

UPDATE ON U.S. EPA DECISION SUPPORT TOOLS FOR THE MANAGEMENT OF DISASTER GENERATED WASTE AND DEBRIS

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SUMMARY: Unique challenges exist for the handling, transport, treatment, and disposal of debris resulting from homeland security incidents, disasters or other national emergencies. Access to guidance for facilitating decision making for the safe and timely disposal of debris is critical to help restore a contaminated site and to prevent further contamination or spread of disease. A suite of decision support tools (DSTs) has been developed by the U.S. Environmental Protection Agency to help with the treatment and disposal of waste and debris from terrorist attacks, natural disasters, and other emergencies. For events related to agriculture, containment to prevent spread of disease is especially critical for disposal of animal carcasses or plant materials in the aftermath of an event involving avian influenza or foot and mouth disease. This paper provides an update of the further development and deployment of EPA's Suite of DSTs for Homeland Security. The paper also provides an overview of the most recent DST to be developed for agricultural waste responses. Each DST provides quick reference to technical information, regulations, and other information to assist decision makers in guiding disposal decisions that are important for the protection of public health, first responders, and the environment. Although the DSTs were developed for application in the U.S., information available through the tool is widely applicable to other countries.

1. INTRODUCTION

In the U.S., a single comprehensive approach to domestic incident management has been established by the Department of Homeland Security (DHS) through the National Response Framework (NRF) (U.S. DHS, 2008). The NRF provides guidance to prevent, prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies, as well as designates lead and support Agency roles in responses. In support of the NRF, a suite of

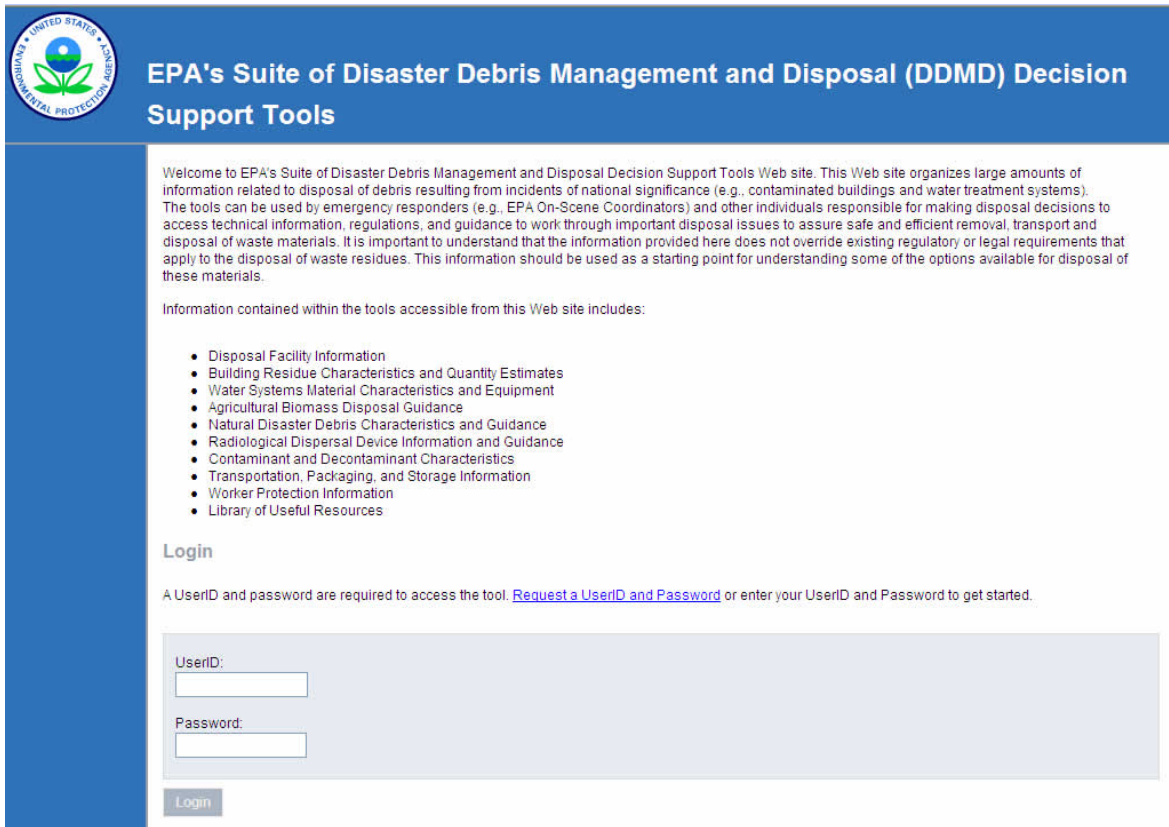
decision support tools (DSTs) has been developed for a range of incidents that could potentially occur. This work has been conducted by the U.S. Environmental Protection Agency's (EPA's) National Homeland Security Research Center in partnership with other U.S. government agencies, EPA program offices, industry, and state and local emergency response programs. The DSTs provide information needed to facilitate more timely responses by providing a tool that can be used in planning, as well as for providing quick and easy access during potential events, to information needed for making decisions associated with handling, transport, and disposal of waste and disaster debris (Thorneloe et al., 2007 and 2008).

