Cleanup Worker Protection at the DOE Nuclear Weapons Complex

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More than **3 years** have passed since the Department of Energy began a concerted, publicly declared campaign to chart a "new course" toward full accountability in the areas of environment, safety, and health.[1] Yet evidence of DOE leadership and substantive accomplishments in furthering worker health and safety remain sparse. The "new culture" pursued by the Secretary of Energy, a culture that honors protection of the environment, health, and safety as fundamental organizational values, has not been translated into official policies and programs-or even been wholly accepted—by DOE and its contractors.

The new culture has not taken hold largely because of three flaws in DOE's approach to worker protection:

1. Not all DOE employees, contractor managers, and workers are convinced that worker health and safety truly takes precedence over other goals.
2. Within DOE, organizational responsibility for occupational health and safety is dispersed among different program **offices.** This has caused staff with occupational safety and health (OSH) experience to be thinly spread throughout DOE line organizations. Within the DOE Office of Environmental Restoration and Waste Management (EM), there are insufficient numbers of OSH professionals to develop program-specific policies or ensure implementation and enforcement of such policies by EM contractors.
3. Internal oversight of DOE and contractors' implementation and enforcement of OSH programs is weak. The DOE Office of Environment, Safety and Health (EH) does not have enough qualified field staff to monitor contractor operations. Furthermore, EH has no direct authority to en-

The "new culture" at DOE has not yet been translated into official policies and programs

force OSH orders or regulations. EH influence on DOE line organizations rests chiefly on the capacity to embarrass line managers into complying with OSH orders and regulations. There are no meaningful rewards or penalties for occupational health and safety performance levied on DOE or its contractors.

The Occupational Safety and Health Act of 1970 established that those Federal agencies that exercise statutory authority to prescribe or enforce occupational safety and health standards, or regulations affecting those conditions, were not subject to the authority of the Occupational Safety and Health Administration (OSHA) under Section 4(b) 1 of the Act.[2] DOE is the only Federal agency that claims such an exemption. DOE and its contractors derive authority to determine their own occupational safety and health standards from the Atomic Energy Act of 1954.[3] There is thus no external oversight or regulation of DOE's or its contractors' performance in OSH matters.

When OSHA released its comprehensive December 1990 report on occupational safety and health programs at DOE facilities, it recommended that DOE institute a number of major organizational changes to ensure adequate worker safety and health protection.4 DOE reacted promptly to the OSHA review by reasserting line management responsibility for contractor safety and health programs[5] and by directing the relevant DOE program offices to present the Secretary with ways of responding to the OSHA findings.[6-8]

Several important reforms resulted from these efforts, including the establishment of an Office of Occupational Safety within EH[9] and the addition of many health and safety professionals, among them former OSHA employees, to DOE headquarters staff. In addition, both EH and EM have established advisory boards consisting of outside experts to augment in-house expertise and provide an independent perspective on DOE activities.[10] DOE also ordered its program offices to include specific crosscuts in the fiscal year 1993 budget to identify and summarize all occupational health and safety activities in a single document "to make visible and facilitate action on OSH activities." Future budget submissions will be subjected to comprehensive OSH reporting and will be used to support an OSH Five-Year Plan that is under development.[11]

In August 1992, DOE and OSHA signed a Memorandum of Understanding that provides DOE with access to OSHA's technical expertise and formalizes arrangements for joint training programs. The agreement acknowledges that DOE retains authority to develop, implement, and enforce OSH policies for its contractor employees, whereas OSHA has the right to conduct unannounced inspections at DOE facilities to protect Federal (i.e., DOE) employees.[12-14]

These are positive steps, but it is unclear if such efforts can overcome fundamental organizational obstacles that underlie DOE's approach to worker protection. DOE's problematic organizational OSH framework, coupled with the enormous scope and complex nature of the pollution at Nuclear Weapons Complex (NWC) will likely reflect and magnify worker protection problems already encountered at non-Federal Superfund sites. Success in addressing cleanup worker health and safety at the NWC will depend to a large extent on achieving substantial changes in the organizational format of DOE's approach to worker protection. The next section discusses organizational problems pertinent to OSH matters at DOE. Subsequent sections of the chapter address particular OSH issues encountered at non-Federal hazardous waste sites that are likely to be troublesome during cleanup of the NWC.

MANAGEMENT COMMITMENT TO OCCUPATIONAL SAFETY AND HEALTH PRIORITIES

Skepticism about the vigor and persistence of DOE's commitment to occupational safety and

health continues to haunt the Department. In the course of OSHA's 1990 audit of DOE worker health and safety programs—carried out at DOE's request—OSHA inspectors noted that "pressures to get the job done often overrule safety and health concerns."[15] OSHA found that resource allocation decisions and planning by DOE managers and contractors did not indicate worker health or safety to be of paramount concern. OSHA reported that some top managers in DOE's contractor organizations failed to demonstrate a strong commitment to worker health and safety:

> One top manager stated that occupational safety and health was not a fundamental organizational value . , . [and] saw the emphasis on safety and health as a hindrance to the facility's mission.[16]

Assertions that DOE management is aggressively pursuing staunch worker protection policies are weakened by failure to correct inadequate OSH practices documented by Tiger Teams; [17 18] by long delays in official adoption of proposed OSH orders; [19-21] by the failure of DOE managers to impose penalties on contractors who do not enforce sound worker protection policies; [22 23] and by reports that DOE facility operations were resumed or allowed to continue before appropriate safety training and procedures had been completed. [24-27]

Workers, too, appear skeptical of the depth and staying power of DOE's commitment to the new culture. In November 1991 the Secretary's Advisory Committee on Nuclear Facility Safety found that the new philosophy of valuing health and safety over weapons production is "not understood, accepted or believed" by workers at Rocky Flats,[28] where public controversy over safety has been intense. The committee (referred to as the Ahearne committee after its Chair, John Ahearne) reported that DOE's response to high-profile safety issues has been characterized by

> [an] . . . insistence on rapid response without adequate understanding [that] has produced premature action plans and decisions, with resultant frequent schedule revisions, organizational changes, and unclear explanations of the need and bases for the actions and decisions. Workers may be left with no alternative but to consider production in fact as the continuing, dominant priority, and safety as simply a passing fancy of the current Secretary .29

OSHA noted that union representatives were not routinely included in health and safety committees, and that employees were not routinely asked to participate in safety and health inspection activities at weapons sites.[30] Although at most weapons sites, joint labor-management committees have been formed to facilitate communication about health and safety issues and other matters,[31 32] workers have not been actively enlisted in efforts to enhance occupational safety and health at DOE facilities. [33]

OSHA also noted that investigations of workers' complaints of health and safety problems had in some instances resulted in DOE field offices referring the problem back to the employer against whom the complaint was raised. In some cases, OSHA found that allegations of reprisals against employees who had initiated health and safety complaints had not been investigated properly by DOE.[34]

Reports of workers being harassed for raising health and safety concerns continue to surface. For example, the DOE Inspector General reported in September 1991 that a DOE contractor and a former contractor at Hanford had acquired wiretapping and eavesdropping equipment designed for covert surveillance, in violation of DOE orders and Federal acquisition requirements. Security forces at the Idaho National Engineering Laboratory and at Savannah River were discovered to have similar equipment. [35] The Inspector General reviewed 14 instances of covert video surveillance conducted by security forces at Hanford, but found no evidence to sub-

stantiate allegations by Hanford workers that they had been subjected to illegal surveillance after complaining about health and safety problems.[36]

In February **1992 the** Department of Labor found that a worker at the Oak Ridge National Laboratory had been isolated, assigned to menial jobs, and forced to work in hazardous areas after raising concerns about safety issues.[37,38] The DOE contractor involved is appealing this ruling.

In April 1992, DOE published its proposed Whistleblower Rule in the *Federal Register*.[39] *The* DOE Office of Nuclear Energy has taken the lead in developing complaint procedures for DOE contractor employees, but these procedures have not been finalized.[40] EH reviews of employee concerns programs indicate that some DOE field offices have neglected to establish adequate employee concerns programs in spite of long-standing directives to do so.[41]

