Health & Safety Report

Worker Health and Safety Branch

HS-1800

Worker Health & Safety
Human Effects Incidents Investigation Manual

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1. Introduction

The Department of Pesticide Regulation (DPR) is responsible for ensuring the safe use of pesticides, including ensuring safe working conditions for those using pesticides or working in and around pesticide-treated areas (1). This role includes assuring compliance with applicable rules and regulations, implementing mitigation measures to reduce pesticide exposures, and investigating human effects incidents involving pesticide exposure, illness, or injury. Human effects incidents occur in both agricultural and non-agricultural settings and involve both occupational and non-occupational exposures. Over the past twenty-five years, the most serious human effects incidents have generally involved workers who handle pesticides or are exposed to pesticide residues.

County Agricultural Commissioner's (CAC) staffs are the local enforcement agents for DPR. The CAC are generally the initial point of contact when a human effects incident occurs (2). CAC staffs investigate all human effects incidents in their county to determine what happened and whether violations occurred.

The United States Environmental Protection Agency (US EPA), in a cooperative agreement with DPR and the California Agricultural Commissioners and Sealers Association (CACASA), established priority investigation criteria for pesticide-related human effects incidents (3). A formal investigation process is initiated when incidents meet these criteria. DPR's Enforcement Branch (ENF), including Regional Offices (ROs), and the Worker Health and Safety Branch (WH&S) may conduct joint investigations with the CAC of more serious episodes meeting one or more of the following priority investigation criteria:

- Death - including suicide,
- Serious illness (any pesticide illness requiring hospital admission as "inpatient status"), or
- Any injury or illness involving 5 or more persons that may have resulted from a single pesticide episode.

(Other priority investigation criteria exist for property or environmental loss or damage and special incidents.)

In recent years, a number of human effects incidents that do not meet the above criteria have received special attention from DPR because of their sensitivity or visibility. The Department identified the need to coordinate notification and response to these incidents and has taken several steps to improve the system (4). Beginning in 2002, WH&S established annual priorities for investigating certain types of incidents (5). Via CAC letter, WH&S formally defined our roles, responsibilities and priorities for illness investigations and work place evaluations (6). In coordination with ENF and the ROs, WH&S and ENF developed guidelines for the CAC in responding to non-occupational pesticide use-related exposure incidents (7). Adopting the procedures in this manual and coordinating with the CACs to implement them will enhance DPR's effectiveness in incident response. This manual will be revised periodically to incorporate changes in notification procedures, contacts, investigation criteria, sampling strategies and other pertinent information.

The purpose of this manual is to:

1) Provide WH&S staff the knowledge and resources to conduct thorough and appropriate investigations of human effects incidents,
2) Ensure WH&S consistently communicates, cooperates, and coordinates with the CACs and ENF, including the ROs, throughout all phases of the investigations,
3) Discuss how WH&S targets pesticide safety and health hazards for further study, sets mitigation measures and evaluates their effectiveness.

This manual includes a number of charts that present "at a glance" information. These are generally presented on the page immediately following their reference in the text.

2. Background

Investigations of pesticide-related episodes are critical in compiling appropriate data and other information to identify problems and evaluate the effectiveness of DPR's regulatory program. CAC and ENF are skilled in conducting thorough, professional investigations to reconstruct pesticide-related episodes and determine whether violations have occurred. DPR relies on the CACs to provide sound, factual information and is available to assist them during an investigation. WH&S has a long history of investigating episodes of human effects to assess how much exposure persons received and the factors contributing to the exposure, then using this information to develop appropriate stratagems for evaluating, measuring, and/or mitigating exposure.

2.1. Notification Process for Human Effects Incidents

Hereafter in this document, both US EPA episodes meeting priority criteria for investigation and other human effects incidents (HEI) will be referred to jointly as "incidents", unless processes differ.

When episodes occur which meet US EPA criteria for priority investigation, ROs generally inform WH&S at the same time the Enforcement headquarters is notified (usually within 24 hours). The ROs and CAC may also notify WH&S via phone or e-mail when incidents occur which meet our criteria for investigation, which WH&S establishes annually (5).

WH&S is usually notified of incidents that do not meet priority investigation criteria via the pesticide illness surveillance program (PISP). Physicians must immediately call their county health officer and inform them of all incidents of illness or injury which may be related to pesticide exposure (8). The county health officer fills out a PIR and submits to the CAC and DPR. Thus, PIRs are generated only when a person seeks medical attention.

PISP is also notified of incidents via reports (Doctor's First Report of Illness or Injury, DFROII) submitted to the California's workers' compensation system, with a typical delay of several weeks to several months following the incident. Following WH&S receipt of the DFROIIs, the CAC is notified and investigates the incident. Incidents reported via DFROIIs may or may not also have been reported via the PIR system.

Complete and detailed investigations are essential in order to assess DPR's pesticide regulatory program. WH&S conducted an analysis of the completeness of pesticide episode investigation reports in 2001 and found complete or required information was collected about 63% of the time (9). That percentage, although encouraging, is not adequate for WH&S to evaluate the pesticide regulatory program. Much of the information WH&S considers missing pertains to occupational safety issues. Often, enough information is presented in the investigative reports to allow trained scientists to make an educated guess as to how the exposure occurred. However, without details on exposure, work history, activity at the time of exposure, clothing worn and protective equipment used, scientists cannot completely evaluate the exposure scenario. Without the details on how the pesticide was handled (i.e., cut open water soluble packaging, properly used protective clothing, exact spray or mixing equipment used, etc.) WH&S cannot determine the adequacy of the current regulatory requirements. Ensuring WH&S is informed of incidents in a timely manner allows Branch management to decide whether WH&S should have a role in the investigation. WH&S can be involved in incident investigation in three ways: 1) in a support role to the CAC, 2) as consultants to the CAC, or 3) lead a parallel pesticide safety investigation.

3. Communication

3.1. WH&S General Investigation Criteria: When WH&S Needs to Know

Chart 1, "WH&S General Priorities", describes the types of incidents that may trigger a WH&S investigation or consultation:

1) Human effects episodes meeting US EPA priority investigation criteria, i.e., involving non-suicide death, serious illness, (any pesticide illness requiring hospital admission as "inpatient status"), or five or more persons with illness related to a single pesticide exposure incident,
2) Incidents involving high-visibility pesticides which either have been or are likely to draw media attention due to their location, sensitivity, frequency, the scope of exposure, or the exposed group,
3) Incidents which involve a pesticide listed as a high priority for risk assessment (http://www.cdpr.ca.gov/docs/risk/highpri.pdf),
4) Incidents which meet WH&S' annual investigation priorities (5), and
5) External incidents involving pest eradication projects, large spills or accidents, and forest incidents.

Chart 1 provides the WH&S main office phone number and fax number. Exposure Monitoring Program (EMP) and/or Pesticide Illness Surveillance Program (PISP) staff should be notified when pertinent incidents occur. Lists of specific WH&S staff contacts and phone numbers within these programs will be maintained separately and updated as needed. If WH&S is notified of a human effects incident from non-ENF, RO or CAC sources, staff should inform ENF to ensure they are aware of the incident as well. Staff should refer any media contacts to the Communications Director. Other DPR contacts, such as the Executive Branch or Environmental Monitoring Branch, may be consulted as appropriate for certain human effects incidents. Lists of specific staff contacts will be maintained separately and updated as needed.

Chart 1 WH&S General Priorities
(Specific priorities are established annually)

WH&S may respond to the following types of incidents
Notify WH&S at (916) 445-4222
Ask for any of the following staff:
Supervisor, Exposure Monitoring Program
Staff, Exposure Monitoring Program
Staff, Pesticide Illness Surveillance Program
FAX pertinent info to (916) 445-4280
Check current contact lists for designated staff contacts

Human Effects Incidents Meeting US EPA Priority Investigation Criteria

- Non-suicide deaths
- Serious injury (pesticide illness and hospital admission as "inpatient status")
- 5 or more persons with symptoms related to a single pesticide episode

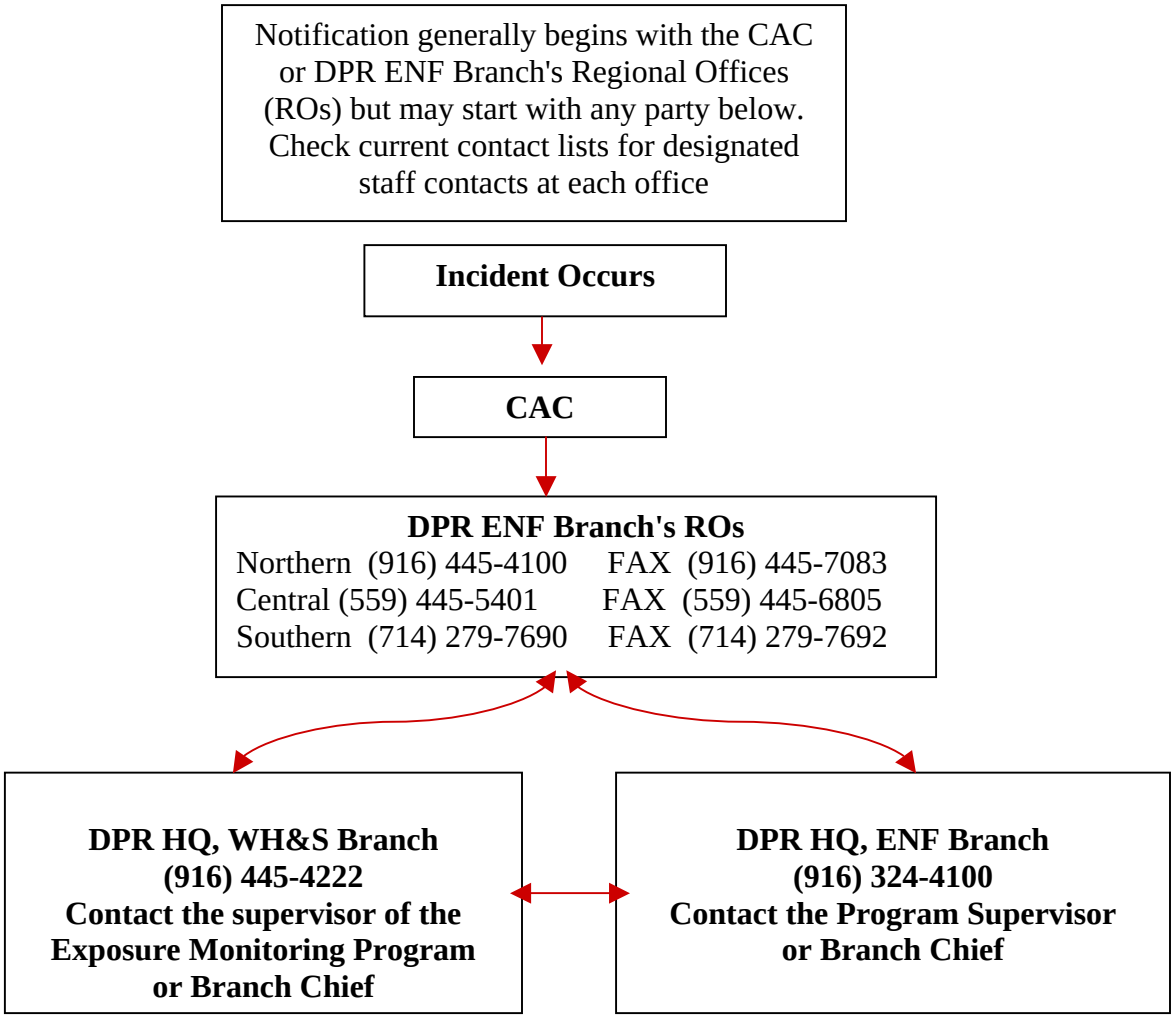
Other Human Effects Incidents

- *Incidents meeting WH&S annual priorities for participation in episode investigation* (list available on request)
- *High-profile pesticides and incidents*
- *Drift incidents*
- *Field residue incidents*
- *Widespread community exposure*
- *Incidents occurring at/near schools*
- *Repeated incidents of a similar nature*
- *High priority risk assessment pesticides* (list available on request)

