

**MONITORING AND REPORTING PROGRAM ORDER NO. _____
ATTACHMENT A**

**Additional Groundwater Monitoring,
Monitoring Well Installation And Sampling Plan
And
Monitoring Well Installation Completion Report
For
Existing Milk Cow Dairies**

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A. Additional Groundwater Monitoring

The Executive Officer has authority pursuant to California Water Code Section 13267 to order Dischargers to implement monitoring and reporting programs. Pursuant to Section 13267, the Executive Officer will order Dischargers to install monitoring wells to comply with Monitoring and Reporting Program Order No. _____ in phases of 100 to 200 dairies per year based on an evaluation of the threat to water quality at each dairy. The first group of dairies ordered to install groundwater monitoring wells will be those dairies where nitrate-nitrogen is detected at 10 mg/l or more in any one domestic well, agricultural well, or subsurface (tile) drainage system in the vicinity of the dairy. If necessary, the Executive Officer will further prioritize these groundwater monitoring requirements based on the factors in Table 5 below. Pursuant to Section 13267, the Executive Officer may order implementation of a monitoring and reporting program at a dairy at any time. Such order may occur, for instance, if violations of the General Order are documented and/or the dairy is found to be in an area where site conditions and characteristics pose a high risk to groundwater quality.

1. When ordered by the Executive Officer, 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.

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TABLE 5. GROUNDWATER MONITORING FACTORS FOR RANKING PRIORITY ¹			
FACTOR	SITE CONDITION	POINTS	SCORE
Highest nitrate concentration (nitrate-nitrogen in mg/l) in any existing domestic well, agricultural supply well, or subsurface (tile) drainage system at the dairy or associated land application area.*	< 10	0	
	10 - 20	10	
	>20	20	
Location of production area or land application area relative to a Department of Pesticide Groundwater Protection Area ² (GWPA).	Outside GWPA	0	
	In GWPA	20	
Distance (feet) of production area or land application area from an artificial recharge area ³ as identified in the California Department of Water Resources Bulletin 118 or by the Executive Officer.	> 1,500	0	
	601 to 1,500	10	
	0 to 600	20	
Nitrate concentration (nitrate-nitrogen in mg/l) in domestic well on property adjacent to the dairy production area or land application area (detected two or more times).	< 10 or unknown	0	
	10 or greater	20	
Distance (feet) from dairy production area or land application area and the nearest off-property domestic well.*	> 600	0	
	301 to 600	10	
	0 to 300	20	
Distance (feet) from dairy production area or land application area and the nearest off-property municipal well.*	> 1,500	0	
	601 to 1,500	10	
	0 to 600	20	
Number of crops grown per year per field.*	1	5	
	2	10	
	3	15	
Nutrient Management Plan completed by 1 July 2009*	Yes	0	
	No	100	
Whole Farm Nitrogen Balance. ^{4*}	<1.65	0	
	1.65 to 3	10	
	>3	20	

Total Score: _____

*This information will be provided by the Discharger. All other information will be obtained by the Executive Officer.

1 Information on each factor may not be available for each facility. Total scores will be the ratio of the points accumulated to the total points possible for each facility. Dairies with higher total scores will be directed to install monitoring wells first.

2 The Department of Pesticide Regulation (DPR) defines a Groundwater Protection Area (GWPA) as an area of land that is vulnerable to the movement of pesticides to groundwater according to either leaching or runoff processes. These areas include areas where the depth to groundwater is 70 feet or less. The DPR GWPA's can be seen on DPR's website at <http://www.cdpr.ca.gov/docs/gwp/gwpamaps.htm>.

3 An artificial recharge area is defined as an area where the addition of water to an aquifer is by human activity, such as putting surface water into dug or constructed spreading basins or injecting water through wells.

4 The Whole Farm Nitrogen Balance is to be determined as the ratio of (total nitrogen in storage – total nitrogen exported + nitrogen imported + irrigation nitrogen + atmospheric nitrogen)/(total nitrogen removed by crops) as reported in the Preliminary Dairy Facility Assessment in the Existing Conditions Report (Attachment A).

Attachment A

Existing Milk Cow Dairies

After 24 months, 100 points will be added if the preparation or implementation of the nutrient management plan is behind schedule.

- 3. Prior to installation of monitoring wells, the Discharger shall submit to the Executive Officer a Monitoring Well Installation and Sampling Plan (MWISP) (see below) and schedule prepared by, or 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.
- 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 below) prepared, by or under the direct supervision of, and certified by, a California registered civil engineer or a California registered geologist with experience in hydrogeology.
- 8. The Discharger shall sample monitoring wells for the constituents and at the frequency as specified in Table 6 below. Groundwater monitoring shall include monitoring during periods of the expected highest and lowest water table levels.

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Table 6. ADDITIONAL GROUNDWATER MONITORING
Monitoring Wells
<u>Semi-annually:</u> Measurement of the depth to groundwater from a surveyed reference point to the nearest 0.010 foot in each monitoring well.
Field measurements of electrical conductivity and pH.
Laboratory analyses for nitrate and ammonia
<u>Within six months of well construction and every five years thereafter:</u> Laboratory analyses for general minerals (calcium, magnesium, sodium, bicarbonate, carbonate, sulfate, and chloride).