LINE MANAGEMENT RESPONSIBILITY FOR OCCUPATIONAL SAFETY AND HEALTH

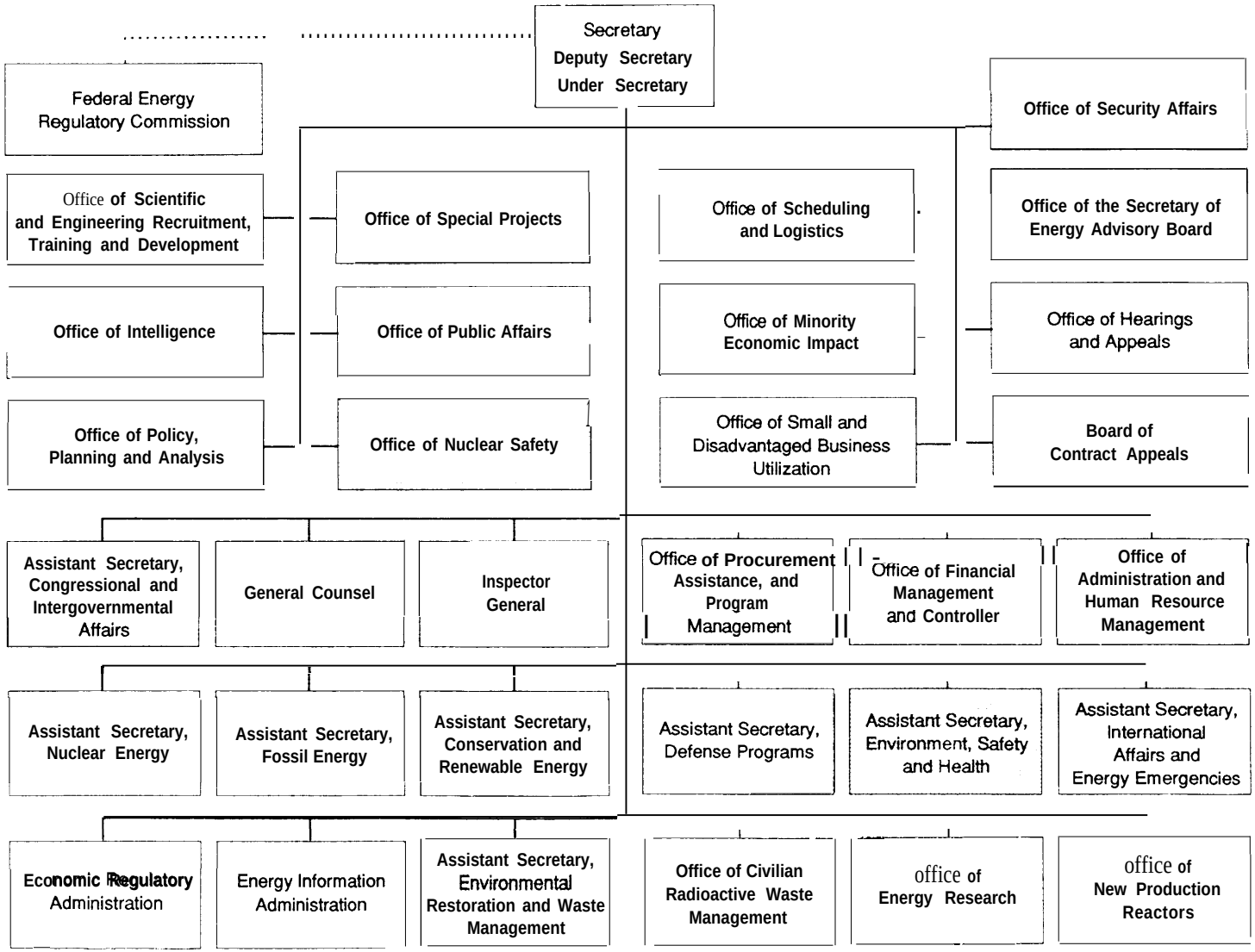
Occupational health and safety programs within DOE and its contractor corps are based on two organizational "pillars": line responsibility for safety and health, and independent oversight.[42] (See figure 3-1,) A directive from the Secretary of Energy explicitly charged DOE line organizations with responsibility for occupational health and safety matters within their purview.[43] Each program office (e.g., Environmental Restoration and Waste Management, Defense Programs, Nuclear Energy) is expected to develop health and safety policy relevant to its mission, to issue guidance in worker safety and health matters, and to assess contractors' OSH performance.

Responsibility for worker safety and health may be an appropriately decentralized function in a large organization. However, EM, the DOE program office examined by the Office of Technology Assessment, lacks adequate numbers of qualified staff to develop occupational health and safety programs suited to EM line operations and has little capacity to assess contractors' performance in health and safety matters. As of late 1992, the DOE Office of Environment, Safety, and Health, had not initiated serious consultations with EM or other line organizations to determine the top priorities of the line programs or to assist managers in formulating effective OSH policies.

EM headquarters staff handling worker safety and health matters are overwhelmed with the constant need to react to the latest crisis, and are unable to devote the time and resources needed to develop coherent cleanup worker protection policies.[44] EM's office of Oversight and Self-Assessment is responsible for producing health and safety policy, implementation guidance, and technical advice on EM related OSH matters, and for assessing the adequacy of EM and its contractors' occupational safety and health performance.[45] **EM has a single** staff person with training in occupational health and safety, and two employees with nuclear safety expertise.[46,47] The EM program office responsible for environmental remediation has no staff trained in occupational safety or health, and is planning to rely entirely on contractors to meet its OSH needs. One consequence of such staffing patterns is that by August 1992, EM headquarters staff had not reviewed a single cleanup site health and safety plan (HASP).[48]

When the DOE Office of Environmental Restoration and Waste Management was established in 1989, its leaders confronted pressing responsibilities. Undertaking cleanup of the Weapons Complex required EM to create and staff a new program office; to initiate more productive relationships between DOE and its contractors and between DOE and a skeptical, alarmed public; to demonstrate progress and justify proposed cleanup budgets to Congress; to comply with environmental regulations, and to meet schedule deadlines in Interagency Agreements. Amidst these diverse and urgent efforts, EM neglected the de-

Figure 3-1-The Department of Energy



SOURCE: U.S. Department of Energy, 1992.

velopment of rigorous or high-profile policies related to cleanup worker safety and health.

It maybe that EM will evolve a more purposeful and aggressive approach to occupational safe~ and health as the organization becomes established, as cleanup gets underway, and as the cleanup workforce increases in size. Currently, however, there is little evidence of leadership in OSH matters at EM headquarters, and few indications that decision makers have recognized the need to urgently address cleanup worker protection issues.

The head of DOE's Environmental Restoration and Waste Management program explicitly reaffirmed the Secretary of Energy's commitment to protecting worker health and safety as the "highest programmatic priority" in a July 1991 memo to all EM and contractor personnel.[49] The memo goes on to list actions and programs needed to accomplish EM's OSH goals:

- establishment of firm OSH priorities and responsibilities,
- development and implementation of quantitlable OSH performance standards to ensure programmatic accountability,
- planning and budgeting for necessary OSH resources to ensure availability, and
- formulation and application of improved channels of communication.[50]

Little progress has been made in implementing these programs. Some of EM's OSH goals could be accomplished by adopting the proposed DOE Order 5483, XX, "Occupational Safety and Health Program for DOE Employees;' which was designed by EH and has been under review by DOE program offices for months. Adoption of this order would be a constructive response to the recommendation repeated over the years by multiple expert advisory bodies—including the National Academy of Sciences,[51] OSHA,[52] the Advisory Committee on Nuclear Facility Safety,[53] and the Defense Nuclear Facilities Safety Board (DNFSB)[54]—that DOE develop clear health and safety policies at the national level and establish explicit, measurable goals that its operations offices and contractors should achieve to implement these policies.

In the absence of a comprehensive OSH order or policy directed at cleanup work, DOE contractors must rely on existing DOE orders. Numerous expert reviewers[55-57] have cemented that many DOE OSH orders lack specificity and adequate implementation guidance. This lack of precision allows DOE contractors great leeway in determining what constitutes satisfactory compliance with Occupational Health and Safety orders. Also, DOE's existing OSH orders and policies do not address some worker protection issues specific to the DOE cleanup, such as the content of health and safety training programs or medical surveillance for hazardous waste workers.

Recent DOE policy changes designed to reduce risks to off-site populations, but developed in the absence of comprehensive occupational health and safety policies or a clear focus on worker protection needs, may have heightened cleanup worker health and safety threats. For example, the Final Safety Analysis for Rocky Flats concentrated principally on off-site radiological risks from plant operations. The Secretary's Advisory Committee on Nuclear Facility Safety expressed concern that changes in plant operations made on the basis of this safety analysis might actually increase risks to workers.58 In addition, the committee worried that concerns about environmental threats might prompt managers to replace carbon tetrachloride, a liver toxin used in large quantities at Rocky Flats, with less toxic—but more flammable-solvents. Because fire hazards are among the most serious threats at the plant, a narrow analysis that focuses on health hazards but ignores potential worker safety risks could be disastrous.[59]

The Ahearne committee also expressed concern that ongoing activity may jeopardize workers at the Hanford tank farms, where potentially

flammable high-level radioactive waste is stored. The committee noted that DOE and its contractor managers "have shown little appreciation of the safety of workers working on top of Tank 101-SY,' which is suspected to have an appreciable chance of exploding. The committee went on:

> At Hanford, as elsewhere in the DOE, there is a tendency to concentrate on risk to the general public and give much less attention to workers. At such an isolated site as Hanford, this can make conditions seem much better than they really are.[60]

There is a pressing need to establish the primacy of orders, standards, and regulations applicable to cleanup worker protection at DOE facilities. Throughout DOE and its contractor corps, compliance with environmental laws is seen as having a higher priority than compliance with occupational health and safety regulations. The former are statutory requirements, and violation is understood by DOE and its contractors to carry a threat of great embarrassment and possible fries against DOE. Some fear that criminal sanctions might be levied against the employees responsible.

