An Opportunity: Improving Client Services During Disaster Relief
Omar Keith Helferich; John E Griggs
Journal of Environmental Health; Nov 2006; 69, 4; Research Library
pg. 34

Guest Commentary

Omar Keith Helferich, M.S., M.B.A., Ph.D.
John E. Griggs, M.B.A., Ph.D.

An Opportunity: Improving Client Services During Disaster Relief

Experience and research show that we must improve our response to catastrophic incidents regardless of their nature—natural disasters, emerging diseases such as avian influenza, or terrorist events. This commentary discusses in-field observations of responses to catastrophic incidents, reviews of after-action reports, and research funded by the Department of Homeland Security.

The authors believe that solutions exist that would allow improvements to be made in the provision of basic client services (e.g., sheltering, feeding, health care) following a catastrophic incident. Aside from the obvious issue of funding, support for incremental improvement from organizations such as NEHA and the American Red Cross is a necessity.

In-field Observations

As assistant director of logistics operations for the American Red Cross (ARC), Dr. Helferich, a 15-year ARC volunteer, helped direct the logistics operations for the feeding and sheltering of Hurricane Katrina victims. This and other on-the-ground disaster recovery experience has provided insight regarding shortcomings and opportunities in the provision of basic client services.

Effective communication in the actual in-field situation remains a significant challenge: after Hurricane Katrina, phones were generally not operable, mobile phones were not dependable, and wireless technology was not available. Public needs and the availability of resources (e.g. food, water, housing, and health) are still often assessed and communicated via paper-based systems, which leads to inaccurate, inconsistent, and outdated information. Environmental health response teams collect necessary assessment data using clipboards, thus requiring the additional step of data entry upon returning to the response headquarters. This process increases errors and slows response to critical environmental health issues (e.g., contamination caused by general water pollution, mold, feces, chemical toxicity, oil, and pest infestation). All of the supporting response teams (e.g., ARC, environmental health agencies, faith-based groups, and governmental agencies) seem to experience this lack of reliable information and communication systems.

Unfortunately, methods of communication were antiquated in far too many instances during our collective response to Hurricane Katrina. For example, during the first few weeks of response, critical communications among food preparation operations, feeding stations and shelters, and the ARC command center relied on courier services. These same basic problems have been observed in other disaster operations such as after the Oklahoma City Bombings, after the September 11 terror attacks, and during responses to floods and hurricanes.

After-action Reports

The above observations are supported by a 2004 American Red Cross research support initiative, conducted under the direction of the authors. In addition, Katrina after-action reports pointed out a number of similar issues.

All of the research and reviews indicate that the problem of loss of land line connectivity and limited cellular bandwidth is to be expected. This problem is compounded by competition among various disaster operations vying for the limited amount of telecommunications resources that are available. ARC also lacks technology that allows databases to be shared among the various logistics operations, other ARC service functions, and other agencies.

The reviews clearly indicate that ARC must implement software-based solutions that are user friendly, compatible with other ARC operating systems, and readily available to all ARC Chapters, Service Areas, and disaster operations personnel. A Web-based software solution that works across relief agencies, coupled with improved communication infrastructure, will save time and money in the long run. It will also provide better tracking of inventory and expenditures. For safety, quality, materials, and public health assessment and control, ARC must leverage Web-based technology with use by various disaster relief organizations. It must acquire current systems that can be configured for normal ARC chapter operations and that, for cost and efficiency reasons, also can be used for disaster response and recovery. A common solution must be available across functional areas such as damage assessment, shelter, kitchen, mental health, and medical; the solution needs to allow for information sharing.

Homeland Security–Sponsored Research

GSC Mobile Solutions, in conjunction with Michigan State University (MSU), is working on a research project funded through the National Center for Food Protection and Defense (NCFPD). This Homeland Security Center of Excellence was formed in July 2004 and is charged with addressing the vulner-

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

ability of the nation's food supply chain to intentional or unintentional contamination with biological or chemical agents.

