



State of New Jersey  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
DIVISION OF HAZARDOUS WASTE MANAGEMENT

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MAY 21 1990

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED  
No. P 905 517 872

Mr. David R. Smith  
Director of Environmental Services  
Shieldalloy Metallurgical Corporation  
P.O. Box 768  
Newfield, NJ 08344

Dear Mr. Smith:

Re: Shieldalloy Metallurgical Corporation  
Revised Remedial Investigation Work Plan  
December 7, 1989

The Department has completed a review of the Revised Remedial Investigation Work Plan (RIWP) dated December 7, 1989 and has the following comments.

The numbered comments below correspond to the paragraph numbers contained in Shieldalloy's letter dated October 6, 1989.

Figures

8. The figures provided in the RIWP are acceptable, however, none show the location of the three underground storage tanks, SB-59, or the background soil samples locations. Therefore, the locations of the underground storage tanks shall be included on one of the figures. SB-59 and the background soil sampling locations shall be shown on Drawing Nos. 10A, 10B, and 10C, as appropriate.

Historical VOC usage

9. Shieldalloy shall submit a revised Historical VOC Usage at the SMC Newfield, New Jersey Facility report as agreed to in Shieldalloy's



letters of October 5, 1989 and December 7, 1989 and the Department's letter of October 31, 1989. The revised report shall include the discussion presented in Shieldalloy's letter of December 7, 1989 and shall provide additional details, or an explanation that details do not exist, for the following.

As restated from the Department's letter of September 6, 1989:

The submittal states that "sludges/bottoms from degreasing operations were drummed as they were generated and maintained on site," however, their final disposition was not discussed. This information shall be provided.

Details of reclamation of the drummed liquids shall be provided, including the approximate volume of materials processed, the area where the material was processed (the submittal implies that processing was done on-site), and the areas where the sludges were consolidated, re-drummed and stored. Review of the contract with the waste oil reclaimer (i.e., Casie Pro-Tank) and the manifests should provide the details. These documents shall (contract and manifests) be attached.

The original Historical VOC Usage report states that Casie Pro-Tank manifested the residuals generated as a result of their operations. Copies of the manifests shall be provided. The original report also states that Associated Chemical and Environmental Services (ACES) repackaged and shipped the drummed solids for disposal. The contract, manifests and other relevant documentation associated with this procedure shall be provided.

A revised figure shall be provided identifying the locations of the reclamation, consolidation and re-drumming operations, storage areas for the drums containing consolidated solids, the piles of titanium chips (as shown as the 1965 aerial photograph in appendix H), the drainage ditch, storm sewer and any other areas associated with the Man-Pro Vibra degreasing system.

The condition of the stockpiled titanium chips, whether degreased or not, shall also be addressed.

#### Section 1.0 Introduction

10. The correct reference on pages 1-1 and 4-54 for the USEPA's "Interim Final Draft of the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA" is EPA/540/G-89/004, OSWER Directive 9355.3-01 dated October 1988.

15. Soil boring numbers SB-41, SB-42, SB-72 and SB-73 in the underground storage tank area shall be analyzed for total petroleum hydrocarbons in addition to base neutrals and volatile organic compounds. These borings may require relocation based upon the figure discussed in comment No. 8, above.

#### Section 2.0 Site Background and Setting

16. Section 2.1.3 - Water Use shall mention that the Department established a "well restriction area" in 1986 and used money available from the New Jersey Spill Fund to extend an existing public water line to affected residential wells in the City of Vineland (see Attachment 1). The restriction area was established as a result of the volatile organic compound contamination detected in the ground water, and prohibits use of wells as sources of potable water. It should be noted that a public water line was also extended on Weymouth Road, east of West Boulevard.
21. Because of their interchangeable usage, it is assumed that the terms "baghouse dust", "baghouse fines" and "baghouse residues" are synonymous. In the future, please be consistent with the terminology.
22. The first paragraph on page 2-12 should read that the NJPDES-DGW (Discharge to Ground Water) Permit for operation of the lagoons was denied and, subsequently, closure plans have been submitted. It mistakenly reads the NJPDES-DSW Permit.
35. Page 2-33 - It is not clear who initiated the May 1988 Investigation to characterize locations where chromium waste waters may have spilled, discharged or leached into the soil. This shall be provided. Documentation supporting the hexavalent chromium data present in Table 2-10 must be provided in Appendix A.

#### Section 3.0 Initial Evaluation

38. Page 2-35 must include an explanation as to why the soils near Department 106 and southeast of the lagoons were analyzed for PCB's. If this is in response to a spill, documentation of the spill must be provided. Also, documentation supporting the data present in Table 2-11 must be provided in Appendix A.
40. Page 3-10 shall include a statement that in 1972 a municipal well, which supplied water to Shieldalloy alone, and not the residents of Newfield, was condemned because of chromium contamination.