Occupational health and safety regulations, on the other hand, have the status "merely" of DOE orders, which many mangers consider "policy" rather than explicit, legally enforceable commands. Although the Secretary of Energy specifically instructed managers to comply with all applicable OSHA standards and regulations,[61] DOE and its contractors appear to regard this directive as 1ess compelling or of lower priority than compliance with environmental statutes. This attitude is understandable, if regrettable, given the absence of effective mechanisms for enforcing OSH orders at DOE facilities and the lack of significant or visible penalties imposed for failure to implement sound worker protection policies.

A litany of problems at the Hanford tank farms suggests that DOE's ability to monitor contractor OSH practices or induce contractors to follow adequate worker health and safety practices is extremely limited.[62-65] DOE regards Hanford's single-shell tanks as its top safety concern because of the potential for tank contents to undergo a chemical explosion and spew radionuclides across the surrounding countryside. Yet at least 16 different "events" resulting in worker exposure to tank vapors occurred between 1987 and 1992, before a DOE investigation revealed the seriousness of the problem and the lack of adequate management response,[66]

Several of these exposures caused workers to be hospitalized; at least one worker suffered permanent loss of lung function. In January 1992 an investigation by the DOE Richland Field Office concluded that the causes of the recurring exposures were inadequate "implementation of management systems," lack of a properly developed industrial hygiene program, and "failure to properly characterize the work environment and develop appropriate engineering controls."[67] It is notable that the Richland Field Office Safety Program had no staff whatsoever from August 1991 until April 1992.[68] From 1980 through August 1991 the Richland Field Office had only one-half of one full-time-equivalent (FTE) staff person for industrial hygiene functions .69

A former Assistant Secretary of Labor for Occupational Safety and Health, who reviewed DOE's internal report investigating the tank farm exposures[70] at OTA's request, commented:

> The failure of those in responsible management charge to assign resources to this problem in the presence of repeated violations would, without any doubt, have been viewed by OSHA as willful violations of the [Occupational Safety and Health] Act and subject to possible criminal penalties. This conclusion would probably have been reached by the end of 1987 when three [worker exposure] episodes had occurred, but certainly by 1989 when the episodes reoccurred. The absence of high priority for solving this problem in 1990, with attendant lack of professional staff and resources could well put someone on trial for criminal behavior [had the oc-

currences been subject to OSHA enforcement and penalties]. Also, in 1989 with the reoccurrence of the episode, [an OSHA finding of] "imminent danger" and a series of restrictive procedures akin to closure of a manufacturing facility probably would have been invoked.'[1]

A DOE internal memo on the subject of the tank farm vapor exposures noted that if Hanford were subject to OSHA citations and penalties, fines up to $70,000 per day might be expected.[72] Nonetheless, despite these and other failures in occupational health and safety performance, the DOE contractor at Hanford was granted an award fee of almost $5 million in 1991.[73]

OVERSIGHT OF OCCUPATIONAL SAFETY AND HEALTH PRACTICES

DOE's Office of Environment, Safety, and Health makes up the second pillar of the Department's approach to worker health and safety protection: independent oversight. EH is responsible for providing DOE line management programs with internal review of DOE and contractor OSH programs. EH also provides line organizations with technical advice, develops and maintains DOE orders, and conducts Technical Safety Appraisals and Tiger Team Assessments.[74]

EH has 11 site representatives or "residents" stationed at 5 weapons facilities. These 11 individuals are responsible for monitoring contractor OSH performance throughout the NWC,[75] covering a total work force of more than 100,000.[76] EH site representatives have been directed to shift their evaluation of DOE facilities from compliance-oriented inspections to "programmatic assessment" of DOE line management OSH performance and to identify root causes of deficiencies.[77] The **results** of these assessments are sent directly to DOE Program Secretarial Officials (PSOs) such as the Assistant Secretary for EM.[78]

Formerly, EM field resident reports were reviewed at the DOE field office level. The change in reporting structure was made to increase the visibility of OSH performance[79] and to respond **to** OSHA's complaint that DOE field offices were embroiled in a "major conflict of interest" because they were responsible both for ensuring contractor compliance with DOE health and safety policies and for reporting back to program offices at DOE headquarters on their own effectiveness as overseers and enforcers of such compliance.[80]

The EH site representative reports indicate that significant progress must be made if DOE line managers are to exercise meaningful oversight of contractor OSH activities. For example, EH site residents found that the Oak Ridge Field Office had not assessed the adequacy of the site construction contractor's work control program and could not guarantee that "adequate work controls will be established and implemented to ensure worker safety during construction activities."[81] This report also documented that the construction management contractor had not ensured that the personnel who assessed the site for the presence of possible worker safety hazards were properly trained to perform this task.[82] In addition to these findings of inadequate DOE oversight of OSH matters, the EH representative found that "work controls specifying safety requirements are not effectively and consistently implemented and followed by construction personnel and their management at work sites."[83]

DOE Chain of Command and Accountability for Occupational Safety and Health

Other monthly reports of EH site representatives provide additional evidence that DOE line management is not effectively overseeing contractor occupational health and safety performance. One impediment to effective DOE oversight of contractors is the complex and overlapping jurisdictions of its different line organizations at weapons facilities.

According to an EH report on Idaho National Engineering Laboratory (INEL) for example, DOE managers failed to independently assess or

verify contractors' freeze protection initiatives. (Such winterization precautions are essential to ensure functioning fire protection systems at INEL.)[84] This failure was largely due to confusion about the jurisdictional overlaps between different line management organizations at DOE. A memo from the DOE Office of Defense Programs (DP) detailing department policy on freeze protection was interpreted by the prime contractor as being applicable to DP facilities only. Consequently, the contractors did not address INEL operations controlled by EM in its response to the Idaho Field Office questionnaire. DOE field office staff failed to realize that the contractor had not considered all aspects of INEL operations.[85]

Another instance of inadequate DOE oversight of contractor activities was documented by EH representatives at Hanford, who found that construction contractor safety programs were quite good, but that the Richland Field Office exercised only "weak" oversight over contractor construction safety programs and had failed to assign anyone the responsibility of identifying emerging regulations, requirements, or safety training needs in construction. The representatives determined that "contractor [IOSH] performance is due to the contractor's efforts rather than direction from the line organization."[86] The report noted that DOE field office staff "did not programmatically review any of the contractor's safety programs and that the contractor could revise existing safety programs without [the field office's] knowledge. Therefore there is no assurance that the apparently acceptable performance of a contractor will remain acceptable."[87]

The lack of strong, centralized control over DOE contractor organizations will hinder efforts to ensure consistent and comprehensive implementation of OSHA's Hazardous Waste Operation and Emergency Response (HAZWOPER) standard and other health and safety standards during the NWC cleanup. DOE headquarters is currently unable to determine the roster of workers at a given weapons facility.[88] Ascertaining that all contractor and subcontractor employees have undergone legally mandated health and safety training, are enrolled in required medical surveillance programs, and so forth, will be difficult under these circumstances. Currently, most weapons facilities lack administrative mechanisms to ensure that workers transferring to new jobs at a facility undergo initial fitness exams prior to beginning new duties or are subsequently enrolled in appropriate medical surveillance programs. Overseeing the quality and comprehensiveness of cleanup worker health and safety programs administered by hundreds of DOE subcontractors engaged in the cleanup will be a monumental task.

DOE Tiger Teams and OSHA noted that health and safety personnel at DOE facilities had a poor grasp of OSHA inspection and hazard assessment methods.[89] Recent guidance from EH headquarters to its site representatives on how DOE and contractor OSH performance should be assessed is an important step forward, but without a significant infusion of staff and resources, such guidance cannot overcome current staffing limitations within DOE.

OSHA and DOE have negotiated a Memorandum of Understanding (MOU) that establishes a formalized working relationship and allows "where practical" for "mutually beneficial" OSH training, technical assistance and information exchange, and program evaluations.[90] Although the MOU does not specifically mention cleanup worker issues, DOE EH has already arranged access to computerized files of OSHA's "HAZWOPER Interpretative Quips" and has plans to access much of OSHA's technical information as well.[91]

The interactions made possible by the MOU might be very helpful to DOE staff, who are trying in effect to reproduce OSHA policies and programs. The content of the MOU is vague, however; it contains no promises of specific interactions and proposes collaboration only "to the extent priorities and resources permit." Specific arrangements for reimbursing OSHA

will be worked out in future interagency agreements.[92]

EH has initiated major revisions of two DOE orders that are fundamental to worker protection at the Weapons Complex. The Occupational Safety and Health Program for DOE Contractor Employees (DOE Order 5483. XX)[93] is a comprehensive reformulation of DOE OSH orders that would codify the hierarchy of DOE-developed OSH standards, DOE-adopted OSHA standards, DOE-adopted consensus standards, etc., that managers should follow in implementing worker protection programs at DOE facilities. In addition, the proposed Order 5483.XX establishes DOE OSH program requirements; sets forth rules for procedures, schedules, and employee participation in DOE and contractor OSH self-assessments; prescribes reporting procedures for work-related illnesses and injuries; and describes a risk assessment methodology for determining the priority of abatement procedures .94

This proposed DOE order would also establish a formal process for hazard abatement and would require approval of any significant delays in correcting identified hazards.[95] OSHA found that at one facility, more than 5,000 hazards had gone uncorrected for over a year because managers did not recognize these items as a priority. At another facility, OSHA identified inadequate ventilation and electrical conditions that had been uncorrected for 6 years.[96] A 1992 EH review of occupational safety and health programs at the Portsmouth Gaseous Diffusion Plant revealed more than 500 violations of DOE OSH orders, most of which were classified as "serious." Many of these violations had been previously identified, but had not been corrected.[97] Situations such as the failure to abate—or even fully investigate—the vapor exposure hazards at the Hanford tank farms would hopefully become less likely with the adoption and implementation of the proposed order.

