State of New Mexico
ENVIRONMENT DEPARTMENT
Harold Runnels Building
1190 St. Francis Drive. P.O. Box 26110
Santa Fe. New Mexico 87502
(505) 827-2850

BRUCE KING
GOVERNOR

JUDITH M. ESPINOSA
SECRETARY

RON CURRY
DEPUTY SECRETARY

ENTERED

RETURN RECEIPT REQUESTED

September 18, 1991

Mr. Ron Johnson,
Public Service Company of New Mexico
Alvarado Square
Albuquerque, NM 87158

RE: CORRECTIVE ACTION DIRECTIVE
NMT360010342

CERTIFIED MAIL

Dear Mr. Johnson:

The New Mexico Environment Department (**NMED**) hereby rescinds the Administrative Order issued to Public Service Company of New Mexico (**PNM**) January 11, 1990.

Based on contaminant concentrations found in samples from designated monitoring wells at PNM's Person Station Facility, NMED has determined that a groundwater contamination plume is moving eastward from the PNM property boundary and may present a danger to the public health and the environment. NMED directs PNM to submit a proposal for a Corrective Action Plan which will include, but is not limited to, assessment and remediation of the groundwater contamination plume that is a result of a release of contaminants by PNM at the Person Station Property. This directive is issued pursuant to Module III, Item 6 of Permit # NMT 360010342 issued to PNM on September 15, 1988.

This Directive sets forth a schedule for Corrective Action (Attachment A). PNM must submit a Corrective Action Plan (**CAP**) that follows either the attached Corrective Action schedule or a revised version within sixty (60) days of the receipt of this Order. Failure to follow this Directive is failure to comply with the Permit and will result in enforcement action.

Inquiries should be directed to Joseph Kennedy (505) 827-2424 or Tracy Hughes (505) 827-2987.

Sincerely,

Kathleen M. Sisneros
Director, Water and Waste Management Division

KS/jk

cc: Benito Garcia, Chief, Hazardous and Radioactive Materials Bureau
Edward Horst, Program Manager, Hazardous Waste Program
Bruce Swanton, Compliance Supervisor, Hazardous Waste Program
Tracy Hughes, Office of General Counsel, HED

ATTACHMENT A

Technical Schedule for Corrective Action Program
Public Service Company of New Mexico
Person Generating Station

PHASE ONE-GROUNDWATER QUALITY ASSESSMENT

Item	Days to Completion	Action
1	1	PNM adopts HRMB's sampling and analysis plan shown as Attachment D.
2	60	HRMB receives PNM's proposal for a groundwater assessment program that will assess the rate and extent of hazardous constituent migration, both on and offsite in the uppermost aquifer. An approvable groundwater assessment plan must include:

A. A characterization of the uppermost aquifer which must at a minimum include:

1) Flow nets (if a vertical gradient is identified). Flow nets are defined here as stratigraphic cross sections showing vertical flow lines. Each flow net diagram should include the location and name of each well, the location of all well screens, the stratigraphy of the subsurface, the groundwater elevations and the date of water elevation measurements.

2) Cross-sections depicting the stratigraphy of the uppermost aquifer. If an aquitard is identified below the saturated zone, cross sections must be constructed both down dip and cross dip with respect to the aquitard.

Item	Days to Completion	Action

3) The hydraulic conductivities of each potential migration flow path in the uppermost aquifer, not previously determined, based upon site specific pump tests. Potential confining units must be characterized.

4) Groundwater potentiometric contour maps.

5) Narrative description of the hydrogeologic conditions and potential contaminant pathways.

B. The assessment monitoring system described in Attachments B and C, or a proposed modification of this system.

C. The investigatory approach that will be used to fully characterize the horizontal and vertical rate and extent of contaminant migration and each investigatory phase involved. The horizontal extent of the plume shall be that boundary at which all historically identified constituents are below the Maximum Concentration Limits (**MCLs**) for those constituents. The vertical extent of the plume shall be that boundary at which all historically identified constituents are below the Method Detection Limits (**MDL**) for those constituents.

MCL is defined as the maximum concentration of constituents allowed in groundwater by the New Mexico Water Quality Control Commission (**WQCC**) or the US EPA, whichever is the lesser. The MCLs for the constituents found at PNM Person Station are as follows:

1,1,1-Trichloroethane (**TCA**):	.06 mg/l	(WQCC)
1,1-Dichloroethylene (**DCE**):	.005 mg/l	(WQCC)
Tetrachloroethylene (**PCE**):	.005 mg/l	(EPA)
Lead:	.015 mg/l	(EPA)
Chromium:	.05 mg/l	(WQCC)

MDL is defined as the estimated concentration at which the signal generated by a known constituent is three standard deviations above the signal generated by a blank, and represents the 99%

Item	Days to Completion	Action

confidence level that the constituent does exist in the sample.

D. The number, location, and depth of the wells that will initially be installed.

E. The strategy to be used in subsequent investigatory phases.

F. The chosen method of well drilling, construction and completion. A schematic and narrative description of the proposed well construction must include:

1) Borehole diameter, casing diameter and casing material proposed.

2) Well screen slot size.

3) Filter pack material particle size range.

4) Annular seal(s) and location(s) and composition(s) of annular seal(s).

5) Type of grout used above the saturated zone.

6) Riser pipe protection and security (secondary casing, bumper guards, etc.).

7) The proposed depth and length of well screens. All RCRA monitoring wells designed to monitor a specific flow zone must be screened over an equivalent length such that the same vertical section of the flow zone is monitored. Wells must be screened for no more than 5 feet above the ground water surface elevation. If a discrete flow zone is present, the screen must be positioned to monitor this zone. No more than one flow zone should be monitored per well.

8) The proposed method of well development. Compressed air jetting will not be approved.

G. The Provision that cores will be obtained using a split-spoon sampler at 5 foot intervals from the

Item	Days to Completion	Action

surface to total depth.

H. The data analysis procedures that will be used to interpret the analytical data.

I. Documentation of the appropriateness of any other investigatory techniques (e.g., soil gas studies, use of temporary driven-point wells) to be used in addition to the use of permanent, RCRA-type monitoring wells, and a discussion of how they will be utilized.