Section 4.0 RI Tasks

42. The "targeted" analytical program proposed by Shieldalloy in the letter dated December 7, 1989, is acceptable to the Department with the following exceptions:

- a. One hundred percent, not 50% as proposed, of the surface runoff samples shall be analyzed for the expanded list of analytes as required by the Department's letter of October 31, 1989.
- b. The Department has determined that it is neither redundant nor inappropriate to include radionuclides as potential contaminants of concern (PCOC's). Based on previous environmental radiological surveys, including readings of gamma radiation measured during a site visit on May 2, 1990, it has been determined that radiological contamination exists in environmental media on and off Shieldalloy's property. This radiological contamination may pose a potential threat to human health and the environment, therefore, the Department requires that a radiological investigation be included as part of the site-wide remedial investigation (RI). The radiological investigation shall address all environmental media, including surface soil, subsurface soil, surface runoff, surface water and sediment, and air, and shall determine the extent to which radiological contamination exists in excess of relevant NRC, EPA, and DEP cleanup criteria. In addition, to fingerprint potential sources of radiological contamination, all slags, drosses and the lime/dust pile shall be sampled and analyzed for radiological parameters and rare earth elements. Incoming ores known to contain radioactive materials shall likewise be sampled and analyzed for radiological parameters and rare earth elements.

A work plan addressing the radiological contamination in environmental media shall be submitted to the Department for review and approval within thirty (30) calendar days of receipt of this letter. The work plan shall be submitted as an addendum to the RI Work Plan and shall contain the specific cleanup standards of which Shieldalloy intends to comply. A schedule shall be provided that includes submission of the results as part of the Phase I RI Report (within eight (8) calendar months of receipt of this letter).

Because of the overlapping nature of the radiological investigation within NRC, EPA, and DEP authorities, a single work plan may be submitted that meets the combined requirements of the

regulatory agencies. Be advised, however, that any radiological investigation work plan submitted will be reviewed by each of the regulatory agencies for compliance with the respective regulations. The Department will incorporate any comments made by the respective agencies into the work plan.

- c. A soil boring and surface soil sampling program shall be proposed for the NRC controlled area located within the by-product storage area which may be a source of contaminants other than radionuclides. The analytical program shall include analyses for the targeted and expanded lists of parameters. The activities conducted within the controlled area must conform with NRC safety procedures. A work plan addendum shall be submitted to the Department for review and approval within thirty (30) calendar days of receipt of this letter. A schedule shall be proposed that includes submittal of the results as part of the Phase I RI Report.
  - d. In the event that other "non-targeted" compounds or analytes are detected in samples analyzed for the expanded list, the Department may require additional sampling and analysis to delineate the full vertical and horizontal extent of these compounds or analytes.
  - e. Zirconium shall be included as a PCOC and in the expanded list of parameters. It was included on page 3-1, but was not included in Table 3-1.
45. The soil borings around the underground storage tanks must include analysis for total petroleum hydrocarbons as well as base neutrals and volatile organic compounds. See, also, Comment No. 15.

Soils Investigation - Soil Boring Program

49. The soil boring program is acceptable to the Department with the following exceptions:
- a. Where borings are proposed for metals analysis only, replace the deep (15 foot) sample with one at mid-depth, or the first less permeable subsurface stratigraphic layer.
  - b. Be reminded that if elevated VOCs or visual contamination is apparent, then additional biased samples shall be collected and analyzed. Also, be reminded that all samples collected from each designated boring will be analyzed for the expanded list of parameters.

- c. Note that SB-59 could not be located on Figure 10B. The location shall be provided to the Department. See, also, Comment No. 8.
  - d. Page 4-6 of the RIWP states that should all ambient temperature headspace (ATH) values be below background in the former material storage areas, one sample at mid-depth will be selected for analysis. The Department requires that three (3) samples be collected and analyzed from the intervals specified. Should the ATH values exhibit a wide range of VOC concentrations, the three (3) highest values shall be collected for analysis, not the highest, lowest and medium values as proposed.
  - e. Table 4-1 Shall include:
    - 1. Background samples as discussed in comment No. 62, below.
    - 2. Trip blanks as discussed in Comment No. 63, below.
    - 3. SB-1 through SB-6 shall also be analyzed for base neutral compounds.
    - 4. Analysis for VOC's, base neutral compounds and titanium as discussed in Comment No. 52, below.
    - 5. SB-41, SB-42, SB-72, and SB-73 shall also be analyzed for petroleum hydrocarbons as discussed in Comment No. 15, above.
  - f. A limited number of split spoon samples, obtained from different characteristic site subsurface lithographies (e.g. silty clay, sand), should be analyzed for cation exchange capacity and bulk density. This data may be used in saturated and unsaturated zone contaminant transport modelling.
50. For soil borings, note that the sample interval for shallow samples for VOC analysis is 6 to 18 inches. This was corrected on page 4-4 of the RIWP, but not on page 2-7 of the QA/QC Plan.

