

National Alliance of State Animal and Agricultural Emergency Programs (NASAAEP)  
Current Best Practices in Animal Emergency Management

# Decontamination





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## Preface

The evolution of disaster response over the last decade was the catalyst for revising animal emergency management practices. The United States Department of Agriculture's (USDA) Animal and Plant Health Inspection Service Animal Care funded a cooperative agreement with the University of Kentucky.

This agreement was to collaborate with the National Alliance of State Animal and Agriculture Emergency Programs (NASAAEP), the National Animal Rescue and Sheltering Coalition (NARSC), the American Veterinary Medical Association (AVMA), and other key stakeholders to update, consolidate, and create animal emergency management best practices.

The 2023 NASAAEP Current Best Practices in Animal Emergency Management documents are the result of extensive work by subject matter experts (SMEs) over a 24-month period. Document topics and content development were guided by the Best Practices Working Group (BPWG) Steering Committee and subjected to a rigorous external peer review process. The documents include:

- Incident Command and Coordination
- Planning and Resource Management
- Community Engagement and Outreach
- Animal Search and Rescue
- Disaster Veterinary Medical Response
- Decontamination
- Household Pet Evacuation and Transportation
- Equine Evacuation and Transportation
- Mass Care and Sheltering

NOTE: Links to external resources are denoted by underlined text.

The core planning team gratefully acknowledges the significant contributions of everyone who provided time, expertise, and resources for the development and review of these documents.

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## Executive Summary

Animal decontamination can be challenging, even when dealing with limited numbers of animals. Large-scale hazards, such as oil spills, hazardous chemical releases, animal or zoonotic disease outbreaks, or radiological incidents could produce high numbers of animals needing assessment, monitoring, and decontamination.

While planning for limited incidents with manageable numbers can accommodate detailed and thorough operational procedures, large numbers might mandate the ability to use flexible and scalable methodologies. This will achieve a level of decontamination acceptable for the incident conditions.

No single set of procedures will comprehensively cover the potential variety of animals, hazards, environmental conditions, and available resources. This means a wide range of options are needed that can be tailored to various incidents.

There are substantial knowledge gaps in the science of managing contaminated animals. While some recent research has provided initial objective data, many of the procedures discussed in this document are based on extrapolation and experience from past incidents. A significant amount of extrapolation from veterinary and human experience is necessary, pending additional research specific to the management and decontamination of animals.

Additional research is needed into optimal mechanisms of decontamination and other management elements, as well as an array of options for rapid decontamination of large numbers of animals.

This document provides an overview of the challenges, options, and resources involved in the development and implementation of decontamination plans for the following animals (see *Appendix A: Acronyms, Key Terms and Definitions* for more information):

- Service animals
- Working animals
- Household pets
- Livestock
- Poultry
- Wildlife
- Biomedical research animals
- Other animals



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## Typical Authorities or Agencies Having Jurisdiction (AHJ)

### AHJ – Regulatory Authorities

Decontamination of animals may involve a complex interweaving of authorities that will start with the jurisdictional authority for the primary incident. Jurisdictional animal authorities may include local animal control, law enforcement, and public health, whereas state, tribal, and territorial (STT) authorities may include animal health officials, public health, or emergency management.

In some cases, jurisdictional animal authorities might have primary jurisdiction pertaining to animal decontamination. For example, household pets exposed to flood waters should be decontaminated before entering emergency animal shelters in a flooding incident.

The decontamination and sheltering missions might be under the direct control of the jurisdictional animal authority, which may be working within a broader Incident Command System (ICS) hierarchy.

In a primary hazardous materials incident, animal decontamination may be guided by the jurisdictional authority for HAZMAT incidents. Animal resources should be working under the supervision of HAZMAT authorities.


In another example, a coastal oil spill would be managed by the U.S. Coast Guard with an oil company as the responsible party for costs. The oil company might contract with a non-governmental organization (NGO) for wildlife decontamination, which it would perform as an operational element of the USCG ICS. The jurisdictional animal authority may support operations but is not in primary control of animal decontamination.

Collaboration is essential between those with authority to regulate or respond to hazards and those with authority specific to animals.

### Responsible Parties

While the response in many incidents may be primarily funded through local, state, or federal agencies, in some incidents, certain corporations or individuals may bear financial responsibility for some or all emergency response costs.

