

APPENDIX B

TOTAL COSTS BY ALTERNATIVE (\$)			
	Alt 1	Alt 2	Alt 3
Capital Costs	\$ 925,355,010	\$195,624,060	0
O&M Costs	\$ 7,343,552,534	\$ 3,007,461,514	\$11,595,420
Decommissioning Costs	\$ 20,144,769	\$ 20,181,320	\$19,807,839
Total Undiscounted Costs	\$ 8,289,052,313	\$ 3,223,266,894	\$ 31,403,259
Present Worth	\$ 318,548,475	\$ 251,753,065	\$ 28,943,053

ALTERNATIVE 1				COST ESTIMATE SUMMARY	
No Action (Continued Groundwater Containment and Removal)				Sheet 1	
Site: HMC Grants Reclamation Project		Phase: ACL Application		Base Year:	
Location: Grants, NM		Date: 4/4/22		Duration: 1,003 years	
Description: Alternative 1 assumes denial for amendment of existing groundwater corrective action plan and continued operation of the existing groundwater containment and removal systems essentially in perpetuity, due to the long-term sources of groundwater impact. Therefore, this alternative has been modeled for the compliance period of 1,000 years using existing capital equipment and infrastructure design. Groundwater pumping to mitigate the groundwater plume down gradient of the LTP/STP area would be performed for 150 years, after which is assumed (based on groundwater model simulations) that low concentration off-site waters have been mitigated and zeolite is no longer appropriate for treatment of higher concentration on-site groundwater and the groundwater plumes have been limited to the immediate area around the LTP/STP. It is also assumed that water treatment rates would decrease to a long-term steady state rate (600 gpm) for the remainder of the compliance period to contain the long-term groundwater sources to the immediate LTP/STP area. All capital equipment (e.g., wells, treatment systems, etc.) are assumed to have a 50 year life except for spray evaporators which have a 10 year capital life due the high salinity environment on the evaporation ponds. Groundwater monitoring and routine Site facilities operati0on and staffing continue throughout the socompliance period. All subsequent reclamation costs are assumed to be incurred in years 1,001 through 1,003. The groundwater wells, piping infrastructure, and other above-ground groundwater treatment systems (RO, evaporation ponds) would continue to operate for the full compliance period (1,000 years) and are all assumed to have 50 year capital lives, after which replacement of the capital equipment is necessary. Perpetual treatment under this alternative precludes license termination, Site transfer to DOE, and de-listing from the National Priorities List (NPL).					
Capital Costs: The zeolite water treatment system would be relocated from the top of the Large Tailings Pile to an area of approximately 4 acres just south of the existing reverse osmosis treatment plant in year 0. Re-lining of Evaporation Pond 1 (EP1) would be planned for year 0. Installation of the LTP engineered final cover (part of groundwater source control efforts) would occur in year 1 after the zeolite system is relocated. The LTP Construction Completion Report (CCR) would be provided to NRC in year 152. Covering of the STP, which is not considered a substantial long-term source of groundwater impacts, is not included as a groundwater CAP alternatives cost. After 150 years of pumping, it is assumed that groundwater recovery rates would be based on long-term containment pumping rates (from groundwater model alternatives analyses), and would continue to use only RO treatment (600 gpm), evaporation and spray evaporation (100%), and compliant water re-injection into the aquifer. Long-term management of water recovered from the LTP toe drain system and groundwater recovery system would be managed/treated in the RO system and existing evaporation ponds for the full 1,000 years.					
Decommissioning of the RO, zeolite, and evaporation pond treatment systems, and site wide piping infrastructure would completed in Year 1,001. Corrective Action wells and removal of site wide piping infrastructure would be abandoned per License and State requirements in years 1,001 and 1,002. The Corrective Action CCR would be submitted to NRC in year 1,003.					
Operating and Maintenance Costs (O&M): Ongoing O&M costs include operation of groundwater recovery and injection wells and above ground infrastructure (years 0-1,000), operation of the RO treatment and zeolite system at a nominal rate of approximately 600 gpm, operation of the zeolite treatment system at a nominal rate of 600 gpm (years 0-150), operation of the spray evaporation systems (100%) on the evaporation ponds (years 0-1000). After 150 years of pumping, treatment rates would be reduced to manage the reduced flow rates associated with groundwater containment,. This includes operation of the RO treatment system at a nominal rate of approximately 600 gpm (years 151-1,000) and operation of the spray evaporation systems (100%). Groundwater monitoring costs for the existing groundwater monitoring program (years 0-1,000), and operation of the Site support facilities (years 0-1,000; admin, environmental, maintenance, sampling and staff, etc.) would be performed throughout the entire compliance period.					
Periodic Costs: The LTP Cover is placed in year 1 and the LTP Cover CCR is developed in year 2. Capital equipment for the groundwater monitoring and water treatment systems are replaced every 50 years after initial installation, including EP1 (inital re-lining in year 0, first periodic re-lining in year 50), Evaporation Pond 2 (EP2; first relining in year 5), Evaporation Pond 3 (EP3; first relining in year 20), while spray evaporators, which are subject to high salinity conditions, are replaced every 10 years starting in year 10. The montirting well network is first replaced in year 20 and every 50 years thereafter, the RO plant is first replaced in year 45 and every 50 years thereafter. Capital replacement of the zeolite system would parallel that of the reverse omosis treatmemnt system in timing and frequency.					
