

Appendix F

Utah Division of Radiation Control
Equipment Laboratory
August 29, 2001

Instruments

Quantity	Type	Make	Model	QTY	RAD	Shape	Type	Maker	Model	area (cm ²)	window
1	Pressurized Ion Chamber	Reuter-Stokes	RSS-111-100	4	α	2" X 6"	ZnS	Eberline	AC-3-8	59	myear
2	Alarm Rate meter	Ludlum	177	1	α	1" end window counter	ZnS	Eberline	SPA-1	5	myear
7	Pressurized Ion Chamber	Victoreen	450P	2	α	4" round flashlight	ZnS	Ludlum	43-1	75	myear
1	Microrem	Bicron	Microrem	1	α	1.5" end window	ZnS	Ludlum	43-2	11.6	myear
2	Neutron	Ludlum	15	6	α	2" X 7"	ZnS	Ludlum	43-5	50	myear
2	Rate Meter GM	Ludlum	14C	1	α	3" X 3"	ZnS	Ludlum	43-65	50	myear
2	Rate meter	Ludlum	2	1	α	1" end window counter	ZnS	Ludlum	43-9	5	myear
12	Rate Meter	Ludlum	2241-2	6	$\alpha\beta\gamma$	Pancake shielded	GM	Bicron	LPGM	12	minea
8	Scaler	Ludlum	1000	2	$\alpha\beta\gamma$	Pancake shielded	GM	Eberline	HP-210T	12	minea
1	Scaler/Rate Meter	Ludlum	2200	1	$\alpha\beta\gamma$	Pancake	GM	Eberline	HP-260	12	minea
6	Scaler/Rate Meter	Ludlum	2220	12	$\alpha\beta\gamma$	Pancake	GM	Ludlum	44-9	12	minea
4	Scaler/Rate Meter	Eberline	ESP-1	2	$\alpha\beta$	Gas Proportional	PRO	Ludlum	43-68	100	myear
3	ur meter	Ludlum	12S	1	$\beta\gamma$	side window	GM	Ludlum	44-6		Stainless
2	ur meter	Ludlum	19	2	$\beta\gamma$	side window	GM	Eberline	HP-270		Stainless
1	Portable NaI MCA	Berkeley Nucleonics	SAM 935	2	$\beta\gamma$	side window	GM	Victoreen	489-4		aluminum
6	High Vol Air Samplers	Hi-Q		1	$\alpha\beta\gamma$.01" X 1" end window	ORG	Bicron	B1	5	myear
12	Pocket Dosimeters	Arrowtech	200 mm	3	Y	2 X 2	Nal	Ludlum	44-10		N _i
2	Alarming Dosimeters	Dositec	L36	1	Y	.08 X 2	Nal	Ludlum	44-17	20	myear
				3	Y	1 X 1	Nal	Ludlum	44-2		N _i
				3	Y	.04 X 1	Nal	Ludlum	44-3	5	myear

Detectors

Quantity	Type	Shape	Type	Maker	Model	area (cm ²)	window
4	α	2" X 6"	ZnS	Eberline	AC-3-8	59	myear
1	α	1" end window	ZnS	Eberline	SPA-1	5	myear
2	α	4" round flashlight	ZnS	Ludlum	43-1	75	myear
1	α	1.5" end window	ZnS	Ludlum	43-2	11.6	myear
6	α	2" X 7"	ZnS	Ludlum	43-5	50	myear
1	α	3" X 3"	ZnS	Ludlum	43-65	50	myear
1	α	1" end window counter	ZnS	Ludlum	43-9	5	myear
6	$\alpha\beta\gamma$	Pancake shielded	GM	Bicron	LPGM	12	minea
2	$\alpha\beta\gamma$	Pancake shielded	GM	Eberline	HP-210T	12	minea
1	$\alpha\beta\gamma$	Pancake	GM	Eberline	HP-260	12	minea
12	$\alpha\beta\gamma$	Pancake	GM	Ludlum	44-9	12	minea
2	$\alpha\beta$	Gas Proportional	PRO	Ludlum	43-68	100	myear
1	$\beta\gamma$	side window	GM	Ludlum	44-6		
2	$\beta\gamma$	side window	GM	Eberline	HP-270		
1	$\alpha\beta\gamma$.01" X 1" end window	ORG	Bicron	B1	5	myear
3	Y	2 X 2	Nal	Ludlum	44-10		N _i
1	Y	.08 X 2	Nal	Ludlum	44-17	20	myear
3	Y	1 X 1	Nal	Ludlum	44-2		N _i
3	Y	.04 X 1	Nal	Ludlum	44-3	5	myear

Calibration Source Dose Rate Calculations

Source Manufacturer:	Source Model:	Source S/N:
J.L. Shepard	28-6A	10181
Calibration Date:	Half Life (years)	Current Date:
8/14/86	30.17	10/8/98
Dose Rate @ 1 Meter	Source Age:	Current Dose Rate @ 1 Meter
353 mr/hr	12.16 years	267 mr/hr
Dose Rate Desired (mr/hr)	Distance (inches)	FEET INCHES "16ths"
10,000	6.43	0 6 7
9,000	6.78	0 6 12
8,000	7.19	0 7 3
7,000	7.69	0 7 11
6,000	8.30	0 8 5
5,000	9.10	0 9 2
4,000	10.17	0 10 3
3,000	11.74	0 11 12
2,000	14.38	1 2 6
1,000	20.34	1 8 5
900	21.44	1 9 7
800	22.74	1 10 12
750	23.49	1 11 8
700	24.31	2 0 5
600	26.26	2 2 4
500	28.77	2 4 12
400	32.16	2 8 3
300	37.14	3 1 2
250	40.68	3 4 11
200	45.49	3 9 8
190	46.67	3 10 11
180	47.95	3 11 15
170	49.34	4 1 5
160	50.86	4 2 14
150	52.52	4 4 16
140	54.37	4 6 6
130	56.42	4 8 7
120	58.72	4 10 12
110	61.33	5 1 5
100	64.33	5 4 5
90	67.81	5 7 13
80	71.92	5 11 15
75	74.28	6 2 14
70	76.89	6 4 14
60	83.05	6 11 1
50	90.97	7 6 16
40	101.71	8 5 11
30	117.44	9 9 7
25	128.65	10 8 10
20	143.84	11 11 13

INSTRUMENT CALIBRATION PROCEDURE

1. Purpose

This procedure is designed to ensure that portable radiation instruments are calibrated accurately and safely.

2. Applicability

This procedure applies to all portable radiation instruments that are being used by staff members for verifying regulatory compliance or for protecting Division staff.

3. References

- a. Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination, NCRP 112
- b. American National Standards Institute, Radiation Protection Instrumentation Test and Calibration, ANSI N323-1978
- c. U.S. Nuclear Regulatory Commission, Regulatory Guide 10.*, Revision 2, 1985.

4. Procedures

a. Exposure Rate Instruments

i. Physical checks

- (1) Physical Condition
- (2) Check Batteries
- (3) Digital element
- (4) Meter Light
- (5) Zero adjust
- (6) High Voltage
- (7) Setup Parameters
- (8) audible function works

ii. Calibration

- (1) Set up calibration area
 - (a) Wear dosimetry
 - (b) Mark area as Radiation Area
 - (c) Position source beam toward an uninhabited area ie. outside wall on second floor
 - (d) Set up calibration stand at the predetermined distance from the source
 - (e) Position the detector's long axis perpendicular to the beam axis.
- (2) As Found readings
 - (a) Calculate current source strength (See appendix a)
 - (b) Check each range at mid scale. Do not attempt to calibrate any

- meters at dose rate < 2 mr/hr because of background interference. Also it is not necessary to calibrate instruments above 1000 mr/hr.
- (c) Check one range at approximately $\frac{1}{4}$ and $\frac{3}{4}$ scale
 - (d) Check integrating modes by exposing the detector for 36 seconds to a rate 100 times the desired dose. (36 seconds is 1/100th of an hour)
 - (e) Check dose and dose rate alarms by exposing them to sufficient radiation to trip the alarms and verifying that they function. Regardless of the reading, document the results in the as found section of the form.
 - (f) If all readings are within $\pm 10\%$, the instrument passes calibration
- (3) After adjustment
- (a) If any reading is not within $\pm 10\%$ then make adjustments and recalibrate and record the results in the after adjustment section of the calibration form.
 - (b) Recent surveys, made with meters that are adjusted, may need to be reviewed.
- (4) Fill out a calibration sticker (appendix d) and attach it to the meter. Include any special instructions or notes on the sticker such as:
- (a) Maximum radiation calibrated to.
 - (b) Specific Probe Serial numbers
 - (c) Any limitations
 - (d) Any special settings

b. Contamination Survey Instruments

i. Physical checks

- (1) Physical Condition
- (2) Check Batteries
- (3) Digital element
- (4) Meter Light
- (5) Zero adjust
- (6) High Voltage
- (7) Setup Parameters
- (8) audible function works

ii. Calibration

- (1) Select source
 - (a) Similar energy
 - (b) Similar activity
- (2) Measure background
- (3) Determine Plateau if appropriate
- (4) Count Source(s) and record reading.
- (5) If detector area is greater than source size then take measurements at several different locations and average the results.
- (6) If needed, calculate instrument dead time and set instrument accordingly.
- (7) Calculate correction factors (CF) for direct surface readings per 100 cm^2 .
$$CF = 100/A \cdot E \text{ where } A = \text{detector window area in } \text{cm}^2 \text{ and } E = \text{detector}$$

efficiency in cpm/dpm.

- (8) Fill out a calibration sticker (appendix d) and attach it to the meter.
- (9) Attach sticker showing efficiencies or correction factors, if appropriate.

5. Notes

- a. Source to detector distance should be at least 5 times the maximum detector dimension.
- b. Instruments can not be calibrated below 1 mr/hr because of background interference.
Instrument responses can be evaluated below this level.

6. Appendices

- a. Calibration Source Dose Rate Calculations
- b. Exposure Rate Instrument Calibration Form
- c. Contamination Instrument Calibration Form
- d. Calibration Stickers

CALIBRATION CERTIFICATE



STATE OF UTAH
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF RADIATION CONTROL

EQUIPMENT

	MAKE	TYPE	MODEL	SERIAL
METER				
PROBE				
CALIBRATOR	J.L. Shepard	Cs-137	28-6A	10181

PHYSICAL CHECKS

BATTERY CHECK	AUDIO CHECK	METER LIGHT	DIGITAL ELEMENT	HI-VOLT CHECK	SETTINGS

AS FOUND READINGS

SCALE/ DECADE	UNITS	SOURCE DISTANCE	EXPOSURE		% ERROR	± 10%
			ACTUAL	READING		

CORRECTED READINGS

SCALE/ DECADE	UNITS	SOURCE DISTANCE	EXPOSURE		% ERROR	± 10%
			ACTUAL	READING		

COMMENTS

[Large empty box for comments]

Signature: _____

DATE: _____



State of Utah
Department of Environmental Quality

Division of Radiation Control

METER	MAKE	TYPE	MODEL	SERIAL	CALIBRATION SETTING	THRESHOLD SETTING
DETECTOR						
					DIGITS	VOLT

Nuclide	Initial Activity	Calibration Date	Source Age	Half Life	Activity	DPM	First	Second	Third	Sample Counts	Net Counts	Efficiency
Bkgd		2/5/01										
C-14	1.8e-01	1/1/80	21.1	5.73e+03	0.17455	3.84e+05						
Pm-147	1.4e-01	11/17/79	21.2	2.62e+00	0.00051	1.13e+03						
Tc-99	4.0e-02	3/19/80	20.9	2.13e+05	0.04000	8.80e+04						
Sr-90	2.1e-02	10/11/79	21.3	3.02e+01	0.01286	5.66e+04						
Cl-36	2.3e-02	10/12/79	21.3	3.01e+05	0.02260	4.97e+04						
Bi-210	1.9e-02	10/16/79	21.3	2.23e+01	0.00983	2.16e+04						
Th-230	1.6e-04	1/9/96	5.1	7.70e+04	0.00016	3.52e+02						

Signature: _____

DATE: _____



Utah Division of Radiation Control
168 North 1950 West
Salt Lake City, Utah 84114-4850
(801)536-4250 Office

DEL: _____ SERIAL: _____

DATE: _____ BY: _____

NOTES: _____

Nuclide	Efficiency	Max Energy	Avg Energy
C-14		0.156	0.049
Pm-147		0.002	0.062
Tc-99		0.003	0.084
Sr-90		0.005	0.157
Cl-36		0.007	0.251
Bi-210		1.161	0.389
U-238			N/A

PROCEDURES FOR SAMPLE ANALYSIS USING THE IBM MODEL 30 COMPUTER WITH EG&G GAMMA VISION SPECTRUM ANALYSIS FOR MICROSOFT WINDOWS 3.x

PLEASE READ PROCEDURES CAREFULLY BEFORE PERFORMING OPERATIONS

CAUTION: DO NOT TOUCH SETTINGS ON THE NIMBIN MODULE!

Background Information: EG&G ORTEC's GammaVision, is an integrated MCA emulator and gamma spectrum analysis program for the Microsoft windows operating environment. A spectrum may exist in three places: in the multichannel buffer (called Detector), in computer memory (Buffer), or in a file on disk. The detector is where the data are generated from the HPGe detector. Data may be displayed and manipulated directly in the detector memory or the buffer. Copying data into either will overwrite the current contents (you are warned before any data is lost). Actions on the buffer have no effect on data acquisition taking place in the detector.

If the computer is turned off, you will need to turn on the computer first. Then you start by double-clicking (using the mouse) on the GammaVision icon. The gamma vision main display will now be on the screen. If the computer is already on, you can press any Key and the main display will appear on the screen.

- 1) If a spectrum appears on the screen the operator will need to save this spectrum by clicking on File along the menu line (See figure 1). This will cause a submenu to appear.
- 2) Now click on the Save function. These functions write the spectrum from the displayed memory to disk. If the Save function is selected with a memory that has no previous filename associated with it, the dialog box shown in Fig. 2 appears, prompting the user for a filename. The user should now enter a filename followed by extension: .spc Once the filename and extension has been entered, you are provided with a series of dialog boxes regarding sample description, quantity, collection date and time. If no changes are necessary, click on OK for each one.
- 3) Once the spectrum has been saved, the user can click on Acquire, and click on Clear (fig. 3). This clears the spectrum from the screen. Next the user must click on Acquire and click on Start. The detector has a unique set

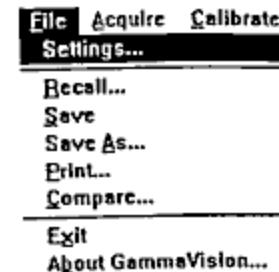


fig. 1

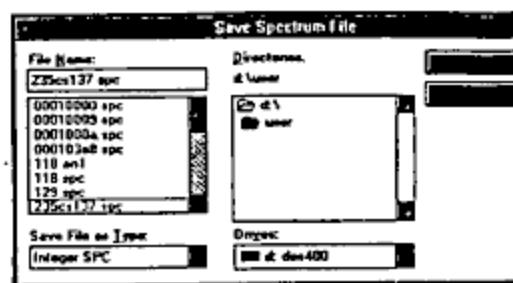


fig. 2

Counting Procedures continue

of entries; ie *real time and live time, sample description, sample quantity, and collection date and time.* These fields should be entered prior to acquisition.

- 3) The live time should remain at 10,000 seconds (unless a shorter acquisition time is warranted by the user). If 10,000 seconds is ok, then click on OK. Next the sample description is entered. Enter the sample description then click on OK. Next the sample quantity should be entered if the output activity is to be normalized to a volume or weight.
Enter the weight of the sample and reporting units, (ie uCi). After the weight has been entered click on OK. Next the collection date and time should be entered.

Prior to clicking on OK, place the sample on the detector and close the lid!

- 4) Then click on OK. Once the user clicks on OK, the acquisition starts. Note: if the sample is not in the counting well prior to the last step, the above steps will have to be repeated.
- 5) Once the acquisition is completed, perform a peak search, click on Analysis, and click on Peak Search. The peaks in the spectrum will be highlighted in blue. The user can press the home key and this will move the cursor to the left of the screen. The user then can press the Ctrl and Arrow key and move the cursor from left to right stopping at each peak or use the mouse and click on peak arrow key, lower right hand corner of screen. Note: overlapping or close peaks may have contiguous ROIs. If ROIs overlap the user may want to delete the region of interest and insert a region around the peak of interest. At the bottom of the screen will be information regarding the peak: ie energy and best library match and activity in uCi's.
- 6) If the user wants a report (printout) of the Regions of Interest, then the user should click on Analysis and click on ROI Report (See fig. 4). The report function can be



fig. 3

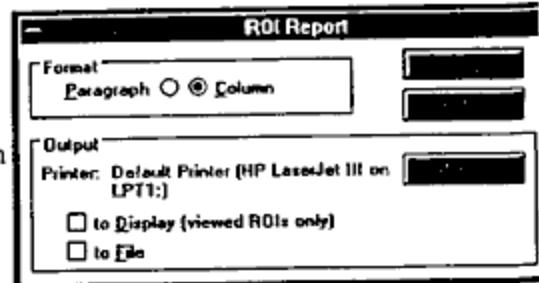


fig. 4

Counting Procedures continue

used to produce a semi-quantitative nuclide list from the spectrum. The dialog shown in fig. 4 allows the report to be sent to a disk or the printer. The format "paragraph" should be highlighted and the output should be to the printer. (Note; these settings are already set up). After checking these parameters, click on OK. The screen will flash the report and send it to the printer which should start printing the information.

- 7) After sending the report to the printer, the user should click on the File setting and click on Save. This will allow the user to save the spectrum as described earlier on page 1. The user should give the sample a filename followed by the .spc extension prior to continuing with the next sample.
- 8) If another sample is to be counted, the user should take out the previously counted sample and write on the can the file name in which it was saved as. Now the user can go back to step 1 (ie; click on Acquire, click on Clear, then click on Start).

More specific software applications, information and function description can be found in the EG&G ORTEC brown user manual labeled #100-00000000 right of the computer.

If the user has questions concerning the above procedures please contact John Hultquist.



Utah!

Where ideas connect

Department of Environmental Quality Division of Radiation Control

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FILE

OCT 22 2002

October 23, 2002

Paul Lohaus, Director
Office of State and Tribal Programs
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Via Federal Express

Dear Mr. Lohaus:

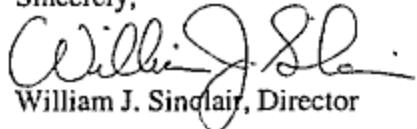
The Utah Division of Radiation Control (UDRC) is preparing to submit a final application to amend the present Agreement with the Nuclear Regulatory Commission (NRC) to allow UDRC to regulate uranium mills and tailings in the State of Utah. Prior to submission of the final application, UDRC is providing NRC with documents pertaining to how UDRC would regulate the groundwater aspect of the amended Agreement. As you are aware, UDRC intends to substitute the Utah Administrative Rules for Ground Water Quality Protection, R317-6 for groundwater standards provided in Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192). In support of this substitution, UDRC has prepared the following document for NRC review and comment:

- (1) Enclosure 1 - Summary of the process used to determine of how to best regulate groundwater at Utah uranium mill facilities;
- (2) Enclosure 2 - Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R317-6)
- (3) Enclosure 3 - Detailed Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Rules (UAC R317-6)

We are providing you with the above information to ensure NRC that the proposed Utah program is equivalent to the comparable NRC groundwater program under Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192). We believe that although we may use different terminology on occasion or may have a different regulatory process approach on an issue, the end result, protection of the groundwater resource, is achieved under both programs.

We are also aware of a provision of the Uranium Mill Tailings Radiation Control Act which specifies that an "alternate standard" may need to be approved by the NRC if a state chooses a different path regarding groundwater regulation. As such, we are requesting a determination of a regulatory and process path forward to facilitate Utah's request. We appreciate your help and consideration of this important matter. If you have questions or I can be of further assistance, please do not hesitate to contact me.

Sincerely,



William J. Sinclair, Director

Enclosure 1 - Description of the Proposed Utah
Groundwater Program for Uranium Mills and Tailings



Description of the proposed Utah Groundwater Program for uranium mills and tailings
Utah Division of Radiation Control
October 2002

Prior to submitting a draft application to the Nuclear Regulatory Commission (NRC), the Department of Environmental Quality (DEQ), Divisions of Radiation Control and Water Quality convened stakeholders to examine the issue of Agreement State status and specifically, how to best address the "groundwater authority" issue. The stakeholders reached consensus that the groundwater program was best addressed by use of the current Utah program. A major issue for stakeholders was to assure consistency of groundwater regulation throughout the state of Utah and among the variety of permit holders. The Stakeholders' group consisted of representatives of the four impacted facilities (Envirocare, International Uranium, Plateau Resources, and Rio Algom), county elected officials (Tooele and San Juan County), DEQ Boards representatives from Radiation Control and Water Quality Board, and representatives of the Division of Radiation Control and the Division of Water Quality. The entire Stakeholder work effort is found at: http://www.deq.state.ut.us/EQRAD/MILLS/ATLAS/Deq_task.htm

The Division of Radiation Control (DRC) intends to administer both the groundwater permitting and radioactive material licensing for disposal facilities and uranium mills. Facilities will have both a groundwater discharge permit and radioactive materials license issued by DRC staff. Two facilities already have state groundwater discharge permits, Envirocare and Plateau Resources. International Uranium is in the process of obtaining a state groundwater discharge permit. International Uranium is also complying with a state Corrective Action Order to investigate a non-radiologic release at the White Mesa Mill.

The permit and enforcement process has been made efficient by utilizing existing provisions of the Utah Water Quality Act which allows the Water Quality Board and Executive Director to designate the Director of the Division of Radiation Control as a Co-Executive Secretary to administer provisions of the Water Quality Act for the identified facilities [see Utah Code Annotated (UCA) 19-5-106 and 19-5-104 (1),(k)]. The DRC Director has been designated as a Co-Executive Secretary of the Water Quality Board and given legal authority to issue, administer, and enforce specific groundwater permits under the Utah Water Quality Rule UCA R317-6 as applied to the following facilities: Envirocare, Rio Algom, International Uranium Corporation, and Plateau Resources Limited, and as allowed under the provisions of UCA 19-5-104(1)(k).

No separate involvement of the DEQ Division of Water Quality staff is required although they are available to consult with the DRC Director regarding interpretation of rules and other technical or procedural matters relating to groundwater protection. Appeals of enforcement proceedings and permit issues relating to groundwater would be through the Utah Water Quality Board. The Division has substituted the Administrative Rules for Ground Water Quality

Protection, R317-6 for groundwater standards provided in Appendix A, 10 CFR Part 40 (EPA Rules 40 CFR Part 192).

Urnills enc1

Enclosure 2 - Executive Summary - Comparison of NRC
Groundwater Protection Criteria in 10 CFR Part 40,
Appendix A With Utah Ground Water Quality Protection
Regulations (UAC R317-6)

**Executive Summary - Comparison of NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A
With Utah Ground Water Quality Protection Regulations (UAC R317-6)**

NRC Criterion	Rule Comparability
Definitions	<p>Aquifer - The State definition is essentially equivalent.</p> <p>Compliance period - Although the mechanics vary, the State provides an equivalent approach.</p> <p>Ground water - The State definition is equivalent.</p> <p>Leachate - The term is not directly defined in the State rule. However, State practice is to ensure control of the discharge of leachates through issuance of Construction and discharge permits (see discussion for "liners" below)</p> <p>Liners - This term is not directly defined in the State Groundwater Discharge Permit (GWDP) rule. However, in practice, liners are carefully examined during the course of issuance of both State construction and discharge permits</p> <p>Point of compliance - The State definition is equivalent.</p> <p>Uppermost aquifer - Equivalent definitions are found in two other State terms (see discussion of "aquifer" in full comparison document)</p>
Criterion 5B(1)	<p>Although the mechanics differ, the State rule provides an equivalent measure of protection for the groundwater resource</p>
Criterion 5B(2)(a)(b)(c)	<p>The State rule is equivalent in its requirements for source term characterization under Criterion 5B(2)(a). No predetermined list of contaminants is specified in the Utah Groundwater Quality Protection (GWQP) Rules. However, the approach provides that:</p> <ul style="list-style-type: none"> (1) Groundwater Quality Standards (GWQS) can be determined by the Executive Secretary a priori before a

<p>Criterion 5B(2)(a)(b)(c) [continued]</p> <p>(2) Executive Secretary can use the Criterion 13 list as a guide in combination with specific source characterization information provided by the Permit applicant to determine the type and number of GWQS and Groundwater Protection levels (GWPLs) necessary for a permit or corrective action plan. The State approach allows flexibility beyond the Criterion 13 list to determine site-specific GWQS on other pollutants known to be toxic or cause health or environmental harm, or established by other accepted regulatory, research, or governmental agencies.</p>
<p>Criterion 5B(3)</p> <p>Minor differences exist in the State wording. However, the objectives of the Permit application needs and the Contaminant Investigation Report (CIR) and Corrective Action Plan (CAP) requirements for groundwater cleanup; plus the capability of the Executive Secretary to require the additional actions and data gathering all combine to provide an equivalent degree of protection of groundwater resources.</p>
<p>Criterion 5B(4)</p> <p>The State rules provide steps to identify underground sources of drinking water through the groundwater classification process. This process is a major underpinning to the State permit issuance and groundwater corrective action programs. The State groundwater classification system provides protection for some limited groundwater resources that could be considered "exempted" from protection under EPA rules.</p>
<p>Criterion 5B(5)</p> <p>Although the State/NRC mechanics differ somewhat, the overall objective in the State rules is equivalent.</p>
<p>Criterion 5B(6)</p> <p>Equivalent requirements are found in the State rules, in that the owner/operator is required to demonstrate that practicable corrective actions have been applied and the ACL poses no risk to human health or the environment. The</p>

Criterion 5B(6) [continued]	detailed technical factors that must be considered under the NRC requirements are also adequately addressed by the State rules.
Criterion 5C	The differences seen in the concentration limits adopted for groundwater protection under the State rules (GWQS) are due to the fact that the State has stayed abreast of the EPA changes to drinking water MCL values.
Criterion 5D	The State rules are equivalent in purpose and objective to the NRC Criterion 5D requirements. While the State process does not include an 18-month deadline for the owner/operator to implement a groundwater corrective action plan, a similar time period transpires during submittal of a contaminant investigation report followed by a corrective action plan. If necessary, an enforcement order ensures any obligations that need to be met are accomplished.
Criterion 5E	The State rules and practice in determining if a discharge facility has incorporated best available control technology (BAT) are consistent and equivalent to all the groundwater protection program considerations in NRC Criterion 5E
Criterion 5F	The State rules and agency practice are equivalent to the NRC requirement
Criterion 5G	The State rules and agency practice are equivalent to NRC requirements for Criterion 5G.
Criterion 5H	The State rules are equivalent to the NRC requirement
Criterion 7A	Detection monitoring: The State rules and practice allow the establishment of a groundwater detection monitoring program that is equivalent to the NRC requirement. License issuance: The State rule is equivalent to this NRC requirement. Compliance monitoring: The State rule is more protective of

<p>Criterion 7A (continued)</p> <p>the groundwater resource, the GWPL concept provides early warning of a release before exceedance of the applicable GWQS.</p> <p>Corrective action: The State rules in question are equivalent to the NRC requirement.</p>	<p>Criterion 13</p> <p>The flexibility of the State rules allow the Executive Secretary to tailor the groundwater monitoring parameters, determine appropriate GWQS and GWPLs, and set groundwater cleanup compliance concentration levels based on the individual waste source term characteristics of each disposal site. NRC Criterion 13 contaminants may be used as a guide in this process</p>

Enclosure 3 - Comparison of Several NRC Groundwater Protection Criteria in 10 CFR Part 40, Appendix A with Utah Ground Water Quality Protection Regulations (UAC R317-6)

**Comparison of Several NRC Groundwater Protection Criteria in 10 CFR 40, Appendix A
with Utah Ground Water Quality Protection Regulations (UAC R317-6)**

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
Definitions	<p><i>"Aquifer" means a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs. Any saturated zone created by uranium or thorium recovery operations would not be considered an aquifer unless the zone is or potentially is (1) hydraulically interconnected to a natural aquifer, (2) capable of discharge to surface water, or (3) reasonably accessible because of migration beyond the vertical projection of the boundary of the land transferred for long-term government ownership and care in accordance with Criterion 11 of this appendix.</i></p>	<p>A similar definition is found in the State Ground Water Quality Protection (GWQP) Rules, Utah Administrative Code (UAC) R317-6-1.1: <i>"Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.</i></p> <p>Editorial Note: the State definition intentionally avoids specifying a minimum aquifer yield value in order to protect all useable groundwater resources, including both current and future sources. As the second-most arid State in the nation, Utah has a unique need to protect many small public water supply systems that draw on low-yielding seeps and springs for public drinking water. In some cases these small water companies capture and combine groundwater flow from several low yielding seeps and springs to provide sufficient drinking water for a local community.</p> <p>With regards to artificial mounds of groundwater created by spills, releases, or other wastewater discharges, found in subsurface intervals that previously were unsaturated, the Utah Water Quality Act (WQA) provides that such wastewaters are privately owned industrial process waters, and not "Waters of the State", should they meet the following statutory requirements [see Utah Code Annotated [UCA] 19-5-102(18)(a and b)]:</p> <ol style="list-style-type: none"> 1. Retained on Private Property – meaning "...confined to or retained within the limits of private property,...". This means the use of active hydraulic control to prevent the wastewater from leaving the physical boundaries of the property owned by the Permittee, and 2. Lack of Adverse Impact – the wastewater discharged to the subsurface does not "...develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife." <p>Under these circumstances, the State GWQP rules would not apply to the artificial zone of saturation created by the facility. However, should the artificial mound leave the property boundaries, or contain contaminants in excess of the State Ground Water Quality Standards (GWQS), said groundwater is subject to regulation by the State.</p> <p>Rule Comparability: the State definition is essentially equivalent.</p>
	<p><i>"Compliance period" begins when the Commission sets secondary ground-water protection standards and ends when the owner or operator's license is terminated and the site is transferred to the State or Federal agency for long-term care.</i></p>	<p>This specific term is currently undefined in the State GWQP Rules. However, two (2) sections of the State rule apply to this concept. Under R317-6-6.1(A) and (B), a facility that "...discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water..." is required to obtain a Ground Water Quality Discharge Permit (hereafter Permit) from the Executive Secretary. Upon issuance of the Permit, the owner/operator is required to comply with the State GWQP Rules, as implemented by the Permit. Thereafter, the Permit continues in force until the Executive Secretary determines that circumstances at the facility have changed such that the operation poses "...a de minimus actual or potential effect on ground water quality." [R317-6-6.2(A) and (A)(25)]. If at facility closure, the Executive Secretary finds groundwater quality at the site to be at concentrations that are less than or equal to the State GWQS, then the facility would be determined to meet the "de-minimus" criterion referenced above, and the Permit terminated. At that point, the radioactive material license would also be terminated, and the facility transferred to the DOE general license.</p> <p>Rule Comparability: although the mechanics vary, the State approach is equivalent.</p>

NRC Definition	State Definition
"Ground water" means water below the land surface in a zone of saturation. For purposes of this appendix, ground water is the water contained within an aquifer as defined above.	A similar definition is found in the State GWQP Rules, as follows (R317-6-1.19): "Ground Water" means subsurface water in the zone of saturation including perched ground water. Rule Comparability: the State definition is equivalent.
"Leachate" means any liquid, including any suspended or dissolved components in the liquid, that has percolated through or drained from the byproduct material.	This term is used extensively in the State GWQP rules without a formal regulatory definition. Many times it is used interchangeably with the term "effluent" (R317-6-1.28, R317-6-6.2(A)(1), and R317-6-6.3(F)). However, this term may also be encompassed by the State definition for "pollution", which is "...contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life." (R317-6-1.30). Rule Comparability: this term is not directly defined in the State rule. However, State practice is to ensure control of the discharge of leachates thru issuance of Construction and discharge permits (see discussion for "liner", below).
"Liner" means a continuous layer of natural or man-made materials, beneath or on the sides of a surface impoundment which restricts the downward or lateral escape of byproduct material, hazardous constituents, or leachate.	This specific term is not used in the State GWQP Rules in order that the rules so apply to many different types of waste or wastewater discharge sources, including waste impoundments, pipe discharges of wastewater, among others. Instead, generic reference is made in the State rules to a "discharge" which is defined as "...the release of a pollutant directly or indirectly into subsurface waters of the state" (R317-6-1.13). Another State term is also applicable, "point of discharge", which "...means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes" (R317-6-1.28). Accordingly, the discharge to the subsurface and to Waters of the State could be through a liner under a waste or wastewater impoundment facility. Said liner could be made of earthen or man-made materials. Under the State WQA, an owner / operator is required to first secure a Permit before operating a Treatment Works [UCA 19-5-107(3)]. In turn, the Executive Secretary reviews engineering plans and specifications for Treatment Works and issues Construction Permits [UCA 19-5-104(1)(b)]. During the course of this review the design and construction of proposed liner systems is carefully examined. The purpose of the liner system is to prevent and/or abate the seepage discharge that must be controlled to be in compliance with the State GWQP rules. In addition, the GWQP Rules also require the Permittee to provide information to demonstrate how the discharge will be controlled and not migrate into or adversely effect the quality of Waters of the State, including both ground water and surface water [R317-6-6.3(G)]. The design and construction of liner systems is central to this goal. Rule Comparability: this term is not directly defined in the State GWQP rule. However, in practice liners are carefully examined during the course of issuance of both State Construction and discharge Permits.
"Point of compliance" is the site specific location in the uppermost aquifer where the ground-water protection standard must be met.	A similar definition is found in the State GWQP Rules for Compliance Monitoring Point (CMP), which is defined as "...a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits" (R317-6-1.10). Another citation in the State GWQP Rules requires that the CMP be located as close as practicable to the point of discharge ... and within the property boundaries owned by the facility [R317-6-6.9(A)]. This same section of the rules allows the Executive Secretary to require that the State GWQS be met at the CMP. Rule Comparability: the State definition is equivalent.