External incidents where WH&S may provide technical or consultation expertise

- CDFA, e.g., eradication projects
- Fish and Game, e.g., Lake Davis
- Large-scale pesticide accidents, spills, e.g., Dunsmuir
- Caltrans, US EPA, Dept. of Corrections Cal/OSHA, US or CA Forest incidents
- OES incidents (notification process established)

Chart 2 DPR Contacts at Regional Offices and HQ



3.2. Incident Tracking

Any WH&S staff informed of an incident will record pertinent information using the form titled "WH&S Human Effects Incidents (HEI) Log" (Chart 3), available in I:/Forms/HEIlog.doc. The form constitutes the starting point for the paper trail to document and reconstruct the investigation. Fill out all sections above the dotted line as completely as possible. Use listed categories to prompt your initial contact to provide critical information about the incident. Notify others as needed. When you have recorded all available information, take the form to the supervisor of the Exposure Monitoring Program (EMP). If the supervisor is absent, take the form to the program supervisor, branch chief, or staff acting in these roles.

3.3. Criteria for Decision-Making - When WH&S Gets Involved

Chart 4, "WH&S Decision-Making Criteria", shows the process for deciding whether WH&S will respond to an incident. Once informed of an incident, only the branch chief or EMP supervisor, or staff acting in these capacities, has authority to decide how WH&S will respond. There are three potential responses:

- Passive response – notification alone is adequate; WH&S will track the incident
- WH&S will provide consultation assistance, or
- In consultation with ENF, WH&S will investigate in a support role to CAC investigations and/or lead a parallel pesticide safety investigation.

The EMP supervisor or branch chief will indicate the status of WH&S involvement in the "WH&S Action" block of the HEI Log, designate the project director who will manage the project, assign other staff as appropriate, and initial their action. For on-site investigations, the branch chief or EMP supervisor will decide whether WH&S will investigate in either a support role and/or lead a parallel pesticide safety investigation. The branch chief or EMP supervisor then forwards the HEI Log to the project director.

Using the Fieldlog Program (SOP WHS-FO08), the project director must assign a project number to all incidents involving consultation or investigation. The project director does not assign a project number to incidents involving only passive response (Notification/Track). However, it is the project director's responsibility to inform the EMP supervisor or branch chief if the status of a passive response incident changes to indicate that WH&S should assume a more active role, i.e., consultation or investigation. If so, the EMP supervisor or branch chief will change the project status designation in the "WH&S Action" column of the HEL log and initial the new designation. The project director will then assign a project number to the incident.

Chart 3 WH&S Human Effects Incidents (HEI) Log

Staff Name _____ Date _____ Time _____

Information received from _____

Representing _____

Phone _____

❑ US EPA Priority Incident ❑ Human Effects Incident

County _____Nature of incident _____

_____

_____

_____

Pesticides(s) implicated _____

_____

_____

Potential Issues	Widespread exposure	Children exposed	English speaking
OP/Carbamate	Short half-life	Sensitive site	Spanish speaking
Drift	Water issues, specify	High profile, specify	Other:
Residue	Native Amer. issues	Fumigation	Structural app
Potential misuse	Odor	Media present	Other issues, see above

Issues from above, field location, contacts _____

_____

_____

Persons I contacted_____

_____

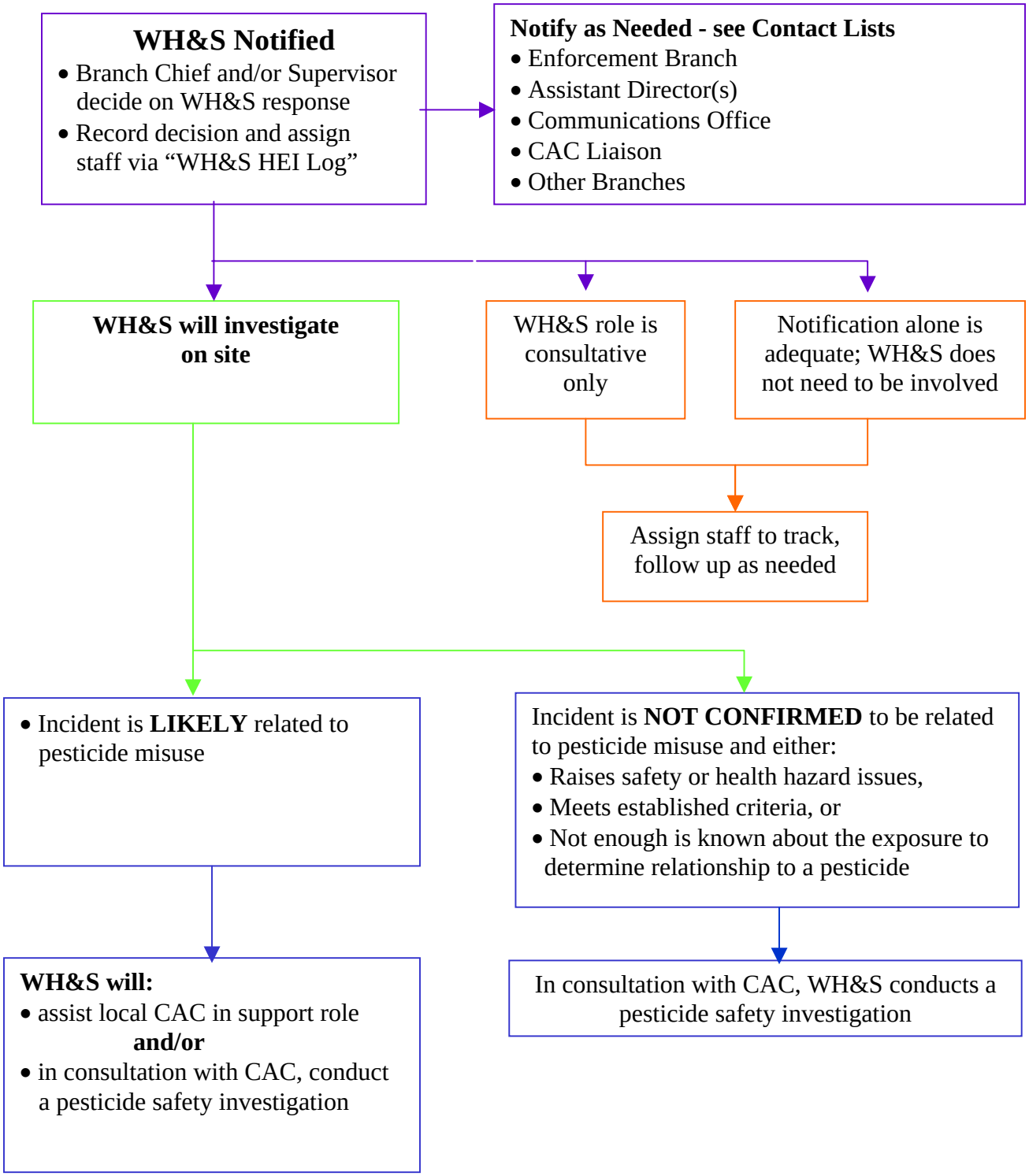
Actions I took _____

Next Steps _____

_____

WH&S Action	**Designated Project Director**	**By (Initials)**	**WH&S Proj. No.** (Not Applicable)
❑ Notification/Track	_____	_____	_____
❑ Consult	_____	_____	_____
❑ Investigate: Support	_____	_____	_____
❑ Investigate: Health and Safety Issues	_____	_____	_____

Chart 4 WH&S Decision-Making Criteria



For incidents meeting US EPA priority investigation criteria, ENF and CAC staff use the assigned tracking number as the reference number for their investigations. WH&S documentation and records will reference both the assigned tracking number and the WH&S project number for priority incidents. For non-priority incidents, the WHS Project Number will be the only reference number used. If multiple HEI Logs are submitted for an incident, they will be filed together – unless that project status changes, the "WH&S Action" block need be completed only once.

3.4. WH&S Communications

Effective investigations require frequent communications among participants during all phases of the investigation. The status of an investigation can change rapidly as investigators corroborate facts, gather information, or respond to new events. WH&S, ENF, ROs, and the CAC must continually coordinate and provide timely updates from the time the incident occurs, on through the notification phase, developing sampling and investigative strategies, to follow-up, de-briefing, and distributing reports. Specifying staff contacts and roles early in the investigation and communicating frequently will optimize investigators' efforts and foster good decision-making at all levels of responsibility.

3.4.1. Initiation

Chart 5, "WH&S Communications", provides guidance regarding the nature and frequency of Branch communications. The following are the initial steps regarding Branch communications:

- After deciding that WH&S will be involved and assigning a project number, the EMP supervisor generally forwards pertinent information to the branch chief. If the EMP supervisor is absent at the onset of WH&S notification, the branch chief or acting chief will be the point of contact. At least one scientist from the PISP group should be copied on this communication and noted on the HEI log so staff are apprised of the status of on-going investigations.
- The EMP supervisor will contact the appropriate Enforcement RO Program Supervisor and inform them of WH&S involvement. A conference call with the Enforcement Program Supervisor, the RO supervisor, appropriate CAC staff and the EMP supervisor should occur to lay out an investigation plan and ensure all are on the same track.
- Others are notified as needed (see Chart 2, “DPR Contacts at Regional Offices and HQ”).