Present value is calculated based on a discounted cashflow factor using the equation $[(1+i)^n]/[(1+r)^n]$ where i is the annual inflation rate, r is the annual discount rate and n is the annual compounding period (See Sheet 13).					
CAPITAL COSTS:					
Item No.	DESCRIPTION & OFF-SITE NOTES	UNIT	UNIT COST	QUANTITY	TOTAL (ROUNDED)
1.00	EP1 Re-lining (Year 0)		\$7,865,000		\$7,865,000
1.01	EP1 Re-lining	LS	\$6,500,000	1	\$6,500,000
1.02	Project Management	%	\$650,000	10	\$650,000
1.03	Contingency	%	\$715,000	10	\$715,000
2.00	Zeolite Relocation (Year 0)		\$4,326,310		\$4,324,210
2.01	Existing Zeolite Decomissioning	LS	\$191,000	1	\$191,000
2.02	Zeolite Relocation	LS	\$3,720,250	1	\$3,720,250
2.03	Project Management	%	\$39,120	10	\$37,210
2.04	Contingency	%	\$375,940	10	\$375,750
3.00	TOTAL CAPITAL COST				\$12,189,210
O&M COSTS:					
4.00	Groundwater Containment and Removal System O&M (Years 0-1000)		\$421,580		\$421,996,580
4.01	Groundwater Extraction & Injection System O&M	year	\$365,000	1001	\$365,365,000
4.02	Project Management	%	\$18,250	5	\$18,268,250
4.03	Contingency	%	\$38,330	10	\$38,363,330
5.00	Groundwater Containment and Removal System O&M (Years 0-1000)		\$2,095,170		\$2,097,265,170
5.01	RO Treatment System O&M up to 600 GPM	year	\$1,814,000	1001	\$1,815,814,000
5.02	Project Management	%	\$90,700	5	\$90,790,700
5.03	Contingency	%	\$190,470	10	\$190,660,470
6.00	Zeolite Treatment System O&M (Years 0-150)		\$702,240		\$106,038,240
6.01	Zeolite Treatment System O&M up to 600 GPM	year	\$608,000	151	\$91,808,000
6.02	Project Management	%	\$30,400	5	\$4,590,400
6.03	Contingency	%	\$63,840	10	\$9,639,840
7.00	Spray Evaporation Treatment System O&M (Years 0-1000)		\$994,460		\$995,449,460
7.01	Spray Evaporation Treatment System O&M (100%)	year	\$861,000	1001	\$861,861,000
7.02	Project Management	%	\$43,050	5	\$43,093,050
7.03	Contingency	%	\$90,410	10	\$90,495,410
8.00	Groundwater Monitoring (Years 0-1,000)		\$169,084	1,001	\$169,253,084
8.01	Sampling Monitoring Wells	EA	\$500	101	\$50,500
8.02	Groundwater Analytical	EA	\$414	101	\$41,814
8.03	Evaluation and Reporting	LS	\$50,000	1	\$50,000
8.03	Project Management	%	\$4,080	8	\$11,390
8.04	Contingency	%	\$5,500	10	\$15,380
9.00	Facility Annual Operation (Years 0-1,000)		\$3,550,000		\$3,553,550,000
9.01	Site Staffing and Management (GW System Active)	year	\$750,000	1,001	\$750,750,000
9.02	Hydrology & Geochemical Consultants	year	\$100,000	1,001	\$100,100,000
9.03	RO Consulting Support	year	\$100,000	1,001	\$100,100,000
9.04	Electrical Maintenance Support	year	\$500,000	1,001	\$500,500,000
9.05	General Equipment Operation and Maintenance	year	\$150,000	1,001	\$150,150,000
9.06	Radiation Safety	year	\$500,000	1,001	\$500,500,000
9.07	Radon/Air Particulate Monitoring	year	\$200,000	1,001	\$200,200,000
9.08	Impoundment Maintenance & Monitoring	year	\$250,000	1,001	\$250,250,000
9.09	Regulatory Reporting	year	\$500,000	1,001	\$500,500,000
9.10	NRC Fees	year	\$500,000	1,001	\$500,500,000
10.00	TOTAL O&M COSTS (through project closeout)				\$7,343,552,534
PERIODIC COSTS:					
11.00	EP2 Re-lining (Year 5, every 50 yrs thereafter)		\$7,865,000		\$157,300,000
11.01	EP2 Re-lining (Year 5, every 50 yrs thereafter)	LS	\$6,500,000	20	\$130,000,000
11.02	Project Management	%	\$650,000	10	\$13,000,000
11.03	Contingency	%	\$715,000	10	\$14,300,000
12.00	Spray Evaporator Capital Replacement (year 10, every 10 years thereafter)		\$242,000		\$23,958,000
12.01	Spray Evaporator Capital Replacement (year 10, every 10 years thereafter)	LS	\$200,000	99	\$19,800,000
12.02	Project Management	%	\$20,000	10	\$1,980,000
12.03	Contingency	%	\$22,000	10	\$2,178,000
13.00	EP3 Re-lining (Year 20, every 50 yrs thereafter)		\$7,865,000		\$157,300,000
13.01	EP3 Re-lining (Year 5, every 50 yrs thereafter)	LS	\$6,500,000	20	\$130,000,000
13.01	Project Management	%	\$650,000	10	\$13,000,000
13.02	Contingency	%	\$715,000	10	\$14,300,000
14.00	Monitoring Well Capital Replacement (year 20, every 50 years thereafter)			20	\$19,822,800
14.01	Install/Develop/Sample Monitoring Wells - Alluvial	EA	\$7,900	91	\$718,110
14.02	Install/Develop/Sample Monitoring Wells - U. Chinle	EA	\$9,100	5	\$45,955
14.03	Install/Develop/Sample Monitoring Wells - M. Chinle	EA	\$10,300	3	\$26,008
14.04	Install/Develop/Sample Monitoring Wells - L. Chinle	EA	\$11,500	3	\$29,038
14.05	Project Management	%		10	\$81,920
