Appendix C

Detailed Output from V-Tanks Decision Support Model

Table C-1. Detailed model output for in situ vitrification.

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
Alternative 1.a—Implementability:									2.29
4.1 Implementability							6.93	33.00%	
4.1.1Technical Feasibility					5.788	40.00%	2.31	13.20%	
4.1.1.1 Ability to construct and operate	7	7	34.85%	2.439				4.60%	
4.1.1.2 Reliability of the alternative	12	5	34.85%	1.742				4.60%	
4.1.1.3 Ease of additional remedial actions	4	6.4	15.15%	0.970				2.00%	
4.1.1.4 Monitoring considerations	4	4.2	15.15%	0.636				2.00%	
4.1.2 Administrative feasibility					6	20.00%	1.20	6.60%	
4.1.2 Administrative feasibility	2	6.0	100.00%	6.0				6.60%	
4.1.3 Availability of services and materials					8.545	40.00%	3.42	13.20%	
4.1.3.1a Availability of storage and disposal facilities	10	9	69.70%	6.273				9.20%	
4.1.3.1b Control factor	7.5							NA	
4.1.3.2 Availability of equipment and specialists	7.5	7.5	30.30%	2.273				4.00%	
Alternative 1.a—Short-Term Effectiveness:									1.58
4.2 Short-term effectiveness:							6.33	25.00%	
4.2.1 Time to remediate					6.223	60.00%	3.73	15.10%	
4.2.1a Waste treatment	2	6.66	37.09%	2.448				5.60%	
4.2.1b ROD completion	3	6	62.91%	3.775				9.50%	
4.2.2 Community protection					8.00	15.00%	1.20	3.80%	
4.2.2 Community protection	8	8	100.00%	8.000				3.80%	

Table C-1. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.2.3 Worker protection					2.67	15.00%	0.40	3.80%	
4.2.3a Worker protection	5	2.667	100.00%	2.667				3.80%	
4.2.3b Worker protection correction factor	5							NA	
4.2.4 Environmental impacts					10.0	10.00%	1.0	2.30%	
4.2.4a Animal impact	10	10	50.00%	0.000				1.15%	
4.2.4b Plant impact	10	10	50.00%	0.000				1.15%	
Alternative 1.a—Long-Term Effectiveness and Permanence:									0.80
4.3 Long-term effectiveness and permanence							10.00	8.00%	
Residual risk					10.00	50.00%	5.00	4.00%	
4.3.1 Magnitude of residual risk	10	10	100.00%	10.000				4.00%	
Controls					10.00	50.00%	5.00	4.00%	
4.3.2 Adequacy and reliability of controls	10	10	100.00%	10.000				4.00%	
Alternative 1.a—Reduction of TMV:									1.325
4.4 Reduction of toxicity, mobility, or volume through treatment							7.794	17.00%	
4.4.1 Amount of hazardous material destroyed or treated					9.465	49.7%	4.70	8.45%	
4.4.1a Reduction of volume	2250	8.335	32.0%	2.541				2.70%	
4.4.1b TRU concentration	Lognormal (0.449,1)	10	22.5%	2.317				1.90%	
4.4.1c Cadmium concentration	0.00E+00	10	7.58%	0.772				0.64%	

