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Toxic and Contaminant Concerns Generated by Hurricane Katrina¹

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When Hurricane Katrina flooded the city of New Orleans, one of many concerns in its wake was contamination. Several chemical plants, petroleum refining facilities, and contaminated sites, including Superfund sites, were located in areas covered by floodwaters. Some 565 oil spills were noted in the wake of Katrina as a result of failures in the petroleum production and refining infrastructure. In addition, hundreds of commercial establishments such as service stations, pest control businesses, and dry cleaners use potentially hazardous chemicals that may have been released into the environment by the floodwaters. Adding to the potential sources of toxics and environmental contaminants are metal-contaminated soils typical of old urban areas and construction lumber preserved with creosote, pentachlorophenol, and arsenic. Compounding these concerns is the presence of hazardous chemicals commonly stored in households and the fuel and motor oil in approximately 400,000 flooded automobiles. Uncontrolled biological wastes from both human and animal sources also contributed to the pollutant burden in the city. Although the flooding in New Orleans resulted in the potential for unparalleled exposure to toxics and contaminants, initial concerns about a "toxic gumbo" have not been supported by sampling and analyses to date. Although floodwaters did contain significant short-term biological hazards that posed risks to stranded residents and relief workers, they did not contain chemical toxicants at levels that are expected to lead to long-term impacts on the surroundings, beyond the impacts expected of a similar volume of storm water from the city (Pardue et al. 2005).

Although floodwaters were removed from the city by October 11, 2005, their legacy of contaminated soils, sediments, debris, and houses remained. Sediment mobilized from storm surge

through Lake Pontchartrain and the Mississippi River Gulf Outlet/Industrial Canal was deposited in the city. Presley et al. (2006) found several inorganic constituents (arsenic, iron, and lead) and organic constituents (mostly PAHs) in sediments from New Orleans that exceeded EPA Region VI Human Health Specific Screening Levels for soils. EPA also identified a number of sediment samples that exceeded screening criteria of the local regulatory authority (EPA 2005), the Louisiana Department of Environmental Quality (Risk Evaluation/Corrective Action Program or RECAP—LDEQ 2005). The constituents most often found to exceed the RECAP screening criteria were arsenic, lead, several PAHs (including benzo[*a*]pyrene), and diesel range organics.

Screening levels, however, are not action levels or cleanup levels but instead identify areas where no further investigation or action is required. Screening levels are typically developed assuming conservative exposure scenarios that may not be applicable, given the uniqueness of the short-term exposure pathways associated with the hurricane. Action levels or concentration standards for cleanup might be defined using site-specific exposure and contaminant fate and transport data. Although the sampling and analysis required for a site-specific assessment and evaluation approach can be costly, using screening levels as remedial goals could also be costly unless there is some assurance of a commensurate reduction in risk. An individual homeowner can assess the contamination on his or her property, but, in the absence of government support for testing and cleanup, the responsibility and cost would fall disproportionately on the poor, effectively meaning that little or no testing would be conducted on individual properties. However, a generic response to potential contamination would undoubtedly lead to the destruction of property that does not pose excessive risks and would further delay the return of people to their homes.

Further complicating the evaluation of risk, the frequency and distribution of elevated concentrations may not differ from pre-Katrina conditions in the city. For example, about 40% of nearly 5,000 soil samples collected prior to the flooding showed lead levels in excess of 400 mg/kg (Mielke et al. 2004; Pelley 2006), and background levels of arsenic are of the order of 10 mg/kg throughout the Mississippi River Delta region of southern Louisiana (Gustavsson et al. 2001). Thus, the question arises as to whether individuals might be willing to delay their return and even support decisions about which neighborhoods might be rebuilt, based on pre-Katrina contamination levels. The cleanup might be an opportunity to reduce exposure to toxics and other contaminants, regardless of whether the contamination was pre- or post-Katrina. However, this would undoubtedly require that the citizens of New Orleans accept a diversion of reconstruction funds to environmental cleanup. Other questions involving contamination concerns will influence decisions about which neighborhoods might be changed to lower exposure parklands or to other uses, to the appropriate balance of expenditures for environ-

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mental restoration and flood protection, to administrative or legal mechanisms for government to make decisions and for citizens to appeal them, and to the role of government condemnations in these decisions. Answers to these questions will be formed in the coming months, both through systematic processes and by the more chaotic process of personal decisions by individual returning residents.

Although the focus of the previous discussion has been on residual contamination of soils and sediments by toxics, even more difficult assessment concerns are posed by the presence of mold and airborne mold spores in homes. Unlike air, water, and soil contamination, there is little scientific basis for evaluating the potential effects of mold on human health or for developing risk-based action or cleanup levels. Mold counts of 50,000 spores/m³ are considered very high; spore counts as high as 650,000 spores/m³ were observed by the Natural Resources Defense Council (NRDC) in a home in mid-city New Orleans (NRDC 2005). Because there are no standards to which these mold counts can be compared, there is no clear regulatory responsibility among federal agencies for indoor air. High mold counts are cause for concern, however, and both NRDC and EPA recommend that returning residents use respiratory protection and remove all porous construction materials, including carpets and dry-wall, from flooded homes. The pervasive nature of mold contamination of New Orleans in the aftermath of Hurricane Katrina and the lack of knowledge on the risks of mold and airborne mold spores suggest that additional research is needed to improve our ability to respond to this problem.

Outlook and Recommendations

Cost effective guidance for remediation of any properties contaminated by Katrina requires site-specific assessment and evaluation of areas where contaminants exceed adopted screening standards. Normally (i.e., with no massive catastrophic event such as Hurricane Katrina), existing institutions (local government, insurers, and banks, etc.) could handle the volume of site-specific assessments. However, in the wake of Hurricane Katrina (and, by analogy, other large-scale disasters), there is a need for uniformity and equity in decision making. Several principles should guide that decision making.

First, the scale of decision making in this case and the number of people impacted by decisions about reconstruction are unprecedented. Thus, there are no “off-the-shelf” models that can be applied.

Second, rules by which decisions are made should be uniform, transparent, and consistent with existing hazardous waste and natural disaster cleanup criteria.

Third, there must be a balance between the cost of maximizing equity by making case-by-case determinations and the need for making many decisions in a relatively short period of time. In the absence of rapid decisions and answers to the many outstanding questions, individuals will proceed to define the future of New

Orleans based on their own circumstances and desires. In that event, uniformity and equity are likely to suffer.

Finally, there must be a system of checks and balances to ensure that government does not simply “take” individual properties. Checks and balances should be based on existing methodologies such as scientific peer review; public involvement; cooperative efforts between local, state, and federal agencies; and public-private partnerships. The critical test of a legal process is not whether an agency chooses the alternative preferred by the public but whether the public perceives that the process is fair.

Ultimately, the lessons learned (or missed) from Katrina should be crystallized in a generic form so that the country as a whole will be better prepared for the next natural disaster, major industrial accident, or act of terrorism. Thus, every effort should be made to put aside partisan concerns to solve real, significant problems in the way we process information in emergencies and to make sensible, safe, and equitable cleanup/habitability decisions in an environment of great uncertainty. Because existing institutions were largely unprepared for a disaster of the scale of Katrina, it may not be possible to implement these principles in New Orleans. However, we can learn from Katrina and provide more effective responses to future catastrophes.

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