J. A description of the parameters which will be included in data collection and the proposed schedule for sampling. This must include the provision that all wells in the assessment program will be initially sampled for Appendix IX parameters. Any hazardous constituents identified above the MDL must be included as parameters in all subsequent sampling events. Within the assessment program, quarterly monitoring must be conducted and quarterly reports submitted to HRMB. These must include chemical analytical data and water surface elevation data to HRMB on pc-compatible computer disk in a data format acceptable to both PNM and HRMB. Isothermic contour maps for each contaminant will be included in the quarterly reports. Sample analysis data must be submitted to HRMB within 45 days of the sampling event.

K. Permanent RCRA monitoring wells just ahead of the horizontal boundary of the contaminant plume(s) and within the plume(s) at or near the site(s) of highest contamination based on evaluation of data from system installed as per Phase One, Item 2.B above. The horizontal and vertical boundaries of the plume shall be as defined in Phase One, Item 2.C. above.

L. A schedule of implementation which sets specific dates for the completion of each phase of the assessment program.

M. The use of HRMB's sampling and analysis plan (Phase One, Item 1 of this schedule).

N. A discussion of the procedures which will be used to determine the rate of constituent migration.

Item	Days to Completion	Action
		O. Health and Safety Plan. PNM shall follow practices consistent with those standards set forth in OSWER Directive 9902.3 ("RCRA Corrective Action Plan"), page 9.
3	90	PNM receives HRMB's comments on its ground water assessment plan proposal.
4	110	PNM incorporates HRMB's comments and resubmits the groundwater assessment plan of its CAP proposal to HRMB.
5	115	The schedule in Phase One, Item 2.L. is triggered. Quarterly sampling of the assessment wells will continue while the assessment program is in effect.
6	190	The installation of the groundwater assessment program is complete as per Phase One, Item 2.B. Phase One, Item 10 will direct the drilling of more wells if HRMB determines that more wells must be drilled to further delineate the plume.
7	200	PNM submits cutting/core logs to HRMB.
8	235	PNM submits an Assessment Summary Report of results of the groundwater assessment program. This report must include at a minimum:
		A. the as-built, well-specific construction schematics of its permanent RCRA monitoring wells, a topographic map pursuant to the requirements of HWMR-6, Part V, Part 40 CFR §270.14(b)(19) and including the extent and location of all known solid waste management units with the location of each well identified using the New Mexico State Coordinate System.
		B. cross-sections constructed using data from its assessment program if HRMB determines that the logs from Phase One, Item 7 above identify distinct strata. Complete cross-sections must indicate definable stratigraphic units which differ according to:
		1) particle size distribution by sieve analysis. 2) overall texture. 3) dry color descriptions based on the Munsel Color Chart as specified by USDA Handbook No.

Item	Days to Completion	Action
		18. 4) zones of moisture or saturation. C. borehole drill logs. Drill logs must include: 1) hole number or code. 2) dates drilling began and finished. 3) driller's name and company affiliation. 4) drill logger's name. (All borehole cuttings from all wells must be logged by the same person to minimize subjective error.) 5) drill hole location. 6) drill rig type. 7) bit/auger size. 8) for cores collected for lab analysis, sample code number and hole elevation from which the sample was taken. 9) items 2, 3 and 4 from Phase One, Item 8.B. above. D. The assessment program results characterizing the uppermost aquifer and the rate and extent of hazardous constituent migration.
9	235	PNM will submit a report which will be 1) a discussion of Potential Corrective Measure Technologies listing all approaches to remediation which will be considered for the site; and 2) a proposal for a groundwater pumping and treatment system capable of capturing the plume identified in Phase One, 8.D. above. The discussion on Potential Corrective Measure Technologies should address the following: 1. What will be the residual concentration of each constituent after treatment using this technology? Either 1) Cite one case study using this technology where the proposed level of cleanup was achieved or 2) see Phase One, Item 9.3, below. 2. At what rate can the cited level of cleanup be attained? Either cite one case study where this rate was achieved or see Phase One, Item 9.3, below. The groundwater remediation system must be sized such that all groundwater within the vertical and horizontal extent of the contaminant plume(s) identified in Phase One, Item 8.D., above, has been remediated to or below the protection standard for all hazardous constituents in the contaminant

Item	Days to Completion	Action
		plume(s) within a period of not more than twenty (20) years from the date of the CAP, PHASE TWO implementation.
		3. In lieu of case citations for Phase One, Items 9.1 and 9.2, above, PNM may propose bench-scale tests of the proposed technologies as a basis for determining what cleanup levels and rates of cleanup will be achievable.
10.	280	PNM receives comments from HRMB addressing the submitted Assessment Summary Report (PHASE ONE, Item 8) and Potential Corrective Measures Technologies Report (PHASE ONE, Item 9). HRMB will direct PNM as to the location and number of wells to be drilled to further delineate the plume. If such wells are necessary, HRMB will issue a schedule for drilling.

PHASE TWO

The PHASE TWO technical schedule will be triggered on that date that HRMB certifies that Phase ONE above has been completed.

Item	Days to Completion	Action
1.	60	PNM will submit a proposal for PHASE TWO of its Corrective Action Program (CAP). PHASE TWO will be based on the results of PHASE ONE. An approvable proposal must address:

A. Corrective Action Objectives

1. Groundwater Protection Standards. Groundwater shall be considered to have been remediated when the concentration of all hazardous constituents is equal to or less than the lesser of the following:

   a. For any constituent listed in Table 1 of HWMR-6, Part V, 40 CFR section 264.94, the concentration given in that table (MCL) if the background level of the constituent is below that given in Table 1; or

   b. The health-based allowable constituent concentration calculated as per the Superfund Public Health Evaluation Manual (OSWER Directive 9285.4-1); or

   c. An alternate concentration limit approved by the HRMB.

B. Corrective Measures Proposal.

PNM will select one or more of the corrective action technologies in Phase One, Item 9, above, for implementation in its corrective action program. PNM's Phase Two, Item 1 report will detail all pertinent findings and substantiate PNM's choice of cleanup technologies.

