5.3E-6	Not Applicable	8.9E-11	Not Applicable

(a) Peak annual hazard quotient values to the hypothetical MEI based on the offsite resident gardener scenario.
(b) Lifetime risk of cancer incidence to the hypothetical MEI based on the offsite resident gardener scenario.

No particular distinction was made among any of the alternatives for operational accidents involving either radiological or chemical materials. Details are provided in Section 5.11.

3.4.11.3 Post-Closure Period

Scenarios for intrusion into waste sites, soon after the time when active institutional control cannot be relied upon to prevent such action, include drilling through the waste in constructing a well and excavation of a basement for a dwelling house. The importance of these scenarios lies in the presence of short-lived radionuclides that may occur in quantity. In the case of drilling, the existence of a cap over the waste is assumed to constitute no deterrence. Inasmuch as the highest concentrations of radionuclides that are used in this analysis are common to all alternatives there would be no distinction among the alternatives based on this type of intrusion (the highest concentrations of radionuclides were determined to occur in waste previously disposed of in LLBGs). In the case of excavation for a basement, the depth to the top of the disposed waste is deep enough in all alternatives for which the waste sites are capped that the scenario is not considered credible. In the No Action Alternative where it is assumed that only the MLLW sites are capped, the depth to the top of the waste would be much less and waste could be encountered in the excavation. In any event these intruder scenarios, save for the No Action Alternative, do not provide a basis for discriminating among the alternatives. Details of these intruder analyses are presented in Section 5.11.2.2 and Appendix F.

Insights regarding the relative potential for impacts on the public over the long term may be obtained by examining the annual dose a hypothetical gardener might receive, if the individual were to intrude on the Hanford Site, drill a well (on the order of 80 to 90 m deep [about 250 ft]) into a contaminated aquifer, spread the drilling mud about the garden plot and use the well water for both domestic and irrigation purposes. Hypothetical wells near the disposal facilities are located 1 km (0.6 mi) from the aggregated waste sites in order to capture the front of the combined plume from the individual trenches. In addition, a well is modeled near the Columbia River where an individual might drill a shallow well rather than use debris-containing water directly from the river. Plots of the annual doses to the hypothetical resident gardener are provided in Figures 3.9 to 3.13. (The vertical line represents 1,000 years after closure of the disposal facilities.) Since the plots for the Hanford Only and Lower Bound waste volumes are essentially the same, plots are provided only for the Hanford Only and Upper Bound waste volumes. As may be seen in the figures, there are differences in the annual doses over time as a function of alternative, however the maximum values are all small compared to DOE's 25 mrem all pathways limit and, except for the period beginning about 9,000 years after disposal, the doses are below the drinking water standard of 4 mrem/yr.

To account for the possibility that the hypothetical gardener had a sauna, or hot tub; or in the case of a Native American, a sweat lodge, the annual dose to such an individual at any time during the 10,000-year analysis period was also determined. Plots of the annual doses to the resident gardener are compared among the alternatives in Figures 3.14 to 3.18. (Note that the vertical scale of Figure 3.16 is 10 times that for the remaining figures in the set.) The much higher doses associated with the sauna/sweat lodge scenario are attributable to inhalation of radionuclides released as a result of elevated water temperatures used in saunas or sweat lodges. For all alternatives the annual dose is at or less than 4 mrem for the first 1,000 years. Late in the 10,000-year period there is considerable difference among the alternatives with the risk of a latent cancer fatality ranging up to about 1 in 10 (about 2.5 rem/yr – 70 yr occupancy) for well locations on the 200 Areas plateau to about 3 in 100 (about 0.8 rem/yr) for a well adjacent to the Columbia River. This rise is due primarily to the late arrival of uranium in quantity in groundwater at some sites.

For perspective, it may be noted that a hypothetical gardener with sauna or sweat lodge, and using water drawn from the Columbia River at Priest Rapids upstream of the Hanford Site, could receive an annual dose of about 90 mrem from upstream sources of uranium (based on 5-year average measurements of the concentration of uranium in Columbia River water at Priest Rapids (Poston et al. 2002). Over a 70-yr period at such an annual dose a probability of latent cancer fatality of 0.004 would be inferred.

