



# State of Utah

## DEPARTMENT OF ENVIRONMENTAL QUALITY DIVISION OF RADIATION CONTROL

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40-8989

March 14, 1994

Sandra Wastler, Project Manager  
Uranium Recovery Branch  
Division of Low-Level Waste Management  
and Decommissioning  
Office of Nuclear Material Safety  
and Safeguards  
Washington, D.C. 20555

Dear Ms Wastler:

Enclosed is a copy of the draft Ground Water Discharge Permit for the Envirocare of Utah facilities. This permit is being modified by the Utah Division of Water Quality to add provisions for regulating the 11e.(2) disposal units for non-radiologic parameters. It is similar to the permit that is in effect for the low-level radioactive waste unit regulated by the Division of Radiation Control. Should you have any questions regarding the enclosure, please contact me or Loren Morton, Division of Water Quality at 801-538-6016.

Sincerely,

Dane L. Finerfrock, Section Manager  
Division of Radiation Control

Enclosure

210005

NW10/11

rc'd 3/18

**DRAFT**

3/8/94

Permit No.: UGW450005



STATE OF UTAH  
DIVISION OF WATER QUALITY  
UTAH WATER QUALITY BOARD  
P.O. BOX 16690  
SALT LAKE CITY, UTAH 84116-0690

**Ground Water Quality Discharge Permit**

In compliance with the provisions of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 1953, as amended,

**Envirocare of Utah**  
46 West Broadway, Suite 240  
Salt Lake City, Utah 84101

hereafter referred to as the "Permittee", is granted a Ground Water Quality Discharge Permit for a Low-Activity Radioactive Waste (LARW) Disposal Facility in accordance with conditions set forth herein. This facility consists of three separate operable units: an ~~Existing~~ LARW Cell and two ~~future~~ LARW ~~Disposal~~ ~~11e.~~(2) Cells, which are located at approximately latitude 40° 41' 18" North, longitude 113° 06' 54" West.

This modified Ground Water Quality Discharge Permit amends and supercedes all other Ground Water Discharge permits for this facility issued previously.

This modified permit shall become effective on \_\_\_\_\_

This permit and the authorization to operate shall expire at midnight, \_\_\_\_\_

Signed this \_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

\_\_\_\_\_  
Executive Secretary  
Water Quality Board

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## I. SPECIFIC CONDITIONS

### A. Ground Water Classification

Based on ground water quality data submitted by the permit applicant, ground water in the vicinity of the site is defined as Class IV.

### B. Background Ground Water Quality

1. Background Quality from Existing Monitoring Wells - Based on ground water quality samples collected through November, 1992, background ground water quality is defined as the mean concentration in Tables 1A and 1B of this permit.
2. Determination and Revision of Background Ground Water Quality - after submittal of additional ground water quality data, background ground water quality values may be revised by the Executive Secretary. After completion of the one year of background sampling of compliance monitoring wells GW-32, GW-60, and GW-63 (Part I.I.3), the background water quality values may also be revised by the Executive Secretary.

### C. Ground Water Protection Levels

1. Ground Water Protection Levels - based on the types of wastes to be received for disposal in the low-activity radioactive waste (LARW) facility, which include naturally occurring radioactive materials (NORM) and low-level radioactive waste (LLRW), an evaluation of indicator isotopes and their mobility, and the Ground Water Quality Standards; ground water protection levels (GWPL) are defined as either the Ground Water Quality Standards or the Background Concentration plus one standard deviation, whichever is greater, as listed in Tables 1A and 1B of this permit.
2. Revision of Ground Water Protection Levels - after submittal of additional ground water quality data, the ground water protection levels may be revised by the Executive Secretary. After completion of the one year of background sampling of compliance monitoring wells GW-32, GW-60, and GW-63 (Part I.I.3), the Ground Water Protection Levels may also be modified by the Executive Secretary.

TABLE 1A: Ground Water Protection Levels - Inorganic/Organic Parameters

I/O Parameter (mg/l or as noted)	Well ID: GW-16R <sup>(12)</sup>					GW-19A <sup>(13)</sup>				
	GWQS <sup>(1)</sup>	Mean Conc. <sup>(2)</sup>	Std Dev. <sup>(3)</sup> s	Mean Conc + 1 s <sup>(4)</sup>	GWPL <sup>(5)</sup>		Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Field & Inorganics										
pH (units)	6.5-8.5	7.61	0.17	7.78	GWQS		7.20	0.20	7.40	GWQS
Fluoride	2.4	1.3272	0.1737	1.5009	GWQS		3.89	0.6522	4.5422	4.54
Nitrate/Nitrite-N	10	0.0372	0.0228	0.06	GWQS		0.0111	0.0033	0.0144	GWQS
Heavy Metals										
Arsenic	0.05	0.0064	0.0032	0.0096	GWQS		0.0153	0.0093	0.0246	GWQS
Barium	1	0.0194	0.0267	0.0461	GWQS		0.0023	0.0009	0.0032	GWQS
Cadmium	0.01	0.004	0.0003	0.0043	GWQS		0.0041	0.0003	0.0044	GWQS
Chromium	0.05	0.0073	0.0063	0.0136	GWQS		0.0136	0.0169	0.0305	GWQS
Copper	1	0.0094	0.0174	0.0268	GWQS		0.0042	0.0004	0.0046	GWQS
Lead	0.05	0.009	0.0135	0.0225	GWQS		0.0057	0.0022	0.0079	GWQS
Mercury	0.002	0.0002	0.0002	0.0004	GWQS		0.0002	0	0.0002	GWQS
Nickel	0.15 <sup>(6)</sup>	0.0077	0.0034	0.0111	GWQS		0.0085	0.0024	0.0109	GWQS
Selenium	0.01	0.005	0.0003	0.0053	GWQS		0.005	0	0.005	GWQS
Silver	0.05	0.0119	0.0214	0.0333	GWQS		0.006	0.0021	0.0081	GWQS
Zinc	5	0.004	0.0049	0.0089	GWQS		1.5051	4.7416	6.2467	6.25 <sup>(8)</sup>
Organics & TDS										
TOC <sup>(10)</sup>		0.8822	0.2542	1.14	1.14		4.975	8.1771	13.15	13.15 <sup>(8)</sup>
TOX		0.0495	0.1494	0.1989	0.20		0.01	0.015	0.025	0.02
TDS <sup>(11)</sup>		23,636	809	24,445	24,445		49,600	2,413	52,013	52,013

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

I/O Parameter (mg/l, or as noted)	Well ID:	GW-20				GW-22			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Field & Inorganics									
pH (units)	6.5-8.5	7.43	0.11	7.54	GWQS	7.25	0.05	7.30	GWQS
Fluoride	2.4	2.7333	0.6225	3.3558	3.36	2.53	0.3368	2.8668	2.87
Nitrate/Nitrite-N	10	0.1055	0.12	0.2255	GWQS	0.049	0.0317	0.0807	GWQS
Heavy Metals									
Arsenic	0.05	0.0172	0.0091	0.0263	GWQS	0.0104	0.004	0.0144	GWQS
Barium	1	0.0021	0.0003	0.0024	GWQS	0.0093	0.023	0.0323	GWQS
Cadmium	0.01	0.004	0	0.004	GWQS	0.004	0	0.004	GWQS
Chromium	0.05	0.0055	0.0016	0.0071	GWQS	0.0064	0.0044	0.0108	GWQS
Copper	1	0.0042	0.0004	0.0046	GWQS	0.0063	0.0069	0.0132	GWQS
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS
Nickel	0.15	0.0083	0.0025	0.0108	GWQS	0.0085	0.0024	0.0109	GWQS
Selenium	0.01	0.0053	0.001	0.0063	GWQS	0.0053	0.0009	0.0062	GWQS
Silver	0.05	0.0055	0.0016	0.0071	GWQS	0.0094	0.0122	0.0216	GWQS
Zinc	5	0.002	0	0.002	GWQS	0.002	0	0.002	GWQS
Organics & TDS									
TOC		1.32	0.764	2.08	2.08	1.1866	0.5632	1.75	1.75
TOX		0.005	0	0.005	0.01	0.005	0	0.005	0.01
TDS		48,000	1,225	49,225	49,225	44,100	1,101	45,201	45,201



TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

I/O Parameter (mg/l, or as noted)	Well ID: GW-23					GW-24				
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	
Field & Inorganics										
pH (units)	6.5-8.5	7.26	0.08	7.34	GWQS	7.38	0.07	7.45	GWQS	
Fluoride	2.4	2.7555	0.3844	3.1399	3.14	2.7888	0.3218	3.1106	3.11	
Nitrate/Nitrite-N	10	0.0411	0.0214	0.0625	GWQS	0.0544	0.032	0.0864	GWQS	
Heavy Metals										
Arsenic	0.05	0.0118	0.0062	0.018	GWQS	0.0143	0.0067	0.021	GWQS	
Barium	1	0.0082	0.0186	0.0268	GWQS	0.0043	0.007	0.0113	GWQS	
Cadmium	0.01	0.004	0	0.004	GWQS	0.004	0	0.004	GWQS	
Chromium	0.05	0.0074	0.0073	0.0147	GWQS	0.006	0.003	0.009	GWQS	
Copper	1	0.0066	0.0076	0.0142	GWQS	0.0042	0.0004	0.0046	GWQS	
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS	
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS	
Nickel	0.15	0.0083	0.0025	0.0108	GWQS	0.0083	0.0025	0.0108	GWQS	
Selenium	0.01	0.0054	0.0013	0.0067	GWQS	0.0064	0.0027	0.0091	GWQS	
Silver	0.05	0.0118	0.0188	0.0306	GWQS	0.0112	0.0168	0.028	GWQS	
Zinc	5	0.002	0	0.002	GWQS	0.002	0	0.002	GWQS	
Organics & TDS										
TOC		1.4475	0.5452	1.99	1.99	1.3675	0.9527	2.32	2.32	
TOX		0.005	0	0.005	0.01	0.005	0	0.005	0.01	
TDS		43,333	1,000	44,333	44,333	48,222	1,394	49,616	49,616	

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

Well ID:		GW-25				GW-26 <sup>(13)</sup>			
I/O Parameter (mg/l, or as noted)	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Field & Inorganics									
pH (units)	6.5-8.5	7.34	0.08	7.42	GWQS	7.49	0.09	7.58	GWQS
Fluoride	2.4	3.19	0.4931	3.6831	3.68	3.3428	0.5061	3.8489	3.85
Nitrate/Nitrite-N	10	0.03	0.0205	0.0505	GWQS	0.9657	0.0791	1.0448	GWQS
Heavy Metals									
Arsenic	0.05	0.0521	0.0229	0.075	0.075	0.068	0.0427	0.1107	0.1107
Barium	1	0.0088	0.0194	0.0282	GWQS	0.0032	0.0034	0.0066	GWQS
Cadmium	0.01	0.0063	0.0072	0.0135	0.014 <sup>(8)</sup>	0.004	0	0.004	GWQS
Chromium	0.05	0.0184	0.0399	0.0583	0.058 <sup>(8)</sup>	0.0061	0.003	0.0091	GWQS
Copper	1	0.0167	0.0398	0.0565	GWQS	0.0041	0.0003	0.0044	GWQS
Lead	0.05	0.0054	0.0012	0.0066	GWQS	0.0052	0.0007	0.0059	GWQS
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS
Nickel	0.15	0.0175	0.029	0.0465	GWQS	0.0085	0.0024	0.0109	GWQS
Selenium	0.01	0.005	0	0.005	GWQS	0.0074	0.0029	0.0103	0.0103
Silver	0.05	0.024	0.0583	0.0823	0.082 <sup>(8)</sup>	0.0057	0.0018	0.0075	GWQS
Zinc	5	0.0024	0.0012	0.0036	GWQS	0.002	0	0.002	GWQS
Organics & TDS									
TOC		6.4933	13.825	20.32	20.32 <sup>(8)</sup>	1.8166	0.7494	2.57	2.57
TOX		0.0545	0.1565	0.211	0.21	0.005	0	0.005	0.01
TDS		46,800	2,936	49,736	49,736	46,285	3,546	49,831	49,831