1. In the event the remediation approach has been selected based on data available from a case history (PHASE ONE, Items 9.1. and 9.2, above), PNM will:

Item	Days to Completion	Action

a. present these findings and conclusions, including the following data from the case study: Aquifer hydraulic conductivity, average depth from ground surface to groundwater potentiometric surface within plume boundary, approximate vertical and horizontal extent of contamination, initial (pre-cleanup) maximum contaminant concentrations for all treatment parameters, time elapsed since implementation of cleanup, current or final constituent concentrations in the plume and the current plume vertical and horizontal dimensions, and the initial and current projected date of cleanup completion.

b. present a map, to approximate scale, showing plume configurations and specific proposed locations of remediation devices.

c. present engineering specifics of all remediation devices.

2. If the remediation approach has been selected based on laboratory bench-scale testing (PHASE ONE, Item 9.3), PNM shall present all data and conclusions including:

a. a narrative description of each type of test run.

b. all raw data with each report signed and dated by the supervising scientist.

c. a presentation of each equation used, with all variables defined, and a narrative description of the use of each equation.

d. a clear presentation of each set of calculations for each trial, with all units (e.g., cm, kg, ppm) indicated for each variable.

e. all calculations clearly performed.

f. a narrative description of the results

Item	Days to Completion	Action

for each trial of each type of test, i.e., if 7 trials are run for a given test type, a narrative description of the outcome of each of the seven trials.

The results shall be presented in PNM's Phase TWO, Item 6 report. The report must include a table of contents which is specific with respect to each test type, trial within each test type, raw data pages, equation explanation pages, trial test narratives and test conclusions.

3. The final remediation technology(ies) chosen must be selected based on level and rate of cleanup, reliability, implementability and personnel safety. HRMB will review the proposed technology(ies) based on the criteria presented in OSWER Directive 9902.3 (RCRA Corrective Action Plan), Task IX, pages 18-20.

4. If the remediation technology(ies) selected may generate a hazardous waste, the Proposal must include:

   a. Testing criteria for waste evaluation, and a schedule for periodic remediation-waste analysis if necessary; and

   b. Specific contingency provisions for appropriate waste disposal including the name(s) of the likely disposal facility(ies) and EPA identification number(s).

5. The Corrective Measure Proposal must include a schedule of implementation with clearly defined milestones to be achieved within a specified number of days from HRMB's acceptance of the Proposal.

6. The Corrective Measure Proposal must include design specifications for all equipment to be used.

7. The Corrective Measure Proposal must include a Health and Safety Plan. PNM shall follow

Item	Days to Completion	Action
		practices consistent with those standards set forth in OSWER Directive 9902.3 ("RCRA Corrective Action Plan"), page 9.
2.	90	PNM receives HRMB's comments on its PHASE TWO proposal.
3.	110	PNM incorporates HRMB's comments and resubmits its Phase Two proposal to HRMB.
4.	105	PNM begins installation of CAP equipment.
5.	165	Installation of CAP equipment is complete.
6.	210	A Post-Corrective Measures Implementation Report is submitted to NMED by PNM. The report shall include: A. as-built diagrams of all groundwater treatment wells or injection wells. Include on a map at 1"=200' scale, the surveyed locations of the RCRA unit and solid waste management unit (SWMU) boundaries, all treatment wells, assessment monitoring wells, injection wells, groundwater flow barriers, groundwater treatment devices, and wastewater holding impoundments, with all survey points identified using the New Mexico State coordinate system. B. PNM's evaluatation of the effectiveness of its remediation technology.
7.		If the groundwater treatment technology includes an above-ground, through-put approach (e.g., "pump and treat"), PNM shall submit an updated evaluation of its remediation technology on a monthly basis. Samples of groundwater shall be collected both before and after treatment and analyzed for all constituents which have been historically identified in PNM's groundwater. PNM will proceed to quarterly evaluations after 8 consecutive monthly sampling events occur in which the constituents are shown to have been have been treated to or below the groundwater protection standards. PNM will proceed to semi-annual evaluations after 4 consecutive quarterly sampling events occur in which the constituents are shown to have been have been treated to or below the groundwater protection standards. PNM will continue to test its remediation system as described above on a semi-annual basis throughout the remainder of the corrective

Item	Days to Completion	Action

action program.

A.) Quarterly reports must be submitted to HRMB summarizing the results of the previous quarter's remediation effectiveness testing. All pages must be consecutively numbered. The reports must include all laboratory data sheets; data summaries by well location for the concentrations of each constituent listed above in this item (Phase Two, Item 7), in the pre- and post-treatment groundwater samples; a narrative summary discussing the effectiveness of treatment of each groundwater treatment device in the previous quarter; and a table of contents locating all sections of the quarterly report.

B.) After semi-annual remediation effectiveness testing has been established, PNM shall submit remediation effectiveness reports annually. This report shall contain all data contained in Phase Two, Item 7.a. above, for PNM's semi-annual testing. PNM shall continue to submit annual reports on or before January 1 of each year until the groundwater protection standard for all hazardous constituents in the contaminant plume(s) has been achieved.

ATTACHMENT B

PNM shall include as part of its groundwater assessment program the following:

1) Sample all off-site wells screened in the uppermost aquifer which are down and sidegradient and within a one mile radius of the waste tank unit. Sampling will target PCE, DCE, TCA, chromium and lead.

2) Install a RCRA monitoring well as far upgradient as possible, while remaining on PNM property, from the waste tank unit (see Attachment C), or designate PSMW-7 as the upgradient well. The upgradient well is to be used to determine background concentrations of groundwater moving below PNM property.