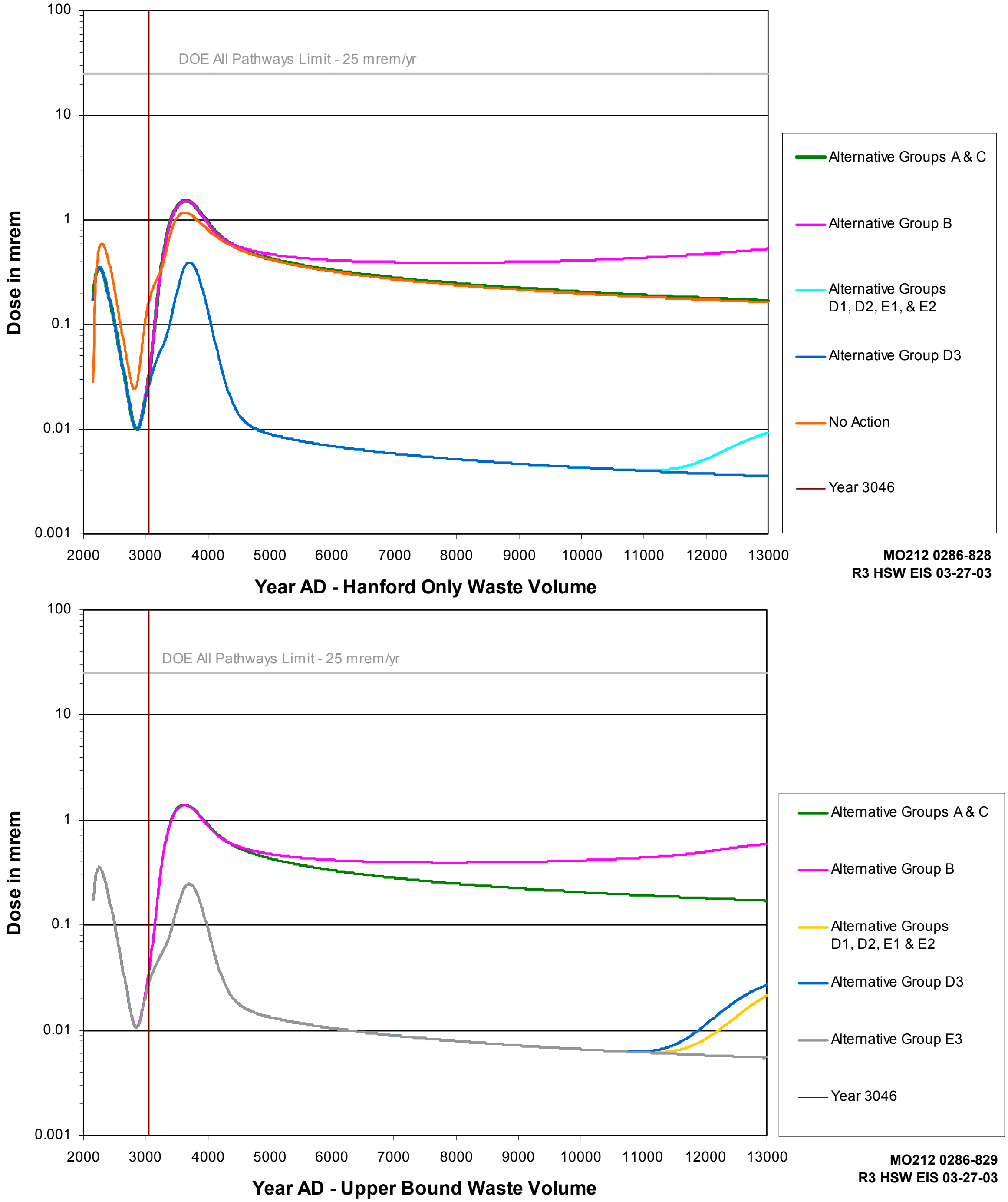

Figure 3.9. Annual Dose to a Hypothetical Resident Gardener at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient from 200 West Area

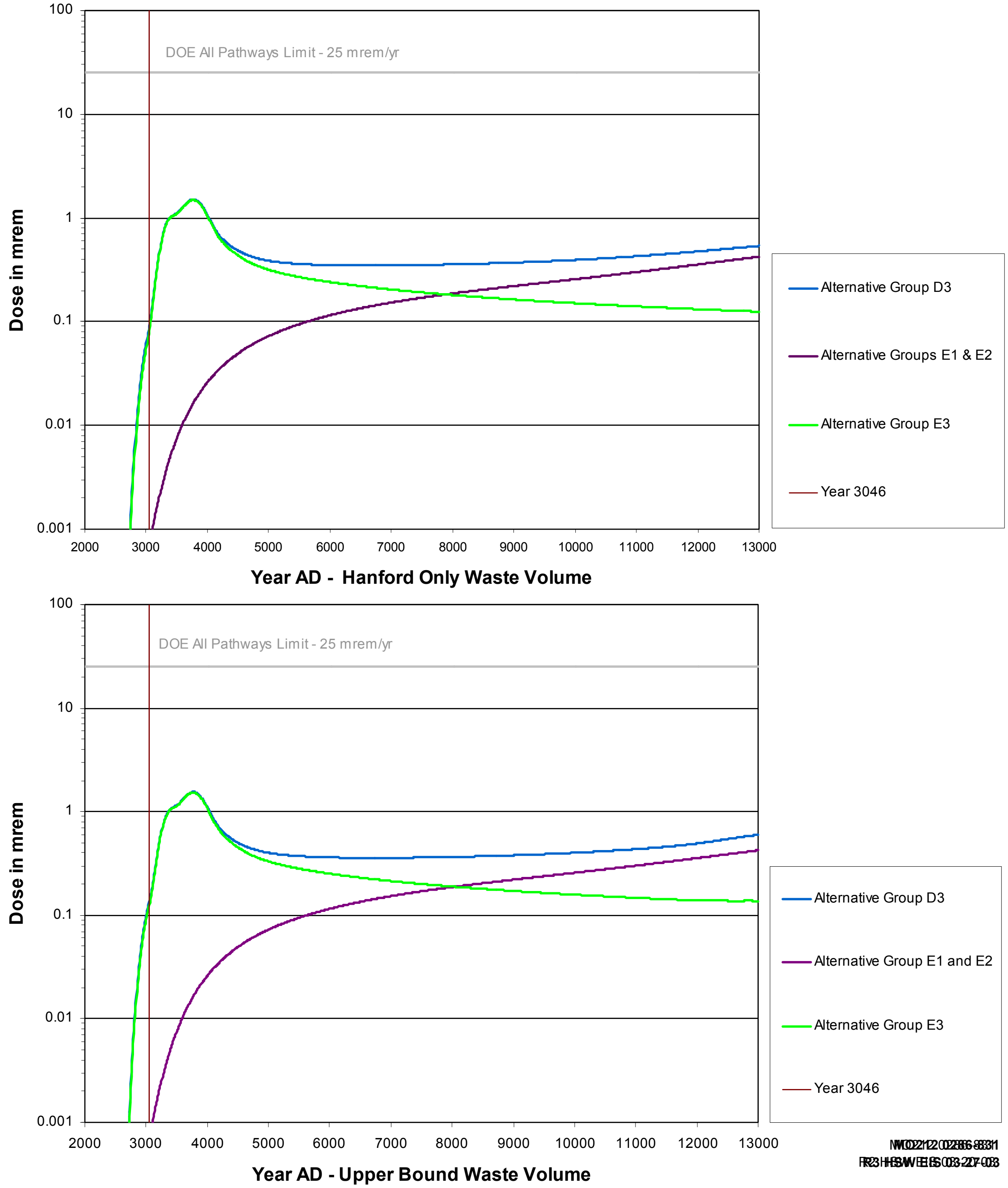

Figure 3.10. Annual Dose to a Hypothetical Resident Gardener at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient from ERDF

