

**STANDARD OPERATING PROCEDURE**  
**Planning, Conducting and Documenting Small-Scale Ground Water Monitoring Studies**

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**KEY WORDS**

Four-section survey, Z-study, N-memos, legal agricultural use, well site selection, suitable well, FAC section 13149, FAC section 13150

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Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in [SOP ADMN002.01](#).

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#### **1.0 INTRODUCTION**

##### **1.1 Purpose**

To establish a standard approach to conducting small-scale ground water monitoring studies (referred to as “four-section surveys”) in response to pesticide and degradate detections reported by external agencies.

##### **1.2 Definitions**

1.2.1 Section/Township/Range: Public Land Survey System units. A standard section is a one-square-mile block of land containing 640 acres. A standard township contains 36 sections. A range is a vertical column of townships.

#### **2.0 MATERIALS**

2.1 [Ground Water Protection Area Shapefiles](#)

2.2 [California’s township/range/section Shapefiles](#)

2.3 Maps

2.4 [SOP QAQC005.01 Preparation of Sample Containers for Ground Water Monitoring](#)

2.5 [SOP FSWA001.02 Obtaining and Preserving Well Water Samples](#)

2.6 [SOP ADMN006.01 Creating and Filling out a Chain of Custody Record](#)

2.7 [SOP ADMN007.00 Preparing and Approving Study Memoranda and Reports](#)

#### **3.0 BACKGROUND**

[Food and Agricultural Code \(FAC\) section 13152](#) requires all agencies to submit the results of well sampling for pesticides and pesticide degradates to DPR. DPR uses this information to assess and prevent further pollution of ground water from the agricultural use of pesticides. DPR conducts small-scale ground water monitoring studies (four-section surveys) to (1) assess reporting agencies’ sampling results and (2) to help determine if the detections resulted from non-point sources, such as legal agricultural pesticide applications, or from point sources such as manufacturing, repackaging, spills or accidents.

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If DPR detects a pesticide not listed under [Title 3, California Code of Regulations \(3CCR\) 6800\(a\)](#) in two or more wells in a single section or in adjacent sections, DPR will undertake an investigation to identify the source of the detections. If the legal agricultural use of the pesticide is determined to have caused the detections, DPR will initiate a formal review process that may result in regulating the pesticide as a ground water contaminant listed under 3CCR section 6800(a).

DPR regulates the use of pesticides listed in 3CCR section 6800(a) in areas vulnerable to leaching or runoff called [Ground Water Protection Areas](#) (GWPA). Detections of these pesticides, or their degradates, outside of current GWPA then is used by DPR to establish new GWPA.

#### **4.0 PROCEDURES**

##### **4.1 Establishing Follow-Up Monitoring Goals**

It is DPR's goal to conduct timely follow-up monitoring whenever warranted and feasible. Ground Water Unit management and staff review pesticide detections reported to DPR by other public agencies to determine the need for and feasibility of follow-up monitoring. Feasibility is determined by the availability of laboratory and staff resources, adequate analytical methods, and other sample sites (wells) near the detections. Ground Water Unit management will approve the monitoring goals and assign project leaders to plan and conduct the monitoring studies.