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

I/O Parameter (mg/l, or as noted)	Well ID: GW-27 <sup>(13)</sup>					GW-28 <sup>(13)</sup>				
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	
Field & Inorganics										
pH (units)	6.5-8.5	7.42	0.12	7.54	GWQS	7.52	0.14	7.66	GWQS	
Fluoride	2.4	3.2428	0.472	3.7148	3.71	3.0571	0.3552	3.4123	3.41	
Nitrate/Nitrite-N	10	0.03	0.02	0.05	GWQS	0.2971	0.0431	0.3402	GWQS	
Heavy Metals										
Arsenic	0.05	0.0194	0.0098	0.0292	GWQS	0.0307	0.0116	0.0423	GWQS	
Barium	1	0.0124	0.021	0.0334	GWQS	0.0035	0.0041	0.0076	GWQS	
Cadmium	0.01	0.004	0	0.004	GWQS	0.004	0	0.004	GWQS	
Chromium	0.05	0.006	0.0026	0.0086	GWQS	0.0082	0.0086	0.0168	GWQS	
Copper	1	0.0041	0.0003	0.0044	GWQS	0.0041	0.0003	0.0044	GWQS	
Lead	0.05	0.005	0	0.005	GWQS	0.0058	0.0022	0.008	GWQS	
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS	
Nickel	0.15	0.0085	0.0024	0.0109	GWQS	0.0085	0.0024	0.0109	GWQS	
Selenium	0.01	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS	
Silver	0.05	0.0057	0.0018	0.0075	GWQS	0.0064	0.0024	0.0088	GWQS	
Zinc	5	0.002	0	0.002	GWQS	0.0024	0.0011	0.0035	GWQS	
Organics & TDS										
TOC		1.7333	0.9626	2.70	2.70	1.4666	0.7257	2.19	2.19	
TOX		0.005	0	0.005	0.01	0.005	0	0.005	0.01	
TDS		39,714	3,729	43,443	43,443	43,000	3,215	46,215	46,215 <sup>(8)</sup>	

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

I/O Parameter (mg/l, or as noted)	Well ID:	GW-29					GW-36 <sup>(13)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	
Field & Inorganics										
pH (units)	6.5-8.5	7.22	0.05	7.27	GWQS	7.51	0.15	7.66	GWQS	
Fluoride	2.4	2.95	0.4006	3.3506	3.35	2.625	0.6627	3.2877	3.29	
Nitrate/Nitrite-N	10	0.0236	0.0237	0.0473	GWQS	0.5812	0.0631	0.6443	GWQS	
Heavy Metals										
Arsenic	0.05	0.0103	0.0035	0.0138	GWQS	0.024	0.0083	0.0323	GWQS	
Barium	1	0.0037	0.0053	0.009	GWQS	0.004	0.0056	0.0096	GWQS	
Cadmium	0.01	0.004	0	0.004	GWQS	0.004	0	0.004	GWQS	
Chromium	0.05	0.0055	0.001	0.0065	GWQS	0.0086	0.0102	0.0188	GWQS	
Copper	1	0.0042	0.0004	0.0046	GWQS	0.0041	0.0003	0.0044	GWQS	
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS	
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS	
Nickel	0.15	0.008	0.0025	0.0105	GWQS	0.0087	0.0023	0.011	GWQS	
Selenium	0.01	0.005	0	0.005	GWQS	0.006	0.0013	0.0073	GWQS	
Silver	0.05	0.0081	0.0082	0.0163	GWQS	0.0056	0.0017	0.0073	GWQS	
Zinc	5	0.002	0	0.002	GWQS	0.002	0	0.002	GWQS	
Organics & TDS										
TOC		1.3155	0.7039	2.02	2.02	1.2428	0.4157	1.66	1.66	
TOX		0.005	0	0.005	0.01	0.005	0	0.005	0.01	
TDS		46,200	4,756	50,956	50,956 <sup>(8)</sup>	42,500	926	43,426	43,426	

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

I/O Parameter (mg/l, or as noted)	Well ID: GW-37 <sup>(15)</sup>					GW-38 <sup>(13)</sup>				
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	
Field & Inorganics										
pH (units)	6.5-8.5	7.46	0.13	7.59	GWQS	7.45	0.12	7.57	GWQS	
Fluoride	2.4	2.625	0.3453	2.9703	2.97	2.33	0.2945	2.6245	2.62	
Nitrate/Nitrite-N	10	0.1437	0.0272	0.1709	GWQS	0.212	0.0725	0.2845	GWQS	
Heavy Metals										
Arsenic	0.05	0.0145	0.0055	0.02	GWQS	0.0158	0.0062	0.022	GWQS	
Barium	1	0.0037	0.0049	0.0086	GWQS	0.019	0.0405	0.0595	GWQS	
Cadmium	0.01	0.004	0	0.004	GWQS	0.0062	0.0069	0.0131	0.013 <sup>(8)</sup>	
Chromium	0.05	0.005	0	0.005	GWQS	0.0175	0.0395	0.057	0.057 <sup>(8)</sup>	
Copper	1	0.0041	0.0003	0.0044	GWQS	0.0187	0.0461	0.0648	GWQS	
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS	
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS	
Nickel	0.15	0.0081	0.0025	0.0106	GWQS	0.0155	0.0277	0.0382	GWQS	
Selenium	0.01	0.005	0	0.005	GWQS	0.0064	0.0016	0.008	GWQS	
Silver	0.05	0.0056	0.0017	0.0073	GWQS	0.024	0.0583	0.0823	0.082 <sup>(8)</sup>	
Zinc	5	0.002	0	0.002	GWQS	0.002	0	0.002	GWQS	
Organics & TDS										
TOC		4.4142	8.209	12.62	12.62 <sup>(8)</sup>	1.36	0.6856	2.05	2.05	
TOX		0.005	0	0.005	0.01	0.0545	0.1565	0.211	0.21	
TDS		46,250	886	47,136	47,136	37,000	1,333	38,333	38,333	

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

Well ID:		GW-56R <sup>(13)</sup>				GW-57 <sup>(13)</sup>			
I/O Parameter (mg/l, or as noted)	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Field & Inorganics									
pH (units)	6.5-8.5	7.27	0.03	7.30	GWQS	7.42	0.03	7.45	GWQS
Fluoride	2.4	2.409	0.3618	2.7708	2.77	3.2166	0.371	3.5876	3.59
Nitrate/Nitrite-N	10	0.0227	0.0119	0.0346	GWQS	0.3153	0.0907	0.406	GWQS
Heavy Metals									
Arsenic	0.05	0.007	0.0025	0.0095	GWQS	0.0083	0.0045	0.0128	GWQS
Barium	1	0.0406	0.0712	0.1118	GWQS	0.0046	0.0065	0.0111	GWQS
Cadmium	0.01	0.0059	0.0063	0.0122	0.012 <sup>(8)</sup>	0.004	0	0.004	GWQS
Chromium	0.05	0.0178	0.0347	0.0525	0.053 <sup>(8)</sup>	0.005	0	0.005	GWQS
Copper	1	0.0197	0.0414	0.0611	GWQS	0.004	0	0.004	GWQS
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS
Nickel	0.15	0.015	0.0216	0.0366	GWQS	0.0083	0.0025	0.0108	GWQS
Selenium	0.01	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS
Silver	0.05	0.0279	0.0554	0.0833	0.083 <sup>(8)</sup>	0.005	0	0.005	GWQS
Zinc	5	0.002	0	0.002	GWQS	0.002	0	0.002	GWQS
Organics & TDS									
TOC		1.4147	0.9457	2.36	2.36	1.6166	0.9558	2.57	2.57
TOX		0.0545	0.1565	0.211	0.21	0.005	0	0.005	0.01
TDS		45,545	1,572	47,117	47,117	40,666	2,944	43,610	43,610 <sup>(8)</sup>

TABLE 1A: GWPLs - Inorganic/Organic Parameters - Continued

Well ID:		GW-58 <sup>(13)</sup>				I-2-30				
I/O Parameter (mg/l, or as noted)	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	
Field & Inorganics										
pH (units)	6.5-8.5	7.57	0.03	7.60	GWQS	7.42	0.13	7.55	GWQS	
Fluoride	2.4	2.6142	0.2544	2.8686	2.87	2.1709	0.3143 <sup>(9)</sup>	2.4852	2.49 <sup>(7)</sup>	
Nitrate/Nitrite-N	10	0.7057	0.0629	0.7686	GWQS	0.0133	0.007	0.0203	GWQS	
Heavy Metals										
Arsenic	0.05	0.0461	0.0176	0.0637	0.0637	0.0117	0.006	0.0177	GWQS	
Barium	1	0.0094	0.0135	0.0229	GWQS	0.0513	0.1457	0.197	GWQS	
Cadmium	0.01	0.004	0	0.004	GWQS	0.004	0	0.004	GWQS	
Chromium	0.05	0.0077	0.0071	0.0148	GWQS	0.0074	0.0073	0.0147	GWQS	
Copper	1	0.004	0	0.004	GWQS	0.0085	0.0133	0.0218	GWQS	
Lead	0.05	0.005	0	0.005	GWQS	0.005	0	0.005	GWQS	
Mercury	0.002	0.0002	0	0.0002	GWQS	0.0002	0	0.0002	GWQS	
Nickel	0.15	0.0065	0.0035	0.01	GWQS	0.0083	0.0025	0.0108	GWQS	
Selenium	0.01	0.0051	0.0003	0.0054	GWQS	0.005	0	0.005	GWQS	
Silver	0.05	0.005	0	0.005	GWQS	0.0128	0.0218	0.0346	GWQS	
Zinc	5	0.002	0	0.002	GWQS	0.0035	0.0046	0.0081	GWQS	
Organics & TDS										
TOC		1.2714	0.4644	1.74	1.74	0.985	0.0798	1.06	1.06	
TOX		0.005	0	0.005	0.01	0.06	0.165	0.225	0.23	
TDS		40,000	2,708	42,708	42,708	33,555	1,130	34,685	34,685	

TABLE 1A Footnotes:

- 1) GWQS = Ground Water Quality Standard.
- 2) Mean concentration based on between six to 11 samples from each well collected prior to December 1, 1992.
- 3) Standard deviation used as a measure of natural variability of ground water quality.
- 4) Where mean concentration plus one standard deviation was greater than the GWQS, the data set was tested for normal distribution to ensure mean concentration and standard deviation were reliable.
- 5) GWPL = Ground Water Protection Level. Numeric values based on either the GWQS or the mean concentration plus one standard deviation, whichever is greater.
- 6) GWQS for Nickel based on EPA Drinking Water Health Advisory.
- 7) Original data set failed the normality test. Consequently, GWPL based on natural log transformation of data which did prove to be normally distributed.
- 8) Both original data and natural log transformed data failed the normality test. Nonetheless, the GWPL has been assigned based on available ground water quality data and statistics.
- 9) GWPLs (mean + standard deviation) for parameters whose statistics were based on transformed values, were derived as follows:

$$\bar{x} + \sigma = e^{\bar{x}_t} + [e^{(\bar{x}_t + \sigma_t)} - e^{\bar{x}_t}]$$

, where: e = natural number, e  
 $\bar{x}_t$  = mean concentration of transformed values  
 $\sigma_t$  = standard deviation of transformed values

- 10) TOC statistics based on samples collected after March 1, 1992.
- 11) GWPL for TDS based on mean concentration plus one standard deviation.
- 12) Replacement wells GW-16R and GW-56R: background concentrations and GWPLs based on samples collected from the original wells GW-16 and GW-56, which are located nearby and also completed in the uppermost aquifer. As ground water quality data becomes available from these replacement wells, the Executive Secretary may modify the background and GWPL concentrations in this permit.
- 13) Those wells located at the ~~Future LARW-11e.(2)~~ Cells, including GW-19A, GW-26, GW-27, GW-28, GW-36, GW-37, GW-38, GW-57, and GW-58 are herein designated as Background Monitoring Wells and not subject to compliance with the GWPL, until such time as waste is disposed in the ~~Future LARW-11e.(2)~~ Cells, see Part I.F.3, below.