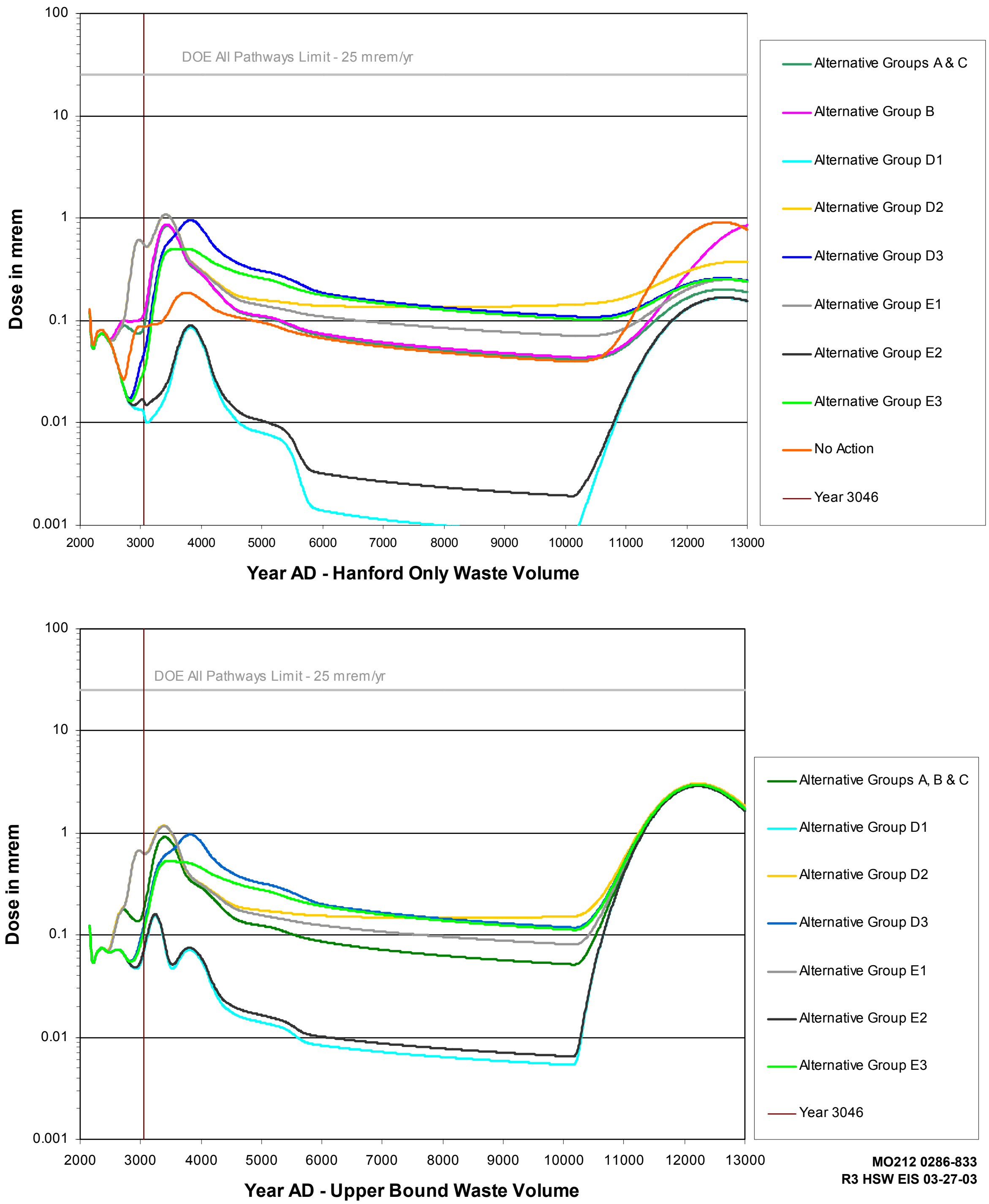

Figure 3.11. Annual Dose to a Hypothetical Resident Gardener at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient Northwest from 200 East Area