The principal use for the DSTs is to provide a starting point for clean-up as a quick reference tool for use by planners and emergency responders. The DSTs are not intended to override existing regulatory or legal requirements that apply to waste and disaster debris handling, transport, treatment, or disposal. The DSTs provide information specific (1) to the types of materials and contaminants involved and (2) for the unique issues or challenges faced with ensuring public and worker safety to assure safe and efficient removal, transport, treatment, and disposal of incident debris. Rather than provide massive quantities of information to the user, The DSTs distill large amounts of information into a more condensed, user-friendly format while maintaining links to the more detailed sources of data and information. The target audience for the tool is the U.S. EPA response community (i.e., on-scene coordinators, Environmental Response Team, National Decontamination Team), state and local agencies (i.e., emergency planners, public health, environmental protection, and transportation), and industry, including disposal facilities, building owners and managers, water infrastructure, and waste haulers.

The suite of DSTs is developed using a web-based platform to allow for more frequent updates to available guidance, facility information, and points of contact. Use of a web-based platform also ensures that users have access to the latest information when accessing the suite of DSTs. First time users will need to request a user ID and password when accessing the tool's web site at: <http://www2.ergweb.com/bdrtool/login.asp>. Figure 1 is a screen shot of the user interface for accessing the tool when either logging in or requesting a password. If your request is approved, your login ID and initial password will be e-mailed to you, usually within 24 hours.

2. OVERVIEW OF THE DEVELOPMENT OF U.S. EPA SUITE OF HOMELAND SECURITY DSTS

The first step in this effort was to meet with stakeholders who had first-hand experience in dealing with the aftermath of 9/11 and subsequent anthrax attacks on government and news media buildings in 2001. A series of meetings was conducted to determine what information would be of help in the cleanup of waste and debris resulting from potential terrorist attacks. Input was received from stakeholders in state and local agencies, waste and water industry groups, and industry trade associations including the Association of State and Territorial Solid Waste Management Officials, the National Solid Waste Management Association, and the Solid Waste Association of North America. Stakeholders and federal partners included other groups within the U.S. EPA (i.e., National Homeland Security Research Center, National Decontamination Team, Environmental Response Team, and the Offices of Emergency Management, Resource Conservation and Recovery, Water, and Radiation and Indoor Air) and the Department of Homeland Security, U.S. Department of Agriculture, U.S. Army Corps of Engineers, U.S. Department of Energy, U.S. Department of Transportation, Federal Emergency Management Agency, and National Institute of Standards and Technology.



EPA's Suite of Disaster Debris Management and Disposal (DDMD) Decision Support Tools

Welcome to EPA's Suite of Disaster Debris Management and Disposal Decision Support Tools Web site. This Web site organizes large amounts of information related to disposal of debris resulting from incidents of national significance (e.g., contaminated buildings and water treatment systems). The tools can be used by emergency responders (e.g., EPA On-Scene Coordinators) and other individuals responsible for making disposal decisions to access technical information, regulations, and guidance to work through important disposal issues to assure safe and efficient removal, transport and disposal of waste materials. It is important to understand that the information provided here does not override existing regulatory or legal requirements that apply to the disposal of waste residues. This information should be used as a starting point for understanding some of the options available for disposal of these materials.