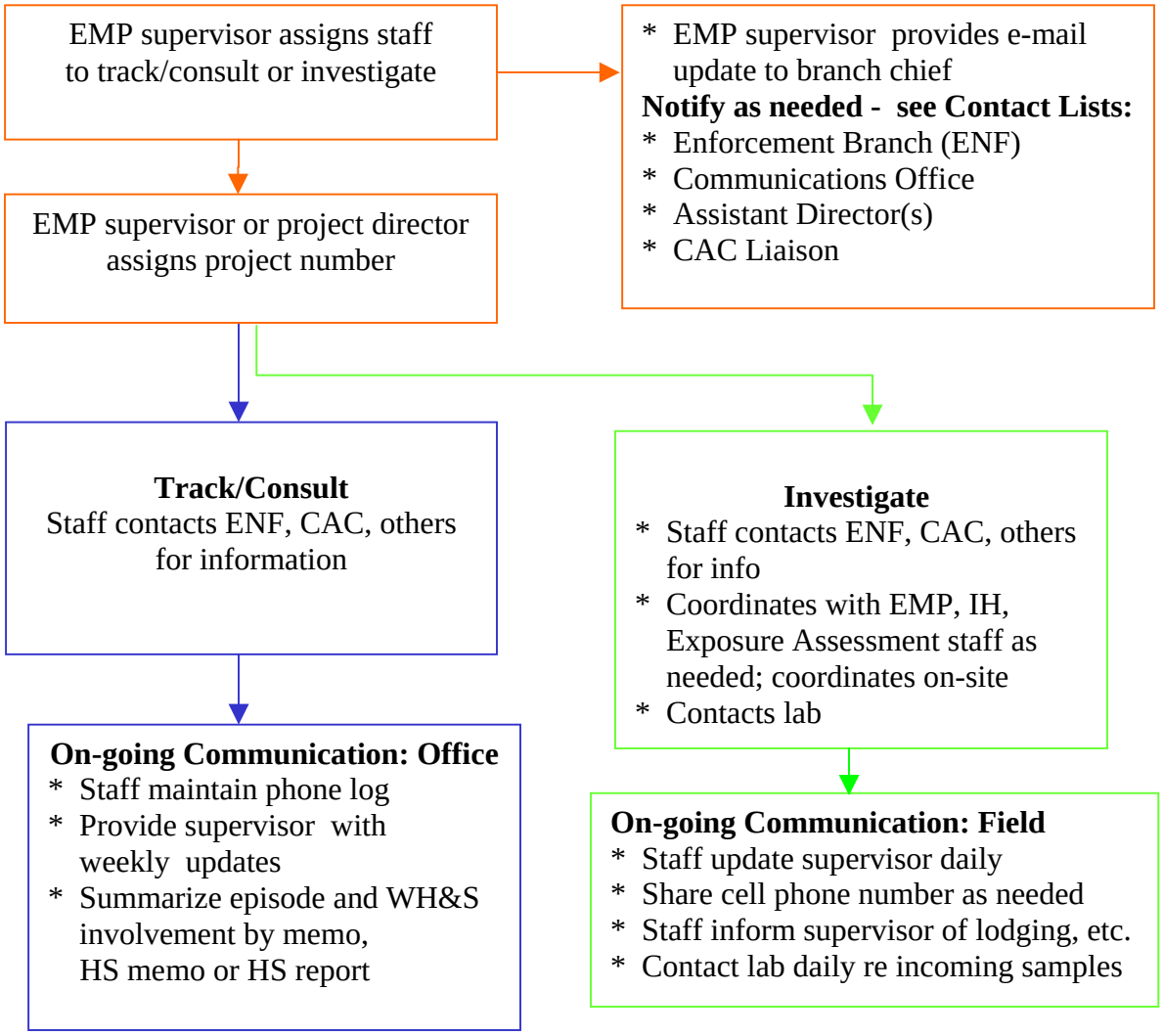
3.4.2. On-going

- When WH&S provides **consultation only** for an incident, communications will generally take place from the office. Unless the EMP supervisor specifies otherwise, staff should maintain the following documentation and communication:
    1. Maintain phone logs for all conversations regarding the investigation (WH&S Branch Phone Log, see Appendix).
    2. Provide their supervisor with weekly updates – this can be as part of the weekly activities reports, by e-mail, or in person.
    3. When completed, summarize the consultation. The EMP supervisor will determine the summary format (HS memo or HS report).

When WH&S investigates either in a support role to the CAC investigation or coordinates a pesticide health and safety investigation, staff will generally travel to the county where the

incident occurred. A support role in investigations may require minimal involvement such as assisting local CAC staff with sample collection. Other times, investigations may involve extensive WH&S presence, including interviews, records collection, sampling, etc. The status of an investigation can change rapidly as new information is gathered. It is important to keep WH&S headquarters informed regularly as the investigation proceeds. Unless the EMP supervisor specifies otherwise, on-site staff should maintain the following minimum communications with WH&S:

Chart 5 WH&S Communications



1. Before leaving for the field location, sign out on the office board and provide your cell phone number to the EMP supervisor and support staff. Inform your supervisor of your field location and the phone number and room number where you are lodging.
2. Update your supervisor at least daily while in the field; more frequent contact may be required. E-mail, phone, and/or radio/cell phone updates may be suitable, depending on the nature of the investigation.
3. The EMP supervisor is the primary point of contact with the analytical laboratory, for both staffing and sample issues. Contact the lab each time you send samples and inform the EMP supervisor as well (schedule will vary depending on the investigation). The EMP supervisor will check that sample shipments were received; the lab provides the EMP supervisor updates regarding sample analyses and results. The project director will be the lab's contact person when the EMP supervisor is not available.
4. The EMP supervisor ensures that the branch chief receives periodic updates, summarizing the status of WH&S' investigative efforts.

3.5. Coordinating Communications Among WH&S, CAC and ENF

Chart 6, "Coordinating Communications Among WH&S, CAC and Enforcement (ENF) provides general guidance for any investigation and specific guidance for the three WH&S investigative roles. For consultation and on-site investigations, staff must coordinate communications with ENF, CAC, and the lab, as well as WH&S headquarters. In recent investigations, periodic phone conference calls among ENF, CAC and DPR HQ staff have proved an expedient way to provide timely updates, discuss investigation strategies and make mutual decisions.

The project director will complete the form "WH&S Human Effects Incidents (HEI) Contacts Record" (Chart 7). The form, also available in I:Forms/HEIcontacts.docs, is designed to keep all pertinent incident contact information readily available, to ensure that communication processes are appropriate and specified, and to help staff formulate investigative strategies. The sections on sampling (Section 4.3) and incident investigation strategies (Section 4.4) provide additional information on completing this form.

At the outset of an investigation, decide how you will approach issues such as the following:

- When WH&S staff act as consultants, who is the primary contact for relaying information and updates? Do WH&S staff need to update both CAC and ENF? Is e-mail a better venue than phone? Is there a deadline?
- For a WH&S support role on-site, who is the lead agency and individual? Who will make decisions? Who will provide updates on decisions and new information?
- When WH&S coordinates a pesticide health and safety investigation, will they also assist local CAC? If so, how? How will WH&S, CAC and RO staff coordinate so that each is kept abreast of the other's progress? How frequently does the local CAC want an update from WH&S? What is the process for asking CAC staff for assistance with records, access to workers, or other issues that may arise? WH&S may need to coordinate these efforts if logistics, lack of staff, or other circumstances indicate that significant delays are expected in obtaining CAC assistance in such matters.

Chart 6 Coordinating Communications Among WH&S, CAC and Enforcement (ENF)

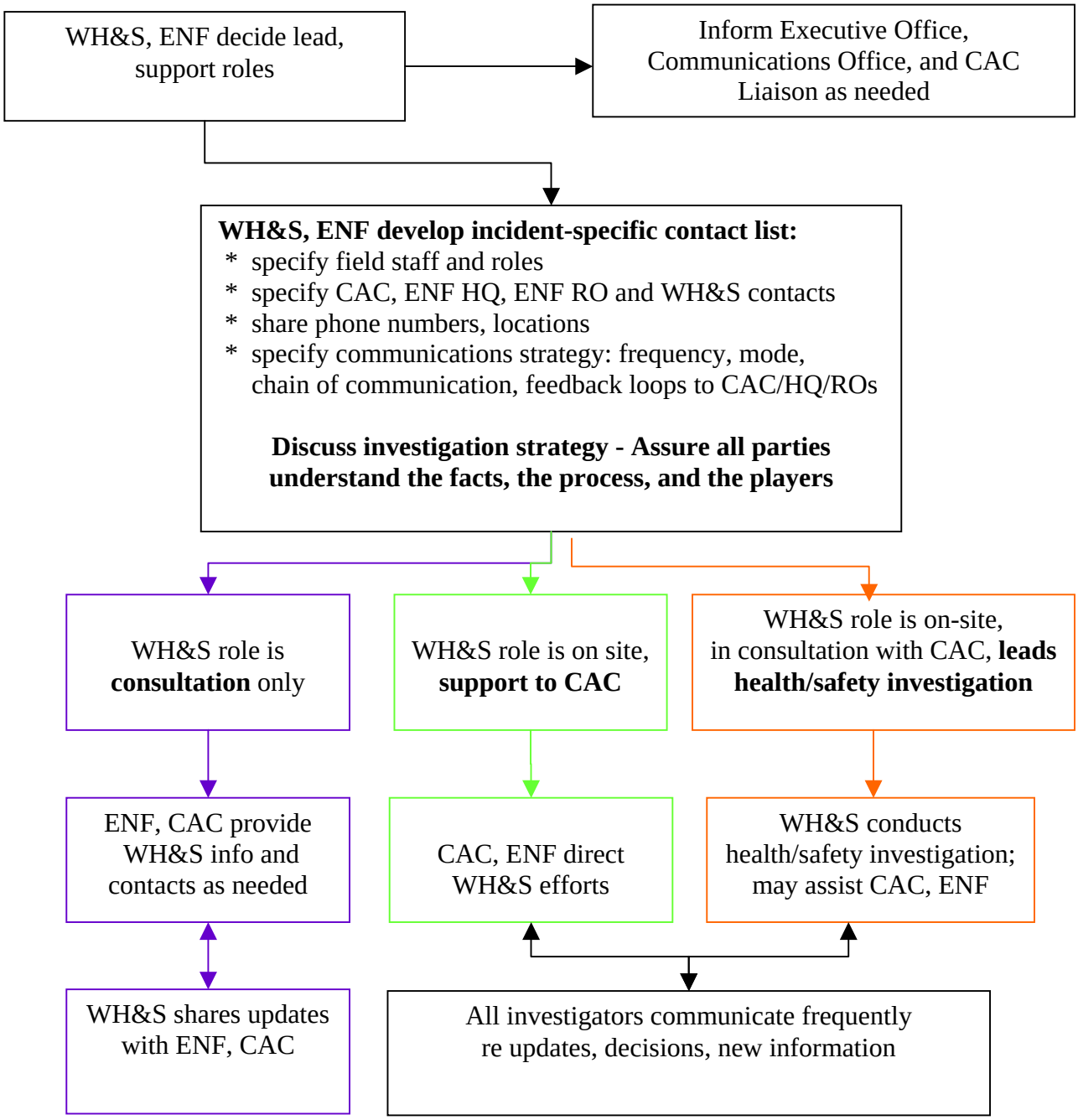


Chart 7 WH&S Human Effects Incidents (HEI) Contacts and Planning Form

WH&S Project No _____ Date _____ Incident Date _____

- ❑ Priority
- ❑ Consultation
- ❑ HEI
- ❑ Support to CAC Investigation
- ❑ WH&S Investigation
- ❑

