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Draft Guidance: Response, Remediation, and Recovery Checklist for Chemically Contaminated Facilities

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August 20, 2007

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This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

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Response, Remediation, and Recovery Checklist
for Chemically Contaminated Facilities**

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August 2007

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Introduction

A key part of preparedness in the event of a chemical warfare agent (CWA) or toxic industrial chemical (TIC) release at a large facility, such as an airport or subway, is to develop a concept of operations that allows for an effective incident response and recovery. This document is intended as a component of the concept of operations and will be used in the Emergency Operations Center (EOC) as a decision tool for the Unified Command (UC). The Checklist for Facility Response, Remediation, and Recovery presented in this document is principally focused on the Consequence Management Phase (see Figure 1; LLNL 2007a and 2007b) of a chemical release. Information in this document conforms to the *National Response Plan* (NRP) (DHS 2004) and the National Incident Management System (NIMS 2004). Under these two guidance documents, personnel responsible for managing chemical response and recovery efforts—that is, the decision-makers—are members of an Incident Command (IC), which is likely to transition to a UC in the event of a CWA or TIC attack. A UC is created when more than one agency has incident jurisdiction or when incidents cross political jurisdictions. The location for primary, tactical-level command and management is referred to as the Incident Command Post (ICP), as described in the NRP. Thus, regardless of whether an IC or a UC is used, the responsible entities are located at an ICP. Agencies work together through designated members of the UC to establish their designated Incident Commanders at a single ICP and to establish a common set of objectives and strategies and a single Incident Action Plan.

Initially during the Crisis Management Phase (see Figure 1), the Incident Commander is likely to be the Chief of the fire department that serves the affected facility. As life-safety issues are resolved and the Crisis Management Phase shifts to the Consequence Management Phase, the work of characterization, decontamination, and facility clearance begins. There will likely be a coincident transition in organizational structure as well, and new remediation-focused groups, units, and personnel will be added as remediation needs are anticipated. In most cases, a UC would be formed, if not formed already, to direct the cleanup process jointly and to take ultimate responsibility for all cleanup decisions. The UC would likely include the Transportation Facility Manager or Emergency Operations Manager; representatives from state and local public health, environmental, and emergency management agencies; and Federal agencies, such as the U.S. Environmental Protection Agency.

Response and Restoration Activities					
(Crisis Management)		(Consequence Management)			
Notification Phase	First Response Phase	Remediation/Cleanup			Restoration (Recovery) Phase
		Characterization Phase	Decontamination Phase	Clearance Phase	
Receive and assess information	HAZMAT and emergency actions	Detailed characterization of CWA or TIC	Worker health and safety	Clearance sampling and analysis	Renovation
Identify suspect release sites	Forensic investigation	Characterization of affected site	Source reduction	Clearance decision	Reoccupation decision
Relay key information and potential risks to appropriate agencies	Public health actions	Site containment	Decontamination strategy		Potential environmental and public health monitoring
	Screening sampling	Continue risk communication	Remediation Action Plan		
	Determine agent type and concentration	Characterization environmental sampling and analysis	Site preparation		
	Risk communication (e.g., public warning and recommended protective actions)	Initial risk assessment	Waste disposal		
		Clearance goals	Decontamination of sites, items, or both		
			Verification of decontamination parameters		

Figure 1. Response and restoration phases to a chemical event. The content of this illustration was developed with interagency cooperation. The focus of this document is on characterization, decontamination, and clearance (areas shaded in blue). Historically, the term Crisis Management referred to the Notification and First-Response Phases; the term Consequence Management referred to the remainder of the phases shown in this illustration.

In an incident involving large-scale chemical contamination, the Governor of the state would typically request, and the President of the United States would likely declare, an emergency under the Stafford Act (1974; amended 2002). In the case of a terrorist-related incident, the Secretary of Homeland Security could determine that the event is an Incident of National Significance on the basis of criteria established in Homeland Security Presidential Directive 5 (HSPD-5), “Management of Domestic Incidents.” Incidents of National Significance are those high-impact events that require a coordinated and effective response by an appropriate combination of Federal, state, local, tribal, private-sector, and nongovernmental entities to save

lives, minimize damage, and provide the basis for long-term community recovery and mitigation activities. If an Incident of National Significance is declared, a Principal Federal Official will be appointed by the Department of Homeland Security (DHS) to facilitate Federal support to the UC structure.