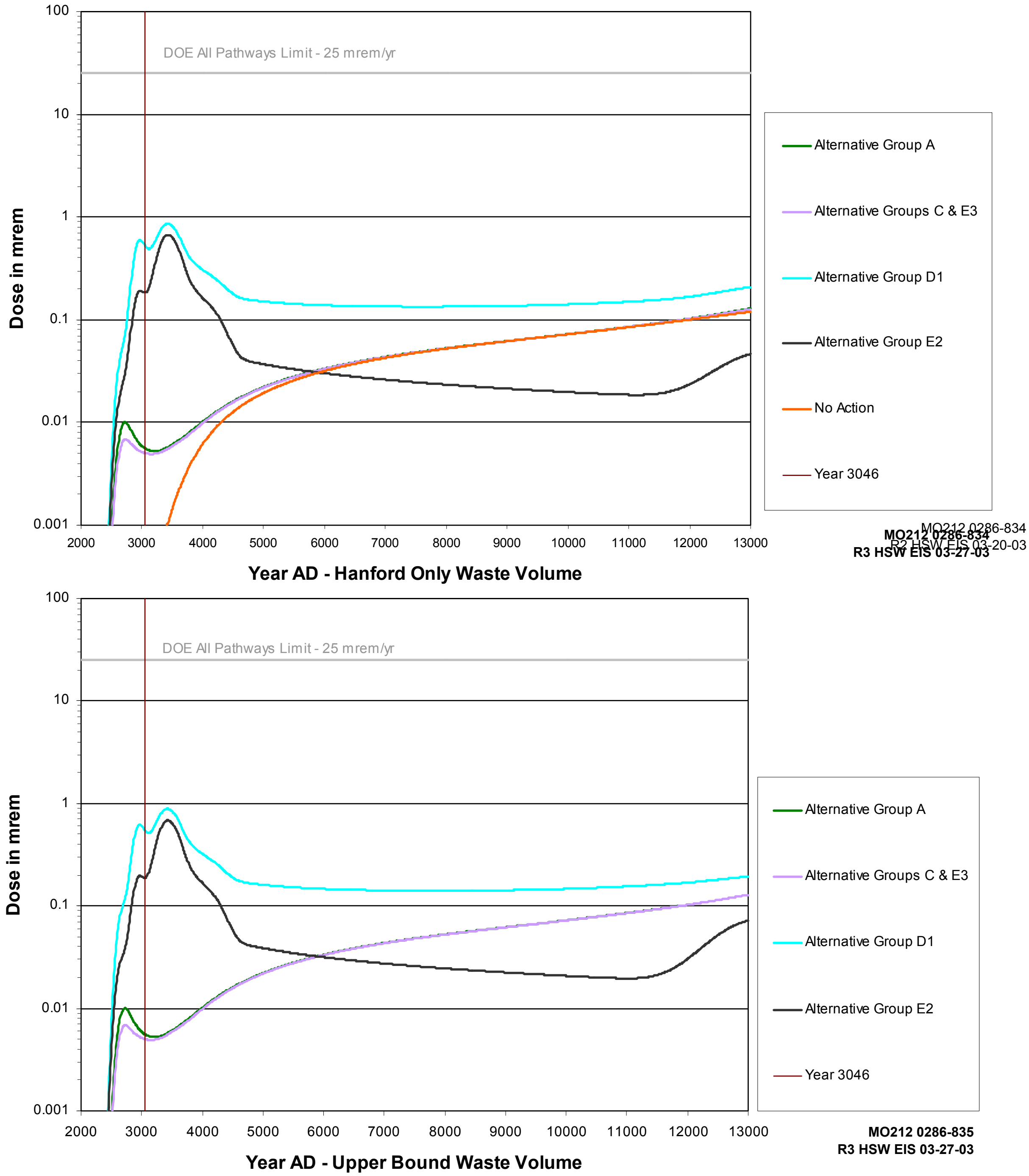

Figure 3.12. Annual Dose to a Hypothetical Resident Gardener at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient Southeast of 200 East Area

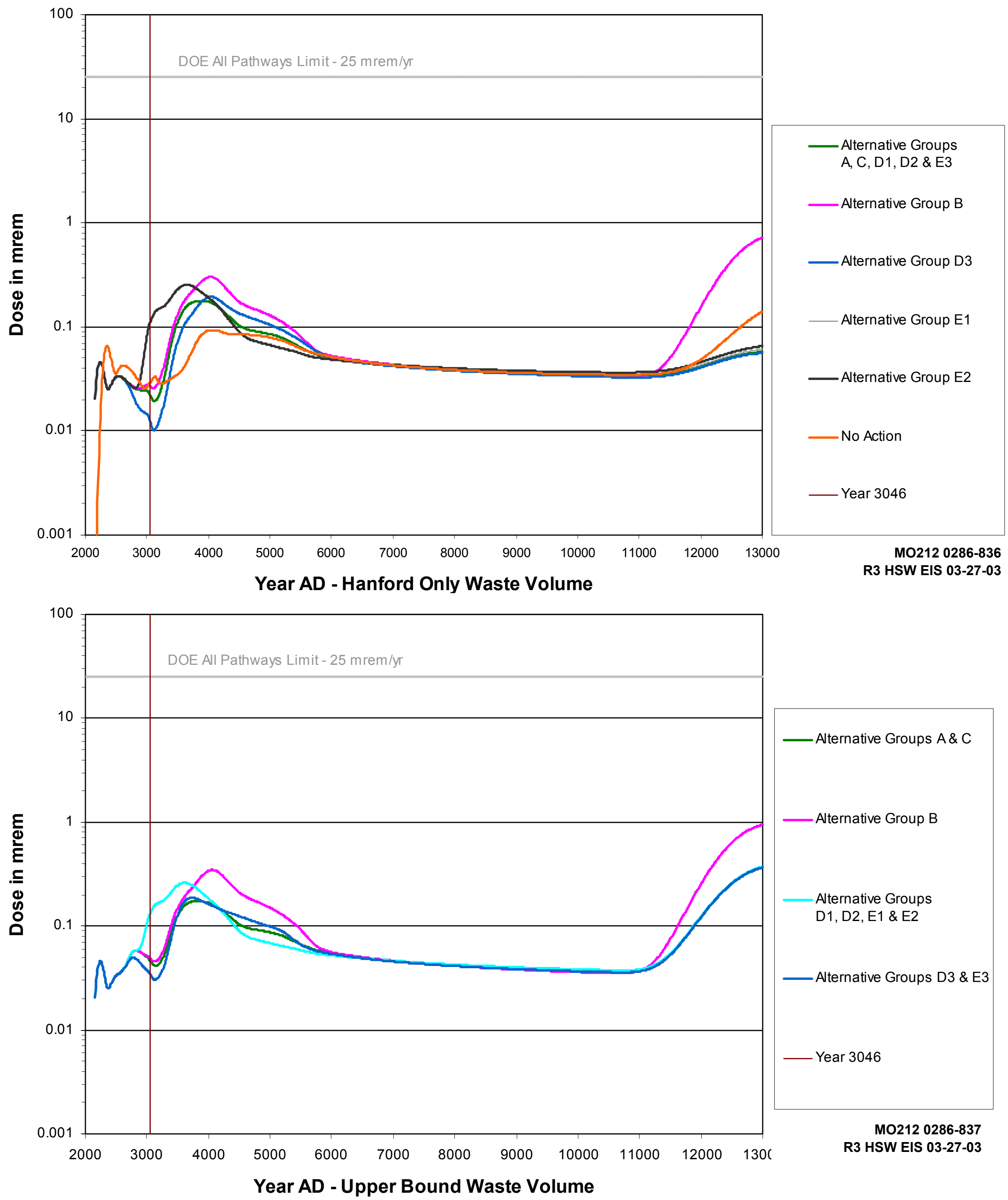

Figure 3.13. Annual Dose to a Hypothetical Resident Gardener at Various Times over 10,000 Years Using Water from a Well Adjacent to the Columbia River