WH&S Staff and Roles Project Director _____

Field Staff _____ _____

Specify Contacts	✓	**Office Phone**	**Cell Phone**	**Role/Location**
ENF Contacts				
RO Contacts				
CAC Contacts				
				Ag biologist
				Ag Biologist
Lab Contacts		916-262-2780		
Elaine Wong		916-262-2062		WH&S Chem. Supervisor
				Chemist
				Chemist
Danny Merkley		916-445-3906		CAC Liaison

Communications strategy: frequency, mode, feedback loops: _____

_____

_____

_____

Investigation Strategy: include reporting units where applicable

Sampling	❑ Blood	**Records**	**Interviews**
❑ DFR	❑ Tank Mix	❑ Application	❑ Grower
❑ Clothing:	❑ Soil	❑ Field History	❑ Applicator
❑ Wipes	❑ Water	❑ Plot Maps	❑ Workers
❑ Air	❑ Fruit	❑ Product Labels	❑ Witnesses
❑ Urine	❑ Other	❑ Work Records	❑ Medical staff
❑	❑	❑ Medical Records	❑

Notes:

3.6. Debriefing Investigations

The final component of communications, debriefing after an investigation, is addressed in Chart 8, "Communications: Debriefing Investigations". Debriefing an investigation with all investigators present is critical to understanding how the investigation proceeded and to improving future investigations. It provides opportunities for:

- Each investigator to ask and answer questions,
- Developing a comprehensive, written chronicle of the events as they occurred,
- Evaluating the success of the communication, decision-making, and coordination processes,
- Suggesting ways to improve these processes in future investigations, and,
- Maintaining institutional memory regarding an investigation.

One or several debriefings may be appropriate for a given investigation. For on-site investigations, the first debriefing should be face-to-face and take place before investigators disperse to their home locations, while the details are still fresh in everyone's minds. For less complex investigations, this may be within the first few days following an incident when the investigations are essentially complete. For investigations with several phases, interim debriefings should take place frequently enough that all players are "in the loop" regarding events and decisions. Effective communication skills are important in successfully conducting all aspects of an investigation.

Debriefings should be conducted calmly, orderly, and with each person having input into the discussion at hand. All opinions should be respectfully considered. Recognize that each party may have different perceptions and priorities. In addition to providing all investigators with a common understanding of facts and status related to an incident, debriefings should be seen as opportunities for brainstorming improvements in conducting future investigations. Investigators under constant pressure or making difficult decisions in complex and rapidly changing situations may need to time to vent before they can discuss issues calmly. Investigators should recognize this potential, schedule time for venting, and each serve as a facilitator to the process.

For more complex investigations, a final debriefing may be the best way to address pros, cons, and suggest improvements for communication, decision-making and coordination issues. While an initial face-to-face debriefing with all the players is ideal, subsequent debriefings may be more practical by conference call, e-mail, etc.

When WH&S investigators serve in a consultative role, a debriefing is still important. However, the debriefing can be less formal and may take place among WH&S staff only. Pertinent observations regarding ways to improve processes should be shared with ENF, CAC and others as they apply.

Chart 8 Communications: Debriefing Investigations

Purpose: To understand and document how the investigation proceeded and to propose both on-going and future improvements to the process.

Who needs to be there

- **If WH&S is on-site:** All players, before leaving for their home locations
- **If WH&S is consulting:** WHS investigator meets with others as applicable

When

- At least initially
- As often as necessary for all to be "in the loop"
- For complex investigations, a final debriefing

How

- Initial: in person, on-site
- Interim and final: as feasible
- Respectfully
- Allow time to vent
- Facilitate the process
- Maintain written record

What

- Ask and answer questions
- Develop a written chronicle
- Identify obstacles or problems
- Suggest process improvements
- Maintain institutional memory

Suggested Discussion Items

* Document a chronology of events: Did investigation proceed smoothly?
* Effectiveness of coordination among roles:
  - Were roles clear and effective? Why or why not?
* Effectiveness of communications, updates
  - Evaluate method (e-mail, phone, etc.), frequency, timing
  - Was there adequate follow-through to those who needed info?
  - Were there effective feedback loops?
* Adequacy of interim health/safety mitigation measures
* Effectiveness of sampling plan, preparation, sample transport
* Effectiveness, ease of conducting interviews
* Ability to obtain necessary maps, records, etc.
* Events, processes out of our control which hindered the investigation
* Distribute final reports to all players

4. Conducting Investigations

4.1. Overview

WH&S conducts investigations in coordination with CAC investigations. In developing investigative strategies, WH&S' goals, provided below, complement those of the CAC, while addressing our distinct responsibility to evaluate pesticide safety issues:

1. To reconstruct the exposure scenario: who is involved, details on how and why exposure happened, and evaluate the situation for possible violations
2. To determine the extent of exposure by directly or indirectly characterizing how much exposure persons received,
3. To identify and evaluate hazards associated with the pesticide exposure,
4. To establish appropriate regulations and exposure mitigation measures (such as medical monitoring requirements, engineering controls, safe residue levels) in response to hazards, and
5. To assess the effectiveness of regulations and the mitigation measures.

The primary objective for the CAC in conducting investigations is to document the exposure and determine the circumstances contributing to the exposure event (10). Thus, the CAC share the spirit of WH&S' first two goals. However, the respective investigative outcomes do differ. Since ENF and the CAC have primary responsibility for documenting regulatory compliance, the outcome of an ENF and CAC investigation may be an enforcement action, while the outcome for a WH&S investigation may be a mitigation measure. For WH&S, the information gathered during the initial investigation guides us in achieving the last two goals. CAC and WH&S investigative strategies must be coordinated, yet tailored so that both entities achieve their unique objectives. Thus, while the CAC and WH&S investigators both rely on records and other documentation typically collected by the CAC, WH&S may require additional records, sampling or interviewing to characterize the details of the exposure event, evaluate the extent of exposure and evaluate pesticide safety issues. WH&S investigators will consult with the CAC before conducting investigation activities that extend beyond those conducted by the CAC.

This document emphasizes the most critical aspects of sampling and interviewing as related to investigating incidents and is not intended to be a comprehensive guide. WH&S staff are expected to be thoroughly familiar with pertinent references and SOPs (11-14). Staff will maintain training records that document their responsibilities for each investigation, and record training, publications, presentations, etc., associated with each project. ENF's Pesticide Episode Investigation Procedures Manual has a wealth of information regarding conducting investigations (10). WH&S investigators will read through this Manual, particularly the Investigation Objectives section and Interview Questions for Exposures and Illnesses, which may provide additional lines of inquiry for WH&S investigators.

4.1.1. Attitude

Whether sampling or interviewing, it is crucial to maintain an open mind throughout the investigative process. Investigators who form rigid opinions prior to exploring all facets of the investigation risk overlooking potentially critical information that may be irretrievable later. Investigators should postpone drawing conclusions and making decisions until they are certain that they have reviewed all incident information and spoken to all individuals with relevant information about the episode.

4.1.2. Support Roles

When WH&S acts in a support role, WH&S is assisting local CAC or ENF staff in an investigation. WH&S may also respond to incidents in which another agency has primary jurisdiction. Examples include incidents at prisons, on federal lands, investigations of major spills which are being directed by the Office of Emergency Services, etc. In these cases, staff should provide whatever assistance is requested and cooperate fully with the lead agency.

4.1.3. Medical Treatment of Exposed Individuals

While the health of exposed persons is the primary concern during an investigation, WH&S staff are not emergency responders and do not have primary responsibility for ensuring that exposed individuals are transported to hospitals, doctors or other facilities. Nor are they responsible for providing any type of first aid or medical assistance. For occupational exposures, it is the employer's responsibility to secure medical treatment. However, staff can inform workers of their right to file a Workers' Compensation claim through their employer. Investigators must be sensitive to workers' possible fears that seeking medical care may result in employer retaliation. Investigators may provide workers with the California Department of Labor Standards contact information (see appendix). For non-occupational exposures, staff can advise exposed persons to seek medical care according to the terms of their insurance provider.

4.1.4. Hazards, Safety

Staff must adequately prepare for chemical, weather, and other site and sampling hazards to which they may be potentially exposed. Appropriate precautions may include bringing personal protective equipment, flashlights, drinking water, sunscreen, etc. WHS-SA01 discusses site safety in general (11). DPR’s Field Safety Manual addresses safety issues in detail and specifies requirements for a variety of potential exposure scenarios (12). WH&S investigators must be familiar with this document and refer to it as needed. Staff must document all investigation activities which involve potential pesticide exposures on a WH&S Pesticide Exposure Record (See Appendix).

4.1.5. Documentation

WH&S investigators must document the investigation thoroughly by using notes, summaries, phone logs, forms, photo records and other appropriate media as needed. Request their permission before photographing individuals.

4.1.6. Media

Media may be present at any time. Staff should direct <u>all</u> media inquiries to DPR's Communications Office, at (916) 445-3974. If a reporter requests interviews or information regarding an incident, refer them to the local CAC. You must not speak to reporters without approval from the DPR Communications Office. Even then, you are under no obligation to speak to reporters. With approval from the Communications Office, if you are asked about a particular sampling procedure and *if you are comfortable doing so*, you may describe and explain it. Similarly, if reporters want to videotape your activities, they may do so with Communications Office approval *if you are comfortable with the idea.* Should you be uncomfortable with a

reporter's presence while you are conducting an investigation, you have no obligation to allow them to observe you and can choose to leave the area.