Table C-1. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.4.1d Lead concentration	Lognormal (1.440e-005,1)	10	7.58%	0.772				0.64%	
4.4.1e Mercury concentration	0.00E+00	10	7.58%	0.772				0.64%	
4.4.1f PCB concentration	0.00E+00	10	7.58%	0.772				0.64%	
4.4.1g TCE	0.00E+00	10	7.58%	0.772				0.64%	
4.4.1h BEHP	0.00E+00	10	7.58%	0.772				0.64%	
4.4.2 Amount of principal threat treated to reduce toxicity, mobility, or volume					5.00	30.00%	1.50	5.10%	
4.4.2 Principle threat Cs-137	2.33	5	100.00%	5.000				5.10%	
4.4.3 Irreversibility of treatment of CFTs					10.00	15.00%	1.50	2.60%	
4.4.3 Irreversibility	Uniform (1.000e+004, 1.000e+005)	10	100.00%	10.000				2.60%	
4.4.4 Treatment residuals					1.7	5.3%	0.09	0.9%	
4.4.4 Secondary waste	123	1.7	100.00%	1.7				0.9%	
Alternative 1.a—Cost									0.526
4.5 Cost							4.049	13.00%	
4.5Cost					4.049	100.00%	4.049	13.00%	
4.5 Life-cycle cost	Triangular (2.47e+7, 3.30e+7, 3.79e+7)	4.049	100.00%	4.049				13.00%	
Alternative 1.a—Other Waste Streams:									0.40
4.6 Application to other waste streams							10.00	4.00%	
Other applicability					10.00	100.00%	10.00	4.00%	
4.6a Applicability to ARA-16 waste	10	10	33.33%	3.333				1.33%	

Table C-1. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.6b Applicability to PM-2A waste	10	10	33.33%	3.333				1.33%	
4.6c Applicability to investigation-derived waste	10	10	33.33%	3.333				1.33%	
Total Score for Alternative 1.a									6.9

Table C-2. Detailed model output for ex situ vitrification.

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
Alternative 1.b—Implementability:									2.23
4.1 Implementability							6.76	33.00%	
4.1.1Technical feasibility					5.367	40.00%	2.15	13.20%	
4.1.1.1 Ability to construct and operate	6	6	34.85%	2.091				4.60%	
4.1.1.2 Reliability of the alternative	13	3.75	34.85%	1.307				4.60%	
4.1.1.3 Ease of additional remedial actions	5	8	15.15%	1.212				2.00%	
4.1.1.4 Monitoring considerations	5	5	15.15%	0.758				2.00%	
4.1.2 Administrative feasibility					6.0	20.00%	1.20	6.60%	
4.1.2 Administrative feasibility	2	6	100.00%	6.000				6.60%	
4.1.3 Availability of services and materials					8.545	40.00%	3.42	13.20%	
4.1.3.1a Availability of storage and disposal facilities	10	9	69.70%	6.273				9.20%	
4.1.3.1b Control factor	7.5							NA	
4.1.3.2 Availability of equipment and specialists	7.5	7.5	30.30%	2.273				4.00%	
Alternative 1.b—Short-Term Effectiveness:									1.58
4.2 Short-term effectiveness:							6.314	25.00%	
4.2.1 Time to remediate					6.223	60.00%	3.73	15.10%	
4.2.1a Waste treatment	2	6.66	37.09%	2.470				5.60%	
4.2.1b ROD completion	3	6	62.91%	3.775				9.50%	
4.2.2 Community protection					8	15.00%	1.20	3.80%	
4.2.2 Community protection	8	8	100.00%	8.000				3.80%	
4.2.3 Worker protection					2.533	15.00%	0.38	3.80%	
4.2.3a Worker protection	5	2.533	100.00%	2.533				3.80%	
4.2.3b Worker protection correction factor	6							NA	

Table C-2. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.2.4 Environmental impacts					10	10.00%	1.0	2.30%	
4.2.4a Animal impact	10	10	50.00%	5.0				1.15%	
4.2.4b Plant impact	10	10	50.00%	5.0				1.15%	
Alternative 1.b—Long-Term Effectiveness and Permanence:									0.80
4.3 Long-term effectiveness and permanence							10.00	8.00%	
Residual risk					10	50.00%	5.00	4.00%	
4.3.1 Magnitude of residual risk	10	10	100.00%	10.000				4.00%	
Controls					10	50.00%	5.00	4.00%	
4.3.2 Adequacy and reliability of controls	10	10	100.00%	10.000				4.00%	
Alternative 1.b—Reduction of TMV:									1.2
4.4 Reduction of toxicity, mobility, or volume through treatment							7.042	17.00%	
4.4.1 Amount of hazardous material destroyed or treated					7.579	49.7%	3.77	8.45%	
4.4.1a Reduction of volume	2427	2.441	32.0%	0.781				2.7%	
4.4.1b TRU concentration	Lognormal (6.38,1)	10	22.5%	2.250				1.90%	
4.4.1c Cadmium concentration	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1d Lead concentration	Lognormal (2.050e-004,1)	10	7.58%	0.758				0.64%	
4.4.1e Mercury concentration	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1f PCB concentration	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1g TCE	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1h BEHP	0.00E+00	10	7.58%	0.758				0.64%	