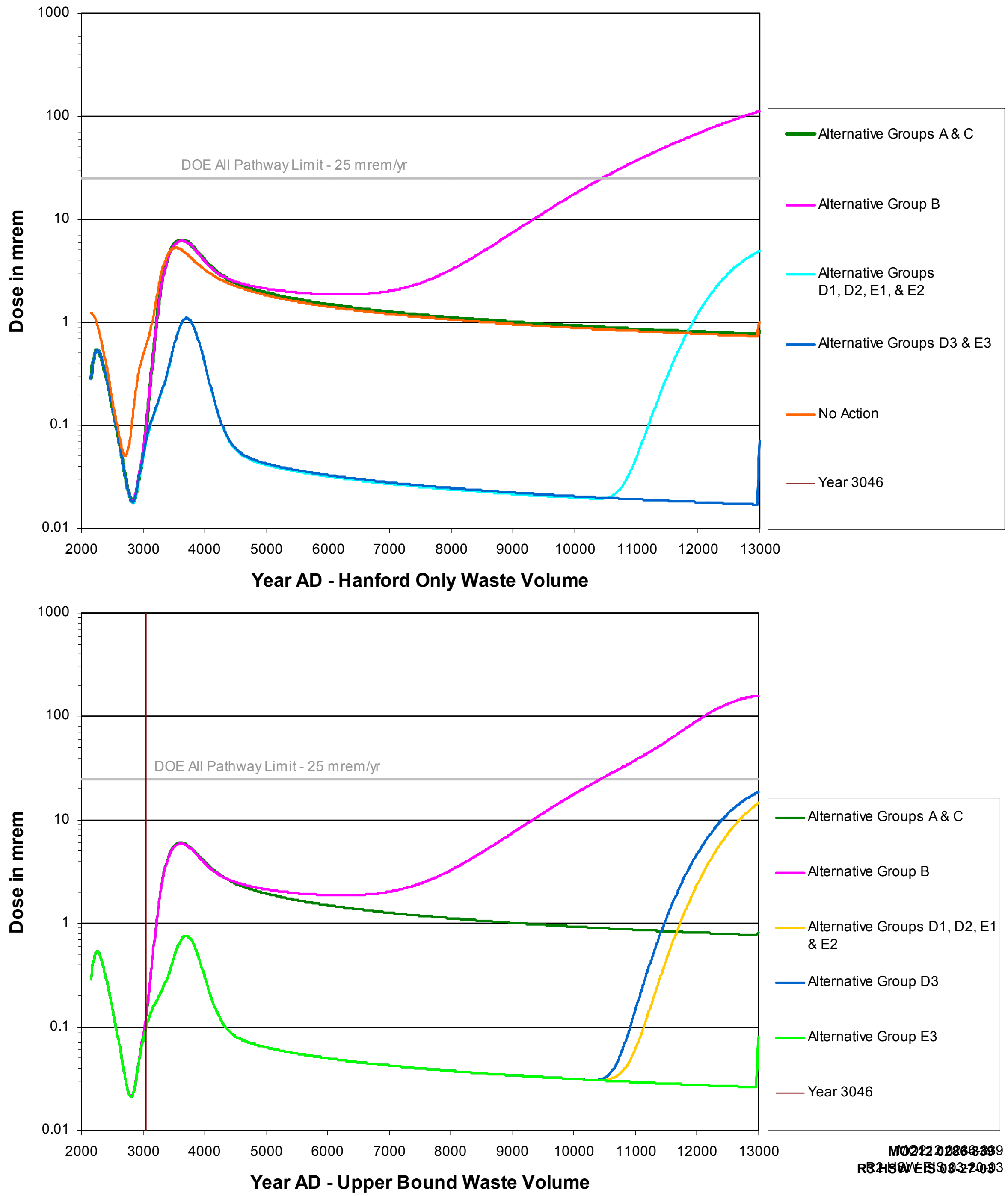

Figure 3.14. Annual Dose to a Hypothetical Resident Gardener with Sauna/Sweat Lodge at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient from 200 West Area

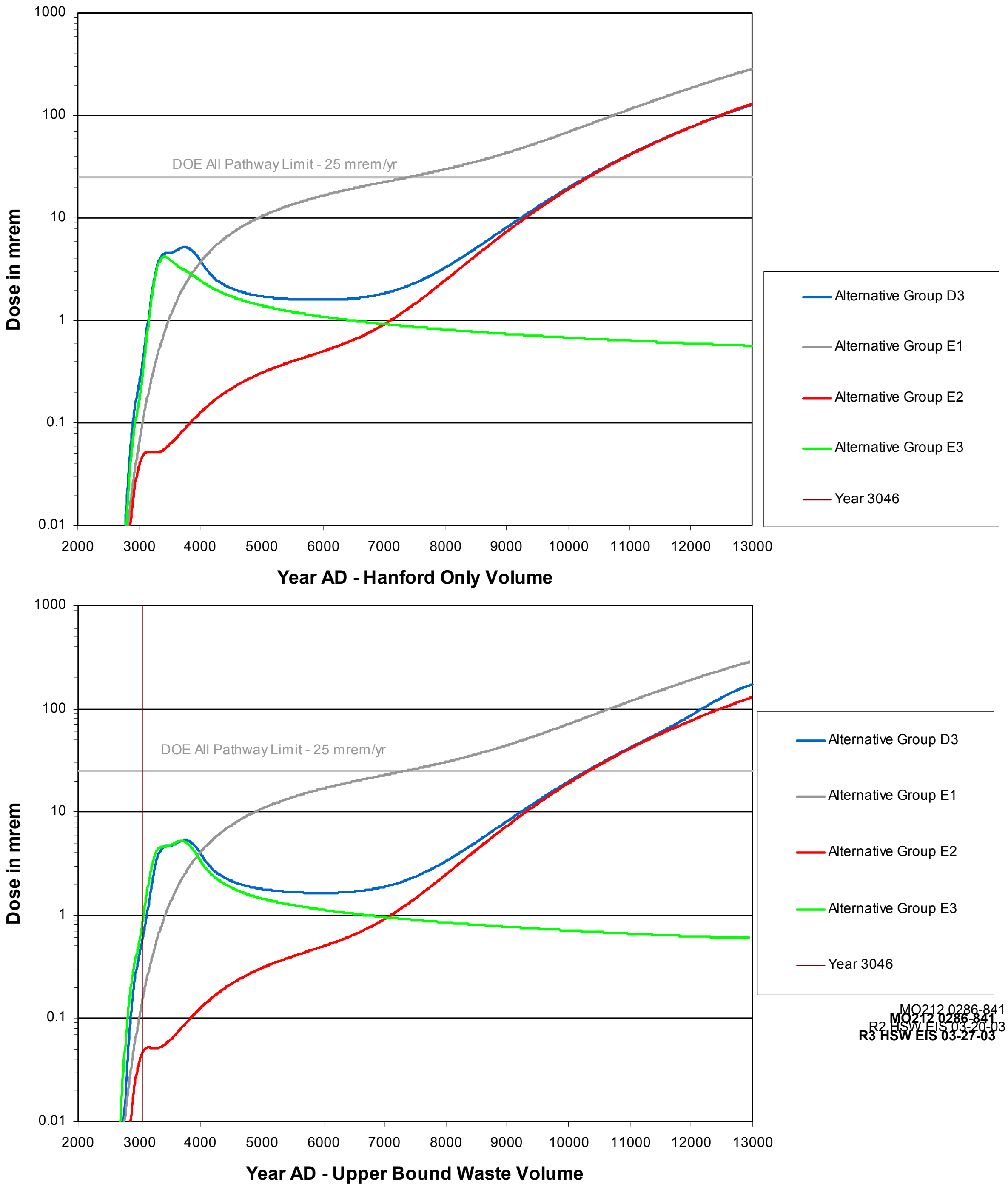

Figure 3.15. Annual Dose to a Hypothetical Resident Gardener with Sauna/Sweat Lodge at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient from ERDF