4.2. Developing an Investigation Strategy

When WH&S learns of an incident, there may be very little information to go on at the outset. The pesticide involved may be confirmed or only alleged. It may later be determined the incident was unrelated to pesticides, that multiple pesticides were involved, or that illegal pesticides were involved. Pesticide misuse may be clearly indicated, as in a drift incident or early field entry, or there may be no obvious misuse of pesticides. The following are considerations in developing an investigation strategy. Consultation with WH&S Exposure Assessment Program staff, Branch statisticians, and/or lab staff may assist in anticipating or resolving some of the issues. Not all issues will be resolved before heading to the field, but an awareness of potential issues is vital to planning. Subsequent sections address the value and limitations for each type of sample, provide guidance for conducting interviews and discuss investigation strategies for typical incident scenarios:

- What type of exposure event has occurred? Fieldworker, drift, pesticide handler, community exposure, fumigant exposure, death?
- Is exposure on-going or resolved?
- Are symptoms severe (hospitalization) or mild? Are symptoms systemic, respiratory, or dermal?
- Are organophosphate (OP) or carbamate pesticides implicated?
- What areas of investigation may overlap for CAC and WH&S? Can these be combined or shared?
- What type of samples may be required? Will WH&S or another entity provide sampling supplies and equipment?
- What records are available to document work and pesticide application histories?
- What types of analyses are required? What reporting units are requested? Does the lab have experience with analyzing the suspected causal pesticide? Is a pesticide screen indicated? Are detection limits an issue?
- Assume sample results need to be quantitative, unless the lab encounters analytical problems.
- Consider staffing issues as well:
    - How many field staff are needed,
    - Is industrial hygiene (IH) or exposure assessment expertise required?
    - Is it a weekend or holiday? This may be an issue for lab staff and sample transport, shipment and/or analysis.

4.3. Sampling

Determining which samples should be collected is a critical first step in investigating an incident. Chart 9, "Sampling for On-site Investigations", provides an overview of probable samples required for several common exposure scenarios, assists staff in completing the "Investigation Strategy" section at the bottom of the "HEI Contacts" form, and facilitates planning and packing for sampling activities. Staff should consider pre-packing a kit with the most commonly needed supplies and forms to facilitate immediate response to an incident. A comprehensive equipment and supply checklist is located in the Appendix (WH&S Checklist of Supplies for Field Studies).

Chart 9 Sampling for On-site Investigations

Type of Exposure Event	Probable Samples Needed	Issues
Fieldworker	DFR	Determine pattern of residues across field and in incident area
	Clothing	Document work history, spray history, clothing use
	Urine - if metabolism known	Maintain chain of custody, especially for third party collection.
	Blood cholinesterase, if an OP/carbamate	
Drift, Community Exposures	DFR	Sample DFR from source to exposure and a little past (gradient samples)
	Wipes	Take wipes of vehicles, skin, or other surfaces
	Air - Requires rapid response	Maintain chain of custody, especially for third party collection
	Urine – if metabolism known	
	Clothing	
Pesticide Handlers	Tank Mix	Document work history, spray history, clothing use
	Urine - if metabolism known	Maintain chain of custody, especially for third party collection
	Clothing	
	Blood cholinesterase for OPs/carbamates	
Fumigant Exposure	Air - Requires rapid response to detect volatile residues	Document work history, spray history, clothing use
	Wipes	Wipes and clothing only for spills or direct contact
	Clothing	Maintain chain of custody, especially for third party collection
	Urine - if parent/ metabolites known	

WH&S staff should coordinate sample collection efforts with the CAC so as not to duplicate sampling. During an investigation, you may not get another chance to collect a sample. It is better to collect a sample, if it may possibly be beneficial than to let the opportunity pass.

4.3.1. Dislodgeable Foliar Residue (DFR) Samples (SOP WHS-FO03 and Reference 13)

Dislodgeable foliar residue (DFR) samples measure pesticide residues as the amount of pesticide per unit of leaf area, typically expressed as $\mu g/cm^2$. DFR samples are collected using a hand-held leaf punch, fitted with a one-inch-diameter steel die ("punch"). Investigators typically collect 40 one-inch leaf discs per sample. Samples can be analyzed for specific pesticides or screened for a variety of pesticides, and can determine the variation in pesticide residue concentrations across a field. DFRs can be directly compared between crops, such as oranges and tomatoes. Whole leaf residues, pesticide residues measured as weight of pesticide/weight of leaf material (ppm) cannot be directly compared between crops, since whole leaf sample weights are unknown and individual leaf weights vary widely. DFRs provide an index of the magnitude of residues available for transfer to a person's clothing or skin and are routinely used to assess human exposures. Whole leaf residues cannot reliably be translated to DFR units nor compared with historical DFR data on which WH&S bases estimates of worker exposure.

DFR is the most important sample for determining field residues in fieldworker and field drift investigations. It is crucial to collect and analyze samples promptly after an incident is reported because DFR can only provide information about residue levels at the time of sampling. The data cannot generally be used with confidence to extrapolate to presumed residue levels at an earlier point in time. For pesticides with half-lives of only a few hours, a delay in sampling can result in documenting less than half the DFR present when exposures occurred. If WH&S cannot respond to an incident immediately, the project director should request that RO or CAC staff collect appropriate DFR samples during their initial sampling effort.

WH&S investigators will evaluate each incident individually as to the number of DFR samples required. In general, at least four samples are required to characterize the residue pattern in the area where exposure or illnesses occurred; more may be indicated (13). For fieldworker incidents, staff must also sample areas of work activity over the preceding 0 - 3 days, including areas where no illnesses were reported on the incident day. If an incident suggests widespread misuse, or if the pesticide has not been well-characterized in previous studies, WH&S may conduct focused DFR sampling of other fields in the general area or initiate a DFR dissipation study.

DFR matrix interferences are an historical analytical issue for crops whose foliage tends to be “dirty”, such as strawberries, lima beans, late-season grapes, and tree crops growing close to busy roads. When samples are dislodged, the excess dirt in the extracts may cause sudsy emulsions to form. The emulsions can gum up the analytical instruments, drastically reducing detector sensitivity and occasionally crippling the instrument. For these and similar crops, staff should sample away from roads when feasible. Study staff should alert the lab to potentially dusty samples by noting them as such on the Chain of Custody form (see Appendix). Consult with the lab for additional crop/pesticide-specific guidance. As a standard component of good quality assurance, the lab generally prefers to analyze blank samples along with treated samples. If available, WH&S staff should provide blank DFR samples with each day’s treated samples.

4.3.2. Documenting Sampling and Location (SOP WHS-FO07)

Investigators must be scrupulous in documenting field locations associated with each sample, as other parties may conduct follow-up sampling and the samples may be used as forensic evidence. Each sampling location must be documented on a plot map or in notes (WH&S Daily Summary of Project Activities, WH&S Field Plot Map and Sample Notes; see Appendix). This documentation should indicate approximate dates and locations of workers in each sampled field. Notes are particularly crucial for documenting sampling sites that are not fixed and cannot be marked, such as vehicle wipes or duff samples. For fixed field sites, survey tape or a field flag should be labeled with a permanent marker and include the sample number, sampling date, approximate field location (block number, row and tree or vine number, "illness site", "NE corner", etc.), and sampler's initials. For vineyards and orchards, the tape can be tied to the associated plant or support. For field crops, the field flag should be secured in the ground. For all crops, an indicator flag should be placed at the end of each sampled row where field entry is most likely, and labeled with a number to indicate how many samples were taken within that row. Field notes should summarize any other pertinent sampling information, such as number of leaves punched per vine or plant, whether inner and outer leaves were sampled, approximate height of sample collection (for trees and vines), etc.

4.3.3. Urine Samples (SOP WHS-FO11 and Reference 15)

Urine sample collection may be appropriate in investigating systemic illness incidents, as it is the only matrix that has the potential to directly evaluate a person's dose. The most routine urinalysis is to quantify alkyl phosphates present following exposure to an OP insecticide. However, these metabolites may also be present from dietary or other non-occupational sources and exposure cannot always be separated from background levels (15). Other pesticides and metabolites can be measured, but urine samples may have limited utility unless much is known about the pesticide's pharmacokinetics. Important considerations include whether the pesticide has a known urinary metabolite, whether it is likely to be present in measurable amounts, how long it takes to be absorbed and excreted, and what type of sampling (spot, 24-hour collection) is appropriate. Since exposed persons are generally available as a group for only a limited time during an investigation, it may be appropriate to collect samples, and make decisions about sample analysis later. If collected, staff must thoroughly document all collection parameters, including time of collection, sample volume, approximate time since exposure, approximate exposure period, etc. Samples should be chilled immediately and frozen if feasible. Consider privacy issues as well. A third party sometimes collects urine samples; staff must maintain appropriate chain of custody records, including documenting third party involvement.

4.3.4. Clothing Samples (SOP WHS-FO01)

Clothing samples can confirm a pesticide's presence and may be useful in assessing degree of exposure. They can be important samples when investigating incidents involving direct contact with pesticide spray or residue such as fieldworker incidents and particulate/aerosol drift incidents. Clothing samples measure aggregate exposure over the covered region. For fieldworker incidents, pesticide residues are transferred from treated foliage to clothing via bodily contact with DFR. Drift exposure results from direct contact with a dilute pesticide mix.

If included in the sampling strategy, collect any article of clothing that is likely to provide information about dermal exposures. A general guideline is to collect pants and outer shirt or coveralls, and the clothing worn beneath the coveralls or outer shirt. Collect clothing from all workers who are willing and advise all exposed persons to decontaminate their remaining clothing by laundering it separately from family wash, using detergent and hot water. Since the intent is to provide information about exposures on the incident day, find out (and document) how many work days the person has worn these items since they were last laundered. In general, do not collect a worker's personal items such as wallet, belt or shoes.

Do not collect a clothing sample if doing so violates someone's privacy or personal dignity. Associated issues may include assuring privacy while changing, providing clean clothes such as coveralls to change into, compensating workers for their clothing, honoring a person's refusal to participate in sample collection, and obtaining signature release for clothing items (see Appendix for WH&S Branch Clothing Release Form). Staff should formulate a strategy to address these issues prior to initiating sample collection. Staff should not provide anyone an assurance they cannot personally deliver, i.e., recompense for clothing. Exposed persons should understand clothing submitted for analysis will not be returned to them.

If clothing items were collected by a third party, chain of custody issues may be involved. Document as much information as possible about the source and circumstances of sample collection, including how long the item was worn and how it was stored. WH&S staff must maintain appropriate chain of custody records once clothing samples are in their possession.

4.3.5. Wipe Samples (SOP WHS-FO01)

Wipe samples are most appropriate in investigating drift, community exposure and indoor residue incidents. Commercial baby wipes are unsuitable for many analyses because of their emollients. Cotton gauze squares or cloth patches cut from washed diapers are generally used for wipe samples. These are moistened before use with plain water or a 0.05% surfactant/water solution. However, while cotton is currently the best wipe matrix, this fiber also contains oils that can cause analytical interferences.

