

ATTACHMENT E

Monitoring Well Installation And Sampling Plan And Monitoring Well Installation Completion Report For Dairies with Individual Waste Discharge Requirements In the Sacramento and San Joaquin River Basins August 2007

A Monitoring Well Installation and Sampling Plan (MWISP) must be submitted by the Discharger prior to installation of groundwater monitoring wells. At a minimum, the MWISP must contain all of the information listed below. Wells may be installed after the Executive Officer notifies the Discharger in writing that the MWISP is acceptable. The Order also requires the Discharger to submit a Monitoring Well Installation Completion Report (MWICR) within 45 days after completion of any monitoring well. At a minimum, the MWICR must summarize the field activities, as described below. All plans and reports must be signed and stamped by a California Registered Geologist, Certified Engineering Geologist, or Professional Engineer with experience in hydrogeology.

General Requirements

1. The Discharger shall install sufficient monitoring wells to:
 - a. Characterize groundwater flow direction and gradient beneath the site;
 - b. Characterize natural background (unaffected by the Discharger or others) groundwater quality upgradient of the facility; and
 - c. Characterize groundwater quality downgradient of the corrals, downgradient of the retention ponds, and downgradient of the land application areas.
2. It may be necessary to install more than one upgradient monitoring well (i.e., for the production area and the land application area). The Executive Officer may order more extensive monitoring based on site-specific conditions.
3. Prior to installation of additional monitoring wells, the Discharger shall submit to the Executive Officer a Monitoring Well Installation and Sampling Plan (MWISP) (see Attachment D) and schedule prepared under the direct supervision of, and certified by, a California registered civil engineer or a California registered geologist with experience in hydrogeology. Installation of monitoring wells shall not begin until the Executive Officer notifies the Discharger in writing that the MWISP is acceptable.
4. All monitoring wells shall be constructed in a manner that maintains the integrity of the monitoring well borehole and prevents the well from acting as a conduit for pollutant/contaminant transport. The sampling interval of each monitoring well shall be appropriately screened and fitted with an appropriate filter pack to enable collection of representative groundwater samples of the first encountered groundwater.

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5. The construction and destruction of monitoring wells and supply wells shall be in accordance with the standards under *Water Wells* and *Monitoring Wells* in the *California Well Standards Bulletin 74-90 (June 1991)* and *Bulletin 74-81 (December 1981)*, adopted by the Department of Water Resources (DWR). Should any county or local agency adopt more stringent standards than that adopted by the DWR, then these local standards shall supercede the Well Standard of DWR, and the Discharger shall comply with the more stringent standards.
6. The horizontal and vertical position of each monitoring well shall be determined by a registered land surveyor or other qualified professional. The horizontal position of each monitoring well shall be measured with one-foot lateral accuracy using the North American Datum 1983 (NAD83 datum). The vertical elevations of each monitoring well shall be referenced to the North American Vertical Datum 1988 (NAVD88 datum) to an absolute accuracy of at least 0.5 feet and a relative accuracy between monitoring wells of 0.01 feet.
7. Within 45 days after completion of any monitoring well, the Discharger shall submit to the Executive Officer a Monitoring Well Installation Completion Report (MWICR) (see Attachment D) prepared under the direct supervision of, and certified by, a California registered civil engineer or a California registered geologist with experience in hydrogeology.
8. Groundwater samples from monitoring wells shall be collected as specified in an approved Monitoring Well Installation and Sampling Plan.

Monitoring Well Installation and Sampling Plan

At a minimum, the MWISP must contain all of the information listed below.

A. General Information:

1. Topographic map showing any existing nearby (about 2000 feet) domestic, irrigation, and municipal supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features, as appropriate.
2. Site plan showing proposed well locations, other existing wells, unused and/or abandoned wells, major physical site structures (such as corrals, freestall barns, milking barns, feed storage areas, etc.), waste handling facilities (including solid separation basins, retention ponds, manure storage areas), irrigated cropland and pasture, and on-site surface water features.

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3. Rationale for the number of proposed monitoring wells, their locations and depths, and identification of anticipated depth to groundwater.
4. Local permitting information (as required for drilling, well seals, boring/well abandonment).
5. Drilling details, including methods and types of equipment for drilling and logging activities. Equipment decontamination procedures (as appropriate) should be described.
6. Health and Safety Plan.

