PROGRAM MANAGEMENT ASSISTANCE FOR RCRA GROUNDWATER MONITORING PROGRAMS IN DETERMINATION OF COMPLIANCE GROUNDWATER MONITORING INSPECTIONS: KERR McGEE CHEMICAL CORPORATION HENDERSON, NEVADA

EPA CONTRACT NO. 68-01-6515
WORK ASSIGNMENT NO. R-09-011

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DRAFT: This report has not yet had External Quality Assurance Review

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1.0 BACKGROUND

As a subcontractor to A. T. Kearney, Inc., Ertec has been assigned to provide program management assistance to the Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act (RCRA) implementation contract 68-01-6515.

In partial response to Work Assignment No. R-09-011, Ertec visited the Kerr McGee facility in Henderson, Nevada. The intent of this visit was to facilitate the evaluation of the facility's compliance with groundwater monitoring requirements of 40 CFR 265 and applicable portions of 40 CFR 264. This evaluation was to be aided by the utilization of the checklists presented in EPA publication SW-954, entitled Interim Status: Groundwater Monitoring Program Evaluations, A Guidance Manual, April 1982.

2.0 SITE VISIT

2.1 INTRODUCTION

On March 15, 1983, Ertec personnel along with Alene Coulson, State of Nevada, Division of Environmental Protection, Hazardous Waste Office, met with Mr. Bert Smith, Hydrologist, Kerr McGee; Mr. Rolfe Chase, Plant Manager, Kerr McGee; Mr. Richard Wohletz, Plant Technician, Kerr McGee; and Ms. Kayrene Brothers, Environmental Engineer, Kerr McGee. The meeting and site inspection took place at the Kerr McGee facility in the BMI complex in Henderson, Nevada.

A copy of the EPA SW-954 checklist was provided to Kerr McGee personnel. It was explained that the checklist is a tool to be used in compliance determination and that the data gathered during the checklist completion procedure would be used to determine Kerr McGee's compliance with RCRA.

2.2 CHECKLIST PROCEDURE

The checklist procedure was conducted in Kerr McGee's conference room. Pertinent issues that were raised during completion of the checklist are summarized below.

- The landfill is closed and has not received waste since January 26, 1983.
- Waste management areas have not been delineated on present drawings. This information will be provided by Kerr McGee at some future date.
- Monitoring wells were developed and information on the development techniques used will be provided by Kerr McGee.
- A geologic cross section of the facility will be provided by Kerr McGee.
- Monitoring wells are not equipped with dedicated pumps. No provisions have beeen made to clean pumps and bailers between

samples to avoid cross-contamination of the groundwater and samples.

2.3 SITE VERIFICATION

Appendix B, Section 10 of SW 954 requires that a field verification of the location of components shown in the groundwater monitoring program be accomplished. After completing the checklist procedure, such a verification was performed.

In the process of this inspection, it was determined that monitoring wells addressed in the groundwater monitoring program were present in the field. Water level measurements were taken at wells M-1 and M-8. The water level probe ceased functioning before more water level measurements could be made.

During the field verification it was noticed that there was no evidence of recent work at the landfill.

APPENDIX - A

COMPLIANCE CHECKLIST FORMS

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS STANDARDS COVERING GROUND-WATER MONITORING

Company Name: Kerr-McGee ; EPA I.D. Number: NUD008290338

Company Address: _____ ; Inspector's Name: _____

Company Contact/Official: _____ ; Branch/Organization: _____

Title: _____ ; Date of Inspection: 3/15/83

	Yes	No	Unknown	Waived
Type of facility: (check appropriately)				
a) surface impoundment	✓			
b) landfill	✓ ←			
c) land treatment facility				
d) disposal waste pile*				

not active since 1/26/83

Ground-Water Monitoring Program

1. Was the ground-water monitoring program reviewed prior to site visit?	✓			
If "No",				
a) Was the ground-water program reviewed at the facility prior to site inspection?		✓		
2. Has a ground-water monitoring program (capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility) been implemented? 265.90(a)	✓			

*Listed separate from landfill for convenience of identification.