TABLE 1B: Ground Water Protection Levels - Radiologic Parameters

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-16R <sup>(11)</sup>				GW-19A <sup>(12)</sup>			
	GWQS	Mean Conc. <sup>(1)</sup>	Std Dev (s) <sup>(1)</sup>	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha <sup>(2)</sup>	15	46.5	43.08	89.579	90	73.33	87.03	166.37	160
Radium-226	n/a	0.94	0.42			0.456	0.46		
Radium-228	n/a	1.74	0.51			1.111	1.12		
Ra-226 + Ra-228	5	2.68	0.66 <sup>(3)</sup>	3.34	GWQS	1.567	1.21	2.78	GWQS
Strontium-90	8	0.3	0.26	0.56	GWQS	0.2	0.32	0.52	GWQS
Calculated Parameters									
Beta/Gamma Emitters <sup>(4)</sup>									
Potassium-40	48	229	83.46	312.46	312	261.3	110.76	372.01	372
Alpha/Gamma Emitters									
Thorium-230	5.33	0.05	0.11	0.16	GWQS	0	0.00	0.00	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l) <sup>(6)</sup>	0.02	0.006	0.0014	0.0071	GWQS	0.002	0.0016	0.0035	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14 <sup>(9)</sup>	2.133	4	4.00	8.00	GWQS	5.43	3.61	9.04	GWQS
Technetium-99 <sup>(10)</sup>	800	0.8	0.00	0.80	GWQS	5.7	0.00	5.70	GWQS
Iodine-129 <sup>(10)</sup>	1.07	3.6	0.00	3.60	4	7.2	0.00	7.20	7
Neptunium-237 <sup>(10)</sup>	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		328	48.03	376.03	376	544.4	147.65	692.09	692

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-20				GW-22			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	40.72	57.88	98.105	98 <sup>(B)</sup>	108	156.47	264.47	264 <sup>(B)</sup>
Radium-226	n/a	1.122	0.54			0.736	0.47		
Radium-228	n/a	2.433	1.13			1.77	0.76		
Ra-226 + Ra-228	5	3.556	1.25	4.81	GWQS	2.506	0.89	3.39	GWQS
Strontium-90	8	0.389	0.59	0.98	GWQS	0.511	0.92	1.43	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	394.7	114.26	508.92	509	380	88.57	468.57	469
Alpha/Gamma Emitters									
Thorium-230	5.33	0.067	0.14	0.21	GWQS	0.02	0.04	0.06	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.01	0.0068	0.0167 <sup>(7)</sup>	GWQS <sup>(5)</sup>	0.016	0.002	0.0183	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	5.33	5.03	10.36	GWQS	15	12.12	27.12	GWQS
Technetium-99	800	0	0.00	0.00	GWQS	2.6	0.00	2.60	GWQS
Iodine-129	1.07	8.2	0.00	8.20	8	5.3	0.00	5.30	5
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		564.4	157.48	721.92	722	548	146.50	694.50	695

TABLE IB: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-23				GW-24			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	64.44	90.29	154.74	155 <sup>(B)</sup>	183.8	313.77	497.52	498 <sup>(B)</sup>
Radium-226	n/a	0.93	0.57			1.025	0.37		
Radium-228	n/a	2.411	0.73			2.325	0.52		
Ra-226 + Ra-228	5	3.341	0.93	4.27	GWQS	3.35	0.64	3.99	GWQS
Strontium-90	8	0.256	0.46	0.71	GWQS	0.075	0.14	0.21	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	347.8	98.84	446.61	447	408.8	67.28	476.03	476
Alpha/Gamma Emitters									
Thorium-230	5.33	0.022	0.07	0.09	GWQS	0	0.00	0.00	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.016	0.0019	0.0181	GWQS	0.017	0.0024	0.0189	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	8.33	8.02	16.35	GWQS	3.33	3.51	6.84	GWQS
Technetium-99	800	13	0.00	13.00	GWQS	0	0.00	0.00	GWQS
Iodine-129	1.07	3.8	0.00	3.80	4	11	0.00	11.00	11
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		647.8	202.96	850.73	851	637.5	266.65	904.15	904

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID: GW-25					GW-26 <sup>(13)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	71.1	69.96	141.06	141	14.285	29.92	44.205	44 <sup>(8)</sup>
Radium-226	n/a	1.4	0.44			0.9857	0.53		
Radium-228	n/a	2.58	0.72			2.5	0.80		
Ra-226 + Ra-228	5	3.98	0.84	4.82	GWQS	3.4857	0.96	4.44	GWQS
Strontium-90	8	0.26	0.24	0.50	GWQS	0.1285	0.19	0.32	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	396	207.39	603.38 <sup>(7)</sup>	603 <sup>(5)</sup>	351.42	110.81	462.23	462 <sup>(8)</sup>
Alpha/Gamma Emitters									
Thorium-230	5.33	0.01	0.03	0.04	GWQS	0	0.00	0.00	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.115	0.0146	0.1298	0.1298	0.0264	0.0046	0.031	0.031
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	7.66	7.02	14.68	GWQS	3	5.20	8.20	GWQS
Technetium-99	800	1.3	0.00	1.30	GWQS	1.1	0.00	1.10	GWQS
Iodine-129	1.07	2	0.00	2.00	2	3	0.00	3.00	3
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		619.2	209.78	828.98	829 <sup>(8)</sup>	631.42	263.78	895.20	895

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-27 <sup>(12)</sup>				GW-28 <sup>(12)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	30	63.51	93.509	94 <sup>(B)</sup>	144.3	206.95	351.23	351 <sup>(B)</sup>
Radium-226	n/a	0.571	0.24			0.471	0.36		
Radium-228	n/a	1.557	0.96			1.743	0.51		
Ra-226 + Ra-228	5	2.129	0.99	3.12	GWQS	2.214	0.63	2.84	GWQS
Strontium-90	8	0.786	0.65	1.43	GWQS	0.286	0.30	0.59	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	365.7	102.77	468.48	468	338.6	68.17	406.74	407
Alpha/Gamma Emitters									
Thorium-230	5.33	0.214	0.57	0.78	GWQS	0.05	0.12	0.17	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.011	0.0043	0.0151	GWQS	0.008	0.002	0.0101	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	6.66	5.51	12.17	GWQS	9.33	8.33	17.66	GWQS
Technetium-99	800	0.3	0.00	0.30	GWQS	5.5	0.00	5.50	GWQS
Iodine-129	1.07	1.3	0.00	1.30	1	4.6	0.00	4.60	5
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		608.6	141.82	750.39	750	500	124.63	624.63	625

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-29				GW-36 <sup>(12)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	69.636	74.04	143.67	144 <sup>(8)</sup>	16.62	182.41	199.03	199 <sup>(3)</sup>
Radium-226	n/a	1.1454	0.53			0.95	0.47		
Radium-228	n/a	2.3454	0.98			2.113	0.34		
Ra-226 + Ra-228	5	3.4908	1.12	4.61	GWQS	3.063	0.58	3.64	GWQS
Strontium-90	8	0.18	0.21	0.39	GWQS	0.275	0.42	0.69	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	428.9	115.64	544.54	545	306.3	98.70	404.95	405
Alpha/Gamma Emitters									
Thorium-230	5.33	0.22	0.57	0.79	GWQS	0.063	0.18	0.24	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.0259	0.0108	0.0366	0.036 <sup>(8)</sup>	0.046	0.007	0.0533	0.0533
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	12.73	9.40	22.13	GWQS	4	6.93	10.93	GWQS
Technetium-99	800	1.2	0.00	1.20	GWQS	5	0.00	5.00	GWQS
Iodine-129	1.07	4.9	0.00	4.90	5	4.6	0.00	4.60	5
Neptunium-237	8.0	0.1	0.0	0.1	GWQS	0.1	0.0	0.1	GWQS
Other Parameters									
Gross Beta		647.81	144.69	792.50	793	543.8	130.26	674.01	674

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-37 <sup>(12)</sup>				GW-38 <sup>(12)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	132.4	153.22	285.66	286	88.36	127.91	216.27	216 <sup>(3)</sup>
Radium-226	n/a	1.457 <sup>(7)</sup>	1.11 <sup>(7)</sup>			1.373	0.39		
Radium-228	n/a	3.011	0.70			3 <sup>(8)</sup>	1.17		
Ra-226 + Ra-228	5	4.468	1.31	5.78	6	4.373	1.24	5.61	6 <sup>(8)</sup>
Strontium-90	8	0.525	0.98	1.51	GWQS	0.53	0.59	1.12	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	340	116.86	456.86	457	306.4	122.07	428.47	428
Alpha/Gamma Emitters									
Thorium-230	5.33	0.075	0.21	0.29	GWQS	0.08	0.19	0.27	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.01	0.0039	0.0138	GWQS	0.026	0.004	0.0301	0.03009
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	4	3.61	7.61	GWQS	3.66	1.15	4.81	GWQS
Technetium-99	800	6.6	0.00	6.60	GWQS	1.8	0.00	1.80	GWQS
Iodine-129	1.07	1.3	0.00	1.30	1	4.4	0.00	4.40	4
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		630.7	115.56	746.22	746	477.1	60.80	537.89	538

TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-56R <sup>(1)</sup>				GW-57 <sup>(2)</sup>			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	81.09	116.96	198.05	198 <sup>(4)</sup>	100.3	85.83	186.11	186
Radium-226	n/a	1.455	0.63			0.529	0.34		
Radium-228	n/a	2.909	1.21			1.057	0.35		
Ra-226 + Ra-228	5	4.364	1.36	5.72	6	1.586	0.48	2.07	GWQS
Strontium-90	8	0.173	0.20	0.37	GWQS	0.333	0.45	0.78	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	385.3	79.13	464.40	464	387.6 <sup>(5)</sup>	98.31	485.95 <sup>(7)</sup>	486
Alpha/Gamma Emitters									
Thorium-230	5.33	0.064	0.09	0.16	GWQS	0	0.00	0.00	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.015	0.0019	0.0164	GWQS	0.006	0.002	0.0079	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	11	8.54	19.54	GWQS	0	0.00	0.00	GWQS
Technetium-99	800	7.4	0.00	7.40	GWQS	4.1	0.00	4.10	GWQS
Iodine-129	1.07	3.9	0.00	3.90	4	3.6	0.00	3.60	4
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		567.3	210.95	778.22	778	527.7 <sup>(5)</sup>	195.49	723.16 <sup>(7)</sup>	723



TABLE 1B: GWPLs - Radiologic Parameters - Continued

Rad Parameter (pCi/l, unless noted)	Well ID:	GW-58 <sup>(12)</sup>				I-2-30			
	GWQS	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL	Mean Conc.	Std Dev (s)	Mean Conc. + 1 s	GWPL
Defined Parameters									
Gross Alpha	15	123.6	101.74	225.36	225	14.44	30.05	44.49	44 <sup>(8)</sup>
Radium-226	n/a	1.325	0.37			0.556	0.17		
Radium-228	n/a	2.3	1.19			1.644	0.62		
Ra-226 + Ra-228	5	3.625	1.25	4.87	GWQS	2.2	0.64	2.84	GWQS
Strontium-90	8	0.233	0.35	0.58	GWQS	0.625	1.16	1.79	GWQS
Calculated Parameters									
Beta/Gamma Emitters									
Potassium-40	48	327.1	66.76	393.90	394	294.4	85.16	379.60	380
Alpha/Gamma Emitters									
Thorium-230	5.33	0.043	0.11	0.16	GWQS	0.033	0.07	0.10	GWQS
Thorium-232	5.33	0	0.00	0.00	GWQS	0	0.00	0.00	GWQS
Uranium-total (mg/l)	0.02	0.031	0.0039	0.0351	0.03512	0.01	0.0016	0.0116	GWQS
New Mobile Parameters (first three are beta/gamma emitters)									
Carbon-14	2,133	4.66	1.53	6.19	GWQS	3.33	4.16	7.49	GWQS
Technetium-99	800	6.2	0.00	6.20	GWQS	0	0.00	0.00	GWQS
Iodine-129	1.07	3.5	0.00	3.50	4	1.6	0.00	1.60	2
Neptunium-237	8.0	0.0	0.0	0.0	GWQS	0.0	0.0	0.0	GWQS
Other Parameters									
Gross Beta		564	175.31	739.31	739	451 <sup>(5)</sup>	247.94	698.89 <sup>(7)</sup>	699

TABLE 1B Footnotes:

- 1) Mean concentration and standard deviation based on all ground water quality values available prior to December 1, 1992. Where concentration was reported below minimum detection levels (MDL), the MDL value was used directly in the statistics.
- 2) Gross alpha activity includes radium-226, but excludes radon and uranium alpha particle activity.
- 3) Equivalent standard deviation ( $S_{eq}$ ) for radium-226 + radium-228 calculated as follows:

$$Seq = \sqrt{S_1^2 + S_2^2}$$

, where:  $S_1$  = standard deviation for radium-226  
 $S_2$  = standard deviation for radium-228

- 4) All GWQS for beta-gamma emitters based on NSB Handbook 69, as amended 1962 for a 4 millirem equivalent dosage. Lowest value selected from either the total body or individual organ calculations.
- 5) Observed data failed the test for normality. Therefore, mean and standard deviation based on natural log transformations, which were found to be normally distributed.
- 6) GWQS for total Uranium based on draft EPA National Primary Drinking Water Regulations for Radionuclides, July 18, 1991, Federal Register, vol. 56, no. 138, p. 33126.
- 7) GWPLs (mean + standard deviation) for parameters whose statistics were based on transformed values, were derived as follows:

$$\bar{x} + \sigma = e^{\bar{x}_t} + [e^{(\bar{x}_t + \sigma_t)} - e^{\bar{x}_t}]$$

, where:  $e$  = natural number, e  
 $\bar{x}_t$  = mean concentration of transformed values  
 $\sigma_t$  = standard deviation of transformed values

- 8) Both observed and transformed values failed the normality test. Nonetheless, the GWPL has been assigned based on the available ground water quality data and statistics.
- 9) Statistics for carbon-14 based on three samples collected by Envirocare between September and October, 1992.
- 10) Statistics for iodine-129, neptunium-237, and technetium-99 based on one sample collected for each parameter in each well by Envirocare during September, 1992. Neptunium-237 and technetium-99 values were found to be significantly below the GWQS, as a result, their protection levels were set equal to the GWQS. However, the reported values for iodine-129 were found to be greater than the GWQS. Consequently, background quality was considered to be in excess of the GWQS, hence the mean concentration was set equal to the reported value. Unfortunately, the lack of multiple samples has forced the Executive Secretary to set the standard deviation for iodine-129 equal to zero.
- 11) Replacement wells GW-16R and GW-56R: background concentrations and GWPLs based on samples collected from the original wells GW-16 and GW-56, which are located nearby and also completed in the uppermost aquifer. As ground water quality data becomes available from these replacement wells, the Executive Secretary may modify the background and GWPL concentrations in this permit.
- 12) Those wells located at the ~~Future LARW-11e.(2)~~ Cells, including GW-19A, GW-26, GW-27, GW-28, GW-36, GW-37, GW-38, GW-57, and GW-58 are herein designated as Background Monitoring Wells and not subject to compliance with the GWPL, until such time as waste is disposed in the ~~Future LARW-11e.(2)~~ Cells, see Part 1F.3, below.