Table C-2. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.4.2 Amount of principal threat treated to reduce toxicity, mobility, or volume					5	30.00%	1.50	5.10%	
4.4.2 Principle threat Cs-137	2.33	5	100.00%	5.000				5.10%	
4.4.3 Irreversibility of treatment of CFTs					10	15.00%	1.50	2.60%	
4.4.3 Irreversibility	Uniform (1.000e+004, 1.000e+005)	10	100.00%	10.000				2.60%	
4.4.4 Treatment residuals					5.2	5.3%	0.28	0.9%	
4.4.4 Secondary waste	88	5.20	100.00%	5.20				0.9%	
Alternative 1.b—Cost:									0.55
4.5 Cost							4.211	13.00%	
Cost					4.211	100.00%	4.211	13.00%	
4.5 Life-cycle cost	Triangular (2.45e+7, 3.27e+7, 3.76e+7)	4.211	100.00%	4.211				13.00%	
Alternative 1.b—Other Waste Streams:									0.40
4.6 Application to other waste streams							10.00	4.00%	
Other applicability					10	100.00%	10.00	4.00%	
4.6a Applicability to ARA-16 waste	10	10	33.33%	3.333				1.33%	
4.6b Applicability to PM-2A waste	10	10	33.33%	3.333				1.33%	
4.6c Applicability to investigation-derived waste	10	10	33.33%	3.333				1.33%	
Total Score for Alternative 1.b									6.8

Table C-3. Detailed model output for thermal desorption on/off-Site.

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
Alternative 2.a—Implementability:									2.52
4.1 Implementability							7.63	33.00%	
4.1.1Technical feasibility					6.98	40.00%	2.79	13.20%	
4.1.1.1 Ability to construct and operate	6	6	34.85%	2.091				4.60%	
4.1.1.2 Reliability of the alternative	10	7.5	34.85%	2.614				4.60%	
4.1.1.3 Ease of additional remedial actions	6	8.4	15.15%	1.273				2.00%	
4.1.1.4 Monitoring considerations	7	6.6	15.15%	1				2.00%	
4.1.2 Administrative feasibility					8.5	20.00%	1.7	6.60%	
4.1.2 Administrative feasibility	0.75	8.5	100.00%	8.5				6.60%	
4.1.3 Availability of services and materials					7.85	40.00%	3.14	13.20%	
4.1.3.1a Availability of storage and disposal facilities	10	8	69.70%	5.576				9.20%	
4.1.3.1b Control factor	5							NA	
4.1.3.2 Availability of equipment and specialists	7.5	7.5	30.30%	2.273				4.00%	
Alternative 2.a—Short-Term Effectiveness:									1.55
4.2 Short-term effectiveness:							6.204	25.00%	
4.2.1 Time to remediate					6.22	60.00%	3.73	15.10%	
4.2.1a Waste treatment	2	6.6	37.09%	2.45				5.60%	
4.2.1b ROD completion	3	6	62.91%	3.775				9.50%	
4.2.2 Community protection					5.00	15.00%	0.75	3.80%	
4.2.2 Community protection	5	5	100.00%	5				3.80%	