	Yes	No	Unknown	Waived
3. Has at least one monitoring well been installed in the uppermost aquifer hydraulically upgradient from the limit of the waste management area? 265.91(a)(1)	✓			
a) Are ground-water samples from the uppermost aquifer, representative of background ground-water quality and not affected by the facility (as ensured by proper well number, locations and depths?)	✓			
4. Have at least three monitoring wells been installed hydraulically downgradient at the limit of the waste handling or management area? 265.91(a)(2)	✓			
a) Do well number, locations and depths ensure prompt detection of any statistically significant amounts of HW or HW constituents that migrate from the waste management area to the uppermost aquifer?	✓			
5. Have the locations of the waste management areas been verified to conform with information in the ground-water program?				
a) If the facility contains multiple waste management components, is each component adequately monitored?	✓			
6. Do the numbers, locations, and depths of the ground-water monitoring wells agree with the data in the ground-water monitoring system program? If "No", explain discrepancies.				
7. Well completion details. 265.91(c)				
a) Are wells properly cased?	✓			
b) Are wells screened (perforated) and packed where necessary to enable sampling at appropriate depths?	✓			
c) Are annular spaces properly sealed to prevent contamination of ground-water?	✓			

	Yes	No	Unknown
8. Has a ground-water sampling and analysis plan been developed? 265.92(a)	✓		
a) Has it been followed?	✓		
b) Is the plan kept at the facility?	✓		
c) Does the plan include procedures and techniques for:			
1) Sample collection?	✓		
2) Sample preservation?	✓		
3) Sample shipment?		✓	
4) Analytical procedures?	✓		
5) Chain of custody control?	✓		
9. Are the required parameters in ground-water samples being tested quarterly for the first year? 265.92(b) and 265.92 (c)(1)	✓		
a) Are the ground-water samples analyzed for the following:			
1) Parameters characterizing the suitability of the ground-water as a drinking water supply? 265.92(b)(1)	✓		
2) Parameters establishing ground-water quality? 265.92(b)(2)	✓		
3) Parameters used as indicators of ground-water contamination? 265.92(b)(3)	✓		
(i) For each indicator parameter are at least four replicate measurements obtained at each upgradient well for each sample obtained during the first year of monitoring? 265.92(c)(2)	✓		
(ii) Are provisions made to calculate the initial background arithmetic mean and variance of the respective parameter concentrations or values obtained from the upgradient well(s) during the first year? 265.92(c)(2)	✓		
b) For facilities which have completed first year ground-water sampling and analysis requirements:	N/A		
1) Have samples been obtained and analyzed for the ground-water quality parameters at least annually? 265.92(d)(1)			
2) Have samples been obtained and analyzed for the indicators of ground-water contamination at least semi-annually? 265.92(d)(2)			

	Yes	No	Unknown
c) Were ground-water surface elevations determined at each monitoring well each time a sample was taken? 265.92(e)	____	____	
d) Were the ground-water surface elevations evaluated annually to determine whether the monitoring wells are properly placed? 265.93(f)	____	____	
e) If it was determined that modification of the number, location or depth of monitoring wells was necessary, was the system brought into compliance with 265.91(a)? 265.93(f)	____	____	
10. Has an outline of a ground-water quality assessment program been prepared? 265.93(a)*	✓	____	
a) Does it describe a program capable of determining:			
1) Whether hazardous waste or hazardous waste constituents have entered the ground water?	✓	____	
2) The rate and extent of migration of hazardous waste or hazardous waste constituents in ground water?	✓	____	
3) Concentrations of hazardous waste or hazardous waste constituents in ground water?	✓	____	
b) After the first year of monitoring, have at least four replicate measurements of each indicator parameter been obtained for samples taken for each well? 265.93(b)	N/A -	____	
1) Were the results compared with the initial background means from the upgradient well(s) determined during the first year?	____	____	
(i) Was each well considered individually?	____	____	
(ii) Was the Student's t-test used (at the 0.01 level of significance)?	____	____	
2) Was a significant increase (or pH decrease as well) found in the:			
(i) Upgradient wells	____	____	
(ii) Downgradient wells	____	____	
If "Yes", Compliance Checklist A-2 must also be completed.			