For example, oil spills, nuclear power plant releases, and chemical plant accidents may involve varying degrees of responsibilities by the owner of the hazard. In communities



where hazards exist, discussing animal decontamination issues with entities may be useful.

Corporations may also be financially responsible for part or all the costs of planning and training, including equipment and supplies. This may be a source of funding for response agencies to purchase needed equipment.

These responsible parties may have a vested interest in both planning and the development of animal decontamination capabilities. For example, the petroleum industry has sponsored a large body of research into decontamination and rehabilitation of oiled wildlife.

Discussions with local industry through emergency management agencies and Local Emergency Planning Committees (LEPC) may be useful to all involved. Even if funding is not available through industries, they may be able to provide expertise in support of the planning process.

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# Planning Considerations

## Planning for Diverse Animal Groups

See the following appendices for additional information on these animal groups:

- *Appendix A: Acronyms, Key Terms and Definitions*
- *Appendix C: Working Dog Decontamination*

### **Household Pets and Non-Commercial Livestock**

Household pets are an integral component of many families. Data from the American Veterinary Medical Association (AVMA) and the American Pet Product Association show that there are approximately half as many household pets in the U.S. as people, depending on the region and community.

Communities in the U.S. and many countries that must evacuate will almost assuredly evacuate with a substantial number of household pets. If accommodations are not made for people with household pets, some owners might refuse to evacuate, fail to follow official instructions or circumvent reception/monitoring sites.

Non-commercial livestock or backyard livestock are common in suburban, semi-rural, and rural communities. The most common animals are equids (horses, donkeys, and mules) but backyard poultry flocks, fancy poultry breeds for show, goats, camelids (llama and alpaca), pet pot-bellied pigs, and other livestock may be found in households where the animals are kept as personal animals rather than as an agricultural business.

### **Service, Assistance, and Working Animals**

Some animals perform services or jobs for their humans and often accompany their human partner. Every attempt should be made to accommodate keeping these animals with their owners or handlers.

### **Commercial Livestock**

Agricultural animals (livestock, poultry, and farmed wildlife) put food on our table and produce fiber (wool), leather, and other products. Commercial livestock include animals bred or trained for commercial performance, such as racing or rodeo.

Agricultural animals must be managed in a complex array of priorities, including public health and safety, food supply safety, animal welfare, agricultural economics, and the environment. Decisions on the disposition of these animals must include dialogue with state and federal authorities.

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## Other Animals

- Captive Wildlife
  - Captive wildlife may be housed in facilities that include zoos, aquaria, wildlife sanctuaries, and wildlife rehabilitators. They are environmentally and culturally significant and managed within a complex array of priorities, including public health and safety, conservation and environmental factors, cultural and educational value, animal welfare, and economic impacts.
- Biomedical Research Animals
  - Vary from small operations to major research facilities housing tens of thousands of rodents or over a thousand non-human primates. Facilities provide critical biomedical research which is important to science, public health, and the economy. These facilities may also present challenges for public health and safety, and animal welfare during disasters. Some research facilities may also work with hazardous disease agents or materials.
- Animals Housed in Other Types of Facilities
  - Animal facilities can include veterinary hospitals, animal shelters, kennels, aviaries, retail pet establishments, breeders, or wholesale pet facilities. Facilities can provide community support during disasters but could have an impact on public health and safety, as well as involve animal welfare concerns. Thoughtful and practiced facility emergency plans are critical to successfully supporting these locations. Management will depend on available resources, incident priorities, and public/media concerns.


## Wildlife

Free-ranging native wildlife can be contaminated in emergencies, creating challenges in assessment, capture, monitoring, decontamination, and treatment. Wildlife impacted by petroleum spills is a classic example of challenges. As with agricultural animals, decisions on the disposition of these animals must also include dialogue with state and federal authorities.

## Scalability Considerations

Catastrophic scenarios can be described that could necessitate the decontamination of tens of thousands of pets and other animals. It is not realistic to expect communities to develop this level of resources at the local level. Each community must analyze the scale of likely incidents and then develop some core animal decontamination capability to meet that likely need.