14.06	Contingency	%		10	\$90,110
15.00	RO Treatment System Capital Replacement (Year 45, every 50 yrs thereafter)		\$19,360,000		\$387,200,000
15.01	RO Treatment System Capital Replacement (Year 65, every 50 yrs thereafter)	LS	\$16,000,000	20	\$320,000,000
15.02	Project Management	%	\$1,600,000	10	\$32,000,000
15.03	Contingency	%	\$1,760,000	10	\$35,200,000
16.00	Zeolite Treatment System Capital Replacement		\$6,050,000		\$18,150,000
16.01	Zeolite Treatment System Capital Replacement	LS	\$5,000,000	3	\$15,000,000
16.02	Project Management	%	\$500,000	10	\$1,500,000
16.03	Contingency	%	\$550,000	10	\$1,650,000
17.00	EP1 Re-lining (Year 50, every 50 yrs thereafter)		\$7,865,000		\$149,435,000
17.01	EP1 Re-lining (Year 50, every 50 yrs thereafter)	LS	\$6,500,000	19	\$123,500,000
17.02	Project Management	%	\$650,000	10	\$12,350,000
17.03	Contingency	%	\$715,000	10	\$13,585,000
18.00	Treatment Systems Decommissioning (Year 151)				\$220,610
18.01	Decomissioning of zeolite treatment system	LS	\$191,000	1	\$191,000
18.02	Project Management	%		5	\$9,550
18.03	Contingency	%		10	\$20,060
19.00	LTP Cover (Year 1)				\$7,643,570
19.01	Installation of LTP Cover	LS	\$6,317,000	1	\$6,317,000
19.02	Project Management	%		10	\$631,700
19.03	Contingency	%		10	\$694,870
20.00	Treatment Systems Decommissioning (Year 1,001)				\$266,200
20.01	Decomissioning of RO treatment system	LS	\$220,000	1	\$220,000
20.02	Project Management	%	\$22,000	10	\$22,000
20.03	Contingency	%	\$24,200	10	\$24,200
21.00	Well Abandonment/Closure (Year 1,001-1,002)				\$3,376,390
21.01	Alluvial Well Abandonment	EA	\$2,090	903	\$1,887,270
21.02	U. Chinle Well Abandonment	EA	\$2,600	29	\$75,400
21.03	M. Chinle Well Abandonment	EA	\$2,600	54	\$140,400
21.04	L. Chinle Well Abandonment	EA	\$2,600	27	\$70,200
21.05	San Andres Well Abandonment	EA	\$100,000	7	\$700,000
21.06	Reporting	LS	\$50,000	1	\$50,000
21.06	Project Management	%		5	\$146,170
21.07	Contingency	%		10	\$306,950
22.00	Evaporation Pond Decommissioning (Year 1,001)				\$3,262,519
22.01	West Collection Pond	LS	\$210,370	1	\$210,370
22.02	East Collection Pond	LS	\$118,730	1	\$118,730
22.03	EP1 Decommissioning (most costs in STP reclamation)	LS	\$2,351	1	\$2,351
22.04	EP2 Decommissioning	LS	\$710,028	1	\$710,028
22.05	EP3 Decommissioning	LS	\$1,783,199	1	\$1,783,199
22.06	Project Management	%	\$141,240	5	\$141,240
22.07	Contingency	%	\$296,600	10	\$296,600
23.00	Corrective Action piping removal site wide (Year 1,001 - 1,002)				\$2,275,480
23.01	Corrective Action piping removal site wide	LS	\$1,970,100	1	\$1,970,100
23.02	Project Management	%	\$146,560	5	\$98,510
23.03	Contingency	%	\$504,780	10	\$206,870
24.00	Construction Completion Reports (CCR) (includes NRC review costs)				\$600,000
24.01	LTP Cover CCR	LS	\$300,000	1	\$300,000
24.02	Treatment Systems CCR	LS	\$300,000	1	\$300,000
25.00	Long-Term Surveillance Fund (Year 1003)	LS	\$2,500,000	1	\$2,500,000
26.00	TOTAL PERIODIC COSTS (through project closeout)				\$933,310,569

ALTERNATIVE 2			COST ESTIMATE SUMMARY			
Groundwater Containment and Removal and In Situ Treatment			Sheet 2			
Site: HMC Grants Reclamation Project		Phase: ACL Application		Base Year:		
Location: Grants, NM		Date: 4/4/22		Duration: 1,003 Years		
Description: Alternative 2 includes maintaining access and groundwater use restrictions in the form of ICs (environmental restrictive covenants, land use zoning or deed restrictions) and ECs (fencing) to limit Site access. Alternative 2 includes continued operation of the groundwater containment and removal systems onsite for 36 years (years 0 through 36) followed by design of a hydroxapatite/permeable active barrier (PRB) in year 35 and installation in year 36 to treat in situ and inhibit long-term impacted groundwater migration. The PRB would be constructed to treat the saturated extent of the Alluvial Aquifer southwest of the LTP (2,750 feet long PRB) and expected to have a functional capital life of 50 years and would be replaced every 50 years and operated for the full compliance period of 1,000 years. The offsite water treatment would continue through Year 150 to address lingering mass beyond the footprint of the PRB. This alternative maintains compliance via corrective action (PRB and monitoring) but precludes license termination, Site transfer to DOE, and de-listing from the National Priorities List (NPL).						
