

STANDARD OPERATING PROCEDURE  
**Selection of Suitable Wells and Study Sites for Groundwater Monitoring**

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**KEY WORDS**

Well site selection, well site criteria, AB2021

**APPROVALS**

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**1.0 INTRODUCTION**

**1.1 Purpose**

To provide instruction on how to select an appropriate well and study site for ground water studies with the objective being to provide samples that are representative of the supplying aquifer, and which minimize the effect of well construction. This document provides a list of criteria to be used for selecting well sampling sites.

**1.2 Definitions**

1.2.1 **Ground Water Protection Area** - An area of land that has been determined to be vulnerable to the movement of pesticides to ground water. The designation of a ground water protection area is based on factors which are characteristic of areas where legally applied pesticides or their breakdown products have been detected and verified in ground water, such as soil type, climate, and depth to the ground water.

**2.0 MATERIALS**

2.1 Well driller's log

2.2 Maps

**3.0 PROCEDURES**

**3.1 Well Selection Criteria**

The selected well(s) should meet as many of the listed criteria as possible.

3.1.1 If possible, obtain the well driller's log. The log is typically obtained after the well is sampled by mailing in a request form to the Department of Water Resources (DWR). In some cases the owner may have a copy of the log or the well logs for a target area could be obtained from DWR prior to conducting the study. Although the log is not normally required for sampling, it contains information such as the construction and dimensions of the well, and well depths and screen locations. This information would be useful in targeting the wells most suited to a particular study if obtained prior to final well selection or it could help staff analyze and understand the sampling results if obtained after sampling. It also helps to

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confirm the official well number of the sampled well. Well driller reports are confidential information and can only be obtained by representatives of official state agencies.

- 3.1.2 Shallow domestic wells are preferable to deep irrigation wells or public water system (pws) wells. Generally, domestic wells are shallower, are sealed more carefully than irrigation wells, and are less likely to contain contaminants often introduced by the lubrication systems found on turbine pumps that power pws and irrigation wells.
- 3.1.3 Steel well casings are preferable over casings constructed with plastic or pvc (plastic can interfere with some pesticide analyses). However, current well construction is mainly from plastic materials.
- 3.1.4 A sample port located between the pump and the storage tank is preferable to one located after the storage tank (Figure 1). The airspace and the temperatures that exist within the storage tank can influence many pesticides. Consequently, residues of these pesticides in tank water may have dissipated or degraded and a tank water sample would not provide an accurate measure of the concentration of the pesticide found in the water from the aquifer.

Figure 1. A snifter (Schrader®) valve sampling port in between the pump and storage tank



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- 3.1.5 Wells that operate regularly are preferred to those that do not in order to allow for a greater possibility that fresh water is being withdrawn from the aquifer. In addition, regularly operated wells are generally in better condition and less likely to introduce contaminants into a well sample.
- 3.1.6 The above-ground equipment and concrete pad should be in good condition. Wells with minor cracks in the pad, which do not affect the integrity of the well, are acceptable. Wells that have missing well caps or openings in the well head, water running into the well head, or storage of pesticides or other chemicals near the well head, are not acceptable. Wells without pads are acceptable if they are well sealed around the casing and meet the other criteria in this SOP for a suitable well site (Figures 2-3).

Figure 2. An example of a well in very poor condition. Note the severely cracked pad and animal burrows under pad. This well should not be sampled due to the potential for point-source contamination from surface water runoff.



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Figure 3. An example of a highly undesirable well site. Note the clutter around the well, much of which is old pesticide containers. This well should not be sampled due to the potential for point-source pesticide contamination.



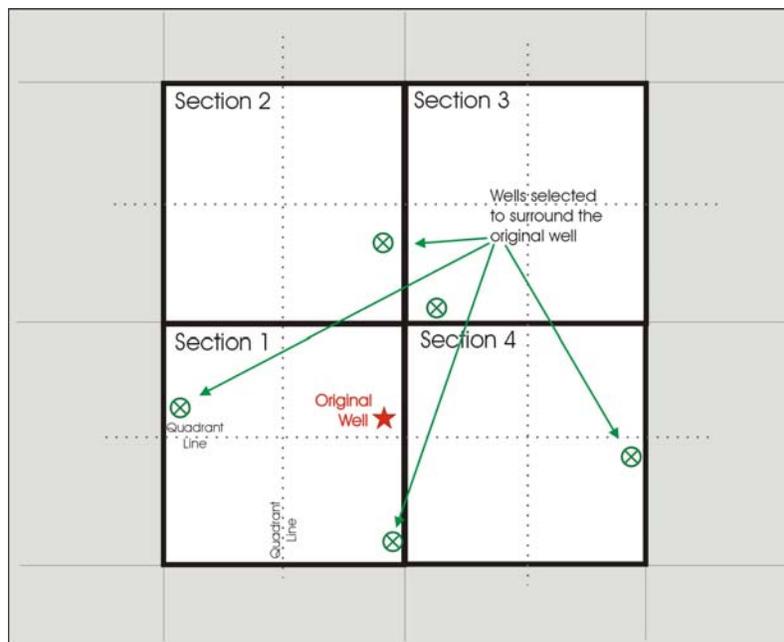
### **3.2 Study Site Criteria**

The selected study site(s) should meet as many of the listed criteria as possible.

- 3.2.1 Four-section survey well sites should encompass the original well in each of the four cardinal directions (Figure 4). Wells may be selected within the boundaries of the section of the detection site and any or all of the three nearest adjacent sections. The three adjacent sections are selected by determining in which quadrant of the original section the positive well is located and then choosing the three sections that are adjacent to that quadrant. If possible, selected wells should be at least 0.25 miles apart to reduce the likelihood of multiple wells being influenced by a single point source. The number of wells to be sampled and whether the original well should be resampled will be determined by the project leader.

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Figure 4. Diagram of a typical four-section survey study area. The heavy lined boxes represent one-mile sections. Well selection is determined by the available wells but ideally would be made so as to surround the well with the original detection. This example shows the selection of five additional wells. Lines dividing the sections into quadrants have been added to illustrate the selection of the four sections based on the location of the original well. The original well will always fall within the inner four quadrants of a four-section study area.



- 3.2.2 Ground water protection list monitoring sites will be determined by selecting sections with the highest amount of the pesticide usage and by using the California vulnerability modeling approach to determine the sections most vulnerable to the movement of pesticides to ground water. Vulnerability is determined by a process of examining soils, rainfall and depth to ground water. The sampling crew should sample one or two wells in each selected section. Priority should be given to wells that are located as close as possible to crops where the targeted pesticide could be applied.
- 3.2.3 For other ground water studies, refer to the study protocol for site selection criteria, the number of wells per section to be sampled, and any additional criteria for determining the suitability of a well for sampling and the distribution of wells to be sampled.