California Department of Pesticide Regulation
Environmental Hazards Assessment Program
1020 N Street
Sacramento, California 95814

STANDARD OPERATING PROCEDURE
Conducting Surface Water Monitoring for Pesticides

KEY WORDS

Field sampling; water quality; discharge; contamination

APPROVALS

APPROVED BY: John L. Sanders DATE: 1/2/97
Management

APPROVED BY: DATE: 12/22/97
EHAP Senior Scientist

APPROVED BY: DATE: 12/22/97
EHAP Quality Assurance Officer

PREPARED BY: Kevin P. Bennett DATE: 12/22/97

Environmental Hazards Assessment Program (EHAP) organization and personnel such as management, senior scientist, quality assurance officer, project leader, etc. are defined and discussed in SOP ADMN002.

1 .O INTRODUCTION

1 .I Purpose

This Standard Operation Procedure (SOP) discusses the general procedures for conducting a surface water monitoring study to determine pesticide concentration.

I.2 Definitions

In the context of this SOP, surface water is defined as all inland waters, excluding groundwater, which are suitable for use as a source of domestic, municipal, or agricultural water supply and which provide habitat for fish and wildlife.

2.0 MATERIALS

Materials are study/event specific.

3.0 PROCEDURES

3.1 Study Plan

A primary task of any surface water sampling activity is to accurately describe the characteristics of the site under investigation. This is essential for the correct evaluation of the water quality parameters measured at a given location. A complete study plan is required prior to commencement of an investigation and should be designed to answer specific questions posed by the researchers.

3.2 Site Selection

3.2.1 Preliminary identification - of monitoring sites will be focused where the potential for contamination is highest and will involve investigation of regions immediately downstream of high use areas. Specific monitoring sites will be selected based on a review of various criteria including reported pesticide use, detections from previous monitoring, previous detections determined to be out-of-compliance with water quality levels, and ecologically sensitive areas. Site selection might also require collocation at a gauging station if flow data are deemed necessary. This will depend on the specific goals of the study. Additional considerations will include previously observed aquatic toxicity, concurrent DPR monitoring, and cooperation potential with other agencies.

3.2.2 Specific sampling sites - will be determined according to the data needs of each study. Final site selection will be determined only after a comprehensive review of the criteria mentioned above and the hydrologic basin's morphological, chemical, and physical characteristics. For lotic waters in general, the site should be well-mixed and located on a stretch of the waterway which is wadable or has a bridge-crossing. The site should be located downstream of potential contamination sources but before any appreciable sources of dilution waters. Where possible, the sampling site should be near a gauging station to correlate flow measurements with pesticide concentrations to compute transport loads. If a gauging station is not available, a discharge measurement at the time of

sampling may be necessary to determine flow. For lentic waters in general, the site should be capable of being sampled without disturbing bottom sediments near sampling points. Final consideration should include staff safety, accessibility (especially under poor weather conditions), and physical security in instances when automated sampling equipment is used.

3.3 Monitoring

3.3.1 Sample Collection

Sampling is the collection of a representative portion of water at a site. Examination of that portion or sample provides information on the water quality characteristics of the site under investigation. Therefore, it is critical that samples be collected using techniques that assure their chemical and physical integrity. Consistency in the sampling method is essential for facilitating statistical analysis of the collected data. The sample type may be composite or discrete and may involve automated or manual collection systems. The preferred method of sample collection for lotic waters is one that provides a depth-integrated, cross-sectional sample. This method is commonly used by the U.S. Geological Survey (USGS) and best provides a representative portion of the water quality at a given site (Edwards and Glysson, 1988). Alternate methods include automated samplers and manual grab samples. Common surface water sampling techniques employed by EHAP are discussed by Ganapathy (1993).

3.3.2 Sampling Frequency

The frequency of sampling is dependent on individual study needs and budgeting constraints. For results describing seasonal variation within a waterway, daily or weekly sampling may be required. If the objective of a study is to determine concentrations of a known pesticide contaminant, sampling may be directed towards periods of highest pesticide use or historic periods of pesticide detections. Sampling during rain runoff events may also be considered.

There are several water quality criteria related to pesticide residue levels that include drinking water standards, and standards for the protection of freshwater aquatic life. In the case of drinking water, these standards are typically instantaneous values and collection schemes should provide comparable data (e.g. grab samples). Standards for the protection of aquatic life however, are

based on toxicity data and consist of both acute and chronic values. For example, acute water quality criteria can be derived from l-hour, 24-hour, 48-hour, or 96-hour tests, depending on monitoring requirements. Chronic water quality criteria can be derived also from variable data. It is therefore, important to design collection schemes with the appropriate sampling frequencies to determine whether water quality standards have been met.

3.3.3 Water Quality Measurements

A basic suite of water quality measurements including ambient water temperature, pH, specific conductance, and dissolved oxygen will be collected at the time of sampling. The objective of a study may require additional measurements of other water quality parameters (e.g. ammonia, dissolved solids, suspended sediment, and nitrates).

3.3.4 Chemical Analysis and Quality Control

All chemical analyses will follow EHAP approved methods. Chemistry laboratory quality control will be conducted in accordance with Standard Operating Procedure QAQC001 .OO. Additional quality control may be considered, depending on the study design.

3.3.5 Data Analysis

Final interpretation of collected data will be guided by individual study objectives and the study design.

4.0 STUDY-SPECIFIC DECISIONS

Study specific information should be included in the study protocol, a separate document describing a specific study.

5.0 REFERENCES

Edwards, T.K. and D.G. Glysson. 1988. Field methods for measurement of fluvial sediment: U.S. Geological Survey Open-File Report 86-531. p. 61-64.

Ganapathy, C. 1993. Four river monitoring protocol. California EPA/Department of Pesticide Regulation, Environmental Hazards Assessment Program. Sacramento, CA. September 27, 1993.

Standard Operating Procedure: ADMN002.00. 1996. Personnel organization and responsibilities for studies. California EPA, Department of Pesticide Regulation, Environmental Hazards Assessment Program. Sacramento, CA.

Standard Operating Procedure: QAQC001 .OO. 1996. Chemistry laboratory quality control. California EPA, Department of Pesticide Regulation, Environmental Hazards Assessment Program. Sacramento, CA.