*See note Page 2-10

	Yes	No	Unknown
11. Have records been kept of analyses for parameters in 265.92(c) and (d)? 265.94(a)(1)	✓		
12. Have records been kept of ground-water surface elevations taken at the time of sampling for each well? 265.94(a)(1)	✓		
13. Have records been kept of required elevations in ~~265.92(b)~~? 265.94(a)(1)	✓		
14. Have the following been submitted to the Regional Administrator 265.94(a)(2) :*	N/A		
a) Initial background concentrations of parameters listed in 265.92(b) within 15 days after completing each quarterly analysis required during the first year?			
b) For each well, have any parameters whose concentrations or values have exceeded the maximum contaminant levels allowed in drinking water supplies been separately identified?			
c) Annual reports including:			
1) Concentrations or values of parameters used as indicators of ground-water contamination for each well along with required evaluations under 265.93(b)?			
2) Any significant differences from initial background values in up-gradient wells separately identified?			
3) Results of the evaluation of ground-water surface elevations?			

*EPA will be proposing (Spring 1982) to replace this reporting requirement with an exception reporting system where reports will be submitted only where maximum contaminant levels or significant changes in the contamination indicators or other parameters are observed. EPA has delayed compliance stage for 14 a) above until August 1, 1982 (Federal Register, February 23, 1982, p.7841-7842) to be coupled with exception reporting in the interim.

APPENDIX -B

GROUND-WATER MONITORING AND ALTERNATE SYSTEM TECHNICAL INFORMATION FORM

APPENDIX B

GROUND-WATER MONITORING AND ALTERNATE SYSTEM
TECHNICAL INFORMATION FORM

1.0 Background Data:

Company Name:_____; EPA I.D.#:_____

Company Address:_____

_____

_____

Inspector's Name:_____; Date:_____

1.1 Type of facility (check appropriately):

1.1.1 surface impoundment ____
1.1.2 landfill ____
1.1.3 land treatment facility ____
1.1.4 disposal waste pile ____

1.2 Has a ground-water monitoring system been established? (Y/N) Y

1.2.1 Is a ground-water quality assessment program outlined or proposed? (Y/N) Y

If Yes,

1.2.2 Was it reviewed prior to the site visit? (Y/N) Y

1.3 Has a ground-water quality assessment program been implemented or proposed at the site? (Y/N) N

If yes, Appendix C, Ground-Water Quality Assessment Program Technical Information Form must be utilized also.

2.0 Regional/Facility Map(s)

2.1 Is a regional map of the area, with the facility delineated, included? (Y/N) Y

If yes,

2.1.1 What is the origin and scale of the map? 1:24,000
USGS

2.1.2 Is the surficial geology adequately illustrated? (Y/N) N

2.1.3 Are there any significant topographic or surficial features evident? (Y/N) Y

If yes, describe Gas Vapor Wash

2.1.4 Are there any streams, rivers, lakes, or wet lands near the facility? (Y/N) Y

If yes, indicate approximate distances from the facility 3-4 miles

2.1.5 Are there any discharging or recharging wells near the facility? see DRI maps (Y/N) N

If yes, indicate approximate distances from the facility.

2.2 Is a regional hydrogeologic map of the area included? (This information may be shown on 2.1) (Y/N) N

If yes:

2.2.1 Are major areas of recharge/dishcarge shown? (Y/N) ____

If yes, describe.