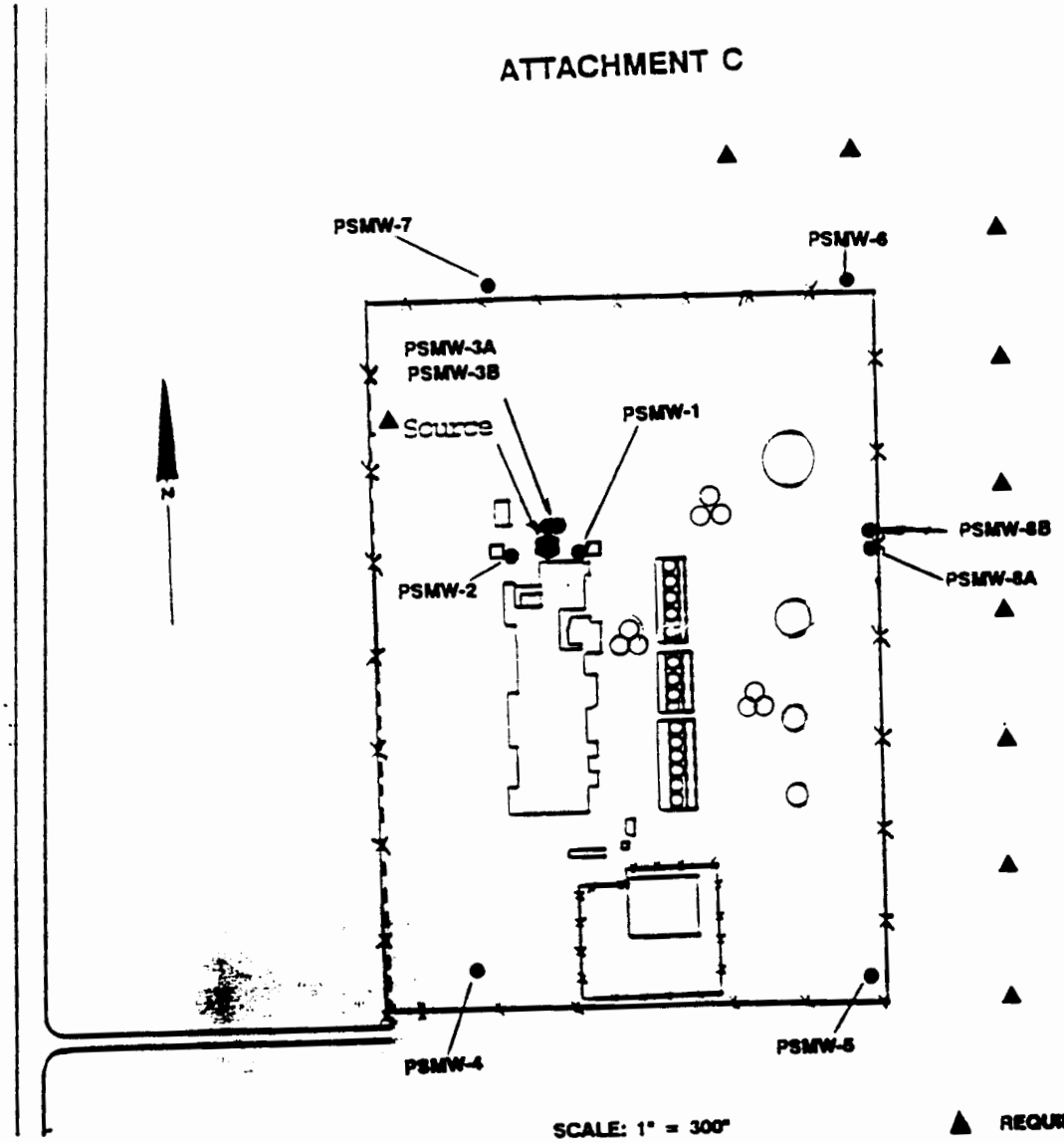
3) Install piezometers adjacent to wells PSMW-1 and PSMW-2 (see Attachment C). The top of the screens in these piezometers will be set at a depth 20 feet below the water table surface. These piezometers will be used to indicate vertical flow.

4) Install well nest shown on Attachment C. A well nest is defined here as a group of wells at the same location, each with its own borehole, and each screened at a different depth. Each nest will include three wells screened at depths approximately 0-10 feet, 20-30 feet, and 50-60 feet below the water table surface. Water level measurements in these wells will also be used to determine if there is vertical flow. Wells in each nest will be designed and constructed as RCRA Monitor wells.

5) Install RCRA monitor wells shown in Attachment C. These wells will be screened from 5 feet above to 15 feet below the water table surface.

Location of the above wells will be subject of HRWB approval.

ATTACHMENT C



REQUIRED NEW MONITOR WELL AND PIEZOMETER LOCATIONS

ATTACHMENT D

PERSON GENERATING STATION
HAZARDOUS WASTE PROGRAM
SAMPLING AND ANALYSIS PLAN
(NMT 360010342)

The purpose of this Sampling and Analsis Plan (S&A plan) is to ensure that groundwater samples are representative of the groundwater in the aquifer and to ensure that the samples are collected, analyzed, and reported in a consistent and appropriate manner. This S&A plan is based on the latest edition of RCRA Groundwater Monitoring Technical Enforcement Guidance Document (TEGD), September, 1986.

The Permittee must refer to TEGD methodologies for groundwater monitoring where appropriate and when questions of correct procedure arise.

I. Water Elevation and Total Depth Measurements:

Before purging, the depth to the bottom of the well and the depth to water must be measured and recorded unless the well has a dedicated installed pump. For monitor wells with dedicated pumps, total depth measurements must be made every five years or when the pump is pulled, whichever is more frequent, unless more frequent measurements are directed by the Director.

All measurements must be made from a visibly marked, surveyed point on the well casing rim. The surveyed point must have an elevation measured to the 0.01 foot with respect to sea level by a licensed surveyor.

The surveyed elevations of the reference points for the monitoring wells must be listed in a table developed by the Permittee and recorded in the log book.

The materials of construction for the measuring devices must be recorded in the field log book.

A. Total Depth Measurements

All total depth measurements must be recorded to the nearest 0.25 foot.

To measure the total depth of the well a weighted tape must be lowered into the well casing until the bottom is felt. The slack in the tape must be taken out while the tape remains on the bottom of the well. The total depth must be recorded in the log book by observing the tape

measurement at the surveyed point on the well casing rim. The total depth measurement must be adjusted to reflect the length of the weight which is attached to the end of the tape.

B. Water Elevation Measurements

All water elevation measurements must be taken before sampling any well and must be taken within a twenty-four (24) hour period or less. All water elevation measurements must be accurate to the nearest 0.01 foot and recorded to the nearest 0.01 foot.

The depth to water must be measured as the distance from the surveyed point on the well casing rim to the wetted interface on the measuring device. The depth to water measurement must be subtracted from the elevation of the surveyed point in order to determine the water elevation measurement.