For example, if a community has a nuclear power plant and predicts the need to decontaminate up to 200 pets over 48 hours, then a resource should be developed. If a



catastrophic incident requires a 10 to 100x increase in that scale, external resources must be mobilized to meet that need.

Mutual aid, state aid, and federal assistance must be available to meet the demands of large-scale incidents:

- Local mutual aid should be the most readily available resource pool for animal decontamination.
- State teams and equipment caches could also be developed by the state (such as through a veterinary medical reserve program) or through state-to-state mutual aid requests such as an Emergency Management Assistance Compact (EMAC).
- No immediately deployable, significant animal decontamination resources currently exist at the federal level. Recent large-scale exercises involving radiological or other contamination hazards have demonstrated the enormity of this gap. Steps should continue to be taken to mitigate this issue.

NGOs may significantly affect animal decontamination, particularly flood water and petroleum contamination. Local, state, and national animal welfare NGOs involved in disaster response should be able to perform flood water decontamination of animals, particularly pets. Except for oil spills, NGOs are not typically prepared to provide large scale animal decontamination of other biohazards, chemical hazards, and radiological contaminants.

Two examples of NGOs with excellent petroleum decontamination capabilities for oiled wildlife include:

- [Tri-State Bird Rescue](#)
- [International Bird Rescue and Research](#)



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## Existing Resource Types

A critical element of the National Incident Management System (NIMS) is effective resource management, including resource typing and individual credentialing.

More information on resource typing for animals can be found in the [National Incident Management System Guidelines for Resource Management Preparedness](#).

Relevant resource typing includes:

- [Animal Decontamination Specialist](#)
- [Companion Animal Decontamination Team](#)

The [FEMA Resource Typing Library Tool](#) contains additional positions, job titles, and qualifications that can be used as components of animal decontamination teams, including:

- Veterinarian
- Animal Technician
- Animal Handling Specialist
- Animal Control Specialist
- Animal Emergency Response Team Leader

## Commitment of Resources for Planning

Animal decontamination is a complex mission area that requires the time and engagement of those with expertise in the science and management of animals and hazardous materials incidents. Without these commitments, responders may be exposed to additional health risks and increased animal suffering.

The animal decontamination mission is not a stand-alone process but rather interdependent on other emergency response missions. For this reason, animal decontamination plans should:

- Emphasize integration into the jurisdictional planning processes at all levels.
- Work to integrate animal decontamination into the envisioned incident command organization.

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## Stakeholder Identification and Engagement

Within communities, states, and the nation, many agencies, organizations, and individuals can bring authority, expertise, or resources to the planning process for developing an animal decontamination capability.

The following are examples of stakeholders that may need to collaborate during this process. Additional stakeholders may be identified within various jurisdictions.

### Local

- Emergency Management
- Animal control agencies
- Law enforcement
- Fire/HAZMAT
- EMS agencies
- Public works/facilities
- Public Health/environment
- Local colleges/universities
- Local Emergency Planning Committees (LEPC)

### State

- State emergency management
- State animal health and agricultural officials
- State public health and environmental health
- State public safety
- National Guard
- State Universities & Cooperative Extension
- State wildlife agencies

### Federal

- DHS/Federal Emergency Management Agency
- Dept. of Agriculture: APHIS, NIFA/EDEN, FSIS, other
- Dept. of Health and Human Services (CDC, FDA, USPHS, NDMS, other)
- Environmental Protection Agency
- Department of Defense DHS/Coast Guard
- Department of Energy
- Advisory Team on Environment, Food & Health (CDC, EPA, FDA, and USDA)
- Department of Interior (USFWS, USGS, NPS)
- Dept. of Commerce (NOAA Marine Fisheries)

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## NGOs

- Veterinarians and veterinary organizations
- Animal welfare and voluntary organizations
- Animal agricultural producers and organizations
- Agricultural processors, distributors, and food retail
- Chemical, petroleum fuel, and nuclear power plant industry
- Other professional associations (animal control, zoological, wildlife rescue, and rehab organizations)
- Animal retail, services, and wholesale businesses



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## Command and Coordination

### Integration of Animal Decontamination into Overall ICS Organization

Animal response missions, particularly animal decontamination, should be integrated into the overall ICS for both exercises and actual incidents. Emergency planners, stakeholder agencies, and organizations must identify the mechanisms for integration:

- Local or State Incident Management Teams (IMT) may consider the incorporation of Animal Branch Managers or Animal Group Supervisors as an element of their IMT development process.
- Animal agencies or organizations should participate in training and exercise programs with emergency managers and IMTs when appropriate. Participation facilitates familiarity with all aspects of hazardous materials incidents, identifies additional capability/training needs, and enhances communication and trust.