Capital Costs:						
The zeolite water treatment system would be relocated from the top of the Large Tailings Pile to an area of approximately 4 acres just south of the existing reverse osmosis treatment plant in year 0. Re-lining of Pond EP-1 would be performed in year 0. Relining of pond EP-2 would be performed in year 5. The PRB would be designed in year 35 and the initial installation in year 36. All other treatment facilities would be maintained through routine operation and maintenance (O&M) expenditures.						
Decommissioning of existing RO treatment systems would occur in year 37, Zeolite and Evaporation pond systems would be decommissioned in Year 151. CAP well abandonment and piping infrastructure decommissioning would occur in years 151 through 152. The engineered final cover (part of groundwater source control efforts) would be installed on the LTP by Year 151. Covering of the STP, which is not considered a substantial long-term source of groundwater impacts, is not included as a groundwater CAP alternatives cost. Construction Completion Reports (CCR) for the LTP Cover and decommissioning of the treatment systems would be provided to NRC in year 152.						
Operating and Maintenance Costs (O&M):						
Ongoing O&M costs include operation of groundwater recovery and injection wells and above ground infrastructure (years 0-150), operation of the RO treatment system at a nominal rate of approximately 600 gpm (years 0-36), operation of the zeolite treatment system at a nominal rate of 600 gpm (years 0-150), and operation of the spray evaporation systems (100%) on the evaporation ponds (years 0-150). After year 17, active extratu groundwater corrective action would cease and related infrastructure decommissioned while the in situ PRB was installed. Groundwater monitoring costs for the existing groundwater monitoring program would continue throughout the entire compliance period (years 0-1,000). Operation of the and operation of the Site support facilities (admin, environmental, maintenance, sampling and staff, etc.) would decrease from the higher staffing and efforts levels of years with active groundwater extraction and treatment (years 0-150) to a long-term level of effort for the remainder of the compliance period (years 151-1,000). Long-term O&M costs includes operation of the PRB monitoring program system (years 36-1,000).						
Periodic Capital Costs:						
The LTP Cover is placed in year 1 and the LTP Cover CCR is developed in year 2. The initial PRB, to be constructed in year 36, is estimated to have a capital life of 50 years and replacement at the end of its capital life would require installation of all new infrastructure immediately down gradient of the previous installation every 50 years. The routine groundwater monitoring well network has a capital life of 50 years and is first replaced in year 20 and every 50 years thereafter. The zeolite treatment system is first replaced in year 50 and every 50 years for a total of two replacements.						
Present value is calculated based on a discounted cashflow factor using the equation $\frac{1}{(1+i)^n/(1+r)^n}$ where i is the annual inflation rate, r is the annual discount rate and n is the annual compounding period (See Sheet 15).						