B. Proposed Drilling Details:

1. Drilling techniques
2. Well logging method

C. Proposed Monitoring Well Design: All proposed well construction information must be displayed on a construction diagram or schematic to identify the following:

1. Well depth
2. Borehole depth and diameter
3. Well construction materials
4. Casing material and diameter – include conductor casing, if appropriate
5. Location and length of perforation interval, size of perforations, and rationale
6. Location and thickness of filter pack, type and size of filter pack material, and rationale
7. Location and thickness of bentonite seal
8. Location, thickness, and type of annular seal
9. Surface seal depth and material
10. Type of well cap(s)
11. Type of well surface completion
12. Well protection devices (such as below-grade water tight-vaults, locking steel monument, bollards, etc.)

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D. Proposed Monitoring Well Development:

1. Schedule for development (at least seven days after well completion)
2. Method of development
3. Method of determining when development is complete
4. Parameters to be monitored during development
5. Method for storage and disposal of development water

E. Proposed Surveying:

1. How horizontal and vertical position of each monitoring well will be determined
2. The accuracy of horizontal and vertical measurements to be obtained
3. The California licensed professional (licensed land surveyor or civil engineer) to perform the survey

F. Proposed Groundwater Monitoring:

1. Schedule (at least 48 hours after well development)
2. Depth to groundwater measuring equipment (e.g., electric sounder or chalked tape capable of ± 0.01 -foot measurements)
3. Well purging method, equipment, and amount of purge water
4. Sample collection (e.g., bottles and preservation methods), handling procedures, and holding times
5. Quality assurance/quality control (QA/QC) procedures (as appropriate)
6. Analytical procedures
7. Equipment decontamination procedures (as appropriate)

G. Proposed Schedule:

1. Fieldwork
2. Laboratory analyses

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3. Report submittal

Monitoring Well Installation Completion Report

At a minimum, the MWICR shall summarize the field activities as described below.

A. General Information:

1. Brief overview of field activities including well installation summary (such as number, depths), and description and resolution of difficulties encountered during field program.
2. Topographic map showing any existing nearby domestic, irrigation, and municipal supply wells and monitoring wells, utilities, surface water bodies, drainage courses and their tributaries/destinations, and other major physical and man-made features.
3. Site plan showing monitoring well locations, other existing wells, unused and/or abandoned wells, major physical site structures (such as corrals, freestall barns, milking barns, feed storage areas, etc.), waste handling facilities (including solid separation basins, retention ponds, manure storage areas), land application area(s), and on-site surface water features.
4. Period of field activities and milestone events (e.g., distinguish between dates of well installation, development, and sampling)

B. Monitoring Well Construction:

1. Number and depths of monitoring wells installed
2. Monitoring well identification (i.e., numbers)
3. Date(s) of drilling and well installation
4. Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards
5. Description of drilling and construction, including equipment, methods, and difficulties encountered (such as hole collapse, lost circulation, need for fishing)
6. Name of drilling company, driller, and logger (site geologist to be identified)
7. Driller's/Lithologic log
8. As-builts for each monitoring well with the following details:

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- a. Well identification
 - b. Total borehole and well depth
 - c. Date of installation
 - d. Boring diameter
 - e. Casing material and diameter (include conductor casing, if appropriate)
 - f. Location and thickness of slotted casing, perforation size
 - g. Location, thickness, type, and size of filter pack
 - h. Location and thickness of bentonite seal
 - i. Location, thickness, and type of annular seal
 - j. Depth of surface seal
 - k. Type of well cap
 - l. Type of surface completion
 - m. Depth to water (note any rises in water level from initial measurement) and date of measurement
 - n. Well elevation (measuring point to nearest ± 0.01 foot) at top of casing
 - o. Well protection device (such as below-grade water tight vaults, stovepipe, bollards, etc)
9. All depth to groundwater measurements during field program
 10. Field notes from drilling, installation, and surveying activities (e.g., all subcontractor dailies, as appropriate)
 11. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen interval, bentonite seal interval, and well elevation
- C. Monitoring Well Development:
1. Date(s) and time of development
 2. Name of developer
 3. Method of development
 4. Methods used to identify completion of development
 5. Development log: volume of water purged and measurements of temperature, pH and electrical conductivity during and after development
 6. Disposal of development water
 7. Field notes (such a bailing to dryness, recovery time, number of development cycles)

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D. Monitoring Well Survey

1. Identify coordinate system or reference points used
2. Description of measuring points (i.e. ground surface, top of casing, etc.)
3. Horizontal and vertical coordinates of well casing with cap removed
4. Name, license number, and signature of California licensed professional who conducted survey
5. Surveyor's field notes
6. Tabulated survey data