D. Best Available Technology (BAT) Design Standard

1. Discharge Technology Performance Criteria - the facility as designed will incorporate discharge technology based on the use of earthen materials in both the bottom liner and final cover. However, under no circumstances shall the facility cause ground water at the compliance monitoring wells (Part I.F.2) to exceed the ground water protection levels in Part I.C for the following minimum periods of time (as measured from the initial start-up of the facility in 1988):
  - a) Containment Design A: Heavy Metals—200 years, and
    - 1) Heavy metals (200 years)
    - 2) Inorganics (200 years)
    - 3) Organics (200 years)
    - 4) Non-mobile Radionuclides (500 years)
  - b) Containment Design B: Mobile Radionuclides —(500 years).
2. Final Authorized LARW Engineering Design and Specifications - Construction of the LARW facilities, ~~including modification of the existing and construction of the future disposal cells~~ shall conform to the engineering plans summarized in Table 2, below, and the specifications listed in the LARW Construction Quality Assurance/Quality Control (CQA/QC) Plan (Radioactive Materials License, Condition 46):

TABLE 2: Approved Engineering Design Drawings

Page No.	Date	Subject
1	June 28, 1993	Title Page
2	July 16, 1993	Cell Location & Excavation Limits
2B	July 16, 1993	Excavation Limits - Proposed
2C	July 21, 1993	Exempt Waste Cross Sections
2D	<del>July</del> -June 28, 1993	Excavation Cross Sections
3	<del>July</del> -June 28, 1993	Closure Cross Sections
4	July 16, 1993	Cell Closure - Current Cell
4A, 4B	July 16, 1993	Cell Closure - Current Cell

5, 6	July-June 28, 1993	Site Layout - Phasing
7, 7A	July-June 28, 1993	Drainage Plan
L1	July 16, 1993	Site Layout
L9	July 21, 1993	Fence Details

For each the LARW cell, this engineering design includes, but is not limited to, the following elements:

a) Heavy Metal Containment Design A (hereafter called the "200 year Design")

- 1) Cover System - shall include the following materials or as specified by the ~~currently approved~~ Modified LARW Construction Quality Assurance/Quality Control (CQA/QC) Plan (Radioactive Materials License, Condition 46) required by Part I.I.17 of this Permit, from the top down;:
  - i) an 18 inch thick erosion barrier consisting of a 8-3 inch nominal diameter rock material,
  - ii) a 12 inch thick filter zone consisting of sandy gravel material ( $D_{10} \geq 2\text{mm}$ ) with a minimum permeability of 0.1 cm/sec,
  - iii) and a 7 foot thick clay radon barrier measured vertically. Said radon barrier will be divided into two layers:
    - 1) an upper layer, one foot thick, with a field hydraulic conductivity of ~~1.0E-8~~ & 5.0E-8 cm/sec or less, and
    - 2) a lower layer, six feet thick with a field hydraulic conductivity of 1.0E-6 cm/sec or less.

Top slope of the embankment shall be between 2% and 4%, as specified on the approved engineering drawings, and side slopes shall be no steeper than approximately 5:1. The outside toe of the clay radon barrier/liner shall extend outward and beyond the outermost edge of the waste layer and shall merge with the bottom clay liner.

- 2) Waste Layer - the waste layer shall not exceed a final thickness of 43 feet above the

top of the bottom clay liner.

- 3) Clay Bottom Liner - the bottom clay liner shall be constructed below natural grade on slopes no greater than 0.12% north to south and 0.2% east to west. Final grade and elevation for the base of the clay liner will comply with the approved engineering design (Table 2). This liner will be constructed after excavation of the site to the total design depth, followed by placement of imported clay materials which meet the approved specifications for material and construction. The new clay liner shall be graded to prevent the accumulation of leachate over the existing one foot thick clay liner. The clay liner shall be a minimum of 2 feet thick, measured perpendicular to the slope, constructed in accordance with the currently approved LARW CQA/QC Plan (Radioactive Materials License, Condition 46), and have a field hydraulic conductivity of  $1.0E-6$  cm/sec or less.

b) ~~Mobile Radioisotope Containment Design B~~ (hereafter called the "500 Year Design")

~~Containment Design B~~ The "500 Year Design" shall meet all the same requirements as ~~Containment Design A~~ the "200 Year Design", with the following exceptions:

- 1) Radon Barrier in the Cover System - shall be constructed of a 7 foot thick layer of clay material with a field hydraulic conductivity of  $1.0E-8$  cm/sec or less.
  - 2) Clay Bottom Liner - the bottom liner shall be constructed of clay material with a field hydraulic conductivity of  $1.0E-7$  cm/sec or less.
  - 3) Vertical Curtain Wall - a vertical clay curtain wall shall be constructed to isolate the Mobile LARW Waste, defined in Part I.D.5-6, below, and prevent infiltration from migrating around the edge of the overlying radon barrier and entering the waste. Said curtain wall shall be constructed of clay material with a field permeability of  $1.0E-6$  cm/sec or less.
3. 11e.(2) Disposal Cell Design - Construction of the 11e.(2) Cells shall conform to the approved engineering design and specifications required by Part I.I.9 of this permit. All construction shall be done in accordance with an approved Construction Quality Assurance/Quality Control (CQA/QC) Plan, as required by Part I.I.14 of this permit. Said engineering design shall include, but is not limited to, the following elements:
- a) Cover System - shall include the following materials, as described from the top down:
    - 1) Topslope Area - the topslope shall consist of the following materials, from the top down:

- i) Riprap Erosion Barrier - a 12 inch thick layer of 3 inch nominal diameter rock material.
  - ii) Filter Zone #2 (upper filter) - a 6 inch thick layer of 4.75 mm (No. 4 sieve) nominal diameter sand.
  - iii) Filter Zone #1 (lower filter) - a 6 inch thick layer of a 0.425 mm (No. 40 sieve) nominal diameter sand.
  - iv) Radon Barrier - a 9 foot thick layer of clay material with a hydraulic conductivity of  $1.0E-7$  cm/sec or less.
- 2) Side-slope Area - the side-slope area shall consist of the following materials, from the top down:
- i) Riprap Erosion Barrier - an 18 inch thick layer of 8 inch nominal diameter rock.
  - ii) Filter Zone #3 - a 6 inch thick layer of one (1) inch nominal diameter gravel.
  - iii) Filter Zone #2 - same as topslope Filter Zone #2.
  - iv) Filter Zone #1 - same as topslope Filter Zone #1.
  - v) Radon Barrier - an 8 foot thick layer of clay material with a maximum hydraulic conductivity of  $1.0E-7$  cm/sec or less.
- b) 11e.(2) Waste Layer - the 11e.(2) waste shall not exceed a final thickness of 42 feet above the bottom clay liner.
- c) Bottom Clay Liner - the clay liner will be constructed only after excavation of the site to the total design depth, followed by placement of imported clay materials which meet the approved specifications for material and construction. The clay liner shall be a minimum of 2 feet thick, measured perpendicular to the slope, and have a field hydraulic conductivity between  $1.0E-7$  to  $5.0E-7$  cm/sec.
- 3-4. ~~LARW~~-Disposal Cell Location Restrictions - the ~~LARW~~-disposal cells shall be restricted to the following locations in Section 32, Township 1 South, Range 11 West, SLBM, as specified on the currently approved engineering plans, Envirocare drawing entitled "LARW Disposal Cell", dated July 16, 1993, page 4, and the following approximate State Plane Coordinates:

a) Existing LARW Disposal Cell -

Edge of Waste Position	Northing	Easting
NW Corner	861,181	1,552,544
SW Corner	859,509	1,552,510
SE Corner	859,489	1,553,625
NE Corner	861,161	1,553,660

b) Future LARW-11e.(2) Disposal Cell No. 1 (southeast cell) -

Edge of Waste Position	Northing	Easting
SW Corner	859,555	1,549,972
SE Corner	859,513	1,552,292
NE Corner	861,185	1,552,327

c) Future LARW-11e.(2) Disposal Cell No. 2 (northwest cell) -

Edge of Waste Position	Northing	Easting
NW Corner	861,330	1,549,972
SW Corner	859,755	1,549,944
NE Corner	861,291	1,552,163

This description does not include the Mixed Waste facility, located east of the Existing LARW Cell, which is authorized under a separate RCRA permit from the Utah Division of Solid and Hazardous Waste.

- 4-5. Definition of LARW Waste - for purposes of this permit, Low-Activity Radioactive Waste (LARW) is defined as radioactive wastes which meet the definition of Low-Level Radioactive Waste (LLRW) under the United States Low-Level Radioactive Waste Policy Act, Public Law 96-573, or are defined as Naturally Occurring and Accelerator Produced Radioactive Materials under the Utah Radiation Control Rules, UAC R447-12-3(35) and (36).
- 5-6. Definition of Mobile LARW Waste - any waste containing any of the following isotopes shall be considered a mobile LARW waste and subject to special provisions or requirements under this permit, including: carbon-14, iodine-129, neptunium-237,

sodium-22, technetium-99, or tritium.

7. Definition of 11e.(2) Waste - for purposes of this permit, 11e.(2) Waste is defined as "... tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content", as defined in Section 11e.(2) of the U.S. Atomic Energy Act of 1954, as amended.
- 6-8. Disposal Location Restriction for Mobile LARW Waste - the disposal of mobile LARW waste shall be restricted exclusively to the location specified on the currently approved engineering design, Envirocare drawing entitled "LARW Disposal Cell", dated July 16, 1993, page 4, and as described by the following approximate State Plane Coordinates:

Edge of Waste Position	Northing	Easting
NW Corner	860,373	1,553,015
SW Corner	859,988	1,553,007
SE Corner	859,985	1,553,147
NE Corner	860,370	1,553,155

Any disposal of mobile LARW waste in any other location at the facility shall constitute a violation of this permit.

- 7-9. Collection Lysimeters for Future Construction at the ~~Existing~~ LARW Cell - future construction of the clay bottom liner in the southwest, southeast and northeast quadrants of the ~~Existing~~ LARW Cell shall include the installation of collection lysimeters below the bottom clay liner, in accordance with the engineering plans and specifications approved by the Executive Secretary on September 22, 1992 and included herein as Appendix C. The permittee shall also comply with the October 21, 1992 Operation, Maintenance and Closure Plan for Envirocare's Collection Lysimeters and the DWQ November 27, 1992 Conditional Approval thereof, also included herein as Appendix C. In addition, the permittee shall comply with the following requirements:
- Collection Lysimeter "As-Built" Report - within 30 days of completion of the construction of each lysimeter, the Permittee shall submit an "As-Built" Report for Executive Secretary approval.
  - Future Collection Lysimeter Construction Notification - the Permittee shall submit a notice of construction of additional lysimeters in the southeast and northeast quadrants of the ~~Existing~~ LARW Cell. Said notice shall be submitted at least one week prior to



construction in order to allow the Executive Secretary to inspect lysimeter construction.

10. Future Modification of Engineering Design or Specifications - any change in the approved engineering design or specifications which causes a significant adverse effect to the infiltration performance of a disposal cell shall require prior submittal and Executive Secretary approval of infiltration and contaminant transport analysis of the proposed change. Said changes must be submitted to the Executive Secretary as a written request with the revised engineering drawings, specifications, ground water flow and contaminant transport models, or any other documentation deemed necessary by the Executive Secretary, at least 180 days prior to the effective date desired by the permittee.