Wipe samples can be collected from any hard surface such as a vehicle, wall, window or countertop. Skin wipes or washes may also be taken. These are especially appropriate for those areas not covered by clothing (face, neck, hands, arms if wearing short-sleeved shirt) and may provide a suitable alternative when clothing collection is not feasible. For hard surfaces, staff should collect a minimum of 4 samples in any one area. Each wipe should cover a similarly sized area. A template can be devised using a sheet of paper or similar matrix. In general, an area of about 0.5 - 1 square foot should be adequate for each wipe sample. Document all sample information on an appropriate form (WH&S Daily Summary of Project Activities, WH&S Field Plot Map and Sample Notes; see Appendix).

4.3.6. Tank Mix Samples (SOP WHS-TS03)

Tank mixes are sampled to qualitatively confirm the presence of the pesticide(s) in the mix. Because tank mixes are notoriously unstable, sample results cannot be considered truly quantitative. These samples are most appropriate when investigating pesticide handler incidents and possibly drift incidents. WH&S investigators should coordinate with the CAC in collecting tank mix samples so as not to duplicate sampling efforts. Staff must take appropriate safety precautions when collecting tank mix samples, such as wearing label-required PPE and being alert to potential mechanical hazards. Staff should document all sample collection parameters such as purported mix ingredients, amount of water added, type of tank, amount of material remaining at time of sampling, whether tank was under agitation, where sample was collected (nozzle, tank), obtain a copy of the recommendation when possible, etc. Tank mix samples vary in density since pesticide concentration is variable; staff should request that the lab analyze tank mix samples on a weight basis.

4.3.7. Air Samples (SOP WHS-FO02)

Since volatile pesticides dissipate rapidly, particularly in unconfined settings, air sampling is generally indicated only for 1) ongoing, recurring or massive community exposure incidents, or 2) incidents related to confined settings, where airborne pesticide residues may persist. Local CAC generally do not have air monitoring equipment. When air monitoring is indicated, WH&S or the appropriate RO should initiate monitoring as soon as possible. Sampling equipment and matrices (pumps, filters, sorbent tubes, single or multi-stage capture, direct read-out tubes, pump flow settings, etc.) must be appropriate for the pesticide(s) under evaluation. Consult with IH staff when developing a sampling strategy.

4.3.8. Blood Samples (SOP WHS-FO11)

WH&S staff does not ordinarily participate in collecting blood samples during incident investigations. Hospitals may evaluate cholinesterase levels (ChE) to qualitatively assess exposure to OP or carbamate pesticides, especially for individuals with systemic symptoms. If so, WH&S staff can request the exposed person to sign a release for the medical facility to release these records (Forms PR-ENF 133 (English) or PR-ENF-133X (Spanish)).

4.3.9. Labeling, Shipment (SOPs WHS-FO04, WHS-FO05)

Labeling and shipment of samples should be in accordance with applicable SOPs. Completed chain of custody form(s) must accompany all samples submitted to the analytical laboratory.

4.4. Strategies, Samples and Supplies for Typical Incidents

4.4.1. Fieldworker Incidents

Generally, fieldworker incidents occur when agricultural workers become ill while working in treated fields. Determining the nature, cause, and extent of a fieldworker incident is probably the most difficult of all exposure scenarios because so many variables are involved. Illness symptoms can vary; symptoms may be systemic (nausea, headache, or vomiting), respiratory, dermal or affect the eyes. While pesticides are often the causal agent, noxious weeds, insect pests, or even the crop itself can contribute to symptoms. Sometimes workers in only one

section of a field or orchard may be affected. You may need to obtain work records that tell you what fields the workers were in recently and treatment histories for all the fields in the work records. Interviews that examine pre-existing medical conditions and prior activities, work records, treatment histories and sampling are essential in evaluating these incidents.

Chart 10, “Sampling for Fieldworker/Cluster Incidents", summarizes the strategies, samples and supplies most commonly used in these investigations. The sampling objectives are to identify and characterize the pesticide residues in the immediate area where workers became ill and determine the pattern of residues across the field. DFR, clothing, dermal samples and urine may each provide some of this information, but DFR is generally the most essential sample. If other fields in the surrounding area were sprayed with the same pesticide and at similar rates, focused DFR sampling may provide an index of expected residue and permit estimates of residue dissipation. Clothing samples provide an index of individual exposure. However, clothing collected by a third party (County Haz Mat, hospital) may not be documented by appropriate chain of custody. Urine samples may be useful, depending on the pharmacokinetics of the pesticide and the availability of analytical methods.

4.4.2. Drift Incidents

Pesticide drift generally occurs when a pesticide is applied improperly or an unexpected environmental condition develops, such as an inversion or sudden strong wind. Drift incidents may involve exposures to agricultural workers, non-agricultural workers, or the public. WH&S investigators’ primary goals are determining how many people were exposed, the relative extent of exposure, how exposure occurred and preventing future incidents. Depending on the pesticides involved and the degree of exposure, illnesses may or may not be manifested. Both interviews and sampling are essential in evaluating drift incidents. Some incidents involve large groups of people who receive considerable exposure, while in other incidents there is no direct contact with the spray materials. Sometimes odor is the primary complaint.

Chart 11, "Sampling for Drift Incidents", provides guidance in collecting the most pertinent samples by type of incident. DFR, wipes and clothing are the most important samples. In a field, DFR samples should be collected both at the site of human contact and to characterize the distribution of residues in the surrounding area. When crop foliage is not present, grass, weed duff or occasionally soil samples can confirm the presence of pesticide residues. Wipe samples can be collected from vehicles, walls, counters, tree trunks, skin and other available surfaces.

Chart 10 Sampling for Fieldworker Incidents

Strategy	Samples	Supplies
• Determine pattern of residues in area of incident • Determine pattern of residues where workers were for previous 2 - 3 days	DFR	• small and/or large leaf punches • jars, lids • Zip-loc® bags • survey tape, field flags • water for cleaning punches • field maps
• Determine dermal exposure	Clothing samples	• collection bags • vinyl gloves
• Determine pesticide dose via urinary metabolites * is it an OP/carbamate? * is lab method available? * is spot sample meaningful?	Urine samples	• collection jars, lids • volume measures • vinyl gloves • bleach, sanitizers

Miscellaneous Equipment, Supplies

- marking pens
- labels, tape
- ice chests, ice or dry ice
- recording forms
- chain of custody forms
- maps
- mailing labels
- paper towels
- trash bags
- camera
- cell phone

Chart 11 Sampling for Drift Incidents

Strategy	Samples	Supplies
• Determine if pesticide residues are present on foliage or surfaces (vehicles, etc.) • For fields, characterize residue "trail"	DFR Wipes	• small and/or large leaf punches • cloth or commercial wipes • jars, lids • Zip-loc® bags • survey tape, field flags • water for cleaning punches • field maps
• Determine if dermal exposure occurred	Clothing	• collection bags • vinyl gloves
• Determine if exposure occurred - appropriate for some pesticides	Urine samples	• sampling vials • vinyl gloves • sanitation supplies: bleach buckets, etc.
• Determine extent of exposures – **may** be appropriate if monitoring initiated rapidly	Air samples	• pumps • cassettes, tubes, other media • mounting stands for stationary sites, belts for personal monitoring

Miscellaneous Equipment, Supplies

- marking pens
- labels, tape
- ice chests, ice or dry ice
- recording forms
- chain of custody forms
- maps
- mailing labels
- paper towels
- trash bags
- camera
- cell phone

Clothing should be collected from any willing exposed person. Document whether the item was clean when put on, how long it was worn and where the person was working when exposed. To fully document the incident, collect information on work and spray histories. Urine samples **may** be appropriate if persons are grossly exposed and/or have illness symptoms, but less acute exposures may not be distinguished from background levels of the urinary metabolite(s). Medical facilities may conduct blood cholinesterase testing.

4.4.3. Pesticide Handler Incidents

In pesticide handler incidents, the exposure source is often known. Handler tasks potentially expose workers to concentrated pesticide solutions and undiluted products. Pesticide handler incidents can involve serious physical injury from accidental pesticide exposures and/or equipment malfunction or misuse. While injuries and illnesses can result from plane or helicopter crashes, improper mix/load procedures, or improper personal protective equipment, other times, no obvious pesticide misuse or equipment malfunction was involved.

Chart 12, "Sampling for Pesticide Handler Incidents", describes the sampling strategy for such incidents. WH&S investigators should focus on interviews and observations to document the circumstances surrounding the exposure and to determine whether workplace hazards contributed to the exposure. Thoroughly evaluate the application equipment and PPE used – can the worker demonstrate how to use all required equipment safely? What type of engineering controls were available and/or in use? When available, the most appropriate samples are clothing and, for pesticides with suitable metabolites, urine samples. Clothing samples confirm that dermal exposure occurred and urine samples provide an estimate of dose. Medical facilities may evaluate blood cholinesterase levels if an organophosphate or carbamate pesticide was involved. Tank mix samples provide qualitative confirmation of the pesticides involved. Observations of the employee at work may show you specific activities that could lead to exposure.

4.4.4. Fumigation and Related Pesticide Exposure Incidents

Illness and exposure incidents can result from fumigating fields, structures or agricultural commodities. Exposures in the latter two categories are generally restricted to the interior of the area under fumigation. Pesticide exposure incidents can impact both workers and neighborhoods and are most often related to field fumigations. In coordination with the CAC, the WH&S investigative focus is on characterizing exposure the nature and extent of the exposures. Because fumigants volatilize rapidly, sampling opportunities have generally expired by the time investigators arrive on-site and investigations must instead focus on interviews, records and medical evidence. Large-scale incidents involving emergency responders are particularly challenging to investigate: the CAC is not the lead investigator, the incident is highly visible, and the atmosphere is emotionally charged. In these situations, good communication and listening skills and maintaining composure under stress are often of greater importance than sampling expertise.

Chart 12 Sampling for Pesticide Handler Incidents

Strategy	Samples	Supplies
• Exposure source often known • Focus on observation and interview to characterize the exposure scenario • Examine equipment, engineering controls and PPE • Identify health/safety hazards • Blood and urine samples provide more info than clothing samples • Avoid secondary contamination	(If Indicated) • Clothing • Tank mix • Urine • Blood (at hospital)	• clothing release forms • appropriate bottles • sampling vials • vinyl gloves • sanitation supplies: bleach buckets, etc. • volume measures • Zip-loc® bags • questionnaires, notes

Miscellaneous Equipment, Supplies

- marking pens
- labels, tape
- ice chests, ice or dry ice
- recording forms
- chain of custody forms
- maps
- mailing labels
- paper towels
- trash bags
- camera
- cell phone

Chart 13 Sampling for Fumigation and Related Pesticide Exposure Incidents

Strategy	Samples	Supplies
• Verify pesticide presence if exposure is on-going or structural • Protect yourself from on-going exposure sources with PPE • Consult with IH staff to develop sampling strategy and identify PPE required for sampling	• Air samples	• air pumps, supports • instant read-out devices • chargers • appropriate sampling tubes and filters • Zip-loc® bags • survey tape, field flags • field maps

Miscellaneous Equipment, Supplies

- marking pens
- labels, tape
- ice chests, ice or dry ice
- recording forms
- chain of custody forms
- maps
- mailing labels
- paper towels
- trash bags
- camera
- cell phone

Guidance for sample collection is provided in Chart 13, "Sampling for Fumigant and Related Pesticide Exposure Incidents". Air samples are generally the only appropriate matrix. Since gases are volatile and dissipate quickly, WH&S must respond quickly to collect meaningful samples. CAC or other local investigators who can respond immediately are sometimes able to collect these samples. Air sampling should be conducted only if there is a reasonable expectation that residues are still present. Sampling should not be undertaken for the sole purpose of allaying fears. Residues may persist longer in enclosed areas; air sampling may be suitable for structural and commodity fumigations and on-going exposures. Wear appropriate PPE to avoid exposures from on-going or recent releases. Consult with IH staff for appropriate sampling strategies.