CAPITAL COSTS:						
Item No.	DESCRIPTION & NOTES		UNIT	UNIT COST	QUANTITY	TOTAL (ROUNDED)
1.00	EP1 Re-lining (Year 0)			\$7,865,000		\$7,865,000
1.01	EP1 Re-lining (Year 0)		EA	\$6,500,000	1	\$6,500,000
1.02	Project Management		%	\$650,000	10	\$650,000
1.03	Contingency		%	\$715,000	10	\$715,000
2.00	Zeolite Relocation (Year 0)			\$4,326,310		\$4,324,210
2.01	Existing Zeolite Decommissioning		LS	\$191,000	1	\$191,000
2.02	Zeolite Relocation		LS	\$3,720,250	1	\$3,720,250
2.03	Project Management		%	\$39,120	10	\$37,210
2.04	Contingency		%	\$375,940	10	\$375,750
3.00	TOTAL CAPITAL COST					\$12,189,210
O&M COSTS:						
4.00	Groundwater Containment and Removal System O&M (Years 0-150)			\$421,580		\$63,657,830
4.01	Groundwater Extraction & Injection System O&M		year	\$365,000	151	\$55,115,000
4.02	Project Management		%	\$18,250	5	\$2,755,750
4.03	Contingency		%	\$38,330	10	\$5,787,080
5.00	RO Treatment System O&M (Years 0-36)			\$2,095,170		\$77,521,290
5.01	RO Treatment System O&M up to 600 GPM		year	\$1,814,000	37	\$67,118,000
5.02	Project Management		%	\$90,700	5	\$3,355,900
5.03	Contingency		%	\$190,470	10	\$7,047,390
6.00	Zeolite Treatment System O&M (Years 0-150)			\$702,240		\$106,038,240
6.01	Zeolite Treatment System O&M up to 600 GPM		year	\$608,000	151	\$91,808,000
6.02	Project Management		%	\$30,400	5	\$4,590,400
6.03	Contingency		%	\$63,840	10	\$9,639,840
7.00	Spray Evaporation Treatment System O&M (Years 0-150)			\$994,460		\$150,162,710
7.01	Spray Evaporation Treatment System O&M (100%)		year	\$861,000	151	\$130,011,000
7.02	Project Management		%	\$43,050	5	\$6,500,550
7.03	Contingency		%	\$90,410	10	\$13,651,160
8.00	Zeolite Treatment System Capital Replacement (yrs 50, 100)			\$6,050,000		\$12,100,000
8.01	Zeolite Treatment System Capital Replacement		LS	\$5,000,000	2	\$10,000,000
8.02	Project Management		%	\$500,000	10	\$1,000,000
8.03	Contingency		%	\$550,000	10	\$1,100,000
8.00	PRB Performance Monitoring (Years 37-1,000)*			\$91,990	964	\$88,678,360 *
8.01	Sampling Monitoring Wells		EA	\$500	30	\$15,000
8.02	Groundwater Analytical		EA	\$414	30	\$12,420
8.03	Evaluation and Reporting		LS	\$50,000	1	\$50,000
8.03	Project Management		%	\$4,080	8	\$6,200
8.04	Contingency		%	\$5,500	10	\$8,370
9.00	Groundwater Monitoring (Years 0-1,000)*			\$169,084	1,001	\$169,253,084
9.01	Sampling Monitoring Wells		EA	\$500	101	\$50,500
9.02	Groundwater Analytical		EA	\$414	101	\$41,814
9.03	Evaluation and Reporting		LS	\$50,000	1	\$50,000
9.03	Project Management		%	\$4,000	8	\$11,390
9.04	Contingency		%	\$5,400	10	\$15,380
10.00	Facility Annual Operation (Years 0-150)			\$3,550,000		\$524,650,000
10.01	Site Staffing and Management (GW System Active)		year	\$750,000	151	\$113,250,000
10.02	Hydrology & Geochemical Consultants		year	\$100,000	151	\$15,100,000
10.03	RO Consulting Support		year	\$100,000	37	\$3,700,000
10.04	Electrical Maintenance Support		year	\$500,000	151	\$75,500,000
10.05	General Equipment Operation and Maintenance		year	\$150,000	151	\$22,650,000
10.06	Radiation Safety		year	\$500,000	151	\$75,500,000
10.07	Radon/Air Particulate Monitoring		year	\$200,000	151	\$30,200,000
10.08	Impoundment Maintenance & Monitoring		year	\$250,000	151	\$37,750,000
10.09	Regulatory Reporting		year	\$500,000	151	\$75,500,000
10.10	NRC Fees		year	\$500,000	151	\$75,500,000
11.00	Facility Annual Operation (Years 151-1000)			\$2,150,000		\$1,827,500,000
11.01	Site Staffing and Management (GW System Inactive)		year	\$200,000	850	\$170,000,000
11.02	Radiation Safety		year	\$500,000	850	\$425,000,000
11.03	Radon/Air Particulate Monitoring		year	\$200,000	850	\$170,000,000
11.04	Impoundment Maintenance & Monitoring		year	\$250,000	850	\$212,500,000
11.05	Regulatory Reporting		year	\$500,000	850	\$425,000,000
11.06	NRC Fees		year	\$500,000	850	\$425,000,000
12.00	TOTAL O&M COSTS (through project closeout)					\$3,019,561,514
PERIODIC COSTS:						
13.00	PRB - Remedial Investigation & Design (Year 35)					\$311,850
13.01	Work Plan & Implementation - Labor		LS	\$50,000	1	\$50,000
13.02	Drilling & Sample Collection (Soil and GW)		LS	\$45,000	1	\$45,000
13.03	Laboratory Analysis of Soil and GW		LS	\$10,000	1	\$10,000
13.04	Remedial Design Reports/Work Plans		LS	\$165,000	1	\$165,000
13.05	Project Management		%	\$13,500	5	\$13,500
13.06	Contingency		%	\$28,350	10	\$28,350