Another OSH order under development by EH is the Construction Safety Program,[98] which would replace the current construction safety and health program (DOE Order 5480.9) adopted in 1980. The new order would establish program requirements for DOE line management and contractors involved in all construction activities, including environmental restoration, and might provide some of the ingredients needed to create sound health and safety plans for cleanup work.

EH has tried to instill sound occupational health and safety principles into line management programs through the provision of technical support. EH has begun an effort to assist contractors with the development of model worker protection projects. Managers will have the option of using EH seed funds to pilot worker health and safety initiatives that will be published and reviewed in a DOE on-line clearinghouse.[99] This project was a response to OSHA's complaint that the historically insular nature of DOE operations had led it to repeatedly reinvent the wheel and had hindered consistency in OSH practices.[100] EH has also undertaken a significant upgrading of DOE's documentation of work-related injuries and illnesses in an effort to remedy serious inaccuracies noted by OSHA in current record-keeping procedures. [101]

The impact of recommendations and policy proposals from EH is tempered by the relatively weak authority it exerts over DOE line management. EH acts in an "advisory capacity" to DOE program offices; its policy products are subject to comment and review by these program offices. (The proposed "Occupational Health and Safety Order, 5480.XX' garnered 1,300 comments from within DOE.[102]) EH maintains that after such intra-agency review, it makes independent determinations on final policies to be submitted to the Secretary for approval. The Assistant Secretary for EH has the option of bringing EH proposals to the Secretary for approval that do not have the concurrence of other DOE program offices.[103] [104]

In practice, the process of gaining official approval of EH recommendations is one of compromise and accommodation.[105] EH has tried, with some success, to "leverage" its sparse resources

and authority by conducting "special assessments" of high-profile problem areas or operations. These reviews are used essentially to embarrass managers into more vigorous OSH efforts.

DOE's limited capacity to enforce worker health and safety policies and orders among contractors has been documented by OSHA and by EH site residents reports,[106-109] This failure was grimly illustrated by the death of a Hanford contractor employee, who was killed in April 1992 after falling through the roof of an abandoned reactor building known to be in danger of collapse. The fatality demonstrated that written safety procedures are not always followed, even when workers and supervisors are aware of their existence.[110]

DOE and contractor management participation in many EH initiatives is voluntary; the principal EH approach to oversight of line management OSH activities remains reactive responses to problems that might have been avoided had strong programs been implemented. Critical OSH orders proposed by EH have yet to be approved.

Nonetheless, progress in occupational health and safety at DOE should be measured against the pervasive and serious deficiencies in worker protection that characterized operations before 1989, with consideration for the difficulties of securing management and worker commitment to new DOE missions and priorities. In this light, EH efforts over the past year represent positive steps toward a programmatic approach to a "new culture" honoring environment, safety, and health at DOE.

The organizationally segmented structure of occupational safety and health activities at DOE demands extensive staff and resources that are not now in place. Further progress in institutionalizing rigorous worker protection throughout the Weapons Complex requires a significant increase in trained occupational health and safety professionals in DOE line organizations and in EH. In addition, serious and sustained consultation between EH and EM will be required to develop and implement OSH programs most urgently needed for cleanup. *EH initiatives and policies—no matter how valid---are meaningless unless line management and field staff have the will and resources to implement them.*

Finally, oversight and enforcement of contractor occupational health and safety activities by both line management and EH must be augmented. DOE must demonstrate its commitment to worker health and safety by making the formulation and implementation of clear and coordinated OSH policies an urgent priority. Otherwise, as will be discussed in the next section of this background paper, management attention will continue to focus on other goals, such as schedules for achieving environmental compliance and contract costs, at the expense of worker protection issues. The risks of such a course include the potential endangerment of thousands of employees and further erosion of DOE's credibility as a responsible and competent protector of environment, safety and health.

WORKER PROTECTION COMPETES WITH OTHER CLEANUP PRIORITIES

DOE and contractor managers involved in cleanup of the NWC must contend with all of **the** issues that clamor for attention and resources at non-Federal hazardous waste sites. If anything, the competing pressures and priorities are more diverse and intense at DOE weapons facilities. Communities neighboring weapons sites are greatly concerned about possible health and environmental impacts of the pollution—and have expressed this concern via Congressional hearings, the national media and in successful and pending lawsuits against DOE.[111-113] The pressure on EM and on DOE contractors to demonstrate progress while holding down costs is unrelenting, and occurs in a context of technical complexities unmatched at most non-Federal waste sites.

In addition to the need to comply with applicable environmental regulations, particularly Superfund and the Resource Conservation and Recovery Act (RCRA), the DOE cleanup is being driven by priorities and schedule "milestones" established in Interagency Agreements (IAGs) negotiated among DOE, EPA, and individual States. The milestones and deadlines set forth in IAGs were typically agreed to before reliable characterization data was available and in the absence of health-based cleanup priorities or analyses of potential occupational hazards associated with proposed cleanup work.[114] The need to respond to regulatory demands and IAG schedules has preoccupied much of the management talent in EM. Available evidence, including staffing patterns and resource allocation, indicates that DOE line management has paid relatively little attention to OSH issues associated with the cleanup.

DOE has convened the Tripartite Commission to discuss occupational health and safety matters related to its operations. This high-level working group consists of DOE senior managers, contractor managers, and representatives of national labor organizations with members employed at facilities in the NWC. The group has discussed DOE initiatives in medical surveillance, health and safety training, and other matters pertinent to DOE workers generally; it is not designed to focus solely on cleanup issues. Much of the group's discussion has reportedly been directed at the fate of DOE production workers whose original job titles will be eliminated as weapons production activities end and some facilities are converted into cleanup sites.[115] The Tripartite Commission does not address the level of technical detail that is the major focus of the EPA-Labor Health and Safety Task Force,[116] 117 nor does it include representatives from EPA, the National Institute of Occupational Safety and Health (NIOSH), OSHA, or other Federal agencies whose missions and expertise are pertinent to the NWC cleanup.

Many contentious questions are involved in interpreting and implementing HAZWOPER, coordinating policies among Federal agencies, and communicating effectively with those who actually do the work of cleaning up. DOE might more efficiently resolve some of these issues by convening a multidisciplinary, interagency task force—perhaps even broader in membership than EPA's—including for example, staff from the National Institute of Environmental Health Sciences (NIEHS) and the Agency for Toxic Substances and Disease Registry (ATSDR), as well as health and safety experts from relevant unions. Health and safety staff from DOE's EM and EH might also benefit from sitting in on sessions of the EPA-Labor Health and Safety Task Force.

DOE SITE CHARACTERIZATION DATA

Both the scale and the complexity of contamination at the Nuclear Weapons Complex distinguish the DOE cleanup from most other hazardous waste operations.[118] These factors increase the uncertainties involved in mapping environmental pathways or determining pollution boundaries, and in turn heighten the difficulties associated with identifying site hazards, recognizing potential worker health and safety risks, and designing and implementing work practices that effectively limit such risks.

Characterizing the nature, extent, and future course of environmental contamination is a time-consuming and technically difficult job in any case, but it will be especially challenging throughout the NWC. Records documenting past releases of contaminants from DOE weapons facilities are scant. The exact content and location of past releases are frequently unknown, and the environmental pathways followed by contaminants released years or decades earlier are often difficult to track. **9

In many cases, the volume of contaminants released to the environment at DOE facilities dwarfs the amount of hazardous material found at more typical waste sites. Groundwater contami-

nation has been confirmed at all NWC facilities. All nonarid sites are believed to have surface water contamination.[120] The volume of soil and sediment contaminated with radionuclides, hazardous chemicals, or both is estimated to total billions of cubic meters.[121] Thousands of solid waste management units have been identified throughout the Weapons Complex, many of which require remedial action. Hundreds of buildings and other structures will eventually require decontamination and decommissioning.

The sheer magnitude of characterization efforts at the NWC will pose great challenges to attempts to link environmental data with potential worker health and safety threats. Currently, DOE environmental cleanup requires the analysis of two to three million samples per year. DOE has estimated that by 1995, at least 10 million analyses of environmental samples conducted in offsite laboratories will be required annually.[122] The possible presence of radionuclides in DOE samples will magnify the costs and logistical problems typically associated with characterizing complex pollution scenarios-including long delays in obtaining sample results—because few laboratories are equipped to handle such analyses.

Very few DOE or DOE contractor employees involved in characterization of the nuclear weapons sites are trained in any health discipline. Trained industrial hygienists qualified to assess the adequacy of available characterization data and review the quality of contractors' HASPS are in short supply at DOE. The few industrial hygienists who are available still appear to be concentrating on reviewing exposure hazards and establishing industrial hygiene protocols for weapons production activities.[123] OTA was unable to identify anyone at DOE headquarters, in either EM or EH, who is attempting to establish guidance or policies that DOE contractors or field staff could use to assess the adequacy of characterization data used in formulating HASPS for cleanup worker protection.