##### **4.2 Developing Study Plans**

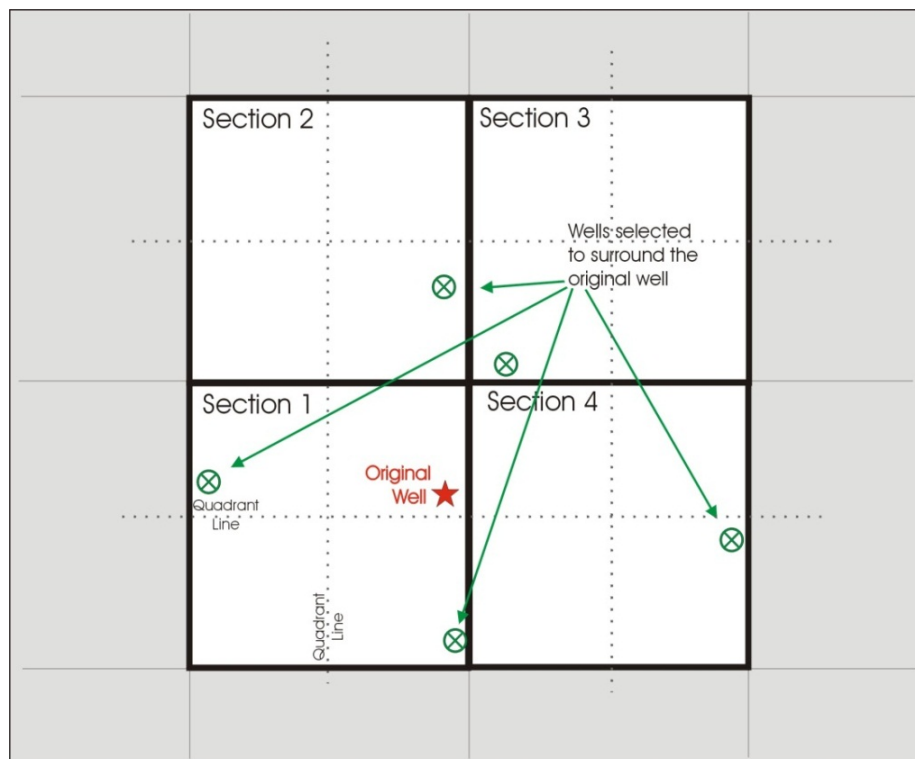
4.2.1 The project leader will identify high priority and alternate study areas using the following procedure:

- 4.2.1.1 Plot the location of the original well with the detection on a map using the GWPA and township/range/section Shapefiles (See Section 2.0).
- 4.2.1.2 Divide the section with the original well into quadrants (Fig. 1 – see Section 1).
- 4.2.1.3 Identify the three sections immediately adjacent to the quadrant with the original well (Fig. 1 – see Sections 2 – 4). If correctly mapped, the original well will be in the center four quadrants of the 16-quadrant study area.

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**Figure 1. Diagram of a typical four-section survey study area.**

The heavy lined boxes represent one-square-mile sections. 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.



- 4.2.1.4 Identify and prioritize alternate sampling areas based on reported pesticide use, historical well availability, and/or the vulnerability to ground water contamination. The alternate sampling areas will be used if suitable wells are not available in the highest priority sampling areas.
- 4.2.2 The project leader will determine the number of wells to sample using the following guidance:
  - 4.2.2.1 Typically, up to ten wells, including the well with the reported detection, are sampled in the four-section study site. Additional wells may be sampled depending on well availability, well locations, reported pesticide use, or positive sampling results.
  - 4.2.2.2 If available, the original well should be sampled. Doing so allows DPR to assess the reported results and also provides a valuable 'starting point' for study plan development.

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4.2.2.3 Sampling the original well is not necessary if DPR previously sampled the original well for the reported pesticide using a DPR-approved laboratory or analytical method, unless one or more of the following conditions apply:

- Sampling occurred more than 5 years ago,
- An improved analytical method is available,
- The original detection was deemed unusual (e.g., high concentration, unlikely contaminant, no reported use, etc.) or:
- Additional data is needed to assess concentration changes that may have occurred since the previous sample.

### **4.3 Conducting the Study**

4.3.1 At least two to three months prior to sampling:

The project leader will discuss analytical needs with the EM Branch laboratory liaison. Method development, method validation, or storage stability studies will be initiated as needed.

Sampling may begin after EM Branch management approves the written analytical method and the unequivocal determination memo and the project leader provides lab specifications sheet and a tentative sampling schedule to the EM Branch laboratory liaison.

4.3.2 At least a week prior to sampling:

4.3.2.1 The project leader will discuss the study plan (both high priority and alternate sample areas) with the project team, provide maps, and review relevant sampling SOPs (Section 2.0) to ensure sample integrity.

4.3.2.2 The project team will prepare sample containers according to [SOP QAQC005.01 Preparation of Sample Containers for Ground Water Monitoring](#).

4.3.3 Prior to taking well samples:

The project team will survey the study area to locate the original well and additional wells that may be suitable for sampling (see [SOP FSWA001.03](#)

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[Obtaining and Preserving Well Water Samples](#) for a description of a suitable well). After surveying all of the available wells, the project team will select five to ten wells that give the best spatial representation of the highest priority sampling areas surrounding the original well.

