

## Guidance on Debris Management for Recovery: Lessons Learned

### 1. General

The main priority is to focus on those recovery and collection activities that will be the quickest to implement, with the least amount of human exposure to any hazardous or toxic materials present in the waste stream. Following collection efforts, materials are to be recycled if feasible, or transported to an appropriate disposal facility.

Typically, there will be two major phases to a debris management strategy. The first is the removal of debris which could cause an immediate threat to public safety (highly unstable structures, clearing of roadways, etc.). Generally, the opportunities for diversion and recycling during this phase will be limited. The second phase is long-term debris removal associated with recovery. This phase provides the greatest opportunity for diversion and recovery.

Wastes vary significantly but generally consist of the following categories: concrete, asphalt, metals, green waste, plastic, sandbags, soil and rock, wallboard, glass, white goods, brown goods, bricks, household hazardous wastes, furniture and personal belongings such as clothing.

Conventional waste collection equipment will have limited use during initial stages of disaster debris clean-up. Target large areas with “collection zones” set-up for efficiency assigned to one contractor. Establish multiple zones within close geographic areas so contractors do not interfere with each other during collection. Utilize *end-dump trucks and tracked excavators with grapples and/or wheeled bucket loaders* to handle large scale debris clean-up. After a couple of passes, traditional collection assets such as *roll-off containers and rear and front end loading packer trucks* can swing into service for individual cleanups.

Develop multiple staging areas around impacted areas with targets in mind for materials to be processed. Set up areas for concrete and asphalt crushing close to areas accessible for future construction areas, wood and tree grinding in areas that will need organic supplements or slope stability improvements, metal and vehicle processing as close to the Port as possible since eventual markets will probably be off-shore or at least transported by ship.

Set up industrial hazardous materials processing sites near commercial/industrial areas. Do not waste resources on retrieving small quantities of household hazardous waste (HHW). Target



International Federation  
of Red Cross and Red Crescent Societies



those larger quantity generators for special handling and allow small quantities of HHW commingled with other debris to move to regular MSW landfills with composite liners.

Handle all soft goods such as bedding, mattresses, curtains, carpet, clothes as soon as possible. No salvageable material will be collected from these items. These items will be extremely heavy and hard to handle and will need to be mechanically loaded by *bucket loaders and/or excavators with grapples*.

In Kauai, HA, residents were asked to place residential debris into five piles at the curb: green waste; metals and appliances; wood debris; aggregate materials (including toilets, tile roofing and concrete) and mixed debris.

## 2. Management of Specific Wastes

### 2.1 School Laboratory Materials

School laboratory materials in small quantities (less than 220 pounds per school) can be commingled with other debris and handled by conventional waste collection methods and disposed of in municipal solid waste (MSW) landfills.

### 2.2 Household Hazardous Materials

Household hazardous materials can be commingled with other debris and handled by conventional waste collection methods and disposed of in municipal solid waste (MSW) landfills.

### 2.3 Automobile-Related Materials (Tires, Lubricating Fluids, Mercury Switches, Lead-Acid Batteries, Contaminated Gasoline/Diesel Fuel)

Whole car and truck bodies can be handled through establishment of additional processing areas as identified above. Any household or consumer auto type wastes can be handled safely enough through regular conventional waste collection.

### 2.4 Propane Tanks

Need to be segregated and removed to a processing facility where they are emptied and recycled. Best handled with white goods on a house-by-house basis.

### 2.5 White Goods (Freon Recovery and Mercury Thermostats)

Need to be segregated and removed from homes individually – a very labor intensive process. These products will need to be placed curbside and handled with the combination of mechanical

loaders and roll-off and/or end-dump trucks. Quantities will probably exceed the local capacity to process scrap metal. Additional outside processing capacity will likely be needed.

## 2.6 Electronic Products

Computers, TV's, monitors, and other electronic devices pose no real hazard to landfills. Limited resources available to Katrina Recovery should target other materials that are more harmful to the environment, or are easily recyclable. Most e-waste can be easily handled within conventional waste collection and disposal methods.

