
Appendix A3
Detailed Calculations

SCENARIO 1: IMPLEMENTATION, ENFORCEMENT AND MONITORING OF WORKERS HEALTH AND SAFETY AND SPILL PREVENTION MEASURES

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20		
1 Raise awareness																										
1.1	Organize workshops with local population	· # and frequency of workshops	3 during year 1 1 / year in the next 5 years	Recurring	3,000	1,000	1,000	1,000	1,000	1,000																
1.2	Produce and diffuse awareness raising material	· # of risk awareness kits produced	500	Initial	5,000																					
2 Develop a Health and Safety / Spill Prevention Plan																										
2.1	Consultation and working session	· Duration of consultation · # of people consulted	0.5 20	Initial	1,600																					
2.2	Development of initial plan	· # of international consultants days · # of national consultants days	10 40	Initial	16,000																					
2.3	Plan revisions	· Frequency of plan revisions (year) · # of national consultants days	1 5	Recurring		750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
3 Train the personnel																										
3.1	Initial training	· # of employees · Employee turnover · Duration of initial training (days)	22 5% 2	Recurring	740	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322	322
3.2	Training updates	· # of employees · Frequency of training updates (year) · Duration of training updates (days)	22 1 0.5	Recurring		185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185	185
4 Implement the Health and Safety Plan																										
4.1	Provide personal protection equipment	· # of kits · Percentage of kits to be replaced yearly)	25 5%	Initial + recurring	2,500	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125	125
4.2	Label hazardous materials and contaminated areas	· # of items to be labeled · Additional items to be labeled yearly	100 5	Initial Recurring	500	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
4.3	Test transformers before handling	· # of tests (CLOR N OIL)	50	Recurring	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
4.4	Implement Health and Safety procedures	- # of employees at the workshop	12																						
		- average time dedicated to procedures by employees at the workshop (% of workday)	5%	Recurring	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936	3,936
		- # of other employees on site	104																						
		- average time dedicated to procedures by other employees on the site (% of workday)	1%																						
4.7	Implement spill response procedures	- # of spills / months	1																						
		- Average time dedicated to clean up (days)	1	Recurring	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
5 Ensure integrity of workplace structure																									
5.1	Provide facilities for showering and changing into and out of street and work clothes; and clean eating areas where workers are not exposed to hazardous or noxious substances	- Unit	-	Initial	2,500																				
5.2	Define "restricted entry" into contaminated area without proper protection and authorization	- Unit	-	Initial	500																				
6 Monitoring																									
6.1	Monitoring of the health and safety plan implementation	- Average time dedicated each month to monitoring by the health and safety specialist	1	Recurring		1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	
6.2	Environmental monitoring - Soil testing	- # of tests	10	Recurring		150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	
6.3	Blood testing	- # of sampling	25	Recurring					25,000					25,000										25,000	
7	Contingency, Technical Support, Project management	- % of overhead	10%	Recurring	3,690	891	891	891	3,391	891	791	791	791	3,291	791	791	791	791	791	791	791	791	791	3,291	
TOTAL					40,586	9,804	9,804	9,804	37,304	9,804	8,704	8,704	8,704	36,204	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	36,204	
PV (Costs)					\$192,168																				
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Benefit stream					0	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	16,696	
PV (Benefits)					\$192,168																				
Stream of benefits - costs					-40,586	6,892	6,892	6,892	-20,608	6,892	7,992	7,992	7,992	-19,508	7,992	7,992	7,992	7,992	7,992	7,992	7,992	7,992	7,992	7,992	
NPV					0																				
DALYs needed/an					3.3																				
IRR (test)					5%																				

Number of DALY /100000hab total	40,324
Population on site	2,826
Total number of DALYs on site	1,140
Minimum required effect of site reclamation on total health	0.3%