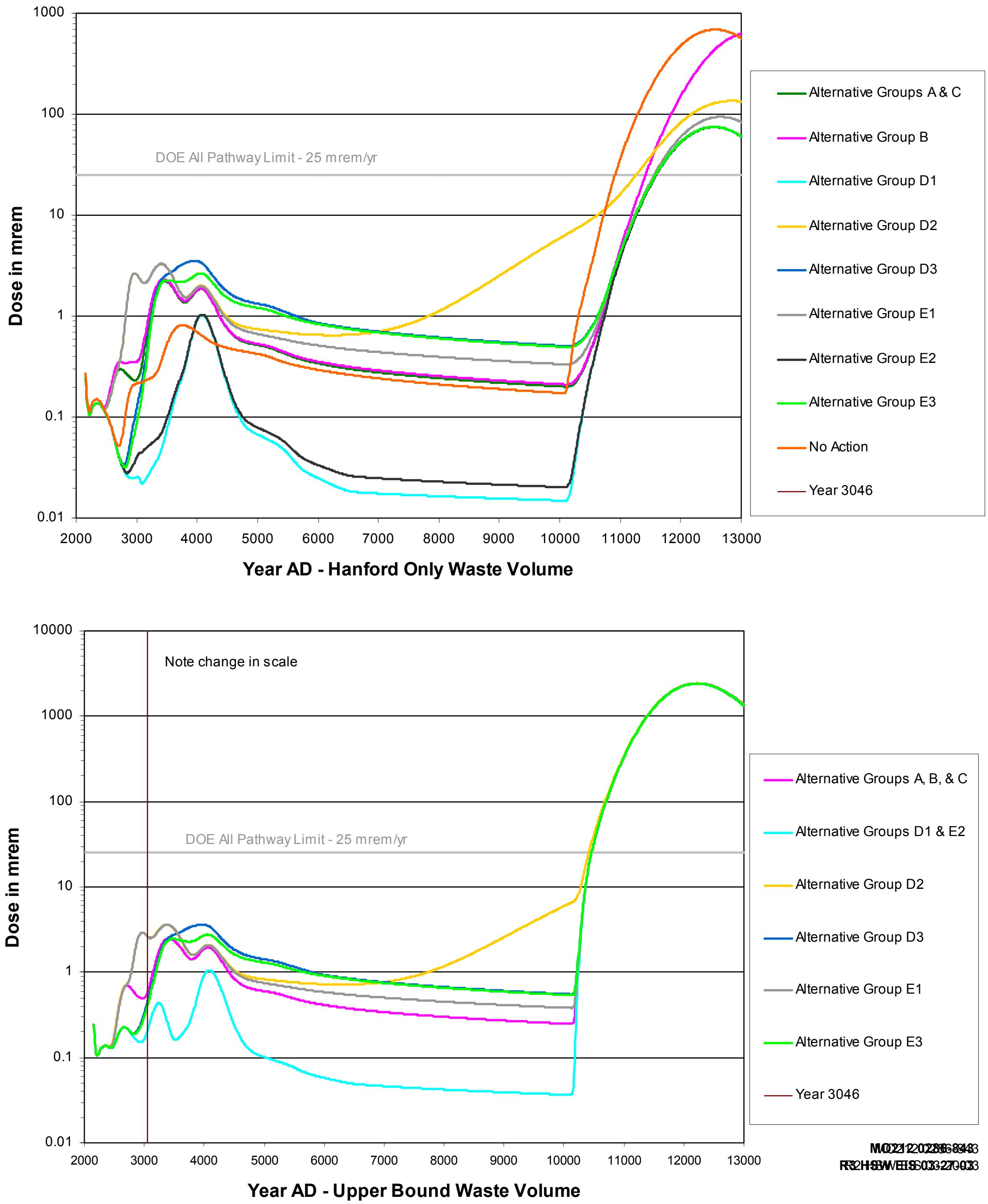

Figure 3.16. Annual Dose to a Hypothetical Resident Gardener with Sauna/Sweat Lodge at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient Northwest from 200 East Area