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
	<p><i>"Uppermost aquifer"</i> means the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers that are hydraulically interconnected with this aquifer within the facility's property boundary.</p>	<p>This specific term is not used in the State GWQP Rules. However, two other related terms are defined, including:</p> <p><i>"Water Table"</i> means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere. (R317-6-1.39), and</p> <p><i>"Water Table Aquifer"</i> means an aquifer extending downward from the water table to the first confining bed. (R317-6-1.40). For additional information see discussion on the definition of "aquifer", above.</p> <p>Rule Comparability: equivalent definitions are found in two other State terms.</p>
Criterion SB(1)	<p><i>Uranium and thorium byproduct materials must be managed to conform to the following secondary ground-water protection standards: Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.</i></p>	<p>The Utah Ground Water Quality Protection (GWQP) Rules also mandate that groundwater quality at the compliance monitoring point must not exceed the State Ground Water Quality Standards (GWQS) while a discharge Permit is required. This mandate is the product of both statutory requirements provided in the Utah Water Quality Act (WQA), and the Utah GWQP Rules promulgated therefrom, as outlined below:</p> <p>WQA Citations (UCA 19-5):</p> <p>19-5-107(1)(a): provides that it is unlawful to discharge pollutants into Waters of the State, or to directly or indirectly place wastes where they may cause ground or surface water pollution.</p> <p>19-5-102(18): defines all groundwater, including the uppermost aquifer, and surface water as Waters of the State.</p> <p>19-5-102(3): defines discharge as the addition of any pollutant to any Waters of the State.</p> <p>19-5-102(10): defines pollution as man-made alteration of the quality of Waters of the State, including among others, radiological changes.</p> <p>19-5-102(17): defines waste or pollutant as the discharge of various types of waste into water.</p> <p>19-5-107(3)(b): requires an owner / operator to first secure a Permit from the Executive Secretary before operating a "treatment works".*</p> <p>19-5-102(14): defines Treatment Works, as facilities used to treat, stabilize, or hold wastes.*</p> <p>19-5-104(1)(c): empowers the Utah Water Quality Board (hereafter Board) to adopt Standards of quality for Waters of the State, and classify said waters, for the prevention, control, and abatement of pollution.</p> <p>19-5-104(1)(d): empowers the Board to review engineering plans and specifications and issue construction permits for Treatment Works.</p> <p>19-5-104(1)(e): empowers the Board to issue, revoke, modify, or deny discharge Permits to prevent or control discharge of pollutants and wastes into Waters of the State (after public notice and opportunity for public hearing).</p> <p>* = Similar requirements are found in the GWQP Rules for waste disposal sites, including mining and milling operations [R317-6-6.1(A) and(B)].</p> <p>Editorial Note: in practice the Executive Secretary issues both the Construction Permit and the Groundwater Quality Discharge Permit concurrently as a single document. Both regulatory instruments work together in tandem to govern the construction, operation, maintenance, monitoring, and closure of a facility in order to protect local groundwater resources.</p> <p>GWQP Rule Citations (Utah Administrative Code R317-6):</p> <p>R317-6-1.1: defines aquifer as geologic formation(s), or parts thereof that are sufficiently saturated to yield useable quantities of water to wells and springs.</p> <p>R317-6-1.20: defines State Ground Water Quality Standards (GWQS) as concentration levels adopted for the protection of groundwater quality.</p>

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
		<p>R317-6-1.10. defines Compliance Monitoring Point (CMP) as a well, or other sampling point used to determine compliance with Permit limits.</p> <p>R317-6-4: defines Ground Water Protection Limits (GWPLs) that are groundwater monitoring concentration limits used at Permitted facilities, and are assigned as a fraction of the GWQS. The determination of these limits vary according to background groundwater class, and are used as an early warning mechanism to protect groundwater quality.</p> <p>R317-6-6.16(B): mandates that out-of-compliance status exists for a facility when 2 consecutive groundwater quality samples from a CMP exceed the Permit limit (GWQS or GWPL) and the background groundwater concentration by a statistically significant measure (e.g. 2 standard deviations).</p> <p>Rule Comparability: although the mechanics differ, the State rule provides an equivalent measure of protection for the groundwater resource.</p>
	<i>Hazardous constituents are those constituents identified by the Commission pursuant to paragraph 5B(2) of this criterion. Specified concentration limits are those limits established by the Commission as indicated in paragraph 5B(3) of this criterion.</i>	<p>Equivalent to this requirement, the Ground Water Quality Standards (GWQS) were adopted by the Utah Water Quality Board (hereafter Board) for the protection of groundwater quality in Utah (R317-6-1.20). Said GWQS include specific groundwater quality contaminants and concentration limits (R317-6-2.1). In a like manner, the Executive Secretary can determine ad hoc GWQS for a facility on a case-by-case basis during issuance of a Permit (R317-6-2.2).</p> <p>Rule Comparability: equivalent capability exists to set ad hoc protections standards for groundwater quality.</p>
	<i>The Commission shall identify hazardous constituents, establish concentration limits, set the compliance period, and may adjust the point of compliance if needed to accord with developed data and site information as to the flow of ground water or contaminants, when the detection monitoring established under</i>	<p>the point of compliance and compliance period on a site specific basis through license conditions and orders. The objective in selecting the point of compliance is to provide the earliest practicable warning that the impoundment is releasing hazardous constituents to the ground water. The point of compliance must be selected to provide prompt indication of groundwater contamination on the hydraulically downgradient edge of the disposal area.</p> <p>1. Wells or other sampling points, determined on a facility specific basis, used to determine compliance with the Permit (R317-6-1.10).</p> <ol style="list-style-type: none"> 2. Used to determine compliance with GWQS and/or Groundwater Protection Levels (GWPL) [R317-6-6.9A]. GWPLs are defined as a fraction of GWQS concentration, depending on local groundwater class, and are used to provide early warning of an impending release to groundwater (R317-6-4). Groundwater class is based on the background concentrations of total dissolved solids (TDS) in the aquifer, and is used to afford more protection to high quality, low TDS groundwater (R317-6-3). 3. Located after consideration of local hydrology, type of pollutants, and other factors (<i>ibid.</i>). 4. Located as close as practicable to the point of discharge in order to provide early warning of a release to groundwater (<i>ibid.</i>). Point of discharge is defined as the outermost perimeter of the discharge source, or for impoundments the outermost edge of the dikes (R317-6-1.28), and 5. Located on property owned by the facility (unless permission granted from affected nearby property owners [R317-6-6.9A]). <p>Rule Comparability: equivalent provisions are provided in the State regulations.</p>
		<p>The Executive Secretary also identifies contaminants needed for monitoring during review of the initial Permit application, primarily through evaluation of the possible source term contaminants present on site (R317-6-6.3F). This information is integral to GWQP Rule mandate that requires the Permittee to submit a groundwater monitoring plan as a part of the Permit application. This plan must include a description and justification of the types and numbers of ground water quality parameters to be monitored [R317-6-6.3(I)(7)].</p> <p>Concentration limits for the Permit are based on Ground Water Protection Levels (GWPL), which by definition are determined by groundwater class, and are fractions of the State GWQS. During issuance of a Permit, the Executive</p>

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	<i>Criterion 7A Indicates leakage of hazardous constituents from the disposal area.</i>	<p>Secretary can determine permit specific pollutants, on a case-by case basis, as Ad-hoc GWQS (R317-6-2.2).</p> <p>As mentioned above, the compliance period begins when the Permit is issued, and continues until it is terminated by the Executive Secretary just prior to site transfer to the DOE general license, see discussion on "compliance period" definition, above.</p> <p>The ability to adjust the number and location of groundwater monitoring wells or to adjust the number of groundwater quality monitoring parameters, to ensure adequate detection of groundwater contamination from the waste disposal site is made possible by the groundwater monitoring requirements in R317-6-6.9A. A re-evaluation and change in Permit requirements, if necessary, is usually accomplished every 5-years as a part of Permit renewal, as outlined in R317-6-6.6 and 6.7.</p> <p>Editorial Note: With the intent of preventing groundwater pollution, the evaluation and adjustment of requirements upon Permit renewal does not require that pollution first adversely impact local groundwater quality before Permit monitoring changes are made. As for a detection monitoring program, historically some Permittees have successfully argued use of an initial short list of groundwater monitoring parameters that is expanded to a longer list of contaminants upon detection of any contaminant of concern. In common practice the Executive Secretary includes re-opening provisions in Permits to allow modification of the CMP locations, numbers of wells, and water quality parameters on an as-needed basis.</p> <p>Rule Comparability: The State rule provides the same capability with regards to identifying the types and numbers of contaminants needed for groundwater monitoring, establishing necessary concentration limits (GWQS and GWPLs), and determining the location and number of CMPs. The State rules also offer an additional degree of protection in that these determinations are made a priori at the time of Permit issuance, and need not wait for groundwater pollution to be made manifest.</p>
Criterion 5B(2)	<p><i>A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:</i></p> <p>(a) <i>The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;</i></p> <p>(b) <i>The constituent has been detected in the ground water in the uppermost aquifer; and</i></p> <p>(c) <i>The constituent is listed in Criterion 13 of this appendix.</i></p>	<p>The Permittee is required to submit an application that provides a detailed characterization of the potential contaminant source term [R317-6-6.3(F)]. Thereafter, the groundwater monitoring contaminants are identified by the Executive Secretary after careful examination of the characteristics of the effluents or wastes that may be discharged or potentially discharged from the facility (<i>ibid.</i>). The Executive Secretary then determines the groundwater monitoring parameters and sets appropriate concentration limits (GWQS and/or GWPLs) to protect public health and the environment [R317-6-6.9(A)]. These contaminants can include ad-hoc GWQS, mentioned above (R317-6-2.2).</p> <p>Editorial Note: with an eye to preventing groundwater pollution the State rule does not have any pre-requisite that the contaminant must first pollute the water table aquifer before it is regulated by Permit. While Criterion 13 is extensive and can be used as a guide to determine groundwater monitoring parameters, no pre-determined list of contaminants is dictated by the GWQP Rules. The purpose of this approach is to allow the Executive Secretary flexibility in tailoring the Permit requirements, on a case-by-case basis, to the individual characteristics of each discharging or potentially discharging facility.</p> <p>Rule Comparability: the State rule is equivalent in its requirements for source term characterization under Criterion 5B(2)(a). No predetermined list of contaminants is specified in the Utah GWQP Rules. However, the State approach provides that:</p> <ul style="list-style-type: none"> I) GWQS can be determined by the Executive Secretary a priori before a contaminant pollutes the water table

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
Criterion 5B(3)	<p><i>Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Commission may exclude a detected constituent from the set of hazardous constituents on a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to exclude constituents, the Commission will consider the following:</i></p> <ul style="list-style-type: none"> (a) <i>Potential adverse effects on ground-water quality, considering --</i> <ul style="list-style-type: none"> (i) <i>The physical and chemical characteristics of the waste in the licensed site, including its potential for migration;</i> (ii) <i>The hydrogeological characteristics of the facility and surrounding land;</i> (iii) <i>The quantity of ground water and the direction of ground-water flow;</i> (iv) <i>The proximity and withdrawal rates of ground-water users;</i> (v) <i>The current and future uses of ground water in the area;</i> (vi) <i>The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;</i> (vii) <i>The potential for health risks caused by human exposure to waste constituents;</i> (viii) <i>The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;</i> (ix) <i>The persistence and permanence of the potential adverse effects.</i> 	<p>aquifer, and</p> <p>2) Executive Secretary can use the Criterion 13 list as a guide in combination with site specific source characterization information provided by the Permit applicant to determine the type and number of GWQS and GWPLs necessary for a Permit or Corrective Action Plan. This State approach allows flexibility beyond the Criterion 13 list to determine site-specific GWQS on other pollutants known to be toxic or cause health or environmental harm, as established by other accepted regulatory, research, or governmental agencies.</p> <p>This type of evaluation is handled either during Permit issuance or thru the course of Executive Secretary approval of a groundwater Corrective Action Plan. As a part of a Permit application, the owner / operator is required to provide a complete description of these same data elements, including [R317-6-6.3(D) thru (G)]:</p> <ol style="list-style-type: none"> 1. Water Source Description – including wells, well uses, topography, springs, water bodies, drainages, and man-made structures within 1-mile of the facility. 2. Hydrogeologic Description – including a description of soil types, aquifers, groundwater flow direction, groundwater quality, aquifer material, and well logs within a 1-mile radius of the facility. 3. Source Term Characterization – including the type, source, and physical / chemical radiological / and toxic characteristics of the effluent or potential effluent that may be discharged from the facility. This also includes average and maximum daily volumes wastewater / leachate to be discharged, and the anticipated contaminant concentrations in said discharges. 4. Source Control Justification – including a detailed description and justification that the source(s) or potential source(s) will be controlled and managed to protect receiving ground and surface water quality resources (including surface water standards, GWQS, groundwater class limits, and GWPLs). <p>During the Permit issuance process, the Executive Secretary may determine that certain groundwater contaminants at a facility are necessary for groundwater monitoring and may set concentration limits (GWQS and GWPLs) for those pollutants (R317-6-6.9(A) and R317-6-2.2). On the other hand, the Executive Secretary may determine that monitoring needs at a waste disposal site are best served by requiring that certain contaminants be sampled only for a groundwater monitoring purpose without establishment of a respective GWPL or GWQS for that contaminant(s). As in all cases of Permit issuance, the Executive Secretary is required to issue a public notice the draft Permit has been prepared for the facility, provide a 30-day minimum public comment period, and receive public comment on the action in question (R317-6-6.5).</p> <p>A similar process is found in the State GWQP Rules after a contaminant reaches the water table aquifer at a facility. After determination that a groundwater contaminant has exceeded its GWQS (un-permitted facility), or a Permit limit (e.g., GWPL), the Executive Secretary may require the owner / operator to prepare and conduct both a Contaminant Investigation and a Corrective Action Plan [R317-6-6.15 (A) and (C)]. The purpose of the Contaminant Investigation Report (CIR) is to fully characterize the apparent pollution and its source, and local groundwater hydrogeologic conditions. The State GWQP Rules require a significant amount of detail must be included in the CIR, including [R317-6-6.15(D)(1)(a) thru (e)]:</p> <ol style="list-style-type: none"> 1. Characterization of Pollution – including: amount, form, concentration, toxicity, environmental fate and transport, other significant characteristics of the groundwater pollution (including any contributing surface contamination).

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
	<p>(b) Potential adverse effects on hydraulically-connected surface water quality, considering –</p> <ul style="list-style-type: none"> (i) The volume and physical and chemical characteristics of the waste in the licensed site; (ii) The hydrogeological characteristics of the facility and surrounding land; (iii) The quantity and quality of ground water, and the direction of ground-water flow; (iv) The patterns of rainfall in the region; (v) The proximity of the licensed site to surface waters; (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters; (vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality; (viii) The potential for health risks caused by human exposure to waste constituents; (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and (x) The persistence and permanence of the potential adverse effects. 	<p>vertical and horizontal extent of the contamination, and concentrations and distribution and chemical makeup of the contamination within the plume.</p> <ol style="list-style-type: none"> 2. Characterization of the Facility – including: contaminant substances / mixtures present and media of occurrence, hydrogeologic conditions present at facility (including upgradient and downgradient conditions), surface waters present at the site, climate and meteorological conditions at the site, type / location / description of the possible sources of the pollution, and groundwater withdrawals and types of uses within a 2-mile radius. 3. Evaluation of CIR Data Gaps – including quality assurance / quality control measures used to collect the data, description of data used in the CIR, and description of data gaps encountered and plans to fill said data gaps. 4. Risk Assessment – including all studies necessary to justify the proposed groundwater contaminant cleanup concentration(s). 5. Any Other Information Required – by the Executive Secretary must also be included in the CIR. Among other uses, this provision allows the Executive Secretary to protect hydraulically connected surface water. <p>After submittal and approval of the CIR, the owner / operator is required to submit a Corrective Action Plan (CAP). The CAP must provide several different types of information, as follows [R317-6-6.15(D)(2) and 6.15(E)]:</p> <ol style="list-style-type: none"> 1. Construction and Operation Description – for the proposed Corrective Action (CA) system. 2. Completion Schedule – for construction of the proposed CA system and cleanup of the effected groundwater. 3. Demonstration of Protection – that the proposed CA system will protect public health and the environment. 4. Demonstration that Approved Groundwater Concentration Limits Will Be Met – thus includes approved GWQS [R317-6-6.15(F)(1)], ad-hoc GWQS established by the Executive Secretary for the cleanup [R317-6-6.15(F)(2)], or other alternate cleanup concentrations approved by the Executive Secretary [as per R317-6-6.15(O)]. 5. Evaluation of Off-site Impacts – including, but not limited to contaminants released from the site by contaminated ground water or the transport and disposition of the contaminated material at a secondary disposal site. 6. Demonstration of Permanent Effect – that the CA will produce a permanent effect in cleaning up the contaminated groundwater at the site. 7. Description of All Measures to be Used – used by the CA system, including, but not limited to: capping or other source control methods, long-term groundwater monitoring and reporting, long-term operation and maintenance of the CA system, environmental hazard notices and other security, periodic review to determine if the CA system continues to protect public health and the environment. 8. Any Other Information Required – by the Executive Secretary during review of the CAP. This provision allows the Executive Secretary to protect hydraulically connected surface waters, among other things. <p>Editorial Note: during review of the CIR and CAP, the Executive Secretary may omit a groundwater contaminant from any required groundwater monitoring or cleanup action, provided that said contaminant does not pose a risk to public health and the environment and meets all other State requirements, as listed above. Before approval of any CAP, the Executive Secretary must publish a public notice in a local newspaper and provide at least a 30-day public comment.</p>

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		<p>period [R317-6-6.15(E)].</p> <p>Rule Comparability: minor differences exist in the State wording. However, the objectives of the Permit application needs and the CIR and CAP requirements for groundwater cleanup; plus the capability of the Executive Secretary to require the additional actions and data gathering all combine to provide an equivalent degree of protection of groundwater resources.</p>
Criterion 5B(4)	<i>In making any determinations under paragraphs 5B(3) and 5B(6) of this criterion about the use of ground water in the area around the facility, the Commission will consider any identification of underground sources of drinking water and exempted aquifers made by the Environmental Protection Agency.</i>	<p>A similar process of identifying groundwater suitable for human consumption, and therefore enhanced protection, is made by the Executive Secretary thru the State groundwater classification process. Under this process, groundwater is classified by its Total Dissolved Solids (TDS) content, among other parameters, as follows (see R317-6-3 and R317-6-4):</p> <p>Class IA = Pristine Groundwater, where TDS < 500 mg/l (GWPLs here are determined on a 10% basis of GWQS).</p> <p>Class 1B = Irreplaceable Groundwater for a public drinking water system (GWPLs here are also determined on 10% basis of the GWQS).</p> <p>Class 1C = Ecologically Important Groundwater, necessary for the existence of wildlife (GWPLs here are based on prerequisite surface water quality standards needed to support the wildlife).</p> <p>Class II = Drinking Water quality groundwater where 500 mg/l < TDS < 3,000 mg/l, and no groundwater contaminant exceeds its GWQS (GWPLs here are determined on a 25% basis of the GWQS)</p> <p>Class III = Limited Use Groundwater, where 3,000 mg/l < TDS < 10,000 mg/l or one or more contaminants exceed their respective GWQS (GWPLs here are determined on a 50% basis of the GWQS.) This groundwater class is roughly equivalent to an "exempted aquifer" under the EPA Safe Drinking Water Act / Underground Injection Control Regulations found in 40 CFR 146.4)</p> <p>Class IV = Saline Groundwater, where TDS > 10,000 mg/l (GWPLs here are determined on a case-by-case basis by the Executive Secretary. In practice, the Executive Secretary has assigned GWPLs at facilities overlying Class IV groundwater in order to ensure that sufficient engineering controls are provided to adequately contain and sequester 11e.(2) waste contaminants.</p> <p>Under State rule, the Board may initiate the groundwater classification process during the Permit issuance process. Either a community or an individual person may petition the Board to classify nearby aquifers or parts of aquifers with the intent of protecting local groundwater quality (R317-6-5).</p> <p>Rule Comparability: the State rules provide steps to identify underground sources of drinking water thru the groundwater classification process. This process is a major underpinning to the State Permit issuance and groundwater corrective action programs. The State groundwater classification system provides protection for some limited groundwater resources that could be considered "exempted" from protection under EPA rules.</p>
Criterion 5B(5)	<i>At the point of compliance, the concentration of a hazardous constituent must not exceed --</i>	<p>The State process for determining compliance at the compliance monitoring point has several points in common. Compliance exists when groundwater quality meets one of the following Permit limits [R317-6-6.16(A) and (B)]:</p>

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	<p>(a) <i>The Commission approved background concentration of that constituent in the ground water;</i></p> <p>(b) <i>The respective value given in the table in paragraph 5C if the constituent is listed in the table and if the background level of the constituent is below the value listed; or</i></p> <p>(c) <i>An alternate concentration limit established by the Commission.</i></p>	<p>1. GWPLs – where groundwater monitoring results are equal to or below the GWPL concentrations assigned in the Permit. As described above, the GWPLs are fractions of the GWQS, are determined largely by groundwater class, and are used to provide early warning of a discharge to groundwater. When a GWPL is exceeded, the Permittee is required to implement more frequent groundwater sampling to confirm the apparent exceedance.</p> <p>2. Alternate Concentration Limits (ACL) – where the Board has approved ACLs in issuance of a Permit, pursuant to R317-6-6.4(B) or (D), the Permittee is required to maintain local groundwater quality below the corresponding ACL limits [R317-6-6.4(E)].</p> <p>Further, background groundwater quality concentrations for contaminants of concern are taken into account in these compliance determinations at one or more of the following decision points:</p> <p>1. Initial Determination of Groundwater Class – if natural background at a waste disposal site contains contaminants at a concentration in excess of the GWQS, then that groundwater is categorized Class III. In this case, less protection of the aquifer is afforded and higher GWPL values assigned in the Permit (R317-6-4.6). Details on how background groundwater quality data are to be collected and the background determined are found in R317-6-10.</p> <p>2. Class IV Groundwater – in those cases where background groundwater TDS is greater than 10,000 mg/l, the Executive Secretary classifies the groundwater Class IV and determine GWPLs, on a Permit specific basis, to protect human health and the environment (R317-6-4.7). Historically in these cases, the GWPL concentrations were assigned equal to the corresponding GWQS.</p> <p>3. Out of Compliance Status – a facility is not deemed to be out-of-compliance with its Permit limits (GWPLs or ACLs) until after 2 consecutive groundwater samples exceed [R317-6-6.16(B)]:</p> <ul style="list-style-type: none"> a) The assigned Permit limit (GWPL or ACL), and b) The background contaminant concentration, as determined by the mean plus 2-standard deviation concentration, gr c) The groundwater concentration found is statistically significantly higher than the applicable Permit limit, as determined by EPA RCRA statistical methods. <p>Rule Comparability: Although the State / NRC mechanics differ somewhat, the overall objective in the State rules is equivalent.</p>
Criterion SB(6)	<p><i>Conceptually, background concentrations pose no incremental hazards and the drinking water limit in paragraph 5C state acceptable hazards but these two options may not be practically achievable at a specific site. Alternate concentration limits that present no significant hazard may be proposed by licensees for Commission consideration. Licensees must provide the basis for any proposed limits including consideration of practicable corrective actions, that limits are as low as reasonably achievable, and</i></p>	<p>In a similar vein, the State also assumes that Class I and II groundwater poses no risk to human consumption, in that these groundwaters are deemed drinking water quality (R317-6-3.1 thru 3.5).</p> <p>For new facilities that overlie Class III groundwater (EPA "exempted" aquifers), the Board may approve an ACL request if the Permittee is able to show the extent which the release will exceed the TDS class limit, the appropriate GWQS, and the applicable GWPLs for all contaminants of concern and demonstrates that [R317-6-6.4(B)]:</p> <ol style="list-style-type: none"> 1. The facility incorporates Best Available Technology (BAT) in its control of the discharge, 2. The pollution poses no risk to human health and the environment, and 3. The ACL is justified based on other considerations such as substantial over-riding social and economic benefits. <p>For existing facilities, i.e., those that pre-dated the State GWQP Rules (adopted in 1989) and notified the Executive</p>

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	<p><i>information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent as provided in paragraph SB(5) of this criterion if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded. In making the present and potential hazard finding, the Commission will consider the following factors:</i></p> <p>(a) <i>Potential adverse effects on ground-water quality, considering –</i></p> <p>(i) <i>The physical and chemical characteristics of the waste in the licensed site including its potential for migration;</i></p> <p>(ii) <i>The hydrogeological characteristics of the facility and surrounding land;</i></p> <p>(iii) <i>The quantity of ground water and the direction of ground-water flow;</i></p> <p>(iv) <i>The proximity and withdrawal rates of ground-water users;</i></p> <p>(v) <i>The current and future uses of ground water in the area;</i></p> <p>(vi) <i>The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;</i></p> <p>(vii) <i>The potential for health risks caused by human exposure to waste constituents;</i></p> <p>(viii) <i>The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;</i></p> <p>(ix) <i>The persistence and permanence of the potential adverse effects.</i></p>	<p>Secretary of their existence before February 10, 1990, ACLs may be approved by the Board if the Permittee shows the extent the discharge exceeds applicable TDS class limits, GWQS and applicable GWPLs for the contaminants of concern, and demonstrates that [R317-6-6.4(D)].</p> <ol style="list-style-type: none"> 1. Steps are being taken to control the source of the pollution, including a defined program of action and schedule, 2. The pollution poses no risk to human health and the environment, and 3. The ACL is justified based on other considerations such as substantial over-riding social and economic benefits. <p>With regards to the detailed factors that the Commission must consider when making a decision on a proposed ACL, particularly those dealing with potential adverse effects on groundwater quality [Criterion SB(6)(a)] and surface water quality [Criterion SB(6)(b)], the NRC regulatory language in Criterion SB(6) is identical to that found in Criterion SB(3), above. For an evaluation of the comparability of these detailed factors with the applicable State rules, the reader is referenced to the Criterion SB(3) section above.</p> <p>Editorial Note: all technical information provided by the Permittee in support of an ACL application is normally revisited and re-evaluated by the Executive Secretary at the time of Permit renewal; which is based on a 5-year life cycle [R317-6-6.7].</p> <p>Rule Comparability: equivalent requirements are found in the State rules, in that the owner / operator is required to demonstrate that practicable corrective actions have been applied and the ACL poses no risk to human health or the environment. The detailed technical factors that must be considered under the NRC requirements are also adequately addressed by the State rules.</p>

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	<p>(b) Potential adverse effects on hydraulically-connected surface water quality, considering --</p> <ul style="list-style-type: none"> (i) The volume and physical and chemical characteristics of the waste in the licensed site; (ii) The hydrogeological characteristics of the facility and surrounding land; (iii) The quantity and quality of ground water, and the direction of ground-water flow; (iv) The patterns of rainfall in the region; (v) The proximity of the licensed site to surface waters; (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters; (vii) The existing quality of surface water including other sources of contamination and the cumulative impact on surface water quality; (viii) The potential for health risks caused by human exposure to waste constituents; (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and (x) The persistence and permanence of the potential adverse effects. 	
Criterion SC	<p>Table 5C contains the NRC maximum concentration values for groundwater protection (GWP Values), see Attachment 1, below.</p> <p>Editorial Note: In 1987 the NRC adopted EPA drinking water maximum concentration limits (MCLs) as Ground Water Protection Standards (GWPS) in 10 CFR 40 Appendix A, Table 5C. Likewise, in 1989 when the Utah GWQP Rules were promulgated, the State's GWQS were equal to these same EPA MCLs (R317-6-2, Table I), see Attachment 1, below. However, since 1989 the U.S. EPA has revised its drinking water MCLs with new concentrations that took effect largely in 1992. In order to ensure protection of groundwater quality and public health in Utah, the State followed suit and adopted the revised EPA MCL values as GWQS. Unfortunately, these changes in drinking water MCLs have not been revised by EPA in its groundwater protection standards for uranium mills found in 40 CFR 192. This is the principal reason why differences exist between the NRC GWPS and the Utah GWQS.</p> <p>Rule Comparability: the differences seen in the concentration limits adopted for groundwater protection under the State rules (GWQS) are due to the fact the State has stayed abreast of the EPA changes to drinking water MCL values.</p>	

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Criterion SD	<p><i>If the ground-water protection standards established under paragraph 5B(1) of this criterion are exceeded at a licensed site, a corrective action program must be put into operation as soon as is practicable, and in no event later than eighteen (18) months after the Commission finds that the standards have been exceeded. The licensee shall submit the proposed corrective action program and supporting rationale for Commission approval prior to putting the program into operation, unless otherwise agreed to by the Commission. The objective of the program is to return hazardous constituent concentration levels in ground water to the concentration levels set as standards. The licensee's proposed program must address removing hazardous constituents that have entered the ground water at the point of compliance or treating them in place. The program must also address removing or treating any hazardous constituents that exceed concentration limits in ground water at the point of compliance and the downgradient facility property boundary. The licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the groundwater standard. The Commission will determine when the licensee may terminate corrective action measures based on data from the ground-water monitoring program and other information that provide reasonable assurance that the ground-water protection standard will not be exceeded.</i></p>	<p>Similar objectives are found in the State regulations. Upon an exceedance of a GWPL established by Permit, the Permittee is required to implement an accelerated groundwater sampling program in order to confirm the exceedance [R317-6-6.16(A)]. Out-of-compliance status does not exist until after at least 2 or more consecutive groundwater samples exceed either [R317-6-6.16(B)]:</p> <ol style="list-style-type: none"> 1. The assigned Permit limit (GWPL or ACL), and 2. The background contaminant concentration, as determined by the mean plus 2-standard deviation concentration, or 3. The groundwater concentration found is statistically significantly higher than the applicable Permit limit, as determined by EPA RCRA statistical methods. <p>Generally this determination takes between 2 to 6-months, depending on the sampling frequency established in the Permit for this purpose. Upon confirmation that the out-of-compliance status exists, the Permittee is required to notify the Executive Secretary of the release within 24-hours (verbal) and 5-days (written) [R317-6-6.15(B)]. At this point, a 2-step process begins, as outlined below:</p> <ol style="list-style-type: none"> 1. Contaminant Investigation Report - the Executive Secretary requires the Permittee to submit a Contaminant Investigation (CI) Report for review and approval [R317-6-6.15(C)]. Within 30-days of receipt of this notice, the Permittee is required to submit a schedule for completion of the contaminant investigation and submittal of the required report (<i>ibid.</i>). This proposed schedule may be accepted, rejected, and/or modified by the Executive Secretary (<i>ibid.</i>). The technical content required of the CI Report is comprehensive and outlined in R317-6-6.15(D)(1). Studies are required to characterize both the groundwater pollution and the apparent pollution source(s). During review of the CI Report the Executive Secretary may request additional information on an as needed basis. 2. Groundwater Corrective Action Plan - in the next step the Permittee is required to submit a Groundwater Corrective Action (CA) Plan for Executive Secretary approval, that includes both a schedule for completion of the action and description of the construction and operation of the corrective action program [R317-6-6.15(D)(2)]. Several technical requirements must be met by the proposed corrective action, including [R317-6-6.15(E)]: <ol style="list-style-type: none"> a. Completeness and Accuracy - both the CA Plan and the CI Report must be complete and accurate. b. Protective - the corrective action must be protective of public health and the environment. To be protective, the Executive Secretary must consider potential impacts to groundwater quality at locations outside and beyond the Permitted facility boundaries. c. Approved Concentration Limits - the corrective action must meet the groundwater concentration limits approved by the Executive Secretary, or Alternate Corrective Action Concentration Limits approved by the Board. d. Permanent Effect - the corrective action must produce a permanent effect. Source controls imposed must not cause pollution to other unaffected areas within the facility boundaries. 3. Groundwater Corrective Action Concentration Limits - significant effort is put into determination of the contaminants that must be controlled and mitigated by the corrective action and the appropriate concentration limit for each. In general, the corrective action must either return the groundwater quality to the State GWQS or to an approved alternative concentration limit [R317-6-6.15(F)]. For contaminants where no GWQS is established in the State rule, the Executive Secretary is allowed to establish site specific, ad-hoc GWQS that are protective of human health and the environment [<i>ibid.</i>, and R317-6-6.15(F)(2)]. 4. Alternative Groundwater Corrective Action Concentration Limits - a CA Plan may propose an Alternate

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		<p>Corrective Action Concentration Limit (ACACL) [R317-6-6.15(G)]. However, only the Board may approve a proposed ACACL. Proposed concentrations for an ACACL may be either higher or lower than the corresponding GWQS, as outlined below:</p> <ul style="list-style-type: none"> a. Higher ACACLs – the Board may approve a higher ACACL concentration provided that the Permittee is able to demonstrate the proposed concentration and corrective action program is: <ul style="list-style-type: none"> i. Protective of human health and the environment ii. Incorporates Best Available Technology (BAT), as defined in R317-6-1.3, and iii. Both conservative and technologically achievable. b. Lower ACACLs – a third party may request the Board apply a lower ACACL to a CA Plan. However, such a request requires submittal and Board consideration of: <ul style="list-style-type: none"> i. Relevant cleanup or health standards, criteria or guidance, ii. Relevant scientific information, iii. Information relevant to protectiveness, iv. Impact of additional proposed measures. c. Additional Considerations – irrespective if the proposed ACACL is higher or lower, the Board must also consider: <ul style="list-style-type: none"> i. Good Cause – which includes capital, operation, and maintenance costs, costs of periodic reviews, potential future remedial action costs, and loss of resource value, and ii. Background and Existing Groundwater Concentrations – in its deliberations the Board may consider background concentrations at the facility. However, under no circumstances can an ACACL be greater than the existing concentrations at the facility, or the concentrations projected to result from the existing pollution conditions. <p>In the process of reviewing the CI Report and CA Plan, the Executive Secretary is required to consider many issues including:</p> <ol style="list-style-type: none"> 1. The need for long-term operation of the corrective action program and long-term groundwater monitoring in order to demonstrate that the GWQS or ACACL concentrations have been met [R317-6-6.15(E)(5)(a) and (d)], and 2. The need for periodic review of the groundwater quality data at the facility to determine if the correction action protects human health and the environment [R317-6-6.15(E)(5)(e)]. <p>Upon acceptance of the CI Report and CA Plan, the Executive Secretary is required to provide a public notice, and a 30-day public comment period. Thereafter, the Executive Secretary is required to issue an order to Permittee approving, disapproving, or modifying the CA Plan [R317-6-6.15(E)].</p> <p>Rule Comparability: the State rules are equivalent in purpose and objective to the NRC Criterion 5D requirements. While the State process does not include an 18-month deadline for the owner/operator to implement a groundwater corrective action program; a similar time period normally transpires during submittal of the contaminant investigation report and groundwater corrective action plan. If necessary, an enforcement order ensures any obligations that need to be met are accomplished.</p>
Criterion SE	<i>In developing and conducting groundwater protection programs, applicants and licensees shall also consider the following:</i>	The State requirements in this regard are very similar. During issuance of a Permit, the Executive Secretary must make a finding that the Permittee has applied BAT to the new waste disposal facility [R317-6-6.4(A)(3)]. Currently, it is the Executive Secretary's practice for Class I, II, and III groundwater to require BAT to include an engineering design that incorporates a double Flexible Membrane Liner (FML) and a leak detection system (LDS). This LDS in turn becomes