2.2.2 Is the regional ground-water flow direction indicated? (Y/N) ____

2.2.3 Are the potentiometric contours logical? (Y/N) ____
If not, explain.

2.3 Is a facility plot plan included? (Y/N) Y

2.3.1 Are facility components (landfill areas, impoundments, etc.) shown? (Y/N) Y

2.3.2 Are any seeps, springs, streams, ponds, or wetlands indicated? None present (Y/N) N

2.3.3 Are the locations of any monitoring wells, soil borings, or test pits shown? (Y/N) Y

2.3.4 Is the facility a multi-component facility? (Y/N) Y

If yes:

2.3.4.1 Are individual components adequately monitored? (Y/N) Y

2.3.4.2 Is a Waste Management Area delineated? (Y/N) _____

2.4 Is a site water table (potentiometric) contour map included? (Y/N) N

If yes,

2.4.1 Do the potentiometric contours appear logical based on topography and presented data? (Consult water level data) (Y/N) _____

2.4.2 Are groundwater flowlines indicated? (Y/N) _____

2.4.3 Are static water levels shown? (Y/N) _____

2.2.4 May hydraulic gradients be estimated? (Y/N) _____

2.4.5 Is at least one monitoring well located hydraulically upgradient of the waste management area(s)? (Y/N) _____

2.4.6 Are at least three monitoring wells located hydraulically downgradient of the waste management area(s)? (Y/N) _____

2.4.7 By their location, do the upgradient wells appear capable of providing representative ambient groundwater quality data? (Y/N) _____

If no, explain. _____

_____

_____

3.0 Soil Boring/Test Pit Details

3.1 Were soil borings/test pits made under the supervision of a qualified professional? (Y/N) ____

If yes,

3.1.1 Indicate the individual(s) and affiliation(s): _____

_____

_____

3.1.2 Indicate the drilling/excavating contractor, if known _____

_____

3.2 If soil borings/test pits were made, indicate the method(s) of drilling/excavating:

- Auger (hollow or solid stem) ____
- Mud rotary ✓
- Air rotary ____
- Reverse rotary ____
- Cable tool ____
- Jetting ____
- Other, including excavation (explain) _____

_____

3.3 List the number of soil borings/test pits made at the site

3.3.1 Pre-existing 1

3.3.2 For RCRA compliance 8

3.4 Indicate borehole diameters and depths (if different diameters and depths use TABLE B-1). - see Reports

3.4.1 Diameter: _____

3.4.2 Depth: _____

3.5 Were lithologic samples collected during drilling? (Y/N) Y

If yes,

3.5.1 How were samples obtained? (Check method(s))

- Split spoon ? not sure
- Shelby tube, or similar ____
- Rock coring ____
- Ditch sampling ____
- Other (explain) ✓

drill - cuttings

3.5.2 At what interval were samples collected? Unknown
<2' interval

3.5.3 Were the deposits or rock units penetrated described? (boring logs, etc.) (Y/N) Y

3.6 If test pits were excavated at the site, describe procedures. N/A

4.0 Well Completion Detail

4.1 Were the wells installed under the supervision of a qualified professional? (Y/N) Y

If yes:

4.1.1 Indicate the individual and affiliation, if known Bert Smith
staff Hydro, Kerr-McGee

4.1.2 Indicate the well construction contractor, if known Converse
Consultants, Las Vegas Nev.

4.2 List the number of wells at the site

4.2.1 Pre-existing 1

4.2.2 For RCRA Compliance 6

4.3 Well construction information (fill out INFORMATION TABLE B-2)

4.3.1 If PVC well screen or casing is used, are joints (couplings): N/A

- Glued on
- Screwed on

4.3.2 Are well screens sand/gravel packed? (Y/N) Y

4.3.3 Are annular spaces sealed? (Y/N) Y

If yes, describe:

- bentonite slurry ✓
- Cement grout ✓
- Other (explain) cement-y at surface

- Thicknesses of seals See Reports

4.3.4 If "open hole" wells, are the cased portions sealed in place? (Y/N) N/A

If yes, describe how: See Rpts

4.3.5 Are there cement surface seals? (Y/N) Y

If yes,

- How thick? _____

4.3.6 Are the wells capped? (Y/N) Y

If yes,

- Do they lock? (Y/N) N

4.3.7 Are protective standpipes cemented in place? (Y/N) Y

4.3.8 Were wells developed? (Y/N) Y

If yes, check appropriate method(s):