Information contained within the tools accessible from this Web site includes:

- Disposal Facility Information
- Building Residue Characteristics and Quantity Estimates
- Water Systems Material Characteristics and Equipment
- Agricultural Biomass Disposal Guidance
- Natural Disaster Debris Characteristics and Guidance
- Radiological Dispersal Device Information and Guidance
- Contaminant and Decontaminant Characteristics
- Transportation, Packaging, and Storage Information
- Worker Protection Information
- Library of Useful Resources

Login

A UserID and password are required to access the tool. [Request a UserID and Password](#) or enter your UserID and Password to get started.

UserID:

Password:

Figure 1. Suite of U.S. EPA Homeland Security DSTs Login Screen

The first DST developed was for disposal of building decontamination residue resulting from anthrax attacks on government and news media buildings in 2001. The objective in the development of the DST was to provide assistance in the management of residue from decontamination of buildings from attacks using chemical and biological contaminants. Restoration of buildings results in the removal and disposal of carpet, drywall, and building contents. The DST for this type of event encompasses different types of buildings including hospitals, hotels, office buildings, schools, shopping malls, and theaters. Use of the tool enables one to quantify the amount of waste and debris depending upon the specifics of the incident. The DST provides calculators to quantify the different materials for disposal. The major output from the use of this DST is an inventory of the waste and debris that can be used in communicating with potential treatment or disposal facilities. A DST also provides a summary report of the event and response information on how to handle, transport, and dispose of the building debris.

Stakeholder feedback was very positive from the first DST that was developed, so additional DSTs are being developed to support other types of events including attacks on water infrastructure, natural disasters (i.e., earthquakes, fires, floods, and hurricanes), use of radiological dispersal devices, and management of agricultural biomass resulting from events involving avian influenza or foot and mouth disease. Figure 2 provides a screen shot of the user interface for accessing the DSTs.

The design philosophy in developing the suite of DSTs is to provide access as soon as DSTs or enhancements are available. To date, five different versions of the suite of DSTs have been released since 2004 (Figure 3). Feedback from stakeholders on each new version is received

through use of “homework” assignments that help to verify the ease of use and ability to obtain information needed for different types of events. Stakeholder meetings typically occur about every six months to coincide with the release of new versions and to obtain guidance and feedback. The positive response received from the development of the DSTs is in large part because of the close interaction with stakeholders who see the value of and need for this information.



Figure 2. Interface for Selecting DST of Interest

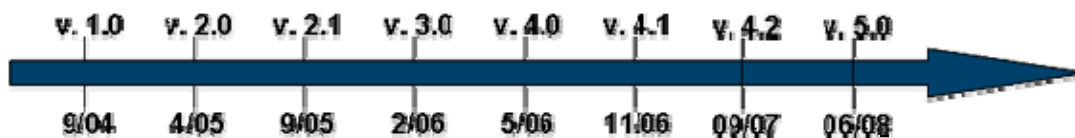


Figure 3. Release Dates of the Different Homeland Security DSTs

3. DEPLOYMENT OF THE U.S. EPA SUITE OF HOMELAND SECURITY DSTS

Within the NRF, national planning scenarios are identified for helping to develop plans through a coordinated response for federal, state and local emergency response agencies. Exercises are held at various times to test out the plans which have identified issues related to effective management of disaster-generated waste and debris. The tool allows multiple scenarios to be evaluated and encourages discussions with disposal facilities prior to an event. Currently, there

are over 400 registered DST users. Figure 4 shows the distribution within different user groups. Most DST applications thus far have been part of planning exercises as required in the NRF for regional and local authorities to develop disaster recovery and response effort plans. Example applications in planning include use in Snohomish County, Washington to (1) develop a plan for animal carcass disposal; (2) refine the existing continuity of operations plan; and (3) update the disaster debris plan for the Snohomish County Solid Waste Division. A second example is use in developing estimated remediation costs for the Houston Airport. The tool has also been used to conduct capacity analysis as part of an agricultural waste planning exercise by EPA's Office of Solid Waste and Emergency Response. Finally, the suite of DSTs has been used in several DHS "table top" exercises for generating estimates of waste materials and identifying potential disposal facilities. An exercise occurred in April 2005 for a scenario based on a mustard gas attack in New London, CT. Several on-scene coordinators have also used the Suite of DSTs as part of planning exercises.