## 2.7 Gypsum Wallboard

Gypsum wallboard (commonly referred to as “drywall”) has two components: a heavy paper backing and a 3/8 inch layer of gypsum. These materials must be separated and recycled separately, an extremely difficult task if the material is wet.

The landfilling of gypsum wallboard can lead to the production of hydrogen sulfide in MSW landfills. Therefore, one respondent suggested that wallboard be kept out of landfill to the maximum extent possible to avoid sulfide production.

Some have expressed concern about the potential for hydrogen sulfide to be generated within piles of wet drywall that have been constructed and are awaiting transport to a disposal facility. However, in the opinion of at least one expert, there is no need for debris workers to worry about the H<sub>2</sub>S production from wallboard debris during the debris removal phase.

## 3. Other Lessons Learned

### 3.1 Suspension of Regulations

After a flood, the State of Missouri temporarily set aside its recycling policy so that communities could landfill leaves and yard wastes.

State solid waste agencies could temporarily lift permit requirements for solid waste facilities.

### 3.2 Use of Air-Curtain Incinerators

In Miami, FL, the use of air-curtain incinerators that met all federal and state requirements led to many complaints from the public and environmental activists. As a result, county commissioners shut down all debris burn operations.



International Federation  
of Red Cross and Red Crescent Societies



### 3.3.3 Miscellaneous

Asphalt roofing can be separated at Temporary Debris Staging Sites for recycling.

**SOURCE: *Hurricane Katrina Disaster Debris Management: Lessons Learned from State and Local Governments* BRIEFING REPORT, September 21, 2005**

© Solid Waste Association of North America 2005

[http://www.swana.org/pdf/swana\\_pdf\\_358.pdf](http://www.swana.org/pdf/swana_pdf_358.pdf)

## Resources

### 1. Planning For Disaster Debris (US EPA, 1995)

This 30-page document provides a framework for the development of a disaster response plan. The document includes general information on what to expect from different types of disasters (including hurricanes and floods), as well as recommended planning actions and brief case histories (including the 1993 Midwest Floods and the 3 major hurricanes).

Link: <http://www.epa.gov/epaoswer/non-hw/muncpl/disaster/disaster.txt>

### 2. Disaster Debris Management – Planning Tools (Reinhart and McCreanor, 1999)

This 33-page report, while focusing on the recycling of disaster debris, provides an excellent summary of the recent literature regarding disaster debris management. It includes case studies that address both hurricane and flood debris.

Link: <http://people.cecs.ucf.edu/reinhart/DDfinalreport.pdf>.

### 3. Disaster Debris Best Management Practices (State of Hawaii): *Hawaii Disaster Debris Management Plan –Final Draft (2005): Annex VI –Best Management Practices*

This 16-page draft document contains concise, one-page sheets recommending best management practices for the following waste types:

- § Green waste
- § Metals
- § Mixed Debris
- § Woody C&D Debris



International Federation  
of Red Cross and Red Crescent Societies



§ Asphalt Roofing

§ Gypsum

§ Plastics, including:

- Plastic Sheeting
- Plastic Water Jugs

§ Aggregate and Rubble

§ Household Furnishings and Belongings

§ Hazardous Wastes:

- Household Hazardous Wastes
- Fugitive, Commercially-Generated Hazardous Debris
- C&D Debris including Asbestos and Lead Paint

§ Putrescible Wastes

Web link: [http://www.swana.org/pdf/swana\\_pdf\\_358.pdf](http://www.swana.org/pdf/swana_pdf_358.pdf) Annex I

**Example of Debris Management Recovery Plan can be seen at:**

[http://www.swana.org/pdf/swana\\_pdf\\_358.pdf](http://www.swana.org/pdf/swana_pdf_358.pdf) Annex VI



International Federation  
of Red Cross and Red Crescent Societies