If a plastic or polytetrafluoroethylene (PTFE) measuring tape is used, then this tape must be checked periodically, at least once a year, with a steel tape in order to determine whether the synthetic tape has stretched. If the synthetic tape has stretched more than 0.01 foot then the tape must be calibrated with the steel tape.

Measurements must be taken three times to accurately determine water level elevation. If the gradient is flat,an error in measurement could significantly change the calculated direction of groundwater flow. The field person must note which of the three measurements appears to be the correct measurement.

The Permittee must note in the field logbook whether any wells that are being pumped could potentially impact the water elevations measured at the RCRA wells.

C. Decontamination of the Measuring Device

The level of decontamination for the tape depends on the situation. Less stringent decontamination procedures can be used if the wells have not evidenced contamination in the past, and more stringent decontamination should be used if the wells have evidenced contamination in the past. The tape must be cleaned before and between sampling points as follows.

The weighted tape must be washed with non-phosphate detergent followed by a tap water rinse. A hexane rinse can be included if the well has evidenced organic

contamination.

Decontamination procedures for the tape are less stringent than for sampling equipment because the tape does not come into contact with the sample and the wells will be purged after the tape is used.

II. Detection of Immiscible Layers

For newly developed wells, the Permittee must use the guidelines in the TEGD for determining the presence, measuring the thickness, and collecting a sample of any light or dense immiscible layers (TEGD, Section 4.2.2.). These procedures must be accomplished prior to purging the well.

A. Light Immiscible Layers

The Permittee must test for light immiscible layers when a new well is developed if the Permittee believes that a light immiscible layer may be present. In addition, the Permittee must test for light phase immiscible layers if requested by the Director to do so.

If the Permittee determines that any immiscible light phase is present, TEGD guidelines for measuring the thickness and sampling the phase must be adopted. A clear bailer constructed of inert material with a bottom filling, bottom emptying device can be used to determine an immiscible light phase.

The Permittee may use an alternative method if the Director approves the method.

B. Dense Immiscible Layers

The Permittee must test for dense phase immiscibles when a new well is developed if the Permittee believes that a dense immiscible layer may be present. In addition, the Permittee must test for dense phase immiscible layers if requested by the Director to do so.

Dense phase immiscible layers can be detected by lowering an interface probe to the bottom of a monitoring well, if there is sufficient layer thickness to register on the probe. If there is a sufficiently thick dense phase present, a teflon double check valve bailer must be used to obtain a sample.

The Permittee may use an alternative method if the Director approves the method.

III. Field Log Book

A field log book must be maintained in the facility operating record and must be available for review. It must include a record of the following information:

- Identification of well
- Well depth and date of measurements
- Static water level depth and measurement technique, and date of measurement
- Presence of immiscible layers and detection method, if applicable
- Well yield -- high or low
- Purge volume/calculation and purge/sample pumping rate
- Time well purged
- For low yielding wells, the time needed for well to recover enough to collect a sample after purging
- For high yielding wells, the time needed for complete recovery after purging
- Collection method for immiscible layers, if applicable
- Sample identification numbers
- Well evacuation procedure/equipment
- Sample withdrawal procedure/equipment
- Date and time of sample collection
- Types of sample containers used, parameter to be analyzed and sample identification information and number
- Preservative(s) used
- Parameters requested for analysis (e.g., volatile organics, total metals)
- Field analysis data and method(s)
- Sample distribution and transporter
- Field observations on sampling event.

- Name of sample collector
- Weather conditions including air temperatures, wind velocity and direction
- Internal temperatures of refrigerated field and shipping containers
- Well condition
  - security of well cap
  - presence of cracks in concrete apron
  - presence of standing water around well
  - condition of protective posts
  - condition of inner and outer well casing
  - presence of cracks, holes and/or burrows in the ground near the well or RCRA unit
- Purpose of sampling, e.g. detection, compliance, corrective action
- Sequence in which the samples are collected (e.g., volatile organics, extractable organics, total metals, etc.)
- Any problems that were encountered

IV. Equipment Decontamination

The nondedicated sampling and purging equipment must be decontaminated as follows depending on whether the sample will be analyzed for inorganic or organic parameters:

A. For inorganic analysis

1. nonphosphate detergent wash
2. tap water rinse
3. dilute acid rinse HNO3 or HCL
4. distilled or deionized water rinse
5. air dry before use

B. For organic analysis

1. nonphosphate detergent wash
2. tap water rinse

3. distilled/deionized water rinse
4. acetone or methanol rinse (optional)
5. pesticide grade hexane rinse
6. distilled/deionized water rinse (optional)
7. air dry before use

Decontamination of nondedicated sampling containers must be in accordance with the procedures described in the most recent edition of Test Methods for Evaluating Solid Waste (SW-846).

V. Sample Withdrawal and Collection

A. Purging Techniques and Field Measurements

For high yielding wells, unofficial field measurements of pH, temperature, and specific conductance must be obtained before, during and after purging in order to verify that these parameters have stabilized. Stabilization indicates that the well has been sufficiently purged.

Stability is achieved when two consecutive measurements are plus or minus 0.01 pH units for pH, plus or minus twenty (20) umhos for conductivity, and plus or minus one (1) degree for temperature. Alternative standards may be approved by the Director.

Field measurements should be used to determine purge efficiency unless it can be demonstrated that stabilization occurs after a specific volume of water has been purged. The specific purge volume required for stabilization may change as the well casing volume changes through time. The Permittee may determine and provide documentation to the Director of the purge volume necessary for the seasonal high water level and use that purge volume year round. This purge volume must be updated when the seasonal high water level changes significantly.

During purging, the discharge rate of the wells should not be faster than the rate used during development. In addition, the purge rate must not be so fast that the recharging water rushes turbulently into the well, creating an audible noise.

Low yielding wells should be purged no more than once to dryness and the official field measurements for pH, temperature, and specific conductance and the groundwater samples must be obtained as soon as the well has recovered enough to yield water for a sample.

For higher yielding wells, the official field measurements for pH, temperature, and specific conductance must be determined after the unofficial field parameters have stabilized.

The official field measurements must be recorded to the 0.01 pH unit and the pH meter must be accurate to the 0.01 pH unit. The conductivity measurements must be recorded to the nearest 20 umhos and the conductivity meter must be accurate to the 20 umhos. Alternative standards may be approved by the Director.