GSC Mobile's NCPFD research is designed to provide two primary outputs: 1) a framework for the development of "best-practices-standard" food protection processes out of routine assessment/audits through detection of noncompliance and incident response and recovery and 2) "proof of concept" that a bi-directional risk-based field incident management system (FIMS) for communication and decision support creates added value in situations ranging from routine assessment to response and recovery—from incident source through incident command system. The goal is to demonstrate that a risk-based system will fill the communications gap identified through on-the-ground experience and research findings. The authors of this commentary are co–project directors of these initiatives. The research has produced the following key preliminary findings:

- The best opportunity to create an effective assessment and response network is to consider the system as a process control system with three elements: 1) routine assessments or monitoring, 2) tests of abnormality with identified triggers for evaluation, and 3) response and recovery.
- A major area for improvement in catastrophic-incident process improvement is the inadequacy of disaster response/recovery communications needed for damage assessment, rescue and recovery, provisioning of food and water, client sheltering, environmental health, public safety, pollution control, and other client services.
- Both private and public organizations, for reasons of cost and efficiency, require a single solution covering routine, abnormal, and major incidents.

The proof of concept for FIMS will be evaluated through the following sources:

- development and testing of a pilot or prototype system to demonstrate use of Web-based technology for safety, quality, and security;
- a survey conducted in collaboration with NEHA of current and in-process emergency preparedness and response systems; and
- a review of current computerized systems that are or could provide the basis for safety, quality, and security solutions.

The prototype being tested contains the following elements as suggested within the findings:

- *routine inspection and assessments:* risk-based scheduling, execution, assessment, and follow-on processes related to the conduct of routine inspections (e.g., quality, safety, and security protection) and assessment;
- *assessment for abnormal operations:* tracking and analysis of "abnormalities" that are uncovered through the routine risk-based scheduled or random inspection-and-assessment process; and
- *incident response and corrective action:* tracking and assessment of an abnormality that rises to the status of an "incident" or dealing with an incident of natural origin or a planned incident of criminal origin.

A pilot survey of 30 environmental health organizations, while not envisioned as part of the initial NCFPD research goals, gave indications that a knowledge gap was occurring in terms of capability to respond to bioterrorism attacks at a local level. The research team, therefore, elected to conduct a comprehensive full survey of the overall population of U.S. environmental health organizations to 1) gain insight into the level of organizational awareness about the National Incident Management System (NIMS), 2) assess the extent to which environmental health organizations had adopted technology, and 3) ascertain opinions of these organizations about the role of environmental health professionals in prevention of and response to bioterrorism attacks.

The preliminary findings from the pilot survey of 30 county agencies, which intended by the authors to gather insights rather than achieve statistical accuracy, are as follows:

- Fewer than half of the county environmental health agencies had completed all of the required NIMS training.
- Only one agency reported the use of an installed software solution for tracking foodborne-illness incidents, while approximately 75 percent of the agencies reported that they had yet to begin discussions concerning the use of an in-field information system for assessment and tracking.
- Approximately 50 percent of the agencies believed that health inspectors would likely have a role in responding to a bioterrorism attack; approximately one quarter were evaluating whether they would be involved.

Analysis of current software applications is an additional way to test the hypothesis that a software solution should provide an environmental health department with added value in emergency preparedness and response. The research will use a small stratified sample of representative environmental health departments, small to large, whose current practices range from no software solutions through completely manual solutions.

A phrase that the authors believe will summarize the position of environmental agencies is the old "empowered but not enabled."

On the basis of results from the pilot survey, the M.S.U. National Center for Food Protection and Defense research team, in collaboration with NEHA, is in the process of developing a survey targeted at a statistically stratified sample of the NEHA membership. Development and distribution of the survey are planned for the next few months, with results available in early 2007. The objective is to obtain knowledge that will provide the basis for enhancing the effectiveness of the environmental health profession over the entire incident management process. The targeted survey areas include but are not necessarily limited to the following:

- information that will contribute to the understanding of the current position and role of environmental health professionals on matters related to emergency preparedness and response;
- identification of potential areas of knowledge and resource gaps for emergency preparedness and response;
- identification of tools, equipment, and information technology gaps for emergency preparedness and response;
- identification of the status of and potential gaps in environmental health emergency-preparedness-and-response processes; and
- determination of the status of measures needed for evaluation of emergency preparedness and response programs and performance monitoring.