- Air lift pumping ✓
- Pumping and surging ✓
- Jetting ✓
- Bailing
- Other (explain) _____

5.0 Aquifer Characterization

5.1 Has the extent of the uppermost saturated zone (aquifer) in the facility area been defined? (Y/N) Y

If yes,

5.1.1 Are soil boring/test pit logs included? (Y/N) Y

5.1.2 Are geologic cross-sections included? (Y/N) Y will be soon

5.2 Is there evidence of confining (low permeability) layers beneath the site? (Y/N) Y

If yes,

5.2.1 Is the areal extent and continuity indicated? (Y/N) U

5.2.2 Is there any potential for saturated conditions (perched water) to occur above the uppermost aquifer? (Y/N) U

If yes, give details: _____

a) Should or is this perched zone being monitored? (Y/N) N/A

Explain _____

5.2.3 What is the lithology and texture of the uppermost saturated zone (aquifer)? See Reports

5.2.4 What is the saturated thickness, if indicated? See Reports

5.3 Were static water levels measured? (Y/N) Y

If yes,

5.3.1 How were the water levels measured (check method(s)).

- Electric water sounder
- Wetted tape ✓
- Air line
- Other (explain)

5.3.2 Do fluctuations in static water levels occur? (Y/N) Y

If yes,

5.3.2.1 Are they accounted for (e.g. seasonal, tidal, etc.)? (Y/N) Y

If yes, describe: _____

5.3.2.2 Do the water level fluctuations alter the general ground-water gradients and flow directions? (Y/N) N

If yes,

5.3.2.3 Will the effectiveness of the wells to detect contaminants be reduced? (Y/N) ____

Explain ____________________

5.3.2.4 Based on water level data, do any head differentials occur that may indicate a vertical flow component in the saturated zone? (Y/N) ? See USGS Reports

If yes, explain Issue hasn't been assessed.

5.4 Have aquifer hydraulic properties been determined? (Y/N) N

If yes,

5.4.1 Indicate method(s):

- Pumping tests ____
- Falling/constant head tests ____
- Laboratory tests (explain) ____________________

5.4.2 If determined, what are the values for:

- Transmissivity ____
- Storage coefficient ____
- Leakage ____
- Permeability ____
- Porosity ____
- Specific capacity ____

5.4.3 In cases where several tests were undertaken, were discrepancies in the results evident? (Y/N) ____

If yes, explain ____________________

5.4.4 Were horizontal ground-water flow velocities determined? (Y/N) ____

If yes, indicate rate of movement ____________________

6.0 Well Performance

6.1 Are the monitoring wells screened in the uppermost aquifer? (Y/N) Y

6.1.1 Is the full saturated thickness screened? (Y/N) Y

6.1.2 For single completions, are the intake areas in the: (check appropriate levels)

- Upper portion of the aquifer ✓
- Middle of the aquifer
- Lower portion of the aquifer ✓

6.1.3 For well clusters, are the intake areas open to different portions of the aquifer? (Y/N) N/A

6.1.4 Do the intake levels of the monitoring wells appear to be justified due to possible contaminant density and groundwater flow velocity? (Y/N) Y

7.0 Ground-Water Quality Sampling

7.1 Is a sampling (groundwater quality) program and schedule included? (Y/N) Y

7.2 Are sample collection field procedures clearly outlined? (Y/N) Y

7.2.1 How are samples obtained: (check method(s))

- Air lift pump
- Submersible pump Y
- Positive displacement pump
- Centrifugal pump
- Peristaltic or other suction-lift pump
- Bailer X
- Other (describe) _____

_____

7.2.2 Are all wells sampled with the same equipment and procedures? (Y/N) Y

If no, explain _____

_____

_____

7.2.3 Are adequate provisions included to clean equipment after sampling to prevent cross-contamination between wells? (Y/N) Y