Surficial Soil Sampling Program

51. It is acceptable to conduct surface soil sampling on a 200 foot grid. The grid must include additional sampling points where visible contamination currently exists, had existed and/or where contamination is likely. All sampling points shall be semi-permanently marked and the additional samples will be added in the field. Agreement between

Shieldalloy and the Department must be reached prior to finalizing the locations of the sampling points.

52. The 1965 aerial photograph clearly shows numerous piles of titanium chips in the southwest portion of the property, however, this area is not included in the discussions of the Manpro-Vibra Degreasing System on pages 2-14 or 4-8. As required in the Department's letter of September 6, 1989, the discussion shall include whether or not the chips were degreased prior to disposition. The borings in this area shall include analysis for VOC's, base neutral compounds and titanium.
61. It shall be specified in Section 9 - Decontamination Procedures of the QA/QC Plan, and where appropriate in Section 4.0 of the RIWP, that all water generated during decontamination of equipment shall be containerized and treated at the ground water or waste water treatment plant. The proposed procedures for handling well development water, purging water from sample collection, and drilling muds shall also be provided.

Please note that DWR, Bureau of Industrial Discharge Permits must be notified in writing of these procedures.

#### General

62. The locations and depths of the background soil samples shall be specified. The Department suggests that a minimum of three (3) samples from various areas and depths be collected. Analysis shall be for all PCOC's. The locations of the background soil samples shall be specified on the figure discussed in Comment No. 8, above.
63. Trip blanks are not required for soil samples, but must accompany aqueous samples. This shall be included in the specific sections of the RIWP and QA/QC Plan.

#### Ground Water Investigation

70. The proposed ground water sampling program is acceptable to the Department with the following exceptions:
  - a. A discussion must be provided to explain why sulfate and fluoride were included in the sampling plan.
  - b. All wells shall be sampled for pH, Eh, and specific conductance in the field. The Department strongly recommends the use of the downhole probe for measuring these parameters to increase the

accuracy of the results since exposure to atmospheric conditions will effect the Eh results.

Select wells should be analyzed for all major cations and anions. The concentration of the major cations and anions, as well as Eh and pH, will affect the solubility and mobility of hexavalent and trivalent chromium in ground water and soil. This data may be used in saturated and unsaturated zone contaminant transport modelling.

- c. All deep wells installed through confining or semi-confining units shall be constructed according to confining well specifications (see Attachment 2).
- d. All shallow wells shall not breach confining units and shall be installed in accordance with the Department's specifications (see Attachment 3).
- e. The deep wells may be installed using mud rotary drilling methods, however, in order to define subsurface litology, split spoon borings must be obtained every five feet or at changes in litology. The wells shall be installed in accordance with the Department's specifications (see Attachment 3).
- f. The RIWP and QA/QC Plan specify the Department's requirement that non-filtered ground water samples be collected for analysis. In addition, both the RIWP and QA/QC Plan should specify that at monitoring wells where metals are detected in excess of ARAR's, filtered samples shall also be collected and analyzed in the second round of sampling.
- g. Additional wells shall be installed and analyzed as follows:
  - 1) A shallow well in the vicinity of the Man-Pro Vibra Degreasing System shall be analyzed for the expanded list of parameters, hexavalent chromium and sulfate.
  - 2) A deep well paired with SC-13S shall be analyzed for TAL, hexavalent chromium and sulfate.
  - 3) A second well cluster south of the Hudson Branch (as required by Comment No. 72 in the Department's letter of September 6, 1989) shall be analyzed for VOC, TAL, hexavalent chromium and sulfate.

- 4) A well cluster south of the surface impoundment area shall be analyzed for the expanded list of parameters, hexavalent chromium and sulfate.

Figures showing the locations of these additional wells are attached to this letter (see Attachment 4).

- h. Results of the ground water investigation shall be used in conjunction with the ground water data obtained pursuant to paragraph 22(a) of the 1984 ACO and paragraph 20(g) of the 1988 ACO to complete the RI for a final ground water operable unit. The final ground water RI will be used, in addition to the treatability information discussed below, to develop the final remedy for ground water.

#### Air Investigation

74. The air monitoring program is acceptable to the Department, if addition to the ten (10) metals proposed in the work plan, the program includes any other metals detected in the surface soil samples.

Also, please note that energy dispersive x-ray fluorescence, in addition to being a very sensitive and nondestructive method for detecting metals, is susceptible to interferences. It is recommended that the data be interpreted using deconvolution computer programs that eliminate many of the interferences.