E. BAT Performance Standards

1. Waste Restrictions -

- a) LARW Waste - waste to be disposed of in the LARW Disposal Cells shall be limited exclusively to those bulk radioactive materials defined in Conditions 6, 7, and 8 of the Utah Radioactive Materials License UT 2300249. Any change effecting these Conditions of the Radioactive Materials License, resulting in additional types of wastes to be disposed of in the LARW Disposal Cells or any increase in waste concentration, after issuance of this permit, shall require prior approval from the Executive Secretary of the Water Quality Board, after submittal of satisfactory technical justification in accordance with applicable requirements of the Utah Licensing Requirements for Land Disposal of Radioactive Waste (UAC R447-25).
  - b) 11e.(2) Waste - any change effecting the non-radiologic content of the waste to be disposed of in the 11e.(2) Cells, including additional types or concentrations of non-radiologic contaminants, above and beyond those defined in Table 3 below, shall require prior approval from the Executive Secretary, after submittal of satisfactory technical justification to demonstrate that the requirements of Part I.D.1(a) of this permit will be met.
2. Prohibited Wastes - The disposal of any waste that exceeds the regulatory concentration levels of the Toxic Characteristic Leaching Procedure (TCLP) as defined in 40 CFR Part 261 Subpart C, Table 1 is prohibited in any of the LARW Disposal Cells, unless specifically authorized in Table 3, below. Waste samples shall be collected in accordance with the currently approved LARW Waste Characterization Plan (Radioactive Materials License, Condition 50) or the 11e.2 Waste Characterization Plan required by Part II.10 of this permit, and analyzed for those exclusive parameters listed in Table 3, below. Leachate concentrations from the TCLP test shall not exceed the maximum allowable concentrations

in Table 3, below.

The disposal of any waste ~~in the LARW Disposal Cells~~ that exceeds the Maximum Allowable TCLP Leachate Concentration in Table 3 for heavy metals, below, is prohibited without prior written approval from the Executive Secretary. The disposal of any 11e.(2) Waste which exceeds the TCLP regulatory concentrations for organic compounds identified in 40 CFR 261.24, Table 1, is expressly prohibited without prior written approval from the Executive Secretary.

The disposal of free liquids ~~in the LARW Disposal Cells~~ shall also be prohibited. Liquid content of wastes shall be monitored and controlled pursuant to the currently approved LARW Waste Characterization Plan and the LARW Waste Management Plan in the Radioactive Materials License, Conditions 50 and 51, respectively; and the 11e.(2) Waste Characterization and Waste Management Plans required by Part I.I.10 and 11 of this permit.

The disposal of any LARW or 11e.(2) Waste containing chelating agents in excess of 0.1% by weight is prohibited.

TABLE 3: Maximum Allowable TCLP Leachate Concentrations in Waste

Parameter	TCLP Regulatory Concentration (mg/l)	Maximum Allowable TCLP Leachate Concentration (mg/l)
Arsenic	5.0	<del>300</del> -2,150
Barium	100	<del>20,000</del> -35,000
Cadmium	1.0	<del>10</del> -70
Chromium	5.0	<del>50</del> -350
Copper	n/a	<del>100</del> -700
Lead	5.0	<del>5,000</del> -35,000
Mercury	0.2	<del>10</del> -70
Selenium	1.0	<del>10</del> -13
Silver	5.0	<del>100</del> -700
Zinc	n/a	<del>50</del> -375

3. Failure to Construct as per Approval - Failure to construct any portion of the ~~LARW Disposal Cells~~ facility in compliance with the approved engineering design and specifications or in a manner inconsistent with the ~~currently approved~~ applicable CQA/QC Plan (Radioactive Materials License, Condition 46 or Part II.14 of this permit) shall be cause for the Executive Secretary to require excavation of the materials and remedial construction, retrofit of the embankment or any other mitigative action to prevent the release of pollutants to soil or ground water.
4. Contingency Plan - in the event that Out-of-Compliance status is determined as per Part I.G.1(b) and I.G.3, the Permittee shall immediately implement the approved August 5, 1991 Contingency Plan in Appendix A of this permit, and notify the Executive Secretary in compliance with Part II.I of this permit. Upon written notification from the Executive Secretary, the Permittee shall also immediately implement the Contingency Plan.
5. Future Facility Modification - any modification of the LARW Disposal Cells, 11e.(2) Disposal Cells, Waste Storage Area, Railcar Rollover or Unloading Areas, Decontamination Areas, or any portion thereof, beyond the approved design and specifications cited in this permit shall require prior written approval from the Executive Secretary.
6. Unsaturated Soil Moisture Content Monitoring - the permittee shall conduct soil moisture content monitoring at the ~~Existing~~ LARW Cell to verify performance of the engineered containment systems for both the LARW Waste and the Mobile LARW Waste, see Part II.7 of this permit. This monitoring shall consist of instrumentation, as approved by the Executive Secretary, installed in both:
  - a) The radon barrier over both the LARW Waste and the Mobile LARW Waste, and
  - b) The Unit 3 sand along the west margin of the ~~Existing~~ LARW Cell.

This instrumentation and required monitoring shall be used by the Executive Secretary to observe any trend in soil moisture content which may indicate failure of the containment system to control the contaminants disposed of in the embankment. All monitoring shall be conducted in compliance with the modified Ground Water Monitoring Quality Assurance Plan required in Part II.2 of this permit. The permittee shall maintain and replace, ~~as necessary,~~ all soil moisture instrumentation in compliance with the approved plan required by Part II.1(a) of this permit, or as directed by the Executive Secretary.

The Executive Secretary reserves the right to require similar soil moisture content monitoring in the radon barrier at either of the ~~Future LARW 11e.(2) Cells~~. The permittee shall install and make operational any soil moisture instrumentation within 30 days of written notification from the Executive Secretary.

7. Installation of Additional Vadose Zone Monitoring - upon any exceedance of the protection levels in leachate which accumulates in the collection lysimeters at the ~~Existing~~-LARW Cell required by Part I.D.7-10 or I.F.7 of this permit or upon any increasing soil moisture trend in the Unit 3 sand, as determined by the Executive Secretary and as outlined by Part I.I.7 of this permit, the Permittee shall:
  - a) Submit a plan for the installation of vadose zone monitoring devices at the perimeter of the disposal cell(s) in question within 30 days of discovery for Executive Secretary approval. These devices may include suction lysimeters, observation wells, or other devices in accordance with applicable EPA or NRC guidance.
  - b) Install and make fully operational the vadose zone monitoring equipment within 30 days of Executive Secretary approval.
8. Plugging and Abandonment of Wells or Other Monitoring Instrumentation - the permittee shall secure Executive Secretary approval prior to any plugging and abandonment of any wells, piezometers, soil tensiometers, soil moisture instruments, or any other monitoring instrumentation. Following completion and within 30 days of the plugging and abandonment, the permittee shall submit an "As-Plugged" report for Executive Secretary approval. Failure to comply with any condition of said approval shall constitute a violation of this permit.
9. Open Cell Time Limitation - for each open portion of any disposal cell, the radon barrier shall be constructed and completed in accordance with the approved engineering plans and specifications (Part I.D.2) within two years of the date of initial placement of the first lift of any LARW waste in that portion of the open cell. For all open portions of the ~~Existing~~ LARW Cell at the time of permit issuance, the permittee shall ensure the radon barrier is constructed and completed in accordance with the requirements of Part I.D.2 on or before September 1, 1995. Any modification of this two year limitation shall require submittal of ground water flow and contaminant transport modeling of open cell conditions or other technical information as necessary, and prior Executive Secretary approval. Said modeling report or other studies must be submitted in their entirety to the Executive Secretary 180 days prior to the expiration date of the two year open cell time limit. Failure to secure Executive Secretary approval prior to expiration of the two year deadline shall not be cause for the permittee to postpone construction of the cover of any cell in accordance with the currently approved engineering design and specifications in Part I.D.2 or 3 of this Permit.
10. General Stormwater Management Requirements - the permittee shall contain all stormwater runoff at both the LARW and 11e.(2) Disposal Cells which has contacted the waste, including runoff from:

- a) Waste disposed in excavated, below grade, areas of the both the LARW and 11e.(2) Disposal Cells, and
- b) Waste stored on unexcavated portions of the 11e.(2) Disposal Cells.

Said containment shall include control and maintenance of the stormwater runoff over a clay liner which has been constructed in compliance with an applicable Construction Quality Assurance/Quality Control Plan. Any removal and disposal of this stormwater shall comply with the applicable requirements of the currently approved LARW Waste Management Plan (RML Condition 51).

11. 11e.(2) Waste Management Requirements - the permittee shall manage the 11e.(2) Waste and related activities at the facility in accordance with all applicable requirements of the currently approved LARW Waste Management Plan (RML Condition 51) for the following activities and procedures:
  - a) Spill response and prevention
  - b) Runon and runoff containment
  - c) Decontamination of vehicles, equipment, and containers
  - d) Unloading procedures
  - e) Waste storage time limits
  - f) Stormwater/wastewater collection and disposal
  - g) Leaking waste shipments
12. 11e.(2) Waste Storage - storage of 11e.(2) Waste at the facility shall be explicitly limited to unexcavated areas within the confines of the 11e.(2) Disposal Cells. Said disposal shall be over areas of native grade and consist of clays which have been scarified and compacted in compliance with the 11e.(2) Waste Construction Quality Assurance/Quality Control Plan required by Part I.I.14 of this Permit.

F. Compliance Monitoring

1. Statistical Compliance Monitoring Method - compliance of the ground water monitoring wells with the protection levels found in Part I.C above, shall be determined by any of the

following methods:

- a) Concentration limits determined for each well and parameter as outlined in Part I.G of this permit, or
  - b) Use of other statistical methods found in the EPA document entitled "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities", February, 1989, Section 7, or
  - c) Trend and/or spatial analysis of ground water quality data from the compliance monitoring wells.
2. Compliance Monitoring Wells - the following wells defined in the April 15, 1993 Third Quarter Accelerated Background Sampling Report, Figure 4, shall be sampled and analyzed for purposes of compliance monitoring at the ~~Existing~~-LARW Cell, in accordance with Part I.F.6 of this permit:
- a) ~~Existing~~-LARW Cell - existing wells I-2-30, GW-16R, GW-22, GW-23, GW-24, GW-25, GW-20, GW-29, ~~GW-32, GW-56R, and GW-63,~~ and GW-64.
3. Background Monitoring Wells at ~~Future~~-LARW-11e.(2) Cells - the following wells located at the ~~Future~~-LARW-11e.(2) Cells, and defined in the July 9, 1993 As-Built Report, Figure 1, will be sampled and analyzed at least quarterly for the purpose of establishing background ground water quality, in accordance with Part I.F.7, of this permit. These wells will be sampled on a quarterly basis and the results thereof submitted in compliance with Part I.H.1, 2, and 3. Prior to disposal of any waste in any of the ~~Future~~-LARW-11e.(2) Cells, these wells shall become compliance monitoring wells and subject to the Ground Water Protection Levels of Part I.C of this permit.
- a) ~~Future~~-LARW-11e.(2) Cell No. 1 (Southeast) - existing wells GW-19A, GW-36, GW-37, GW-38, ~~and well~~-GW-60, and GW-63.
  - b) ~~Future~~-LARW-11e.(2) Cell No. 2 (Northwest) - existing wells GW-25, GW-26, GW-27, GW-28, GW-57, and GW-58.
4. Future Modification of the Monitoring Well Network - if at any time the Executive Secretary determines the monitoring well network to be inadequate, the Permittee shall submit within 30 days of receipt of notification, a plan and compliance schedule to modify the monitoring well network.
5. Additional Compliance Monitoring Wells - pursuant to Part I.F.4, above, the Permittee shall install ground water monitoring wells at the facility in accordance with the following

requirements, unless otherwise directed by the Executive Secretary:

- a) The wells shall be hydrologically downgradient of the LARW Disposal Cells.
  - b) Each well shall be completed exclusively in the uppermost aquifer.
  - c) Each well shall be located in the buffer zone at the outside edge of the future access road which will surround each LARW Disposal Cell.
  - d) Each compliance monitoring well shall be constructed in conformance to the criteria found in the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986, OSWER-9950.1 (RCRA TEGD).
  - e) Failure to comply with the above requirements for the additional wells required will be considered a failure to monitor.
6. Compliance Monitoring Period - monitoring shall commence upon:
- a) Issuance of this permit for those compliance monitoring wells at the ~~Existing~~-LARW Cell, identified in Part I.F.2 of this permit,
  - b) Completion of the Background Sampling required for wells GW-32, GW-60, and GW-63 in Part I.I.3 of this permit, and establishment of corresponding Ground Water Protection Levels by the Executive Secretary,
  - c) Completion of the suction lysimeters required by Part I.I.1, and
  - d) Completion of the soil moisture instrumentation required by Part I.E.6.