Table C-3. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.2.3 Worker protection					4.80	15.00%	0.72	3.80%	
4.2.3a Worker protection	4	4.8	100.00%	4.8				3.80%	
4.2.3b Worker protection correction factor	7							NA	
4.2.4 Environmental impacts					10.00	10.00%	1.0	2.30%	
4.2.4a Animal impact	10	10	50.00%	5.0				1.15%	
4.2.4b Plant impact	10	10	50.00%	5.0				1.15%	
Alternative 2.a—Long-Term Effectiveness and Permanence:									0.80
4.3 Long-term effectiveness and permanence							10.00	8.00%	
Residual risk					10.00	50.00%	5.00	4.00%	
4.3.1 Magnitude of residual risk	10	10	100.00%	10				4.00%	
Controls					10.00	50.00%	5.00	4.00%	
4.3.2 Adequacy and reliability of controls	10	10	100.00%	10				4.00%	
Alternative 2.a—Reduction of TMV:									1.00
4.4 Reduction of toxicity, mobility, or volume through treatment							5.887	17.00%	
4.4.1 Amount of hazardous material destroyed or treated					6.74	49.7%	3.35	8.45%	
4.4.1a Reduction of volume	2407	3.107	32.0%	0.994				2.7%	
4.4.1b TRU concentration	Lognormal (0.816,1)	10	22.5%	2.250				1.90%	
4.4.1c Cadmium concentration	Lognormal (0.0188,1)	3.836	7.58%	0.291				0.64%	
4.4.1d Lead concentration	Lognormal	2.284	7.58%	0.173				0.64%	

Table C-3. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
	(0.262,1)								
4.4.1e Mercury concentration	Lognormal (1.930e-004,1)	10	7.58%	0.0758				0.64%	
4.4.1f PCB concentration	Lognormal (3.440e-003,1)	10	7.58%	0.758				0.64%	
4.4.1g TCE	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1h BEHP	0.00E+00	10	7.58%	0.758				0.64%	
4.4.2 Amount of principal threat treated to reduce toxicity, mobility, or volume					5.00	30.00%	1.50	5.10%	
4.4.2 Principle threat Cs-137	2.33	5	100.00%	5				5.10%	
4.4.3 Irreversibility of treatment of CFTs					6.67	15.00%	1.00	2.60%	
4.4.3 Irreversibility	1000	6.666	100.00%	6.666				2.60%	
4.4.4 Treatment residuals					0.7	5.3%	0.037	0.9%	
4.4.4 Secondary waste	133	0.7	100.00%	0.7				0.9%	
Alternative 2.a—Cost:									0.73
4.5 Cost							5.608	13.00%	
Cost					5.608	100.00%	5.608	13.00%	
4.5 Life-cycle cost	Triangular (2.27e+7, 3.03e+7, 3.48e+7)	5.608	100.00%	5.608				13.00%	
Alternative 2.a—Other Waste Streams:									0.31
4.6 Application to other waste streams							7.66	4.00%	
Other applicability					7.66	100.00%	7.66	4.00%	
4.6a Applicability to ARA-16 waste	8	8	33.33%	2.667				1.33%	
4.6b Applicability to PM-2A waste	10	10	33.33%	3.333				1.33%	

Table C (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.6c Applicability to investigation-derived waste	5	5	33.33%	1.667				1.33%	
Total Score for Alternative 2.a									6.9

Table C-4. Detailed model output for thermal desorption on-Site.

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
Alternative 2.b—Implementability:									2.49
4.1 Implementability							7.538	33.00%	
4.1.1Technical feasibility					6.602	40.00%	2.64	13.20%	
4.1.1.1 Ability to construct and operate	6	6	34.85%	2.091				4.60%	
4.1.1.2 Reliability of the alternative	11	6.25	34.85%	2.178				4.60%	
4.1.1.3 Ease of additional remedial actions	7	8.8	15.15%	1.333				2.00%	
4.1.1.4 Monitoring considerations	7	6.6	15.15%	1				2.00%	
4.1.2 Administrative feasibility					6.00	20.00%	1.20	6.60%	
4.1.2 Administrative feasibility	2	6.0	100.00%	6.0				6.60%	
4.1.3 Availability of services and materials					9.242	40.00%	3.70	13.20%	
4.1.3.1a Availability of storage and disposal facilities	10	10	69.70%	6.970				9.20%	
4.1.3.1b Control factor	10							NA	
4.1.3.2 Availability of equipment and specialists	7.5	7.5	30.30%	2.273				4.00%	
Alternative 2.b—Short-Term Effectiveness:									1.74
4.2 Short-term effectiveness:							6.954	25.00%	
4.2.1 Time to remediate					6.223	60.00%	3.73	15.10%	
4.2.1a Waste treatment	2	6.66	37.09%	2.470				5.60%	
4.2.1b ROD completion	3	6	62.91%	3.775				9.50%	
4.2.2 Community protection					10.0	15.00%	1.5	3.80%	
4.2.2 Community protection	10	10	100.00%	10				3.80%	