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	<p>(1) Installation of bottom liners (Where synthetic liners are used, a leakage detection system must be installed immediately below the liner to ensure major failures are detected if they occur. This is in addition to the ground-water monitoring program conducted as provided in Criterion 7. Where clay liners are proposed or relatively thin, in-situ clay soils are to be relied upon for seepage control, tests must be conducted with representative tailings solutions and clay materials to confirm that no significant deterioration of permeability or stability properties will occur with continuous exposure of clay to tailings solutions. Tests must be run for a sufficient period of time to reveal any effects if they are going to occur (in some cases deterioration has been observed to occur rather rapidly after about nine months of exposure))</p> <p>(2) Mill process designs which provide the maximum practicable recycle of solutions and conservation of water to reduce the net input of liquid to the tailings impoundment.</p> <p>(3) Dewatering of tailings by process devices and/or in-situ drainage systems (At new sites, tailings must be dewatered by a drainage system installed at the bottom of the impoundment to lower the phreatic surface and reduce the driving head of seepage, unless tests show tailings are not amenable to such a system. Where in-situ dewatering is to be conducted, the impoundment bottom must be graded to assure that the drains are at a low point. The drains must be protected by suitable filter materials to assure that drains remain free running. The drainage system must also be adequately sized to assure good drainage).</p>	<p>the primary compliance monitoring point for the facility, and the Permit issued with appropriate performance monitoring requirements for operation and maintenance of the LDS [R317-6-6.9(B)]. In these situations, groundwater monitoring wells then become secondary compliance monitoring points in a Permit [R317-6-6.9(A)].</p> <p>With regard to clay liners that might be used at a disposal site, State rules found in R317-6-6.3(F) require, among other things, that the applicant thoroughly characterize the physical properties of the waste and leachate to be controlled. State requirements set out in R317-6-6.3(G) mandate that the Permittee provide "...information which shows that the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state, ..." This includes geochemical and engineering stability of the earthen materials with the anticipated waste and leachates.</p> <p>As for three (3) remaining NRC considerations, mill process designs that maximize wastewater recycling, tailings dewatering, and neutralization of tailings; all are consistent with the State definition of BAT which includes "...the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods ..." (R317-6-1.3)</p> <p>Editorial Note: for facilities where disposal cell or other related construction occurs over a multi-year timeframe, or where construction is delayed for an extended period, it is possible that new or emerging environmental and engineering technology could be available. Under these circumstances, the State definition of BAT could change during the non-construction period. In such situations, the Executive Secretary would:</p> <ol style="list-style-type: none"> 1. Inform the Permittee that the Construction Permit has expired. Pursuant to State rules, a Construction Permit expires within 1-year of the issuance date should the approved facility not be under "substantial construction" [see R317-3-1.1(E)(3)(b)]. This action terminates any former approval for the Permittee to construct, operate, or modify the disposal cell or other "treatment works". 2. Amend the Groundwater Quality Discharge Permit to incorporate the new BAT definition and related requirements for facilities that have yet to be constructed. This change would normally be made at the time of Permit renewal, which is based on a 5-year life cycle [R317-6-6.6]. However, at the Permittee's request this Permit change could be made at an earlier date as a major modification of the Permit, following public notice and comment. At issuance of the modified or renewed Permit, the Executive Secretary is required to make a finding before the public that adequate BAT has been applied to the facility not yet constructed [R317-6-6.4(A)(3)]. <p>In this manner, the Executive Secretary ensures that current BAT engineering design, construction, operation, and maintenance have been applied to the permitted facility for the protection of local groundwater resources.</p> <p>Rule Comparability: the State rules and practice in determining if a discharge facility has incorporated BAT at its facility are consistent with and equivalent to all the groundwater protection program considerations in NRC Criterion SE.</p>

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	<i>(4) Neutralization to promote immobilization of hazardous constituents.</i>	
Criterion SF	<i>Where ground-water impacts are occurring at an existing site due to seepage, action must be taken to alleviate conditions that lead to excessive seepage impacts and restore ground-water quality. The specific seepage control and ground-water protection method, or combination of methods, to be used must be worked out on a site-specific basis. Technical specifications must be prepared to control installation of seepage control systems. A quality assurance, testing, and inspection program, which includes supervision by a qualified engineer or scientist, must be established to assure the specifications are met.</i>	<p>Similar requirements are found in the State rules. In the process of issuing a Permit for an existing facility, one that pre-dated the GWQP rules, the Executive Secretary must determine that the GWQS and GWPLs will be met at some time in the future [R317-6-6.4(C)]. Among other mitigation measures, this demonstration would include adequate engineering design, construction, operation and maintenance of seepage control systems at a tailings impoundment or other treatment works. The Executive Secretary can require such technical information be provided as a part of a Permit application pursuant to R317-6-6.3(Q). Agency practice has been to also require submittal of construction quality assurance / quality control (CQA/QC) plans as a part of a Permit application. Once approved by the Executive Secretary, these plans become enforceable attachments to the Permit. Again, State rules allow such plans to be required and implemented during construction of a waste / wastewater disposal system (<i>ibid</i>).</p> <p>For existing facilities that have already caused groundwater pollution, the State rules require the Permit application include a corrective action plan or other measures to remedy the groundwater quality problem [R317-6-6.3(F)]. Again, agency practice has been to require development and implementation of CQA/QC Plans in order to ensure the efficacy of the corrective action, which is authorized under R317-6-6.3(Q).</p> <p>Rule Comparability: the State rules and agency practice are equivalent to this NRC requirement.</p>
Criterion SG	<i>In support of a tailings disposal system proposal, the applicant/operator shall supply information concerning the following:</i> <i>(1) The chemical and radioactive characteristics of the waste solutions.</i> <i>(2) The characteristics of the underlying soil and geologic formations particularly as they will control transport of contaminants and solutions. This includes detailed information concerning extent, thickness, uniformity, shape, and orientation of underlying strata.</i> <i>Hydraulic gradients and conductivities of the various formations must be determined. This information must be gathered from borings and field survey methods taken within the proposed impoundment area and in surrounding areas where contaminants might migrate to ground water. The information gathered on boreholes must include both geologic and geophysical logs in sufficient number and degree of</i>	<p>State rules also require detailed characterization of the tailings waste and wastewater as a part of the Permit application process [R317-6-6.3(F)].</p> <p>As for subsurface characterization, the State rules mandate that a Permit application include a detailed characterization of:</p> <ol style="list-style-type: none"> 1. Local geology and groundwater hydrology within a 1-mile radius of the tailings facility [R317-6-6.3(D and E)], and 2. Detailed site-specific characterization of hydrogeologic conditions, including, but not limited to: depth to groundwater, background groundwater quality, saturated thickness, groundwater flow direction(s), porosity, aquifer permeability, and flow system characteristics [R317-6-6.3(K)]. <p>Further, the Executive Secretary has the ability to require additional information from the Permittee as needed in the application process [R317-6-6.3(Q)]. Historically, State Permits for 11e.(2) facilities in Utah have been required to provide the following information, including:</p> <ol style="list-style-type: none"> 1. On-Site Geologic and Hydrogeologic Data – from borings, boreholes, and wells installed in the immediate vicinity of the proposed disposal areas. Such information includes, but is not limited to: depth to groundwater; hydraulic gradients; groundwater flow directions; aquifer permeability and spatial distribution thereof; geologic formation thickness, orientation, and extent; and aquifer mineral content; etc. 2. Field Aquifer Permeability - laboratory test results have been excluded in favor of field permeability test methods, e.g. slug and pump tests.

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	<p><i>sophistication to allow determining significant discontinuities, fractures, and channeled deposits of high hydraulic conductivity. If field survey methods are used, they should be in addition to and calibrated with borehole logging.</i></p> <p><i>Hydrologic parameters such as permeability may not be determined on the basis of laboratory analysis of samples alone; a sufficient amount of field testing (e.g., pump tests) must be conducted to assure actual field properties are adequately understood.</i></p> <p><i>Testing must be conducted to allow estimating chem-sorption attenuation properties of underlying soil and rock.</i></p> <p><i>(3) Location, extent, quality, capacity and current uses of any ground water at and near the site.</i></p>	<p>3. Soil-Water Partitioning Coefficients – geochemical testing of site specific soil materials has already been required to justify 11e.(2) tailings cell design.</p> <p>Regarding the extent, quality, capacity and current uses of groundwater, these same information needs are required by the State rules for a Permit application, pursuant to R317-6-6.3(D), (E), and (K).</p> <p>Rule Comparability: the State rules and agency practice are equivalent to the NRC requirements for Criterion 5G.</p>
Criterion 5H	<p><i>Steps must be taken during stockpiling of ore to minimize penetration of radionuclides into underlying soils; suitable methods include lining and/or compaction of ore storage areas.</i></p>	<p>Ore stockpiles are an essential component of milling operations, and are regulated as potential sources of groundwater contamination under the State rules [R317-6-6.1(A) and (B)]. For a new disposal facility, the Permittee must demonstrate that BAT has been applied to the project [R317-6-6.4(A)(3)]. In turn, the State definition of BAT includes the application of engineering design and operation standards to maximize the reduction of pollutants discharged (R317-6-1.3). The design and construction of liners beneath an ore storage pad could meet this requirement. For existing facilities other means may be necessary to minimize the discharge of pollutants from an ore storage pad.</p> <p>Rule Comparability: The State rules are equivalent to this NRC requirement.</p>
Criterion 7A	<p><i>The licensee shall establish a detection monitoring program needed for the Commission to set the site specific ground-water protection standards in paragraph 5B(1) of this appendix. For all monitoring under this paragraph the licensee or applicant will propose for Commission approval as license conditions which constituents are to be monitored on a site specific basis. A detection monitoring program has two purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the disposal area so that the need to set ground-water protection standards is monitored. If</i></p>	<p>The existing State Permit process establishes GWQS for all related contaminants at time of Permit issuance [R317-6-2 and 2.2, and R317-6-6.4(A)(1) and (C)(1)]. In the event that new GWQS are adopted by the Board, the Permit may be reopened and new monitoring requirements, GWQS, and GWPLs required of the Permittee [R317-6-6.6(B)].</p> <p>Similar to the NRC requirements and as explained above, some State Permits have been issued with a 2-tiered approach to groundwater monitoring, including a limited list of initial parameters used for detection monitoring. Later, upon detection this short list can be expanded, at the discretion of the Executive Secretary, to include more contaminants, should the initial parameters be detected [R317-6-6.9(A)].</p> <p>Although the Permit applicant may propose groundwater monitoring parameters [R317-6-6.3(I)], the final determination of the number and type of contaminants that will be sampled by the Permittee is made by the Executive Secretary at the time of Permit issuance [R317-6-6.9(A)].</p> <p>Any adjustment needed in the number and location of groundwater monitoring wells or in the number of groundwater quality monitoring parameters required by the Permit in order to maximize early detection of groundwater contamination from a waste disposal site is possible pursuant to R317-6-6.9A. A re-evaluation of the groundwater</p>

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
	<p><i>leakage is detected, the second purpose of the program is to generate data and information needed for the Commission to establish the standards under Criterion 5B. The data and information must provide a sufficient basis to identify those hazardous constituents which require concentration limit standards and to enable the Commission to set the limits for those constituents and the compliance period. They may also need to provide the basis for adjustments to the point of compliance.</i></p>	<p>monitoring system and any change needed in Permit requirements is usually accomplished every 5-years as a part of Permit renewal (R317-6-6.6 and 6.7).</p> <p>Rule Comparability: the State rules and practice allow the establishment of a groundwater detection monitoring program that is equivalent to the NRC requirement.</p>
	<p><i>For licenses in effect September 30, 1983, the detection monitoring programs must have been in place by October 1, 1984. For licenses issued after September 30, 1983, the detection monitoring programs must be in place when specified by the Commission in orders or license conditions.</i></p>	<p>All State Permits have an approved groundwater monitoring program in place at the time of Permit issuance [R317-6-6.4(A)(2), R317-6-6.4(C)(2), and R317-6-6.9].</p> <p>Rule Comparability: the State rule is equivalent to this NRC requirement.</p>
	<p><i>Once ground-water protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and implement a compliance monitoring program. The purpose of the compliance monitoring program is to determine that the hazardous constituent concentrations in ground water continue to comply with the standards set by the Commission.</i></p>	<p>Under the State process, GWQS and GWPLs are determined for the facility at the time of Permit issuance [R317-6-2 and 2.2, and R317-6-6.4(A)(1) and (C)(1)]. Compliance with the GWPL ensures compliance with the GWQS, in that the GWPLs are set at lower concentrations, as determined by local groundwater class. This approach provides extra protection for high quality groundwater or sensitive wildlife habitats dependent on groundwater. The State GWPL approach also provides early warning of a release and additional time to identify the cause and full extent of the problem and craft a corrective action program to solve it before it travels off-site.</p> <p>Rule Comparability: the State rule is more protective of the groundwater resource, in that the GWPL concept provides early warning of a release before exceedance of the applicable GWQS.</p>
	<p><i>In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective actions. Any monitoring program required by this paragraph may be based on existing monitoring programs to the extent the existing programs can meet the stated objective for the program.</i></p>	<p>The State rules require that long-term groundwater and other monitoring is an essential element of the CA Plan approved by the Executive Secretary [R317-6-6.15(E) and (E)(5)(a)]. These long-term monitoring requirements can be added to a facility's Permit, pursuant to R317-6-6.4(G). Thereafter, determination that a facility continues to comply with the requirements of the CA Plan is made thru groundwater monitoring requirements in the Permit [R317-6-6.4(A)(2) and (C)(2)].</p> <p>Rule Comparability: the State rules in question are equivalent to this NRC requirement.</p>

NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules															
Criterion 13	<p><i>Secondary ground-water protection standards required by Criterion 5 of this appendix are concentration limits for individual hazardous constituents. The following list of constituents identifies the constituents for which standards must be set and complied with if the specific constituent is reasonably expected to be in or derived from the byproduct material and has been detected in ground water. For purposes of this appendix, the property of gross alpha activity will be treated as if it is a hazardous constituent. Thus, when setting standards under paragraph 5(B)(5) of Criterion 5, the Commission will also set a limit for gross alpha activity. The Commission does not consider the following list imposed by 40 CFR Part 192 to be exhaustive and may determine other constituents to be hazardous on a case-by-case basis, independent of those specified by the U.S. Environmental Protection Agency in Part 192.</i></p>	<p>All of the NRC Criterion 13 hazardous constituents, and more, can be incorporated into the monitoring and compliance requirements in a State Permit, at the discretion of the Executive Secretary [R317-6-6.9(A), and R317-6-6.4(A)(2) and (C)(2)].</p> <p>The flexibility provided by the State rule has allowed the Executive Secretary to regulate several contaminants at 11e.(2) waste disposal sites that have significant human health and / or environmental impacts, and are not currently listed in Criterion 13. Examples of several contaminants that exist leachates or groundwater at one or more 11e.(2) waste sites in Utah include, but are not limited to: ammonia, fluoride, manganese, nitrate, and nitrite. Although not classified as hazardous constituents under the EPA RCRA program, these groundwater contaminants have potential adverse health and environmental effects that deserve attention and control.</p> <p>Close review of the NRC Criterion 13 parameters with the current EPA RCRA list of Hazardous Constituents (40 CFR 261, Appendix VIII), has also shown that the current Criterion 13 list of contaminants is less than complete, as summarized in the findings below. Details of this review are also found in Attachment 2, below.</p>															
	<p><i>Hazardous Constituents</i></p> <p><<< See Attachment 2 below for listing of the 380 NRC Criterion 13 contaminants>>></p>	<p>Findings: the State rules allow the Executive Secretary flexibility in determination of the type and number of groundwater monitoring parameters needed in a Permit for an 11e.(2) facility, see discussion on NRC Criterion 5(B)(2), above. In this process, the Executive Secretary may use the NRC Criterion 13 list of contaminants as a guide, in conjunction with site specific source term characterization efforts, to determine appropriate groundwater monitoring parameters, GWQS and GWPLs in a Permit.</p> <p>However, it is important to note that at the time of promulgation of the NRC uranium mill rules in 1987 the 380 Criterion 13 contaminants were adopted verbatim from the EPA RCRA list of Hazardous Constituents found in 40 CFR 261, Appendix VIII. Since 1987, the EPA has amended Appendix VIII list 13 times, as outlined below:</p> <table> <tbody> <tr> <td>53 FR 13388, Apr. 22, 1988</td> <td>53 FR 43881, Oct. 31, 1988</td> <td>54 FR 50978, Dec. 11, 1989</td> </tr> <tr> <td>55 FR 50483, Dec. 6, 1990</td> <td>56 FR 7568, Feb. 25, 1991</td> <td>59 FR 468, Jan. 4, 1994</td> </tr> <tr> <td>59 FR 31551, June 20, 1994</td> <td>60 FR 7853, Feb. 9, 1995</td> <td>60 FR 19165, Apr. 17, 1995</td> </tr> <tr> <td>62 FR 32977, June 17, 1997</td> <td>63 FR 24625, May 4, 1998</td> <td>65 FR 14475, Mar. 17, 2000, and</td> </tr> <tr> <td>65 FR 67127, Nov. 8, 2000</td> <td></td> <td></td> </tr> </tbody> </table> <p>DRC comparison of the NRC Criterion 13 contaminants with the current EPA RCRA Appendix VIII list, promulgated on November 8, 2000, shows many differences exist in the number of contaminants listed, as follows:</p> <ol style="list-style-type: none"> 1. 8 NRC Contaminants Eliminated – eight (8) NRC Criterion 13 contaminants have been dropped from the current EPA RCRA Hazardous Constituent list, including: 	53 FR 13388, Apr. 22, 1988	53 FR 43881, Oct. 31, 1988	54 FR 50978, Dec. 11, 1989	55 FR 50483, Dec. 6, 1990	56 FR 7568, Feb. 25, 1991	59 FR 468, Jan. 4, 1994	59 FR 31551, June 20, 1994	60 FR 7853, Feb. 9, 1995	60 FR 19165, Apr. 17, 1995	62 FR 32977, June 17, 1997	63 FR 24625, May 4, 1998	65 FR 14475, Mar. 17, 2000, and	65 FR 67127, Nov. 8, 2000		
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NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules																																																																
		<p>2-sec-Butyl-4,6-dinitrophenol (DNBP) Molybdenum* and compounds, N.O.S. Radium -226 and -228 Thorium and compounds, N.O.S., 3 (when producing thorium byproduct material) * Uranium and molybdenum have been effectively added back to the Criterion 13 list pursuant to existing EPA rules in 40 CFR 192.32(a)(2)(i).</p> <p>2. 84 New Contaminants Added – EPA has added 84 new contaminants to its Appendix VIII RCRA Hazardous Constituent list that are not currently found in NRC Criterion 13, including:</p> <table> <tbody> <tr><td>A2213</td><td>Aldicarb sulfone</td></tr> <tr><td>Allyl Chloride</td><td>Barban</td></tr> <tr><td>Bendiocarb</td><td>Bendiocarb phenol</td></tr> <tr><td>Benomyl</td><td>Benz(k)fluoranthene</td></tr> <tr><td>Beryllium powder</td><td>Bis(pentamethylene)-thiuram tetrasulfide</td></tr> <tr><td>Burylate</td><td>Carbaryl</td></tr> <tr><td>Carbendazim</td><td>Carbofuran</td></tr> <tr><td>Carbofuran phenol</td><td>Carbosulfan</td></tr> <tr><td>Chloroprene</td><td>Copper dimethyl(dithiocarbamate)</td></tr> <tr><td>m-Cumetyl methylcarbamate</td><td>Cyclonate</td></tr> <tr><td>Dazomet</td><td>Diethylene glycol, dicarbamate</td></tr> <tr><td>Dimetilaz</td><td>Dineoseb</td></tr> <tr><td>Disulfiram</td><td>EPTC</td></tr> <tr><td>Ethyl Zinc</td><td>Ethyleneglycol monoethyl ether</td></tr> <tr><td>Ferbam</td><td>Formetanate hydrochloride</td></tr> <tr><td>Formparanate</td><td>Heptachlorodibenzofurans</td></tr> <tr><td>Hepatichlorodibenzo-p-dioxins</td><td>Hexachlorodibenzo-p-dioxins</td></tr> <tr><td>Hexachlorodibenzofurans</td><td>3-Jodo-2-propynyl n-butylcarbamate</td></tr> <tr><td>Isolan</td><td>Manganese dimethyl(dithiocarbamate)</td></tr> <tr><td>Metsim Sodium</td><td>Methiocarb</td></tr> <tr><td>Metolcarb</td><td>Mexacarbate</td></tr> <tr><td>Molinate</td><td>2-Nitropropane</td></tr> <tr><td>Oesachlorodibenzo-p-dioxin (OCDD)</td><td>Octachlorodibenzofuran (OCDF)</td></tr> <tr><td>Oxamyl</td><td>Pebulizate</td></tr> <tr><td>Pentachlorodibenzo-p-dioxins</td><td>Pentachlorodibenzofurans</td></tr> <tr><td>Physostigmine</td><td>Physostigmine salicylate</td></tr> <tr><td>Potassium dimethyl(dithiocarbamate)</td><td>Potassium n-hydroxymethyl-n-methyl(dithiocarbamate)</td></tr> <tr><td>Potassium n-methyl(dithiocarbamate)</td><td>Potassium pentachlorophenate</td></tr> <tr><td>Promecarb</td><td>Prophan</td></tr> <tr><td>Propoxur</td><td>Prosulfocarb</td></tr> <tr><td>Selenium, tetrakis(dimethyl-dithiocarbamate)</td><td>Sodium dibutyl(dithiocarbamate)</td></tr> <tr><td>Sodium diethyl(dithiocarbamate)</td><td>Sodium dimethyl(dithiocarbamate)</td></tr> </tbody> </table>	A2213	Aldicarb sulfone	Allyl Chloride	Barban	Bendiocarb	Bendiocarb phenol	Benomyl	Benz(k)fluoranthene	Beryllium powder	Bis(pentamethylene)-thiuram tetrasulfide	Burylate	Carbaryl	Carbendazim	Carbofuran	Carbofuran phenol	Carbosulfan	Chloroprene	Copper dimethyl(dithiocarbamate)	m-Cumetyl methylcarbamate	Cyclonate	Dazomet	Diethylene glycol, dicarbamate	Dimetilaz	Dineoseb	Disulfiram	EPTC	Ethyl Zinc	Ethyleneglycol monoethyl ether	Ferbam	Formetanate hydrochloride	Formparanate	Heptachlorodibenzofurans	Hepatichlorodibenzo-p-dioxins	Hexachlorodibenzo-p-dioxins	Hexachlorodibenzofurans	3-Jodo-2-propynyl n-butylcarbamate	Isolan	Manganese dimethyl(dithiocarbamate)	Metsim Sodium	Methiocarb	Metolcarb	Mexacarbate	Molinate	2-Nitropropane	Oesachlorodibenzo-p-dioxin (OCDD)	Octachlorodibenzofuran (OCDF)	Oxamyl	Pebulizate	Pentachlorodibenzo-p-dioxins	Pentachlorodibenzofurans	Physostigmine	Physostigmine salicylate	Potassium dimethyl(dithiocarbamate)	Potassium n-hydroxymethyl-n-methyl(dithiocarbamate)	Potassium n-methyl(dithiocarbamate)	Potassium pentachlorophenate	Promecarb	Prophan	Propoxur	Prosulfocarb	Selenium, tetrakis(dimethyl-dithiocarbamate)	Sodium dibutyl(dithiocarbamate)	Sodium diethyl(dithiocarbamate)	Sodium dimethyl(dithiocarbamate)
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NRC Citation	NRC Regulatory Language	Discussion of Equivalent Utah Statutory Authority and/or Rules
		<p>Sodium pentachlorophenate Tetrabutylthiuram disulfide Tetrachloroethylene 2,3,4,6-tetrachlorophenol, sodium salt Thiodicarb Tirpate Toluene-2,6-diamine o-Tolidine Triallate Vermolate</p> <p>Sulfalite Tetrachlorodibenzofuran 2,3,4,6-tetrachlorophenol, potassium salt Tetramethylthiuram monosulfide Thiophanate-methyl Toluene-2,4-diamine Toluene-3,4-diamine p-Toluidine Triethylamine Ziram.</p> <p>Rule Comparability: the flexibility of the State rules allows the Executive Secretary to tailor the groundwater monitoring parameters, determine appropriate GWQS and GWPLs, and set groundwater cleanup compliance concentration limits based on the individual waste source term characteristics of each disposal site. NRC Criterion 13 contaminants may be used as a guide in this process.</p>

ATTACHMENT 1

Comparison of NRC GWPS (10 CFR 40, Appendix A, Table 5C)
With
Utah Ground Water Quality Standards (UAC R317-6-2)

DRC Spreadsheet NRCgwps.xls
Tabsheet Compare

Comparison of NRC GWPS vs. Utah DEQ GWQS									
10 CFR 40, Appendix A, Table 5c vs. Utah Administrative Code (UAC) R317-6-2, Table 1									
Parameter	CAS No.	Current		EPA Drinking Water Criteria					
		NRC GWPS	Utah GWQS	40 CFR MCL	40 CFR DW Action Level	Lifetime Health Advisory	Effective Date	Effective Date	Effective Date
		10 CFR 40, (UAC R317-6-2, Appendix A, Table 1)	Aug-89	1/22/92	Gen. Conc.	Date	Conc.	Date	Conc.
Metals (mg/l)									
Arsenite		0.05	0.05	0.05	0.01	1/23/92			
Barium		1.0	1.0	2.0	2.0	1992			
Cadmium		0.01	0.01	0.005	0.005	7/20/92			
Chromium		0.05	0.05	0.03	0.1	7/20/92			
Lead		0.05	0.05	0.015		0.015	Jan-92		
Mercury		0.002	0.002	0.002	0.002	7/20/92			
Selenium		0.01	0.01	0.005	0.05	7/20/92			
Silver		0.05	0.05	<0.1			0.1		1992
Organics (mg/l)									
Endrin	72-20-5	0.0002	0.0002	0.0002	0.002	8/17/92			
Lindane	58-89-9	0.004	0.004	0.0002	0.0002	7/20/92			
Methoxychlor	72-43-5	0.1	0.1	0.04	0.04	7/20/92			
Toxaphene	8001-35-2	0.005	0.005	0.003	0.003	7/20/92			
2,4-D	94-75-7	0.1	0.1	0.07	0.07	7/20/92			
2,4,5-TP Silvex	93-72-1	0.01	0.01	0.05	0.05	7/20/92			
Radiologics (pCi/L)									
Ra-226/Ra-228		5.0	5.0	5.0	5.0				
Gross Alpha		15.0	15.0	15.0	15.0				
Key to Notes:									
no shade = Utah GWQS = NRC GWPS									

ATTACHMENT 2

Utah Division of Radiation Control
Comparison of NRC Criterion 13 Contaminants (10 CFR 40, Appendix A)
With
Current EPA List of Hazardous Constituents (40 CFR 261, Appendix VIII)

DRC Spreadsheet NRCriterion13.xls
Tabsheet CompareNRCvsEPA

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (Verbatim listing)	Compound Names Parsed by DRC	Chemical Name		EPA Order No.	Common name	Chemical abstracts name	GAS No.	HW No.
			= parameters found on both lists	Bold Underline Text = New Parameters in Current EPA Rules (not found in NRC Criterion 13)					
			= parameters dropped by EPA since 1987	Bold Red Text = parameters dropped by EPA since 1987					
1	Acetonitrile (Ethanenitrile)	Acetonitrile	Ethanenitrile	2	1 A2213	Ethanaminic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester	30658-43-1	U084	
2	Acetophenone (Ethanone, 1-phenyl)	Acetophenone	Ethanone, 1-phenyl	3	2 Acetonitrile	Same	75-66-8	U003	
3	3-(alpha-Acetoxybenzyl)-4-hydroxycoumarin and salts		3-(alpha-Acetoxybenzyl)-4-hydroxycoumarin and salts	478		"			
3	(Warfarin)	Warfarin		478	3 Acetophenone	Ethanone, 1-phenyl-	98-66-2	U004	
4	2-Acetylaminofluorene								
4	(Acetamide, N-(B-Fluoren-2-yl)-) 2-Acetylaminofluorene			4	4 2-Acetylaminofluorene	Acetamide, N-B-Fluoren-2-yl-	53-96-3	U005	
5	Acetyl chloride (Ethanoyl chloride)	Acetyl chloride	Ethanoyl chloride	5	5 Acetyl chloride	Same	75-36-5	U006	
6	1-Acetyl-2-thiourea (Acetamide, 6-(aminothioxomethyl)-)	1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	6	6 1-Acetyl-2-thiourea	Acetamide, N-(aminothioxomethyl)-	591-08-2	P002	
7	Aldarin (2-Propenal)	Acrolein	2-Propenal	7	7 Aldarin	2-Propenal	107-02-8	P003	
8	Acrylamide (2-Propenamide)	Acrylamide	2-Propenamide	8	8 Acrylamide	2-Propenamide	79-06-1	U007	
9	Acrylonitrile (2-Propenenitrile)	Acrylonitrile	2-Propenenitrile	9	9 Acrylonitrile	2-Propenenitrile	107-13-1	U009	
10	Alatoxins	Alatoxins	Same	10	10 Alatoxins	Same	1402-68-2		
11	Aldrin (1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,9b-hexahydroendo, exo-1,4a,5,8-Dimethanonaphthalene)	Aldrin	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a,9b-hexahydroendo, exo-1,4a,5,8-Dimethanonaphthalene	13	11 Aldicarb	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime	116-05-0	P070	
12	Allyl alcohol (2-Propen-1-ol)	Allyl alcohol	2-Propen-1-ol	14	12 Aldicarb sulfone	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime,	1646-89-4	P203	
13	Aluminum phosphide	Aluminum phosphide	Same	15	13 Aldrin	1,4,5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-(1alpha,4alpha,4abeta,5beta,8alpha,8beta)-	309-00-2	P004	
14	4-Aminobiphenyl [(1,1'-Biphenyl)-4-amino]	4-Aminobiphenyl	[1,1'-Biphenyl]-4-amino	17	14 Allyl alcohol	2-Propen-1-ol	107-18-6	P005	

NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (verbatim listing)	Chemical Name		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
	6-Amino-1,1a,2,6,8a,8b-hexahydro-6-(hydroxymethyl)-8a-methoxy-5-methyl-carbamate azine(2,3,4)pyrrol(1,2-a)indole-4,7-dione, (ester) (Mitomycin C) (Azirine(2,3,4)pyrrol(1,2-a)indole-4,7-dione, 6-amino-6-[(amino-carbonyloxy)methyl]-1,1a,2,6,8a,8b-hexahydro-8a-methoxy-5-methyl-)	Mitomycin C	295	15	Allyl chloride	1-Propene, 3-chloro	107-18-6	
15	5-(Aminomethyl)-3-isoxazol-5(2H)-isoxazolone, 5-(aminomethyl)-	5-(Aminomethyl)-3-isoxazol-	3129-Isoxazolone, 5-(aminomethyl)-	18	16	Aluminum phosphide	Same	20859-73-8 P008
16	4-Aminopyridine (4-Pyridinamine)	4-Aminopyridine	4-Pyridinamine	19	17	4-Aminobiphenyl	[1,1'-B(phenyl)-4-amine	92-67-1
17	Amitrole (1H-1,2,4-Triazol-3-amine)	Amitrole	1H-1,2,4-Triazol-3-amine	20	18	5-(Aminomethyl)-3-isoxazolol	3(2H)-Isoxazolone, 5-(aminomethyl)-	2763-98-4 P007
18	Aniline (Benzanamine) (Antimony and compounds, N.O.S.(3))	Aniline	Benzanamine	22	19	4-Aminopyridine	4-Pyridinamine	504-24-5 P008
19	Anarite (Sulfurous acid, 2-chloroethyl-, 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester)	Aranite	Sulfurous acid, 2-chloroethyl-, 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	25	20	Amitrole	1H-1,2,4-Triazol-3-amine	61-82-5 U011
20	Arsenic and compounds, N.O.S.3	Arsenic	Same	26	21	Ammmonium vanadato	Sulfurous acid, ammonium salt	7803-55-6 P119
21	Arsenic acid (Orthoarsenic acid)	Arsenic acid	Orthoarsenic acid	28	22	Aniline	Benzanamine	60-53-3 U012
22	Arsenite pentoxide Arsenic pentoxide	Arsenite (V) oxide	Arsenite (V) oxide	29	23	Antimony	Same	7440-36-0
23	Arsenic trioxide (Arsenic (III) oxide)	Arsenic trioxide	Arsenic (III) oxide	30	24	Antimony compounds, N.O.S.1	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	140-57-8
24	Auramine (Benzanamine, 4,4'-carbonimidoyl bis(N,N-Dimethyl-monohydrochloride))	Auramine	Benzanamine, 4,4'-carbonimidoyl bis(N,N-Dimethyl-monohydrochloride)	31	25	Aramite	Same	7440-38-2
25	Azaserine (L-Serine, diazoacetate (ester))	Azaserine	L-Serine, diazoacetate (ester)	32	26	Arsenic	Same	
26	Barium and compounds, N.O.S.3	Barium and compounds, N.O.S.3	Same	34 &	27	Antonic compounds, N.O.S.1	27	
27					28	Arsonic acid	Arsenic acid H3 AsO4	77 4 P010