14.00	PRB - Installation (Year 36)					\$4,244,610
14.01	Install/Develop/Sample Injection Wells - Alluvial		EA	\$7,900	138	\$1,090,200
14.02	Install/Develop/Sample Monitoring Wells - Alluvial		EA	\$7,900	30	\$237,000
14.03	Laboratory Analysis of Soil and GW		LS	\$50,000	1	\$50,000
14.04	Apatite Chemicals		EA	\$5,000	138	\$690,000
14.05	Mob/Demob - Apatite Solution Injection Equipment		LS	\$40,000	1	\$40,000
14.06	Apatite Solution Injection		EA	\$3,500	138	\$483,000
14.07	Drilling & Injection Oversight		LS	\$200,000	1	\$200,000
14.08	Mob/Demob - Post Injection Confirmation Sampling		LS	\$25,000	1	\$25,000
14.09	Post Injection Confirmation Sampling		EA	\$5,000	40	\$200,000
14.10	Post Injection Confirmation - Laboratory Analysis		LS	\$75,000	1	\$75,000
14.11	Post Injection Confirmation Sampling Oversight		LS	\$40,000	1	\$40,000
14.12	Other Direct Costs (Per Diem, Equipment, Supplies, Travel)		LS	\$265,000	1	\$265,000
14.13	Technical Support, Data Analysis & Validation, Design Report		LS	\$120,000	1	\$120,000
14.14	Project Management		%	\$	5	\$175,760
14.15	Contingency		%		15	\$553,650
15.00	Treatment Systems Decommissioning (Year 37)			\$266,200		\$266,200
15.01	Decommissioning of RO treatment system		0	\$220,000	1	\$220,000
15.02	Project Management		%	\$22,000	10	\$22,000
15.03	Contingency		%	\$24,200	10	\$24,200
16.00	EP2 Re-lining (Year 5, every 50 yrs thereafter)			\$7,865,000		\$23,595,000
16.01	EP2 Re-lining (Year 5, every 50 yrs thereafter)		EA	\$6,500,000	3	\$19,500,000
16.02	Project Management		%	\$650,000	10	\$1,950,000
16.03	Contingency		%	\$715,000	10	\$2,145,000
17.00	Spray Evaporator Capital Replacement (year 10, every 10 years thereafter)			\$242,000		\$3,388,000
17.01	Spray Evaporator Capital Replacement (year 10, every 10 years thereafter)		year	\$200,000	14	\$2,800,000
17.02	Project Management		%	\$20,000	10	\$280,000
17.03	Contingency		%	\$22,000	10	\$308,000
18.00	EP3 Re-lining (Year 20, every 50 yrs thereafter)			\$7,865,000		\$23,595,000
18.01	EP3 Re-lining (Year 20, every 50 yrs thereafter)		EA	\$6,500,000	3	\$19,500,000
18.02	Project Management		%	\$650,000	10	\$1,950,000
18.03	Contingency		%	\$715,000	10	\$2,145,000
19.00	Monitoring Well Capital Replacement (year 20, every 50 years thereafter)					\$19,822,800
19.01	Install/Develop/Sample Monitoring Wells - Alluvial		EA	\$7,900	91	\$718,110
19.02	Install/Develop/Sample Monitoring Wells - U. Chinle		EA	\$9,100	5	\$45,955
19.03	Install/Develop/Sample Monitoring Wells - M. Chinle		EA	\$10,300	3	\$27,027
19.04	Install/Develop/Sample Monitoring Wells - L. Chinle		EA	\$11,500	3	\$29,938
19.05	Project Management		%		10	\$81,920
19.06	Contingency		%		10	\$90,110
20.00	EP1 Re-lining (Year 50, every 50 yrs thereafter)			\$7,865,000		\$15,730,000
20.01	EP1 Re-lining (Year 50, every 50 yrs thereafter)		EA	\$6,500,000	2	\$13,000,000
20.02	Project Management		%	\$650,000	10	\$1,300,000
20.03	Contingency		%	\$715,000	10	\$1,430,000
21.00	PRB - Installation (Year 86 and every 50 years thereafter)					\$80,647,590
21.01	Install/Develop/Sample Injection Wells - Alluvial		EA	\$7,900	138	\$1,090,200
21.02	Install/Develop/Sample Monitoring Wells - Alluvial		EA	\$7,900	30	\$237,000
21.03	Laboratory Analysis of Soil and GW		LS	\$50,000	1	\$50,000
21.04	Apatite Chemicals		EA	\$5,000	138	\$690,000
21.05	Mob/Demob - Apatite Solution Injection Equipment		LS	\$40,000	1	\$40,000
21.06	Apatite Solution Injection		EA	\$3,500	138	\$483,000
21.07	Drilling & Injection Oversight		LS	\$200,000	1	\$200,000
21.08	Mob/Demob - Post Injection Confirmation Sampling		LS	\$25,000	1	\$25,000
21.09	Post Injection Confirmation Sampling		EA	\$5,000	40	\$200,000
21.10	Post Injection Confirmation - Laboratory Analysis		LS	\$75,000	1	\$75,000
21.11	Post Injection Confirmation Sampling Oversight		LS	\$40,000	1	\$40,000
21.12	Other Direct Costs (Per Diem, Equipment, Supplies, Travel)		LS	\$265,000	1	\$265,000
21.13	Technical Support, Data Analysis & Validation, Design Report		LS	\$120,000	1	\$120,000
21.14	Project Management		%	\$141,240	5	\$175,760
21.15	Contingency		%	\$296,600	10	\$296,600
22.00	Treatment Systems Decommissioning (Year 151)					\$231,110
22.01	Decommissioning of zeolite treatment system		LS	\$191,000	1	\$191,000
22.02	Project Management		%	\$19,100	10	\$19,100
22.03	Contingency		%	\$21,010	10	\$21,010
23.00	LTP Cover (Year 1)			\$6,948,700		\$7,643,570