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9. Groundwater samples from monitoring wells shall be collected as specified in an approved Monitoring Well Installation and Sampling Plan.
10. The Discharger shall submit to the Executive officer an evaluation of the groundwater monitoring data within six months of obtaining sufficient data to evaluate trends in the data (usually about 8 independent samples). The submittal shall include a description of the statistical or non-statistical methods proposed for use in evaluating the groundwater monitoring data. The proposed methods must be approved by the Executive Officer.

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B. Monitoring Well Installation and Sampling Plan

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

1. General Information:
 - a. 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.
 - b. 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.
 - c. Rationale for the number of proposed monitoring wells, their locations and depths, and identification of anticipated depth to groundwater.

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- d. Local permitting information (as required for drilling, well seals, boring/well abandonment). T
 - e. Drilling details, including methods and types of equipment for drilling and logging activities. Equipment decontamination procedures (as appropriate) should be described. E
 - f. Health and Safety Plan.
2. Proposed Drilling Details: N
- a. Drilling techniques.
 - b. Well logging method.
3. Proposed Monitoring Well Design: All proposed well construction information must be displayed on a construction diagram or schematic to identify the following: T
- a. Well depth.
 - b. Borehole depth and diameter. A
 - c. Well construction materials.
 - d. Casing material and diameter – include conductor casing, if appropriate. T
 - e. Location and length of perforation interval, size of perforations, and rationale. T
 - f. Location and thickness of filter pack, type and size of filter pack material, and rationale. I
 - g. Location and thickness of bentonite seal.
 - h. Location, thickness, and type of annular seal.
 - i. Surface seal depth and material. V
 - j. Type of well cap(s).
 - k. Type of well surface completion.
 - l. Well protection devices (such as below-grade water tight-vaults, locking steel monument, bollards, etc.). E

4. Proposed Monitoring Well Development:

- a. Schedule for development (at least seven days after well completion).
- b. Method of development.
- c. Method of determining when development is complete.
- d. Parameters to be monitored during development.
- e. Method for storage and disposal of development water.

5. Proposed Surveying:

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

6. Proposed Groundwater Monitoring:

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

7. Proposed Schedule:

- a. Fieldwork.
- b. Laboratory analyses.

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- c. Report submittal.

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C. Monitoring Well Installation Completion Report

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

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1. General Information:

- a. Brief overview of field activities including well installation summary (such as number, depths), and description and resolution of difficulties encountered during field program.
- b. 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.
- c. 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.
- d. Period of field activities and milestone events (e.g., distinguish between dates of well installation, development, and sampling).

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2. Monitoring Well Construction:

- a. Number and depths of monitoring wells installed.
- b. Monitoring well identification (i.e., numbers).
- c. Date(s) of drilling and well installation.
- d. Description of monitoring well locations including field-implemented changes (from proposed locations) due to physical obstacles or safety hazards.
- e. Description of drilling and construction, including equipment, methods, and difficulties encountered (such as hole collapse, lost circulation, need for fishing).
- f. Name of drilling company, driller, and logger (site geologist to be identified).
- g. Driller's/Lithologic log.

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- h. As-builts for each monitoring well with the following details:
 - i. Well identification.
 - ii. Total borehole and well depth.
 - iii. Date of installation.
 - iv. Boring diameter.
 - v. Casing material and diameter (include conductor casing, if appropriate).
 - vi. Location and thickness of slotted casing, perforation size.
 - vii. Location, thickness, type, and size of filter pack.
 - viii. Location and thickness of bentonite seal.
 - ix. Location, thickness, and type of annular seal.
 - x. Depth of surface seal.
 - xi. Type of well cap.
 - xii. Type of surface completion.
 - xiii. Depth to water (note any rises in water level from initial measurement) and date of measurement.
 - xiv. Well elevation (measuring point to nearest ± 0.01 foot) at top of casing.
 - xv. Well protection device (such as below-grade water tight vaults, stovepipe, bollards, etc).
- i. All depth to groundwater measurements during field program.
- j. Field notes from drilling, installation, and surveying activities (e.g., all subcontractor dailies, as appropriate).
- k. Construction summary table of pertinent information such as date of installation, well depth, casing diameter, screen interval, bentonite seal interval, and well elevation.

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3. Monitoring Well Development:

- a. Date(s) and time of development.
- b. Name of developer.
- c. Method of development.
- d. Methods used to identify completion of development.
- e. Development log: volume of water purged and measurements of temperature, pH and electrical conductivity during and after development.
- f. Disposal of development water.
- g. Field notes (such a bailing to dryness, recovery time, number of development cycles).

4. Monitoring Well Survey:

- a. Identify coordinate system or reference points used.
- b. Description of measuring points (i.e. ground surface, top of casing, etc.).
- c. Horizontal and vertical coordinates of well casing with cap removed.
- d. Name, license number, and signature of California licensed professional who conducted survey.
- e. Surveyor's field notes.
- f. Tabulated survey data.

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