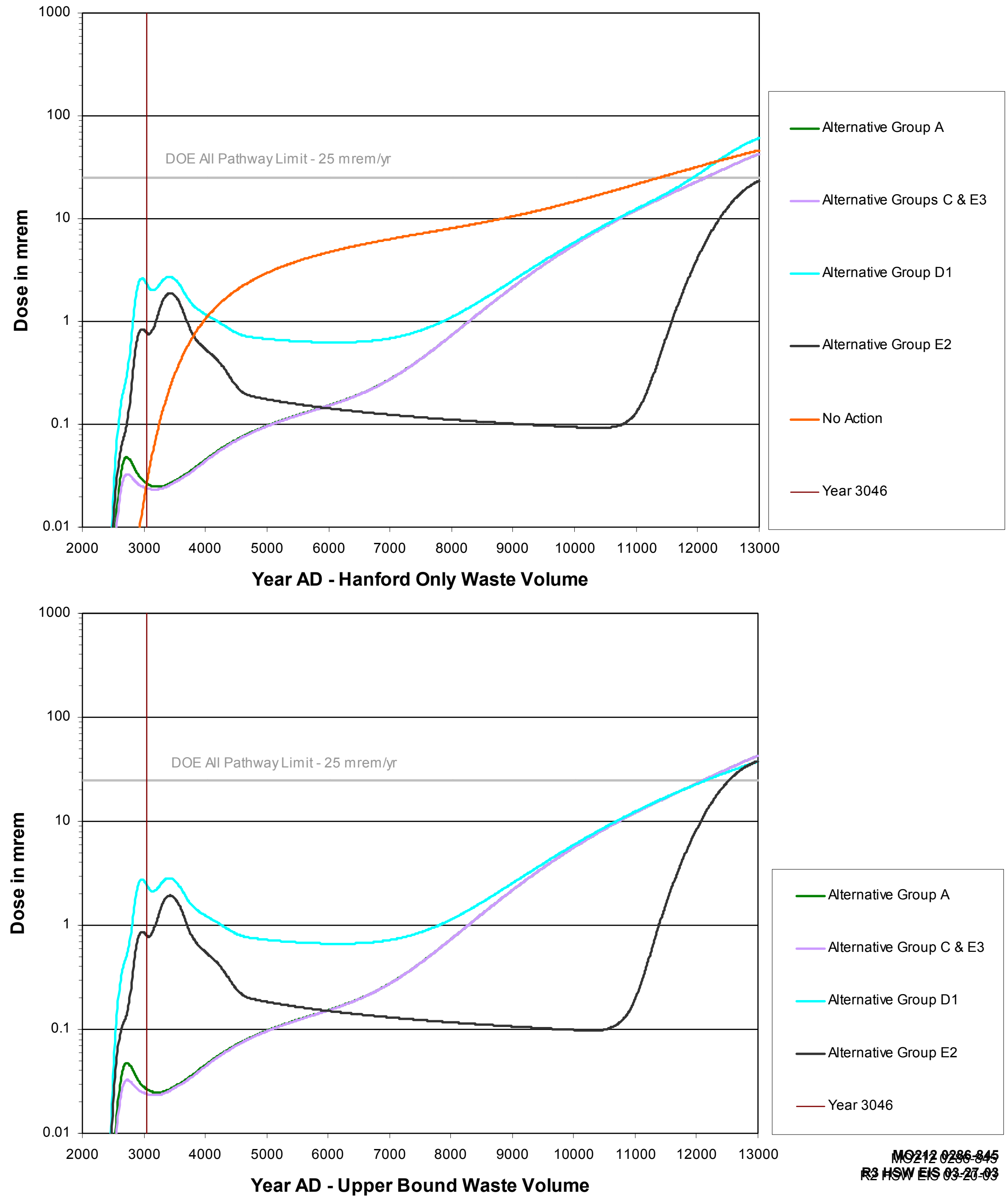

Figure 3.17. Annual Dose to a Hypothetical Resident Gardener with Sauna/Sweat Lodge at Various Times over 10,000 Years Using Water from a Well 1 km Downgradient Southeast from 200 East Area

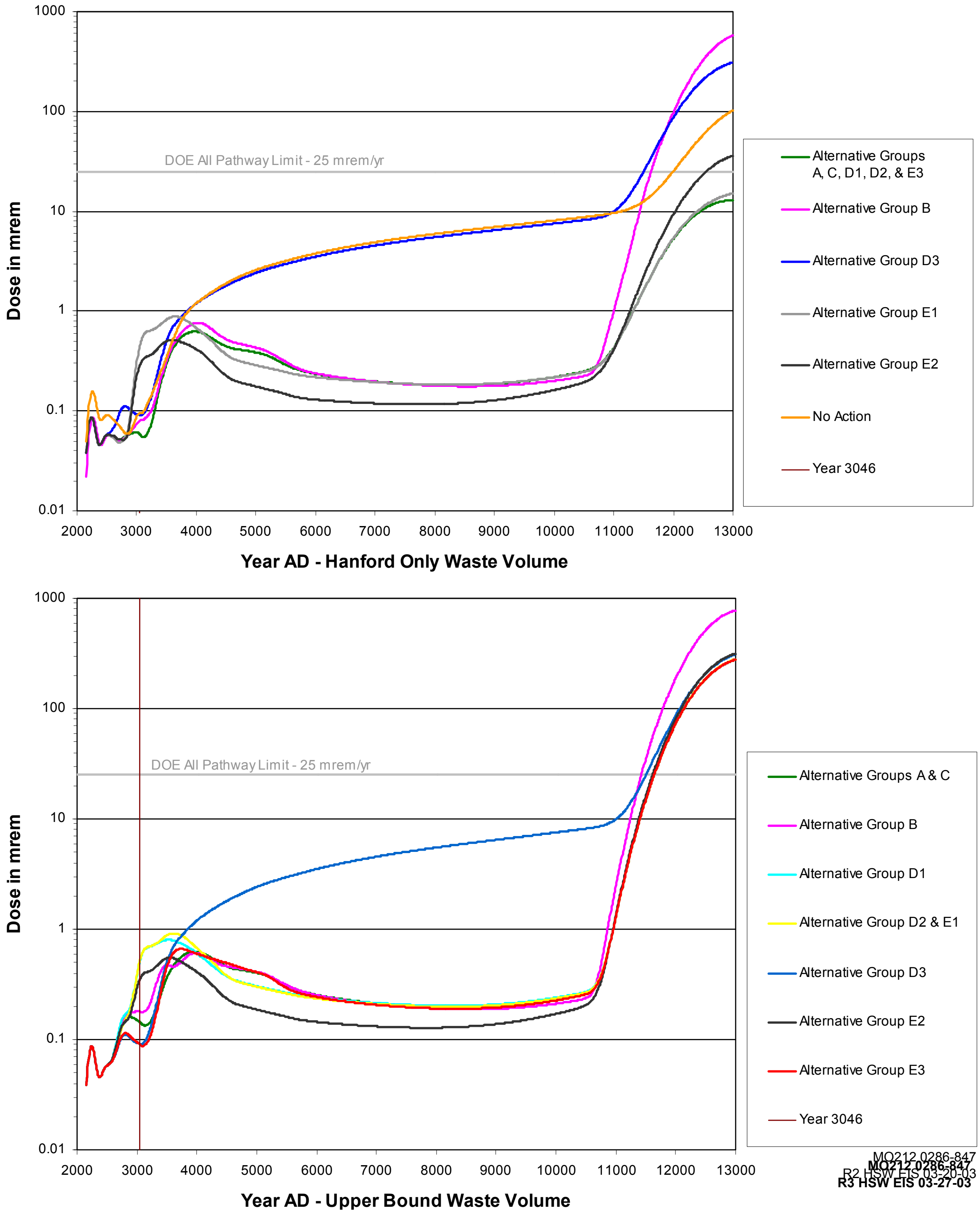

Figure 3.18. Annual Dose to a Hypothetical Resident Gardener with Sauna/Sweat Lodge at Various Times over 10,000 Years Using Water from a Well Adjacent to the Columbia River

3.4.12 Cumulative Impacts

Potential cumulative impacts associated with implementing the various alternative groups and waste volumes would be essentially the same for all alternatives (see Section 5.14). The cumulative impacts analysis focused on past, present, and reasonably foreseeable future actions. Other such current and future actions at Hanford include preparation for and disposal of tank waste and strontium and cesium capsules, CERCLA remediation projects, decontamination and decommissioning of the Hanford production reactors and canyon facilities, operation of a commercial LLW disposal site by US Ecology, and operation of the Columbia Generating Station by Energy Northwest. Cumulative impacts regarding worker health and safety, public health (for atmospheric, surface water, and groundwater pathways), land use, air quality, and ecological, cultural, and socioeconomic resources were evaluated. For most resource and potential impact areas, the combined affects from the HSW EIS proposed actions added to these activities are small.