23.01	Installation of LTP Cover		LS	\$6,317,000	1	\$6,317,000
23.02	Project Management		%	\$631,700	10	\$631,700
23.03	Contingency		%	\$694,870	10	\$694,870
24.00	Well Abandonment/Closure (Year 151-152)					\$3,402,441
24.01	Alluvial Well Abandonment		EA	\$2,090	903	\$1,887,087
24.02	U. Chinle Well Abandonment		EA	\$2,600	29	\$75,122
24.03	M. Chinle Well Abandonment		EA	\$2,600	54	\$140,854
24.04	L. Chinle Well Abandonment		EA	\$2,600	27	\$70,427
24.05	San Andres Well Abandonment		EA	\$100,000	7	\$722,330
24.06	Reporting		LS	\$50,000	1	\$50,000
24.06	Project Management		%	\$8,000	5	\$147,300
24.07	Contingency		%	\$16,790	10	\$309,320
25.00	Evaporation Pond Decommissioning (Year 151)					\$3,262,519
25.01	West Collection Pond		LS	\$210,370	1	\$210,370
25.02	East Collection Pond		LS	\$118,730	1	\$118,730
25.03	EP1 Decommissioning (most costs in STP reclamation)		LS	\$2,351	1	\$2,351
25.04	EP2 Decommissioning		LS	\$710,028	1	\$710,028
25.05	EP3 Decommissioning		LS	\$1,783,199	1	\$1,783,199
25.06	Project Management		%	\$141,240	5	\$141,240
25.07	Contingency		%	\$296,600	10	\$296,600
26.00	Corrective Action piping removal site (Year 151-152)					\$2,275,480
26.01	Corrective Action piping removal site side		LS	\$1,970,100	1	\$1,970,100
26.02	Project Management		%	\$98,510	5	\$98,510
26.03	Contingency		%	\$197,010	10	\$206,870
27.00	Construction Completion Reports (CCR) (includes NRC review costs) (153)					\$600,000
27.01	LTP Cover CCR		LS	\$300,000	1	\$300,000
27.02	Treatment Systems CCR		LS	\$300,000	1	\$300,000
28.00	Long-Term Surveillance Fund (Year 1003)		LS	\$2,500,000	1	\$2,500,000
29.00	TOTAL PERIODIC COSTS (through project closeout)					\$191,516,170

ALTERNATIVE 3		COST ESTIMATE SUMMARY	
Alternative Concentration Limits and Institutional Controls		Sheet 3	
Site: HMC Grants Reclamation Project	Phase: Groundwater Corrective Action F	Base Year:	
Location: Grants, NM	Date: 4/4/22	Duration: 5 years	
Description: Alternative 3 includes approval of proposed alternate concentration limits (ACLs) and durable and enforceable institutional controls (IC's) to limit access to potential groundwater exposures within the porposed longterm control boundary (LTCB). Fee title and/or ICs to applicable lands and interests therein not already owned by the Federal Government within the Long Term Care Boundary (LTCB) would be transferred to the long-term custodian (US Depatymnt of Energy; DOE). A Long-term surveillance fund determined by NRC would be provided by the licensee. Under this alternative, corrective action extraction and treatment of groundwater would cease upon approval of the proposed ACLs and final decomissioning and reclamation of the Site would resume. This altmative allows for license termination, de-listing from the Nantional Priorities List (NPL), and transfer to the Long-term custodian (DOE). Beacuse Site transfer takes place, funding by the licensee for long-term surveillance plan (LTSP) montiring and reporting is included.			
Capital Costs:			
Decommissioning of existing CAP treatment systems (RO, zeolites and evap ponds) would occur in year 0, CAP well abandonment and piping infrastructure decommissioning would occur in years 0-1. The engineered final cover (part of groundwater source control efforts) would be installed on the LTP in Year 1. Covering of the STP, which is not considered a substantial long-ter source of gorundwater impacts, is not included as a groundwarer CAP alternatives cost. Construction Completion Reports (CCR) for the LTP Cover and decomissioning of the treatment systems would be provided to NRC in year 3.			
Operating and Miantenance Costs (O&M):			
Groundwater monitoring costs for the existing groundwater monitoring program would conitue throughout the entire compliance period (years 0-4), Operation of the and operation of the Site support facilities (admin, environmental, maintenance, sampling and staff, etc.) would continue through transfer (years 0-4).			
Perodic Capital Costs:			
Long-term serveillance and monitoring costs are provided to the Federal Government in the LTSP funding.			
Present value is calculated based on a discounted cashflow factor using the equation $[(1+i)^n]/[(1+r)^n]$ where i is the annual inflation rate, r is the annual discount rate and n is the annual compounding period (See Sheet 13).			