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A) Promulgated by NRC circa 1987			Equival. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) Last Date of EPA Promulgation: 11/8/00 (verbally issued)				
	Hazardous Constituent (verbally listing)	Compound Names Parsed by DRC	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
28	Barium cyanide	Barium cyanide	Same	38	29	Arsenic pentoxide	Arsenic oxide As2 O5	1303-28-2	P011
29	Benz[<i>c</i>]acridine (3,4- <i>a</i>)	Benz[<i>c</i>]acridine	3,4-Benzacridine	40	30	Arsenic trioxide	Arsenic oxide As2 O3	1327-53-3	P012
30	Benz[a]anthracene (1,2- <i>b</i> -Benzanthracene)	Benz[a]anthracene	1,2-Benzanthracene	41	31	Auramine	Benzemamine, 4,4'-carbamimidoybis[N,N-dimethyl]	452-60-8	U014
31	Benzene (Cyclohexatriene)	Benzene	Cyclohexatriene	43	32	Azaserine	L-Serino, diazoacetate (ester)	115-02-6	U015
32	Benzenearsenic acid (Aromatic acid, phenyl-)	Benzenearsenic acid	Arsenic acid, phenyl-	44	33	Barban	Carbamic acid, (3-chlorophenoxy)-, 4-chloro-2-butyl ester	101-27-9	U260
33	Benzene, dichloromethyl- (Benzil chloride)	Benzene, dichloromethyl	Benzil chloride	45	34	Barium	Same	7440-30-3	
34	Benzenthol (Thiophenol)	Benzenthol	Thiophenol	46	35	Barium compounds, N.O.S.1			
35	Benzidine (1,1'-Biphenyl)-4,4'-diamine)	Benzidine	[1,1'-Biphenyl]-4,4'-diamine	47	36	Barium cyanide	Same	542-62-1	P013
36	Benz[b]fluoranthene (2,3-Benzo[b]fluoranthene)	Benz[b]fluoranthene	2,3-Benzofluoranthene	48	37	Bendiocarb	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate	22781-23-3	U278
37	Benz[b]fluoranthene (7,8-Benzo[b]fluoranthene)	Benz[b]fluoranthene	7,8-Benzofluoranthene	49	38	Bendiocarb phenol	1,3-Benzodioxol-4-ol, 2,2-dimethyl-,	22951-82-5	U364
38	Benz[e]pyrene (3,4-Benzopyrene)	Benz[e]pyrene	3,4-Benzopyrene	49	39	Benomyl	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]methyl ester,	17804-35-2	U271
39	p-Benzquinone (1,4-Cytohexadienedione)	p-Benzquinone	1,4-Cytohexadienedione	50	40	Benz[<i>c</i>]acridine	Same	225-51-4	U016
40	Benzotrichloride (Benzene, Trichloromethyl)	Benzotrichloride	Benzene, trichloromethyl	51	41	Benz[a]anthracene	Same	56-55-3	U018
41	Benzyl chloride (Benzene, (chloromethyl)-)	Benzyl chloride	Benzene, (chloromethyl)-	52	42	Benzal chloride	Benzene, (dichloromethyl)-	98-87-3	U017
42	Beryllium and compounds, N.O.S.3	Beryllium and compounds, N.O.S.3	Same	54	43	Benzene	Same	71-43-2	U018
43	Bis(2-chloromethoxy)methane (Ethane, 1,1'-(methylenebis[oxy])bis[2-chloro-])	Bis(2-chloromethoxy)methane	Ethane, 1,1'-(methylenebis[oxy])bis[2-chloro-]	147	44	Benzenearsenic acid	Arsenic acid, phenyl-	88-00-6	
44	Bis(2-chloroethyl) ether (Ethane, 1,1'-oxybis[2-chloro-])	Bis(2-chloroethyl) ether	Ethane, 1,1'-oxybis[2-chloro-]	148	45	Benzidine	[1,1'-Biphenyl]-4,4'-diamine	92-87-5	U021
45	N,N-Bis(2-chloroethyl)-2-naphthylamine (Chloraphazine)	Chloraphazine	N,N-Bis(2-chloroethyl)-2-naphthylamine	84	46	Benz[b]fluoranthene	Benz[e]acphenanthrylene	205-69-2	
46	Bis(2-chloroisopropyl) ether (Propene, 2,2'-oxybis[2-chloro-])	Bis(2-chloroisopropyl) ether	Propane, 2,2'-oxybis[2-chloro-]	149	47	Benz[b]fluoranthene	Same	20	3

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 291, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (verbatim listing)	Chemical Name		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
47	Bis(chloromethyl) ether (Methane, oxybis(chloro-))	Bis(chloromethyl) ether	Methane, oxybis(chloro-)	148	48 Benzo[b]fluoranthene	Same	207-08-9	
48	Bis(2-ethylhexyl) phthalate (1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester)	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) phthalate	Bis(2-ethylhexyl) ester	161	49 Benzo[a]pyrene	Same	50-32-8	U022
49	Bromocyclopropane (2-Propanone, 1-bromo-)	Bromopropane	2-Propanone, 1-bromo-	59	50 p-Benzoquinone	2,5-Cyclohexadiene-1,4-dione	106-51-4	U197
50	Bromomethane (Methyl bromide)	Bromomethane	Methyl bromide	276	51 Benzotrifluoride	Benzene, (trichloromethyl)-	58-07-7	U023
51	4-Bromophenyl phenyl ether (Benzene, 1-bromo-4-phenoxy-)	4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-	68	52 Benzyl chloride	Benzene, (dichloromethyl)-	100-44-7	P025
52	Brucine (Strychnidin-10-one, 2,3-dimethoxy-)	Brucine	Strychnidin-10-one, 2,3-dimethoxy-	59	53 Beryllium powder	Same	7440-41-7	P015
53	2-Butanone peroxide (Methyl ethyl ketone, peroxide)	2-Butanone peroxide	Methyl ethyl ketone, peroxide	256	54 Beryllium compounds, N.O.S.1			
54	Butyl benzyl phthalate (Benzenedicarboxylic acid, butyl phenylmethyl ester)	Butyl benzyl phthalate	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	60	55 Bis[2-(dimethylamino)ethyl]benzyl tetrasulfide	Piperidine, 1,1'-[tetrahydro- bis(dimethylamino)]-	120-64-7	
55	2-sec-Butyl-4,6-dinitrophenol (Phenol, 2,4-dinitro-6-(1-methylpropyl)-)	2-sec-Butyl-4,6-dinitrophenol (DNBP)	Phenol, 2,4-dinitro-6-(1-methylpropyl)-	N.C.	56 Bromoacetone	2-Propanone, 1-bromo-	598-31-2	P017
56	Cadmium and compounds, N.O.S.3	Cadmium and compounds, N.O.S.3	Same	63 &	57 Bromoform	Methane, tribromo-	75-25-2	U225
57	Calcium chromate (Chromic acid, calcium salt)	Calcium chromate	Chromic acid, calcium salt	65	58 4-Bromophenyl phenyl ether	Benzene, 1-bromo-4-phenoxy-Strychnidin-10-one, 2,3-dimethoxy-	101-65-3	U030
58	Calcium cyanide	Calcium cyanide	Same	66	59 Brucine	357-67-3	P018	
59	Carbon disulfide (Carbon bisulfide)	Carbon disulfide	Carbon bisulfide	71	60 Butyl benzyl phthalate	1,2-Benzenedicarboxylic acid, butyl phenylmethyl ester	85-68-7	
60	Carbon oxyfluoride (Carbonyl fluoride)	Carbon oxyfluoride	Carbonyl fluoride	72	61 Butylate	Carbamothioic acid, bis(2-methylpropyl)-, S-ethyl ester	2098-41-5	
61	Chloral (Acetaldehyde, trichloro-) Chloral	Acetaldehyde, trichloro-	73	62 Cacodylic acid	Aracnic acid, dimethyl-	75-60-6	U136	
62	Chlorambucil (Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-)	Chlorambucil	Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene-	76	63 Cadmium	Same	7440-43-9	
63	Chlordane (alpha and gamma isomers) (4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-tetrahydro-) (alpha and gamma isomers)	Chlordane (alpha and gamma isomers)	4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3,4,7,7a-tetrahydro-) (alpha and gamma isomers)	77 &	64 Cadmium compounds, N.O.S.1			
				78				

NRC Criterion 13 Hazardous Constituents (16 CFR 49, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
Order No.	Hazardous Constituent (verbatim listing)	Compound Names Parsed by DRC		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
64	Chlorinated benzenes, N.O.S.3 N.O.S.3	Chlorinated benzenes, N.O.S.3	Same	70	66 Calcium chromate	Chromic acid H ₂ CrO ₄ , calcium salt	13705-19-0	U032
65	Chlorinated ethane, N.O.S.3 N.O.S.3	Chlorinated ethane, N.O.S.3	Same	80	68 Calcium cyanide	Calcium-cyanide Ca(CN) ₂	682-01-0	P021
66	Chlorinated fluorocarbons, N.O.S.3	Chlorinated fluorocarbons, N.O.S.3	Same	81	67 Carbonyl	1-Naphthalanol, methylcarbamate	63-25-2	U279
67	Chlorinated naphthalenes, N.O.S.3	Chlorinated naphthalene, N.O.S.3	Same	82	69 Carbendazim	Carbamic acid, 1H-benzimidazo- 2-yl, methyl ester	10605-21-7	U372
68	Chlorinated phenol, N.O.S.3 N.O.S.3	Chlorinated phenol, N.O.S.3	Same	83	69 Carboluran	7-Benzofuranol, 2,3-dihydro-2,2- dimethyl-, methylcarbamate	1563-68-2	P127
69	Chloroacetaldehyde (Acetaldehyde, chloro-)	Chloroacetaldehyde	Acetaldehyde, chloro-	85	70 Carboluran phenol	7-Benzofuranol, 2,3-dihydro-2,2- dimethyl-	1563-39-9	U367
70	Chloroallyl ethers, N.O.S.3 p-Chloroaniline (Benzeneamine, 4- chloro-)	Chloroallyl ethers, N.O.S.3	Same	86	71 Carbon disulfide	Same	75-15-0	P022
71	p-Chloroaniline	Benzeneamine, 4-chloro-	Benzeneamine, 4-chloro-	87	72 Carbon oxyfluoride	Carbonic difluoride	353-50-4	U033
72	Chlorobenzene (Benzene, chloro-)	Chlorobenzene	Benzene, chloro-	88	73 Carbon tetrachloride	Methane, tetrachloro-	66-20-6	U211
73	Chlorobenzilate (Benzeneacetic acid, 4-chloro-alpha-(4- chlorophenyl)-alpha-hydroxy- ethyl ester)	Chlorobenzilate	Benzeneacetic acid, 4-chloro- alpha-(4-chlorophenyl)-alpha- hydroxy-ethyl ester	89	74 Carbosulfan	Carbamic acid, [(dibutylamino)- methyl] methyl-, 2,3-dihydro-2,2- dimethyl-7-benzofuranyl ester	55285-14-8	P168
74	Chloro-3-methyl- 1-Chloro-2,3-epoxypropane	p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl	90	75 Chloral	Acetaldehyde, trichloro-	75-67-6	U034
75	1-Chloro-2-(chloromethyl)- 1-Oxane, 2-(chloromethyl)-	1-Chloro-2,3- epoxypropane	Oxiane, 2-(chloromethyl)-	201	76 Chlorambutil	Benzenebutanolic acid, 4-[bis(2- chloroethyl)amino]-	305-03-3	U035
76	2-Chloromethyl vinyl ether (Ethene, (2-chloroethoxy)-)	2-Chloromethyl vinyl ether	Ethene, (2-chloroethoxy)-	91	77 Chlordane	4,7-Methano-1H-indene, 1,2,4,5,6,7,8-octachloro- 2,3,3a,4,7,7a-hexahydro-	57-74-9	U036
77	Chloroform (Methane, trichloro-)	Chloroform	Methane, trichloro-	92	78 Chlordane	Chlordane (alpha and gamma isomers)		U036
78	Chloromethane (Methyl chloride)	Chloromethane	Methyl chloride	277	79 Chlorinated benzenes, N.O.S.1			
79	(Chloromethyl methyl ether (Methane, chloromethoxy-)	Chloromethyl methyl ether	Methane, chloromethoxy-	93	80 Chlorinated ethane, N.O.S.1			
80	2-Chloronaphthalene (Naphthalene, beta-chloro-)	2-Chloronaphthalene	Naphthalene, beta-chloro-	94	81 Chlorinated fluorocarbons, N.O.S.1			
81	2-Chlorophenol (Phenol, o- chloro-)	2-Chlorophenol	Phenol, o-chloro-	95	82 Chlorinated naphthalene, N.O.S.1			
82	1-(o-Chlorophenyl)thiourea (Thiourea, (2-chlorophenyl)-)	1-(o- Chlorophenyl)thiourea	Thiourea, (2-chlorophenyl)-	96	83 Chlorinated phenol, N.O.S.1			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)					
Order	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym		EPA Order	No.	Common name	Chemical abstracts name	CAS No.	HW No.
83	3-Chloropropionitrile (Propanenitrile, 3-chloro-)	3-Chloropropionitrile	Propanenitrile, 3-chloro-	88	84	Chlorophazin	Naphthaleneamine, N,N'-bis(2-chloroethyl)-	494-03-1	U026	
84	Chromium and compounds, N.O.S.3	Chromium and compounds, N.O.S.3	Same	99 &	100	85	Chloroacetaldehyde	Acetaldehyde, chloro-	107-20-0	P023
85	Chrysene (1,2-Benzphenanthrene)	Chrysene	1,2-Benzphenanthrene	101	88	88	Chloralkyl ethers, N.O.S.1			
86	Citrus red No. 2 (2-Naphthol, 1-[2-(5-dimethoxyphenyl)isoxol-])	Citrus red No. 2	2-Naphthol, 1-[2-(5-dimethoxyphenyl)isoxol-]	102	87	p-Chloraniline	Benzaniline, 4-chloro-	105-47-8	P024	
87	Coal tars	Coal tar	Same	103	89	Chlorobenzene	Benzene, chloro-	108-90-7	U037	
88	Copper cyanide	Copper cyanide	Same	104	89	Chlorobenzilate	Benzenesulfonic acid, 4-chloro-alpha-(4-chlorophenyl)-alpha-hydroxy-, ethyl ester	510-15-6	U038	
89	Creosote (Creosote, wood)	Creosote	Creosote	105	90	p-Chloro-m-cresol	Phenol, 4-chloro-3-methyl-	59-60-7	U039	
90	Cresols (Cresylic acids) (Phenol, methyl-)	Cresols (Cresylic acid)	Phenol, methyl-	107	91	2-Chloroethyl vinyl ether	Ethene, (2-chloroethoxy)-	110-75-8	U042	
91	Crotonaldehyde (2-Butenal)	Crotonaldehyde	2-Butenal	108	92	Chloroform	Methane, trichloro-	67-66-3	U044	
92	Cyanides (soluble salts and complexes), N.O.S.3	Cyanides (soluble salts and complexes), N.O.S.3	Cyanides (soluble salts and complexes), N.O.S.3	110	93	Chloromethyl methyl ether	Methane, chloromethoxy-	107-30-2	U046	
93	Cyanogen (Ethanedinitrile)	Cyanogen	Ethylenedinitrile	111	94	beta-Chloronaphthalene	Naphthalene, 2-chloro-	91-56-7	U047	
94	Cyanogen bromide (Bromine cyanide)	Cyanogen bromide	Bromine cyanide	112	95	e-Chlorophenol	Phenol, 2-chloro-	65-57-8	U048	
95	Cycasin (beta-D-Glucopyranoside, (methyl-OHN-90-azoxy)methyl-)	Cycasin	Chlorine cyanide	113	96	1-(o-Chlorophenyl)thiourea	Thiourea, (2-chlorophenoxy)-	5344-62-1	P026	
96	2-Cydoxyethyl-4,6-dinitrophenol (Phenol, 2-cydoxyethyl-4,6-dinitro- 2-Cydoxyethyl-4,6-dinitrophenol)	Cydoxyethyl-4,6-dinitrophenol	Phenol, 2-cydoxyethyl-4,6-dinitro-	116	97	3-Chloropropionitrile	1,3-Butadiene, 2-chloro-	125-69-8		
97	Cydoxaphosphamide (2H-1,3,2-Oxazaphosphorine, [bis(2-chloromethyl) amino]tetrahydro-2-oxide)	Cydoxaphosphamide	2H-1,3,2-Oxazaphosphorine, [bis(2-chloromethyl) amino]tetrahydro-2-oxide	117	98	Chromium	Propanenitrile, 3-chloro-	542-76-7	P027	
98	Daunomycin (5,12-Naphthacenedione, (5S-cis)-8-acetyl-10-(3-amino-2,3,6-trideoxy)-alpha-L-fucopyranosyloxy)-7,8,9,10-tetrahydro-6,6,11-trihydroxy-1-methoxy-)	Daunomycin	5,12-Naphthacenedione, (5S-cis)-8-acetyl-10-(3-amino-2,3,6-trideoxy)-alpha-L-fucopyranosyloxy)-7,8,9,10-tetrahydro-6,6,11-trihydroxy-1-methoxy-	120	99	100	Chromium compounds, N.O.S.1	7440-47-3		

NRC Order No.	NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym		EPA Order No.	Last Date of EPA Promulgation: 11/8/02 (verbatim listing)			
					No.	Common name	Chemical abstracts name	GAS No.	HW No.
100	(Dichlorodiphenylchloroethane) DDD (Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-)	(Dichlorodiphenylchloroethane)	Ethane, 1,1-dichloro-2,2-bis(p-chlorophenyl)-	123	101 Chrysene	Same		216-01-9	U050
101	DDE (Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-)	DDE	Ethylene, 1,1-dichloro-2,2-bis(4-chlorophenyl)-	123	102 Citrus red No. 2	2-Naphthalenol, 1-[(2,5-dimethoxyphenyl)fazo]-		6366-63-8	
102	DDT (Dichlorodiphenyltrichloroethane DDT (Ethane, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)-)	(Dichlorodiphenyltrichloroethane)	Ethane, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)-	124	103 Coal tar creosote	Same		8007-45-2	
103	Diastat (S-(2,3-dichlorallyl))	Diastat	S-(2,3-dichlorallyl)disopropylcarbamate	125	104 Copper cyanide	Copper cyanide CuCN		544-92-3	P023
104	Dibenz[a,h]azocine (1,2,5,6-Dibenz[a,h]azocine)	Dibenz[a,h]azocine	1,2,5,6-Dibenz[a,h]azocine	126	105 Copper dimethylthiocarbamate	Copper bis(dimethylthiocarbamato-5,5'-)		137-29-1	
105	Dibenz[a,j]anthracene (1,2,7,8-Dibenz[a,j]anthracene)	Dibenz[a,j]anthracene	1,2,7,8-Dibenz[a,j]anthracene	127	106 Creosote	Same			U051
106	Dibenz[a,j]anthracene (1,2,5,6-Dibenz[a,j]anthracene)	Dibenz[a,j]anthracene	1,2,5,6-Dibenz[a,j]anthracene	128	107 Cresol (Cresylic acid)	Phenol, methyl-		1319-77-3	U052
107	7H-Dibenzo(c,g)carbazole (3,4,5,6-Dibenzocarbazole)	Dibenzo(c,g)carbazole	3,4,5,6-Dibenzocarbazole	129	108 Crotonaldehyde	2-Butenal		4170-30-3	U053
108	Dibenz[e,h]pyrene (1,2,4,5-Dibenz[e,h]pyrene)	Dibenz[e,h]pyrene	1,2,4,5-Dibenz[e,h]pyrene	130	109 m-Cumeneyl methylcarbamate	Phenol, 3-(methylidihydro- methyl carbamate		64-00-6	P020
109	Dibenz[e,h]pyrene (1,2,5,6-Dibenz[e,h]pyrene)	Dibenz[e,h]pyrene	1,2,5,6-Dibenz[e,h]pyrene	131	110 Cyanides (soluble salts and complexed) N.O.S.t	Cyanides (soluble salts and complexed) N.O.S.t			P030
110	Dibenz[e,h]pyrene (1,2,7,8-Dibenz[e,h]pyrene)	Dibenz[e,h]pyrene	1,2,7,8-Dibenz[e,h]pyrene	132	111 Cyanogen	Ethanedinitrile		460-19-5	P031
111	1,2-Dibromo-3-chloropropane (1,2-Dibromo-3-chloro-1-propanol)	1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	133	112 Cyanogen bromide	Cyanogen bromide (CN)Br		506-68-3	U246
112	1,2-Dibromethane (Ethylene bromide)	1,2-Dibromoethane	Ethylene dibromide	209	113 Cyanogen chloride	Cyanogen chloride (CN)Cl		506-77-4	P033
113	Dibromomethane (Methylene bromide)	Dibromomethane	Methylene bromide	262	114 Cycasin	beta-D-Glucopyranoside, (methyl-O-Nitroxy) methyl		14901-08-7	
114	Dimethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)	Dimethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	134	115 Cycloalate	Carbamoholic acid, cyclohexylethyl-, S-ethyl ester		1134-23-2	
115	o-Dichlorobenzene (Benzene, 1,2-dichloro-)	o-Dichlorobenzene	Benzene, 1,2-dichloro-	135	116 2-Cyclohexyl-4,6-dinitrophenol	Phenol, 2-cyclohexyl-4,6-dinitro-		131-89-5	P034
116	m-Dichlorobenzene (Benzene, 1,3-dichloro-)	m-Dichlorobenzene	Benzene, 1,3-dichloro-	136	117 Cyclophosphamide	2H-1,3,2-Oxazaphosphorin-2-amine, N,Nbis(2-chloroethyl)tetrahydro-, 2-oxide		50-18-0	U059
117	p-Dichlorobenzene (Benzene, 1,4-dichloro-)	p-Dichlorobenzene	Benzene, 1,4-dichloro-		118 2,4-D	Acetic acid, (2,4-dichlorophenoxy)-			U240

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
	Promulgated by NRC circa 1987		Compound Names Parsed by DRC (verbalm listing)		EPA Order No.	Last Date of EPA Promulgation: 11/6/00 (verbalm listing)			
	Hazardous Constituent	Chemical Name	Synonym		No.	Common name	Chemical abstracts name	CAS No.	HW No.
118	Dichlorobenzene, N.O.S.3 (Benzene, dichloro-, N.O.S.3)	3	Dichlorobenzene, N.O.S.	Benzene, dichloro-, N.O.S.3	138	119 2,4-D, salts, esters			U240
119	3,3'-Dichlorobenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-)	3,3'-Dichlorobenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dichloro-	139	120 Dacronylchin		5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lychosa-pyranosyl)oxy]-7,8,9,10-tetrahydro-5,8,11-trihydroxy-1-methoxy-, (RS-ee)-		
120	1,4-Dichloro-2-butene (2-Butene, 1,4-dichloro-)	1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	140	121 Dazomet		2H-1,3,5-thiadiazine-2-thione, tetrahydro-3,5-dimethyl	20890-61-3	U059
121	Dichlorodifluoromethane (Methane, dichlorodifluoro-)	Dichlorodifluoromethane	Methane, dichlorodifluoro-	141	122 DDD		Benzene, 1,1'-(2,2-dichlorovinylidene)bis[4-chloro-	533-74-6	
122	1,1-Dichloroethane (Ethylene dichloride)	1,1-Dichloroethane	Ethylene dichloride	215	123 DDE		Benzene, 1,1'-(dichloroethoxyethoxy)bis[4-chloro-	72-54-8	U060
123	1,2-Dichloroethane (Ethylene dichloride)	1,2-Dichloroethane	Ethylene dichloride	210	124 DDT		Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-chloro-	50-29-3	U061
124	trans-1,2-Dichloroethene (1,2-Dichloroethylene)	trans-1,2-Dichloroethene	1,2-Dichloroethylene	144	125 Dalate		Carbamothioic acid, bis(1-methylpropyl-, S-(2,3-dichloro-2-propenyl)ester	2303-16-4	U062
125	Dichloroethylene, N.O.S.3 (Ethene, dichloro-, N.O.S.3)	3	Dichloroethylene, N.O.S.	Ethene, dichloro-, N.O.S.3	142	126 Dibenz[a,h]acridine	Same	229-36-6	
126	1,1-Dichloroethylene (Ethene, 1,1-dichloro-)	1,1-Dichloroethylene	Ethene, 1,1-dichloro-	143	127 Dibenz[a,g]acridine	Same	224-42-0		
127	Dichlormethane (Methylene chloride)	Dichlormethane	Methylene chloride	283	128 Dibenz[a,h]anthracene	Same	53-70-3	U063	
128	2,4-Dichlorophenol (Phenol, 2,4-dichloro-)	2,4-Dichlorophenol	Phenol, 2,4-dichloro-	149	129 7H-Dibenzo[c,g]carbazole	Same	194-69-2		
129	2,6-Dichlorophenol (Phenol, 2,6-dichloro-)	2,6-Dichlorophenol	Phenol, 2,6-dichloro-	150	130 Dibenz[a,e]pyrene	Naphtho[1,2,3,4-def]chrysene	192-65-4		
130	2,4-Dichlorophenoxyacetic acid (2,4-D), salts and esters (Acetic acid, 2,4-dichlorophenoxy-, salts and esters)	2,4-Dichlorophenoxyacetic acid (2,4-D) salts and esters	Acetic acid, 2,4-dichlorophenoxy-, salts and esters	118 & 119	131 Dibenz[a,h]pyrene	Dibenzo[b,de]chrysene	180-84-0		
131	Dichloroerythritol (Phenyl dichloroerithritol)	Dichloroerythritol	Phenyl dichloroerithritol	151	132 Dibenz[a,j]pyrene	Benzene[1,1,1,1,1-penta-	169-55-0	U064	
132	Dichloropropane, N.O.S.3 (Propane, dichloro-, N.O.S.3)	3	Dichloropropane, N.O.S.	Propene, dichloro-, N.O.S.3	152	133 1,2-Dibromo-3-chloropropane	Propane, 1,2-dibromo-3-chloro-	96-12-6	U065
133	1,2-Dichloropropane (Propylene dichloride)	1,2-Dichloropropane	Propylene dichloride	370	134 Diethyl phthalate	1,2-Benzenedicarboxylic acid, dibutyl ester	84-74-2	U066	

NRC Order No.	NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A) Promulgated by NRC circa 1987			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) List Date of EPA Promulgation: 11/8/00 (verbally listing)				
	Hazardous Constituent (verbally listing)	Chemical Name	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
134	Dichloropropene, N.O.S.3 (Propano, dichloro-, N.O.S.3)	Dichloropropane, N.O.S. 3	Propene, dichloro-, N.O.S.3	153	135 o-Dichlorobenzene	Benzene, 1,2-dichloro-	25-50-1	U070	
135	Dichloropropene, N.O.S.3 (Propene, dichloro-, N.O.S.3)	Dichloropropene, N.O.S. 3	Propene, dichloro-, N.O.S.3	154	136 m-Dichlorobenzene	Benzene, 1,3-dichloro-	541-73-1	U071	
136	1,3-Dichloropropene (1-Propene, 1,3-dichloro-)	1,3-Dichloropropene	1-Propene, 1,3-dichloro-	155	137 p-Dichlorobenzene	Benzene, 1,4-dichloro-	106-60-7	U072	
137	Dieldrin (1,2,3,4,10,10-hexachloro-6,7-epoxy- 1,4,4b,5,6,7,8,8a-octa-hydro- endo, exo- 1,4,5,6-Dimethanonaphthalene)	Dieldrin	1,2,3,4,10,10-hexachloro-6,7- epoxy-1,4,4a,5,6,7,8,8a-octa- hydro-endo, exo- 1,4,5,6-Dimethanonaphthalene	156	138 Dichlorobenzene, N.O.S.1	Benzene, dichloro-[1,1'-Biphenyl]-4,4'-diamin, 3,3'- dichloro-	25521-22-6		
138	1,2,3,4-Diepoxybutane (2,2'- Bisoxane)	1,2,3,4-Diepoxybutane	2,2'-Bisoxane	157	139 3,3'-Dichlorobenzidine	3,3'-Biphenol, 4,4'-dichloro-	91-64-1	U073	
139	Diethylarsine (Arsine, diethyl-)	Diethylarsine	Arsine, diethyl-	158	140 1,4-Dichloro-2-butene	2-Butene, 1,4-dichloro-	76-41-0	U074	
140	N,N-Diethylhydrazine (Hydrazine, 1,2-diethyl)	N,N-Diethylhydrazine	Hydrazine, 1,2-diethyl	160	141 Dichlorodifluoromethane	Methane, dichlorodifluoro-	75-71-6	U075	
141	O,O-Diethyl S-methyl ester of phosphordithioic acid (Phosphordithioic acid, O,O- diethyl S-methyl ester)	O,O-Diethyl S-methyl ester of phosphordithioic acid	Phosphordithioic acid, O,O- diethyl S-methyl ester	161	142 Dichloroethylene, N.O.S.1	Dichloroethylene	25323-30-2		
142	O,O-Diethylphosphoric acid, O,p-O,O-Diethylphosphoric nitrophenyl ester (Phosphoric acid, diethyl p-nitrophenyl ester)	O,O-Diethylphosphoric acid, diethyl p-nitrophenyl ester	Phosphoric acid, diethyl p- nitrophenyl ester	162	143 1,1-Dichloroethylene	Ethene, 1,1-dichloro-	76-35-4	U076	
143	Diethyl phthalate (1,2-Benzenedicarboxylic acid, diethyl ester)	Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	163	144 1,2-Dichloroethylene	Ethene, 1,2-dichloro-, (E)-	156-60-5	U078	
144	O,O-Diethyl O-2-pyrazinyl phosphorothioate (Phosphorothioic acid, O,O- diethyl O-pyrazinyl ester)	O,O-Diethyl O-2- pyrazinyl phosphorothioate	Phosphorothioic acid, O,O- diethyl O-pyrazinyl ester	164	145 Dichloroethyl ether	Ethane, 1,1'oxybis[2-chloro-	111-44-4	U025	
145	Diethylstilbestrol (4,4'- Stibenediol, alpha,alpha-diethyl, bis(dihydro phosphate, (E)-)	Diethylstilbestrol	4,4'-Stibenediol, alpha,alpha- diethyl, bis(dihydro phosphate, (E)-)	165	146 Dichloroisopropyl ether	Propane, 2,2'-oxybis[2-chloro-]	108-60-1	U027	
146	Dihydrostilbene (Benzene, 1,2- methyleneoxy-4-propyl-)	Dihydrostilbene	Benzene, 1,2-methyleneoxy-4- propyl-	166	147 Dichloromethoxy ethane	Ethane, 1,1'- [methylanabis(oxy)]bis[2-chloro-]	111-91-1	U024	
147	3,4-Dihydroxy-alpha- (methylamino)methyl benzyl alcohol (1,2-Benzenediol, 4-[1- hydroxy-2-(methylamino)ethyl]-)	3,4-Dihydroxy-alpha- (methylamino)methyl benzyl alcohol	1,2-Benzenediol, 4-[1-hydroxy-2- (methylamino)ethyl]-	202	148 Dichloromethyl ether	Methane, oxybis(chloro-	542-88-1	P016	

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equival. Order No.	EPA Hazardous Constituents (40 CFR 251, APPENDIX VII)				
	Promulgated by NRC circa 1987		Compound Names Parsed by DRC		EPA Order No.	Last Date of EPA Promulgation: 11/6/00 (verbalm listing)			
	Hazardous Constituent (verbalm listing)	Chemical Name	Synonym		No.	Common name	Chemical abstracts name	CAS No.	HW No.
148	Diisopropylfluorophosphate (DFP) (Phosphorochloridic acid, Diisopropylfluorophosphate (DFP))	Phosphorofluoridic acid, bis(1-methylethyl) ester		169	148 2,4-Dichlorophenol	Phenol, 2,4-dichloro-		120-83-2	U081
149	Dimelbaine (Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester) Dimelbanoate	Phosphorodithioic acid, O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] ester		170	150 2,6-Dichlorophenol	Phenol, 2,6-dichloro-		67-65-0	U082
150	3,3'-Dimethoxybenzidine (1,1'-Biphenyl-4,4'-diamine, 3,3'-dimethoxy-)	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-		171	151 Dichlorophenylarsine	Arsinous dichloride, phenyl-		606-28-6	P036
151	p-Dimethylaminobenzene (benzenamine, N,N-dimethyl-4-(phenylazo)-)	Dimethylaminobenzene Benzenamine, N,N-dimethyl-4-(phenylazo)-		172	152 Dichloropropane, N.O.S.1	Propane, dichloro-		26638-19-7	
152	7,12-Dimethylbenz[a]anthracene, 7,12-(1,2-Benzanthracene, 7,12-dimethyl-)	Dimethylbenz[a]anthracene, 1,2-Benzanthracene, 7,12-dimethyl-		173	153 Dichloropropane, N.O.S.1	Propanol, dichloro-		26545-73-3	
153	3,3'-Dimethoxybenzidine ([1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-)	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-		174	154 Dichloropropane, N.O.S.1	1-Propene, dichloro-		26952-23-8	
154	Dimethylcarbamoyl chloride (Carbamoyl chloride, dimethyl-)	Dimethylcarbamoyl chloride	Carbamoyl chloride, dimethyl-	175	155 1,3-Dichloropropene	1-Propene, 1,3-dichloro-		542-75-6	U084
						2,7,3,6-Dimethanonaphthal[2,3-b]oxine, 3,4,5,6,8,9-hexachloro-1a,2,2a,3,6,8a,7,7a-octahydro-[1a,2a]bicyclo[2.2.1]hepta-3a[alpha],3beta,5beta,5a[alpha],7beta,7a[alpha]-		60-57-1	P037
155	1,1-Dimethylhydrazine (Hydrazine, 1,1-dimethyl-)	1,1-Dimethylhydrazine	Hydrazine, 1,1-dimethyl-	176	156 Dielidrin	2,2-Bioxane		1484-53-5	U085
156	1,2-Dimethylhydrazine (Hydrazine, 1,2-dimethyl-)	1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	177	157 1,2,3,4-Diepoxybutane	Arginine, diethyl-		692-42-2	P038
157	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[[(methylamino)carbonyl]oxime (Thiocanox)	Thiocanox	3,3-Dimethyl-1-(methylthio)-2-butanone, O-[(methylamino)carbonyl]oxime	178	158 Diethyltartrate	Ethanol, 2,2'-oxybis-, dicarbamato dicarbamato		5952-26-1	U085
158	alpha, alpha-Dimethylphenethylamine (Ethanamine, 1,1-dimethyl-2-phenyl-)	alpha, alpha-Dimethylphenethylamine phenyl-	Ethanamine, 1,1-dimethyl-2-			1,4-Dioxane		123-61-1	U108
159	2,4-Dimethylphenol (Phenol, 2,4-dimethyl-)	2,4-Dimethylphenol	Phenol, 2,4-dimethyl-	179	160 1,4-Dihydroxane dioxide				