The DSTs have also been used to respond to events of local, regional, or national significance. The most recent application of the DSTs was location of potential disposal facilities and guidance for the 2008 floods in the Midwestern U.S. states. The DSTs were also used to locate information on disposal of household hazardous waste resulting from the San Diego County, California, wildfires in 2007. In addition, in February 2006 the DSTs were used for managing debris from the cleanup of anthrax contamination at a New York City residence and again in 2007 in cleanup of an anthrax contamination event in Connecticut. The DST for managing building decontamination residue was used to identify information on potential disposal facilities for decontaminated personal effects. Finally, the DSTs were used to locate information on potential disposal facilities in the aftermath of Hurricane Katrina.

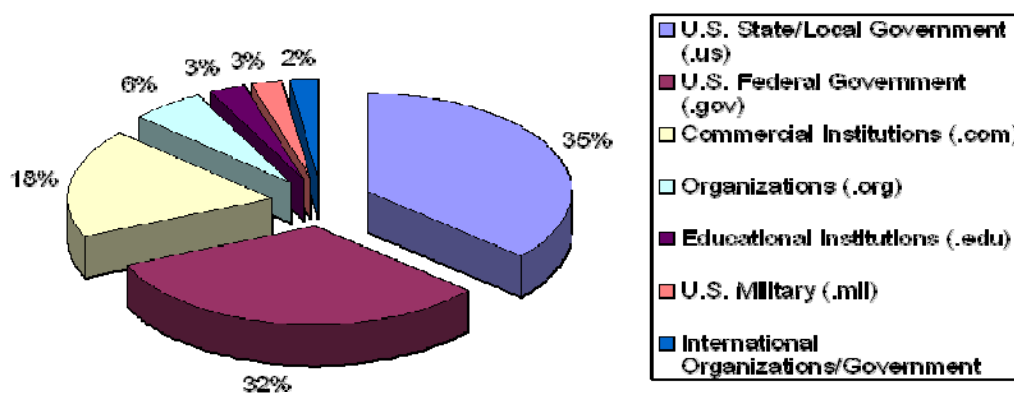


Figure 4. Distribution of Users of U.S. EPA Suite of Homeland Security DSTs

4. DEVELOPMENT OF AGRICULTURAL BIOMASS MANAGEMENT DST

The Agricultural Biomass Management DST, is being developed in close coordination with the U.S. Department of Agriculture (USDA), is intended for use by those responding to the disposal of animal carcasses or plant materials in the aftermath of an event that could contaminate the U.S. food supply. Typically these responses are much more time-critical to help ensure quick containment to prevent further spread of disease or contaminants. The USDA has developed several training modules that can be accessed within the tool by clicking "Disposal Options" from the left navigation menu. Access to several other key resources for additional guidance is

provided using hyperlinks to the National Center for Animal Health Emergency Management and the National Animal Health Emergency Management System Guidelines. The USDA has developed a best practices handbook on carcass disposal to which the DST will be linked. Figures 5 through 10 provide screen shots of the user interface for obtaining access and information provided within this DST.