Special emphasis was given to cumulative impacts associated with contamination of groundwater and the Columbia River. Cumulative groundwater impacts are examined in the context of existing sources of contamination in the soil, vadose zone, and groundwater. Groundwater beneath the operational areas and in plumes from the Central Plateau moving towards the Columbia River is currently contaminated with hazardous chemicals and radionuclides from past liquid and other disposal practices and unplanned releases. Radionuclides leached from wastes in the environment could eventually be transported through the vadose zone to groundwater. Although not used as a source of drinking water today nor in the foreseeable future, it was analyzed as such a scenario where and the dose to an individual who in the future might drill a well through the vadose zone to groundwater and consume two liters per day of the water.

To arrive at the cumulative impact from Hanford sources, all wastes intentionally or unintentionally disposed of on the Hanford Site since the beginning of operations and waste forecast to be disposed of through cleanup completion were taken into account. Technetium-99 and uranium isotopes were selected as representative of long-lived mobile radionuclides and were analyzed using the System Assessment Capability (SAC) (Kincaid et al. 2000) software and data (see Section 5.14 and Appendix L).

Using the SAC analysis, it was concluded that the potential dose from groundwater contamination by technetium-99 would be dominated by the existing groundwater plumes and releases from liquid waste disposal sites (e.g., cribs, ponds, ditches) over the next 2,000 years. Figure 3.19 illustrates the results of the analysis.

The SAC was also employed to evaluate the relative role in overall release of different waste types, including solid waste, past liquid discharges, past tank leaks, future tank losses, tank residuals, unplanned releases, and facilities including canyon buildings. In the simulation, the contribution to technetium-99 from solid waste releases to groundwater would amount to approximately 20 percent of the cumulative release from all Hanford sources. For uranium, releases from solid waste to groundwater are much lower. The majority of the technetium-99 and uranium releases from wastes (other than ILAW) were predicted to occur from liquid discharge sites (e.g., cribs, ponds, ditches) used in the past and from unplanned releases on the Central Plateau and from off-plateau waste sites.

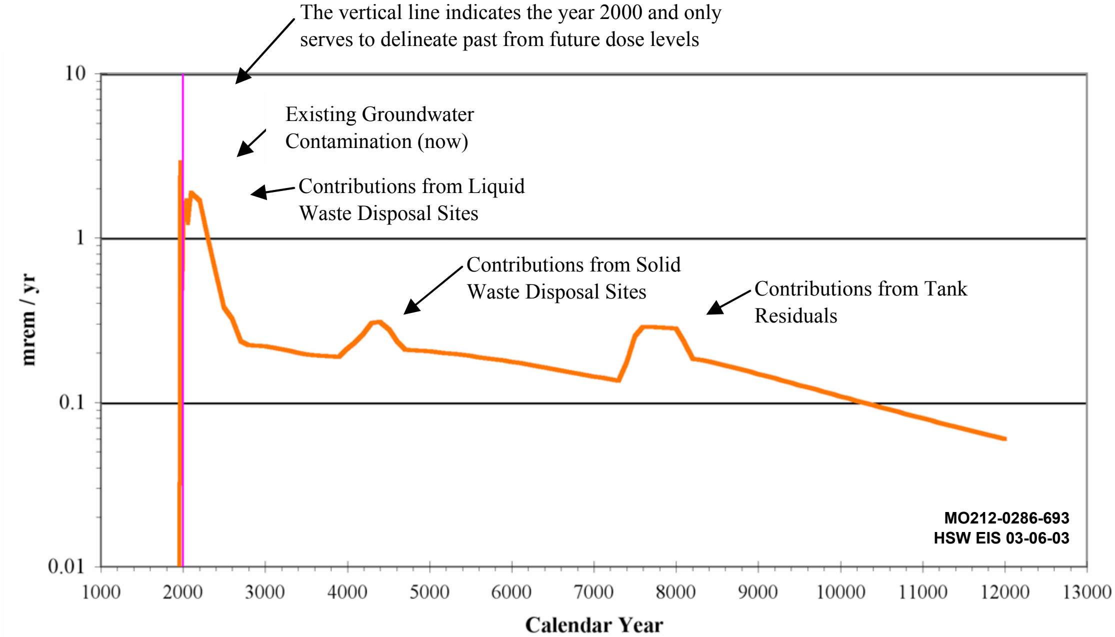

Figure 3.19. Annual Drinking Water Dose from Technetium-99 in Groundwater Southeast of the 200 East Area from All Hanford Sources Including ILAW

3.5 Areas of Uncertainty, Incomplete, or Unavailable Information

This section discusses uncertainties associated with alternatives evaluated in the HSW EIS, and takes into account areas where information is either incomplete or unavailable. Because an EIS is by nature a document prepared during the planning stages for a proposed action, information needed to evaluate environmental impacts of the activities in detail may not always be available. In some cases, there are uncertainties that cannot be resolved by collection or development of additional information, such as the uncertainties associated with projected environmental impacts at very long times in the future, or those associated with inherent variability in human and ecological systems. The approach used to account for these uncertainties would vary with the nature of the impact being evaluated and the methods used for the assessment. The individual analyses of environmental impact areas in Section 5 provide additional detail regarding uncertainties unique to each evaluation. Major areas of uncertainty associated with the proposed waste management alternatives evaluated in this HSW EIS are described in the following sections.

3.5.1 Waste Volumes

The volume of wastes that could ultimately be managed at Hanford represents one of the larger uncertainties associated with the analyses in this EIS. Many of the impact assessments depend on the waste volume that ultimately requires treatment or disposal onsite. Forecasts of future waste volumes from Hanford generators have been compiled for a number of years, and have been shown to be reasonably accurate, if somewhat conservative overall (See Appendix B). Potential waste receipts from