NRC Order No.	NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Environ. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VII)				
	Promulgated by NRC circa 1987		Compound Names Permed by DRC		EPA Order No.	Last Date of EPA Promulgation: 11/6/00			
	(verbalm listing)	Chemical Name	Synonym		No.	Common name	Chemical abstracts name	CAS No.	RW No.
160	Dimethyl phthalate (1,2-Benzenedicarboxylic acid, dimethyl ester)	Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester	180	161	Diethylhexyl phthalate	1,2-Benzenedicarboxylic acid, bis[2-ethylhexyl] ester	117-61-7	U028
161	Dimethyl sulfate (Sulfuric acid, dimethyl ester)	Dimethyl sulfate	Sulfuric acid, dimethyl ester	181	162	N,N-Diethylhydrazine	Hydrazine, 1,2-dimethyl-	1615-80-1	U086
162	Dinitrobenzene, N.O.S. 3 (Benzene, dinitro-, N.O.S. 3)	Dinitrobenzene, N.O.S.	Benzene, dinitro-, N.O.S. 3	183	163	O,O-Diethyl S-methyl phosphorothioic acid, O,O-diethyl S-methyl ester	Phosphorothioic acid, O,O-diethyl S-methyl ester	3268-68-2	U087
163	4,6-Dinitro-o-cresol and salts (Phenol, 2,4-dinitro-6-methyl-, and salts)	4,6-Dinitro-o-cresol and salts	Phenol, 2,4-dinitro-6-methyl-, and salts	184 &	164	Diethyl-p-nitrophenyl phosphate	Phosphoric acid, diethyl 4-nitrophenyl ester	311-45-5	P041
164	2,4-Dinitrophenol (Phenol, 2,4-dinitro-)	2,4-Dinitrophenol	Phenol, 2,4-dinitro-	185	165	Diethyl phthalate	1,2-Benzenedicarboxylic acid, diethyl ester	64-66-2	U088
165	2,4-Dinitrotoluene (Benzene, 1-methyl-2,4-dinitro-)	2,4-Dinitrotoluene	Benzene, 1-methyl-2,4-dinitro-	187	166	Phosphoro-thioate	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297-07-2	P040
166	2,6-Dinitrotoluene (Benzene, 1-methyl-2,6-dinitro-)	2,6-Dinitrotoluene	Benzene, 1-methyl-2,6-dinitro-	188	167	Diethylstibestrol	Phenol, 4,4'-(1,2-dethyl-1,2-ethenediylibis, (E))-	56-53-1	U089
167	Di-n-octyl phthalate (1,2-Benzenedicarboxylic acid, dioctyl ester)	Di-n-octyl phthalate	1,2-Benzenedicarboxylic acid, dioctyl ester	190	168	Dihydrostilbene	1,3-Benzodioxole, 5-propyl-	84-58-6	U090
168	1,4-Dioxane (1,4-Diethylene oxide)	1,4-Dioxane	1,4-Diethylene oxide	191	169	Diisopropyltluorophosphate (DIP)	Phosphorofluoridic acid, bis[1-methylpropyl] ester	56-91-4	P043
169	Diphenylamine (Benzanamine, N-phenyl-)	Diphenylamine	Benzanamine, N-phenyl-	191	170	Dimethoate	Phosphorothioic acid, O,O-dimethyl S-[2-(dimethylaminoc)-2-oxethyl] ester	60-51-5	P044
170	1,2-Diphenylhydrazine (Hydrazine, 1,2-diphenyl-)	1,2-Diphenylhydrazine	Hydrazine, 1,2-diphenyl-	192	171	3,3'-Dimethoxybenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethoxy-	119-60-4	U091
171	Di-n-propylnitrosamine (N-Nitroso-di-n-propylamine)	Di-n-propylnitrosamine	N-Nitroso-di-n-propylamine	193	172	p-Dimethylaminobenzene	Benzanamine, N,N-dimethyl-4-(phenylazo)-	60-11-7	U093
172	Disulfoton (O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate)	Disulfoton	O,O-diethyl S-[2-(ethylthio)ethyl] phosphorodithioate	195	173	7,12-Dimethylbenz[a]anthracene	Benz[a]anthracene, 7,12-dimethyl-	57-07-6	U094
173	2,4-Dihlobutene (Thiomodocarbonic diamide)	2,4-Dihlobutene	Thiomodocarbonic diamide	196	174	3,3'-Dimethylbenzidine	[1,1'-Biphenyl]-4,4'-diamine, 3,3'-dimethyl-	119-83-7	U095
174	Endosulfan (5-Norbornene, 2,3-dimethanol, 1,4,5,6,7,7-hexachloro-, cyclo sulfite)	Endosulfan	5-Norbornene, 2,3-dimethanol, 1,4,5,6,7,7-hexachloro-, cyclo sulfite	197	175	Dimethylcarbamoyl chloride	Carbamic chloride, dimethyl-	79-44-7	U087
175	Endrin and metabolites (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-ando-1,4,5,8-dimethanaphthalene, and metabolites)	Endrin and metabolites	1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo-ando-1,4,5,8-dimethanaphthalene, and metabolites	198 &	176	1,1-Dimethylhydrazine	Hydrazine, 1,1-dimethyl-	57-14-7	U098
176	Ethyl carbamate (Urethan)	Ethyl carbamate (Urethan)	Carbamic acid, ethyl ester	200	177	1,2-Dimethylhydrazine	Hydrazine, 1,2-dimethyl-	640-73-8	U099

NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Equivalent NRC Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)			
NRC Order No.	Hazardous Constituent (verbalm listing)	Compound Name Parsed by DRC	EPA Order No.	Common name	Chemical abstracts name	CAS No.	RW No.
177	Ethyl cyanide (propanenitrile)	Ethyl cyanide	205	-alpha,alpha-	Benzeneethanamine,		
	Ethylenecidithiocarbamic acid, salts and esters (1,2-Ethanediyl-biscarbamodithioic acid, salts and esters)	Ethylenecidithiocarbamic acid, salts and esters	207 &	178 Dimethyl(etherethyl)amine	-alpha,alpha-dimethyl-	122-09-6	P048
178			208				
179	Ethylenimine (Aziridine)	Ethylenimine	212		Phenol, 2,4-dimethyl-	105-67-9	U101
180	Ethylene oxide (Oxirane)	Ethylene oxide	213	180 Dimethyl phthalate	1,2-Benzenedicarboxylic acid, dimethyl ester	131-11-3	U102
				181 Dimethyl sulfate	Sulfuric acid, dimethyl ester	77-78-1	U103
181	Ethylenetriourea (2-Imidazolidinethione)	Ethylenetriourea	214	182 Dimetan	Carbamic acid, dimethyl-, 1-(dimethylaminio) carbonyl[5-methyl-1H-pyrazol-3-yl]ester	644-64-4	P191
182	Ethyl methacrylate (2-Propenoic acid, 2-methyl-, ethyl ester)	Ethyl methacrylate	215	183 Dinitrobenzene, N.O.S.1	Benzene, dinitro-	25154-54-5	
					Phenol, 2-methyl-4,6-dinitro-	534-62-1	P047
183	Ethyl methanesulfonate (Methanesulfonic acid, ethyl ester)	Ethyl methanesulfonate	217	184 4,6-Dinitro-o-cresol	Phenol, 2,4-dinitro-	51-29-5	P047
					Benzene, 1-methyl-2,4-dinitro-	121-14-2	U105
184	Fluoranthene (Benz[a]k[fluorene])	Fluoranthene	220	185 4,6-Dinitro-o-cresol salts	Benzene, 2-methyl-1,3-dinitro-	606-20-2	U106
185	Fluorine	Fluorine	221	186 2,4-Dinitrophenol	Phenol, 2-(1-methylpropyl)-4,6-dinitro-	68-85-7	P020
186	2-Fluoroacetamide (Acetamide, 2-fluoro-)	2-Fluoroacetamide	222	187 2,4-Dinitrotoluene	1,2-Benzenedicarboxylic acid, diethyl ester	117-64-0	U017
					Benzene, N-phenyl-	122-39-4	
187	Fluoroacetic acid, sodium salt (Acetoic acid, fluoro-, sodium salt)	Fluoroacetic acid	223	188 2,6-Dinitrotoluene	Hydrazine, 1,2-diphenyl-	122-66-7	U109
					1-Propanamine, N-nitroso-N-propyl-	621-64-7	U111
188	Formaldehyde (Methylene oxide) Formaldehyde	Methylene oxide	224	189 Diacetone			
189	Formic acid (Methanoic acid)	Formic acid	226	190 Di-n-octyl phthalate			
190	Glycidaldehyde (1-Propenol-2,3-epoxy)	Glycidaldehyde	228	191 Diphenylamine			
191	Halomethane, N.O.S.3	Halomethane, N.O.S.3	229	192 1,2-Diphenylhydrazine			
192	Heptachlor (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-4,7-heptachloro-3a,4,7,7-tetrahydro-	Heptachlor	230	193 Di-n-propylnitrosamine			
193	Heptachlor epoxide (alpha, beta, and gamma isomers) (4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3,3-epoxy-3a,4,7,7-tetrahydro-alpha, beta, and gamma isomers)	Heptachlor epoxide (alpha, beta, and gamma isomers)	231 &	194 Disulfiram	Triperoxydihydrofuran	97-77-8	
			232				

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
Order No.	Hazardous Constituent (verbatim listing)	Chemical Name		EPA Order No.	Common name	Chemical abstracts name	CAS No.	
194	Hexachlorobenzene (Benzene, 1,1,1,2,2,2-hexachloro-)	Hexachlorobenzene	Benzene, hexachloro-	235	165 Diisuteton	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester	298-04-4	P039
195	Hexachlorobutadiene (1,3-Butadiene, 1,1,2,3,4,4-hexachloro-)	Hexachlorobutadiene	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	236	196 Dihlobutene	Thiimidodicarbonic diamide [H2 N(C(S)2NH	541-63-7	P048
196	Hexachlorocyclohexane (all isomers) (Lindane and isomers)	Lindane and isomers	Hexachlorocyclohexane (all isomers)	261	187 Endosulfan	6,6-Methano-2,4,3-benzodioxolehepten,6,7,8,9,10,10-hexachloro-1,5,5a,6,6,9,9a-hexamethylene-3-oxide	116-29-7	P050
197	Hexachlorocyclopentadiene (1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-)	Hexachlorocyclopentadiene	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	237	198 Endothall	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145-73-3	P088
198	Hexachloroethane (Ethane, 1,1,1,2,2,2-hexachloro-)	Hexachloroethane	Ethane, 1,1,1,2,2,2-hexachloro-	240	199 Endrin	2,7,3,6-Dimethanaphthal[2,3-b]ene,2,4,5,6,9-hexachloro-1a,2,2a,3,3a,4a,7,7a-octa-hydro-[1a]alpha,2beta,2abeta,3alpha,5alpha,5beta,6beta,7alpha]-	72-20-8	P051
199	1,2,3,4,10,10-Hexachloro-1,4,4a,5,6,8a-hexahydro-1A:5,6-endo,endo-dimethanoperhydrophthalene (Hexachlorohexa-hydro-endo,endo-dimethanoperhydrophthalene)	Isodin	Hexachlorohexa-hydro-endo,endo-dimethanoperhydrophthalene	251	200 Endrin metabolites			P051
200	Hexachlorophene (2,2'-Methylenbis(4,6-iodophenol))	Hexachlorophene	2,2'-Methylenbis(3,4,6-trichlorophenol)	241	201 Epichlorohydrin	Oxirane, (chloromethyl)-	106-89-8	U041
201	Hexachloropropene (1-Propene, 1,1,2,3,3-hexachloro-)	Hexachloropropene	1-Propene, 1,1,2,3,3-hexachloro-	242	202 Epinephrine	1,2-Benzenediol, 4-(1-hydroxy-2-(methylamino)ethyl)-, (R)-	51-43-4	P042
202	Hexethyl tetraphosphate (Tetraphosphoric acid, hexethyl Hexethyl ester)	Tetraphosphate	Tetraphosphoric acid, hexethyl ester	243	203 EPTC	Carbamothioic acid, dipropyl-, S-ethyl ester	750-94-4	
203	Hydrazine (Diamine)	Hydrazine	Diamine	244	204 Ethyl carbamate (urethane)	Carbamic acid, ethyl ester	51-71-6	U238
204	Hydrocyanic acid (Hydrogen cyanide)	Hydrocyanic acid	Hydrogen cyanide	245	205 Ethyl cyanide	Propanenitrile	107-12-0	P101
205	Hydrofluoric acid (Hydrogen fluoride)	Hydrofluoric acid	Hydrogen fluoride	246	206 Ethyl Ziram	Zinc, bis(dialkylcarbamodithiocato-3,S)-	14324-55-1	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)					
NRC	Order	No.		EPA Order	No.	Common name	Chemical abstracts name	CAS No.	RW No.
206	Hydrogen sulfide (Sulfur hydride)	Hydrogen sulfide	Sulfur hydride	247	207	Ethylenebiscarbamic acid	Carbamothioic acid, 1,2-ethanediyldis-	111-54-6	U114
208	Hydroxymethyllysine oxide	Hydroxymethyllysine oxide			208	Ethylenebiscarbamic acid, salts and esters			U114
209	(Cecidic acid)	Cecidic acid		62					
210	Indeno (1,2,3- <i>cd</i>)pyrene (1,10- <i>di</i> -1,2-phenylene)pyrene	Indeno (1,2,3- <i>cd</i>)pyrene	1,10-(1,2-phenylene)pyrene	248	209	Ethylene dibromide	Ethane, 1,2-dibromo-	106-69-4	U067
211	Indomethane (Methyl iodide)	Iodomethane	Methyl iodide	287	210	Ethylene dichloride	Ethane, 1,2-dichloro-	107-06-2	U077
212	Ferro dextran (Ferric dextran)	Ferro dextran	Ferric dextran	N.C.	211	Ethylene glycol monomethyl ether	Ethanol, 2-ethoxy-	110-80-5	U059
213	(Isocyanic acid, methyl ester)	Isocyanic acid	Methyl isocyanate	268	212	Ethyl eneimine	Aziridine	151-56-4	P054
214	(Methyl isocyanate)				213	Ethylene oxide	Oxirane	75-21-8	U115
215	(Isobutyl alcohol) (1-Propanol, 2-methyl-)	Isobutyl alcohol	1-Propanol, 2-methyl-	250	214	Ethylenethiourea	2-Iimidazolidinethione	95-45-7	U116
216	(Isosafrole (Benzene, 1,2-methylenedioxy-4-ethyl-))	Isosafrole	Benzene, 1,2-methylenedioxy-4-ethyl-	253	215	Ethylene dichloride	Ethane, 1,1-dichloro-	75-34-3	U076
217	Kepone (Decachlorooctahydro-1,3,4-Methano-2H-cycloocta[cd]pentalen-2-one)	Kepone	Decachlorooctahydro-1,3,4-Methano-2H-cycloocta[cd]pentalen-2-one	254					
218	Lesiocarpine (2-Butenoic acid, 2-methyl-, 7-[{[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutyl]methyl}-2,3,5,7-tetrahydro-1H-pyrrolizin-1-yl ester])	Lesiocarpine	2-Butenoic acid, 2-methyl-, 7-[{[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutyl]methyl}-2,3,5,7-tetrahydro-1H-pyrrolizin-1-yl ester]	255	216	Ethyl methacrylate	2-Propenoic acid, 2-methyl-, ethyl ester	97-63-2	U118
219	Lead and compounds, N.O.S.3	Lead and compounds, N.O.S.3	Same	256 &	217	Ethyl methanesulfonate	Methanesulfonic acid, ethyl ester	62-60-0	U119
220	Lead acetate (Acetic acid, lead salt)	Lead acetate	Acetic acid, lead salt	257	218	Famphur	Phosphorothioic acid, O-[4-[(dimethylamino)sulfonyl(phenyl)]O,O-dimethyl ester	52-85-7	P067
221	Lead phosphate (Phosphoric acid, lead salt)	Lead phosphate	Phosphoric acid, lead salt	258	219	Fentarn	Iron, tris(dimethylcarbamodithioato-S,S')	14484-64-1	
222	Lead subacetate (Lead, bis(aceto-2-hydroxyethyl)-)	Lead subacetate	Lead, bis(aceto-2-hydroxyethyl)-	260	220	Fluoranthene	Same	206-44-0	U120
223	Maleic anhydride (2,5-Furanone)	Maleic anhydride	2,5-Furanone	262	221	Fluorine	Same	7782-41-4	P055
224	Maleic hydrazide (1,2-Dihydro-3,6-pyridazineiones)	Maleic hydrazide	1,2-Dihydro-3,6-pyridazineiones	263	222	Fluoroacetamide	Acetamide, 2-fluoro-	640-19-7	P057
225	Malononitrile (Propanenitrile)	Malononitrile	Propanenitrile	264	223	Fluoroacetic acid, sodium salt	Acetic acid, fluoro-, sodium salt	62-74-8	P068

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
	Promulgated by NRC circa 1987		Compound Names Parsed by DRC		EPA Order No.	List Date of EPA Promulgation: 1/6/90 (verbatim listing)			
	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym		No.	Common name	Chemical abstracts name	CAS No.	HW No.
223	Melphalan (Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-L-)	Melphalan	Alanine, 3-[p-bis(2-chloroethyl)amino]phenyl-L-	265	224 Formaldehyde	Same		60-00-0	U122
224	Mercury fulminate (Fulminic acid, mercury salt)	Mercury fulminate	Fulminic acid, mercury salt	269	225 Formelanate hydrochloride	Methanimidamide, N,N-dimethyl-N-[3-[(methylamino)carbonyloxy]phenyl]-mmonohydrochloride	23422-53-9	P198	
225	Mercury and compounds, N.O.S.3	Mercury and compounds, N.O.S.3	Same	267.6	226 Formic acid	Same		64-10-6	U123
226	Methacrylonitrile (2-Propenenitrile, 2-methyl-)	Methacrylonitrile	2-Propenenitrile, 2-methyl-	271	227 Fomparanate	Methanimidamide, N,N-dimethyl-N-[2-methyl-4-[(methylamino)carbonyloxy]phenyl]-	17702-57-7	P197	
227	Methanethiol (Thiomethanol)	Methanethiol	Thiomethanol	437	228 Glycidaldehyde	Oxiranecarboxyaldehyde	76-34-4	U126	
228	Methacrylene (Pyridine, 2-[(2-dimethylamino)ethyl]-2-methylamino-)	Methacrylene	Pyridine, 2-[(2-dimethylamino)-Acetoic acid, N-[(methylcarbamoyloxy)thio]-methyl ester	272	229 Halomethanes, N.O.S.1	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	76-66-8	P059	
229	Methoxymethyl (Acetimidic acid, N-(methylcarbamoyloxy)thio-methyl ester)	Methoxymethyl		274	230 Heptachlor	2,5-Methano-2H-indeno[1,2-b]azirine,2,3,4,5,6,7,7-heptachloro-1a,1b,5,6a,6,6a-hexahydro-1a[alpha],1b[beta],2[alpha],5[alpha],6[a,beta],6[beta],6[alpha]-			
230	Methoxychlor (Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-)	Methoxychlor	Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	275	231 Heptachlor epoxide	Heptachlor epoxide (alpha, beta, gamma isomers)	1024-57-3		
231	2-Methylaziridine (1,2-Propylamine)	2-Methylaziridine	1,2-Propylamine	380	232				
232	3-Methylcholanthrene (Benz[[a]aceanthrylene, 1,2-dihydro-3-methyl-])	3-Methylcholanthrene	Benz[[a]aceanthrylene, 1,2-dihydro-3-methyl-]	280	233 Heptachlorodibenzofurans				
233	Methyl chlorocarbonate (Carboxylic acid, methyl ester)	Methyl chlorocarbonate	Carboxylic acid, methyl ester	278	234 Heptachlorodibenzo-p-dioxins				
234	4,4-Methylenebis(2-chloroaniline) (Benzanamine, 4,4,4,4-Methylenebis(2-methylenebis-(2-chloro-))chloraniline)		Benzanamine, 4,4-methylenebis-(2-chloro-)	281	235 Hexachlorobenzene	Benzene, hexachloro-1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	118-74-1	U127	
235	Methyl ethyl ketone (MEK) (2-Butanone)	Methyl ethyl ketone (MEK)	2-Butanone	284	236 Hexachlorobutadiene	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87-68-3	U128	
236	Methyl hydrazine (Hydrazine, methyl-)	Methyl hydrazine	Hydrazine, methyl-	285	237 Hexachlorocyclopentadiene	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77-47-4	U130	
237	2-Methylactonitrile (Propanenitrile, 2-hydroxy-2-methyl-)	2-Methylactonitrile	Propanenitrile, 2-hydroxy-2-methyl-	286	238 Hexachlorodibenzo-p-dioxins				

NRC No.	NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A) Promulgated by NRC circa 1987			Equivalency Order	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) Last Date of EPA Promulgation: 11/6/00					
	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym		EPA Order	No.	Common name	Chemical abstracts name	CAS No.	HW No.
238	Methyl methacrylate (2-Propenoic acid, 2-methyl-, methyl ester)	Methyl methacrylate	2-Propenoic acid, 2-methyl-, methyl ester	290	238	Hexachlorobenzenes				
239	Methyl methanesulfonate (Methanesulfonic acid, methyl ester)	Methyl methanesulfonate	Methanesulfonic acid, methyl ester	291	240	Hexachloroethane	Ethane, hexachlor-	67-72-1	U131	
240	2-Methyl-2-(methylthio)propionaldehyde-o-(methylcarbonyl) oxime (Propanal, 2-methyl-2-(methylthio)-, O-(methylamino)carbonyl)oxime	2-Methyl-2-(methylthio)propionaldehyde-o-(methylthio)-, O-(methylamino)carbonyl)oxime	Propanal, 2-methyl-2-(methylthio)-, O-(methylamino)carbonyl)oxime	115	241	Hexachlorophane	Phenol, 2,2'-methylenebis[3,4,6-trichloro-	20-30-4	U132	
241	N-Methyl-N-nitro-N-nitrosoguanidine (Guanidine, N,N-dimethyl-N-nitro-N-nitroso-N-methyl-N-nitro-)	Guanidine, N-nitro-N-methyl-N-nitro-	Guanidine, N-nitro-N-methyl-N-nitro-	297	242	Hexachloropropane	1-Propane, 1,1,2,3,3,3-hexachloro-	1688-71-7	U243	
242	Methyl parathion (O,O-dimethyl O-(4-nitrophenyl) phosphorothioate)	Methyl parathion	O,O-dimethyl O-(4-nitrophenyl) phosphorothioate	292	243	Hexaethyl tetraphosphate	Tetraphosphoric acid, hexaethyl ester	757-58-4	P062	
243	Methylthioureas (4-H-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-)	Methylthioureas	4-H-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	293	244	Hydrazine	Same	302-01-2	U133	
244	Molybdenum and compounds, N.O.S.3	Molybdenum and compounds, N.O.S.3	Same	N.C.	245	Hydrogen cyanide	Hydrocyanic acid	74-90-8	P063	
245	Mustard gas (Sulfide, bis[2-chloroethyl])	Mustard gas	Sulfide, bis[2-chloroethyl]	295	246	Hydrogen fluoride	Hydrofluoric acid	7684-39-3	U134	
246	Naphthalene	Naphthalene	Same	300	247	Hydrogen sulfide	Hydrogen sulfide H2S	7783-05-4	U135	
247	1,4-Naphthoquinone (1,4-Naphthoquinone)	1,4-Naphthoquinone	1,4-Naphthoquinone	301	248	Iodo[1,2,3,cd]pyrene	Same	160-38-5	U137	
248	1-Naphthylamine (alpha-Naphthylamine)	1-Naphthylamine	alpha-Naphthylamine	302	249	3-Iodo-2-propenyl n-butylcarbamate	Carbamic acid, butyl-, 3-iodo-2-propenyl ester	55406-53-6		
249	2-Naphthylamine (beta-Naphthylamine)	2-Naphthylamine	beta-Naphthylamine	303	250	Iodoethyl alcohol	1-Propanol, 2-methyl-	78-63-1	U140	
250	1-Naphthyl-2-thiourea (Thioures, 1-naphthylmercapto-)	1-Naphthyl-2-thiourea	Thiourea, 1-naphthalenyl-	304	251	Iodrin	1,4,5,6-Dimethanophthalene, 1,2,3,4,10,10-hexamethoxy-1,4,4a,5,6,6a-hexahydro-(1alpha,4alpha,4abeta,5beta,6b eta,6abeta)-	465-73-6	P060	
251	Nickel and compounds, N.O.S.3	Nickel and compounds, N.O.S.3	Same	305-81-1	252	Iodine	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester	118-38-0	P182	
252	Nickel carbonyl (Nickel tetracarbonyl)	Nickel carbonyl	Nickel tetracarbonyl	311	253	Ioscalrol	1,3-Benzodioxole, 5-(1-propenyl)	120	U141	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (verbatim listing)	Compound Names Parsed by NRC		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
253	Nickel cyanide (Nickel (II) cyanide)	Nickel cyanide	308	254	Kepone	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3a,4,5,5a,5b,6-decahydrocyclooctahydro-	143-60-0	U142
254	Nicotine and salts (Pyridine, (S)-3-(1-methyl-2-pyrididinyl)-, and salts)	Nicotine and salts	309 & 310	255	Lasciocarpine	2-Butanol: acid, 2-methyl-,7-[[(2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutyl)methyl]-2,3,5,7-tetrahydro-1Himidazin-1-yl ester [1S-(1alpha,2),7(2S*,3R*)-7asphi]]-	303-34-1	4143
255	Nitric oxide (Nitrogen (II) oxide)	Nitric oxide	311	256	Lead	Same	7439-92-1	
256	p-Nitroaniline (Benzeneamile, 4-nitro-)	p-Nitroaniline	312	257	Lead compounds, N.O.S.1			
257	Nitrobenzene (Benzene, nitro-)	Nitrobenzene	313	258	Lead acetate	Aceto acid, lead(2+) salt	301-04-2	U144
258	Nitrogen dioxide (Nitrogen (IV) oxide)	Nitrogen dioxide	314	259	Lead phosphate	Phosphoric acid, lead(2+) salt (2:3)	7440-27-7	U145
259	Nitrogen mustard and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)-N-methyl-, and hydrochloride salt)	Nitrogen mustard and hydrochloride salt	315 & 316	260	Lead subacetate	Lead, bis(acetoato-Olethoxyhydrotri-	1335-32-6	U146
260	Nitrogen mustard N-Oxide and hydrochloride salt (Ethanamine, 2-chloro-, N-(2-chloroethyl)-N-methyl-, and hydrochloride salt)	Nitrogen mustard N-Oxide and hydrochloride salt	317 & 318	261	Undane	Cyclohexane, 1,2,3,4,5,6-hexachloro-(1alpha,2alpha,3beta,4alpha,5alpha,6beta)-	68-89-6	U128
261	Nitroglycerine (1,2,3-Propanetriol, trinitrate)	Nitroglycerine	319	262	Maleic anhydride	2,5-Furanedione	108-31-6	U147
262	4-Nitrophenol (Phenol, 4-nitro-)	4-Nitrophenol	320	263	Maleic hydrazide	3,6-Pyridazinedione, 1,2-dihydro-	123-33-1	U148
263	4-Nitroquinoline-1-oxide (Quinoline, 4-nitro-1-oxide-)	4-Nitroquinoline-1-oxide	N.C.	264	Malononitrile	Propanedinitrile	109-77-3	U149
264	Nitrosamine, N.O.S.3	Nitrosamine, N.O.S.3	Same	265	Manganese, dimethyl-1,3-propanediamine	Manganese, bis(dimethylcarbamodithioato-3,5'),	15339-35-3	P156
265	N-Nitrosodi-n-butylamine (1-Butanamine, N-butyl-N-nitroso-)	N-Nitrosodi-n-butylamine 1-Butanamine, N-butyl-N-nitroso-	323	266	Melphalan	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	148-80-3	U150

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A) Promulgated by NRC circa 1987			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) Last Date of EPA Promulgation: 11/8/00 (verbatim listing)			
	Hazardous Constituent (verbatim listing)	Chemical Name	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.
265	N-Nitrosodiethanolamine (Ethanol, 2,2-(nitrosoimino)bis-)	N-Nitrosodiethanolamine Ethanol, 2,2-(nitrosoimino)bis-		324	267 Mercury	Same		7439-97-6 U151
267	N-Nitrosodiethylamine (Ethanamine, N-ethyl-N-nitroso-)	N-Nitrosodiethylamine Ethanamine, N-ethyl-N-nitroso-		325	268 Mercury compounds, N.O.S.			
268	N-Nitrosodimethylamine (Dimethylnitrosamine)	N-Nitrosodimethylamine Dimethylnitrosamine		326	269 Mercury fulminate	Fulminic acid, mercury(2+) salt	626-88-4 P065	
269	N-Nitroso-N-ethylurea (Carbamide, N-methyl-N-nitroso-)	N-Nitroso-N-ethylurea Carbamide, N-ethyl-N-nitroso-		327	270 Metam Sodium	Carbamothioic acid, methyl-, monozincium salt	137-42-8	
270	N-Nitrosomethylethylene (Ethanamine, N-methyl-N-nitroso-)	N-Nitrosomethylethylene Ethanamine, N-methyl-N-nitroso-		328	271 Methacryonitrile	2-Propenenitrile, 2-methyl- 1,2-Ethanedamine, N,N-dimethyl-2-pyridyl-N-(2-thienylmethyl)-	125-98-7 U152	
271	N-Nitroso-N-methylurea (Carbamide, N-methyl-N-nitroso-)	N-Nitroso-N-methylurea Carbamic acid, methylnitroso-, ethyl ester		329	272 Methacrylene	Phenol, (3,5-dimethyl-4-(methylol)-, methylcarbamate	2002-65-7 P199	
272	N-Nitrosomethylvinylamine (Ethanamine, N-methyl-N-nitroso-)	N-Nitrosomethylvinylamine Ethanamine, N-methyl-N-nitroso-		330	273 Methiocarb	Ethanimidothioic acid, N-[[methylamino]carbonyl]oxy-, methyl ester	16752-77-5 P066	
273	N-Nitrosomorpholine (Morpholine, N-nitroso-)	N-Nitrosomorpholine Morpholine, N-nitroso-		331	274 Methylomyl	Benzene, 1,1'-(2,2,2-trichloroethylidene)bis[4-methoxy-]	72-43-5 U247	
274	N-Nitrosomonicoline (Norlaudine, N-nitroso-)	N-Nitrosomonicoline Norlaudine, N-nitroso-		332	275 Methoxychlor	Methane, bromo-	74-83-9 U029	
275	N-Nitrosopiperidine (Pyridine, hexahydro-, N-nitroso-)	N-Nitrosopiperidine Pyridine, hexahydro-, N-nitroso-		333	276 Methyl bromide	Methane, chloro- Carbenochloride acid, methyl ester	74-87-3 U045	
276	Nitrosopyrrolidine (Pyrrole, tetrahydro-, N-nitroso-)	Nitrosopyrrolidine Pyrrole, tetrahydro-, N-nitroso-		334	277 Methyl chloride	Ethene, 1,1,1-trichloro-	79-22-1 U158	
277	N-Nitrososarcosine (Sarcosine, N-nitroso-)	N-Nitrososarcosine Sarcosine, N-nitroso-		335	278 Methyl chlorocarbonate	Benzylacetophenone, 1,2-dihydro-3-methyl-	66-49-5 U157	
278	5-Nitro-o-toluidine (Benzanamine, 2-methyl-5-nitro-)	5-Nitro-o-toluidine Benzanamine, 2-methyl-5-nitro-		336	279 Methyl chlorofrom	Benzeneamine, 4,4'-methylenebis[2-chloroaniline]	101-14-4 U158	
279	Ocamethylpyrophosphamide (Diphosphoramido, ocamethyl-)	Ocamethylpyrophospho- ramide Diphosphoramido, ocamethyl-		337	280 3-Methylcholanthrene	Methane, dichromo-	76-95-3 U088	
280	Osmium tetroxide (Osmium (VIII) oxide)	Osmium tetroxide Osmium (VIII) oxide		340	281 4,4'-Methylenobis(2-chloroaniline)	Methane, dichloro-	75-1 U080	
281	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid (Endothal)	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	Endothal	341	282 Methylene bromide			
282				342	283 Methylene chloride			