The outcomes will serve as the basis for improvement programs, training, and resource requests. Research is continuing through the Department of Homeland Security grants and is being expanded to include collaboration with the private sector, disaster response agencies, and environmental health agencies to assess readiness for potential public health threats resulting from catastrophic incidents. Preliminary findings have also suggested a) that there is a need for greater awareness of the critical role of the environmental health profession in all stages of incident management; b) that there is a gap in the knowledge and technology needed to meet basic public needs following a catastrophic incident, such as feeding, sheltering, transportation, and environmental health services; and c) that while solutions are available, they are of little practical value without decision-maker support and funding.

continued on page 37

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

TABLE 1

Failure Rates Versus Economic Useful Lives of Septic Systems

Annual Failure Rate	Economic Useful Life (Years)*
1.0%	100
1.5%	67
2.0%	50
2.5%	40
3.0%	33
4.0%	25
5.0%	20

*Inverse of malfunction rate.

advanced-treatment onsite systems with nutrient removal are now necessary to protect water quality. A brief description of performance malfunctions follows.

Bacteria Malfunctions

Insufficient bacterial purification of onsite septic systems is usually associated with insufficient depth of unsaturated adequate soils. Improved groundwater information may reveal that some septic systems are in bacterial-performance malfunction status.

Nitrogen

Many coastal areas are considering and proposing sewering to address the nitrogen contributions from conventional septic systems; advanced onsite systems can, however, perform as well as centralized treatment. In areas where the receiving water body is a drinking-water aquifer, onsite-system effluent requirements of <10 mg/L of total nitrogen (TN) are now becoming commonplace. In coastal areas, water quality conditions may require standards at the accepted limits of current technology for nitrogen removal, TN < 3 mg/L. Although conventional onsite systems may be in malfunction status in terms of meeting effluent requirements, advanced onsite systems can achieve those standards, often through retrofit, in a more cost-effective manner than sewering.

Phosphorus

Although many onsite systems have relied upon the ability of soils to remove phosphorus, recent research has shown that soils have limited and possibly reversible sorption capacity and that some soils have little to no phosphorous removal capability. Also, a number of bio-geochemical reactions control phosphorous removal in drainfield soils. Using advanced treatment systems that remove biochemical oxygen demand, total suspended solids, and nitrogen before effluent reaches the drainfield may prevent the phosphorus-removing bio-geochemical reactions from occurring and thereby possibly create a performance failure in phosphorus-sensitive areas. Knowledge of the soil mechanisms in phosphorous removal is imperative to ensure that phosphorous performance failures do not occur with newly installed systems.

Emerging Contaminants

Consideration of emerging containments, such as endocrine disrupters and personal-care products, may increase treatment performance requirements in the future and thereby create a new malfunction definition. In the interim, however, communities whose drinking-water aquifers receive effluent from onsite systems may wish to utilize indirect-water-reuse guidelines to determine if malfunction is occurring. These guidelines specify minimum treatment requirements depending upon the percentage of the water supply that is wastewater derived.

Conclusion

The definitions this paper lays out for *annual malfunction rate* and *percentage of septic systems in malfunctioning status* can be good matrices for communities attempting to benchmark their onsite-wastewater-management programs. Also, because the use of these definitions allows problems to be clearly identified by type and location, it makes possible a rational analysis of the most appropriate solutions for a community.

Corresponding Author: Pio Lombardo, President, Lombardo Associates, Inc., 49 Edge Hill Road, Newton, MA 02467. E-mail: Pio@LombardoAssociates.com.

Visit → www.neha.org

- Job Center
- Students Section
- Research and Development
- Credentialing
- Continuing Education
- AEC & Exhibition
- Regional Workshops
- Awards and Scholarships
- National Radon Proficiency
- Terrorism and All-Hazards Preparedness Resources
- Online Training and much, much more!!

An Opportunity: Improving Client Services During Disaster Relief

Continued from page 35

Summary

Access to current, accurate, and relevant information is mandatory for effective disaster response. In-field observations, reviews of after-action reports, and basic research indicate that this most basic of requirements is not being met.

Participating disaster recovery parties, in particular environmental health agencies, lack clarity about their exact roles and lack the most basic of technological solutions that could support any given role definition.

There is a need, from both cost and training perspectives, for a single, integrated solution covering risk-based routine inspections, abnormalities, and major incidents.

Corresponding Author: Omar Keith Helferich, Department of Homeland Security Co–Project Leader at MSU and Supply Chain Management Faculty at Central Michigan University, 5633 Bayonne Avenue, Haslett, MI 48840. E-mail: okeithhelferich@msn.com.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.