#### Project Schedule

79. The proposed project schedule coordinates the RI/FS with the RCRA closure. While this is an acceptable approach, the schedule is still excessive and, therefore, cannot be approved. At this time, the RCRA Closure Plan is under review and the revised draft closure permit may contain a reduced closure schedule which, in turn, may reduce the RI/FS schedule. However, please note that Phase I of the RI will not be affected by any changes in the closure schedule and shall be completed within eight (8) calendar months, not 11 months as proposed, of receipt of this letter. Shieldalloy shall revise the Phase I schedule to reflect this. A revised Phase II schedule will be approved by the Department under separate cover.

On Figures 5-1 and 5-2 it is indicated that the Feasibility Study Work Plan will be initiated upon submission of the Draft Phase I RI Report. While this time frame is acceptable with the reduced schedule specified

above, the time to complete the Feasibility Study Work Plan or report is not specified. Therefore, the FS Work Plan shall be submitted within three (3) calendar months after submission of the Draft Phase I RI Report and shall conform with Appendix D of the 1988 ACO. Be reminded that, as described in the USEPA RI/FS Guidance, the RI and FS are typically conducted concurrently in an iterative fashion. This approach will result in an effective and efficient process given the phased RI approach conducted at the site.

Finally, be advised that Shieldalloy shall submit the results of all treatability investigations conducted, including both bench and pilot scale studies. The Department is in receipt of the results of the treatability studies conducted to date. However, any additional treatability investigations shall proceed and shall be reported in accordance with Chapter 5 of USEPA's "Interim Final Draft of the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA."

#### Appendix B - Field and Laboratory QA/QC Plan

80. Please note that most of the Department's comments on the QA/QC Plan have been incorporated into the revised QA/QC Plan, however, the responses should have also been incorporated into the appropriate sections of the RIWP. Conversely, changes in the RIWP should be incorporated into the QA/QC Plan.

The list of inconsistencies has not been included in this letter because it was discussed in the previously referenced correspondence between the Department and Shieldalloy. It is important that these inconsistencies are resolved in revised documents so that correct procedures are utilized during the RI.

Although not previously identified in the Department's correspondence, please note that Table 3-3 of the QA/QC Plan is incorrect. Sediment samples do not need to be preserved, therefore, sodium hydroxide should not be added to the cyanide sample.

#### Recent Waste Water Spills

The Department has determined that the investigation and remediation of potential in-situ soil contamination resulting from the waste water discharges of December 1, 1989 and May 2, 1990 shall be addressed as part of the site-wide RI. Therefore, Shieldalloy must incorporate the following into the RI Work Plan:

- a. Include a detailed description of the two spills into Section 2.2.3.4-Accidental Discharges. Documentation of the spills shall be provided in Appendices A and G, as appropriate.
- b. Include two additional soil borings into the soils investigation at the spill locations (south-southeast of T-12). These borings shall be sampled in the same manner as the other soil borings, with the exception that the 0 to 6 inch interval shall be collected in place of the 0 to 2 foot sample. Analysis shall be for TAL and hexavalent chromium. The location of these borings will be made in the field. Agreement between Shieldalloy and the Department must be reached prior to finalizing the locations of the borings.

#### Summary

To summarize the requirements of this letter, Shieldalloy must perform the following:

1. Submit a revised RIWP which includes all comments discussed above within thirty (30) calendar days of receipt of this letter. Upon the Department's final approval, the RIWP will be considered final and will become part of the administrative record for the site. Please submit two (2) additional copies to NJDEP along with the specified number of copies to be submitted to NJDEP and USEPA pursuant to paragraph 45 of the 1988 ACO.
2. Submit for review and approval a work plan addendum that includes, a soil boring and surface soil sampling and analysis program for contaminants other than radionuclides in the NRC controlled area and a radiological investigation as described in Comment Numbers 42b and 42c, above. The work plan addendum shall be submitted within thirty (30) calendar days of receipt of this letter.
3. Commence field work within the time frame specified in the revised Phase I schedule as described in Comment Number 79, above, and in the RIWP and pursuant to paragraph 23 of the 1988 ACO.
4. Submit a revised Historical VOC Usage at the SMC Newfield, New Jersey Facility report within forty five (45) calendar days of receipt of this letter.
5. Submit the draft Phase I RI Report within eight (8) calendar months of receipt of this letter.

Mr. David R. Smith  
Shieldalloy Metallurgical Corporation  
Revised RI Work Plan  
Page 12

6. Submit the Feasibility Study Work Plan within three (3) calendar months after submission of the draft Phase I RI Report (approximately eleven (11) months after receipt of this letter).

Pursuant to paragraph 46 of the 1988 ACO, Shieldalloy shall notify the Department in writing two weeks prior to the initiation of all field activities.

In accordance with paragraph 57 of the October 5, 1988 ACO, Shieldalloy is hereby reminded that failure to comply with the requirements and time frames specified in this letter will subject Shieldalloy to daily stipulated penalties.

If you have any questions, please contact me at (609) 633-1455.