The following Checklist for Facility Response, Remediation, and Recovery presents the critical steps that would be taken by organizations involved in responding to a chemical incident. It is intended for use by key decision-makers in the event that an incident occurs and steps must be taken immediately and systematically. The organizations would follow the Incident Command System (ICS). See Appendix A for more information on the ICS and how the responsible personnel identified in the checklist map into the consequence management organizational structure.

The Notification and First-Response Phases are cursorily addressed in the checklist, whereas the main focus is on consequence management actions. The order of actions is generally sequential. However, depending on the specifics of an event and how a response is implemented, actions may be reordered. For example, preparing a Remediation Action Plan (RAP) is identified in the checklist as a critical step of the Remediation Phase. However, it is likely that preparation of the RAP would begin before completing all actions identified in the Characterization Phase. In addition to the actions recommended in the checklist, any emergency response should comply with notification and response procedures established by the facility, as well as applicable procedures established by the jurisdictional responding agencies.

Checklist for Facility Response, Remediation, and Recovery

Responsible Personnel		Action
Notification Phase		
Facility emergency management organization and law enforcement or other response organizations	<input type="checkbox"/>	Facility receives notification that: <ul style="list-style-type: none"> • A CWA incident has been detected, or • A CWA incident is suspected, or • Information about a developing threat is received from an agency or responsible person.
	<input type="checkbox"/>	Gather information and continue to assess incident credibility, incident status, potential effect on the facility, and the degree to which a response is needed.
	<input type="checkbox"/>	Facility makes notification, as appropriate, by: <ul style="list-style-type: none"> • Following established facility notification protocol, tailored to each stage of a developing incident, and either alerting responders and agencies (Federal, state, and local) or acting on direction from them. • Disseminating available information and initiating protective actions.
First-Response Phase		
Incident Commander or Facility Manager	<input type="checkbox"/>	Activate, or coordinate with law enforcement and emergency operations personnel as needed, to include: <ul style="list-style-type: none"> • Security personnel. • FBI and/or local law enforcement (they will likely control the crime scene to protect evidence and commence forensic investigation). • Fire department personnel. • Public health and medical personnel. • Hazardous materials (HAZMAT) and/or other screening sampling teams, e.g., Civil Support Team (CST).
	<input type="checkbox"/>	Evacuate, rescue, and/or isolate affected persons, as needed based on the facility's emergency response plan.
	<input type="checkbox"/>	Mitigate any conditions posing immediate threat to human health.
	<input type="checkbox"/>	Activate EOC, as appropriate <ul style="list-style-type: none"> • Continue to inform responders and agencies (Federal, state, and local) about developing details related to the incident.
	<input type="checkbox"/>	Determine if facility operations should be sustained, diverted, or suspended.
	<input type="checkbox"/>	Initiate risk communication.
	<input type="checkbox"/>	Control access to the affected area.
	<input type="checkbox"/>	Implement emergency containment procedures.
	<input type="checkbox"/>	Transition to a Unified Command (UC), if appropriate, as additional agencies and organizations respond.
IC or Unified Command	<input type="checkbox"/>	Confirm identity of specific chemical.
	<input type="checkbox"/>	Determine if there is a significant risk to public health.
	<input type="checkbox"/>	Gather new information if necessary, e.g., additional agent analytical testing, medical symptoms, additional environmental sample analyses, and available intelligence information.

Checklist continued.