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Environ.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VII)				
NRC	Promulgated by NRC circa 1987	Compound Names Parsed by DRC	EPA	Last Date of EPA Promulgation: 7/18/00 (verbally listing)				
Order	Hazardous Constituent	Synonym	Order	No.	Common name	Chemical abstracts name	CAS No.	HW No.
283	Paraldehyde (1,3,5-Trioxane, 2,4,6-trimethyl-)	Paraldehyde	1,3,5-Trioxane, 2,4,6-trimethyl-	343	284 Methyl ethyl ketone (MEK)	2-Butanone	78-63-3	U159
284	Parathion (Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester)	Parathion	Phosphorothioic acid, O,O-diethyl O-(p-nitrophenyl)ester	344	285 Methyl ethyl ketone peroxide	2-Butanone, peroxide	1339-23-4	U160
285	Pentachlorobenzene (Benzene, pentachloro-)	Pentachlorobenzene	Benzene, pentachloro-	346	286 Methyl hydrazine	Hydrazine, methyl-	60-34-4	P068
286	Pentachloroethane (Ethane, pentachloro-)	Pentachloroethane	Ethane, pentachloro-	349	287 Methyl iodide	Methane, Iod->	74-89-4	U138
287	Pentachloronitrobenzene (PCNB) (Benzene, pentachloronitro-)	Pentachloronitrobenzen-	Benzene, pentachloronitro-	350	288 Methyl isocyanate	Methane, Isocyanato-	624-83-9	P064
288	Pentachlorophenol (Phenol, pentachloro-)	Pentachlorophenol	Phenol, pentachloro-	351	289 2-Methylacetonitrile	Propanenitrile, 2-hydroxy-2-methyl-	78-66-5	P069
289	Phenacetin (Acetanilide, N-(4-ethoxyphenyl)-)	Phenacetin	Acetanilide, N-(4-ethoxyphenyl)-	352	290 Methyl methacrylate	2-Propenoic acid, 2-methyl-methyl ester	60-62-6	U162
290	Phenol (Benzene, hydroxy-)	Phenol	Benzene, hydroxy-	353	291 Methyl methanesulfonate	Methanesulfonic acid, methyl ester	66-27-3	
291	Phenylenediamine (Benzendiamine)	Phenylenediamine	Benzenediamine	354	292 Methyl parathion	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester	298-00-0	P071
292	Phenylmercury acetate (Mercury, acetato phenyl-)	Phenylmercury acetate	Mercury, acetophenyl-	355	293 Methylthiourea	4(1H)-Pyrimidinone, 2,3-dihydro-5-methyl-2-hydro-	59-04-2	U164
293	N-Phenyliburea (Thiourea, phenyl-)	N-Phenyliburea	Thiourea, phenyl-	356	294 Mexcarb	Carbamoic acid, methyl-, 3-methylphenyl ester	1129-41-5	P150
294	Phosgene (Carbonyl chloride)	Phosgene	Carbonyl chloride	357	295 Mexcarbate	Phenol, 4-(dimethylamino)-3,5-dimethyl-methylcarbamate (gas)	318-18-4	P128
295	Phosphine (Hydrogen phosphide)	Phosphine	Hydrogen phosphide	358	296 Miamycin C	Amino[2',3'(4-pyridyl)[1,2-e]indole-4,7-dione, 6-imino-6-[(aminoacarbonyloxy)methyl]-1,1a,2,8,8a-hexahydro-8a-methoxy-5'-methyl-, [1aS-(1alpha,2beta,6beta,8alpha,8beta)]-	60-07-7	U010
296	Phosphorothioic acid, O,O-diethyl S-[(ethylthio)methyl] ester (Phorate)	Phorate	Phosphorothioic acid, O,O-diethyl S-[(ethylthio)methyl] ester	359	297 MNNG	Guanidina, N-methyl-N-nitro-N-nitroso-	70-25-7	U163
297	Phosphorothioic acid, O,O-dimethyl O-[(dimethylamino)sulfonyl]phenyl ester (Famphur)	Famphur	Phosphorothioic acid, O,O-dimethyl O-[(dimethylamino)sulfonyl]phenyl ester	218	298 Melitate	1H-Azepine-1-carbothioic acid, hexahydro-, 5-ethyl ester	2212-67-1	
298	Phthalic acid esters, N.O.S.3 (Benzene, 1,2-dicarboxylic acid, esters, N.O.S.3)	Phthalic acid esters, N.O.S.3	Benzene, 1,2-dicarboxylic acid, esters, N.O.S.3	260	299 Mustard gas	Ethane, 1,1'-thiobis[2-chloro-	605-49-2	

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
Promulgated by NRC circa 1987 (Verbatim listing)	Compound Names Parsed by DRC Chemical Name	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.	
Phthalic anhydride (1,2-Benzenedicarboxylic acid anhydride)	Phthalic anhydride	1,2-Benzenedicarboxylic acid anhydride	361	300 Naphthalene	Same		61-20-3	U165
300 2-Picoline (Pyridine, 2-methyl-)	2-Picoline	Pyridine, 2-methyl-	364	301 1,4-Naphthoquinone	1,4-Naphthalenedione		130-15-4	U166
301 Polychlorinated biphenyl, N.O.S.3	Polychlorinated biphenyl, N.O.S.3	Same	365	302 alpha-Naphthylamine	1-Naphthalenamine		134-32-7	U167
302 Potassium cyanide	Potassium cyanide	Same	366	303 beta-Naphthylamine	2-Naphthalenamine		91-59-8	U168
303 Potassium silver cyanide [Argentate(1-), dicyano-, potassium]	Potassium silver cyanide potassium	Argentate(1-), dicyano-,	371	304 alpha-Naphthyliourea	Thiourea, 1-naphthyl-		66-89-4	P072
304 Propanamide (3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide)	Propanamide	3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	373	305 Nickel	Same		7440-02-0	
305 1,3-Propane sultone (1,2-Oxathiolane, 2,2-dioxide)	1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	374	306 Nickel compounds, N.O.S.1	Nickel compounds, N.O.S.1			
306 n-Propylamine (3-Propanamine)	n-Propylamine	1-Propanamine	375	307 Nickel carbonyl	Nickel carbonyl Ni(CO)4, [T-4]-		13463-39-3	P073
307 Propylchloride (Undecamethylene diamine, N,N'-bis(2-chlorobenzyl))	Propylchloride	Undecamethylene diamine, N,N'-bis(2-chlorobenzyl), dihydrochloride	381	308 Nickel cyanide	Nickel cyanide Ni(CN)2		557-10-7	P074
308 2-Propyn-1-ol (Propargyl alcohol)	Propargyl alcohol	2-Propyn-1-ol	376	309 Nicotine	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-		54-11-6	P075
309 Pyridine	Pyridine	Same	383	310 Nicotine salts	Nicotine salts			P075
310 Radium -226 and -228	Radium -226 and -228	Same	N.C.	311 Nitric oxide	Nitrogen oxide NO		10102-43-9	P076
Reserpine (Yohimbane-10-carboxylic acid, 11,17-dimethoxy 18-[3,4,5-trimethoxybenzoyloxy]-, methyl ester)	Reserpine	Yohimbane-10-carboxylic acid, 11,17-dimethoxy-18-[3,4,5-trimethoxybenzoyloxy]-, methyl ester	384	312 p-Nitroaniline	Benzeneamine, 4-nitro-		100-01-6	P077
312 Resorcinol (1,3-Benzenediol)	Resorcinol	1,3-Benzenediol	385	313 Nitrobenzene	Benzene, nitro-		98-95-3	U169
313 Saccharin and salts (1,2-Benzisothiazolin-3-one, 1,1-dioxide, and salts)	Saccharin and salts	1,2-Benzisothiazolin-3-one, 1,1-dioxide, and salts	366 &	314 Nitrogen dioxide	Nitrogen oxide NO2		10102-44-0	P078
314 Satoole (Benzene, 1,2-methylenedioxy-4-ethyl-)	Satoole	Benzene, 1,2-methylenedioxy-4-ethyl-	388	315 Nitrogen mustard	Ethanamine, 2-chloro-N-(2-chloroethyl)-N-methyl-		51-75-2	
315 Selenious acid (Selenium dioxide)	Selenious acid	Selenious acid	391	316 salt	Nitrogen mustard, hydrochloride			
316 Selenium and compounds, N.O.S.3	Selenium and compounds, N.O.S.3	Same	389 &	317 Nitrogen mustard N-oxide	Ethanamine, 2-chloro-N-[2-chloroethyl]-N-methyl-, N-oxide,			
317 Selenium sulfide (Sulfur selenide)	Selenium sulfide	Sulfur selenide	390	318 hydro- chloride salt	Nitrogen mustard, N-oxide,		126-85-2	

NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (verbatim listing)	Compound Names Parsed by DRC	EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.	
318	Selenourea	Carbamimidoseleno acid	394	318 Nitroglycerin	1,2,3 Propanetriol, trimethyl	55-63-0	P081	
318	(Carbamimidoselenoic acid)		395 &					
318	Silver and compounds, N.O.S.3	Silver and compounds, N.O.S.3	396	320 p-Nitrophenol	Phenol, 4-nitro-	100-02-7	U170	
320	Silver cyanide	Silver cyanide	397	321 2-nitropropane	Propane, 2-nitro-	79-46-9	U171	
321	Sodium cyanide	Sodium cyanide	398	322 Nitrosamines, N.O.S.1		35576-91-0		
322	Streptozotocin (D-Glucopyranose, 2-deoxy-2-(3-methyl-5-nitrosourido)-)	Streptozotocin	404	323 N-Nitrosodi-n-butylamine	1-Butanamine, N-butyl-N-nitroso-	924-10-3	U172	
323	Strontium sulfide	Strontium sulfide	N.C.	324 N-Nitrosodiethanolamine	Ethanol, 2,2'-(nitrosoimino)bis-	1116-54-7	U173	
324	Strychnine and salts (Strychnidin 10-one, and salts)	Strychnine and salts	405 &	325 N-Nitrosodiethylamine	Ethanamine, N-ethyl-N-nitroso-	65-18-5	U174	
325	1,2,4,5-Tetrachlorobenzene (Benzene, 1,2,4,5-tetrachloro-)	1,2,4,5-Tetrachlorobenzene	410	326 N-Nitrosodimethylamine	Methanamine, N-methyl-N-nitroso-	62-75-8	P082	
326	2,3,7,8-Tetrachlorobenzo-p-dioxin (TCDD) (Dibenz-p-dioxin, 2,3,7,8-tetrachloro-)	Dibenzo-p-dioxin, 2,3,7,8-tetrachloro-	408 &	327 N-Nitroso-N-ethyleurea	Urea, N-ethyl-N-nitroso-	760-73-8	U176	
327	Tetrachloroethane, N.O.S.3 (Ethane, tetrachloro-, N.O.S.3)	Tetrachloroethane, N.O.S.3	412	328 N-Nitrosomethylbutylamine	Ethanamine, N-methyl-N-nitroso-	10505-85-6		
328	1,1,1,2-Tetrachloroethane (Ethane, 1,1,1,2-tetrachloro-)	1,1,1,2-Tetrachloroethane	414	329 N-Nitroso-N-methylurea	Urea, N-methyl-N-nitroso-	684-93-5	U177	
329	1,1,2,2-Tetrachloroethane (Ethane, 1,1,2,2-tetrachloro-)	1,1,2,2-Tetrachloroethane	415	330 N-Nitroso-N-methylurethane	Carbamic acid, methylimidio-, ethyl ester	615-63-2	U178	
330	Tetrachloroethane (Ethene, 1,1,2,2-tetrachloro-)	Tetrachloroethane	415	331 N-Nitrosomethylvinylamine	Vinylamine, N-methyl-N-nitroso-	4549-40-0	P084	
331	Tetrachloromethane (Carbon tetrachloride)	Tetrachloromethane	75	332 N-Nitrosomorpholine	Morpholine, 4-nitroso-	59-89-2		
332	2,3,4,6-Tetrachlorophenol (Phenol, 2,3,4,6-tetrachloro-)	Tetrachlorophenol	2,3,4,6-	333 N-Nitrosomicoline	Pyridine, 3-(1-nitroso-2-pyridinyl)-(S)-	16543-55-8		
333	Tetraethylidiphosphosphate (Dithiopyrophosphoric acid, tetraethyl ester)	Tetraethylidiphosphoric acid, phate	420	334 N-Nitrosopiperazine				
334	Tetraethyl lead (Plumbane, tetraethyl-)	Tetraethyl lead	421	335 N-Nitrosopyrididine	Piperidine, 1-nitroso-	100-75-4	U179	
335	Tetraethylpyrophosphate (Pyrophosphoric acid, tetraethyl ester)	Tetraethylpyrophosphate ester	422	336 N-Nitrososarcosine	Pyrididine, 1-nitroso-	930-55-2	U180	
336	Tetranitromethane (Methene, tetra-nitro-)	Tetranitromethane	424	337 5-Nitro-o-toluidine	Glycine, N-methyl-N-nitroso-	13255-22-9		
337	Thallium and compounds, N.O.S.3	Thallium and compounds, N.O.S.3	425 &	Octachlorodibenzo-p-dioxin	Benzanine, 2-methyl-5-nitro-	99-55-8	U181	
		Same	426	(OCDD)	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268-87-8		

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A) Promulgated by NRC circa 1987			Eqv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order	Hazardous Constituent (verbatim listing)	Chemical Name Compound Names Parsed by DRC	EPA Order	EPA No.	Common name	Chemical abstracts name	GAS No.	HW No.
338	Thallium oxide (Thallium (III) oxide)	Thallium oxide	Thallium (III) oxide	427	Octachlorodibenzofuran	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001-02-0	
339	Thallium (I) acetate (Acetic acid, Thallium (I) salt)	Thallium (I) acetate	Acetic acid, thallium (I) salt	428	339 (ICDF)	340 Octamethylpyrophosphamide	Diphosphoramide, octamethyl-	P065
340	Thallium (I) carbonate (Carbonic acid, di-thallium (I) salt)	Thallium (I) carbonate	Carbonic acid, di-thallium (I) salt	429	341 Osmium tetroxide	Osmium oxide OsO ₄ , (T-4)-	20810-12-0	P087
341	Thallium (I) chloride	Thallium (I) chloride	Same	430	342 Oxamyl	Ethanimidithio acid, 2-(dimethylamino)-N-((methylamino)carbonyl(oxo)-2-oxo-methyl ester	23135-22-0	P196
342	Thallium (I) nitrate (Nitric acid, Thallium (I) salt)	Thallium (I) nitrate	Nitric acid, thallium (I) salt	431	343 Paraldehyde	1,3,5-Trioxane, 2,4,6-trimethyl-	123-63-7	U162
343	Thallium sulfide	Thallium sulfide	Same	432	344 Parathion	Phosphorothioic acid, O,O-dimethyl-O-(4-nitrophenyl)ester	68-98-2	P060
344	Thallium (I) sulfate (Sulfuric acid, thallium (I) salt)	Thallium (I) sulfate	Sulfuric acid, thallium (I) salt	433	345 Petulante	Carbamothioic acid, butylidethyl-S-propyl ester	1114-71-2	
345	Thiacetamide (Ethanethioamide)	Thiacetamide	Ethanethioamide	434	346 Pentachlorobenzene	Benzene, pentachloro-	808-93-5	U163
346	Thiocemicarbazide (Hydrazinecarbothioamide)	Thiocemicarbazide	Hydrazinecarbothioamide	435	347 Pentachlorodibenzo-p-dioxins			
347	Thiourea (Cetamide thio-)	Thiourea	Cetamide thio-	441	348 Pentachlorodibenzofuran			
348	Thiuram (Bis(dimethylthiocarbamoyl) disulfide)	Thiuram	Bis(dimethylthiocarbamoyl) disulfide	442	349 Pentachloroethane	Ethane, pentachloro-	76-01-7	U164
349	Thorium and compounds, N.O.S.3 when producing thorium byproduct material	Thorium and compounds, N.O.S.3 when producing thorium byproduct material	Same	350	Pentachlorobenzene			
350	Toluene (Benzene, methyl-)	Toluene	Benzene, methyl-	444	350 (PCNB)	Benzene, pentachloronitro-	82-68-8	U165
351	Toluenediamine (Diaminotoluene)	Toluenediamine	Diaminotoluene	445	351 Pentachlorophenol	Phenol, pentachloro-	67-86-6	See P027
352	o-Toluidine hydrochloride (Benzanamine, 2-methyl-, hydrochloride)	o-Toluidine hydrochloride	Benzanamine, 2-methyl-, hydrochloride	451	352 Phenacetin	Acetamide, N-(4-ethoxyphenyl)-	62-44-2	U167
353	Tolylene diisocyanate (Benzene, 1,3-diisocyanatomethyl-)	Tolylene diisocyanate	Benzene, 1,3-diisocyanatomethyl-	449	354 Phenylendiamine	Benzenediamine	25285-76-3	
354	Toxaphene (Camphene, octachloro-)	Toxaphene	Camphene, octachloro-	453	355 Phenylmercury acetate	Mercury, (acetato-O-phenyl)-	62-38-4	P092
355	Tribromomethane (Bromoform)	Tribromomethane	Bromform	356	356 Phenylthiourea	Thiourea, phenyl-	107-3	P093

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)				Eqv.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)					
NRC	Promulgated by NRC circa 1967			EPA	Last Date of EPA Promulgation: 7/18/00 (verbally listing)					
Order	Hazardous Constituent (verbally listing)	Compound Names Parsed by DRC	Chemical Name	Synonym	Order	No.	Common name	Chemical abstracts name	CAS No.	HW No.
356	1,2,4-Trichlorobenzene (Benzene, 1,2,4-trichloro-)	1,2,4-Trichlorobenzene	Benzene, 1,2,4-trichloro-	455	357	Phosphene	Carbonyl dichloride	75-44-5	P095	
357	1,1,1-Trichloroethane (Methyl chloroform)	1,1,1-Trichloroethane	Methyl chloroform	279	358	Phosphine	Same	7803-51-2	P096	
358	1,1,2-Trichloroethane (Ethane, 1,1,2-trichloro-)	1,1,2-Trichloroethane	Ethane, 1,1,2-trichloro-	456	359	Phonite	Phosphorodithioic acid, O,O-diethyl 5-[ethyldimethyl] ester	298-02-2	P094	
359	Trichloroethylene (Trichloroethylene)	Trichloroethylene	Trichloroethylene	457	360	Phthalic acid esters, N.O.S.1				
360	Trichloromethanethiol (Methanethiol, trichloro-)	Trichloromethanethiol	Methanethiol, trichloro-	458	361	Phthalic anhydride	1,3-Isobenzofuranone	85-44-9	U190	
361	Trichloromethanofluoromethane (Methane, trichlorofluoro-)	Trichloromethanofluoromethane	Methane, trichlorofluoro-	459	362	Phystostigmine	Pyrrole[2,3-b]indol-5-01, 1,2,3,8,8,8-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-	67-47-6	P294	
362	2,4,5-Trichlorophenol (Phenol, 2,4,5-trichloro-)	2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	460	363	Phenoxyamine salicylate	Benzolo acid, 2-hydroxy-, compl with (3aSdis) - 1,2,3,3a,8,8a-hexahydro-1,3a,8- trimethylpyrrole [2,3-b]indol-5-yl methylcarbamate ester (1:1)	57-64-7	P188	
363	2,4,6-Trichlorophenol (Phenol, 2,4,6-trichloro-)	2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	461	364	2-Picoline	Pyndine, 2-methyl-	109-06-8	U191	
364	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) (Acetic acid, 2,4,5-trichlorophenoxy-)	2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	Acetic acid, 2,4,5-trichlorophenoxy-	462	365	N.O.S.1	Polychlorinated biphenyls,			
365	2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP) (Shex)	Shex (2,4,5-Trichlorophenoxypropion Propionic acid, 2-(2,4,5-trichlorophenoxy)-)	Propionic acid, 2-(2,4,5-trichlorophenoxy)-	369	366	Potassium cyanide	Potassium cyanide K(CN)	151-50-8	P098	
366	Trichloropropane, N.O.S.3 (Propane, trichloro-, N.O.S.3)	Trichloropropane, N.O.S.3	Propane, trichloro-, N.O.S.3	463	367	Potassium dimethylidithiocarbamate	Carbamodithioic acid, dimethyl-, potassium salt	128-03-0		
367	1,2,3-Trichloropropane (Propane, 1,2,3-trichloro-)	1,2,3-Trichloropropane	Propane, 1,2,3-trichloro-	464	368	Potassium n-hydroxymethyl-n-methylidithiocarbamate	Carbamodithioic acid (hydroxymethyl)methyl-, monopotassium salt	51026-26-9		
368	O,O,O-Triethyl phosphorothioate (Phosphorothioic acid, O,O,O-triethyl ester)	O,O,O-Triethyl phosphorothioate	Phosphorothioic acid, O,O,O-triethyl ester	466	369	Potassium n-methylidithiocarbamate	Carbamodithioic acid, methylmonopotassium salt	137-41-7		
369	sym-Trinitrobenzene (Benzene, 1,3,5-trinitro-)	sym-Trinitrobenzene	Benzene, 1,3,5-trinitro-	467	370	Potassium pentachlorophenate	Pentachlorophenol, potassium salt	7778736	None	

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A) Promulgated by NRC circa 1987			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) Last Date of EPA Promulgation: 11/9/00 (verbally listing)			
	Hazardous Constituent (verbally listing)	Chemical Name	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.
370	(Tri(1-azidinyl) phosphine sulfide (Phosphine sulfide, tri(1-azidinyl) phosphine sulfide	Phosphine sulfide, tri(1-azidinyl)-		469	371	Potassium silver cyanide	Argentite(1-), bis(cyano-C), potassium	500-61-6
371	Tri(2,3-dibromopropyl) phosphate (1-Propanol, 2,3-dibromo-, phosphate)	Tri(2,3-dibromopropyl) phosphate	1-Propanol, 2,3-dibromo-,	469	372	Promecarb	Phenol, 3-methyl-5-(1-methylallyl)-, methyl carbamate	2691-97-0
372	Trypan blue (2,7-Naphthalenedisulfonic acid, 3,3'-[[3,3'-dimethyl (1,1'-biphenyl)-4,4'-diyl]bis[azoxyl]bis[5-amino-4-hydroxy-, tetrasodium salt])	Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'[[3,3'-dimethyl (1,1'-biphenyl)-4,4'-diyl]bis[azoxyl]bis[5-amino-4-hydroxy-, tetrasodium salt]	470	373	Pronamide	Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2-propynyl)-	23960-58-5
373	Ureid mustard (Ureid 5-[bis(2-chloroethyl)amino]-)	Ureid mustard	Ureid 5-[bis(2-chloroethyl)amino]-	471	374	1,3-Propane sultone	1,2-Oxathiolane, 2,2-dioxide	1120-71-4
374	Uranium and compounds, N.O.S.3	Uranium and compounds, N.O.S.3	Same	N.C.	375	n-Propylamine	1-Propanamine	107-10-8
	Vanadic acid, ammonium salt	Vanadic acid	ammonium vanadate	21	376	Propargyl alcohol	2-Propyn-1-ol	107-19-7
	Vanadium pentoxide (Vanadium (V) oxide)	Vanadium pentoxide	Vanadium (V) oxide	472	377	Prepham	Carboxic acid, phenyl-, 1-methylethyl ester	122-42-9
	Vinyl chloride (Ethene, chloro-)	Vinyl chloride	Ethene, chloro-	474	378	Propoxur	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-25-1
	Zinc cyanide	Zinc cyanide	Same	479	379	Propylene dichloride	Propane, 1,2-dichloro-	75-87-5
	Zinc phosphide	Zinc phosphide	Same	480	380	1,2-Propylenimine	Aziridine, 2-methyl-	75-55-8
	= Total Number of NRC Hazardous Constituents (circa 1987)				381	Propylthiouracil	4(1H)-Pyrimidinone, 2,3-dihydro-6-propyl-2-thioxo-	51-52-6
	= Number of 1987 Parameters Removed by EPA				382	Propulocarb	Carboxylic acid, dipropyl-, 5-(phenylmethyl) ester,	52888-80-0
					383	Pyridine	Same	110-86-1
					384	Reserpine	Yohimbane-18-carboxylic acid, 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyloxy)methyl]ester,(3beta,16beta,17alpha,18beta,20alpha)-	50-65-5
					385	Resorcinol	1,3-Benzenediol	108-46-3
					386	Saccharin	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide	61-1-

NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A)			Equiv.	EPA Hazardous Constituents (49 CFR 261, APPENDIX VIII)			
NRC Order No.	Hazardous Constituent (verbam listing)	Compound Name/ Parsed by DRC	EPA Order No.	Last Date of EPA Promulgation: 11/6/00 (verbam listing)			
		Chemical Name		Common name	Chemical abstracts name	GAS No.	HW No.
				387 Selenmann salts			U202
				388 Selenite	1,3-Benzodioxole, 5-(2-propenyl)	94-59-7	U203
				389 Selenum	Same	7782-49-2	
				390 Selenium compounds, N.O.S.1			
				391 Selenium dioxide	Selenous acid	7783-00-8	U204
				392 Selenium sulfide	Selenium sulfide SeS2	7486-55-4	U205
				393 Selenium, tetrakis(dimethyl-dithiocarbamate)	Carbamodithioic acid, dimethyl-tetrahydrodisulfide with orthothioselenic acid	144-34-3	
				394 Selenourea	Same	630-10-4	P103
				395 Silver	Same	7440-22-4	
				396 Silver compounds, N.O.S.1			
				397 Silver cyanide	Silver cyanide Ag(CN)	500-64-9	P104
				398 Silver (2,4,5-TIP)	Propenoic acid, 2-(2,4,5-trichlorophenoxy)-	53-72-1	See F027
				399 Sodium cyanide	Sodium cyanide Na(CN)	143-33-9	P105
				400 dimethylthiocarbamate	Carbamodithioic acid, ethyl-, sodium salt	136-30-1	
				401 diethylthiocarbamate	Carbamodithioic acid, diethyl-, sodium salt	146-18-5	
				402 dimethylthiocarbamate	Carbamodithioic acid, dimethyl-, sodium salt	128-04-1	
				403 Sodium pentachlorophenate	Pentachlorophenol, sodium salt	131522	None
				404 Streptozotocin	D-Glucose, 2-deoxy-2-[[[methylthio]carbamino]carbonyl]alpha-mino]-	16883-66-4	U206
				405 Strychnine	Strychnidin-10-one	57-24-9	P108
				406 Strychnine salts			P108
				407 Sulfitate	Carbamodithioic acid, diethyl-, 2-chloro-2-propenyl ester	95-05-7	
				408 TCDD	Dibenz[<i>p,p'</i>]dioxin, 2,3,7,8-tetrachloro-	1748-01-6	
				409 Tetrabutylthiuram disulfide	Tetrapropyldicarbonic diamide, tetraethyl	1634-02-2	
				410 1,2,4,5-Tetrachlorobenzene	Benzene, 1,2,4,5-tetrachloro-	65-94-3	U207
				411 Tetrachlorobenzo-p-dioxins			
				412 Tetrachlorodibenzofuran	Ethane, tetrachloro-, N.O.S.	25322-20-7	
				413 Tetrachloromethane, N.O.S.1	Ethane, 1,1,2-tetrachloro-	630-20-6	U208
				414 1,1,1,2-Tetrachloroethane	Ethane, 1,1,2,2-tetrachloro-	79-34-5	U209
				415 1,1,2,2-Tetrachloroethane	Ethane, tetrachloro-	17-74-4	U210

NRC Order No.	Hazardous Constituent (verbasc listing)	Compound Names Parsed by DRC	EPA Order No.	List of Hazardous Constituents (NRC/13, EPA/2000, verbasc listing)			
				Common name	Chemical abstracts name	CAS No.	HW No.
			417	2,3,4,6-Tetrachlorophenol 2,3,4,6-tetrachlorophenol	Phenol, 2,3,4,6-tetrachloro-	69-90-2	See F027
			418	potassium salt	same	63526279	None
			419	sodium salt	same	25567559	None
			420	Tetramethylthiopyrophosphate	Thiophosphoric acid, tetraethyl ester	5580-24-5	P109
			421	Tetraethyl lead	Plumbane, tetraethyl-	78-00-2	P110
			422	Tetraethyl pyrophosphate	Diphosphorus acid, tetraethyl ester	107-49-3	P111
			423	Tetramethylthiuram	Bis(dimethylthiocarbamoyl)sulfide	97-74-5	
			424	Thionyl chloride	Methane, tetranitro-	509-14-6	P112
			425	Thallium	Same	7440-28-0	
			426	Thallium compounds, N.O.S.1			
			427	Thallium oxide	Thallium oxide Tl2 O3	1314-32-5	P113
			428	Thallium(0) acetate	Aceto acid, thallium(+) salt	583-68-8	U214
			429	Thallium(0) carbonate	Carbonic acid, di-thallium(+) salt	6533-73-6	U215
			430	Thallium(0) chloride	Thallium chloride TlCl	7791-12-0	U215
			431	Thallium(0) nitrate	Nitric acid, thallium(+) salt	10102-45-1	U217
			432	Thallium selenite	Selenious acid, di-thallium(+) salt	12039-62-0	P114
			433	Thallium(II) sulfate	Sulfuric acid, di-thallium(+) salt	7445-16-6	P115
			434	Thiocetamide	Ethanethioamide	62-65-5	U216
			435	Thiodicarb	Ethanimidethiolic acid, N,N'-[thiobis ([methylimino]carbonyloxy)] bis-, dimethyl ester	50669-25-0	U410
			436	Thianox	2-Butanone, 3,3-dimethyl-1-(methylthio)-, 0-[methyl(aminocarbonyl)oxime]	39190-18-4	P045
			437	Thiomethanol	Methanethiol	74-93-1	U153
			438	Thiophanate-methyl	Carbonic acid, [1,2-phenylenecis-(imino-carbonyloxy)] bis-, dimethyl ester	23584-05-8	U409
			439	Thiophenol	Benzeneethiol	108-98-5	P014
			440	Thiosemicarbazide	Hydrazinocarbothiamide	79-19-6	P116
			441	Thiourea	Same	62-66-6	U219
			442	Thiram	Thioperoxydicarbonic diamide [H2 NiCl(S)]2 S2, tetramethyl-	137-18	U244

NRC Criterion 13 Hazardous Constituents (40 CFR 40, Appendix A)			Equivalent	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII)				
NRC Order No.	Hazardous Constituent (verbatim listing)	Chemical Name	Compound Names Parsed by GRC	EPA Order No.	Last Date of EPA Promulgation (verbatim listing)			
				No.	Common name	Chemical abstracts name	CAS No.	HW No.
					1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-,O-[methyl(aminocarbonyl)] oxime	26419-73-8	P185	
				443	Triptale			
				444	Toluene	Benzene, methyl-	108-80-3	U228
				445	Toluenediamine	Benzenediamine, ar-methyl-	25376-45-8	U221
				446	Toluene-2,4-diamine	1,3-Benzenediamine, 4-methyl-	93-80-7	
				447	Toluene-2,6-diamine	1,3-Benzenediamine, 2-methyl-	623-40-6	
				448	Toluene-3,4-diamine	1,2-Benzenediamine, 4-methyl-	490-72-0	
				449	Toluene diisocyanate	Benzene, 1,3-diisocyanato(methyl)-	26471-62-5	U223
				450	<i>o</i> -Toluidine	Benzanamine, 2-methyl-	95-53-4	U328
				451	<i>o</i> -Toluidine hydrochloride	Benzanamine, 2-methyl-, hydrochloride	638-21-5	U222
				452	<i>p</i> -Toluidine	Benzanamine, 4-methyl-	106-49-0	U353
				453	Toxaphene	Same	8001-35-2	P123
				454	Trilolate	Carbamothioic acid, bis(1-methylethyl), S-(2,3,3-trichloro-2-propenyl) ester	2303-17-5	U389
				455	1,2,4-Trichlorobenzene	Benzene, 1,2,4-trichloro-	120-62-1	
				456	1,1,2-Trichloroethylene	Ethane, 1,1,2-trichloro-	79-00-5	U227
				457	Trichloroethylene	Ethene, trichloro-	79-01-6	U228
				458	Trichloromethanethiol	Methanethiol, trichloro-	75-70-7	P118
				459	Trichloromonofluoromethane	Methane, trichlorofluoro-	75-69-4	U121
				460	2,4,5-Trichlorophenol	Phenol, 2,4,5-trichloro-	95-95-4	See P027
				461	2,4,6-Trichlorophenol	Phenol, 2,4,6-trichloro-	69-06-2	See P027
				462	2,4,6-T	Acetic acid, (2,4,6-trichlorophenoxy)-	63-70-5	See P027
				463	Trichloropropane, N.O.S.		25736-29-9	
				464	1,2,3-Trichloropropane	Propane, 1,2,3-trichloro-	99-18-4	
				465	Trimethylamine	Ethanamine, N,N-dimethyl-	121-44-5	U404
				466	O,O,O-Triethyl phosphorothioate	Phosphorothioic acid, O,O,O-inethyl ester	126-68-1	
				467	1,3,5-Trinitrobenzene	Benzene, 1,3,5-trinitro-	99-35-4	U234
				468	Tri(1-azidinyl)phosphine	Aziridine, 1,1,1'-phosphino-	62-24-4	
				469	sulfide	1-Propanol, 2,3-dibromo-, phosphate (3:1)	126-72-7	U235
				470	Tri(2,3-dibromopropyl) phosphate			

NRC Order No.	NRC Criterion 13 Hazardous Constituents (10 CFR 40, Appendix A) Formulated by NRC circa 1987			Equiv. Order No.	EPA Hazardous Constituents (40 CFR 261, APPENDIX VIII) Last Date of EPA Formulation: 11/6/00 (Verbatim listing)				
	Hazardous Constituent (Verbatim listing)	Chemical Name	Synonym		EPA Order No.	Common name	Chemical abstracts name	CAS No.	HW No.
				470	Trypan blue	2,7-Naphthalenedisulfonic acid, 3,3'-(3,3'-dimethyl(1,1'-biphenyl)-4,4'-diyl)bis(azo)-N,N-bis(6-amino-4-hydroxy-, triasodium salt	72-57-1	U236	
				471	Uradil mustard	2,4-(H ₃ SiH)-Pyrimidinedione, 5-[bis(2-chloroethyl)amino]-	60-75-1	U237	
				472	Vanadium pentoxide	Vanadium oxide V2 O5	1314-62-1	P120	
				473	Vermolate	Carbamothioic acid, dipropyl-5-propyl ester	1829-77-7		
				474	Vinyl chloride	Ethene, chloro-	75-01-4	U043	
						2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, when present at concentrations less than 0.3%	81-81-2	U245	
				475	Warfarin				
				476	Warfarin	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, when present at concentrations greater than 0.3%	81-81-2	P001	
				477	Warfarin salts, when present at concentrations less than 0.3%				U246
				478	Warfarin salts, when present at concentrations greater than 0.3%.				
				479	Zinc cyanide	Zinc cyanide Zn(CN) ₂	557-21-1	P121	
				480	Zinc phosphide	Zinc phosphide Zn ₃ P ₂ , when present at concentrations greater than 10%	1314-84-7	P122	
				481	Zinc phosphide	Zinc phosphide Zn ₃ P ₂ , when present at concentrations of 10% or less.	1314-84-7	U249	
				482	Ziram	Zinc, bis(dimethylcarbamodithiocato-8,8')-(T-4)	137-30-4	P295	
						= Total Number of Current EPA Parameters			
						= Number of New EPA Parameters (post-1987)			

Cell: H2

Comment: Current EPA Hazardous Constituents from EPA rules found on Internet at:
http://www.access.gpo.gov/nara/cfr/cfrhtml_00>Title_40/40cfr261_00.html
Downloaded on 7/30/02.