DOE has not directed contractors to factor potential cleanup worker health threats into characterization strategies or remediation plans. The Los Alamos National Laboratory (LANL) recently proposed to assist the EH Office of Health Physics and Industrial Hygiene by developing technical documents in support of draft program requirements for a "Health and Safety Standard for Hazardous Waste Operations and Emergency Response" and an "Industrial Hygiene Technical Manual for Health and Safety During Hazardous Waste Operations and Emergency Response.''[124] The former document is to follow OSHA's HAZWOPER standard, whereas the latter "will be similar in depth and scope" to existing NIOSH and OSHA manuals.[125] It is unclear to what extent this proposed project might develop new material specific to the nuclear weapons sites cleanup. DOE has noted that this proposal "will be revised to include EM,''[126] but the draft documents appear to be aimed at worker protection efforts that commence only after site characterization is well under way or completed.

DOE lacks the field staff needed to determine if contractors have done a good job analyzing the type and extent of pollution, or to assess whether available characterization data adequately delineate the health and safety hazards that cleanup workers might encounter. Thus, DOE managers will have little substantive basis for evaluating contractors' proposed site-specific HASPS.

Prime contractors at some weapons facilities are attempting to reduce the time and costs required to complete characterization efforts by integrating Remedial Investigations with Feasibility Studies. Westinghouse Hanford is planning to use the "observational approach" in assessing pollution in Hanford old plutonium reactor areas for example.[127] This approach has been used with success at some non-Federal waste sites and incorporates the idea that characterization studies should be conducted for a specific purpose, not merely to satisfy regulatory checklists (see ch, 1).

A focal point of environmental studies used to support the observational approach to site characterization should be the identification of possible risks to cleanup workers. It is not evident, however, that either DOE or EPA has instructed contractors to make potential threats to cleanup worker health an important "purpose" of site characterization. In the absence of such policy, eagerness to reduce characterization costs may also reduce the availability of environmental data vital to site hazard identification and worker protection.

DOE has not issued any orders or guidance to ensure that contractors use approved or consistent methods in collecting and analyzing environmental samples throughout the Weapons Complex so that pollution scenarios at different sites can be compared. Indeed, DOE has no comprehensive plan for consistently gathering and analyzing environmental monitoring data within or across weapons sites, and no strategy and little technical capacity for relating such data to potential adverse health effects among workers or offsite populations who may be exposed to pollutants.[128] Consequently, DOE has no means of determining which of the many thousands of polluted areas within the NWC require more urgent or more rigorous characterization and cleanup because of their potential health risks. Nor will DOE be able to weigh potential risks to cleanup workers against possible benefits of proposed environmental remedies.

Another problem confronting identification of potential cleanup worker health and safety threats is the lack of coordination or consistent management of characterization data across DOE facilities. Subcontractors engaged in cleanup efforts at DOE facilities have complained to OTA that it is sometimes difficult to get access to characterization data pertinent to worker health and safety.[129] [130] The varying organizational structures associated with different DOE contractors are such that there is no consistency among sites in the titles of individuals assigned to data collection and analysis or in the procedures required for subcontractors to obtain these data.

Such inconsistencies in the structure of DOE contractor organizations add another layer of complexity to efforts to link characterization data to potential cleanup worker health threats. The lack of standard procedures for collecting, analyzing, and recording site characterization data and ongoing environmental monitoring data will also impede efforts to fashion efficient, effective, and consistent medical surveillance programs or health and safety training programs for the cleanup.

IMPACTS OF DOE CONTRACTING PRACTICES

DOE and its predecessor agencies were not conceived as organizations subject to strong centralized direction and control. The Manhattan Project was a loose consortium of private corporations who agreed to participate in building the atomic bomb for reasons of national security.

The companies that contributed their skills and expertise to managing and operating government-owned nuclear weapons facilities during the Cold War (the M&Os) did so in an era when the risks of nuclear technology and other potentially hazardous processes used in weapons production were not fully known. These considerations, and the pressure to augment the nuclear arsenal, induced the government to indemnify M&Os against nuclear and other losses, including workers' compensation costs. [131]

Over the years, a special "partnership" developed between DOE and its M&O's that has greatly complicated DOE's oversight of its contractors.[132] About 90 percent of DOE'S total budget is spent on contractors, primarily those who manage the NWC. This amounted to $17.6 billion in fiscal year 1990.[133]

Beginning in the 1980's, revelations about the seriousness of environmental contamination throughout the NWC, and a succession of weapons facility shutdowns prompted by safety con-

cerns raised questions about DOE's ability to effectively monitor contractor operations. Such events also prompted questions about the appropriate limits of contractor indemnification in the face of regulatory noncompliance.[134]

Environmental Restoration Management Contractors (ERMCS)

Environmental cleanup will be a significant activity at all sites run by M&O contractors, including those facilities that continue to have responsibilities for weapons production, testing, and dismantlement. DOE has determined that at facilities where environmental restoration is the only or major mission, Environmental Restoration Management Contractors (ERMCs) will replace or augment M&Os.

ERMCs will be responsible for conducting Superfund Remedial Investigation/Feasibility Studies, RCRA Remedial Field Investigations, and associated "base program" activities. Subcontractors supervised by the ERMC will actually carry out the characterization studies and will design and implement remedial actions. The ERMC Will be responsible for procuring and managing construction subcontractors.[135] The DOE Office of Environmental Restoration and Waste Management is the program office in charge of all environmental restoration and waste management act iv i ties, whether they occur at ERMC sites or at facilities run by M&O contractors.[136]

The ERMC concept was designed to help restore public confidence in the DOE cleanup effort by making a clear distinction between cleanup contractors and those who had generated the contamination, ERMCs also reflect DOE's desire to expand its contractor corps to include firms with environmental expertise and to inject more competition into bids for its cleanup contracts.

DOE claims that contractor accountability is increased under the ERMC rules.[137] *Some critics* have. however, dubbed the ERMC approach "an accountability disaster."[138] It is possible that the large number of subcontractors and the multiple layers of managerial responsibility characteristic of ERMC cleanup operations will dilute and confuse responsibility and authority for worker health and safety issues.

DOE has tried to build provisions into ERMC agreements that enhance its authority over contractors. For example, ERMCs will not be "bankrolled" in advance by the government for cleanup costs. Instead, they will have to invest their own capital, and DOE will reimburse costs after budgetary review.[139] This approach may force ERMCs to pursue more responsible and prudent cost-accounting practices than have always been followed by M&Os, but it might also encourage contractors to scrimp on outlays for occupational safety and health, unless DOE imposes and enforces explicit OSH performance criteria.

Two ERMCs are currently planned. The Fluor-Daniel Co. has been selected as the ERMC at Fernald, DOE estimates that up to $5 billion could be spent on the Fernald cleanup over the next 5 years; the ERMC could earn as much as $125 million annually during this period.[140] Bidding for the Hanford ERMC is under way. The Hanford ERMC will manage all environmental restoration and defense decontamination and decommissioning *projects.* Waste management activities at Hanford, including characterization and retrieval of materials stored in high-level waste tanks, will remain the responsibility of the current M&O contractor, Westinghouse Hanford Corporation. (WHC).[141]

Cost-Plus Award Fee Process

Contractors at all DOE weapons facilities (M&Os and ERMCs) are now subject to a new contracting process, the cost-plus award fee (CPAF) policy. DOE established the CPAF to encourage attention to environment, health, and safety issues,[142] Under the new policy, contractors are paid a "base fee" for reimbursement of costs, plus a variable "award fee,'" 51 percent of which is determined by DOE on the basis of con-

tractor performance in environment, safety, and health. [143] If the contractor fails any one of these categories, the entire award fee would be at risk. [144]

The record suggests that the award fee contracting provisions are not functioning as planned. Reports by the General Accounting Office (GAO) *45 and the DOE Inspector Genera1[146] have called into question DOE's willingness or ability to use the CPAF to hold contractors accountable for performance. OSHA noted that M&Os have avoided penalties for deficiencies in health and safety by negotiating larger base fees.[147] For example, the M&O contractor at Oak Ridge increased its "award fee" in 1992 compared to 1991, even though its performance in environment, health, and safety-areas that supposedly determine 51 percent of the award-had declined. The contractor accomplished this by negotiating a higher base fee in 1992,[148]

GAO reported that under the new cost-plus award fee system, DOE failed to reduce contractor awards even when serious deficiencies had been found in contractor performance.[149] 150 At Hanford, for example, multiple management errors in safety performance,[151] 152 and shortcomings in hazard analysis and worker protection at the high-level radioactive waste tank farms, *53 154 did not prevent WHC from receiving an appreciable award fee in fiscal year 1991.[155]

At the Nevada Test Site, the contractor's performance in environment, safety, and health in 1990 was rated "average." According to DOE policy, this should result in lower award fees. The DOE Inspector General found, however, that DOE field personnel adjusted the maximum award fees to allow their contractor to earn fees equal to earlier amounts-without increasing its performance score.[156]

The M&O contractor at Rocky Flats was granted an award fee of $1.7 million for 1991, even though the performance review board found that the contractor did not deserve the award. Defense Programs, the DOE office responsible for Rocky Flats, decided to overrule the board with the concurrence of the DOE field office manager.[157] DOE's EM and EH offices reviewed the award fee in an advisory role: EM supported the award; EH did not. EH opposition was based largely on 29 significant deficiencies in environment, safety, and health cited by the board. In reviewing this decision, GAO was unable to determine the weight accorded environment, safety, and health in the final award decision. GAO also recalled earlier undeserved awards to previous Rocky Flats contractors who tolerated serious environment, safety, and health problems, and noted that "some of the same problems we identified [in 1989] still exist.'' [158]

In practice, DOE contractor compliance with environmental regulations appears to receive more emphasis than occupational health and safety issues when award fees are assigned. The CPAF process does not establish what, if any, portion of the award is based on *occupational safety* and health performance. As discussed earlier in this background paper, the priorities and processes that guide Superfund and RCRA cleanups accentuate the importance of environmental cleanup schedules, costs, and possible off-site impacts of pollution, downplaying potential health and safety threats to on-site workers. DOE appears to be reasserting these priorities in its contractor awards. Contractor performance in *environmental* areas—measured by meeting schedule deadlines and milestones set forth in IAGs-appears to weigh more heavily than performance in occupational health and safety.