Thereafter, compliance monitoring shall continue through the life of the permit.

7. Monitoring Requirements and Frequency - measurements or analysis done for monitoring will be conducted in compliance with the requirements below, and reported to the Executive Secretary as per the requirements of Part I.H.
- a) Water Level Measurements - water level measurements shall be made quarterly in each monitoring well prior to any collection of ground water samples in accordance with the Ground Water Monitoring Quality Assurance Plan in Appendix B of this permit. These measurements will be made from a permanent single reference point clearly demarcated on the top of the well or surface casing. Measurements will be made to the nearest 0.01 foot.

- b) Ground Water and Pore Water Quality Sampling and Analysis - grab samples of ground water from compliance monitoring wells and lysimeters (as available) will be collected for chemical analysis on a quarterly basis, in conformance with Part II.A and B and the Ground Water Monitoring Quality Assurance Plan in Appendix B of this permit .
- ~~1) Analysis by Certified Laboratories — analysis of any ground water sample shall be performed by laboratories certified by the State Health Laboratory, or otherwise after prior written approval by the Executive Secretary.~~
- 2-1) Ground Water Analytical Methods - methods used to analyze ground water samples must comply with the following:
- i) Are methods cited in UAC R317-6-6.3A(13), and
  - ii) Have detection limits which do not exceed those listed in the Ground Water Monitoring Quality Assurance Plan, Appendix B.
- 3-2) Analysis Parameters - the following analyses will be conducted on all ground water samples collected for compliance monitoring:
- i) Field Parameters - Eh, pH, temperature, specific gravity, and specific conductance.
  - ii) Laboratory Parameters - including:
    - Major Anions and Cations: Chloride, Sulfate, Carbonate, Bicarbonate, Sodium, Potassium, Magnesium, Calcium, and total anions and cations.
    - All Protection Level Parameters - individual analysis for all parameters found in Part I.C, Tables 1A and 1B of this permit.
    - ~~Gross Beta.~~
    - Total Organic Carbon (TOC) and Total Organic Halogens (TOX).
    - New Non-Radiologic Hazardous Constituents for Wells at the 11e.(2) Cells, including: beryllium, molybdenum, cyanide, fluoride, acetone, 2-butanone, chloroform, carbon disulfide, 1,2-dichloroethane, methylene chloride, naphtha, diethylphthalate, and 2-methylnaphthalene.



8. Suction and Collection Lysimeter Sampling - suction and collection lysimeter sampling shall be conducted in compliance with the modified Ground Water Monitoring Quality Assurance Plan approved by the Executive Secretary, as required by Part I.I.2 of this permit. Sample analysis shall conform to the requirements of Part I.F.7(b) of this permit. For collection lysimeters the priority of sample parameters shall conform to the Executive Secretary Conditional Approval of November 27, 1992.
9. Modification of Monitoring or Analysis Parameters - if at any time the Executive Secretary determines the monitoring or analysis parameters to be inadequate, the Permittee shall modify all required monitoring parameters immediately after receipt of written notification from the Executive Secretary. Upon any change in the approved waste parameters defined in Conditions 6, 7, and 8 of the Utah Radioactive Materials License UT 2300249, dated September 10, 1993, the Permittee shall revise the Ground Water Monitoring Quality Assurance Plan in Appendix B.
10. Waste Characterization -
  - A. LARW Waste - all LARW waste received by the Permittee shall be fully characterized to determine its chemical and radiological constituents and the presence and concentration of any chelating agents before shipment and emplacement for disposal, in accordance with the requirements of the currently approved Waste Characterization Plan in the Radioactive Materials License, Condition 50.
  - B. 11e.(2) Waste - all 11e(2) Waste received by the Permittee shall be fully characterized both before shipment and after arrival at the facility to identify any new non-radiologic contaminants not authorized by this permit. This characterization shall comply with an approved plan, as required by Part I.I.10, below.
11. Waste Liquid Content Monitoring - all wastes received shall be tested in a representative manner by the Paint Filter Liquids Test in accordance with the currently approved Waste Characterization Plan in the Radioactive Materials License, Condition 50, and the Waste Characterization Plan for 11e.(2) Wastes required by Part I.I.10 of this permit. Any wastes which fails the required Paint Filter Liquids testing upon arrival at the facility shall be rejected for receipt or disposal and returned to its place of origin or otherwise managed in accordance with the currently approved LARW Waste Management Plan, Radioactive Materials License, Condition 51.
12. Post-Closure Monitoring - post-closure monitoring shall conform to the requirements of an approved Post-Closure Monitoring Plan (Permit Part I.I.4).
13. Bulk Waste Storage Area: Leak Detection Monitoring - the Permittee shall conduct daily inspection of the Bulk Waste Storage Pad in accordance with the currently approved LARW Waste Management Plan (Radioactive Materials License, Condition 51), including: physical integrity of the asphalt surface, visual observation of the leachate collection system sump and

the leak detection system observation manhole, and container/package integrity. The Permittee shall maintain a written record of these inspections on site.

14. On-Site Meteorological Monitoring - Envirocare shall provide continuous monitoring of the following minimum meteorological parameters in accordance with the approved Meteorological Quality Assurance/Quality Control Plan required by Part I.I.6:
  - A. Wind direction and speed.
  - B. Temperature
  - C. Daily Precipitation
  - D. Pan evaporation

The Permittee shall maintain records of this monitoring on site. On or before June 1 of each calendar year, the Permittee shall submit a one year meteorological report for Executive Secretary approval. The objective of this report shall be to show that the meteorological assumptions made in the infiltration and unsaturated zone modeling used to support issuance of the permit were conservative or representative of the actual conditions at the site. In addition, and in conjunction with an application for permit renewal, 180 days before expiration of the permit, the Permittee shall submit a summary report of all meteorological data collected since issuance of the last permit (minimum of 4 years of data). Said report shall compare the data observed against regional normal values, as available, and provide summary statistics of all meteorological data collected.

15. Monitoring Well Elevation Survey For Permit Renewal - within 180 days before expiration of this permit, upon application for permit renewal, the permittee shall submit an elevation survey of all monitoring wells and piezometers at the facility, with special emphasis on the water level measuring points at each well/piezometer. Said survey shall be conducted and certified by a Utah licensed civil engineer or land surveyor.
16. Containerized Waste Storage Area: Leakage and Spill Monitoring - the permittee shall conduct daily inspections of the containerized waste storage area in accordance with the currently approved LARW Waste Management Plan (Radioactive Materials License, Condition 51).
17. Ground Water Monitoring: Well GW-3 - on a quarterly basis until further notice from the Executive Secretary, Envirocare shall collect ground water quality samples from well GW-3. Said samples shall be collected and analyzed in accordance with the Ground Water Monitoring Quality Assurance Plan (Appendix B). Results thereof shall be submitted to the Executive Secretary with the quarterly reports required by Part I.H of this permit. If the Executive Secretary determines that ground water monitoring is no longer necessary for well GW-3, monitoring may be discontinued after Executive Secretary approval.

G. Non-Compliance Status: Ground Water Monitoring

1. Noncompliance with the Protection Levels - noncompliance with the ground water protection levels in Part I.C, Tables 1A and 1B shall be defined as follows:
  - a) Probable Out-of-Compliance Status - probable out-of-compliance shall be defined as follows:
    - 1) Protection Levels Set Equal to the GWQS - for those parameters where the mean concentration + 1 standard deviation was found to be less than or equal to the GWQS, probable out-of-compliance shall be defined as any exceedance of any protection level (GWQS) in Tables 1A or 1B at any compliance monitoring well.
    - 2) Protection Levels Set Above the GWQS - for those parameters where the mean concentration + 1 standard deviation was found to be greater than the GWQS, probable out-of-compliance status shall be defined as two (2) consecutive samples in excess of the protection level for any parameter from the same compliance monitoring well.
    - 3) Trend and/or Spatial Analysis - in the event that the above two methods are not applicable for any reason, the Executive Secretary may use trend analysis at any compliance monitoring well or spatial analysis for any group of compliance monitoring wells in order to determine if probable out-of-compliance status exists.
  - b) Out-of-Compliance Status - out-of-compliance status shall be defined as follows:
    - 1) Protection Levels Set Equal to the GWQS - for those parameters where the mean concentration + 1 standard deviation was found to be less than or equal to the GWQS, out-of-compliance shall be defined as two (2) consecutive samples in excess of the protection level (GWQS) in Tables 1A or 1B at any compliance monitoring well.
    - 2) Protection Levels Set Above the GWQS - for those parameters where the mean concentration + 1 standard deviation was found to be greater than the GWQS, out-of-compliance status shall be defined as two (2) consecutive samples in excess of the mean concentration plus two (2) standard deviations for any parameter from the same compliance monitoring well.
    - 3) EPA RCRA Statistical Methods - in the event that the above two methods are not applicable for any reason, the Executive Secretary may use other applicable statistical methods to determine out-of-compliance status, as defined in the EPA document "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities", February, 1989.

2. Requirements for Probable Out-of-Compliance Status - the Permittee shall evaluate the results of each round of ground water sampling and analysis to determine probable out-of-compliance as defined in Part I.G.1(a) of this permit. Upon determination by the Permittee that probable out-of-compliance exists, the Permittee shall:
  - a) Immediately resample the monitoring well(s) of concern for the parameter(s) in question, submit the analytical results thereof, and notify the Executive Secretary of the probable out-of-compliance status within 30 days of the initial detection.
  - b) Immediately implement an accelerated schedule of monthly ground water sampling and analysis, consistent with the requirements Part I.F.7(b) and the approved Ground Water Monitoring Quality Assurance Plan, Appendix B of this permit. This monthly sampling will continue for at least two months or until the compliance status can be determined by the Executive Secretary. Reports of the results of this sampling will be submitted to the Executive Secretary as soon as they are available, but not later than 45 days from each date of sampling.
3. Requirements for Out-of-Compliance Status
  - a) Notification and Accelerated Monitoring - upon determination by the permittee that an out-of-compliance status exists, in accordance with Part I.G.1(b) of this permit, the permittee shall:
    - 1) Verbally notify the Executive Secretary of the out-of-compliance status within 24 hours, and provide written notice within 5 days of the detection, and
    - 2) Immediately implement an accelerated schedule of monthly ground water monitoring of the monitoring wells of concerns for the parameters in question. This monitoring shall continue for at least two months or until the facility is brought into compliance, as determined by the Executive Secretary. At the discretion of the Executive Secretary, the permittee may be required to sample and analyze for additional inorganic, organic, or radiochemical parameters in order to determine the compliance status of the facility.
  - b) Source and Contamination Assessment Study Plan - within 30 days of the verbal notice to the Executive Secretary required in Part I.G.3(a) of this permit, the permittee shall submit an assessment study plan and compliance schedule for:
    - 1) Assessment of the source or cause of the contamination, and determination of steps necessary to correct the source.
    - 2) Assessment of the extent of the ground water contamination and any potential dispersion.
    - 3) Evaluation of potential remedial actions to restore and maintain ground water quality.

and ensure that the ground water standards will not be exceeded at the compliance monitoring wells.

H. Reporting Requirements - notwithstanding any other environmental monitoring and reporting required by the Radioactive Materials License, the Permittee shall submit the following reporting information.

1. Quarterly Monitoring - monitoring required in Part I.F of this permit, shall be reported according to the following schedule, unless modified by the Executive Secretary:

<u>Quarter</u>		<u>Report Due On</u>
1st	(Jan., Feb., March)	April 15
2nd	(April, May, June)	July 15
3rd	(July, Aug., Sept.)	October 15
4th	(Oct., Nov., Dec.)	January 15

2. Water Level Measurements - water level measurements from ground water monitoring wells will be reported quarterly in both measured depth to ground water and fresh water equivalent head elevation above mean sea level. The distribution of freshwater equivalent head will be summarized with each quarterly report in the form of a potentiometric map of the uppermost aquifer.
3. Ground Water and Pore Water Quality Sampling - reporting will include:
  - a) Field Data Sheets - or copies thereof, including the field measurements, required in Part I.F.7(b)(3-2) of this permit, and other pertinent field data, such as:
    - 1) Ground Water Monitoring - well name/number, date and time, names of sampling crew, type of sampling pump or bail, measured casing volume, volume of water purged before sampling, volume of water collected for analysis.
    - 2) Suction Lysimeter/Soil Moisture Monitoring - lysimeter name/number, date and time, names of sampling crew, type of sampling equipment, vacuum applied and duration of application, volume of sample collected, resistivity reading and corresponding moisture content from soil moisture instrumentation.
  - b) Results of Ground Water and Pore Water Analysis - including date sampled, date received; and the results of analysis for each parameter, including: value or concentration, units of measurement, reporting limit (minimum detection limit for the examination), analytical method, the date of the analysis, and the counting error for each radiochemical analysis.
  - c) Quality Assurance Evaluation - with every sampling report the permittee shall include a quality assurance evaluation of the reported ground water and pore water data. Said

report shall evaluate the sample collection techniques, sample handling and preservation, and analytical methods used in sampling with the objective of verifying the accuracy of the compliance monitoring results.