Refer to the *NASAAEP 2023 Current Best Practices in Animal Emergency Management Incident Command and Coordination* document for additional information.



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## Key Tasks and Sub-Tasks: Operational Practices

### Considerations

The longest steps are decontamination and drying, which may be twice the intake time and three times the other times (approximately). By having three lines for decontamination and two lines for intake/triage, theoretically, the operation would be able to process around 20 animals per hour. 200 animals would take 10 hours. Two entire parallel units could achieve the results in five hours.

Stay times in PPE and the need for rest times can also profoundly impact the number of personnel needed for the operation. For example, if one “shift” needed to rest 50% of the time, then either the time required to perform the tasks, or the number of necessary personnel would double.

### Hazard Identification

In most cases, jurisdictional authority hazardous materials experts will identify the hazard, and safety officers will determine the PPE and operational precautions needed for animal decontamination.

- Chemical
  - Chemical hazards are any substance that can cause physical injury (explosive or flammable agents) or a health hazard (acute or chronic effects that affect one or more body systems such as respiratory, reproductive, or liver).
    - Examples: pesticides, herbicides, mercury, carbon monoxide, lead, and illicit agents, including narcotics (fentanyl, carfentanyl) or illegal drugs (methamphetamine, cocaine, etc.).
  - Carcinogens: Some substances may increase long-term cancer risk in addition to any immediate toxicological effects.
  - Petroleum: Petroleum hazards are a subset of chemical hazards. Due to the thick, dense nature of many petroleum products, other lighter oils, such as vegetable oil, may be needed to help break up these compounds as part of the decontamination process.
  - Weaponized chemicals may be used in intentional attacks, potentially affecting people and animals. Categories include:
    - Blister agents such as phosgene or mustard gases damage skin, mucus membranes, and the respiratory tract
    - Nerve agents - cause interference with normal nerve function, inducing severe effects, potentially including disorientation, seizures, and eventual respiratory failure (military or civilian grade)
    - Blood agents such as cyanide containing compounds.

- Biological
  - Biological hazards include naturally occurring and intentionally introduced infectious diseases caused by viruses, bacteria, fungi, protozoa, or biologically produced toxins that threaten human or animal health.
    - Soil, water, insects, plants, animals, and humans can be the source of the infectious disease or be a carrier that transmits the contagious disease to another organism allowing the infection to spread.
  - Examples:
    - Bacteria: Escherichia coli, Salmonella, Listeria, anthrax
    - Viruses: SARS-CoV-2 (cause of COVID-19), influenza, and foot and mouth disease
    - Protozoa: Giardia, amoeba species, coccidiosis
    - Fungal: Dermatophytes (ringworm), coccidioidomycosis (valley fever), blastomycosis, etc.
    - Biotoxins: Ricin (castor beans), Clostridium biotoxins, Tetanus biotoxins, etc.
- Radiological/Nuclear
  - Radiological hazards result from the accidental release of ionizing radiation, such as from a nuclear power plant or the intentional detonation of a device containing radioactive material (Radiological Dispersion Device [RDD], Improvised Nuclear Device [IND], or nuclear weapon).
  - Intentional detonation of an IND or nuclear weapon also causes blast and thermal injuries which will most likely outnumber the radiation injuries.
  - Nuclear power plant release
  - Transportation accident
- Floodwaters and Debris
  - Floodwaters are a combination of biological and chemical hazards combined with physical injury hazards from flood debris.
  - Floodwater must be treated as a severe contaminant, and animals must be decontaminated. The public might not understand the seriousness of floodwater contamination, so including information in public messaging regarding the need for decontamination would be prudent.
  - Debris can cause physical injuries leading to chemical and biological hazards entering the animal's body through puncture wounds or lacerations. Dust particles from debris may also enter via the respiratory system (for example, asbestos fibers.)
  - Floodwaters are one of the most dangerous types of contamination. Flood waters contain stored chemicals released from flooded areas along with microorganisms associated with human and animal sewage or feces.