7.2.4 Are organic constituents to be sampled? (Y/N) Y

If yes,

7.2.4.1 Are samples collected with equipment to minimize absorption and volatilization? (Y/N) N?

If yes,

Describe equipment _____

_____

_____

8.0 Sample Preservation and Handling

8.1 Have appropriate sample preservation and preparation procedures been followed (filtration and preservation where appropriate)? (Y/N) Y

8.2 Are samples refrigerated? (Y/N) Y

8.3 Are EPA recommended sample holding period requirements adhered to? (Y/N) Y

8.4 Are suitable container types used? (Y/N) Y

8.5 Are provisions made to store and ship samples under cold conditions (ice packs, etc.)? (Y/N) Y

8.6 Is a chain of custody control procedure clearly defined? (Y/N) Y

8.7 Is a specific chain of custody form illustrated? (Y/N) Y

If yes,

8.7.1 Will this form provide an accurate record of sample possession from the moment the sample is taken until the time it is analyzed? (Y/N) Y

9.0 Sample Analysis and Record Keeping

9.1 Is sample analysis performed by a qualified laboratory? (Y/N) Y

Indicate lab Truesdale Labs

9.2 Are analytical methods described in the records? (Y/N) Y

9.2.1 Are analytical methods acceptable to EPA? (Y/N) Y

9.3 Are the required drinking water suitability parametters tested for? (Y/N) Y

9.4 Are the required groundwater quality parameters tested for? (Y/N) Y

9.5 Are the required groundwater contamination indicator parameters tested for? (Y/N) Y

9.6 Are any analytical parameters determined in the field? (Y/N) Y

Identify:

- pH ✓
- Temperature ✓
- Specific conductance ✓
- Other (describe) _____

_____

9.7 Is a plan included to record information about each sample collected during the groundwater monitoring program? (Y/N) Y

9.7.1 Are field activity logs included? (Y/N) Y

9.7.2 Are laboratory results included? (Y/N) Y

9.7.3 Are field procedures recorded? (Y/N) Y

9.7.4 Are field parameter determinations included? (Y/N) N

9.7.5 Are the names and affiliation of the field personnel included? (Y/N) Y

9.8 Are statistical analyses planned or shown for all water quality results where necessary? (Y/N) Y

9.8.1 Is an analysis program set-up which adheres to EPA guidelines? (Y/N) Y

9.8.2 Is Student's t-test utilized? (Y/N) Y
If other evaluation procedure used, identify _____

_____

9.8.3 Are provisions made for submitting analysis reports to the Regional Administrator? (Y/N) Y

10.0 Site Verification

10.1 Plot Plan indicating the locations of various facility components, ground-water monitoring wells, and surface waters? (Y/N ____)

10.1.1 Is the plot plan used for the inspection the same as in the monitoring program plan documentation? (Y/N) ____

If not, explain _____

_____

10.1.2 Are all of the components of the facility identified during the inspection addressed in the monitoring program documentation? (Y/N) _____

If not, explain _____

_____

10.1.3 Are there any streams, lakes or wetlands on or adjacent to the site? (Y/N) _____

If yes, indicate distances from waste management areas _____

_____

_____

10.1.4 Are there any signs of water quality degradation evident in the surface water bodies? (Y/N) _____

If yes, explain _____

_____

_____

10.1.5 Is there any indication of distressed or dead vegetation on or adjacent to the site? (Y/N) _____

If yes, explain _____

_____

_____

10.1.6 Are there any significant topographic or surficial features on or near the site (e.g., recharge or discharge areas)? (Y/N) _____

