

**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 hydroxyapatite permeable reactive 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. Re-lining 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 off-site 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  $(1+i)^n/(1+r)^n$  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)
<b>1.00</b>	<b>EP1 Re-lining (Year 0)</b>		<b>\$7,865,000</b>		<b>\$7,865,000</b>
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
<b>2.00</b>	<b>Zeolite Relocation (Year 0)</b>		<b>\$4,326,310</b>		<b>\$4,326,310</b>
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
<b>3.00</b>	<b>TOTAL CAPITAL COST</b>				<b>\$12,189,210</b>

**O&M COSTS:**

<b>4.00</b>	<b>Groundwater Containment and Removal System O&amp;M (Years 0-150)</b>		<b>\$421,580</b>		<b>\$63,657,830</b>
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
<b>5.00</b>	<b>RO Treatment System O&amp;M (Years 0-36)</b>		<b>\$2,095,170</b>		<b>\$77,521,290</b>
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
<b>6.00</b>	<b>Zeolite Treatment System O&amp;M (Years 0-150)</b>		<b>\$702,240</b>		<b>\$106,038,240</b>
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
<b>7.00</b>	<b>Spray Evaporation Treatment System O&amp;M (Years 0-150)</b>		<b>\$994,460</b>		<b>\$150,162,710</b>
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
<b>8.00</b>	<b>Zeolite Treatment System Capital Replacement (yrs 50, 100)</b>		<b>\$6,050,000</b>		<b>\$12,100,000</b>
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
<b>8.00</b>	<b>PRB Performance Monitoring (Years 37-1,000)*</b>		<b>\$91,990</b>	<b>964</b>	<b>\$88,678,360</b>
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
<b>9.00</b>	<b>Groundwater Monitoring (Years 0-1,000)*</b>		<b>\$169,084</b>	<b>1,001</b>	<b>\$169,253,084</b>
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	%	\$5,490	10	\$16,380
<b>10.00</b>	<b>Facility Annual Operation (Years 0-150)</b>		<b>\$3,550,000</b>		<b>\$524,650,000</b>
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	\$75,000,000
10.05	General Equipment Operation and Maintenance	year	\$150,000	151	\$22,650,000
10.06	Radiation Safety	year	\$500,000	151	\$75,000,000
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	\$75,000,000
10.10	NRC Fees	year	\$500,000	151	\$75,000,000
<b>11.00</b>	<b>Facility Annual Operation (Years 151-1000)</b>		<b>\$2,150,000</b>		<b>\$1,827,500,000</b>
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
<b>12.00</b>	<b>TOTAL O&amp;M COSTS (through project observat)</b>				<b>\$3,019,561,514</b>

**PERIODIC COSTS:**

<b>13.00</b>	<b>PRB - Remedial Investigation &amp; Design (Year 35)</b>				<b>\$311,850</b>
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	\$105,000	1	\$105,000
13.05	Project Management	%	\$13,500	5	\$13,500
13.06	Contingency	%	\$28,350	10	\$28,350
<b>14.00</b>	<b>PRB - Installation (Year 36)</b>				<b>\$4,244,610</b>
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	\$20,000
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	%	\$175,760	5	\$175,760
14.15	Contingency	%	\$553,650	15	\$553,650
<b>15.00</b>	<b>Treatment Systems Decommissioning (Year 37)</b>		<b>\$266,200</b>		<b>\$266,200</b>
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
<b>16.00</b>	<b>EP2 Re-lining (Year 5, every 50 yrs thereafter)</b>		<b>\$7,865,000</b>		<b>\$23,595,000</b>
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
<b>17.00</b>	<b>Spray Evaporator Capital Replacement (year 10, every 10 years thereafter)</b>		<b>\$242,000</b>		<b>\$3,388,000</b>
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
<b>18.00</b>	<b>EP3 Re-lining (Year 20, every 50 yrs thereafter)</b>		<b>\$7,865,000</b>		<b>\$23,595,000</b>
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
<b>19.00</b>	<b>Monitoring Well Capital Replacement (year 20, every 50 years thereafter)</b>		<b>\$19,822,800</b>		<b>\$19,822,800</b>
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	\$26,088
19.04	Install/Develop/Sample Monitoring Wells - L. Chinle	EA	\$11,500	3	\$29,038
19.05	Project Management	%	\$81,920	10	\$81,920
19.06	Contingency	%	\$90,110	10	\$90,110
<b>20.00</b>	<b>EP1 Re-lining (Year 50, every 50 yrs thereafter)</b>		<b>\$7,865,000</b>		<b>\$15,730,000</b>
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
<b>21.00</b>	<b>PRB - Installation (Year 86 and every 50 years thereafter)</b>				<b>\$80,647,590</b>
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	\$20,000
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	%	\$175,760	5	\$175,760
21.15	Contingency	%	\$553,650	15	\$553,650
<b>22.00</b>	<b>Treatment Systems Decommissioning (Year 151)</b>				<b>\$231,110</b>
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
<b>23.00</b>	<b>LTP Cover (Year 1)</b>		<b>\$6,948,700</b>		<b>\$7,643,570</b>
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
<b>24.00</b>	<b>Well Abandonment/Closure (Year 151-152)</b>				<b>\$3,402,441</b>
24.01	Alluvial Well Abandonment	EA	\$2,080	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
<b>25.00</b>	<b>Evaporation Pond Decommissioning (Year 151)</b>				<b>\$3,262,519</b>
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			