- 4.3.3.1 If the study plan includes the original well but it cannot be sampled, the project team will identify and attempt to sample the nearest well as a replacement for the original well.
  - 4.3.3.2 If the minimum number of wells required by the sampling plan is not available in the highest priority sections, the project team will expand the sampling area based on the alternate sample plan.
  - 4.3.3.3 The project team will not sample a well that is less than 0.25 miles away from a well that was sampled as part of the study. Doing so will avoid sampling from the same aquifer.
  - 4.3.3.4 The total sample area should not exceed nine sections and the furthest sampled well should be not more than one mile from the original well.
- 4.3.4 The project team will document any significant SOP and/or study plan deviations in the study memo.

#### **4.4 Results Assessment and Study Completion**

- 4.4.1 The study is complete when the required number of wells have been sampled or when all potential wells within the four-section study area have been eliminated as candidates due to well condition or the inability to obtain well owners' permission to sample.
- 4.4.2 If the targeted pesticide is detected in a well sampled during the study, additional samples may be taken in the vicinity of the detection(s) to determine the extent of the impacted area. The project leader will discuss initial results with EM branch management to develop further sampling plans.

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#### **5.0 DOCUMENTING RESULTS**

- 5.1.1 Study results should be documented within six months of study completion in a study memo or study report.
- 5.1.2 Depending on the study complexity and outcome, the project leader may either document the study results using the attached “Z memo” template (See [Appendix 1](#)) or they may prepare a study report per [SOP ADMN007.00 Preparing and Approving Study Memoranda and Reports](#).
- 5.1.3 Due to the large number of studies conducted throughout the history of DPR’s Ground Water Protection program, “Z Memos” have not been posted to DPR’s external homepage. Electronic copies of the “Z Memos” are maintained internally and the hard copies are archived in the respective study files. Study reports are posted to DPR’s homepage ([www.cdpr.ca.gov](http://www.cdpr.ca.gov)) under the EM Branch Study Reports and Memos page (<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps.htm>) as well as being archived with the study files.

#### **6.0 APPENDICES**

[APPENDIX 1: Z-memo template](#)



# Department of Pesticide Regulation



Brian Leahy  
Director

Edmund G. Brown Jr.  
Governor

## MEMORANDUM

TO: Ground Water Management  
Staff title  
Environmental Monitoring Branch

FROM: Staff name  
Staff title  
Environmental Monitoring Branch  
Staff phone number

DATE:

SUBJECT: ZXXX: COMPLETION OF THE SURVEY FOR X DETECTIONS OF X IN X COUNTY AND DETERMINATION WHETHER RESIDUES IN THE ORIGINAL POSITIVE WELL RESULTED FROM LEGAL AGRICULTURAL USE

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### SUMMARY

X has reported detections of X in X wells in X counties. A summary of the detections follows.

Table 1: Sampling results for wells located in section X in X County sampled during X.

Well Key	Section	Sample Date	Conc (ppb)	MDL
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Summarize the conclusion.

### BACKGROUND

Describe when the original well was sampled.

### MATERIALS AND METHODS

Summarize the number of wells sampled, the different types of samples collected, and what the lab analyzed. Include a citation for the analytical method and whether it was deemed unequivocal.



Table 2: Study ZXXX. Concentrations of pesticides<sup>a</sup> and degradates in well water samples.

County	Township/ Range- Section	Well Location	Concentration (ppb)		
			Analyte	Analyte	Analyte

<sup>a</sup> All well samples were analyzed for X, X, and X. Only compounds detected are shown.

## RESULTS

### WELL CONDITION:

Describe who evaluated the wells. Summarize the results of the well investigation.

### LAND AND PESTICIDE USE INFORMATION:

Summarize the land use and pesticide use history around the wells.

## DISCUSSION

Summarize the sampling results, the type of analytical method used, pesticide and land uses in the vicinity of the well(s) and whether there was any evidence of point source contamination. If pesticides were detected in more than one well within the study area, discuss whether there is adequate evidence to determine the source and if more monitoring is / in not needed.

If there are other Z studies or DPR monitoring studies for the same pesticide(s), please discuss these results as well.

## CONCLUSION and RECOMMENDATIONS

Summarize conclusions regarding source(s) of detections, if there is enough information and further recommended actions (e.g.: more monitoring; enter pesticide into PDRP, etc.). If pesticide not detected or degradates does not exceed a health level, include appropriate recommendations.

Approved: \_\_\_\_\_

Date: \_\_\_\_\_

## References