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Bacterial organisms may include serious pathogens, including enteric organisms like Salmonella species and flesh-eating bacteria.

- In some cases, particularly floodwater decontamination, animal decontamination hazard identification may be left up to the animal decontamination teams, such as those decontaminating animals before entering an emergency animal shelter. Animals and responders should both be monitored for signs of illness after floodwater decontamination operations.
- Refer to the *NASAAEP 2023 Current Best Practices in Animal Emergency Management Disaster Veterinary Medical Response* document for more information.

## Activation – Mobilization

Planning efforts should identify a method for team members to be given notice of possible responses and to determine which team members are currently available.

Activation may include two phases:

- **Standby Alerts:** When circumstances provide possible notice for this mission.
- **Mobilization:** Orders to move team members and equipment to a specific location at a particular time. This should include taking inventory of equipment and supplies. Rapid restocking might be needed if some materials are absent, damaged, or inadequate.

## Setup

Setup at a specific location may be integrated with human decontamination operations or at an animal-specific site. If owners and animals are moving in tandem, personnel trained in restraint should be available to assist. Setup should be exercised regularly.

Coordination in operational procedures and safety practices will be essential and driven by local hazardous materials authorities. All the issues in the animal-specific discussion below will be needed but will be developed in coordination with the jurisdictional authorities in command of the site.

Considerations for owner-performed animal decontamination in radiological incidents:

- Some jurisdictions have integrated plans for owners to perform much of the animal decontamination for their household pets.
- Advantages should include a higher throughput of animals and extending the capabilities of available animal decontamination teams. In addition, owners would need to go through decontamination themselves after finishing their household

pets. Owners might be able to help with gross decontamination more easily in some situations.

- Disadvantages potentially include a lack of training in safe animal handling and decontamination techniques, personal protective equipment, lack of fit testing or medical clearance for respirator use, injury potential, additional exposure potential, and failure to adequately decontaminate pets. Significant resources would need to be dedicated to instructing people on the processes, observing for safety problems, and intervening when needed.
- One major barrier is that owner-performed decontamination has not, in the working group's experience, been adequately exercised in a meaningful manner.
- In catastrophic incidents, such as a nuclear detonation, where animal decontamination capabilities may be grossly insufficient during the initial days of the response, owner-performed decontamination may be essential due to a lack of other options.

The setup of animal-specific locations must accommodate many factors, including:

- Identification of hot, warm, and cold zones
- Identification of utilities available and mitigation where some utilities are not available.
- Intake area
- Decontamination area
- Holding area for animals awaiting initial decontamination
- Holding areas for clean animals post-decontamination
- Holding areas for animals needing further decontamination
- Recovery area for animal decontamination personnel
- Veterinary area for triage, stabilization pre-decontamination (warm zone)
- Veterinary area for post-decontamination treatment of animals (cold zone)
- Discharge station for record finalization, reunion, or animal transfer