Sincerely,

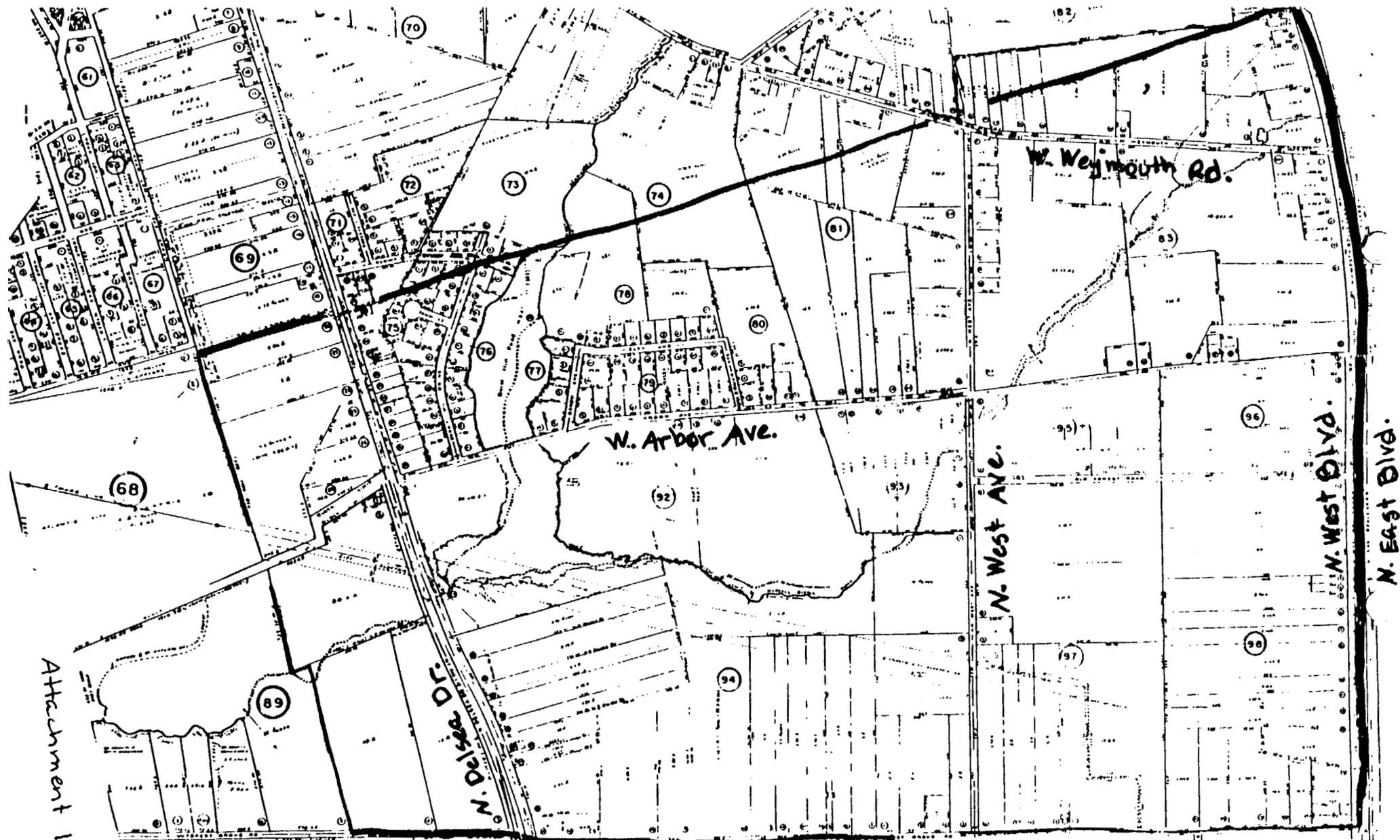


Donna L. Gaffigan, Case Manager  
Bureau of Federal Case Management

DLG:cn

Enclosure

c: W. Fergus Porter, SMC  
Laura Lombardo, USEPA/SCB  
Michael Soranno, USEPA/NJFS  
Susan Anton, CDM/FPC  
George Nicholas, DWR/BGWPA  
Kathleen Kunze, DHSM/BEERA  
Joseph Morris, DEQ/BER  
A. Duncan White, DEQ/BER  
Gary C. Comfort, Jr., USNRC  
~~Betsy Ullrich, USNRC/Region I~~  
Nick Sodano, DHWM/SBFO



Attachment 1

10 yr well restriction area. —  
 Project Site. —

Well Restriction Area  
 City of Vineland, N.J.