CAPITAL COSTS:					
Item No.	DESCRIPTION & NOTES	UNIT	UNIT COST	QUANTITY	TOTAL (ROUNDED)
1.00	Treatment Systems Decommissioning (Year 0)				\$497,310
1.01	Decomissioning of zeolite treatment system	LS	\$191,000	1	\$191,000
1.02	Decomissioning of RO treatment system	LS	\$220,000	1	\$220,000
1.03	Project Management	%		10	\$41,100
1.04	Contingency	%		10	\$45,210
2.00	LTP Cover (Year 1)				\$7,296,140
2.01	Install LTP Cover	LS	\$6,317,000	1	\$6,317,000
2.02	Project Management	%		5	\$315,850
2.03	Contingency	%		10	\$663,290
3.00	Well Abandonment/Closure (Year 0-1)				\$3,376,390
3.01	Alluvial Well Abandonment	EA	\$2,090	903	\$1,887,270
3.02	U. Chinle Well Abandonment	EA	\$2,600	29	\$75,400
3.03	M. Chinle Well Abandonment	EA	\$2,600	54	\$140,400
3.04	L. Chinle Well Abandonment	EA	\$2,600	27	\$70,200
3.05	San Andres Well Abandonment	EA	\$100,000	7	\$700,000
3.06	Reporting	LS	\$50,000	1	\$50,000
3.06	Project Management	%	\$8,000	5	\$146,170
3.07	Contingency	%	\$16,790	10	\$306,950
4.00	Evaporation Pond Decommissioning (Year 1)				\$3,262,519
4.01	West Collection Pond	LS	\$210,370	1	\$210,370
4.02	East Collection Pond	LS	\$118,730	1	\$118,730
4.03	EP1 Decommissioning (most costs in STP reclamation)	LS	\$2,351	1	\$2,351
4.04	EP2 Decommissioning	LS	\$710,028	1	\$710,028
4.05	EP3 Decommissioning	LS	\$1,783,199	1	\$1,783,199
4.06	Project Management	%	\$141,240	5	\$141,240
4.07	Contingency	%	\$296,600	10	\$296,600
5.00	Corrective Action piping removal site wide (Year 0-1)				\$2,275,480
5.01	Corrective Action piping removal site wide	LS	\$1,970,100	1	\$1,970,100
5.02	Project Management	%	\$98,510	5	\$98,510
5.03	Contingency	%	\$197,010	10	\$206,870
6.00	Construction Completion Reports (CCR) (Year 2)				\$600,000
6.01	LTP Cover CCR	LS	\$300,000	1	\$300,000
6.02	Treatment Systems CCR	LS	\$300,000	1	\$300,000
7.00	Long-Term Surveillance Fund (Year 5)	LS	\$2,500,000	1	\$2,500,000
8.00	TOTAL CAPITAL COST				\$19,807,839

O&M COSTS:					
9.00	Groundwater Monitoring (Years 0-4)			5	\$845,420
9.01	Sampling Monitoring Wells	EA	\$500	101	\$50,500
9.02	Groundwater Analytical	EA	\$414	101	\$41,814
9.03	Evaluation and Reporting	LS	\$50,000	1	\$50,000
9.04	Project Management	%		8	\$11,390
9.05	Contingency	%		10	\$15,380
10.00	Facility Annual Operation (Years 0-4)			5	\$10,750,000
10.01	Site Staffing and Management (GW System Inactive)	year	\$200,000	1	\$200,000
10.02	Radiation Safety	year	\$500,000	1	\$500,000
10.03	Impoundment Maintenance & Monitoring	year	\$250,000	1	\$250,000
10.04	Radon/Air Particulate Monitoring	year	\$200,000	1	\$200,000
10.05	Regulatory Reporting	year	\$500,000	1	\$500,000
10.06	NRC Fees	year	\$500,000	1	\$500,000
11.00	TOTAL O&M COSTS (through project closeout)				\$11,595,420

PERIODIC COSTS:					
	None				\$0
12.00	TOTAL PERIODIC COSTS (through project closeout)				\$0

PROJECT COST SCHEDULE & PRESENT VALUE ANALYSIS						
Item No.	DESCRIPTION	YEAR	PERIOD COST	CUMULATIVE COST	DISCOUNT FACTOR	PERIOD NET PRESENT VALUE
13.00	Annual Cost					
13.00	Treatment System Decomm; Well Aband.;GW Monitoring; Corr. Act. Piping Removal; Facility Ops	0	\$5,642,329	\$5,642,329	1.0000	\$5,642,329
13.01	LTP Cover, Well Aband.; Evap Pond Decom.; Corr. Act. Piping Removal; GW Monitoring; Facility Ops	1	\$15,703,678	\$21,346,007	0.9486	\$14,896,479
13.02	Cover & Treatment Systems CCRs, GW Monitoring; Facility Ops	2	\$2,919,084	\$24,265,091	0.8998	\$2,626,704
13.03	GW Monitoring; Facility Ops	3	\$2,319,084	\$26,584,175	0.8536	\$1,979,535
13.04	GW Monitoring; Facility Ops	4	\$2,319,084	\$28,903,259	0.8097	\$1,877,784
13.05	Long-Term Surveillance Fund	5	\$2,500,000	\$31,403,259	0.7681	\$1,920,222
TOTAL PROJECT COSTS			\$31,403,259			\$28,943,053
COST SUMMARIES			CURRENT DOLLAR			NPV
	Costs through Year 1		\$21,347,000			\$20,539,000
	Costs through Year 2		\$24,266,000			\$23,166,000
	Costs through Year 3		\$26,585,000			\$25,146,000
	Costs through Year 4		\$28,904,000			\$27,023,000

Note: * Annual cost is shown and is multiplied by the number of years for inclusion in Total O&M Costs.