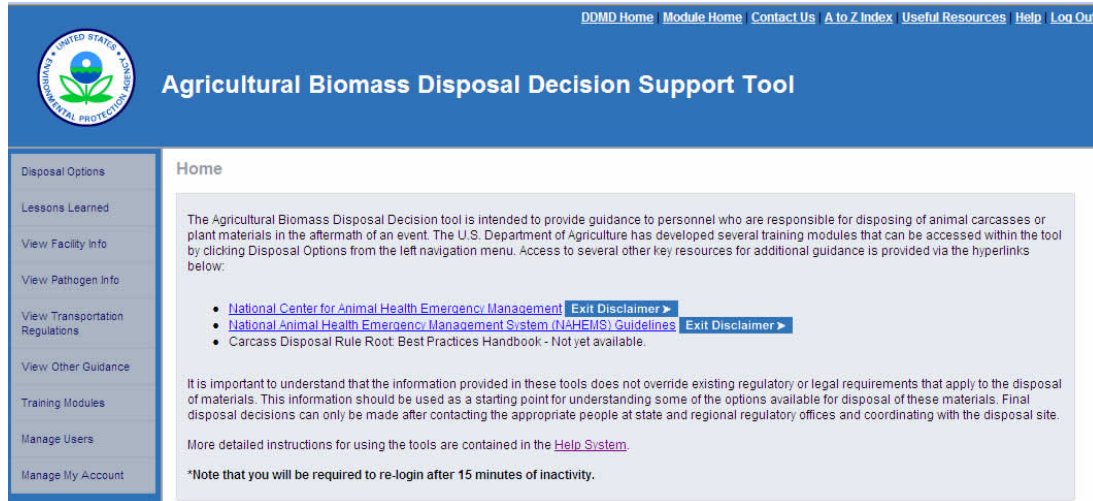


Figure 5. Screen Shot of the Agricultural Biomass Management DST

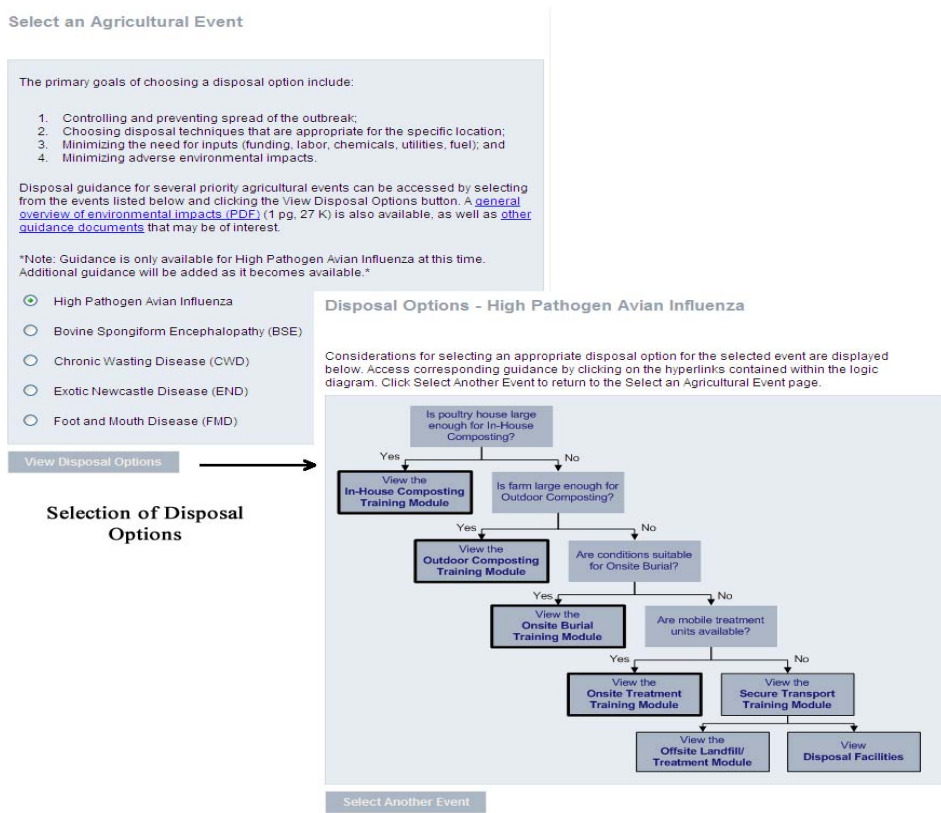


Figure 6. Screen Shot Identifying How to Identify Response Options Based on Type of Event

View Other Guidance

Choose a guidance topic below to review information collected that may assist you in determining how to safely package, transport and dispose of your waste materials. Click Next to continue.