APPLICATION OF HAZWOPER TO DOE CLEANUP

Policy Guidance on Implementation

The DOE Office of Environmental Restoration and Waste Management has line responsibilities for the cleanup of weapons facilities. EM has made it clear that all environmental restoration and waste management activities are subject to existing DOE orders and must comply with

HAZWOPER, OSHA's construction standard (29 CFR 1926), and other relevant OSHA regulations.[159]

In December 1991, responding to earlier findings by the DOE Inspector General that failure to comply with HAZWOPER training provisions was widespread at NWC facilities,[160] the Office of the Environment within EH issued guidance on "OSHA Training Requirements for Hazardous Waste Operations.''[161] EH recently completed a draft of a document outlining HAZWOPER,[162] which essentially reiterates the requirements of OSHA's standard,[163] albeit in a more readable format. It also provides some important ancillary references that might be helpful in implementing the regulation and includes a sample outline of a site-specific HASP.

The effort proposed by LANL in October 1992 to develop a draft "Health and Safety Standard for Hazardous Waste Operations and Emergency Response" on behalf of the EH Office of Health Physics and Industrial Hygiene[164] will presumably focus more specifically on the programmatic requirements of identifying and controlling cleanup worker exposures to health and safety hazards, although available documents do not make clear how the EH HAZWOPER draft differs from the proposed LANL project. It is also unclear that either effort will significantly alter or augment the existing OSHA standard.

Full implementation of the OSHA HAZWOPER standard at DOE facilities will require considerable effort and cooperation on the part of DOE line managers and contractors. A robust implementation of the standard-for example, a program that takes into account private sector criticisms of deficiencies in OSHA's proposed health and safety training program accreditation process, includes reporting requirements and qualification criteria for physicians designing medical surveillance programs, and imposes more rigorous standards for emergency responder training—cannot occur unless DOE line managers and EH staff make such goals a priority.

It is also probable that cooperative cross-organization efforts among health and safety staff at EM and in different divisions of EH will be necessary to create workable and rigorous OSH policies for the cleanup. The EPA-Labor Task Force on Health and Safety has demonstrated that regular discussion among experienced health and safety practitioners from multiple disciplines and agencies can produce valuable insights and help resolve some of the more ambiguous and problematic questions surrounding HAZWOPER implementation. DOE's efforts to interpret and implement HAZWOPER effectively might also benefit from consultation with health and safety experts from academia and the private sector, as well as different branches of the government such as NIOSH, NIEHS, ATSDR, and the Army Corps of Engineers (ACE), who are familiar with some of the issues involved. DOE has not yet initiated any such outreach.

DOE and its contractors are not moving aggressively to ensure that the minimal requirements of HAZWOPER are met at DOE facilities. EM has not issued policies or guidance explaining how DOE field offices and contractors should interpret and implement HAZWOPER. The EH HAZWOPER draft, even if promptly finalized, will not address interpretive issues associated with HAZWOPER that were discussed in earlier sections of this background paper.

In the absence of clear DOE policies and guidance, implementation of HAZWOPER by different contractors at different facilities is certain to be of variable quality. Furthermore, compliance with some aspects of the HAZWOPER standard developing emergency response plans and meeting worker training requirements, for example-requires contractors to make preparations well in advance of initiating site cleanup activities. However, DOE has not yet carried out assessments of the resources and programs that must be established to ensure compliance with HAZWOPER. The next section of this background paper addresses the implication for DOE's complex cleanup of specific elements of

HAZWOPER that have proved contentious at non-Federal cleanup sites.

Health and Safety Plans

The site Health and Safety Plan is a cornerstone of HAZWOPER's approach to cleanup worker protection. Experience with Superfund and RCRA cleanups has shown that the design and implementation of HASPS encompass many of the most frequently encountered disputes associated with HAZWOPER.[165,166] EPA explicitly states that "there can be only one HASP per site ."[167] Many of the DOE sites, however, are huge. The Idaho National Engineering Laboratory is larger than the State of Rhode Island. Hanford is nearly as big. Even relatively small sites, such as Fernald and Rocky Flats, harbor multiple and complicated pollution sources.[168] At a given time, dozens of subcontractors may be operating on-site and potentially be exposed to different Solid Waste Management Units (SWMUs)[169,170] encompassing many different contaminants e n - vironmental transport pathways, and waste streams.

The scope and complexity of contamination throughout the NWC will probably accentuate the problems experienced at other waste sites in linking characterization data to potential cleanup worker health and safety risks. Characterization of the NWC will continue for years, and in some cases, will overlap with remediation activities and efforts to prevent contamination from spreading. It will be necessary to have systems in place that allow existing HASPs to efficiently integrate new site information, including environmental monitoring data, plans for altered or additional work tasks, and associated worker protection strategies.

Crafting HASPS that accurately delineate weapons site hazards will require a major effort on the part of DOE and its contractors. The EH Draft Hazardous Waste Operations and Emergency Response document stipulates that DOE contractors must designate a Company Health and Safety Supervisor who has "overall responsibility for development and implementation of the HASP."[171] The proposed guidance also requires that a health and safety officer be on-site during all level A,B, or high-hazard level C field operations, and during all invasive/evacuation work such as well drilling. Site OSH officers would have stop-work authorization. These provisions, if implemented, might mitigate some of the problems with accountability and chain of command that have been troublesome at non-Federal cleanup sites.

Organizing and updating the paperwork needed to document site characterization studies, work plans, and environmental monitoring results, and the challenges of linking appropriate worker protection strategies to particular cleanup jobs throughout the NWC, will be formidable. Paper reviews of written HASPs-let alone field assessments of the adequacy of implemented health and safety programs-will be daunting tasks. Thus far, the press of competing demands and limited staffing have prevented the EM headquarters Office of Oversight from reviewing a single HASP from any weapons facility.[172] No Federal or State agency currently reviews HASPS for the DOE cleanup. *73

OTA has reviewed site-wide HASPS written to support cleanup activities at some DOE facilities, but has not reviewed a sufficient number to draw generalizable conclusions. The few documents reviewed by OTA focused on weapons production activities—not cleanup operations-and emphasized hazards from radionuclide contamination. Health threats associated with potential worker exposure to hazardous chemicals did not receive much consideration, even though characterization data demonstrated the presence of these materials on-site. Potential safety threats were also given minimal attention.

The tendency of DOE and its prime contractors to focus on radionuclides and neglect nonradioactive chemical hazards has been noted by the National Academy of Sciences[174] and by DOE Tiger Teams auditing environment, safety, and

health programs at NWC facilities. This emphasis also reflects DOE staffing patterns and the importance accorded radioactive materials in DOE orders.

The focus on radioactive hazards that has traditionally characterized DOE contractor OSH practices need not be a Liability as DOE attempts to forge HASPS suitable for cleanup of environments contaminated with a wide variety of toxic materials, Although the Advisory Committee on Nuclear Facilities Safety 175 and the Defense Facilities Nuclear Safety Board [176] have strongly criticized the poor quality and dispersed organization of DOE radiation protection programs, DOE clearly has significant, if insufficient, expertise in this area. Radiation protection, which will be a critical component of worker health and safety programs during many cleanup operations at the NWC, is not an area in which many health and safety professionals outside DOE have extensive experience. If DOE "borrowed" expertise in nonradiologic hazard assessment and control from other agencies or sources of expertise, it could focus greater efforts on upgrading and applying its own capabilities in radiation protection.