Purge water should be containerized until the analytical results indicate whether the water is contaminated. If sampling results indicate that the purge water is contaminated, the contaminated water shall be disposed of at a permitted TSDF unless: the resulting analysis detected contaminants at below MCLs or; if there are no MCLs, a health based risk analysis indicates that the water is safe to dispose of on the ground. Disposal of contaminated purge water on the ground could result in soil contamination that requires clean up.

B. Sampling Equipment

A PTFE bailer or any fluorocarbon or stainless steel bailer that is constructed of inert material with a bottom filling-bottom emptying device or a positive gas displacement PTFE bladder pump must be used to withdraw samples from monitor wells.

The bailer cord must be specified in the field log book and composed of inert material or be discarded between sampling points.

Precautions in using sampling equipment must be taken to insure that parts that come in contact with well fluid are constructed of inert material and can be decontaminated or disposed of between uses.

C. Sample Collection Techniques

If a pump is used to collect samples, the flow rate must be one hundred (100) ml/minute or less for collecting the organic samples, metal samples and any other samples which could be chemically unstable due to aeration and turbulence. The pump must be operated to prevent surging or pulsing, if possible.

If a bailer is used, it must be handled in such a manner to minimize agitation and aeration of the groundwater, (e.g., the bailer must not be dropped down the well

casing or allowed to splash the water surface in the casing.)

The contents of the bailer must be transferred to the appropriate containers using procedures to minimize agitation and aeration and in order of sensitivity to volatization as listed below:

- Volatile Organics (VOA)
- Total Organic Halogen (TOX)
- Total Organic Carbon (TOC)
- Extractable Organics
- Total Metals
- Phenols
- Cyanide
- Sulfate and Chloride
- Turbidity
- Nitrate and Ammonia
- Radionuclides

The Permittee must analyze for total metals instead of filtered metals because filtering can remove mobile particles. The purpose of the sampling is to identify constituents that may be moving through the aquifer. New studies indicate that a sample that is filtered with a 0.45 micron filter does not represent a dissolved phase nor does it represent what may be moving through the aquifer.

VI. Sample Containers and Preservation

The appropriate sample volumes, preservatives, container types, and holding times must be as described in Table 1.

Sample labels must include the Permittee facility name, date, preservatives used, sample identification numbers and parameters to be analyzed for (e.g. TOX, TOC, VOA, Acid Extractable, Base/Neutral Extractable, General Chemistry, etc.).

Sample labels must remain legible even if wet.

Sample labels must remain firmly attached even when wet.

Custody seals must be placed on the sample shipping containers in such a manner that ensures that the samples are not altered.

Water samples for organic and inorganic (including metal) analyses must not be filtered.

Samples for metal analyses must be analyzed for total metals.

The bottles for VOA, TOX, and TOC analysis will be filled to eliminate headspace (no air bubbles).

Sample containers should be packaged in a manner that prevents breakage (e.g., there should not be direct contact between glass containers).

Sample containers should be packaged in a manner that prevents the wet labels from rubbing together.

Volatile septum vials should be packaged and transported upside down with the teflon septum on bottom to prevent leakage of gas through the septum.

Volatile septum vials should be packaged in a manner that prevents cross-contamination through the teflon septum. For example, the vials should be placed in plastic baggies or whirlpacks.

VII. Field QA/QC Program

Field QA/QC samples must be collected and reported to ensure that the groundwater samples are representative of the groundwater quality and to ensure that cross-contamination has not occurred.

Duplicate samples are required as an indication of variability in water quality or the precision of the laboratory analyses.

Sample collection techniques, sample containers and preservation must be as described in TABLE 1.

A. Trip Blanks

1. Preparation

The Permittee's laboratory will prepare at least one trip blank for each sampling event. The trip blank will be prepared by filling two 40 ml vials with deionized, distilled water. The bottles must

be filled to eliminate headspace. The deionized or distilled water must be free of contamination.

2. Handling

The trip blank must be transported from the laboratory to the sampling location and returned to the laboratory in a manner identical to the handling procedure used for the sampling.

3. Analysis

The trip blanks must be analyzed for volatile organic constituents. Additional trip blanks must be prepared and analyzed for other sample parameters (e.g., extractable organics, total metals, etc.) if the sample containers are suspected of causing cross-contamination.

4. Contamination

Trip blank contamination can be attributed to improperly cleaned containers, contaminated deionized, distilled water, or cross-contamination during the trip or at the laboratory.

If contamination is detected in a trip blank, the Permittee must adequately demonstrate the probable cause of the contamination within thirty (30) days of receipt of the laboratory report. If the contaminant in question is a potential constituent from the Permittee's site, the Permittee will immediately modify the laboratory or field procedure in question in order to prevent future contamination by the contaminant in question and provide documentation of this modification to the Director within sixty (60) days of receipt of the laboratory report.

Trip blank analyses must not be used to correct the groundwater sample data.

B. Equipment Blanks

1. Preparation

During the course of a sampling event, all nondedicated sampling devices must be checked to determine if the device has been effectively cleaned between sampling points.

Distilled, deionized water must be poured or pumped

through the sampling device, and collected directly by the water sample containers. The distilled, deionized water must be free of contamination. If possible this water should be provided by the Permittee's analytical laboratory.

At least one equipment blank must be collected per day of sampling or one equipment blank per 10 wells, when nondedicated sampling devices are used.

2. Handling and Analysis

The equipment blanks must be handled in a manner identical to the handling procedures used for the water samples.

The equipment blanks must be returned to the laboratory for volatile, extractable (semi-volatile) constituents, and total metal analyses.

3. Contamination

Dedicated sampling equipment must be used if previous equipment blank analysis indicates any organic or inorganic contamination above background or the reporting limit, excluding those constituents whose presenses was caused by laboratory procedure contamination or field equipment decontamination.

If contamination is detected in an equipment blank, the Permittee must either adequately demonstrate that the contamination was caused by laboratory procedure or field equipment decontamination within thirty (30) days of receipt of the laboratory report or use dedicated sampling equipment for future sampling. If the above mentioned procedures are proven to cause the contamination, then the Permittee will immediately modify the laboratory procedure and/or the equipment decontamination in order to prevent future contamination by the contaminant in question and provide documentation of this modification to the Director within sixty (60) days of receipt of the laboratory report.