- ☐ View Landfill Procedures and Environmental Controls
- ☐ View Regulatory Overview of Hazardous Material Storage and Handling
- ☐ View Packaging/Container Guidance
- ☐ View Transportation Regulations
- ☐ View Transportation Guidance
- ☐ View Miscellaneous State Hazardous

Next

Training Modules

The U.S. Department of Agriculture is developing training modules addressing various disposal options. Currently, training modules to address disposal options related to agriculture waste resulting from a high pathogen avian influenza event are available. Additional modules will be added as they become available.

- On-Site Burial - not yet available
- [In-House Composting](#)
- Outdoor Composting - not yet available
- Onsite Treatment - not yet available
- Offsite Landfill/Treatment - not yet available
- Secure Transport for Offsite Disposal - not yet available

Figure 7. Screen Shots of the Process of Identifying How to Access Available Training Modules and Other Available Resources in the Agricultural Biomass Management DST

View Facility Information

You may customize the list of facilities generated by applying one or more of the following filter criteria. To view all facilities, leave the selection boxes blank. Click View List of Facilities to generate a list of facilities that meet all of the specified criteria.

Filter Criteria

Facility types:

- Inert or Construction and Demolition (C and D) Landfills
- Large Landfills (largest by state based on acceptance rate)
- Municipal Solid Waste (MSW) Landfills
- RCRA Subtitle C (Hazardous Waste) Landfills
- Hazardous Waste Combustion Facilities
- Medical/Biohazardous Waste Incinerators
- Municipal Waste (Large) Combustion Facilities (>250 tons/day)**
- Municipal Waste (Small) Combustion Facilities (<250 tons/day)
- Centralized Waste Treatment (CWT) Facilities
- Federally Owned Treatment Works (FOTW)

(Hold down the CTRL key to select multiple facility types)

Air Pollution Control Devices (APCDs):

Select an APCD

(APCDs are associated with combustion facilities only; results containing only combustion facilities.)

State:

- MA - MASSACHUSETTS
- MD - MARYLAND**
- ME - MAINE
- MI - MICHIGAN

(Hold down the CTRL key to select multiple states)

EPA Region:

- Region 1 (CT, ME, MA, NH, RI, VT)
- Region 2 (NJ, NY)
- Region 3 (DE, MD, PA, VA, WV, DC)
- Region 4 (AL, FL, GA, KY, MS, NC, SC, TN)**

(Hold down the CTRL key to select multiple EPA region)

View List of Facilities

View Potential Disposal Facilities

View Candidate Disposal Facilities

The list of facilities matching your criteria are listed below. For your reference, the criteria used to conduct this search are also listed below.

Filter Criteria:

Municipal Waste (Large) Combustion Facilities (>250 tons/day)

State(s): MD - MARYLAND

Universe of Facilities

Print Facilities

Name	Address	State	EPA Region	Contact Information	Select All This Page
Covanta Montgomery, Inc.	21204 Martinsburg Road, Dickerson	MD	3	Beth Hurley (973) 882-7245	<input type="checkbox"/>
Wheelabrator Baltimore, L.P.	1801 Annapolis Road, Baltimore	MD	3	Frank Ferraro (603) 929-3305	<input type="checkbox"/>

Page: 1

Make a New Selection

Figure 8. Screen Shot Identifying a Potential Disposal Facility and Contact Information. Hyperlinks provide access to more detailed information including the facility's permit and pollution control equipment.

Lessons Learned from Historical Incidents - Search

A compilation of historical incidents was created and includes a clearinghouse of summarized background information, disposal methods, and "lessons learned" information obtained from publicly available articles and other documents. Initial efforts were focused on obtaining information on the methods used in disposing of animal carcasses in response to various disease outbreaks or other natural events (e.g., hurricanes).

Summaries were last updated in early 2005 and contain information on 64 historical events. Specify filter criteria (i.e., pathogen, entity, state/region, and/or disposal method) and click Search Incidents. Leave the filter criteria blank to view all incidents.