4.5. Interviews

While sample results often determine the extent of exposure, interviews and associated documentation are often needed to fully characterize the exposure scenario, determine who was involved, and how and why the exposure happened. Chart 14, "Illness Symptoms: Interviews and Observations", provides a thumbnail sketch for conducting interviews for various types of illness (systemic, dermal, respiratory). Chart 15, "Exposure Scenario: Interviews and Observations", presents information for conducting interviews related to specific types of episodes (fumigant, drift) or work tasks (pesticide handler, field worker). Reference 6 provides additional resources for conducting interviews.

Privacy laws protect exposed persons and investigators should conduct interviews in as private a setting as possible. Interviews should be held in the primary language of the interviewee, and, when feasible, should be conducted in neutral locations. Investigators should use good judgment in selecting the interview site, the translator, and controlling which parties may be present. Suitable locations may include medical facilities and CAC offices. Depending on the circumstances, interviews may be conducted at a field location at the work site or at the workers' home. Translators should be neutral parties, such as DPR or CAC staff, or the interviewee's co-workers or family. Since workers may understandably be reluctant to provide details about the incident, out of concerns that their employer may take disciplinary action or other reprisals, interviews should be conducted without the worker's employer or supervisor present.

Pre-printed interview questionnaires such as the sample “WH&S Pesticide Incident Interview Record”, located in the Appendix, are useful tools to maintain consistency in asking each person the same questions in the same manner. Staff can use this form directly or as a starting point for developing other formats. Staff should adapt the line of questioning as new information warrants. In coordination with the CAC, WH&S investigators may need to interview a variety of individuals, including exposed persons, pesticide handlers, grower, labor contractor, pest control advisor, CAC staff, medical and emergency response personnel, co-workers, witnesses, neighbors, etc., to fully characterize the incident. Because investigators' interview strategies may differ, the interviewee may participate in several interviews, e.g., CAC, WH&S, medical personnel, etc. WH&S investigator should try to limit duplication of questions as much as possible.

Interviews of exposed persons should focus on exposure, specific activities, symptoms and the time relationship between them as well as identifying other unrecognized cases. Investigators must obtain an exposure history and fully describe the circumstances of each exposure. Ideally, WH&S interviews should consist of a mix of both short answer and open-ended questions. For example, by asking an exposed field worker both "Where were you when you became ill?" and, "Tell me (or show me) how the exposure happened", a WH&S interviewer may learn more about an exposure than by asking only specific questions. Do not "lead" the interviewee, but let them tell you their story in their own words; narrative descriptions often include relevant details. Interviewers should attempt to reconstruct the exposure scenario in its entirety. Did anything happen "differently" on the exposure day compared to other work days? If feasible, visit the exposure site and have the worker(s) physically and verbally "walk" the investigator through the exposure. Ascertain exactly how tasks were performed, specifying the tools, processes, protective equipment, and clothing worn. Workers can provide vital details about whether/when they removed protective clothing or equipment, when PPE became torn/damaged, when they encountered mechanical problems, how they resolved them, whether they saw posting notices, whether they were informed of any pesticide applications to the field, etc. When possible, inspect the PPE worn during the incident, any engineering controls that were in use, and document potential pesticide safety issues related to the exposure.

Sometimes, the relationship between an illness and the causal pesticide is straightforward. However, because pesticide exposure is often associated with nonspecific medical complaints, it can be challenging to ascertain a pesticide's involvement in a suspected illness. In evaluating the relationship between pesticide exposure, illness, and possible workplace or pesticide hazards, it is important to establish the following:

- Identify all persons who are ill or have symptoms,
- Determine all the symptoms experienced
- Determine whether the onset of symptoms as they relate to the timing of suspected exposure to the pesticide,
- Confirm physical exposure to the pesticides involved by inquiring about work history, work tasks, field application history, location, protective equipment worn, etc.,
- Rule out non-pesticide exposures or pre-existing illnesses, and
- Evaluate whether safety or health hazards may have contributed to the exposure or illness ("WH&S HEI Field Summary Record", see Appendix).

4.6. <u>Obtaining Records (Application History, Work History, and Medical Records)</u>
WH&S often compiles the most valuable information for characterizing exposure scenarios from field and application histories and medical records. Investigators should coordinate with the CAC to obtain maps, records and other documents that verify the location, rate, and frequency of pesticide applications, describe workers' training, and document their activities in and around treated fields. These records are important in understanding the circumstances involved in pesticide exposure incidents. Similarly, medical records and doctors' reports supplement sampling data and provide additional information about the magnitude of exposures.

4.6.1. Application and Notification Records

Application records are generally the most readily available documentation. The property operator, pest control operator, pest control advisor and/or pesticide handler may each have records for the property. WH&S investigators should coordinate with the CAC to review and

Chart 14 Illness Symptoms: Interviews and Observations

Key Principles for Interviews and Observations

- Keep an open mind; don't assume any one person is the expert
- Talk to as many sources as possible before making conclusions
- Communicate decisions to CAC, WH&S before making them public
- Keep questionnaires brief and to the point
- Ask both open-ended and specific questions, i.e., "describe what happened" as well as "where were you when the incident occurred".
- Refer media to Communications Office when possible
- It's OK not to know everything; research and get back to them
- Conduct interviews in neutral location and in interviewee's primary language or have an unbiased translator available
- Collect necessary records, documentation

Respiratory Illness

- What type of respiratory protection was worn?
- Was odor noted?
- How long from exposure to onset of symptoms?
- How long after removal from exposure did symptoms persist?
- Is person predisposed to asthma, allergies?
- Is person a smoker? How many cigarettes/day?

Dermal Illness

- Did person contact residues or product/mix?
- What clothing and PPE were worn, and for how long?
- What tasks were performed?
- How were tasks performed? What tools were used?
- Collect work history information for prior 1-2 weeks
- Is person predisposed to allergies, sensitization?
- Does dermal pattern correspond to plant contact?
- Are plants noticeably infested with mites, etc?
- Is field infested with suspect weeds?

Systemic Illness

- What clothing and PPE were worn?
- What tasks were performed?
- How were tasks performed?
- How long from exposure to onset of symptoms?
- Is suspect pesticide an OP or carbamate?
- How long has crew been in incident field?
- What is work history for prior 1 - 2 weeks?
- How did the exposure occur (time, location, etc.)?
- Is person being treated for other illness?
- What medications is the person currently taking?
- Was odor noted?

Chart 15 Exposure Scenarios: Interviews and Observations

- ♦ Make every effort to locate workers, grower, witnesses, etc.
- ♦ Obtain all necessary medical documentation
- ♦ Obtain all necessary field and application documentation; take photos as appropriate
- ♦ Document all field sampling sites clearly and completely (flag markers, maps, etc.)
- ♦ Sample appropriately for each scenario: consider sample type and sampling strategy

Field Worker

- Determine suspect pesticide:
  - * for OPs/carbamates, expect systemic symptoms
  - * for pyrethroids, expect respiratory, eye and skin symptoms
- How many workers are affected?
- When, where, were symptoms or odor noted? (Refer to ExToxNet for possible symptoms)
- What clothing and PPE were worn; for how long?
- Obtain recent work histories and corresponding field histories

Drift Exposure, Community Exposure

- Was odor noted?
- Was spray mist noted
- Were symptoms noted?
- Did environmental conditions affect exposure?
- Is exposure large-scale or small-scale?
- What can be swabbed, punched, or sampled?
- Are witnesses available for interview?
- Consider air sampling for on-going exposures

Pesticide Handler

- What PPE is required by label?
- What clothing and PPE was the person wearing?
- What engineering controls were in place?
- What application equipment was used?
- Was equipment malfunction involved?
- Did person eat or smoke immediately prior to onset of symptoms?

Fumigant Exposure

- Is exposure source controlled?
- If controlled, meaningful air samples can be collected only immediately following exposure
- When were symptoms noted?
- How long did symptoms persist?
- For structural applications:
  - * Where was odor noted?
  - * How long was the building closed up?

copy plot maps, restricted materials permit, Notice(s) of Intent to Apply (NOI), and application-specific records. For mixer/loader incidents, obtain a copy of the recommendation or other document specifying the pesticides and other tank mix ingredients, their intended concentrations in the mix, and the intended application rate. These are available at he mix/load site or from the pest control operator or pest control advisor. For fieldworker incidents, work with the CAC to obtain 30-day application histories for all fields workers have entered in the two weeks preceding the incident. For incidents involving reentry violations, coordinate with the CAC to gather copies of all records that demonstrate when applications were completed, when the property operator was notified of application completion, and when and how workers were notified of the applications and associated restrictions. Similarly, if posting violations or failure to notify contributed to the incident, try to ascertain where the breakdown in communications took place.

4.6.2. Work Records

Work records will often be available for pesticide handlers. WH&S should attempt to obtain records of the materials workers have handled in the prior month. Such information can supplement medical records and blood test results and assist in evaluating on-going exposures. Signed training records may not confirm that workers are familiar with the hazards, use restrictions, and PPE required for the pesticides they handle. This is often the case when training requirements are signed on the same day for multiple pesticides. During the interview process, WH&S staff may wish to include questions that assess whether a training program is in place, the effectiveness of workers' training and whether insufficient training potentially contributed to the incident.

Fieldworkers' work records can be obtained from their employers or supervisors. Crew foremen can usually provide specifics regarding each worker's tasks, field locations and work schedule. It is especially challenging to document work histories for migrant workers who are no longer in the area. Investigators must piece together available work history information with the field application history. If specific work history information is not available, investigators should try to characterize the workers' exposure more generally, e.g., pinpoint days they worked or were off work, identify the crops, tasks and recent work locations, etc.