Responsible Personnel		Action
Characterization Phase		
Planning Section: Situation Unit	<input type="checkbox"/>	Compile all analytical and observational data and reports that were created during the First-Response Phase, and provide results to the Environmental Unit.
UC	<input type="checkbox"/>	Mobilize, as necessary, pre-identified resources for characterization activities, including: <ul style="list-style-type: none"> • Appropriate analytical laboratories, (e.g., Environmental Laboratory Response Network (eLRN), Organisation for the Prevention of Chemical Warfare (OPCW) certified laboratory such as Edgewood or LLNL). • Environmental sampling teams with their decontamination and disposal resources. • Data management and documentation specialists. • Facility air-dispersion modeling resources.
	<input type="checkbox"/>	Create or activate a Technical Working Group (TWG) if appropriate; establish lines of authority and responsibilities.
	<input type="checkbox"/>	Notify pre-identified resources for remediation and clearance phases.
Safety Officer and Logistics Section: Medical Unit	<input type="checkbox"/>	Create and implement Health and Safety Plan (HASP).
Facility	<input type="checkbox"/>	Provide detailed blueprints of areas of operation and HVAC systems to Planning Section: Documentation Unit.
Planning Section: Environmental Unit	<input type="checkbox"/>	Consider and recommend immediate agent containment and source reduction, if needed.
	<input type="checkbox"/>	Depending on actions completed during crisis management: <ul style="list-style-type: none"> • Assess potential contaminant transport outside the facility (i.e., direct release, rolling stock). • Evaluate the need for air monitoring. • Evaluate the need for conceptual or mathematical modeling.
	<input type="checkbox"/>	Perform air modeling of movement of a CWA throughout facility to estimate initial extent of contamination.
	<input type="checkbox"/>	Identify waste-disposal facilities and capacities, if needed.
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Identify clearance goal(s).
	<input type="checkbox"/>	Develop a characterization strategy to support remediation activities. Organize the facility into characterization zones. Select sampling locations for each zone.
	<input type="checkbox"/>	Write an incident-specific characterization plan in which all goals are identified.
UC	<input type="checkbox"/>	Approve the characterization plan and clearance goal(s).
Operations Section: Site Access Group	<input type="checkbox"/>	Implement any recommended agent containment actions.
Operations Section: Sampling Group	<input type="checkbox"/>	Implement the characterization plan.
eLRN and/or other field or fixed laboratories	<input type="checkbox"/>	Analyze samples to meet the objectives of the characterization plan.
Planning Section: EU with input from TWG	<input type="checkbox"/>	Evaluate results of characterization activities. Recommend additional characterization activities, as needed. Report to the UC.

Checklist continued.

Responsible Personnel		Action
Decontamination Phase		
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Develop measurable decontamination process criteria, as appropriate, based on characterization results.
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Develop the decontamination strategy, including assessment of potential environmental impacts of remediation.
	<input type="checkbox"/>	Prepare the Remediation Action Plan (RAP), including: <ul style="list-style-type: none"> • Areas to decontaminate and types of surfaces involved. • Materials and structures to decontaminate in place or remove, i.e., source reduction. • What decontamination technologies to use (e.g., reagent and delivery system). • Appropriate process parameters and analytical techniques. • Waste disposal decisions.
	<input type="checkbox"/>	Include Ambient Air Monitoring Plan (AAMP) in RAP, as required.
	<input type="checkbox"/>	Prepare Clearance Sampling and Analysis Plan (SAP), including: <ul style="list-style-type: none"> • Clearance zones. • Sampling approach(es) for each zone (e.g., judgmental and random or statistical sampling). • Air sampling, as necessary.
Operations Section: Decontamination Group	<input type="checkbox"/>	Perform source reduction.
	<input type="checkbox"/>	Review draft RAP and SAP.
Safety Officer	<input type="checkbox"/>	Develop a specific Emergency Response Plan to address potential uncontrolled releases (e.g., from explosion, fire, or hurricane) if toxic gas/vapor phase decontaminants are used.
	<input type="checkbox"/>	Review and update HASP.
UC	<input type="checkbox"/>	Approve the RAP and SAP with input from the TWG.
Operations Section: Decontamination and Sampling Groups	<input type="checkbox"/>	Perform all site preparations as specified in the RAP.
Operations Section: Decontamination Group	<input type="checkbox"/>	Conduct decontamination and monitor process parameters.
	<input type="checkbox"/>	Conduct limited surface sampling as initial check of decontamination effectiveness.
	<input type="checkbox"/>	Evaluate whether decontamination process criteria are met. <ul style="list-style-type: none"> • For gas/vapor phase decontamination (e.g., concentration, temperature, time) • For surface decontamination (e.g., initial pH, contact time) Recommend additional decontamination activities, as necessary.

Checklist continued.