The Nuclear Weapons Complex contains some environmental contaminants and mixtures of pollutants that may never be encountered at more typical hazardous waste operations, High-level radioactive waste and mixed waste (containing both radionuclides and hazardous chemicals) are in this category. For some contaminants and contamination scenarios, there are no published standards or guidelines setting forth appropriate action levels and permissible exposure limits. For example, no Federal agency has established allowable worker exposure levels for soil contaminated with radionuclides.[177]

Attempts by DOE to independently establish allowable worker exposure levels are likely to encounter strong opposition because its credibility in the field of occupational health and safety has been called into question as a result of past practices.[178-181] The need for such worker exposure levels and action levels is too pressing to wait the 3 years or longer that are usually required for OSHA to complete new rule making under the Administrative Procedures Act, EPA is working on the development of allowable soil standards for radionuclides,[182] but denies having jurisdictional authority over workers. A consensus approach that draws on expertise from EPA, NIOSH, OSHA, and other knowledgeable agencies and individuals might usefully address issues such as appropriate environmental monitoring strategies and methods, and the development of action levels and other worker exposure standards.

Medical Surveillance

In 1990 the Secretarial Panel for Evaluation of Epidemiologic Research Activities at DOE (SPEERA) strongly criticized DOE's past efforts to conduct medical surveillance among weapons production workers. In particular, SPEERA noted that epidemiologic studies and health surveillance programs were uncoordinated and lacked the capacity to monitor workplace exposure, to evaluate such exposure in terms of workers health, or to prescribe the corrective actions required. *83

DOE and its contractors still have very limited ability to monitor worker exposure to toxic materials. This is true even for weapons production workers, whose exposures are technically and administratively much less difficult to track than those of cleanup workers. Medical staff at many DOE facilities do not have access to information documenting potential production worker exposures and are not informed of job transfers that might result in worker exposure to hazardous materials.[184-190] Thus, some NWC facility medical departments are unable to verify that workers who are potentially exposed to hazardous materials are receiving appropriate medical surveillance.[191]

Efforts to establish a viable system of medical surveillance for workers engaged in the DOE

cleanup facilities must overcome several obstacles. The initial problem is that worker job titles and tasks, management procedures, and the organizational structure of occupational medicine departments are different at each weapons facility.[192] This makes it difficult to craft and implement DOE-wide procedures that would identify individual workers who potentially face hazardous exposures, are at greatest risk of acquiring work-related illnesses, and are required by DOE orders or OSHA standards to be offered inclusion in medical surveillance programs.

The task of identifying individual cleanup workers at high risk for exposure to potentially toxic contaminants and in need of medical surveillance is further complicated by the panoply of employers engaged at a given site, and by the lack of any coherent analysis of characterization data from the perspective of potential worker exposures. Medical directors at DOE facilities are not informed when subcontractors are working on-site, do not assess the potential hazards that subcontractor employees might encounter, and do not review subcontractors' medical surveillance programs.

Another problem impeding efforts to develop DOE medical surveillance programs that comply with HAZWOPER is the lack of influence and authority of the EH Office of Occupational Medicine.[193,195] which would presumably be the source of policies related to cleanup worker medical surveillance.

When DOE established the Office of Health within EH in May 1990, separate offices were assigned responsibility for industrial hygiene and health physics, epidemiology and health surveillance, and occupational medicine[196] (see figure 3-2). This reorganization of health activities was a direct response to SPEERA recommendations and accomplished the important goal of collecting previously disparate health-related programs under a single Deputy Assistant Secretary. It is not clear, however, that this reorganization has effectively signaled the importance of occupational medicine to DOE and its contractor managers, or improved the visibility and status of occupational health and safety professionals at DOE.

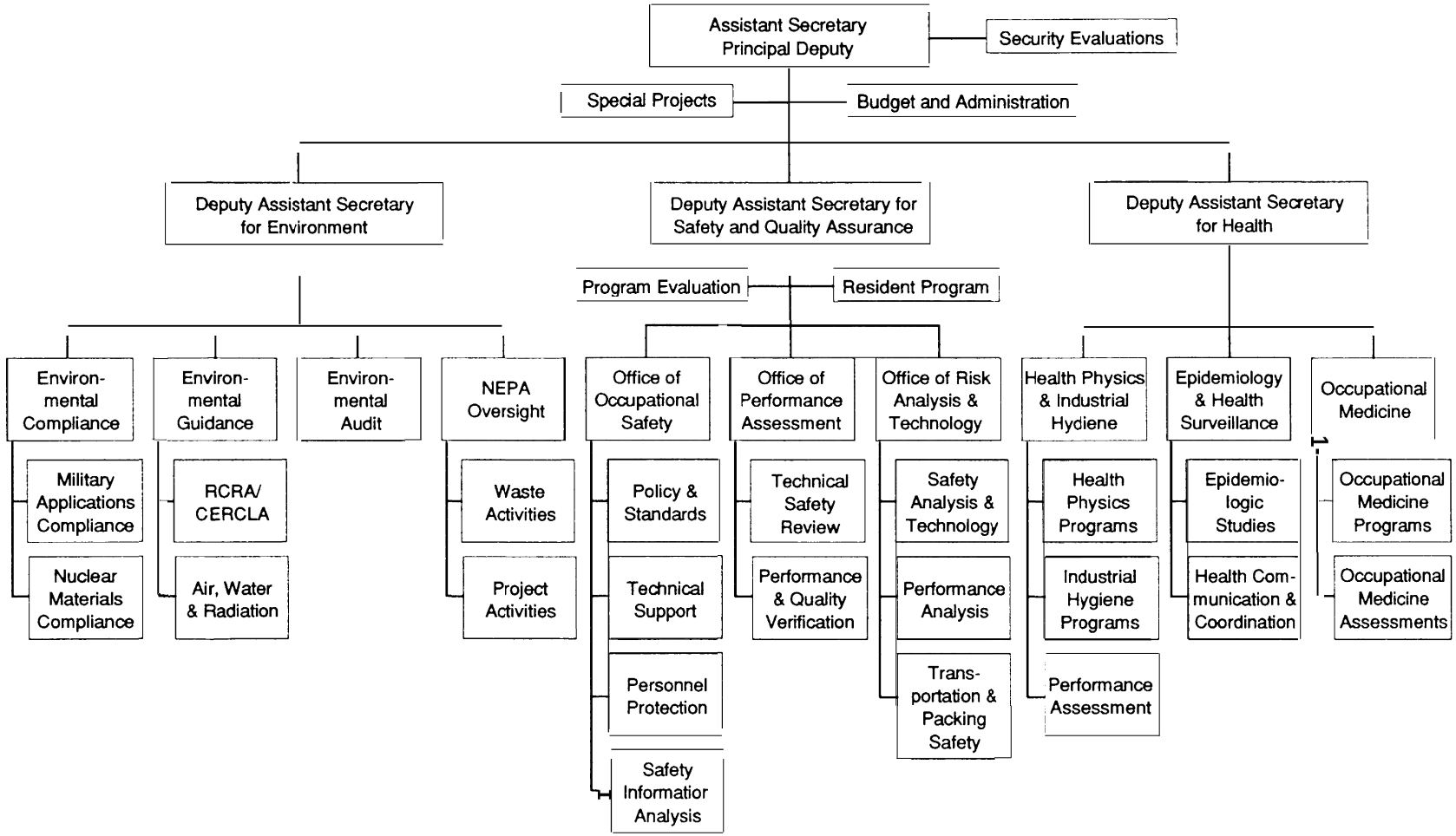
The separate Offices of Environment, Safety, and Health within EH and the different divisions in the Office of Health appear to remain independent domains with their own agendas. OTA found little evidence of coordination or communication among the Offices of Health Physics and Industrial Hygiene, Occupational Medicine, and Epidemiology and Health Surveillance, and no indications of regular contact between EH staff and health and safety professionals working in DOE line organizations.

The DOE Office of Occupational Medicine continues to exert little influence within DOE or among its contractors. Neither the newly created Office of Occupational Medicine, nor the Office of Epidemiology and Health Surveillance, had acquired its full complement of staff when a hiring freeze was imposed across all EH divisions. Consequently, as of late 1992, both of these offices remain well below projected size.[197,198]

In June 1992, DOE Order 5480.8A, which prescribes minimal occupational medicine program requirements for DOE contractors,[199] was updated for the first time in more than a decade.[200] The new order has the potential to place occupational medicine in a more proactive role at DOE facilities. For example, under the new order, managers must ensure that site occupational medicine physicians are informed of worker exposures.[201] On paper, the new Contractor Occupational Medicine Order is a significant improvement; the speed and thoroughness with which the order is actually implemented will be important indicators of managers' readiness to embrace a strong health and safety presence at the operations level.

EH had to make important concessions to DOE program offices to win approval of the Occupational Medicine Order, however. To achieve the "consensus" among DOE Program Secretarial Officers that is a prerequisite for adoption of most EH policy recommendations, EH dropped

F gu e 3-2—Assistant Secretary for Environment, Safety, and Health



SOURCE: U.S. Department of Energy, 1992.

language requiring that contractor medical directors report directly to the site manager and instead allowed the option of medical directors reporting to "another management level with sufficient authority to ensure program effectiveness."[202,203] The importance of this concession is reflected in comments by the National Academy of Sciences,[204] SPEERA,[205] and OSHA,[206] These expert reviewers observed that occupational medical input to decisions at DOE facilities was "negligible" and "inadequate"; that medical departments were relegated to a reactive role at DOE facilities; and that these roles were mirrored at DOE headquarters.