SCENARIO 2 : CONTAINMENT OF EXISTING CONTAMINATION

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
1	Implementation, enforcement and monitoring of workers health and safety and spill prevention measures	Measures described in Scenario 1	-	-	40,586	9,804	9,804	9,804	37,304	9,804	8,704	8,704	8,704	36,204	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	36,204
2	Design of containment plan																							
2.1	Develop a detailed containment plan	· # of international consultant days	30	Initial	30,000																			
2.2	Conduct test based inventory of PCBs contaminated transformers and oil	· # of tests (CLOR N OIL)	50	Initial	500																			
2.3	Conduct detailed soil analysis	· # of tests (CALUX)	50	Initial	20,000																			
3	Provide secured containment infrastructure and equipment																							
3.1	Provide secured drums	· # of drums required initially	14	Initial																				
		· # of additional drums required yearly	14	Recurring	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376	1,376
3.2	Build a secured containment facility	· Unit	1	Initial	50,000																			
3.3	Move and store PCB contaminated equipment and oil in containment facility	· Unit	10	Initial	2,000																			
3.4	Cap and pave the most contaminated areas that are not paved yet (workshop and truck parking areas)	· Extent of the area requiring capping (m2)	600	Initial	30,000																			
3.5	Improve drainage and sediment control system on the site	· Unit	1	Initial	20,000																			
4	Monitor and maintain containment infrastructure																							
4.1	Monitoring and maintenance of contaminated transformers and oil containment measures	· % of capital costs	10%	Recurring		5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338	5,338
4.2	Conduct soil/sediment analysis	· Number of analysis	4	Recurring		1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
4.3	Pavements and drainage system maintenance	. % of capital costs	10%	Recurring		5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
5	Contingency, Technical Support, Project management	. % of overhead	10%	Recurring	15,388	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	1,331	
TOTAL					209,849	24,449	24,449	24,449	51,949	24,449	23,349	23,349	23,349	50,849	23,349	23,349	23,349	23,349	23,349	23,349	23,349	23,349	23,349	50,849	
PV (Costs)					\$521,929																				
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Benefit stream					0	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346	45,346
PV (Benefits)					\$521,929																				
Stream of benefits - costs					-209,849	20,897	20,897	20,897	-6,603	20,897	21,997	21,997	21,997	-5,503	21,997	21,997	21,997	21,997	21,997	21,997	21,997	21,997	21,997	21,997	-5,503
NPV					0																				
DALYs needed/an					9.0																				
IRR (test)					5%																				

Number of DALY /100000hab total	40,324
Population on site	2,826
Total number of DALYs on site	1,140
Minimum required effect of site reclamation on total health	0.8%

SCENARIO 3: DISPOSAL OF EXISTING CONTAMINATION

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
1	Implementation, enforcement and monitoring of workers health and safety and spill prevention measures	Measures described in Scenario 1			40,586	9,804	9,804	9,804	37,304	9,804	8,704	8,704	8,704	36,204	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	36,204
2	Design of disposal plan																							
2.1	Develop a disposal plan	· # of international consultant days	30	Initial	30,000																			
2.2	Conduct test based inventory of PCBs contaminated transformers/ oil	· # of tests (CLOR-N-OIL)	50	Initial	500																			
2.3	Conduct detailed soil analysis	· # of detailed tests (CALUX)	50	Initial	20,000																			
3	Implementation of disposal																							
3.1	Disposal of contaminated transformers	· Quantity of transformer (tons)	3.4	Initial	8,184																			
3.2	Disposal of contaminated oil	· Quantity of oil (tons)	1.3	Initial	3,958																			
3.3	Disposal of contaminated soil from the area around the workshop	· Quantity of contaminated soil (tons)	96	Initial	142,080																			
3.4	Removal /replacement of paving on the transformer storage area	· Area of pavement	500	Initial	25,000																			
3.5	Disposal of contaminated soil from the transformer storage area	· Quantity of contaminated soil (tons)	160	Initial	236,800																			
3.6	Disposal of contaminated soil from the road	· Quantity of contaminated soil (tons)	3	Initial	4,736																			
3.7	Disposal of contaminated sludge in the basement of the former generator building	· Quantity of contaminated sludge (tons)	10	Initial	14,208																			
3.8	Disposal of contaminated sediments	· Quantity of contaminated sediments (tons)	13	Initial	18,944																			

Item	Description	Quantification	Value	Timing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
3.9	Packaging and shipping	. % of overhead	25%	Initial	107,227																				
4	Contingency, Technical Support, Project management	. % of overhead	10%	Initial	61,164	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TOTAL					713,386	9,804	9,804	9,804	37,304	9,804	8,704	8,704	8,704	36,204	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	8,704	36,204	
PV (Costs)			\$832,930																						
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
Benefit stream					0	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367	72,367
PV (Benefits)			\$832,930																						
Stream of benefits - costs					-713,386	62,563	62,563	62,563	35,063	62,563	63,663	63,663	63,663	36,163	63,663	63,663	63,663	63,663	63,663	63,663	63,663	63,663	63,663	63,663	36,163
NPV			0																						
DALYs needed/an			14.3																						
IRR (test)			5%																						

Number of DALY /100000hab total	40,324
Population on site	2,826
Total number of DALYs on site	1,140
Minimum required effect of site reclamation on total health	1.3%