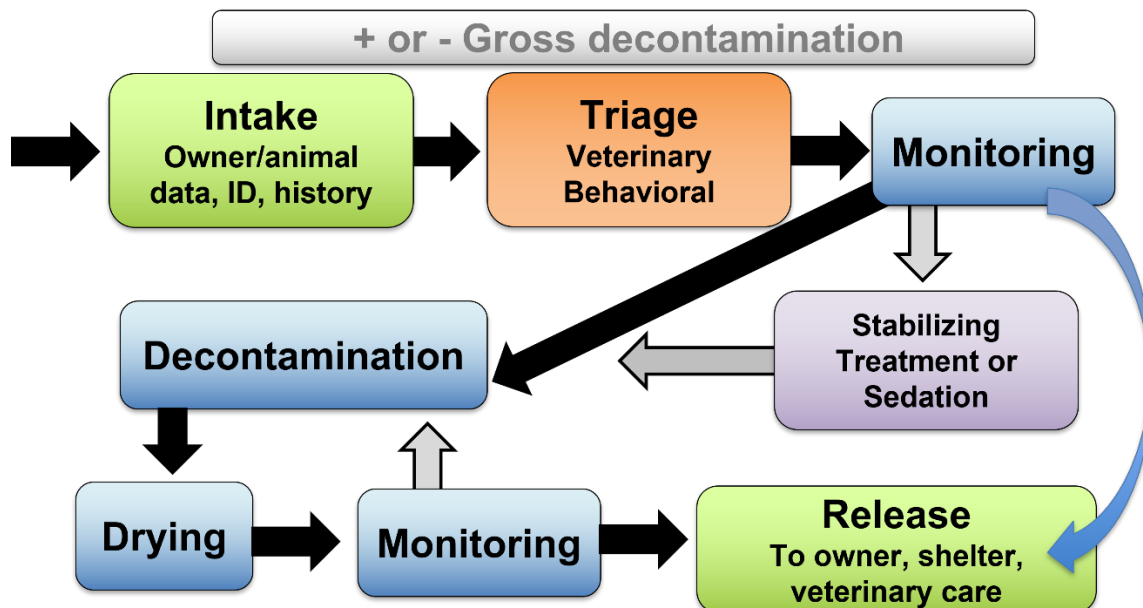
### **Adjustment for Hazards in Setup**

- Environmental hazards
  - Decontamination and temporary sheltering should be set in an area that will not be affected by the disaster should conditions change. Ensure the area selected is a sufficient distance and direction from the event to not be affected by smoke/plume should the wind direction change, away from the risk of increased flooding, etc.
  - Trees or buildings can protect the decontamination area from the elements.

- Propane-powered tankless water heaters are an inexpensive way to ensure water used for decontamination is of a species-appropriate temperature.
- Portable propane heaters can be used for unheated buildings or outdoor decontamination areas as long as adequate ventilation is maintained, per the manufacturer's recommendations.
- Cooling or warming stations should be planned for decontamination workers, and breaks should be scheduled as needed. Food and beverages should be available at these stations, but NOT in the decontamination area
- Emergency housing and sheltering (animals awaiting decontamination, needing additional decontamination, awaiting return to owner or transfer to emergency sheltering locations). Please see the Mass Care and Sheltering document.

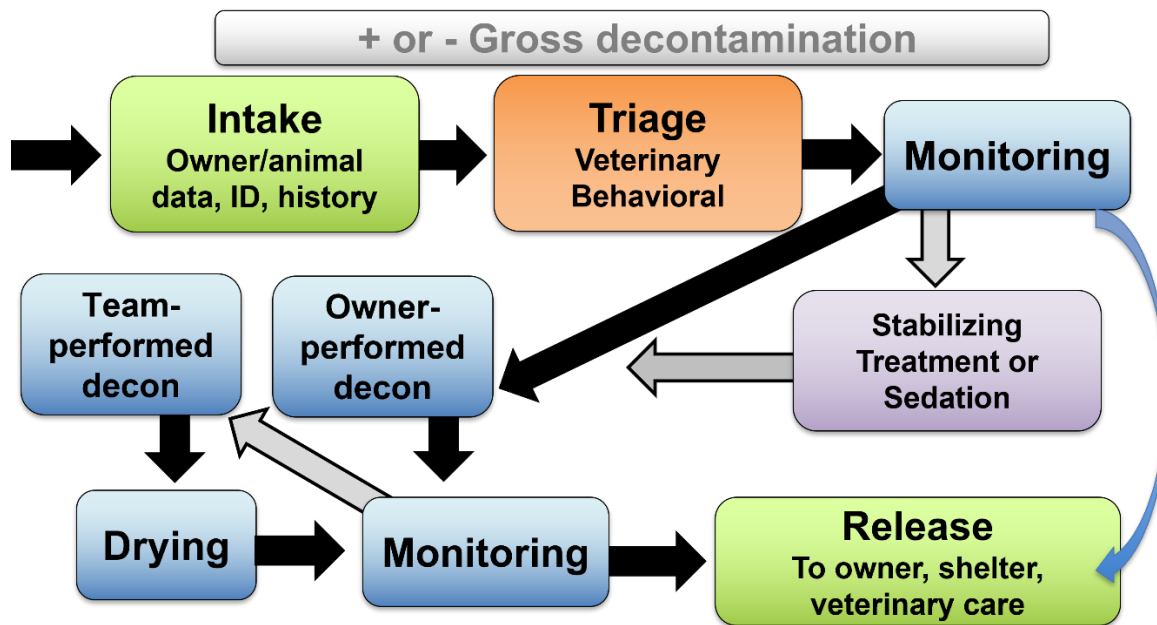
### Operational Flow Chart 1: Decontamination by Team Only