In 1991 and 1992, EH conducted audits of occupational medicine programs throughout the Weapons Complex. These studies documented that as of 1992, occupational physicians at many weapons facilities remain uninformed of workers' potential exposure to hazardous materials, that physicians continue to experience problems in getting the attention of decision makers, and that every occupational medicine program in the Weapons Complex has fewer staff than called for by DOE orders .207-213

The weakness of contractor occupational medicine programs has important implications for the cleanup. As matters now stand, there is no entity in DOE or its contractor corps capable of designing, conducting, or overseeing the medical surveillance of cleanup workers required under HAZWOPER. In the absence of guidance from DOE, contractors and subcontractors are free to pursue any notion of adequate medical surveillance that a licensed physician is willing to endorse. Under these conditions, the quality and comprehensiveness of cleanup worker medical surveillance are destined to be uneven. The costs of this service are also likely to vary considerably because DOE has no means of competently assessing the scope or effectiveness of proposed surveillance activities.

The development, implementation, and analysis of useful medical surveillance data necessarily represent a multidisciplinary task requiring the cooperation of health experts from many disciplines including medicine, industrial hygiene, health physics, biostatistics, and epidemiology. OTA found little indication that the institutional capacity for such cooperative efforts exists at DOE.

In its approach to medical surveillance for the NWC cleanup, DOE is repeating some of the mistakes critics have accused it of making in studying the health outcomes of radiation-exposed workers.[214,215] DOE is not reaching beyond its own organization to gather expertise from other government agencies or the private sector. The failure to institute an effective quality assurance program for medical surveillance data collection and analysis will compromise any findings the data might suggest. The absence of any system for following individual workers' cumulative exposures to hazardous materials will also limit what lessons can be learned from medical surveillance efforts. The data documenting surveillance activities will differ not only from site to site but also among subcontractors. There will be little chance of pooling data from different vendors in ways that support sound science, and the opportunity to learn what kinds of surveillance are useful, which are a waste of time and money, and what types of cleanup task or exposures are problematic, will be lost.

Finally, it is very important that DOE make a strong effort to guarantee workers that the contents of individual medical records will be treated confidentially, that pooled information used for research purposes or made available to the public will not permit identification of individuals, and that the contracts and affiliations of persons conducting medical surveillance will be disclosed if requested. These steps are necessary both to encourage extensive worker participation in surveillance projects and to comply with standard ethical medical practices.

Health and Safety Training

A December 1990 DOE Inspector General's report documented that contractors at seven M&O facilities and three field offices were not complying with AZWOPER health and safety training requirements. The report noted that the root causes of noncompliance were "acceptance of non-compliance conditions and a lack of corporate and DOE ownership of problems;' as well as failure of DOE field offices to issue site-specific guidance to M&O contractors or to monitor contractor training efforts.[216]

In response to these findings, EH staff prepared guidance on "OSHA Training Requirements for Hazardous Waste Operations.'' [217] Although this guidance does spell out procedures for documenting training at DOE sites, it is little more than a near-verbatim reiteration of the sections of the OSHA regulation that deal with worker training, stapled to a copy of EPA's "Fact Sheet on Establishing Work Zones at Uncontrolled Hazardous Waste Sites."[218] The guidance document does not indicate what the content of training curricula for DOE cleanup projects should be (beyond reproducing OSHA's suggested HAZWOPER course content checklist), nor does it incorporate the training course accreditation criteria proposed in OSHA's 1910.121 regulation[219] or indicate that DOE will evaluate the adequacy of cleanup worker health and safety training programs.

A year after EH released the guidance on HAZWOPER training, the Colorado Health Department found violations of RCRA training requirements among DOE contractor personnel at the Rocky Flats Plant.[220] In May 1992, the DOE Hanford contractor denied State inspectors from the Washington State Department of Ecology access to personnel training records. The State cited the contractor for "failure to properly identify personnel in the training plan," a violation that could include penalties up to $6,000 per day. DOE has admitted that under the terms of the DOE-Westinghouse contract, it would be compelled to reimburse Westinghouse for these fines.[221]

The National Defense Authorization Act for fiscal years 1992 and 1993 authorized DOE to award training grants to workers engaged in hazardous substance response or emergency response at nuclear weapons facilities.[222] DOE and NIEHS have begun collaborative efforts in this area.[223] [224]

A provision in an earlier Defense Authorization Act had required DOE to evaluate the suitability of NIEHS Training Grants for workers involved in hazardous waste operations and emergency response at DOE facilities.[225] In the course of its assessment of NIEHS training programs, DOE found that about half of the DOE contractors had trained all or most employees targeted for 24- and 40-hour health and safety courses. DOE also discovered that its contractors were "taking various approaches" to defining populations of employees who require training under HAZWOPER. At some DOE facilities, decisions about worker training were left to subcontractors who conducted cleanup operations.[226] The survey revealed that the confusion evident at non-Federal waste sites about which workers should receive 24 hours of training and which should undergo 40-hour training sessions was also bothering DOE contractors.[227] DOE facilities were relying on an assortment of vendors to deliver training, at costs of $1,000 to $1,200 per trainee for a 40-hour course.[228]

The report also noted a number of barriers to utilization of NIEHS training programs. It was suggested that NIEHS grant programs might be more attractive to DOE contractors if DOE headquarters guidance and standards "were to specify as a minimum criterion for all training that it meet the requirements of the [proposed 29 CFR 1910.121] OSHA rule on training program accreditation . . .".[229] DOE has not promulgated such guidance, however. Although EH plans to develop curricula for all worker health and training courses to be implemented by DOE line organizations, there is no program to develop mini-

mum criteria or course content for the cleanup on an urgent basis. DOE contractors continue to comply with HAZWOPER's worker training requirements without any guidance from DOE headquarters on course content, type or extent of hands-on training, or site-specific training needs.

The International Association of Firefighters (IAFF) has expressed concern that NIEHS grant monies set aside for DOE workers will not be directed toward the special training needs of firefighters. The IAFF contends that firefighters who might be called on during emergencies related to DOE cleanup activities—including personnel employed at on-site fire brigades and members of municipal fire departments located near weapons sites—are in urgent need of extensive training in hazardous materials incidents. 230 The IAFF maintains that most NIEHS programs do not provide adequate training for emergency response (ER) professionals,[231] and argues that firefighters require more substantive training courses than those that merely satisfy the minimal number of hours stipulated by HAZWOPER.[232] IAFF believes that providing adequate training for ER professionals should be a top priority in worker health and safety efforts at all hazardous waste operations, including DOE weapons facilities.[233]

The IAFF conducted an informal survey of hazardous materials training among emergency responders employed in fire brigades at DOE facilities and at fire departments located in communities near nuclear weapons facilities.[234] All responders reported having had some emergency response training, but most had received only "awareness/operational level" instruction. Training was provided by a variety of vendors including in-house instructors (Hanford); State-certified instructors (Savannah River, Oak Ridge National Laboratory, and Hanford); community college- or university-based training programs (Pantex, Rocky Flats); and instructors from a national chemical manufacturing concern (Hanford). There is presently no way of evaluating the content or quality of these courses.

Emergency Response

DOE weapons facilities have written emergency response or disaster plans addressing emergencies that might arise from regular (weapons production) operations at each facility.[235] All DOE facilities have on-site fire brigades and are required to establish liaisons with local fire departments and medical facilities.[236] DOE Tiger Team audits of environment, safety, and health performance at weapons facilities have documented deficiencies in emergency preparedness at DOE facilities, although these assessments presumed continued weapons production operations and did not usually address risks from environmental cleanup activities.

The Ahearne committee report noted that Hanford does not have plans to handle an emergency at high-level waste tanks.[237] The committee also concluded that at Rocky Flats, the potential release of toxic chemicals, "which could be catastrophic to the on-site population," had been inadequately assessed,[238] and that Rocky Flats "has not had much success in demonstrating its emergency preparedness and response capabilities, even in exercises" carried out as late as May 1991.[239] The Ahearne committee found fire detection and suppression systems at Rocky Flats to be "antiquated" This finding is of particular concern because, historically, fires have been the greatest safety hazard at that location. Recent decisions to cease production operations may reduce the possibility of accidents and emergency situations at this facility.

Many emergency scenarios that could plausibly arise during the DOE cleanup would require the involvement of off-site fire departments and emergency medical teams. At Pantex, where assembly, dismantlement, and testing of conventional explosive components of nuclear warheads take place, the Tiger Team found off-site medical facilities to be inadequate and noted no evidence that DOE had ever audited the real status of medical response there or compared actual capabilities to the commitment made by the local hospi-

tal in written contracts.[240] DOE has taken steps to remedy these deficiencies.

It is difficult to assess the ER capabilities available at DOE facilities with respect to cleanup tasks, in part because neither DOE nor its contractors have surveyed the possible emergency response needs specifically associated with environmental restoration and waste management operations. Most emergencies that might plausibly arise from environmental restoration or waste management functions are likely to be less calamitous than the worst-case scenarios associated with weapons production activities. Some exceptional situations covered by the environmental restoration and waste management program-such as the potential for fire or explosion at the Hanford tank farm where residues of high-level radioactive waste are stored, fire in a radiation-contaminated building at Rocky Flats, or an emergency involving vitrification of high-level radioactive waste-could potentially jeopardize large numbers of workers or pose significant risks to off-site populations.

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