Equipment blank analyses must not be used to correct the groundwater sample data.

C. Duplicate Samples

1. Preparation

For each sampling event, at least one set of

duplicate samples must be collected from one well per each day of sampling or one set of duplicate samples per ten (10) wells. The volatile duplicate sample must be collected immediately after the "primary" volatile sample, the "primary" extractable organic sample must be collected followed by the duplicate extractable organic sample. This pattern must continue until a set of duplicate samples have been collected for every "primary" sample at the well. The order of sample collection must be as described in Section V of this Sampling and Analysis Plan.

Duplicate sample analyses must not be used to correct the groundwater sample data.

2. Handling and Analyses

The duplicate samples must be handled in a manner identical to the handling procedures used for the "primary" groundwater samples.

The duplicate samples are analyzed for the same parameters as the "primary" groundwater samples.

D. Calibration and Decontamination of Field Equipment

The following discussion refers to the pH and conductivity meters.

Before and after the daily sampling event, a calibration check against a known standard must be performed and noted in the field logbook. The equipment manufacturer's procedures for calibration must be used and any deviations, problems, and repairs will be noted in the field log book.

The pH meter must be calibrated with a pH 7 buffer and either a pH 4 buffer if the pH is below 7, or a pH 10 buffer if the pH is above 7. If the general pH is not known, then pH paper can be used to determine which buffer to use.

The batteries must be tested prior to using the equipment. Spare batteries should be carried in the field and used whenever the instrument provides unstable readings.

The equipment manufacturer's procedures must be maintained in the facility operating record.

The instrument's cell or sampling cup must be repeatedly

flushed with distilled water before and after use and in between actual sampling events. Flushing must be of a duration to prevent cross contamination.

For the sampling event, the cup or cell must be flushed three times with the liquid to be sampled before measurements are made.

The manufacture approved method of cleaning and storage must be used and any deviations, or problems must be noted in the field logbook.

Additionally, if the groundwater samples are obviously contaminated with oil or any other substance which could cause the pH/EC probe response to deteriorate, then the probe must be cleaned per manufacturer's procedure and recalibrated before the measurement.

E. Chain of Custody and Sample Request Forms

The chain of custody must ensure that the samples are never left unattended unless they are in a secure, locked location and only authorized people have access to the samples.

The sample request form provides the necessary information to the laboratory (e.g., identification of sample, analyses requested, preservatives used or requested, etc.).

The chain of custody record and sample request form information may be combined on the same document and must include the following:

1. Facility name

2. Sample identification number

3. Date and time of collection if different from sample identification number

4. Identification number or name of well(s)

5. Number of containers and parameters required (e.g., VOA, total metals)

6. Preservatives used or required

7. Internal temperatures or presence of ice in shipping container upon opening at the laboratory

8. Signature, date, and time of receipt of collector

and all person(s) in the chain of possession

9. Laboratory personnel statement of the condition of seals at time of receipt at laboratory

VIII. Laboratory Quality Assurance and Quality Control Program

The Permittee must ensure the laboratory performing the sample analysis adheres to QA/QC procedures and methods described in the TEGD, or the most recent edition of SW-846 or other EPA approved laboratory QA/QC procedures.

A. The laboratory QA/QC program must insure the validity and reliability of laboratory data and include the following:

1. Use of EPA-acceptable sample preparation and analytical methods as specified in the permit.

2. Calibration of laboratory instruments to within acceptable limits according to EPA or manufacture's specifications before, after, and during use, as appropriate. Reference standards must be used when necessary.

3. Periodic inspection, maintenance, and servicing (as necessary) of all laboratory instruments and equipment.

4. Periodic training, testing and evaluation of laboratory personnel to insure accurate performance.

5. The use of reference standards and QC samples (e.g., checks, spikes, laboratory blanks, duplicate, splits) as necessary to determine the accuracy and precision of procedures, instruments, and operators, as well as the identification of potential interference by the sample matrix.

6. QA/QC samples must not to be used to correct data.

7. The use of adequate statistical procedures (e.g. QC charts) to monitor the precision and accuracy of the data and to establish acceptable confidence limits.

8. The use of the appropriate percentage of the

reference standards, spiked standards, blanks and split samples based on EPA standards.

9. If an alternative method for analysis is used, split samples must be run with another laboratory for comparison purposes and must be included with the laboratory data.

10. Continuous review of results to identify and correct problems within the measurement system (e.g. instrumentation problems, inadequate operator training, inaccurate measurement methodologies.)

11. Documenting the performance of systems and operators.

12. Documenting any deviation from SW-846 or other EPA approved procedure (latest editions).

13. Use of acceptable sample identification and, as necessary, formal chain-of-custody procedures in the laboratory.

14. Maintenance and storage of complete records, charts, and logs of all pertinent laboratory calibration, analytical, and QC activities and data.

15. Insure all data outputs are presented in their prescribed format. The following information must be provided for each parameter and included on the raw laboratory data sheets for each sampling event: well number, detection limit, percent recovery, surrogate standards, date that sample was collected, date that sample was received by laboratory, date that sample was extracted if applicable, and date that sample was analyzed.

16. A laboratory logbook must include the following:

    a. Experimental conditions (e.g. temperature, humidity, etc.)

    b. Observation of headspace in any sample received for volatile analysis

    c. Results for all QA/QC samples

    d. Time, data, and name of person for each

processing step

e. Sample preparation technique (e.g. extraction)

f. Instrumental methods

g. The actual holding time information

h. Laboratory sample number (if different from field number)

i. Analyses to be performed

IX. Groundwater Quality Data

A. Reporting of Low and Zero Concentration Values

The Permittee must insure that MDL's (method detection limits) be set as low as possible consistent with SW846 and Appendix B of 40 CFR 136. If detection limits are greater than the New Mexico Water Quality Control Commission Standards as listed in Section 3-103A, WQCC 82-1 Amendment No. 4 or the EPA Drinking Water Standards, (or the Groundwater Protection Standard or background as defined in the Permit), and the constituent is not detected, then the well must be resampled within fourteen (14) days and analyzed with detection limits as outlined above.