4.6.3. Medical Records

Investigators should attempt to obtain workers' signed release for access to their medical records related to the incident. If WH&S is conducting their investigation jointly with the CAC, the county staff may obtain signed releases; be sure to coordinate this activity. Under no circumstances should staff divulge personal or medical information about exposed individuals to a non-investigating party. Medical records are vital for their perspective on a number of important issues:

- Workers' narratives of their symptoms and the exposure scenario taken shortly after the incident are likely to be more accurate and provide greater detail than the same information collected later.
- Physician's diagnoses and the outcomes of their prescribed treatment course provide valuable information about the nature and extent of exposure.
- Where the causal agent is unknown or not determined, blood tests and urinalyses may confirm or rule out a pesticide's involvement, and may provide an index of the extent of exposure.

- Follow-up evaluations provide additional information about the pattern and severity of the illness and may pinpoint potential mitigation strategies.

5. Establishing Mitigation Measures and Evaluating Their Effectiveness

WH&S may establish exposure mitigation measures in response to workplace hazards identified during an investigation, following an investigation, or by studying hazards identified through incident trend analysis (16). Time and staffing constraints have frequently necessitated that the Branch set mitigations based on data gathered from pilot investigations. Generally, if incidents do not recur, the mitigations are considered appropriate. Less frequently, WH&S has evaluated the effectiveness of established mitigation measures by conducting further field studies. Establishing appropriate mitigation measures may be straightforward or complex. Because there is a wide array of possible exposure scenarios and potential mitigation measures, there is no defined process to identify potential workplace hazards. Education, training, experience, good observation skills and intuition are all important in discerning workplace hazards. Both samples and interviews can provide vital information about the pesticide application and subsequent exposure and may reveal potential problems. Asking "why" and "how" questions can help investigators uncover larger issues and pinpoint specific problem areas. On-going communication with the CAC, ENF, and other investigators provides an opportunity to share information and brainstorm. WH&S investigators often consult with Branch toxicologists, IH staff, and Pesticide Illness Surveillance Program staff to develop mitigation measures. Emergency mitigation measures are typically established to address the specific hazards of the current incident and prevent further exposures and illnesses from occurring. Per 3 CCR 6706, the Director has authority to establish many types of mitigation measures, which, unless promulgated into regulation, are temporary (17). Examples include prohibiting or restricting field entry, requiring additional personal protective equipment, and requiring medical monitoring.

Other times, the hazard is not as immediately apparent and mitigation measures may be developed at a later stage of the investigation, such as when investigators discuss the incident during de-briefing. Sometimes the need for a mitigation measure is clear only after investigating several similar incidents or by analyzing several years of incident trends. The hazard may be a pesticide, a work task, equipment, or an environmental condition. Potential mitigation measures include those mentioned above, as well as recommendations for training, product label amendments, suspension or cancellation of product registration, and setting reentry intervals, buffer zones, or use conditions. Many require rule-making packages to establish new regulations or modify existing regulations.

6. Getting the Word Out – Outreach and Updates

WH&S will ensure that ENF, the ROs and the CACs receive copies of this document and are informed of all guidelines which pertain to communications, mutual expectations and other interactions. WH&S will provide updates to these groups regarding subsequent changes to the guidelines.

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8. Appendix to HS-1800

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8.1. Worker Health & Safety Branch Daily Summary of Project Activities

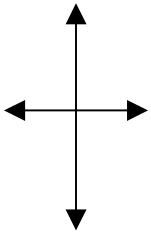
Entries made by:	Date	WH&S Project No.

Contacts and Notes

Samples

8.2. Worker Health & Safety Branch Field Plot Map and Sample Notes

Entries made by:	Date	WH&S Project No.
Location		



Sampling Notes

8.3. Worker Health & Safety Branch Phone Log

Project No. _____ **Date** _____ **Time** _____

❑ **To** _____

❑ **From** _____

Representing _____

Phone No. _____ **Fax No.** _____

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8.4. Worker Health & Safety Branch Human Effects Incident (HEI) Field Summary Record

Date: _____ Project No. _____ Completed by: _____

(Field) Location		
Crop	Crop Maturity/Condition	
Field Condition (weeds, muddy, pests, etc.)		
Did field conditions contribute to hazard?		
Weather during event		
Other applicable conditions		
Did these conditions contribute to hazard?		

Samples Collected	Number, Type	Locations/other information
❑ DFR		
❑ Urine		
❑ Wipes		
❑ Clothing		
❑ Air		
❑ Other:		

Describe work tasks
Did task performance or workplace hazards contribute to incident?
Describe equipment
Did equipment/malfunction contribute to hazard?
Are mitigations appropriate? Describe:

8.5. Worker Health & Safety Branch Pesticide Illness Interview Record

Date _____ Project No. _____ Interviewer _____

Name	Role in Incident	History	Symptoms
Age	❑ Fieldworker	❑ Smoked during event	❑ Systemic
Occupation	❑ Mixer/Loader	❑ Ate during event:	❑ Respiratory
How long?	❑ Applicator		❑ Dermal
Employer	❑ Grower	❑ History of asthma	❑ Eye
	❑ Private citizen	❑ Allergies: describe	
	❑ Other: describe	❑ Current medications: list	
		❑ Currently ill: describe	

Describe what you saw, felt, tasted or smelled
Did you feel sick? ❑ No ❑ Yes Describe symptoms and their onset:
When did exposure occur?
How did exposure occur?
Where in the field did exposure occur?
Describe clothing, PPE worn Was clothing clean this AM?
How long after exposure were symptoms noted?
Did symptoms resolve after removal from exposure? ❑ Yes ❑ No Describe
What pesticides did you handle?
Describe work tasks
Describe tools and equipment used

Did you see a doctor? ❑ Yes ❑ No	Were you hospitalized? ❑ Yes ❑ No
Doctor info	Hospital info

Fieldworkers: Obtain work history for past two weeks
List others exposed or who felt ill

Interviewer Comments:

8.6. Sección de Salud y Seguridad de los Trabajadores Expediente del Entrevista

Fecha _____ Numero de projeto _____ Entrevistador _____

Nombre	Papel en Incidente	Historia	Síntomas
Edad	❑ Campesino	❑ ¿Fumo durante el incidente?	❑ Sestemic
Ocupacíon	❑ Mezclador	❑ ¿Comiendo durante el incidente?	❑ Respiratorio
¿Cuánto tiempo?	❑ Aplicador		❑ Cutáneo
Patrón	❑ Dueño	❑ Asma	❑ Ojos
	❑ Privado ciuadano	❑ Alergias: describe	
	❑ Otre: describe	❑ Actuales medicaciones	
		❑ Actual enfermado:	

Describe qué vio, sentía, probado o olido
¿Se sentiá enfermo? ❑ No ❑ Sí Describe su síntomas y su inicio:
¿Cuánd ocurrió la exposición?
¿Cómo ocurrió la exposición?
¿Dónde ocurrió la exposición?
Describe la ropa y el equipo personal protector personal usada
¿Cuánto tiempo después de exposicíon fueron las síntomas notados?
¿Se resolución las síntomas después de retiro de la exposición? ❑ Sí ❑ No Describe
¿Qué pesticidas manejó?
Describe el trabajo
Describe el equipo y herramientes utilisa

¿Vio un doctor? ❑ Sí ❑ No	¿Le hospitalizaron? ❑ Sí ❑ No
Información del Doctor	Información de la Hospital

Campesinos: Proporcione la historia de trabajo por últimas dos semanas
¿Quien más fueron expuestos o sentidos enfermos?

Notas del Entrevistador:

8.7. Worker Health and Safety Branch Clothing Release Form

Sección de Salud y Seguridad de los Trabajadores Forma del Desbloquear el Arropar

List Clothing - Describe item and where it was worn Enumera Artículos de la Ropa – describe donde lo uso	Days Worn/ Diás Usado	Estimated Value/ Valor	Sample Number
1.		$	
2.		$	
3.		$	
4.		$	

Notes/Notas

As part of an investigation of a pesticide-related incident, I willingly submit the clothing items listed above for laboratory analysis of pesticide residues. I understand that the clothing items will not be returned to me. My signature indicates that I understand and agree to these conditions. I will receive a copy of this signed release.

❑ I would like to receive a copy of the laboratory results. Address Phone number	Signature Print Name

Forma del Desbloquear el Arropar

Como parte de una investigación de un incidente relacionado de pesticida, yo me someto dispuesto los artículos de la ropa enumerados para análisis de laboratorio de residuos de pesticida. Entiendo que la ropa no serán vueltos a mí. Mi firma indica que entiendo y convengo a estas condiciones. Recibiré una copia de esta desbloquear firmada.

❑ Quisiera recibir una copia de los resultados del laboratorio. Dirección Telefono	Su firma Su nombre (letre de molde)

Sample Collector (Print name)	Signature
California Department of Pesticide Regulation Worker Health and Safety Branch Phone 916-445-4222	1001 I Street Sacramento, CA 95814

Date	Date of Incident	Incident Tracking Number/Project Number

8.8. California Division of Labor Standards Enforcement District Offices

Bakersfield 5555California Avenue, Suite 200 Bakersfield, CA 93309 (661) 395-2710	San Bernardino 464 W. Fourth Street, Room 348 San Bernardino, CA 92401 (909) 383-4334
Eureka 619 Second Street, Room 109 Eureka, CA 95501 (707) 445-9067	San Diego 75745 Metropolitan Drive, Room 210 San Diego, CA 92108 (619) 220-5451
Fresno 770 E. Shaw Avenue, Room 315 Fresno, CA 93710 (559) 244-5340	San Francisco 455 Golden Gate Ave., 8th Floor San Francisco, CA 94102 (415) 557-7878
Long Beach 300 Oceangate, Suite 302 Long Beach, CA 90802 (213) 620-6330	San Jose 100 Paseo de San Antonio, Room 120 San Jose, CA 95113 (415) 557-7878
Los Angeles 320 W. Fourth Street, Suite 450 Los Angeles, CA 90013 (213) 620-6330	Santa Ana 28 Civic Center Plaza, Room 625 Santa Ana, CA 92701 (213) 620-6330
Oakland 1515 Clay Street, Suite 801 Oakland, CA 94612 (415) 557-7878	Santa Barbara 411 E. Canon Perdido, Room 3 Santa Barbara, CA 93101 (805) 568-1222
Redding 2115 Civic Center Drive, Room 17 Redding, CA 96001 (916) 323-4920	Santa Rosa 50 D Street, Suite 360 Santa Rosa, CA 95404 (707) 445-9067
Sacramento 2031 Howe Avenue, Suite 100 Sacramento, CA 95825 (916) 323-4920	Stockton 31 E. Channel Street, Room 317 Stockton, CA 95202 (209) 948-7770
Salinas 1870 N. Main Street, Suite 150 Salinas, CA 93906 (415) 557-7878	Van Nuys 6150 Van Nuys Blvd., Room 206 Van Nuys, CA 91401 (213) 620-6330