If yes, explain _____

_____

10.1.7 Are the monitor well locations and numbers in agreement with the monitoring program documentation? (Y/N) _____

If no, explain _____

_____

10.1.7.1 Were locations and elevations of the monitor wells surveyed into some known datum? (Y/N) _____

If not, explain _____

_____

10.1.7.2 Were the wells sounded to determine total depth below the surface? (Y/N) _____

If not, explain _____

_____

10.1.7.3 Were discrepancies in total depth greater than two feet apparent in any well? (Y/N) _____

If yes, explain _____

_____

10.1.8 Was ground water encountered in all monitoring wells? (Y/N) _____

If not, indicate which well(s) were dry _____

_____

10.1.9 Were water level elevations measured during the site visit? (Y/N) _____

If yes, indicate well number and water level elevation _____

_____

If not, explain _____

_____

APPENDIX - E

RCRA REFERENCES

APPENDIX E

RCRA REFERENCES

1. Implement a ground-water monitoring system (265.90)

2. Submit a written report to have all or part of the ground water requirements waived (265.90(c)) (by a geologist or geotechnical engineer)

   - migration of hazardous waste (or HW constituents) to the uppermost aquifer

   - potential for HW to migrate from uppermost aquifer to water supply wells or surface water

3. To qualify for an alternate plan (265.90(d))

4. Have at least one well hydraulically upgradient and at least three hydraulically downgradient (listing # and location and depths (265.91)

5. Have all wells properly completed (265.91(c))

6. Obtain and analyze samples; also must develop and follow a ground-water sampling and analysis plan (265.92(a))

7. Must determine the concentration or values of parameters listed in 265.92(b)

8. Must establish background concentrations or values for all wells as in Paragraph (b), quarterly (265.92(c))

   - for contaminant indicator parameters take at least four replicate measurements, initial background arithmetic mean & variance for upgradient wells (first year)

   - after first year, all wells must be sampled and analyzed with the following frequencies:

     - those in 265.92(b)(2) at least annually
     - those in 265.92(b)(3) (indicators) at least semi-annually

   - elevation of ground-water surface must be determined at each sampling

9. Within one year of effective date of regulations, prepare an outline of a ground-water assessment program (265.93(a))*

10. Calculate arithmetic mean and variance for each indicator for each well and compare with its initial background (265.93(b))

*See note page 2-10.

11. If comparisons (265.93(c)(1)) for upgradient wells show a significant change, info must be submitted as in 265.94(a)(2)(ii)

12. If comparisons (265.93(c)(2)) for the downgradient wells show a significant change, obtain additional samples, split in two, and obtain analyses of all additional samples to determine if difference was due to error.

13. If significant change is confirmed, notify Regional Administrator (RA) within seven days (265.93(d)(1))

14. Within 15 days after notification, develop and submit a specific plan to the RA (based on outline in Paragraph a) certified by a geologist, etc., for a ground-water assessment program at the facility (265.93(d)(2))

15. Must specify (265.93(d)(3))

    (i) No., location and depth of wells
    (ii) sampling and analytical methods
    (iii) evaluation procedures, including any use of previously gathered ground-water quality info
    (iv) schedule of implementation

16. Must implement ground-water quality assessment plan and determine

    (i) rate and extent of migration of HW in ground water
    (ii) concentrations of HW (or HW constituents) in ground water (265.93(d)(4))

17. Must make first assessment determination under Paragraph 265.93(d)(4) as soon as technically feasible, and submit a written report to the RA (265.93(d)(5))

18. If it is determined HW's or HW constituents have not entered the ground water:

    - reinstate the indicator evaluation program described in 265.92 and 265.93(b)

    - notify the RA within 15 days after determination

19. If it is determined HW's or HW constituents have entered the ground water:

    - (265.93(d)(7)(i)) continue to make determinations on quarterly basis until final closure; if implemented prior to final closure or

    - (ii) cease to make further determinations if plan was implemented during the post-closure care period

20. 265.93(e) (Notwithstanding any other provision of this subpart), any ground-water quality assessment to satisfy 265.93(d)(4) which is initiated prior to final closure must be completed and reported in accordance with 265.93(d)(5)

21. 265.93(f) Unless the ground water is monitored for 265.93(d)(4), at least annually o/o must evaluate ground-water surface elevations under 265.92(e) to determine if 265.91(a) is satisfied. If not, the system must be brought into compliance.