Filter Criteria

Pathogen:

Avian Influenza (AI)
Bovine Spongiform Encephalopathy (BSE)
Chronic Wasting Disease (CWD)
Exotic Newcastle Disease (END)

(Hold down the CTRL key to select multiple pathogens)

Entity:

Bird
Cattle
Deer
Dromedaries

(Hold down the CTRL key to select multiple entities)

Location:

Belgium
Cambodia
Canada
Canada, Alberta

(Hold down the CTRL key to select multiple states/region)

Disposal Method:

Alkaline Hydrolysis Digestion
Composting
Incineration
Licensed Landfill

(Hold down the CTRL key to select multiple disposal methods)

Search Incidents

Lessons Learned Incident Summary Search Results

The list of historical incidents matching your criteria are listed below. For your reference, the criteria used to conduct this search are also listed below. Click View Summary to view a summary of an incident. Click Make a New Selection to perform a new search.

Search Criteria:
Pathogen(s): Avian Influenza (AI)
Entity(ies): Bird
Location(s): Canada
All disposal methods

Pathogen(s)	Entity (ies)	Disposal Method(s)	State(s)/ Region(s)	
Avian Influenza (AI)	Bird	Composting, Incineration, Licensed Landfill	Canada, Canada, British Columbia	View Summary

Make a New Selection

Historical Incident Summary

The Canadian Food Inspection Agency quarantined the affected farm. Planning of the depopulation of the flock is progressing along with a ring surveillance program.

Agent: Avian Influenza (AI)

Location: Canada, Canada, British Columbia

Year of Incident: 2004

Entity: Bird
Number: 19,000,000 birds
State/Region: Canada, Canada, British Columbia, British Columbia, Canada

Was testing performed to identify affected entities? Yes

Test Method(s) Used:

1) The presumptive diagnosis was made by a Provincial Laboratory in the Province of British Columbia on 18 February 2004. Samples were sent to the National Centre for Foreign Animal Diseases Laboratory in Winnipeg, Manitoba, where preliminary analysis on 19 February has returned a probable H7 strain. Further sequencing assessment and strain typing is progressing.

2) Samples were sent to the National Centre for Foreign Animal Disease Laboratory in Winnipeg, Manitoba where preliminary analysis on 19 February by hemagglutination inhibition test determined it to be the H7 strain. This finding was confirmed by RT-PCR(1).

Disposal Solutions:

Reference(s)
http://www.oie.int/eng/info/hebdot/AIS_57.HTM#Sec6 **Exit Disclaimer**

Print

Close Window

Figure 9. Screen Shots Identifying How to Search Across Lessons Learned From Worldwide Events and Available Guidance for Responding to Different Emergency Types

Useful Resources

The following resources are available for your reference. Click on the links below to access additional information. Additional resources will be added as they become available.

Links on this page provide access to external Web sites. [Exit Disclaimer ▶](#)

Response Management Jurisdictional Boundaries

Multiple federal agencies have specific emergency support functional roles according to the National Response Plan. Each agency, however, may have different jurisdictional boundaries that define areas of the U.S. The following links present the jurisdictional boundaries for several responsible agencies:

- [U.S. Environmental Protection Agency \(EPA\) | EPA Regions](#)
- [Federal Emergency Management Agency \(FEMA\) | FEMA Regional Operations](#)
- [U.S. Army Corps of Engineers | USACE Civil Engineer Divisions and Districts](#)
- [U.S. Department of Health and Human Services](#)

Contacts

- [EPA's Environmental Response Team](#)
- [EPA's On Scene Coordinators](#)
- [State Medical Waste Contacts](#)
- [State Hazardous Waste Offices](#)
- [State Solid Waste Offices](#)
- [State Emergency Response Coordinators](#)
- [Other Industry Contacts](#)
- [Local Emergency Planning](#)

Documents and Reports

Laboratory Links

Tools

Staging Facilities

Note: The facilities presented are not endorse store any waste.

- [Government-Owned Land/Facilities](#)
- [Transfer Stations](#)

Useful Documents and Reports

Useful documents and reports were compiled and are organized into the categories listed below. Click on the links below to access related information.