Detection limits that are high or vary from past detection limits must be reported and explained to the Director within fourteen (14) days of receipt of the laboratory analyses. This report will be evaluated by the Director to determine if the detection limits must be reduced in future work by laboratory procedures that remove or control interfering constituents that potentially cause detection limits to be elevated.

Regarding GC/MS analyses, the numerical concentration values of any hazardous constituents found at levels below the practical quantitation limit and above the method detection limit must be reported if these constituents have been detected in samples from the well in question by previous GC/MS or GC analyses.

B. Reporting Raw Data

For each sample, the raw data sheets must indicate monitor well number, date sampled, date extracted and

date analyzed. In addition the detection limits, percent recovery, surrogate used, and confidence limits must be reported for each sample.

C. Missing Data Values

The Permittee must statistically evaluate all missing data values in accordance with the TEGD, Section 4.7.2.

D. Outliers

"Outlier" values must be handled and documented in accordance with the TEGD, Section 4.7.3.

E. Units of Measure

The Permittee must report each parameter analytical value with consistent, unambiguous units of measure. The units must be consistent from one sampling event to the next.

Reporting in a consistent number of significant digits, at least three, is required. Rounding techniques must not be used to alter the apparent precision of a measurement. If a constituent concentration cannot be measured to three significant digits, then the reasons must be documented and no more than a ten (10) percent error will be allowed in a one unit change in the last significant digit of a data value.

F. Missing Constituent(s) and/or Parameter(s)

Should a laboratory analytical report be received that does not include the analysis of a required constituent(s) and/or parameter(s), then the following actions must occur:

1. The Permittee must immediately contact the laboratory to determine if there are archive samples that can be retrieved and analyzed for the constituent(s) and/or parameter(s) of concern within specified holding times and if not;

2. The Permittee must resample for the required constituent(s) and/or parameter(s) of concern within fourteen (14) days of contacting the laboratory.

3. All such actions must be recorded in the facility operating record and noted in the annual report.

G. Exceeding Maximum SW-846 Holding Times

Samples must not exceed their maximum holding times as listed in Table 1. The Permittee must review the

laboratory analytical reports within fourteen (14) days after receipt from the laboratory. If a laboratory analytical report indicates that groundwater samples have exceeded their maximum holding times before the appropriate analysis had been performed, then the following actions should occur:

1. The Permittee must immediately verbally notify the EID that such has occurred and;

2. The Permittee must within fourteen (14) calendar days resample for any constituent and/or parameter that has exceeded its maximum holding times.

H. Unsampled Ground-Water Monitoring Wells

If a designated groundwater monitoring well cannot be sampled due to reasons beyond the Permittee's control, then the following actions should occur:

1. The Permittee must immediately contact the EID by telephone and in writing, stating the reasons why said well could not be sampled.

2. The Permittee must sample said well within fourteen (14) calendar days unless conditions preventing the sampling remain beyond the control of the Permittee and the Director accepts the Permittee's reasons.

X. Operation and Maintenance Program

A. Operation and Maintenance Log Book

A separate record must be kept in an Operation and Maintenance (O&M) log book that tracks the integrity and maintenance of the monitor wells and the sampling equipment. This log book must at least include the date and time of inspection, the name of the inspector, a notation of the observations made, and the date and nature of any repairs or other remedial actions. This log book must be maintained in the facility operating record and must be available for review.

B. Maintenance of Sampling Equipment

1. The Permittee must maintain an inventory of sampling equipment and devices used in the sampling program in the O&M log book.

2. One month before each sampling event, the Permittee must inspect all sampling equipment (pumps, bailers, pH meter, and other field equipment) to ensure that the equipment is in good working order and that all necessary equipment is available for the upcoming sampling event.

   This check and any problems must be noted in the O&M log book.

   Sampling equipment that is found to be deteriorated or malfunctioning must be repaired before the next sampling event.

C. Maintenance of Monitor Wells

1. Once every five years (or more often if warranted or if directed by the Director) the Permittee must have the top of the casing of the monitor well resurveyed by a licensed surveyor to elevation above sea level. This information must be reported to the Director in the annual report of that year.

2. One month after each sampling event, the Permittee must inspect all monitor wells to determine whether the wells are maintained in good working order.

   Visual or geochemical evidence of physical degradation of casing material; concrete pad; significant changes in the well depth, recovery rate, and turbidity measurements; and damage to the well casing etc., must be investigated, and recorded in the O&M log book. Investigation may require the use of a borehole camera or caliper logs.

   Any problem with a well must be corrected within two months of the sampling event. A detailed plan to correct or replace any well must be developed and submitted to the Director. If the problem cannot be corrected then the well must be replaced with a Director-approved well within three months of the sampling event.

3. Well samples must be analyzed for turbidity at least once a year (or more often if warranted or if directed by the Director) to determine whether the well is structurally stable or to determine whether the well needs to be redeveloped.

4. If during a sampling event, a monitor well yields

a ground water sample that measures a turbidity greater than 5 turbidity units, or measures significantly greater turbidity than in the past, or the total depth has decreased with time, or the recovery rate has decreased with time, then the well must be redeveloped within two months after this sampling event.

Redevelopment must not employ a discharge rate that exceeds the recovery rate and must include a surge and flow reversal method to dislodge the fine particles from the filter pack. Redevelopment must continue until the turbidity is below 5 turbidity units or until another Director-approved standard is achieved.

Air must never be used to redevelop the wells.

5. If redevelopment does not lower the turbidity to acceptable levels, the Permittee must determine the reason for the increased turbidity. If the turbidity is caused by damage to the well or incorrect filter pack or screen slot size, then the well must be replaced.

6. If a well evidences high pH that is not caused by a contaminant plume, then the well must be repaired or replaced.

7. The Director must be provided with "as built" drawings of all recovery, observation, or monitor wells. If the Director-approved specifications do not coincide with the "as built" drawings then these wells must not be used unless the Director accepts the alternative specifications.

XI. Revision of Sampling and Analysis Plan

Sampling and analysis technology is dynamic and is currently being updated as new studies demonstrate better ways to obtain, analyze, and otherwise ensure a more representative sample. Therefore, this S&A plan will be revised and updated whenever directed by the Director. The Permittee may initiate a revision of this S&A plan if it can be demonstrated to the Director's satisfaction that the new procedures will ensure a more representative sample.