History of Changes to this EPA Rule is as follows:

[53 FR 13388, Apr. 22, 1988, as amended at 53 FR 43881, Oct. 31, 1988; 54 FR 50978, Dec. 11, 1989; 55 FR 50483, Dec. 6, 1990; 56 FR 7568, Feb. 25, 1991;
59 FR 468, Jan. 4, 1994; 59 FR 31551, June 20, 1994; 60 FR 7853, Feb. 9, 1995; 60 FR 19165, Apr. 17, 1995; 62 FR 32977, June 17, 1997; 63 FR 24625, May
4, 1998; 65 FR 14475, Mar. 17, 2000; 65 FR 67127, Nov. 8, 2000].

Cell: B3

Comment: NRC Criterion 13, Hazardous Constituent: the name listed in this column is verbatim from the NRC regulation. The name in parentheses constitutes the chemical synonym for the compound listed.

Cell: A4

Comment: NRC Order Number: given by the DRC in this spreadsheet to serve as a sequential identification number for the various compounds published in the NRC rule, 10 CFR 40, Appendix A, Criterion 13.

Cell: D4

Comment: NRC Criterion 13, Chemical Synonym: this equivalent compound name was originally found in parentheses in 10 CFR 40, Appendix A, Criterion 13.

Cell: G4

Comment: EPA Order Number: given by the DRC in this spreadsheet to serve as a sequential identification number for the various compounds published in the EPA rule, 40 CFR 261, Appendix VIII.

Cell: B23

Comment: 4-Aminopyridine (or 4-Pyridinamine); error made in 10 CFR 40, Appendix A, Criterion 13 in that this compound was mistakenly combined with the one ahead of it on the Criterion 13 list [5-(Aminomethyl)-3-isoxazolo].

Cell: H30

Comment: 1 The abbreviation N.O.S. (not otherwise specified) signifies those members of the general class not specifically listed by name in this appendix.

Cell: E62

Comment: N.C. = No Correlation

Cell: H207

Comment: Other Synonyms for Epichlorohydrin include*:

1-chlor-2,3-epoxypropane
chloromethyloxirane
2-chloropropylene oxide
 γ -chloropropyleneoxide
epichlorhydrin

* () EPA IRIS database for Epichlorohydrin at Internet address: Page 2-29

<http://www.epa.gov/iris/subst/0050.html#syn>.

Cell: C247

Comment: Another Synonym = Aldicarb.

Cell: I303

Comment: Other Synonyms for MNNG:

1-METHYL-1-NITROSO-3-NITROGUANIDINE
(from EPA Envirofacts Master Chemical Integrator database at Internet address:
<http://www.epa.gov/enviro/html/emci/chemref/70257.html>)

Cell: C337

Comment: Other Synonyms for Tetrachloroethane *:

79-34-5
ACETYLENE TETRACHLORIDE
BONOFORM
CELLON
1,1,2,2-CZTEROCHLOROETAN
1,1-DICHLORO-2,2-DICHLOROETHANE
ETHANE, 1,1,2,2-TETRACHLORO-
NCI-C0354
RCRA WASTE NUMBER U209
TCE
1,1,2,2-TETRACHLOORETHAAN
1,1,2,2-TETRACHLORAETHAN
TETRACHLORETHANE
1,1,2,2-TETRACHLORETHANE
1,1,2,2-Tetrachloroethane
Tetrachloroethane, 1,1,2,2-
sym-TETRACHLOROETHANE
TETRACHLORURE D'ACETYLENE
1,1,2,2-TETRACLOROETANO
UN 1702
WESTRON

* From EPA IRIS Internet database at:

<http://www.epa.gov/iris/subst/0193.html#syn>

Cell: B360

Comment: Toluene diisocyanate: this compound is mis-spelled in 10 CFR 40, Appendix A, Criterion 13. Comparison of the synonyms from both the NRC and EPA lists shows this compound is Toluene diisocyanate.

Cell: H422

Comment: OK Synonyms for Tetrachloroethylene *:

127-18-4
Anklostin
Antisol 1
Antisol 1
Carbon bichloride
Carbon dichloride
Czterochloroetylen
Dee-Solv
Didakene
Didokene
Dowclene EC
Dow-Per
ENT 1,860
Ethene, tetrachloro-
Ethylene tetrachloride
Ethylene, tetrachloro-
Fedral-Un
NCI-C04580
Nema
PCE
PER
Perawin
PERC
Perchlorethyleen, per
Perchlor
Perchloroethylen, per
Perchloroethylene, per
Perchloroethylene
Perclos
Percloroethylene
Percosolv
Percosolve
PERK
Perklone
Persec
Tellen
Tetrapac
Tetrachloroethen
Tetrachloraethen
Tetrachlorethylene
Tetrachloroethrene
Tetra^m-chloroethylene
1,1^o-Tetrachloroethylene.

Tetracloroetene

Tetraguer

Tetraleno

Tetralex

Tetravec

Tetroquer

Tetropil

WLN: GYGUYGG

* from EPA IRIS Internet database at:
<http://www.epa.gov/iris/subst/0106.html#syn>.

Cell: H463

Comment: Other synonyms for Trichloroethylene *:

79-01-6

ACETYLENE TRICHLORIDE

ALGYLEN

ANAMENTH

BENZINOL

BLACOSOLV

BLANCOSOLV

CECOLENE

CHLORILEN

1-CHLORO-2,2-DICHLOROETHYLENE

CHLORYLEA

CHLORYLEN

CHORYLEN

CIRCOESOLV

CRAWHASPOL

DENSINFLUAT

1,1-DICHLORO-2-CHLOROETHYLENE

DOW-TRI

DUKERON

ETHINYL TRICHLORIDE

ETHYLÉNE TRICHLORIDE

ETHYLENE, TRICHLORO-

FLECK-FLIP

FLOCK FLIP

FLUATE

GEMALGENE

GERMALGENE

LANADIN

LETHURIN

NAF GEN

NARKOGEN
NARKOSOID
NCI-C04546
NIALK
PERM-A-CHLOR
PERM-A-CLOR
PETZINOL
PHILEX
RCRA WASTE NUMBER U228
TCE
THRETHYLEN
THRETHYLENE
TRETHYLENE
TRI
TRIAD
TRIAL
TRIASOL
TRICHLOORETHEEN
TRICHLOORETHYLEEN, TRI
TRICHLORAETHEN
TRICHLORAETHYLEN, TRI
TRICHLORAN
TRICHLOREN
TRICHLORETHENE
TRICHLORETHYLENE
TRICHLORETHYLENE, TRI
TRICHLOROETHENE
Trichlorethylene
1,1,2-TRICHLOROETHYLENE
1,2,2-TRICHLOROETHYLENE
TRICLORENE
TRICLORETENE
TRICLOROETILENE
TRIELENE
TRIELIN
TRIELINA
TRIKLONE
TRILEN
TRILENE
TRILINE
TRIMAR
TRIOL
TRI-PLUS
TF US M

UN 1710
VESTROL
VITRAN
WESTROSOL

* from EPA IRIS Internet database at:
<http://www.epa.gov/iris/subst/0199.html#syn>.

ATTACHMENT 3

Selected Citations from the Utah Water Quality Act

and the

Utah Ground Water Quality Protection Regulations

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Selected Citations from the Utah Water Quality Act (UCA 19-5) - listed in published order:

19-5-102(3): "Discharge" means the addition of any pollutant to any waters of the state.

19-5-102 (9): "Pollution" means any man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of any waters of the state, unless the alteration is necessary for the public health and safety.

19-5-102(10): "Publicly owned treatment works" means any facility for the treatment of pollutants owned by the state, its political subdivisions, or other public entity.

19-5-102 (14): "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, incinerator, or other works used for the purpose of treating, stabilizing, or holding wastes.

19-5-102 (17): "Waste" or "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

19-5-102 (18): "Waters of the state":

(a) means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion of the state; and

(b) does not include bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, a public health hazard, or a menace to fish or wildlife.

19-5-104(I)(e), (h), and (i): Powers and duties of board.

(I) The board has the following powers and duties, but the board shall give priority to pollution that results in hazards to the public health:

...
(e) adopt, modify, or repeal standards of quality of the waters of the state and classify those waters according to their reasonable uses in the interest of the public under conditions the board may prescribe for the prevention, control, and abatement of pollution; ...

(h) review plans, specifications, or other data relative to disposal systems or any part of disposal systems, and issue construction permits for the installation or modification of treatment works or any parts of them;

(i) after public notice and opportunity for a public hearing, issue, continue in effect, revoke, modify, or deny discharge permits under reasonable conditions the board may prescribe to control the management of sewage sludge or to prevent or control the discharge of pollutants, including effluent limitations for the discharge of wastes into the waters of the state;

19-5-107 (1)(a): Except as provided in this chapter or rules made under it, it is unlawful for any person to discharge a pollutant into waters of the state or to cause pollution which constitutes a menace to public health and welfare, or is harmful to wildlife, fish or aquatic life, or impairs domestic, agricultural, industrial, recreational, or other beneficial uses of water, or to place or cause to be placed any wastes in a location where there is probable cause to believe it will cause pollution.

19-5-107 (3) and (3)(b): It is unlawful for any person, without first securing a permit from the executive secretary as authorized by the board, to:

...
... (b) construct, install, modify, or operate any treatment works or part of any treatment works or any extension or addition to any treatment works, or construct, install, or operate any establishment or extension or modification of or addition to any treatment works, the operation of which would probably result in a discharge.

Selected Citations from the Utah Ground Water Quality Protection Regulations – listed in published order:

R317-6-1.1: "Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.

R317-6-1.3: "Best Available Technology" means the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs.

R317-6-1.10: "Compliance Monitoring Point" means a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits.

R317-6-1.13: "Discharge" means the release of a pollutant directly or indirectly into subsurface waters of the state.

R317-6-1.19: "Ground Water" means subsurface water in the zone of saturation including perched ground water.

R317-6-1.20: "Ground Water Quality Standards" means numerical contaminant concentration levels adopted by the Board in or under R317-6-2 for the protection of the subsurface waters of the State.

R317-6-1.28: "Point of Discharge" means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes.

R317-6-1.30: "Pollution" means such contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

R317-6-1.39: "Water Table" means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

R317-6-1.40: "Water Table Aquifer" means an aquifer extending downward from the water table to the first confining bed.

R317-6-2: Ground Water Quality Standards

2.1: The following Ground Water Quality Standards as listed in Table I are adopted for protection of ground water quality.

TABLE I

GROUND WATER QUALITY STANDARDS

Parameter	Milligrams per liter (mg/l) unless noted otherwise and based on analysis of filtered sample except for Mercury and organic compounds
-----------	--

PHYSICAL CHARACTERISTICS

Color (units)	15.0
Corrosivity (characteristic)	noncorrosive
Odor (threshold number)	3.0
pH (units)	6.5-8.5

INORGANIC CHEMICALS

Cyanide (free)	0.2
Fluoride	4.0
Nitrate (as N)	10.0
Nitrite (as N)	1.0
Total Nitrate/Nitrite (as N)	10.0

METALS

Arsenic	0.05
Barium	2.0
Cadmium	0.005
Chromium	0.1
Copper	1.3
Lead	0.015
Mercury	0.002
Selenium	0.05
Silver	0.1
Zinc	5.0

ORGANIC CHEMICALS

Pesticides and PCBs

Alechlor	0.002
Aldicarb	0.003
Aldicarb sulfone	0.002
Aldicarb sulfoxide	0.004
Atrazine	0.003
Carbofuran	0.04
Chlordane	0.002
Dibromochloropropane	0.0002
2, 4-D	0.07
Diquat	0.02
Dichlorophenoxyacetic acid (2, 4-) (2,4D)	0.07
Endosulfan	0.1
Endrin	0.002
Ethylene Dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
Lindane	0.0002
Methoxychlor	0.04

Polychlorinated Biphenyls	0.0005
Pentachlorophenol	0.001
Toxaphene	0.003
2, 4, 5-TP (Silvex)	0.05

VOLATILE ORGANIC CHEMICALS

Benzene	0.005
Carbon tetrachloride	0.005
1, 2 -Dichlorethane	0.005
1, 1 -Dichloroethylene	0.007
1, 1, 1-Trichloroethane	0.200
para - Dichlorobenzene	0.075
o-Dichlorobenzene	0.6
cis-1,2 dichloroethylene	0.07
trans-1,2 dichloroethylene	0.1
1,2 Dichloropropane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (Total)	10

OTHER ORGANIC CHEMICALS

Trihalomethanes	0.1
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RADIONUCLIDES

The following are the maximum contaminant levels for Radium-226 and Radium-228, and gross alpha particle radioactivity, beta particle radioactivity, and photon radioactivity:

Combined Radium-226 and Radium-228 5pCi/l

Gross alpha particle activity,
including Radium-226 but
excluding Radon and Uranium 15pCi/l

Beta particle and photon radioactivity
The average annual concentration from man-made radionuclides of beta particle and photon radioactivity from man-made
radionuclides shall not produce an annual dose equivalent to the total body or any internal organ greater than four
millirem/year.

Except for the radionuclides listed below, the concentration of man-made radionuclides causing four millirem total body

or organ dose equivalents shall be calculated on the basis of a two liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burden and Maximum Permissible Concentration Exposure", NBS Handbook 69 as amended August 1962, U.S. Department of Commerce. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed four millirem/year.

Average annual concentrations assumed to produce a total body or organ dose of four millirem/year:

Radionuclide	Critical Organ	pCi per liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

R317-6-2.2: A permit specific ground water quality standard for any pollutant not specified in Table I may be established by the Executive Secretary at a level that will protect public health and the environment. This permit limit may be based on U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk based contaminant levels, standards established by other regulatory agencies and other relevant information.

R317-6-3: Ground Water Classes

3.1 GENERAL

The following ground water classes are established: Class IA - Pristine Ground Water; Class IB - Irreplaceable Ground Water; Class IC - Ecologically Important Ground Water; Class II - Drinking Water Quality Ground Water; Class III - Limited Use Ground Water; Class IV - Saline Ground Water.

3.2 CLASS IA - PRISTINE GROUND WATER

Class IA ground water has the following characteristics:

- A. Total dissolved solids of less than 500 mg/l.
- B. No contaminant concentrations that exceed the ground water quality standards listed in Table I.

3.3 CLASS IB - IRREPLACEABLE GROUND WATER

Class IB ground water is a source of water for a community public drinking water system for which no reliable supply of comparable quality and quantity is available because of economic or institutional constraints.

3.4 CLASS IC - ECOLOGICALLY IMPORTANT GROUND WATER

Class IC ground water is a source of ground water discharge important to the continued existence of wildlife habitat.

3.5 CLASS II - DRINKING WATER QUALITY GROUND WATER

Class II ground water has the following characteristics:

- A. Total dissolved solids greater than 500 mg/l and less than 3000 mg/l.
- B. No contaminant concentrations that exceed ground water quality standards in Table I.

3.6 CLASS III - LIMITED USE GROUND WATER

Class III ground water has one or both of the following characteristics:

- A. Total dissolved solids greater than 3000 mg/l and less than 10,000 mg/l, or;
- B. One or more contaminants that exceed the ground water quality standards listed in Table I.

3.7 CLASS IV - SALINE GROUND WATER

Class IV ground water has total dissolved solids greater than 10,000 mg/l.

R317-6-4: Ground Water Class Protection Levels

4.1 GENERAL

A. Protection levels are ground water pollutant concentration limits, set by ground water class, for the operation of facilities that discharge or would probably discharge to ground water.

B. For the physical characteristics (color, corrosivity, odor, and pH) and radionuclides listed in Table 1, the values listed are the protection levels for all ground water classes.

4.2 CLASS IA PROTECTION LEVELS

A. Class IA ground water will be protected to the maximum extent feasible from degradation due to facilities that discharge or would probably discharge to ground water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 500 mg/L.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard value, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.3 CLASS IB PROTECTION LEVELS

A. Class IB ground water will be protected as an irreplaceable source of drinking water.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed the lesser of 1.1 times the background value or 2000 mg/L.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.1 times the background concentration or 0.1 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.4 CLASS IC PROTECTION LEVELS

Class IC ground water will be protected as a source of water for potentially affected wildlife habitat. Limits on increases of total dissolved solids and organic and inorganic chemical compounds will be determined in order to meet applicable surface water standards.

4.5 CLASS II PROTECTION LEVELS

A. Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background value.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.25 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.25 times the background concentration or 0.25 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard.

4.6 CLASS III PROTECTION LEVELS

A. Class III ground water will be protected as a potential source of drinking water, after substantial treatment, and as a source of water for industry and agriculture.

B. The following protection levels will apply:

1. Total dissolved solids may not exceed 1.25 times the background concentration level.

2. When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.5 times the ground water quality standard, or the limit of detection.

3. When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.5 times the background concentration or 0.5 times the ground water quality standard; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard. If the background concentration exceeds the ground water quality standard no increase will be allowed.

4.7 CLASS IV PROTECTION LEVELS

Protection levels for Class IV ground water will be established to protect human health and the environment.

R317-6-5: Ground Water Classification for Aquifers.

5.1 GENERAL

A. When sufficient information is available, entire aquifers or parts thereof may be classified by the Board according to the quality of ground water contained therein and commensurate protection levels will be applied.

B. Ground water sources furnishing water to community drinking water systems with ground water meeting Class IA criteria are classified as Class IA.

5.2 CLASSIFICATION AND RECLASSIFICATION PROCEDURE

A. The Board may initiate classification or reclassification.

B. Any person may petition the Board for classification and reclassification.

C. Boundaries for class areas will be delineated so as to enclose distinct ground water classes as nearly as known facts permit. Boundaries will be based on hydrogeologic properties, existing ground water quality and for Class IB and IC, current use. Parts of an aquifer may be classified differently.

D. The petitioner requesting reclassification will provide sufficient information to determine if reclassification is in the best interest of the beneficial users.

E. A petition for classification or reclassification shall include:

1. factual data supporting the proposed classification;

2. a description of the proposed ground waters to be classified or reclassified;

3. potential contamination sources;

4. ground water flow direction;

5. current beneficial uses of the ground water; and

6. location of all water wells in the area to be classified or reclassified.

F. One or more public hearings will be held to receive comment on classification and reclassification proposals.

G. The Board will determine the disposition of all petitions for classification and reclassification, except as provided in R317-6-5.2.H.

H. Ground water proximate to a facility for which an application for a ground water discharge permit has been made may be classified by the Executive Secretary for purposes of making permitting decisions.

R317-6-6.3: DUTY TO APPLY FOR A GROUND WATER DISCHARGE PERMIT

A. No person may construct, install, or operate any new facility or modify an existing or new facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, without a ground water discharge permit from the Executive Secretary. A ground water discharge permit application should be submitted at least 180 days before the permit is needed.

B. All persons who constructed, modified, installed, or operated any existing facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to: land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, must have submitted a notification of the nature and location of the discharge to the Executive Secretary before February 10, 1990 and must submit an application for a ground water discharge permit within one year after receipt of written notice from the Executive Secretary that a ground water discharge permit is required.

R317-6-6.2(A), (A)(1), and (A)(25): Except as provided in R317-6-6.2.C, the following facilities are considered to be permitted by rule and are not required to obtain a discharge permit under R317-6-6.1 or comply with R317-6-6.3 through R317-6-6.7, R317-6-6.9 through R317-6-6.11, R317-6-6.13, R317-6-6.16, R317-6-6.17 and R317-6-6.18:

1. facilities with effluent or leachate which has been demonstrated to the satisfaction of the Executive Secretary to conform and will not deviate from the applicable class TDS limits, ground water quality standards, protection levels or other permit limits and which does not contain any contaminant that may present a threat to human health, the environment or its potential beneficial uses of the ground water. The Executive Secretary may require samples to be analyzed for the presence of contaminants before the effluent or leachate discharges directly or indirectly into ground water. If the discharge is by seepage through natural or altered natural materials, the Executive Secretary may require samples of the solution be analyzed for the presence of pollutants before or after seepage;

...
25. facilities and modifications thereto which the Executive Secretary determines after a review of the application will have a de minimis actual or potential effect on ground water quality.

R317-6-6.3: APPLICATION REQUIREMENTS FOR A GROUND WATER DISCHARGE PERMIT

Unless otherwise determined by the Executive Secretary, the application for a permit to discharge wastes or pollutants to ground water shall include the following complete information:

A. The name and address of the applicant and the name and address of the owner of the facility if different than the applicant. A corporate application must be signed by an officer of the corporation. The name and address of the contact, if different than above, and telephone numbers for all listed names shall be included.

B. The legal location of the facility by county, quarter-quarter section, township, and range.

C. The name of the facility and the type of facility, including the expected facility life.

D. A plat map showing all water wells, including the status and use of each well, topography, springs, water bodies, drainages, and man-made structures within a one-mile radius of the discharge. The plat map must also show the location and depth of existing or proposed wells to be used for monitoring ground water quality.

E. Geologic, hydrologic, and agricultural description of the geographic area within a one-mile radius of the point of discharge, including soil types, aquifers, ground water flow direction, ground water quality, aquifer material, and well logs.

F. The type, source, and chemical, physical, radiological, and toxic characteristics of the effluent or leachate to be discharged; the average and maximum daily amount of effluent or leachate discharged (gpd), the discharge rate (gpm), and the expected concentrations of any pollutant (mg/l) in each discharge or combination of discharges. If more than one discharge point is used, information for each point must be given separately.

G. Information which shows that the discharge can be controlled and will not migrate into or adversely affect the quality of any other waters of the state, including the applicable surface water quality standards, that the discharge is compatible with the receiving ground water, and that the discharge will comply with the applicable class TDS limits, ground water quality standards, class protection levels or an alternate concentration limit proposed by the facility.

H. For areas where the ground water has not been classified by the Board, information on the quality of the receiving ground water sufficient to determine the applicable protection levels.

I. The proposed monitoring plan, which includes a description, where appropriate, of the following:

1. ground water monitoring to determine ground water flow direction and gradient, background quality at the site, and the quality of ground water at the compliance monitoring point;

2. installation, use and maintenance of monitoring devices;

3. description of the compliance monitoring area defined by the compliance monitoring points including the dimensions and hydrologic and geologic data used to determine the dimensions;

4. monitoring of the vadose zone;

5. measures to prevent ground water contamination after the cessation of operation, including post- operational monitoring;

6. monitoring well construction and ground water sampling which conform to A Guide to the Selection of Materials for Monitoring Well Construction and Ground Water Sampling, (1983) and RCRA Ground Water Monitoring Technical Enforcement Guidance Manual (1986), unless otherwise specified by the Executive Secretary;

7. description and justification of parameters to be monitored.

J. The plans and specifications relating to construction, modification, and operation of discharge systems.

K. The description of the ground water most likely to be affected by the discharge, including water quality information of the receiving ground water prior to discharge, a description of the aquifer in which the ground water occurs, the depth to the ground water, the saturated thickness, flow direction, porosity, hydraulic conductivity, and flow systems characteristics.

- L. The compliance sampling plan which includes, where appropriate, provisions for sampling of effluent and for flow monitoring in order to determine the volume and chemistry of the discharge onto or below the surface of the ground and a plan for sampling compliance monitoring points and appropriate nearby water wells. Sampling and analytical methods proposed in the application must conform with the most appropriate methods specified in the following references unless otherwise specified by the Executive Secretary:
1. Standard Methods for the Examination of Water and Wastewater, eighteenth edition, 1992; Library of Congress catalogue number: ISBN: 0-87553-207-1.
 2. E.P.A. Methods, Methods for Chemical Analysis of Water and Wastes, 1983; Stock Number EPA-600/4-79-020.
 3. Techniques of Water Resource Investigations of the U.S. Geological Survey, (1982); Book 5, Chapter A3.
 4. Monitoring requirements in 40 CFR parts 141 and 142, 1991 ed., Primary Drinking Water Regulations and 40 CFR parts 264 and 270, 1991 ed.
 5. National Handbook of Recommended Methods for Water-Data Acquisition, GSA-GS edition; Book 85 AD-2777, U.S. Government Printing Office Stock Number 024-001-03489-1.
 6. Manual of Analytical Methods for the Analysis of Pesticide Residues in Humans and Environmental Samples, 1980; Stock Number EPA-600/8-80-038, U.S. Environmental Protection Agency.
- M. A description of the flooding potential of the discharge site, including the 100-year flood plain, and any applicable flood protection measures.
- N. Contingency plan for regaining and maintaining compliance with the permit limits and for reestablishing best available technology as defined in the permit.
- O. Methods and procedures for inspections of the facility operations and for detecting failure of the system.
- P. For any existing facility, a corrective action plan or identification of other response measures to be taken to remedy any violation of applicable ground water quality standards, class TDS limits or permit limit established under R317-6-6.4E, which has resulted from discharges occurring prior to issuance of a ground water discharge permit.
- Q. Other information required by the Executive Secretary.

R317-6-6.4: ISSUANCE OF DISCHARGE PERMIT

A. The Executive Secretary may issue a ground water discharge permit for a new facility if the Executive Secretary determines, after reviewing the information provided under R317-6-6.3, that:

1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels, and permit limits established under R317-6-6.4E will be met;
2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
3. the applicant is using best available technology to minimize the discharge of any pollutant; and
4. there is no impairment of present and future beneficial uses of the ground water.

B. The Board may approve an alternate concentration limit for a new facility if:

1. the applicant submits a petition for an alternate concentration limit showing the extent to which the discharge will exceed the applicable class TDS limits, ground water standards or applicable protection levels and demonstrates that:
 - a. the facility is to be located in an area of Class III ground water;
 - b. the discharge plan incorporates the use of best available technology;
 - c. the alternate concentration limit is justified based on substantial overriding social and economic benefits; and,
 - d. the discharge would pose no threat to human health and the environment.
2. One or more public hearings have been held by the Board in nearby communities to solicit comment.

C. The Executive Secretary may issue a ground water discharge permit for an existing facility provided:

1. the applicant demonstrates that the applicable class TDS limits, ground water quality standards and protection levels will be met;
2. the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
3. the applicant utilizes treatment and discharge minimization technology commensurate with plant process design capability and similar or equivalent to that utilized by facilities that produce similar products or services with similar production process technology; and,
4. there is no current or anticipated impairment of present and future beneficial uses of the ground water.

D. The Board may approve an alternate concentration limit for a pollutant in ground water at an existing facility or facility permitted by rule under R317-6-6.2 if the applicant for a ground water discharge permit shows the extent the discharge exceeds the applicable class TDS limits, ground water quality standards and applicable protection levels that correspond to the otherwise applicable ground water quality standards and demonstrates that:

1. steps are being taken to correct the source of contamination, including a program and timetable for completion;
2. the pollution poses no threat to human health and the environment; and
3. the alternate concentration limit is justified based on overriding social and economic benefits.

E. An alternate concentration limit, once adopted by the Board under R317-6-6.4B or R317-6-6.4D, shall be the pertinent permit limit.

F. A facility permitted under this provision shall meet applicable class TDS limits, ground water quality standards, protection levels and permit limits.

G. The Board may modify a permit for a new facility to reflect standards adopted as part of corrective action.

R317-6-6.5: NOTICE OF INTENT TO ISSUE A GROUND WATER DISCHARGE PERMIT

The Executive Secretary shall publish a notice of intent to approve in a newspaper in the affected area and shall allow 30 days in which interested persons may comment to the Board. Final action will be taken by the Executive Secretary following the 30-day comment period.

R317-6-6.6: PERMIT TERM

A. The ground water discharge permit term will run for 5 years from the date of issuance. Permits may be renewed for 5-year periods or extended for a period to be determined by the Executive Secretary but not to exceed 5 years.

B. In the event that new ground water quality standards are adopted by the Board, permits may be reopened to extend the terms of the permit or to include pollutants covered by new standards. The holder of a permit may apply for a variance under the conditions outlined in R317-6-6.4.D.

R317-6-6.7: GROUND WATER DISCHARGE PERMIT RENEWAL

The permittee for a facility with a ground water discharge permit must apply for a renewal or extension for a ground water discharge permit at least 180 days prior to the expiration of the existing permit. If a permit expires before an application for renewal or extension is acted upon by the Executive Secretary, the permit will continue in effect until it is renewed, extended or denied.

R317-6-6.9: Permit Compliance Monitoring

A. Ground Water Monitoring

The Executive Secretary may include in a ground water discharge permit requirements for ground water monitoring, and may specify compliance monitoring points where the applicable class TDS limits, ground water quality standards, protection levels or other permit limits are to be met. The Executive Secretary will determine the location of the compliance monitoring point based upon the hydrology, type of pollutants, and other factors that may affect the ground water quality. The distance to the compliance monitoring points must be as close as practicable to the point of discharge. The compliance monitoring point shall not be beyond the property boundaries of the permitted facility without written agreement of the affected property owners and approval by the Executive Secretary.

B. Performance Monitoring

The Executive Secretary may include in a ground water discharge permit requirements for monitoring performance of best available technology standards.

R317-6-6.10: BACKGROUND WATER QUALITY DETERMINATION

A. Background water quality contaminant concentrations shall be determined and specified in the ground water discharge permit. The determination of background concentration shall take into account any degradation.

B. Background water quality contaminant concentrations may be determined from existing information or from data collected by the permit applicant. Existing information shall be used, if the permit applicant demonstrates that the quality of the information and its means of collection are adequate to determine background water quality. If existing information is not adequate to determine background water quality, the permit applicant shall submit a plan to determine background water quality to the Executive Secretary for approval prior to data collection. One or more up-gradient, lateral hydraulically equivalent point, or other monitoring wells as approved by the Executive Secretary may be required for each potential discharge site.

C. After a permit has been issued, permittee shall continue to monitor background water quality contaminant concentrations in order to determine natural fluctuations in concentrations. Applicable up-gradient, and on-site ground water monitoring data shall be included in the ground water quality permit monitoring report.

R317-6-6.15 and 6.15(A): CORRECTIVE ACTION

It is the intent of the Board that the provisions of these regulations should be considered when making decisions under any state or federal superfund action; however, the protection levels are not intended to be considered as applicable, relevant or appropriate clean-up standards under such other regulatory programs.

A. Application of R317-6-6.15

1. Generally - R317-6-6.15 shall apply to any person who discharges pollutants into ground water in violation of Section 19-5-107, or who places or causes to be placed any wastes in a location where there is probable cause to believe they will cause pollution of ground water in violation of Section 19-5-107.
2. Corrective Action shall include, except as otherwise provided in R317-6-6.15, preparation of a Contamination Investigation and preparation and implementation of a Corrective Action Plan.
3. The procedural provisions of R-317-6-6.15 shall not apply to any facility where a corrective or remedial action for ground water contamination, that the Executive Secretary determines meets the substantive standards of this rule, has been initiated under any other state or federal program. Corrective or remedial action undertaken under the programs specified in Table 2 are considered to meet the substantive standards of this rule unless otherwise determined by the Executive Secretary.

TABLE 2

PROGRAM

Leaking Underground Storage Tank, Sections 19-6-401, et seq.
Federal Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. Sections 9601, et seq.
Hazardous Waste Mitigation Act, Sections 19-6-301 et seq.
Utah Solid and Hazardous Waste Act, Sections 19-6-101 et seq.

R317-6-6.15(B): Notification and Interim Action

1. Notification - A person who spills or discharges any oil or other substance which may cause pollution of ground waters in violation of Section 19-5-107 shall notify the Executive Secretary within 24 hours of the spill or discharge. A written notification shall be submitted to the Executive Secretary within five days after the spill or discharge.
2. Interim Action - A person is encouraged to take immediate, interim action without following the steps outlined in R317-6-6.15 if such action is required to control a source of pollutants. Interim action is also encouraged if required to protect public safety, public health and welfare and the environment, or to prevent further contamination that would result in costlier clean-up. Such interim actions should include source abatement and control, neutralization, or other actions as appropriate. A person that has taken these actions shall remain subject to R317-6-6.15 after the interim actions are completed unless he demonstrates that:
 - a. no pollutants have been discharged into ground water in violation of 19-5-107; and
 - b. no wastes remain in a location where there is probable cause to believe they will cause pollution of ground water in violation of 19-5-107.

R317-6-6.15(C): Contamination Investigation and Corrective Action Plan - General

1. The Executive Secretary may require a person that is subject to R317-6-6.15 to submit for the Executive Secretary's approval a Contamination Investigation and Corrective Action Plan, and may require implementation of an approved Corrective Action Plan. A person subject to this rule who has been notified that the Executive Secretary is exercising his or her authority under R317-6-6.15 to require submission of a Contamination Investigation and Corrective Action Plan, shall, within 30 days of that notification, submit to the

Executive Secretary a proposed schedule for those submissions, which may include different deadlines for different elements of the Investigation and Plan. The Executive Secretary may accept, reject, or modify the proposed schedule.