[American Veterinary Medical Association \(AVMA\) Disaster Preparedness and Response Guide](#)

American Veterinary Medical Association
Provides information for preparing and responding to disasters, and for implementation of the AVMA Emergency Preparedness Plan. The AVMA Emergency Preparedness Plan identifies strategies that will enable veterinarians and animal health technicians to respond to a broad range of emergencies, to integrate those strategies into the National Disaster Medical System as part of the Federal Response Plan, and to assist state and local veterinary medical associations in formulating their emergency preparedness plans.

[Exit Disclaimer ▶](#)

[Avian Influenza Carcass Disposal - Federal Agency Coordination/Considerations \(PDF\)](#)

(1 pp, 714K) U.S. Environmental Protection Agency
One-page fact sheet describing Federal Agency oversight, EPA's role, and other considerations regarding carcass disposal. [Exit Disclaimer ▶](#)

[Carcass Disposal: A Comprehensive Review](#)

National Agricultural Biosecurity Center, Kansas State University
Provides a comprehensive summary of the scientific, technical, and social aspects of various carcass disposal technologies. The report is intended to serve as an evidence-based resource for officials tasked with planning for the safe and timely disposal of animal carcasses. [Exit Disclaimer ▶](#)

Figure 10. Screen Shots Identifying Useful Resources in the Agricultural Biomass Management DST

5. NEXT STEPS

Current focus is to complete the Agricultural Biomass Management DST and work to update the other available DSTs including the Radiological Waste and Debris Management tool and the Natural Disaster Debris Management tool. There is also need to update the facility databases within the tool. Additional facility types are being added including rendering plants. For natural disasters, some disaster-generated waste is amenable to recovery and reuse. Therefore, additional recycling facilities to manage industrial and municipal waste streams are being added.

An additional priority for this next year is to tailor the interface to specific user needs to be consistent with their nomenclature and responsibilities. A separate interface will be created for planning versus responding to an event. Feedback is being obtained using a series of meetings specific to each group. The three groups are those involved in planning for, responding to, and dealing with radioactive waste management. To date, the series of focus group meetings to

discuss interface changes for the three groups has been successfully conducted online to save on time and travel costs.

6. CONCLUSIONS

EPA's Office of Research and Development has led the development of a suite of web-based DSTs that are intended for use by planners and responders responsible for managing disaster-generated waste and debris. Version 5.0 of the suite of Homeland Security DSTs is available online. The use of the DSTs is intended to provide information specific to the type of event (e.g., natural disaster, avian influenza, dirty bomb) and contacts for handling, transport, treatment, and disposal of disaster-generated waste and debris. Because of the unique challenges with agricultural biomass disaster events to ensure containment of disease and protection of food supply, close collaboration is occurring between U.S. EPA and USDA. to provide the latest thinking and guidance on how best to respond to different events. The DSTs are being used in planning exercises as part of the national scenario planning process. The DSTs are also being used to respond to events such as flooding and fires. The DSTs are not intended to override existing regulatory or legal requirements that apply to waste and disaster debris handling, transport, or disposal.

DISCLAIMER

The U.S. Environmental Protection Agency through its Office of Research and Development managed the research described here. It has been subjected to the Agency's review and has been approved for publication. Note that approval does not signify that the contents necessarily reflect the views of the Agency.

REFERENCES

- U.S. Department of Homeland Security (2008). National Response Framework, <http://www.fema.gov/emergency/nrf/>.
- Thorneloe, S., P. Lemieux, K. Nickel, and M. Rodgers (2007). U.S. Homeland Security Debris Management and Disposal Decision Support Tool, *11th International Waste Management and Landfill Symposium*, October 1-5, Sardinia, Italy.
- Thorneloe, S., P. Lemieux, M. Rodgers, and R. Christman (2008). EPA's Suite of Homeland Security Decision Support Tools for Managing Disaster-Generated Waste and Debris, *Global Waste Management Symposium*, Copper Mountain Conference Center, Colorado, USA, September 7-10, 2008.