Responsible Personnel		Action
Clearance Phase		
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Review, and revise as appropriate, the incident-specific clearance SAP.
UC	<input type="checkbox"/>	Approve the incident-specific clearance SAP, if it was revised.
Operations Section: Sampling Group	<input type="checkbox"/>	Perform clearance sampling.
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Evaluate all clearance sampling data. Determine if clearance goals have been met. Recommend additional remediation if necessary.
Planning Section: Environmental Unit with input from TWG	<input type="checkbox"/>	Write and submit the final clearance report.
UC	<input type="checkbox"/>	Review the final report addressing facility, regulatory, and stakeholder needs. Make recommendations on whether facilities and items have been effectively remediated.
Facility Authority	<input type="checkbox"/>	Determine whether to initiate restoration (recovery) activities in all or parts of the facility. If not, further remediation may be warranted.
Restoration (Recovery) Phase		
Facility Authority	<input type="checkbox"/>	Prepare and implement site-specific recovery plan: <ul style="list-style-type: none"> • Implement renovation, including refurbishment of removed and damaged items, system testing, and other required actions. • Determine whether phased-in reuse of the facility is needed to support recovery operations. • Upgrade or enhance facility to lessen future CW vulnerability, as desired.
	<input type="checkbox"/>	Address special work activities as necessary under the reoccupancy (transitional) program, such as safety-based maintenance and housekeeping.
Facility Authority in collaboration with local public health and OSHA, where appropriate	<input type="checkbox"/>	Determine strategy and implement long-term environmental and public health monitoring of the facility and employees, if deemed appropriate.
	<input type="checkbox"/>	Determine whether to permit tenants and employees to return for normal business. Address general industrial safety issues.
Facility Authority	<input type="checkbox"/>	Resume full operations at the facility for the public.

Recommendations for Facility Preparedness

The following list identifies preparedness activities a facility should conduct to expedite chemical restoration. Activities are listed under the response phase with which they are most closely associated.

Initial Notification
<ul style="list-style-type: none"> • Develop a notification protocol for all facility personnel, responders, and agencies (Federal, state, and local) tailored to each stage of a developing incident.
First Response
<ul style="list-style-type: none"> • Develop and incorporate specific chemical response plans into the facility's emergency response plan, as appropriate. • Develop a policy specifying the criteria for facility closure or suspension of operations after a CWA attack. The policy should incorporate public health strategies and management of employees, rolling stock, and patrons. • Develop risk communication plan. • Conduct training exercises with likely command personnel, including responder and agency representatives.
Remediation:
<ul style="list-style-type: none"> • Identify members of a Unified Command (UC) and a Technical Working Group (TWG) (see Figure A-2). • Ensure that UC and TWG members are familiar with facility-specific remediation plan(s) through exercises.
Characterization
<ul style="list-style-type: none"> • Identify characterization resources, such as sampling contractors and analytical laboratories. • Identify potential isolation, containment, sampling, characterization, and gas/vapor phase decontamination zones within the facility. • Identify sampling units (which may consist of surfaces, items, or sets of items) to be sampled. • Identify areas at the facility that can be used or cleared for staging and storing waste materials. • Create and maintain an up-to-date library of key facility architectural and mechanical drawings including heating, ventilation and air conditioning (HVAC) operating parameters. • Create a new, or review and revise an existing, Health and Safety Plan (HASP).
Decontamination
<ul style="list-style-type: none"> • Identify in-house equipment that could be used or upgraded for remediation activities. • Select staging areas or warehouses for equipment and supplies. • Determine disposal and decontamination options for potentially contaminated materials and equipment. • Determine likely facility decontamination method(s). • Determine types of decontamination supplies to store. • Select and retain contractors for the decontamination team. • Identify staging and storage areas for waste. • Establish agreements, if possible, with local waste-disposal facilities and wastewater treatment facilities. • Identify waste-disposal options with solid waste management authority(ies).
Clearance
<ul style="list-style-type: none"> • Identify regulatory cleanup guidance. • Ensure that most of the preplanning activities done under Characterization apply to Clearance.
Restoration (Recovery)
<ul style="list-style-type: none"> • Develop a Hazard Communication Plan, including written examples that would be used to inform employees and the general public about possible risks associated with reoccupancy. • Identify long-term air monitoring options to meet stakeholder needs. • Determine priorities for bringing facility back online. • Conduct facility evaluations to identify CWA vulnerabilities, and address them, as appropriate. • Identify potential facility upgrades to expedite remediation and minimize economic impact.

Notes and References

DHS (December 2004), Department of Homeland Security, *National Response Plan*, available at http://www.dhs.gov/dhspublic/interapp/editorial/editorial_0566.xml.