2. The Contamination Investigation or the Corrective Action Plan may, in order to meet the requirements of this Part, incorporate by reference information already provided to the Executive Secretary in the Contingency Plan or other document.

3. The requirements for a Contamination Investigation and a Corrective Action Plan specified in R317-6-6.15.D are comprehensive. The requirements are intended to be applied with flexibility, and persons subject to this rule are encouraged to contact the Executive Secretary's staff to assure its efficient application on a site-specific basis.

4. The Executive Secretary may waive any or all Contamination Investigation and Corrective Action Plan requirements where the person subject to this rule demonstrates that the information that would otherwise be required is not necessary to the Executive Secretary's evaluation of the Contamination Investigation or Corrective Action Plan. Requests for waiver shall be submitted to the Executive Secretary as part of the Contamination Investigation or Corrective Action Plan, or may be submitted in advance of those reports.

R317-6-6.15(D): Contamination Investigation and Corrective Action Plan - Requirements

1. Contamination Investigation - The contamination investigation shall include a characterization of pollution, a characterization of the facility, a data report, and, if the Corrective Action Plan proposes standards under R317-6-6.15.F.2. or Alternate Corrective Action Concentration Limits higher than the ground water quality standards, an endangerment assessment.

a. The characterization of pollution shall include a description of:

(1) The amount, form, concentration, toxicity, environmental fate and transport, and other significant characteristics of substances present, for both ground water contaminants and any contributing surficial contaminants;

(2) The areal and vertical extent of the contaminant concentration, distribution and chemical make-up; and

(3) The extent to which contaminant substances have migrated and are expected to migrate.

b. The characterization of the facility shall include descriptions of:

(1) Contaminant substance mixtures present and media of occurrence;

(2) Hydrogeologic conditions underlying and, upgradient and downgradient of the facility;

(3) Surface waters in the area;

(4) The location and description of the facility;

(5) Type, location and description of possible sources of the pollution at the facility;

(6) Groundwater withdrawals, pumping rates, and usage within a 2-mile radius.

c. The report of data used and data gaps shall include:

(1) Data packages including quality assurance and quality control reports;

(2) A description of the data used in the report; and

(3) A description of any data gaps encountered, how those gaps affect the analysis and any plans to fill those gaps.

d. The endangerment assessment shall include descriptions of any risk evaluation necessary to support a proposal for a standard under R317-6-6.15.F.2 or for an Alternate Corrective Action Concentration Limit.

e. The Contamination Investigation shall include such other information as the Executive Secretary requires.

2. Proposed Corrective Action Plan

The proposed Corrective Action Plan shall include an explanation of the construction and operation of the proposed Corrective Action, addressing the factors to be considered by the Executive Secretary as specified in R317-6-6.15.E. and shall include such other information as the Executive Secretary requires. It shall also include a proposed schedule for completion.

R317-6-6.15(E): Approval of the Corrective Action Plan

After public notice in a newspaper in the affected area and a 30-day period for opportunity for public review and comment, the Executive Secretary shall issue an order approving, disapproving, or modifying the proposed Corrective Action Plan. The Executive Secretary shall consider the following factors and criteria in making that decision:

1. Completeness and Accuracy of Corrective Action Plan.

The Executive Secretary shall consider the completeness and accuracy of the Corrective Action Plan and of the information upon which it relies.

2. Action Protective of Public Health and the Environment

- a. The Corrective Action shall be protective of the public health and the environment.
- b. Impacts as a result of any off-site activities shall be considered under this criterion (e.g., the transport and disposition of contaminated materials at an off-site facility).
- 3. Action Meets Concentration Limits
The Corrective Action shall meet Corrective Action Concentration Limits specified in R317-6-6.15.F, except as provided in R317-6-6.15.G.
- 4. Action Produces a Permanent Effect
- a. The Corrective Action shall produce a permanent effect.
- b. If the Corrective Action Plan provides that any potential sources of pollutants are to be controlled in place, any cap or other method of source control shall be designed so that the discharge from the source following corrective action achieves ground water quality standards or, if approved by the Board, alternate corrective action concentration limits (ACACLs). For purposes of this paragraph, sources of pollutants are controlled "in place" even though they are moved within the facility boundaries provided that they are not moved to areas with unaffected ground water.
- 5. Action May Use Other Additional Measures
The Executive Secretary may consider whether additional measures should be included in the Plan to better assure that the criteria and factors specified in R317-6-6.15.E are met. Such measures may include:
 - a. Requiring long-term ground water or other monitoring;
 - b. Providing environmental hazard notices or other security measures;
 - c. Capping of sources of ground water contamination to avoid infiltration of precipitation;
 - d. Requiring long-term operation and maintenance of all portions of the Corrective Action; and
 - e. Periodic review to determine whether the Corrective Action is protective of public health and the environment.

R317-6-6.15(F): Corrective Action Concentration Limits

1. Contaminants with specified levels

Corrective Actions shall achieve ground water quality standards or, where applicable, alternate corrective action concentration limits (ACACLs).

2. Contaminants without specified levels

For contaminants for which no ground water quality standard has been established, the proposed Corrective Action Plan shall include proposed Corrective Action Concentration Limits. These levels shall be approved, disapproved or modified by the Executive Secretary after considering U.S. Environmental Protection Agency maximum contaminant level goals, health advisories, risk-based contaminant levels or standards established by other regulatory agencies and other relevant information.

R317-6-6.15(G): Alternate Corrective Action Concentration Limits

An Alternate Corrective Action Concentration Limit that is higher or lower than the Corrective Action Concentration Limits specified in R317-6-6.15.F may be required as provided in the following:

1. Higher Alternate Corrective Action Concentration Limits

A person submitting a proposed Corrective Action Plan may request approval by the Board of an Alternate Corrective Action Concentration Limit higher than the Corrective Action Concentration Limit specified in R317-6-6.15.F. The proposed limit shall be protective of human health, and the environment, and shall utilize best available technology.

The Corrective Action Plan shall include the following information in support of this request:

- a. The potential for release and migration of any contaminant substances or treatment residuals that might remain after Corrective Action in concentrations higher than Corrective Action Concentration Limits;
- b. An evaluation of residual risks, in terms of amounts and concentrations of contaminant substances remaining following implementation of the Corrective Action options evaluated, including consideration of the persistence, toxicity, mobility, and propensity to bioaccumulate such contaminants substances and their constituents; and
- c. Any other information necessary to determine whether the conditions of R317-6-6.15.G have been met.

2. Lower Alternate Corrective Action Concentration Limits

The Board may require use of an Alternate Corrective Action Concentration Limit that is lower than the Corrective Action Concentration Limit specified in R317-6-6.15.F if necessary to protect human health or the environment. Any person requesting that the Board consider requiring a lower Alternate Corrective Action Concentration Limit shall provide supporting information as described in R317-6-6.15.G.3.

3. Protective of human health and the environment

The Alternate Corrective Action Concentration Limit must be protective of human health and the environment. In making this determination, the Board may consider:

- a. Information presented in the Contamination Investigation;
- b. Other relevant cleanup or health standards, criteria, or guidance;
- c. Relevant and reasonably available scientific information;
- d. Any additional information relevant to the protectiveness of a Corrective Action; and
- e. The impact of additional proposed measures, such as those described in R317-6-6.15.E.5.

4. Good cause

An Alternate Corrective Action Concentration Limit shall not be granted without good cause.

- a. The Board may consider the factors specified in R317-6-6.15.E in determining whether there is good cause.
- b. The Board may also consider whether the proposed remedy is cost-effective in determining whether there is good cause. Costs that may be considered include but are not limited to:
 - (1) Capital costs;
 - (2) Operation and maintenance costs;
 - (3) Costs of periodic reviews, where required;
 - (4) Net present value of capital and operation and maintenance costs;
 - (5) Potential future remedial action costs; and
 - (6) Loss of resource value.

5. Conservative

An Alternate Corrective Action Concentration Limit that is higher than the Corrective Action Concentration Limits specified in R317-6-6.15.F must be conservative. The Board may consider the concentration level that can be achieved using best available technology if attainment of the Corrective Action Concentration Limit is not technologically achievable.

6. Relation to background and existing conditions

- a. The Board may consider the relationship between the Corrective Action Concentration Limits and background concentration limits in considering whether an Alternate Corrective Action Concentration Limit is appropriate.

- b. No Alternate Corrective Action Concentration Limit higher than existing ground water contamination levels or ground water contamination levels projected to result from existing conditions will be granted.

R317-6-6.16(A) and (B): OUT-OF-COMPLIANCE STATUS

A. Accelerated Monitoring for Probable Out-of-Compliance Status

If the concentration of a pollutant in any compliance monitoring sample exceeds an applicable permit limit, the facility shall:

- 1. Notify the Executive Secretary in writing within 30 days of receipt of data;
- 2. Initiate monthly sampling, unless the Executive Secretary determines that other periodic sampling is appropriate, for a period of two months or until the compliance status of the facility can be determined.

B. Violation of Permit Limits

Out-of-compliance status exists when:

- 1. two consecutive samples from a compliance monitoring point exceed:
 - a. one or more permit limits; and
 - b. the mean ground water pollutant concentration for that pollutant by two standard deviations (the standard deviation and mean being calculated using values for the ground water pollutant at that compliance monitoring point); or
- 2. the concentration value of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable permit limit. The statistical significance shall be determined using the statistical methods described in Statistical Methods for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 of the Federal Register, Oct. 11, 1988.

Utah!

Where ideas connect

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MEMORANDUM

TO: See Distribution

FROM: Curtis White
Laurie Leib

DATE: November 7, 2002

SUBJECT: Final FY 2004 Fee Document

Attached please find the *final* approved fee document for the FY 2004 budget request with changes from the October 24 Fee Hearing.

Distribution:

AQ - Rick Sprott
Bob Bowen

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Attachments

	<u>Current Fee FY 2003</u>	<u>Proposed Changes FY 2004</u>	<u>Proposed # of Units</u>	<u>Estimated Revenue</u>	<u>Difference (+ or -)</u>
All Divisions					
Request for copies over 10 pages, per page	0.25				
Copies made by the requestor, per page	0.05				
Compiling, tailoring, searching, etc., a record in another format (at rate of lowest paid staff employee who has the necessary skill and training to perform the request, after the first quarter hour)	Actual Cost				
Special computer data requests	70.00				
Computer Disks, each	2.00				
<i>Digital Video Disks, each</i>		8.00	25	200	200
Air Quality					
Compact disk with rules, State Implementation Plan, and Air Conservation Act	20.00				
Rules, paper copy	10.00				
State Implementation Plan, paper copy	40.00				
Utah Air Conservation Act, paper copy	5.00				
Instructions and Guidelines for notice of Intent, Modeling, Asbestos, Lead					
Printed copy	10.00				
Floppy disk	2.00				
Emission Inventory Report					
Printed	10.00				
Computer disk	7.50				
Emissions Inventory Workshop (attendance)	15.00				
Air Emissions Fees, per ton	35.05				
Major and Minor Source Compliance Inspection		Actual Cost			
Certification for Vapor Tightness Tester	300.00				
Asbestos and Lead-Based Paint (LBP) Abatement Course Review Fee, actual cost per hour	70.00				
Asbestos Company/Lead-Based Paint Firm Certification per year	200.00				
Asbestos individual (employee) certification	100.00				
Asbestos individual (employee) certification surcharge, non-Utah certified training provider	25.00				
LBP abatement worker certification (per year).	75.00				
LBP Inspector Certification (per year)	100.00				
LBP Risk Assessor, Supervisor, Project Designer Certification (per year)	150.00				
Lost Certification card replacement	25.00				
Annual asbestos notification	400.00				
Asbestos/LBP Abatement Project notification Base Fee	140.00				
Asbestos/LBP Abatement Project notification Base Fee for Owner-occupied residential structures	40.00				
Abatement unit fee/100 units (square feet/linear feet) up to 10,000 units (School building AHERA abatement unit fees will be waved)	5.00				
Abatement unit fee/100 units (square feet/linear feet) 10,000 or more units (School building AHERA abatement unit fees will be waved)	2.00				
Demolition Notification Base Fee	50.00				
Demolition unit fee per 5,000 square feet above 5,000 square feet	25.00				
Alternative Work Practice Review	100.00				
Permit Category					
Filing fees:					
Name Changes	100.00				
Small Sources and Soil Remediation	250.00				
New Sources, Minor & Major Modifications to Existing Sources	500.00				
Any Unpermitted Sources at an Existing Facility	1,500.00				
New Major PSD Sources (Monitoring Plan Review and site Visit)	5,000.00				
New Major source or major modification to major source in nonattainment area, up to 450 hours	31,500.00				
New Major source or major modification to major source in attainment area, up to 300 hours	21,000.00				
New Minor source or minor modification to minor source, up to 20 hours	1,400.00				
Generic permit for minor source or minor modification of minor source, up to 8 hours (Sources for which engineering review/Bact standardized)	560.00				
Minor sources (new or modified) with less than 3 tons per year uncontrolled emissions, up to 5 hours	350.00				
Permitting cost for additional hours	70.00				
Technical review of and assistance given for sales/use tax exemptions, soil remediations, experimental approvals, impact analyses, etc., per hour	70.00				
Air Quality Training		Actual Cost			
Environmental Response and Remediation					
CERCLIS Lists Disk or Paper, refer to internet	15.00				
Underground Storage Tank Program List					
Underground Storage Tank Facility List (paper only)	30.00				
Underground Storage Tank Facility List (computer disk)	25.00				
Leaking Underground Storage Tank Facility List (paper only)	18.00				
Leaking Underground Storage Tank Facility List (computer disk)	15.00				
Postage for one or both	3.00				
Emergency Planning and Community Right to Know Act Reports	15.00				
EPCRA Technical Assistance per hour	70.00				

	<u>Current Fee FY 2003</u>	<u>Proposed Changes FY 2004</u>	<u>Proposed # of Units</u>	<u>Estimated Revenue</u>	<u>Difference (+ or -)</u>
Environmental Project Technical Assistance and PST Claim Preparation Assistance, per hour	70.00				
Voluntary Environmental Cleanup Program Application Fee	2,000.00				
Review/Oversight/Participation in Voluntary Agreements		Actual Cost			
Annual Underground Storage Tank (UST) Fee					
Tanks on PST Fund	100.00				
Tanks not on PST Fund	200.00				
Tanks Significantly out of Compliance with Leak Detection Requirements	300.00				
Oversight for tanks failing to pay UST fee, per hour	70.00				
UST Compliance Follow-up Inspection, per hour	70.00				
PST Fund Reapplication Fee, Certificates of Compliance Reapplication fee or both.	300.00				
Initial Approval of Alternate UST Financial Assurance Mechanisms (Non-PST Participants)	420.00				
Approval of Alternate UST Financial Assurance Mechanisms after Initial Year (with NO Mechanism Changes)	240.00				
Apportionment of Liability requested by responsible parties. Preparing, administering and conducting the Administrative process, per hour	70.00				
Certification or Certification Renewal for UST Consultants					
UST Installers, Removers and Groundwater and Soil Samplers and non-government UST Inspectors and Testers	150.00				
Environmental Response and Remediation Program Training		Actual Cost			
Log in and processing time to access UST database, per minute	5.00				
Radiation Control					
Utah Radiation Control Rules, complete set	20.00				
Utah Radiation Control Rules, partial set, Machine-Generated Radiation	15.00				
Utah Radiation Control Rules, partial set, Radioactive Materials	15.00				
List of all radioactive material licensees	10.00				
List of all x-ray machine registrants	10.00				
Machine-Generated Radiation					
Hospital/Therapy					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	105.00				
Medical					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	105.00				
Chiropractic					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	105.00				
Podiatry/Veterinary					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	75.00				
Dental					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube					
First tube on a single control unit	45.00				
Additional tubes on a control unit, per tube	12.50				
Industrial Facility with High and/or Very High Radiation Areas Accessible to Individuals					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	105.00				
Industrial Facility with Cabinet X-Ray Units or Units Designed for other Purposes					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Inspection, per tube	75.00				
Other					
Annual Registration Fee, per control unit and first tube, plus annual fee for each additional tube connected to the control unit	15.00				
Division Conducted Annual or Biannual Inspection, per tube	105.00				
Division Conducted Inspection, once every five years, per tube	75.00				
Inspection reports submitted by independent qualified experts or registrants using qualified experts, per tube	15.00				
Radioactive Material					
Special Nuclear Material					
Possession and use of special nuclear material in sealed sources contained in devices used in industrial measuring systems, including x-ray fluorescence analyzers and neutron generators					
New License/Renewal	440.00				
Annual Fee	740.00				

	<u>Current Fee FY 2003</u>	<u>Proposed Changes FY 2004</u>	<u>Proposed # of Units</u>	<u>Estimated Revenue</u>	<u>Difference (+ or -)</u>
Possession and use of less than 15 grams special nuclear material in unsealed form for research and development					
New License/Renewal	730.00				
Annual Fee	740.00				
Special nuclear material to be used as calibration and reference sources					
New License/Renewal	180.00				
Annual Fee	240.00				
All other special nuclear material licenses					
New License/Renewal	1,150.00				
Annual Fee	1,600.00				
Source Material					
Licenses for concentrations of uranium from other areas (i.e. copper, phosphates, etc.) for the production of uranium yellow cake (moist, solid)					
New License/Renewal	5,510.00				
Annual Fee	4,220.00				
<i>Regulation of source and byproduct material at uranium mills or commercial waste facilities</i>					
<i>(1) Uranium mills or commercial sites disposing of or reprocessing by product material, per month</i>		6,667/month	2	160,000.00	160,000.00
<i>(2) Uranium mills the Executive Secretary has determined are on standby status, per month</i>		4,167/month	1	50,004.00	50,004.00
Fees are applicable when the Nuclear Regulatory Commission grants the amendment to Agreement State Status					
Licenses for possession and use of source material for shielding					
New License/Renewal	230.00				
Annual Fee	320.00				
All other source material licenses					
New License/Renewal	1,000.00				
Annual Fee	1,120.00				
Radioactive Material other than Source Material and Special Nuclear Material Licenses of broad scope for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution					
New License/Renewal	2,320.00				
Annual Fee	2,960.00				
Other licenses for possession and use of radioactive material for processing or manufacturing of items containing radioactive material for commercial distribution					
New License/Renewal	1,670.00				
Annual Fee	2,040.00				
Licenses authorizing the processing or manufacturing and distribution or redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices containing radioactive material					
New License/Renewal	2,320.00				
Annual Fee	2,960.00				
Licenses authorizing distribution or redistribution of radiopharmaceuticals, generators, reagent kits, or sources or devices not involving processing of radioactive material					
New License/Renewal	860.00				
Annual Fee	1,000.00				
Licenses for possession and use of radioactive material for industrial radiography operations					
New License/Renewal	1,670.00				
Annual Fee	2,560.00				
Licenses for possession and use of radioactive material in sealed sources for irradiation of materials in which the source is not removed from its shield (self-shielded units)					
New License/Renewal	700.00				
Annual Fee	940.00				
Licenses for possession and use of less than 10,000 curies of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes					
New License/Renewal	1,670.00				
Annual Fee	1,740.00				
Licenses for possession and use of 10,000 curies or more of radioactive material in sealed sources for irradiation of materials in which the source is exposed for irradiation purposes					
New License/Renewal	3,340.00				
Annual Fee	3,480.00				
Licenses to distribute items containing radioactive material that require device					

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
review to persons exempt from the licensing requirements of R313-19, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of R313-19					
New License/Renewal	700.00	580.00			
Annual Fee					
Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require device evaluation to persons exempt from the licensing requirements of R313-19, except for specific licenses authorizing redistribution of items that have been authorized for distribution to persons exempt from the licensing requirements of R313-19					
New License/Renewal	700.00	580.00			
Annual Fee					
Licenses to distribute items containing radioactive material that require sealed source and/or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21					
New License/Renewal	700.00	580.00			
Annual Fee					
Licenses to distribute items containing radioactive material or quantities of radioactive material that do not require sealed source and/or device review to persons generally licensed under R313-21, except specific licenses authorizing redistribution of items that have been authorized for distribution to persons generally licensed under R313-21					
New License/Renewal	700.00	580.00			
Annual Fee					
Licenses of broad scope for possession and use of radioactive material for research and development which do not authorize commercial distribution					
New License/Renewal	2,320.00	2,960.00			
Annual Fee					
Licenses for possession and use of radioactive material for research and development, which do not authorize commercial distribution					
New License/Renewal	700.00	940.00			
Annual Fee					
All other specific radioactive material licenses					
New License/Renewal	440.00	520.00			
Annual Fee					
Licenses that authorize services for other licensees, except licenses that authorize leak testing or waste disposal services which are subject to the fees specified for the listed services					
New License/Renewal	320.00	420.00			
Annual Fee					
Licenses that authorize services for leak testing only					
New License/Renewal	150.00	160.00			
Annual Fee					
Radioactive Waste Disposal					
Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of commercial disposal by land by the licensee					
New Application					
(a) Siting application	Actual costs up to 250,000.00				
(b) License application	Actual costs up to 1,000,000.00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Renewal	Actual cost up to 1,000,000.00				
Pre-licensing and operations review and consultation on commercial low-level radioactive waste facilities, per hour	70.00				
Review of commercial low-level radioactive waste disposal and uranium recovery special projects. Applicable when the licensee and the Division agree that a review be conducted by a contractor in support of the efforts of Division staff		Actual Cost			
Review of topical reports submitted by a licensee or manufacturer to certify waste casks for transportation or disposal, per hour	70.00				
Generator Site Access Permits					
Generators transferring 1001 or more cubic feet of radioactive waste, per year	1,300.00				
Generators transferring 1000 cubic feet or less of radioactive waste, per year	500.00				
Brokers, (waste collectors or processors), per set	5,000.00				
Review of licensing or permit actions, amendments, environmental monitoring reports, and miscellaneous reports for uranium recovery facilities, per hour	70.00				
Licenses specifically authorizing the receipt of waste radioactive material from other persons for the purpose of packaging/repackaging the material. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material					
New License/Renewal	3,190.00				
Annual Fee	2,760.00				
Licenses specifically authorizing the receipt of prepackaged waste radioactive material from other persons. The licensee will dispose of the material by transfer to another person authorized to receive or dispose of the material					
New License/Renewal	700.00				
Annual Fee	1,100.00				
Licenses authorizing packing of radioactive waste for shipment to waste disposal site where licensee does not take possession of waste material					
New License/Renewal	440.00				
Annual Fee	520.00				
Well Logging, Well Surveys, and Tracer Studies					
Licenses for possession and use of radioactive material for well logging, well surveys, and tracer studies other than field flooding tracer studies					
New License/Renewal	1,670.00				
Annual Fee	2,100.00				
Licenses for possession and use of radioactive material for field flooding tracer studies					
New License/Renewal		Actual Cost			
Annual Fee	4,000.00				
Nuclear Laundry					
Licenses for commercial collection and laundry of items contaminated with radioactive material					
New License/Renewal	1,670.00				
Annual Fee	2,380.00				
Human Use of Radioactive Material					
Licenses for human use of radioactive material in sealed sources contained in teletherapy devices					
New License/Renewal	1,090.00				
Annual Fee	1,280.00				
Licenses of broad scope issued to medical institutions or two or more physicians authorizing research and development, including human use of radioactive material, except licenses for radioactive material in sealed sources contained in teletherapy devices					
New License/Renewal	2,320.00				
Annual Fee	2,960.00				
Other licenses issued for human use of radioactive material, except licenses for use of radioactive material contained in teletherapy devices					
New License/Renewal	700.00				
Annual Fee	1,100.00				
Civil Defense					
Licenses for possession and use of radioactive material for civil defense activities					
New License/Renewal	700.00				
Annual Fee	380.00				
Power Source					
Licenses for the manufacture and distribution of encapsulated					

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
radioactive material wherein the decay energy of the material is used as a source for power					
New License/Renewal	5,510.00				
Annual Fee	2,520.00				
Plan Reviews					
Review of plans for decommissioning, decontamination, reclamation, waste disposal pursuant to R313-15-1002, or site restoration activities	400.00				
Plus added cost above 8 hours, per hour	70.00				
Investigation of a misadministration by a third party as defined in R313-30-5 or in R313-32-2, as applicable		Actual Cost			
General License					
Measuring, gauging and control devices					
Initial registration/renewal for first year	20.00				
Annual fee after initial registration/renewal	20.00				
In Vitro Testing					
Initial registration/renewal for first year	20.00				
Annual fee after initial registration/renewal	20.00				
Depleted Uranium					
Initial registration/renewal for first year	20.00				
Annual fee after initial registration/renewal	20.00				
Charge for Late Payment of Fees, for all fees, per 30 days late	25.00				
Publication costs for making public notice of required actions		Actual Cost			
Reciprocity Fees					
Licenses who conduct the activities under the reciprocity provisions of R313-19-30					
Initial Filing of Application		Full Annual for Specific Category of User Listed Above			
Expedited application review Applicable when, by mutual consent of the applicant and affected staff, an application request is taken out of date order and processed by staff, per hour	75.00				
Management and oversight of impounded radioactive material		Actual Cost			
License amendment, for greater than three applications in a calendar year	200.00				
Water Quality					
Water Quality Regulations					
Complete set	30.00				
Water Quality Regulations					
R317-1, 2, 5, 6, 7; R317-4, 10 and 100	2.00				
Water Quality Regulations, R317-3	10.00				
Water Quality Regulations, R317-8	10.00				
305(b) Water Quality Report	20.00				
Report Entitled Utah's Lakes and Reservoirs- Inventory and Classification of Utah's Priority Lakes and Reservoirs	50.00				
Operator Certification					
Certification Examination	35.00				
Renewal of Certificate	10.00				
Renewal of Lapsed Certificate -late fee (per month, \$30.00 maximum)	10.00				
Duplicate Certificate	20.00				
New Certificate - change in status	20.00				
Certification by reciprocity with another state	20.00				
Grandfather Certificate	20.00				
Underground Wastewater Disposal Systems					
New Systems Fee	25.00				
Certificate Issuance	10.00				
Water-Quality-Data Requests					
-Individual Site/Each Year	1.00				
UPDES Permits					
Cement Manufacturing					
Major	3,600.00				
Minor	900.00				
Coal Mining and Preparation					
General Permit*	1,800.00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Individual Major	5,400.00				
Individual Minor	3,600.00				
Concentrated Animal Feeding Operation (CAFO)					
General Permit*	500.00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Construction Dewatering/Hydrostatic Testing					
General Permit*	500.00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Dairy Products					
Major	3,600.00				
Minor	1,800.00				
Electric					
Major	4,500.00				
Minor	1,800.00				
Fish Hatcheries					
General Permit*	500.00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Food and Kindred Products					
Major	4,500.00				
Minor	1,800.00				
Hazardous Waste Clean-up Sites					
Geothermal	10,800.00				
Major	3,600.00				
Minor	1,800.00				
Inorganic Chemicals					
Major	5,400.00				
Minor	2,700.00				
Iron and Steel Manufacturing					
Major	10,800.00				
Minor	2,700.00				
Leaking Underground Storage Tank Cleanup					
General Permit*	1,800.00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Individual Permit					
Meat Products					
Major	5,400.00				
Minor	1,800.00				
Metal Finishing and Products					
Major	5,400.00				
Minor	2,700.00				
Natural Mining and Processing					
Sand and Gravel	1,000.00				
Salt Extraction	1,000.00				
Other Majors					
Other Minors	3,600.00				
Manufacturing					
Major	7,200.00				
Minor	2,700.00				
Oil and Gas Extraction					
Flow rate <= 0.5 MGD	1,000.00				
Flow rate > 0.5 MGD	2,700.00				
Ore Mining					
Major	5,400.00				
Minor	2,700.00				
Major w/Conc. Process					
Organic Chemicals Manufacturing	10,800.00				
Major	9,000.00				
Minor	2,700.00				
Petroleum Refining					
Major	7,200.00				
Minor	2,700.00				
Pharmaceutical Preparations					
Major	7,200.00				
Minor	2,700.00				
Rubber and Plastic Products					
Major	4,500.00				
Minor	2,700.00				
Space Propulsion					
Major	10,000.00				
Minor	2,700.00				
Steam and/or Power Electric Plants					
Major	3,600.00				
Minor	1,800.00				
Water Treatment Plants (Except Political Subdivisions)					
General Permit*	500.00				
*Fees for general permits issued for less than 5 years will be prorated based on a 5-year permit, \$100.00 minimum					
Non-contact Cooling Water					
Flow rate <= 10,000 gpd	500.00				
10,000 gpd < Flow rate <100,000 gpd - \$500 up to \$1,000	1,000.00				
100,000 gpd < Flow rate <1 MGD - \$1,000 up to \$2,000	2,000.00				

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Flow Rate > 1.0 MGD	3,000.00				
Note: Fee amt. will be prorated based on flow rate.					
General Multi-Sector Industrial Storm Water Permit*	500.00				
** Construction Storm Water Permit > 5 Acres*	500.00				
* Fees for general permits issued for areas under 5 acres prorated based on a 5-year permit, \$100.00 minimum					
General Construction Storm Water Permit < 5 Acres	100.00				
Municipal Storm Water Annual Fee:					
0-5,000 Population	500.00				
5,001-10,000 Population	800.00				
10,001-50,000 Population	1,200.00				
50,001-125,000 Population	2,000.00				
> 125,000 Population	3,000.00				
Industrial Users	2,700.00				
Total Containment (Except Political Subdivisions)	500.00				
Annual Ground Water Permit Administration Fee					
Tailings/Evap/Process Ponds, Heaps (per each**)					
0-1 Acre	350.00				
1-15 Acres	700.00				
15-50 Acres	1,400.00				
50-300 Acres	2,100.00				
Over 300 Acres	2,800.00				
All Others					
Base (one regulated facility)	700.00				
Per each ** additional regulated facility	700.00				
**(Multi-celled pond system or grouping of facilities with common compliance point is considered one facility)					
UPDES, Ground Water, Underground Injection Control, and construction permits not listed above and permit modifications (Except political subdivisions), per hour	70.00				
Complex Facilities where the anticipated permit issuance costs will exceed the above categorical fees by 25 percent, per hour (Permittee to be notified upon receipt of application)	70.00				
Water Quality Cleanup Activities					
Corrective Action, Site Investigation/Remediation Oversight					
Administration of Consent Orders and Agreements	70.00				
In lieu of fees for UPDES through Loan established above administration (see preceding pages).					
the applicant or responsible party may voluntarily make advance payment for more than the established fee to facilitate oversight activities or permit issuance.					
Loan Administration Fees, per-hour		Actual Costs			
Technical review of and assistance given for sales/use tax exemptions, per hour	70.00				
Domestic Sewage Sludge Permits (number of resident connections).					
annual fee					
0 - 4,000	500.00				
4,001 - 15,000	1,018.00				
More than 15,000	1,538.00				
Drinking Water					
Safe Drinking Water Regulations Rules					
Bound	20.00				
Part I	10.00				
Part II	10.00				
Computer Disk	10.00				
Special Surveys	Actual Cost				
File Searches	Actual Cost				
Well Sealing Inspection (per hour + mileage + per diem)	70.00				
Special Consulting/Technical Assistance, per hour	70.00				
Operator Certification Program Fees					
Record application fee (one time only)	20.00				
Examination fee (any level)	50.00				
Renewal of certification (every 3 years if applied for during designated period)	50.00				
Grandfather Certification Application fee	50.00				
Reinstatement of lapsed certificate	75.00				
Certificate of reciprocity with another state	50.00				
Conversion Fee (Specialist to Operator-Operator to Specialist)	20.00				
Cross Connection Control Program					
Record application fee (one time only)	10.00				
Examination fee	25.00	60.00	75	4,500	Recover Costs
Certification fee	75.00				
Renewal fee	75.00				
Class I					

	Current Fee FY 2003	Proposed Changes FY 2004	Proposed # of Units	Estimated Revenue	Difference (+ or -)
Class II	100.00				
Class III	100.00	135.00	250	8,750	
All fees will be deposited in a special account to defray the costs of administering the Cross Connection Control and Certification programs					
Financial Assistance Program Fees					
Application processing		Actual Cost			
Solid and Hazardous Waste					
Utah Hazardous Waste Rules	10.00				
Utah Solid Waste Rules	10.00				
Solid Waste Management Plan	5.00				
Utah Used Oil Rules	5.00				
RCRA Facility List	5.00				
Solid and Hazardous Waste Program Administration: (including Used Oil and Waste Tire Recycling Programs)					
The following fees do not apply to municipalities, counties, or special service districts seeking Division of Solid and Hazardous Waste reviews					
Professional, per hour	70.00				
(This fee includes but is not limited to Review of Site Investigation and Site Remediation Plans, Review of permit applications and permit modifications, Review and Oversight of Consent Orders and Agreements and their related compliance activities and Review and Oversight of Construction Activities)					
Solid Waste Permit Filing Fees					
The following fees do not apply to municipalities, counties, or special service districts seeking Division of Solid and Hazardous Waste reviews					
New Comm Facility - Class V and Class VI Landfills	1,000.00				
New Non-Commercial Facility	750.00				
New Incinerator:					
Commercial	5,000.00				
Industrial or Private	1,000.00				
Plan Renewals and Plan Modifications	100.00				
Variance Requests	500.00				
Waste Tire Recycling Fees					
Waste Tire Recycler Registration Fee, annual	100.00				
Waste Tire Transporter Registration Fee, annual	100.00				
Used Oil Fees					
Do It Your Self'er and Used Oil Collection Center Registration Fee	No Charge				
Used Oil Permit Filing Fee for					
Processor/Re-refiner, Off-Spec Burner, and Land Application	100.00				
Used Oil Registration Fee for Transporter, Transfer Facility, Processor/Re-refiner, Off-Spec Burner, and Land Application, annual	100.00				
Used Oil Marketer Registration Fee, annual	50.00				
Used Oil Marketer Permit Filing Fee	50.00				
END					