**TAX MAP**  
 CITY OF VINELAND  
 COMMISSIONERS: JOHN W. ...  
 WILLIAM ...

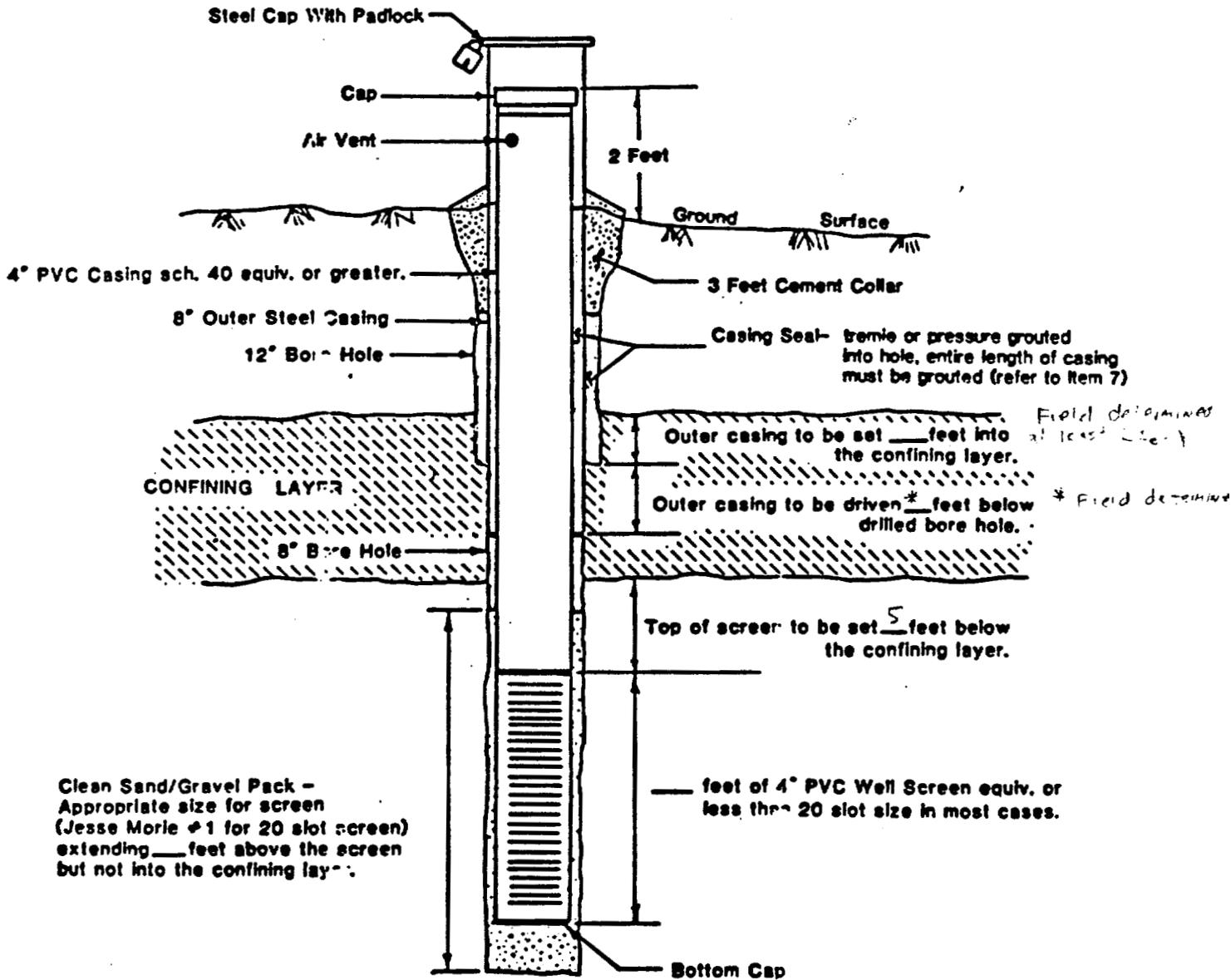
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 MONITOR WELL SPECIFICATIONS FOR  
 CONFINED UNCONSOLIDATED AQUIFERS