4. Spill Reporting - the Permittee shall report as per UCA 19-5-114 and the currently approved LARW Waste Management Plan (Radioactive Materials License, Condition 51), any spill or leakage of waste or waste liquids which comes in contact with native soil or ground water in compliance with Part II.I of this permit.
5. Post-Closure Monitoring - reporting of post-closure monitoring shall comply with the requirements of an approved Post-Closure Monitoring Plan (Part II.4).
6. Semi-Annual "As-Built" Report - the Permittee shall submit a semi-annual "As-Built" Report to document construction of the LARW Disposal Cells in compliance with the currently approved design and specifications and Construction Quality Assurance/Quality Control Plan (Radioactive Materials License, Condition 46). This report will be submitted for the Executive Secretary's approval on or before February 1 and August 1 of each calendar year. This report shall include engineering plans, and cross-sections to document the construction. Said plans shall be based on an elevation survey, conducted and certified by a Utah licensed land surveyor or civil engineer, of all pertinent elements of construction at the facility.
7. Bulk Waste Storage Area: Report of Leakage - the Permittee shall verbally report the presence of any fluid in the leak detection observation manhole within 24 hours of discovery to the Executive Secretary. The Permittee shall provide a written report of the incident to the Executive Secretary within 5 working days of discovery.
8. Monitoring Well "As-Built" Reports - diagrams and description describing the final completion of the monitoring wells shall be submitted within 30 days of construction of each well. These reports will include:
  - a) Casing: depth, diameter, type of material
  - b) Screen: length, depth interval, diameter, material type, slot size
  - c) Sand Pack: depth interval, material type and grain size
  - d) Annular Seals: depth interval, material type
  - e) Surface Casing(s) and Cap: depth, diameter, material type
  - f) Elevation: ground surface and elevation of water level measuring point in feet above mean sea level, measured to 0.01 of a foot.
9. Waste Characterization Reporting - in the event that a new contaminant is detected in any waste at the facility, which has not been authorized by this permit, the permittee shall notify the Executive Secretary in writing within 5 working days from the date of discovery.
10. Collection Lysimeter Reporting - the permittee shall provide a verbal report to the Executive Secretary within 24 hours of discovery of the presence of any fluid in the standpipe of the collection lysimeters. The permittee shall provide a written report of the incident to the

Executive Secretary within 5 working days of discovery.

I. Compliance Schedule

1. ~~As-Built Report: Suction Lysimeters and Soil Moisture Instruments for Existing-LARW Cell - within 30 days of permit issuance, the permittee shall install three suction lysimeters across the northwest margin of the Existing LARW Cell in compliance with the May 21, 1993 Executive Secretary Conditional Approval. Within 45 days of installation of said lysimeters, the permittee shall submit an As-Built report, in compliance with the May 21, 1993 Conditional Approval. In addition, this As-Built report shall also include:~~
  - a) ~~Suction Lysimeter and Soil Moisture Content Instrumentation Maintenance, Closure and Replacement Plan - this plan will consolidate all the issues related to maintenance, closure and replacement of suction lysimeters and soil moisture content instrumentation listed in the October 30 and December 23, 1992 submittals regarding the same from the permittee. Said plan shall also address the following issues: baseline suction and sample volumes for each lysimeter, and calibration curves and baseline resistivity for each electrical resistance block. If soil tension instrumentation is installed pursuant to Part I.I.7, below, this plan shall also include all necessary procedures for maintenance and replacement of these instruments. within 180 days of permit issuance, the permittee shall secure Executive Secretary approval of the November 4, 1993 As-Built report for suction lysimeters and soil moisture instrumentation, entitled: "As-Built for Suction Lysimeters and Soil Resistivity Instruments". After Executive Secretary approval of this document, it shall become an enforceable appendix to this permit.~~
  - b) ~~Revised Structural Contour Map - a revised structural contour map of the upper surface of the Unit 2 Clay. Said map will be based on all data from all wells and piezometers whose soil logs were continuously sampled, i.e., those installed after approximately February 1, 1991. Data will also be included from those wells that meet this criteria at the RCRA Mixed Waste facility.~~
2. ~~Modification of the Ground Water Monitoring Quality Assurance (GWMQA) Plan - within 30 days of receipt of comments from the DWQ, the permittee shall satisfactorily revise the Ground Water Monitoring Quality Assurance Plan and submit for Executive Secretary approval. The revised plan shall incorporate special sampling methods and processes for suction and collection lysimeters, ground water specific gravity, or any other changes found necessary by the Executive Secretary, including use of the EPA co-precipitation method for gross alpha analysis, and all conditions found in the Executive Secretary November 27, 1992 and May 21, 1993 approvals of the collection and suction lysimeters, respectively. within 180 days of permit issuance, the permittee shall secure Executive Secretary approval of the December 3, 1993 submittal entitled: "Revised Ground Water Monitoring Quality Assurance Plan". After approval of this document, the revised plan shall supercede all previous GWMQA Plans.~~

3. Background Sampling - the Permittee shall submit a Background Ground Water Quality Report for the following compliance monitoring wells and suction lysimeters:
  - a) Compliance monitoring wells GW-32 and GW-63,
  - b) Background monitoring well GW-60,
  - c) The three suction lysimeters required for the ~~Existing~~-LARW Cell by Part I.I.1, and
  - d) Existing wells GW-16R and GW-56R at the ~~Existing~~-LARW Cell.

This background report shall summarize the results of the one year of continuous ground water and suction lysimeter sampling for all the compliance monitoring wells and suction lysimeters identified above, and shall be submitted for Executive Secretary approval within 90 days of completion of the one year of quarterly sampling. For each compliance monitoring well or suction lysimeter, this report will provide value or concentration, arithmetic mean ( $\bar{x}$ ), and variance ( $s^2$ ) or standard deviation(s) for each of the ground water compliance monitoring parameters required in Part I.F.7(b)(3-2). This sampling will conform to all the requirements for quarterly ground water monitoring in Part I.F and I.H.2 and 3 of this permit. Results of the Background Sampling will be submitted to the Executive Secretary within 45 days of the end of each sampling quarter, i.e., 1) September, October, and November, 1993, 2) December, 1993, January, and February, 1994, 3) March, April, and May, 1994 and 4) June, July, and August, 1994.

4. Post-Closure Monitoring Plan - In coordination with the requirements of other regulating agencies, the Permittee shall secure Executive Secretary approval of a plan for monitoring the LARW Disposal Cells after cessation of operations and final closure. The Permittee shall receive Executive Secretary approval of this plan before any ~~construction of disposal of waste in the Future LARW-11e.(2)~~ Disposal Cells Nos. 1 and/or 2. Said plan shall resolve all issues raised in the DWQ March 6, 1992 Notice of Deficiency.
5. Evaluation of Effect of Proposed Pumping Well(s) - the Permittee will evaluate the effect of any proposed pumping well at the facility on the local ground water flow field and ground water monitoring. This evaluation will be undertaken with the use of analytical or numeric ground water flow models, which conform to the guidance provided to Envirocare by the Bureau of Radiation Control in the November 26, 1990 Notice of Deficiency, Comment WPC-1 K. The Permittee will submit the results of this evaluation and receive Executive Secretary approval before any construction of the withdrawal well.
6. Meteorological Monitoring Quality Assurance Plan - ~~within 30 days of permit issuance, the permittee will submit for Executive Secretary approval a plan to ensure the quality of all meteorological data collected on-site in compliance with Part I.F.14, above.~~ within 180 days of permit issuance, the permittee shall secure Executive Secretary approval of the Meteorological Monitoring Quality Assurance and Quality Control (MMQA/QC) Plan submitted July 16, 1993. After Executive Secretary approval of ~~said plan~~ the MMQA/QC



Plan, the permittee shall immediately implement and comply with said plan—the approved plan.

7. ~~Unsaturated Flow Post-Model Audit Plan - within 60 days of permit issuance, the permittee shall submit a plan to conduct an audit of the unsaturated flow predictions used to justify addition of the mobile isotopes to and approval of heavy metals in the waste inventory. This plan must include, but is not limited to:~~

~~a) Soil moisture content measurements from at least five (5) stations completed in the radon barrier in the cover system of the Existing LARW Cell. This instrumentation must be installed in a nested configuration at each station consisting of at least three instruments, each positioned at varying depths in the radon barrier. None of the instruments shall breach the radon barrier and penetrate the waste. These five stations must be installed at different locations on the cover system, as follows:~~

~~1) At least three (3) sites in the cover over the LARW waste, two on the 2% top slope area and one on the 5:1 side slope area, and~~

~~2) At least two (2) sites in the cover over the Mobile Waste Area, defined in Part I.D.6 8 of this permit.~~

~~Soil moisture or tension head measurements may also be made in the filter zone and tension head instrumentation may be installed in the radon barrier at any of the above locations.~~

~~This plan shall include and said instruments shall be installed in accordance with all applicable requirements of the May 21, 1993 Executive Secretary approval of the suction lysimeters and soil moisture instrumentation.~~

~~b) Soil moisture or tension head measurements from the Unit 3 Sand, from a minimum of six (6) stations along the west margin of the Existing LARW Cell [not to include any of the soil moisture instrumentation required in conjunction with suction lysimeters in Part I.I.1]. These instruments must be installed in a nested configuration at each station, consisting of at least three (3) instruments, each positioned at varying depths in the Unit 3 sand. One instrument in each nest shall be completed immediately above the interface between the Unit 3 sand and the Unit 2 clay. The permittee shall take effort to place the lowest instrument in each nest at points where the Unit 3 sand/Unit 2 clay interface is lowest in elevation. Said instruments shall also be located at the outside margin of the future access road for the Existing LARW Cell.~~

~~e) Installation schedule for the soil moisture and tension head instruments, which shall include installation within 90 days of permit issuance.~~

~~d) Meteorological Monitoring— as required by Part I.F.14 of this permit, within 180 days of permit issuance, the permittee shall secure Executive Secretary approval of the~~

December 14, 1993 submittal entitled: "Unsaturated Flow Post-Model Audit Plan". After approval of said plan, it shall become an enforceable appendix to this permit.

The permittee shall install and make operational all instrumentation in the post-model audit plan ~~within 30 days of Executive Secretary approval~~ in accordance with a schedule to be approved by the Executive Secretary.

In cooperation with other government entities, the Executive Secretary ~~also reserves~~ the right to require additional tension head or soil moisture content instrumentation for any of the LARW disposal cells in order to confirm performance of the engineering containment system, including the ~~Future LARW-11e.(2) Cells~~. In the event that said instrumentation is required, the permittee shall install and make operational said instrumentation within 30 days of written notice by the Executive Secretary.

8. Evaluation of Frost Damage Predictions and Prevention Plan - within 60 days of issuance of this permit, the permittee shall complete and submit for Executive Secretary approval a report which evaluates the potential for frost damage to the LARW Disposal Cell at the facility, and provides any needed modifications to the cover design. This evaluation will utilize methodology and criteria acceptable to both the U.S. Nuclear Regulatory Commission and the Executive Secretary.
9. Final Engineering Design Drawings and Specifications for the 11e.(2) Cells - prior to any construction at the 11e.(2) Cells, the permittee shall submit detailed engineering design drawings and construction specifications for the 11e.(2) Cells and secure Executive Secretary approval. Said drawings shall revise those cited in Part I.D.2, above, and shall reflect the final design required by both the U.S. NRC and the Executive Secretary. After Executive Secretary approval, this permit may be reopened and modified to incorporate the final approved engineering design and specifications.
10. 11e.(2) Waste Characterization Plan - prior to any receipt or disposal of 11e.(2) Waste, the permittee shall submit a plan and secure Executive Secretary approval thereof for the identification and characterization of the 11e.(2) Waste.
11. Containment Justification Study for Additional Contaminants in 11e.(2) Waste - before any disposal of 11e.(2) Waste, the permittee shall provide justification that the additional contaminants in the 11e.(2) Waste can be adequately contained by the approved engineering design for the minimum 200 year period required in Part I.D.1(a) of this permit. These contaminants include, but are not limited to: beryllium, molybdenum, nickel, cyanide, fluoride, acetone, 2-butanone, chloroform, carbon disulfide, 1,2-dichloroethane, methylene chloride, naphtha, diethylphthalate, and 2-methylnaphthalene. This justification should include ground water flow and contaminant transport analysis.