Homeland Security Presidential Directive (HSPD-5), *Management of Domestic Incidents*, The White House, February 28, 2003.

LLNL (2007a), Lawrence Livermore National Laboratory, *Remediation Guidance for Major Airports After a Chemical Agent Attack*, Lawrence Livermore National Laboratory, Livermore, draft report; to be issued as a joint Department of Homeland Security and U.S. Environmental Protection Agency document.

LLNL (2007b), Lawrence Livermore National Laboratory, *Remediation Guidance for Major Airports After a Bioterrorist Attack*, Lawrence Livermore National Laboratory, Livermore, CA, UCRL-TR-210178-DRAFT Rev. 2; to be issued as a joint Department of Homeland Security and U.S. Environmental Protection Agency document.

NIMS (March 1, 2004), *National Incident Management System*, document available from FEMA at 1-800-480-2520, Option 4, ask for FEMA 501.

Robert T. Stafford Disaster Relief and Emergency Assistance Act, 93 Pub. L. No. 288, 88 Stat 143 (1974) [codified as amended at 42 U.S.C. §§ 5121–5206 and scattered sections of 12 U.S.C., 16 U.S.C., 20 U.S.C., 26 U.S.C., and 38 U.S.C. (2002)].

Appendix A. Incident Command System

The Incident Command System (ICS) is a standardized, flexible, on-scene, emergency management construct specifically designated to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. It includes the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure and is designed to aid in managing resources during an emergency response, such as an incident involving a CWA or TIC. It is critical that the ICS structure remain flexible and adaptable. It can be resized and restructured as the incident unfolds, adding or disbanding various groups, as dictated by the incident. The consequence management organization structure shown in Figure A-1 shows typical relations among ICS organizations involved in consequence management of a chemical contamination incident.

Formation of a Technical Working Group (TWG) early in an incident is strongly recommended. This group of technical specialists helps to plan restoration operations and provides advice to the Incident Commander or Unified Commander, staff, and contractors.

Figure A-2 identifies some of the specialty areas that would be required of personnel who staff the Unified Command and TWG and the organizations that could provide representatives for each group. Technical roles played by members of the TWG are varied and challenging. For an incident involving a CWA or TIC, qualifications would include medical or restoration experience related to chemical contamination.