SITE NAME : \_\_\_\_\_

LOCATION : \_\_\_\_\_

DATE : \_\_\_\_\_

**DRAFT**



NOT TO SCALE

Attachment 2

MONITORING WELL REQUIREMENTS FOR CONFINED UNCONSOLIDATED AQUIFERS  
Revised 12/87

1. Notification to the NJDEP is required two (2) weeks prior to drilling.
2. State well permits are required for each monitor well constructed by the driller. Report "use of well" on permit application as ground water monitoring. Permit number must be permanently affixed to each monitoring well. NOTE: Well driller must be licensed in the State of New Jersey.
3. All boreholes must be a minimum of four (4) inches greater in diameter than the immediate casing it surrounds.
4. Wells must be gravel packed unless noted otherwise in the Additional Requirements and under no circumstance is the gravel pack to penetrate a confining layer.
5. Casing sealant, drilling fluids and cement must be mixed with potable water.
6. The borehole for the out steel casing is to be drilled and the casing driven, grouted and allowed to set prior to drilling through any confining layer.
7. Acceptable grouting materials are:
  - Neat Cement - 6 gallons of water per 94 pound bag of cement.
  - Granular Bentonite - 1 gallon of water per 1.5 pounds of bentonite.
  - Cement-Bentonite - 8 gallons of water to 5 pounds of bentonite dry mixed per 94 pound bag of cement.
  - Cement-Bentonite - 10 gallons of water per 8 pounds of bentonite water-mixed with a 94 bag of cement.
  - Non-expandable cement - 7.5 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 4 pounds of bentonite and 94 pounds of cement.
  - Non-expandable cement - 7 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 94 pounds of cement (Type I or Type II).
8. The grout for the inner PVC cased well must extend to the ground surface.
9. The cement collar should be installed one (1) hour after the inner casing seal has been emplaced and not while the outer casing seal is setting.
10. All wells must be developed to yield a turbid-free discharge.
11. The driller must maintain an accurate written log of all materials encountered in each hole, record all construction details for each well, the static water levels, and any tidal fluctuations (when applicable). This information must be submitted to the Office of Water Allocation as required by N.J.G.S.A. 58:4A.
12. If organic compounds are to be sampled for, only threaded or press joints (no glue joints) are acceptable.
13. Locking caps must be provided to secure each well.
14. The top of the inner PVC casing (excluding cap) must be surveyed to the nearest hundredth foot (0.01) by a licensed surveyor. The inner casing must be permanently marked at the point surveyed. The well should be numbered clearly on

the outer casing. A detailed site map with the well location and casing elevation must be submitted to \_\_\_\_\_

**Additional Requirements (if checked):**

Split Spoon Samples (X) Spiron samples may be obtained with borings prior to well installation

Dedicated Bailer (Sampler) in Well(s) ( ) \_\_\_\_\_

Threaded or Press Joints (X) Threaded Joints

Five (5) Foot Casing Tailpiece Below Screen ( ) \_\_\_\_\_

Centralizers on Screen ( ) \_\_\_\_\_

Borehole Geophysical Log(s) ( ) \_\_\_\_\_

Other (X) Wells must be developed for several hours if installed with mud rotary

**Notice is Hereby Given of the Following:**

Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules.

The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable, or other structures.

The permittee (applicant) is solely responsible for the safety and adequacy of the design and construction of monitoring well(s) required by the Department.

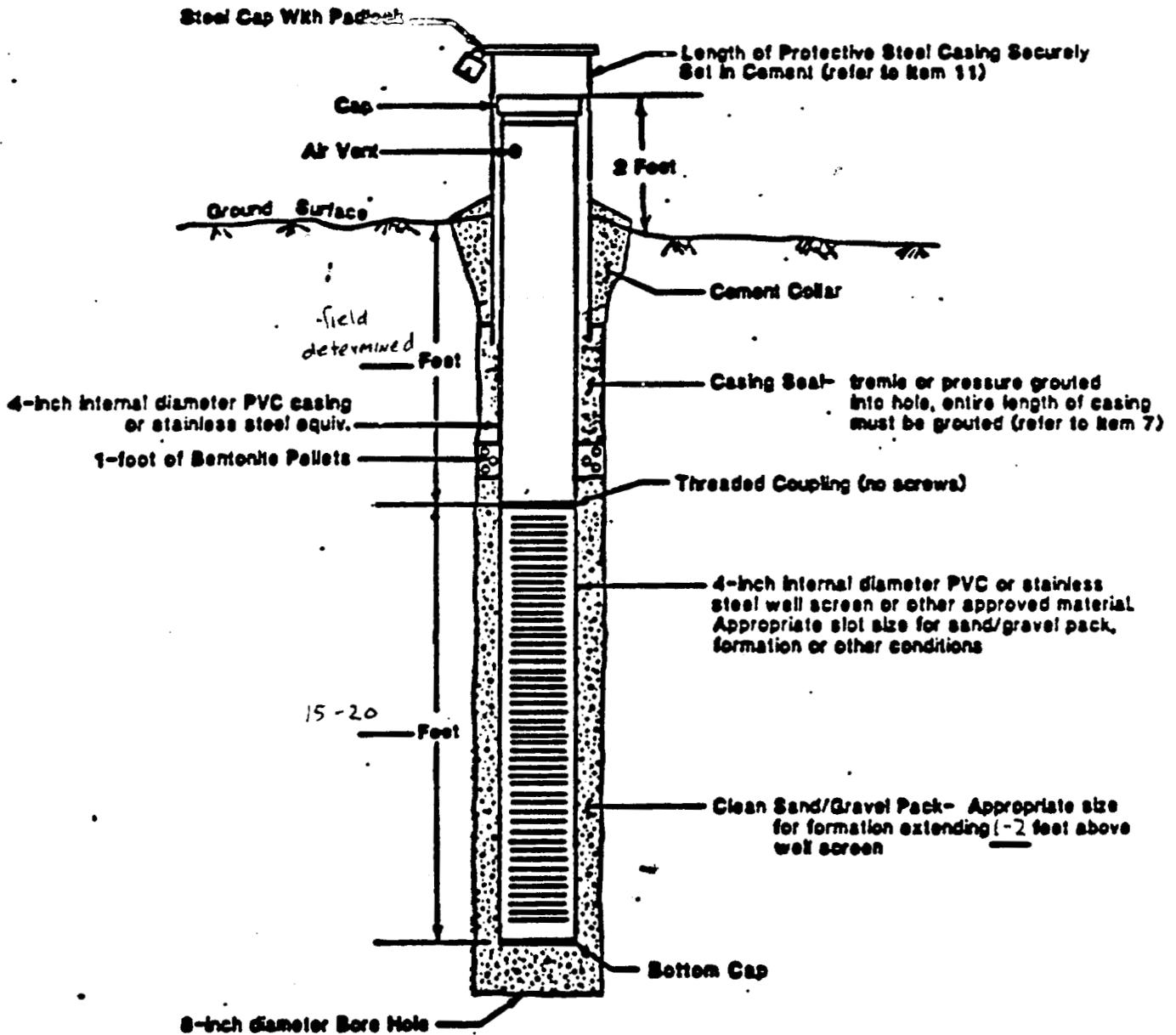
The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.

**NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION  
MONITOR WELL SPECIFICATIONS FOR  
CONSOLIDATED FORMATIONS**

SITE NAME: \_\_\_\_\_

LOCATION: \_\_\_\_\_

DATE: \_\_\_\_\_



NOT TO SCALE

NJGS Revised 9-87

Attachment 3

**MONITORING WELL REQUIREMENTS FOR UNCONSOLIDATED FORMATIONS**  
Revised 9/87

1. Notification to the NJDEP is required two weeks prior to drilling.
2. State well permits are required for each monitoring well constructed by the driller. The well permit tag must be permanently affixed to each monitoring well.
3. Copies of the site specific well specifications must be maintained at the drilling site by the driller.
4. The monitoring well must be installed by a New Jersey licensed well driller.
5. Monitoring well design must conform with NJAC 7:9-7, 8, and 9.
6. The borehole diameter must be a minimum of .4 inches greater than the casing diameter.
7. Acceptable grouting materials are:
  - Neat Cement - 6 gallons of water per 94 pound bag of cement.
  - Granular Bentonite - 1 gallon of water per 1.5 pounds of bentonite.
  - Cement-Bentonite - 8 gallons of water to 5 pounds of bentonite dry mixed per 94 pound bag of cement.
  - Cement-Bentonite - 10 gallons of water per 8 pounds of bentonite water-mixed with a 94 pound bag of cement.
  - Non-expandable cement - 7.5 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 4 pounds of bentonite and 94 pounds of cement.
  - Non-expandable cement - 7 gallons of water per 1/2 teaspoon of aluminum hydroxide mixed with 94 pounds of cement (Type I or Type II).
8. Potable water must be used for mixing grouting materials and drilling fluids.
9. Only threaded joints are acceptable as couplings.
10. The driller must maintain an accurate written log of all materials encountered, record construction details for each well, and record the depths water bearing zones. This information must be submitted to the Bureau of Water Allocation as required by N.J.S.A. 58:4A.
11. A length of protective steel casing with a locking cap must be securely set in cement around the well casing. Flush mount monitoring wells are acceptable provided they have manholes, locking caps, and seals to prevent leakage of surface water into the well.

12. Top of each well casing (excluding cap) must be surveyed to the nearest 0.01 foot by a New Jersey licensed surveyor. The survey point must be marked on each well.
13. Wells must be developed to a turbidity-free discharge.
14. Modifications to designs are allowed only with NJDEP approval.

**Additional Requirements (if checked):**

Split Spoon Samples (X) Continuous to water table then every 5 feet

Borehole Geophysical Logs ( ) \_\_\_\_\_

Top of Screen set 3 feet above/below water table

Dedicated Bailer (Sampler) in Well ( ) \_\_\_\_\_

Other (X) Screen size appropriate for formation

Any wells installed with mud rotary must be developed  
for at least 3 hours. Split spoon samples logged with  
Unifield or Brunnermeister System.

**Notice is Hereby Given of the Following:**

Review by the Department of well locations and depths is limited solely to review for compliance with the law and Department rules.

The Department does not review well locations or depths to ascertain the presence of, nor the potential for, damage to any pipeline, cable, or other structures.

The permittee (applicant) is solely responsible for the safety and adequacy of the design and construction of monitoring well(s) required by the Department

The permittee (applicant) is solely responsible for any harm or damage to person or property which results from the construction or maintenance of any well; this provision is not intended to relieve third parties of any liabilities or responsibilities which are legally theirs.