In addition, this justification shall also include a determination of Maximum Allowable TCLP Concentrations for beryllium, molybdenum, and nickel in the 11e.(2) Waste, and any other inorganic or organic compounds which may exceed the TCLP regulatory concentrations

in the waste, as defined in 40 CFR 261.24, Table 1. The performance criteria for this study will also be to show that the ground water protection levels at the compliance monitoring wells will not be exceeded for the 200 year minimum time period.

After Executive Secretary approval of this study, this permit may be reopened and modified to make any necessary changes, including but not limited to any update of the Maximum Allowable TCLP Concentrations in Part I.E.2, Table 3 of this permit.

12. Background Ground Water Quality Data for Additional Parameters at the 11e.(2) Cells - within one year after issuance of this Permit, the permittee shall provide the Executive Secretary ground water quality data for a number of new non-radiologic contaminants, not previously identified in this permit. These parameters shall be collected from the monitoring wells located at the 11e.(2) Cells, shall include:
  - A. Heavy Metals - beryllium and molybdenum.
  - B. Inorganics - cyanide and fluoride.
  - C. Volatile Organics - acetone, 2-butanone, chloroform, carbon disulfide, 1,2-dichloroethane, methylene chloride, and naphtha.
  - D. Semi-Volatile Organics - Diethylphthalate and 2-Methylnaphthalene.

All data submitted shall be collected in compliance with the approved Ground Water Monitoring Quality Assurance Plan in Appendix B of this permit. Upon review and approval of this information, the Executive Secretary may reopen this permit to establish ground water protection levels for each of these contaminants.

13. Demonstration of Bottom Liner Compatibility with Leachates - prior to disposal of any 11e.(2) Waste, the permittee shall submit a detailed technical report on the chemical compatibility of the bottom clay liner with leachates generated by both the LARW and 11e.(2) wastes. The purpose of this report is to demonstrate to the satisfaction of the Executive Secretary that no significant deterioration of permeability or stability properties will occur with continuous exposure of the clay liner to waste leachate solution and that the integrity of the liner will not be impaired with time. Studies included in this demonstration shall use representative waste solutions and clay liner materials. Tests used for this purpose shall be carried out by both a laboratory and with analytical methods which have been approved by the Executive Secretary. Said tests shall also be completed under the supervision of qualified staff and in accordance with established industry standards.

If the clay liner material fails said tests, the permittee shall make all needed changes to the clay liner material and conduct these tests again to demonstrate compatibility. Any change in the chemical or mineralogical makeup of the clay liner may be cause for the Executive Secretary to reopen and modify this permit.

14. 11e.(2) Waste Construction Quality Assurance/Quality Control (CQA/QC) Plan - prior to disposal of any 11e.(2) Waste, the permittee shall secure Executive Secretary approval of the January 21, 1994 CQA/QC Plan entitled "Construction QA/QC Plan for 11e.(2) Facility". Where applicable, this plan must be consistent with the approved LARW CQA/QC Plan, RML Condition 46, and any requirements imposed by the U.S. NRC 11e.(2) Materials License, No. SMC-1559, Condition 9.7(c). Said 11e.(2) CQA/QC Plan may also be used by the permittee to establish construction specifications for the 11e.(2) disposal cells and all necessary confirmation testing. At the discretion and convenience of the permittee this plan may be combined with the LARW CQA/QC to form a single consolidated plan for the facility.
15. Plugging and Abandonment of Well DH-61 - prior to any clay liner construction at the 11e.(2) Cell No. 1 (southeast), the permittee shall plug and permanently abandon well DH-61 in accordance with the Utah Administrative Rules for Water Well Drillers, Section 12, as adopted July 15, 1987; and submit an "As-Plugged" Report for Executive Secretary approval. In the event that the permittee cannot ascertain the condition of the annular seal between the casing and the native soil, the casing shall be drilled out or otherwise removed before the boring is plugged in accordance with the above requirements.
16. Revised Engineering Plans and Specifications for the Non-Mobile Area of the LARW Cell - before any disposal in the Non-Mobile Waste Area of the LARW Cell in the 1994 construction season, the permittee shall revise the engineering drawings and specifications cited in Part I.D.2, Table 2 of this Permit and submit for Executive Secretary approval. Said revisions shall reflect the design approved in Part I.D.2(a) of this Permit.
17. Revised LARW Construction Quality Assurance/Quality Control (CQA/QC) Plan - prior to any construction in the Non-Mobile Waste Area of the LARW Cell in the 1994 construction season, the permittee shall revise the LARW CQA/QC Plan (LARW RML, Condition 46) to reflect the design approved in Part I.D.2(a) of this Permit.
18. Revision of the Ground Water Monitoring Quality Assurance (GWMQA) Plan - within 45 days of permit issuance, the permittee shall submit a revised GWMQA Plan for Executive Secretary approval. Said revisions shall include the following:
  - A. Revision for Additional 11e.(2) Parameters - inclusion of all the non-radiologic 11e.(2) Waste hazardous constituents authorized by this Permit, as monitoring parameters in the GWMQA Plan. In accordance with this change, the permittee will revise all sampling procedures or protocols, as necessary, in order to accommodate this change. After Executive Secretary approval of the report, the permittee shall immediately implement the methodology and procedures of the plan with the next sampling event.
  - B. Evaluation of Potential for Perched Leachate Beneath LARW Cell - the permittee shall submit for Executive Secretary approval a report in which the potential for leachate to accumulate on top of the Unit 2 clay beneath the LARW Cell is adequately evaluated. This report will include:

- 1) Examination of all existing and any new permeability data, as necessary, for the Unit 2 clay at the LARW Cell.
- 2) Comparisons of vertical permeability in the Unit 2 clay with the predicted leachate flow rate from the LARW Cell.
- 3) Evaluation of the adequacy of the existing compliance monitoring wells, soil moisture measurement instruments and suction lysimeters at the LARW Cell to detect any potential leachate perched on top of the Unit 2 clay.

After Executive Secretary review of the report, the Permit may be modified to require additional monitoring instrumentation to ensure adequate detection of potential perched leachate at the LARW Cell.

## II. MONITORING, RECORDING AND REPORTING REQUIREMENTS

- A. Representative Sampling. Samples taken in compliance with the monitoring requirements established under Part I shall be representative of the monitored activity. Failure by the permittee to conduct all ground water and pore water sampling in compliance with the Ground Water Monitoring Quality Assurance/Quality Control Plan in Appendix B of this permit shall be considered a failure to monitor and may subject the permittee to enforcement action.
- B. Analytical Procedures. Water sample analysis must be conducted according to test procedures specified under UAC R317-6.3.A.13, unless other test procedures have been specified in this permit. All sample analysis shall be performed by laboratories certified by the State Health Laboratory, or otherwise after prior written approval by the Executive Secretary.
- C. Penalties for Tampering. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or by both.
- D. Reporting of Monitoring Results. Monitoring results obtained during each reporting period specified in the permit, shall be submitted to the Executive Secretary, Utah Division of Water Quality at the following address no later than the 15th day of the month following the completed reporting period:

Utah Department of Environmental Quality  
Division of Water Quality  
P.O. Box 144870  
Salt Lake City, Utah 84114-4870  
Attention: Compliance and Monitoring Program

- E. Compliance Schedules. Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.
- F. Additional Monitoring by the Permittee. If the permittee monitors any pollutant more frequently than required by this permit, using approved test procedures as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted. Such increased frequency shall also be indicated.
- G. Records Contents. Records of monitoring information shall include:
1. The date, exact place, and time of sampling or measurements;
  2. The individual(s) who performed the sampling or measurements;
  3. The date(s) and time(s) analyses were performed;
  4. The individual(s) who performed the analyses;
  5. The analytical techniques or methods used; and,

6. The results of such analyses.
- H. Retention of Records. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended by request of the Executive Secretary at any time.
- I. Twenty-four Hour Notice of Noncompliance Reporting.
1. The permittee shall verbally report any noncompliance which may endanger public health or the environment as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the Utah Department of Environmental Quality 24 hour number, (801) 538-6333, or to the Division of Water Quality, Ground Water Protection Section at (801) 538-6146, during normal business hours (8:00 am - 5:00 pm Mountain Time).
  2. A written submission shall also be provided to the Executive Secretary within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:
    - a. A description of the noncompliance and its cause;
    - b. The period of noncompliance, including exact dates and times;
    - c. The estimated time noncompliance is expected to continue if it has not been corrected; and,
    - d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
  3. Reports shall be submitted to the addresses in Part II.D, Reporting of Monitoring Results.
- J. Other Noncompliance Reporting. Instances of noncompliance not required to be reported within 24 hours, shall be reported at the time that monitoring reports for Part II.D are submitted.
- K. Inspection and Entry. The permittee shall allow the Executive Secretary, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:
1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
  2. Have access to and copy, at reasonable times, any records that must be kept under the

conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,
4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.



### III. COMPLIANCE RESPONSIBILITIES

- A. Duty to Comply. The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give advance notice to the Executive Secretary of the Water Quality Board of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- B. Penalties for Violations of Permit Conditions. The Act provides that any person who violates a permit condition implementing provisions of the Act is subject to a civil penalty not to exceed \$10,000 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine not exceeding \$25,000 per day of violation. Any person convicted under Section 26-11-16(2) of the Act a second time shall be punished by a fine not exceeding \$50,000 per day. Nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.
- C. Need to Halt or Reduce Activity not a Defense. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.
- D. Duty to Mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
- E. Proper Operation and Maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Failure to maintain all treatment and control systems in fully functional operating order or condition at the facility is a violation of this permit. Proper operation and maintenance also includes adequate laboratory controls and quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

#### IV. GENERAL REQUIREMENTS

- A. Planned Changes. The permittee shall give notice to the Executive Secretary as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when the alteration or addition could significantly change the nature of the facility or increase the quantity of pollutants discharged.
- B. Anticipated Noncompliance. The permittee shall give advance notice of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- C. Permit Actions. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.
- D. Duty to Reapply. If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a permit renewal or extension. The application should be submitted at least 180 days before the expiration date of this permit.
- E. Duty to Provide Information. The permittee shall furnish to the Executive Secretary, within a reasonable time, any information which the Executive Secretary may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Executive Secretary, upon request, copies of records required to be kept by this permit.
- F. Other Information. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Executive Secretary, it shall promptly submit such facts or information.
- G. Signatory Requirements. All applications, reports or information submitted to the Executive Secretary shall be signed and certified.
  1. All permit applications shall be signed as follows:
    - a. For a corporation: by a responsible corporate officer;
    - b. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.
    - c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.
  2. All reports required by the permit and other information requested by the Executive Secretary shall be signed by a person described above or by a duly authorized representative

of that person. A person is a duly authorized representative only if:

- a. The authorization is made in writing by a person described above and submitted to the Executive Secretary, and,
  - b. The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
3. Changes to Authorization. If an authorization under Part IV.G.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part IV.G.2 must be submitted to the Executive Secretary prior to or together with any reports, information, or applications to be signed by an authorized representative.
4. Certification. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

- H. Penalties for Falsification of Reports. The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or by both.
- I. Availability of Reports. Except for data determined to be confidential by the permittee, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Executive Secretary. As required by the Act, permit applications, permits, effluent data, and ground water quality data shall not be considered confidential.
- J. Property Rights. The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

- K. Severability. The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.
- L. Transfers. This permit may be automatically transferred to a new permittee if:
1. The current permittee notifies the Executive Secretary at least 30 days in advance of the proposed transfer date;
  2. The notice includes a written agreement between the existing and new permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,
  3. The Executive Secretary does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2 above.
- M. State Laws. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, penalties established pursuant to any applicable state law or regulation under authority preserved by Section 19-5-117 of the Act.
- N. Reopener Provision. This permit may be reopened and modified, following proper administrative procedures, to include the appropriate limitations and compliance schedule, if necessary, if one or more of the following events occurs:
1. If new ground water standards are adopted by the Board, the permit may be reopened and modified to extend the terms of the permit or to include pollutants covered by new standards. The permittee may apply for a variance under the conditions outlined in R317-6.4(D)
  2. Changes have been determined in background ground water quality.
  3. Determination by the Executive Secretary that changes are necessary in either the permit or the facility to protect human health or the environment.

# APPENDIX A

## CONTINGENCY PLAN

SUBMITTED: August 5, 1991

APPROVED: September 24, 1991

## APPENDIX B

### GROUND WATER MONITORING QUALITY ASSURANCE PLAN

SUBMITTED: December 4, 1991

APPROVED: December 5, 1991

MODIFIED: August 24, 1993

# APPENDIX C

SPECIFICATIONS

AND

OPERATION, MAINTENANCE, AND CLOSURE PLANS

FOR

COLLECTION LYSIMETERS

AND

RELATED APPROVALS

SUBMITTED: September 16, 1992 and October 21, 1992, respectively

APPROVED: September 21, 1992 and November 27, 1992, respectively