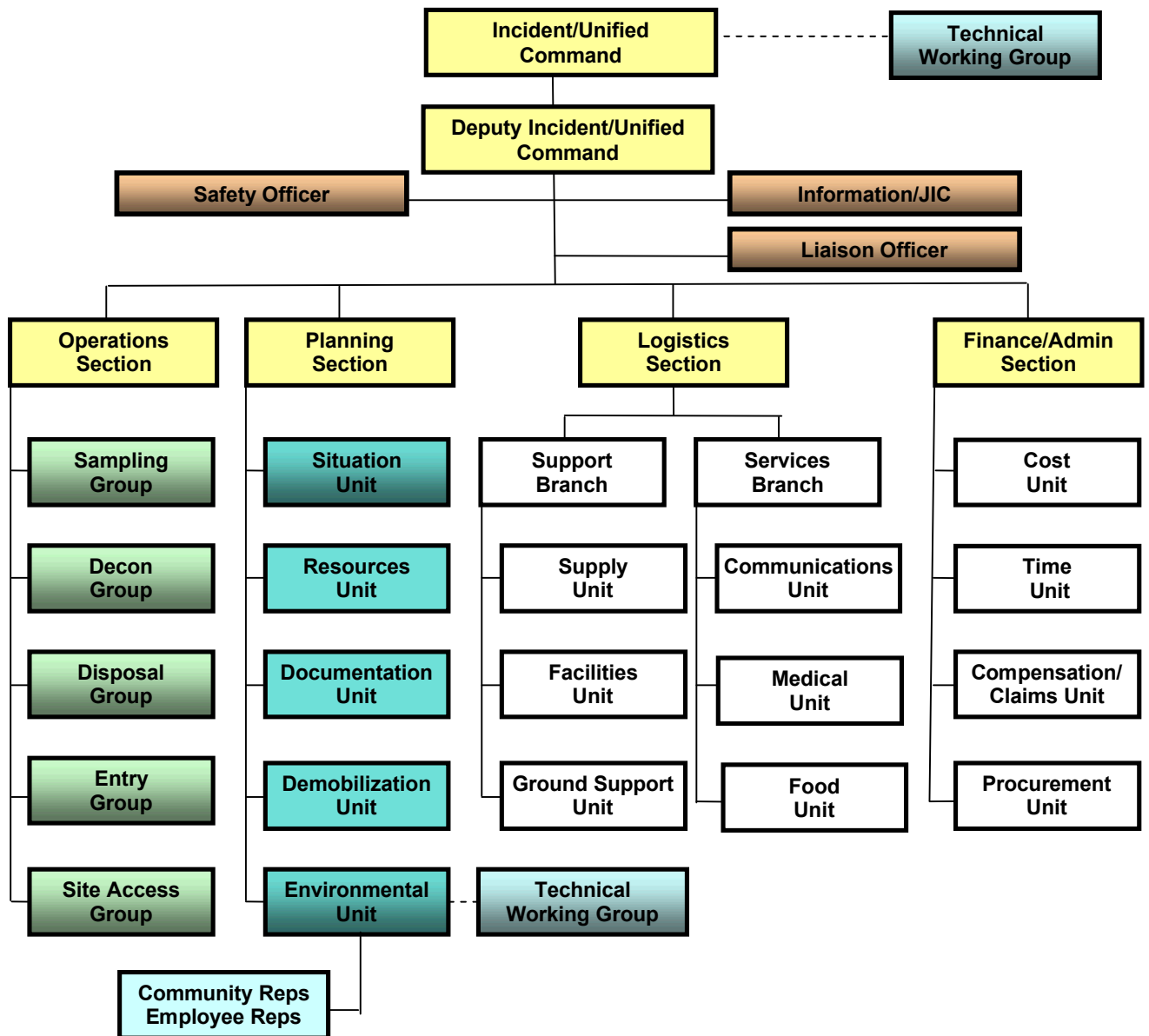


Figure A-1. ICS organizational structure with focus on the consequence management phase of a chemical incident remediation. See Figure A-2 for additional detail.

At the discretion of the UC, the TWG may either report directly to the UC or function under the direction of the Environmental Unit Leader.

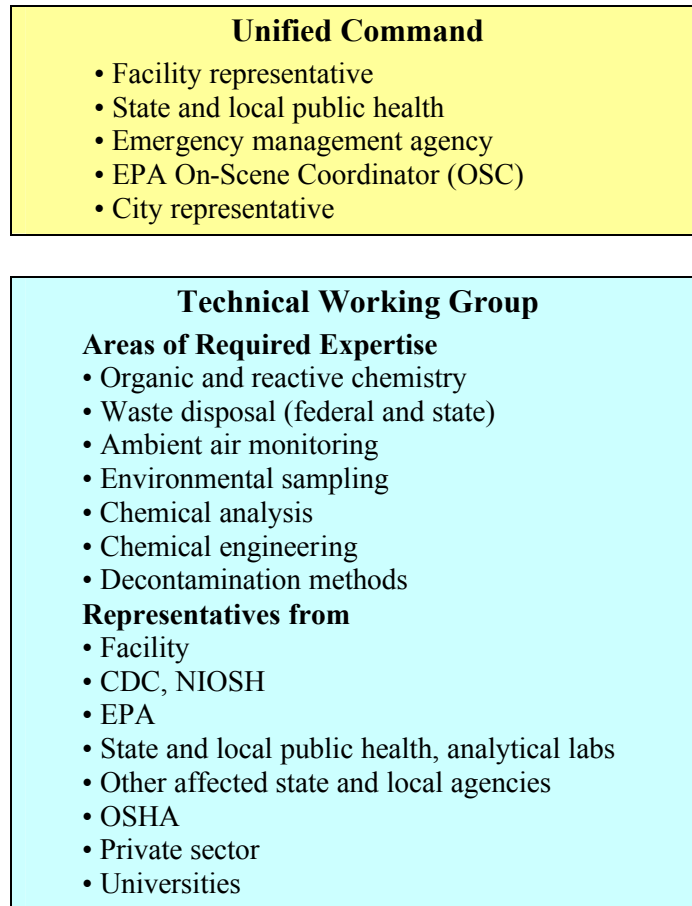


Figure A-2. Members and areas of required expertise of the Unified Command and Technical Working Group focused on the consequence management phase.

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