Table C-4. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.2.3 Worker protection					4.80	15.00%	0.72	3.80%	
4.2.3a Worker protection	4	4.8	100.00%	4.8				3.80%	
4.2.3b Worker protection correction factor	7							NA	
4.2.4 Environmental impacts					10.00	10.00%	1.00	2.30%	
4.2.4a Animal impact	10	10	50.00%	5.0				1.15%	
4.2.4b Plant impact	10	10	50.00%	5.0				1.15%	
Alternative 2.b—Long-Term Effectiveness and Permanence:									0.80
4.3 Long-term effectiveness and permanence							10.00	8.00%	
Residual risk					10.00	50.00%	5.00	4.00%	
4.3.1 Magnitude of residual risk	10	10	100.00%	10				4.00%	
Controls					10.00	50.00%	5.00	4.00%	
4.3.2 Adequacy and reliability of controls	10	10	100.00%	10				4.00%	
Alternative 2.b—Reduction of TMV:									1.02
4.4 Reduction of toxicity, mobility, or volume through treatment							6.009	17.00%	
4.4.1 Amount of hazardous material destroyed or treated					6.74	49.7%	3.35	8.45%	
4.4.1a Reduction of volume	2407	3.107	32.0%	0.994				2.70%	
4.4.1b TRU concentration	Lognormal (0.816,1)	10	22.5%	2.250				1.90%	
4.4.1c Cadmium concentration	Lognormal (0.0188,1)	3.836	7.58%	2.907				0.64%	

Table C-4. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.4.1d Lead concentration	Lognormal (0.262,1)	2.284	7.58%	0.173				0.64%	
4.4.1e Mercury concentration	Lognormal (1.930e-004,1)	10	7.58%	0.758				0.64%	
4.4.1f PCB concentration	Lognormal (3.440e-003,1)	10	7.58%	0.758				0.64%	
4.4.1g TCE	0.00E+00	10	7.58%	0.758				0.64%	
4.4.1h BEHP	0.00E+00	10	7.58%	0.758				0.64%	
4.4.2 Amount of principal threat treated to reduce toxicity, mobility, or volume					5.00	30.00%	1.50	5.10%	
4.4.2 Principle threat Cs-137	2.33	5	100.00%	5				5.10%	
4.4.3 Irreversibility of treatment of CFTs					6.67	15.00%	1.00	2.60%	
4.4.3 Irreversibility	1000	6.666	100.00%	6.666				2.60%	
4.4.4 Treatment residuals					3.00	5.30%	0.16	0.9%	
4.4.4 Secondary waste	110	3.00	100.00%	3.00				0.9%	
Alternative 2.b—Cost:									0.723
4.5 Cost							5.592	13.00%	
Cost					5.592	100.00%	5.592	13.00%	
4.5 Life-cycle cost	Triangular (2.27e+7, 3.03e+7, 3.49e+7)	5.592	100.00%	5.592				13.00%	
Alternative 2.b—Other Waste Streams:									0.31
4.6 Application to other waste streams							7.66	4.00%	
Other applicability					7.67	100.00%	7.66	4.00%	
4.6a Applicability to ARA-16 waste	8	8	33.33%	2.667				1.33%	

Table C-4. (continued).

Value Function	Input Parameter	Output Value	Relative Output Weight within Subcriteria	Weighted Contribution to Subcriteria Score	Subcriteria Score	Relative Subcriteria Weight	Criteria Score	Model Weight	Alternative Score
4.6b Applicability to PM-2A waste	10	10	33.33%	3.333				1.33%	
4.6c Applicability to investigation-derived waste	5	5	33.33%	1.667				1.33%	
Total Score for Alternative 2.b									7.1