- Monitoring if a radiological incident or other measurable hazard
- Some form of gross decontamination could occur at any time before technical decontamination.
- The veterinary team might need to stabilize or sedate some animals before decontamination.
- If still contaminated at the second monitoring, cycle back through the system or hold.



## Operational Flow Chart 2: Decontamination With Some Owner Participation

- Untested with potential major challenges and benefits
- Not all owners will be willing or capable of assisting.
- Primarily applicable to large-scale incidents where resources are inadequate or very low-hazard situations where routine bathing is a precautionary courtesy.



### Intake

- Record creation
  - Can be electronic or written. Some animal agencies have mobile editions of shelter management software that could be used if devices are protected from contamination.
  - Record keeper should minimize any contact with contaminated people, animals, or objects
  - Records include:
    - Signalment (owner info, animal info)
    - History of significance: behavioral, medical
    - A digital photograph of the animal, preferably with the owner in the picture
    - For stray/rescue animals – location found
  - All pets should be scanned with a microchip reader during intake. Microchip information is useful in assuring the identification of the animal. Microchips should never be placed into animals before adequate decontamination.

- Management of accessories (collars, leashes, tags, animal records, prescription medications, etc.)
  - Some items may be able to be decontaminated and returned to the owner. A collar might be difficult to clean, but tags might be more readily cleaned and returned.
  - Temporary/disposable neckbands (e.g., Tyvek ID collars) are useful in maintaining animal ID within the operation.
  - Items that cannot be decontaminated may need to be replaced, photographed, or copied, depending on the circumstances and importance of the item.
    - For example, prescription medication bottles might be fine to be wiped down, or the medications might be transferred to a new container with a suitable label provided to identify the item, instructions, and owner/animal.

## Triage

- Veterinary triage
  - Does not have to be performed by a veterinarian. Triage consists of a quick screening by a veterinary technician or experienced assistant that identifies the health status of the animals into one of four categories. By screening out the animals that don't need immediate care, veterinary resources can be optimized. Detailed triage descriptions are provided in the Veterinary Medical Best Practice Working Group document. Triage levels include:
    - Green – Few issues and OK to proceed with decontamination
    - Yellow – May be able to be decontaminated and then transported for veterinary care. Alternatively, an abrasion or cut may need to be cleaned and bandaged before decontamination.
    - Red – Needs immediate veterinary care. As mentioned above, veterinary facilities are generally not equipped and staffed to accept contaminated animals, so field stabilization and at least some decontamination may be needed before transportation.
    - Black – Not expected to survive. Examples: A dog with severe thermal burns, mechanical injuries, and signs of acute radiation sickness following a nuclear detonation incident. A horse that has been standing in flood waters for an extended period, is sloughing skin and cannot remain standing.
- Behavioral triage
  - Behavioral triage should also occur in the triage tent at the same time as medical triage and is essential in determining whether or not the process

can proceed safely with appropriate handling, muzzles, or if sedation is needed.

- Consideration of methods for preventing self-grooming behaviors (muzzles, etc.) should be considered/implemented for dogs/cats.

## Monitoring and Contamination Assessment

- Contamination may be monitored precisely (as in radiological incidents) or estimated (location, history, visible contamination)
  - Radiological monitoring takes training and specialized equipment. Monitoring, if performed correctly, is extremely accurate and useful. Animals monitoring below the established incident threshold can be passed through without decontamination, which could greatly reduce workloads. In some incidents, monitoring might even be the first step in the cycle, using vehicle monitors, walk-through portal monitors, or hand monitors to divert only those with readings above the incident standard (generally 2x background radiation).
  - External contamination
    - Removing external contamination is the priority so that the animal does not contaminate itself, other animals, humans, or the environment (kennel, shelter, or home). An animal may need to be decontaminated more than once if visible contamination or above-limit radiological contamination remains.
  - Internal contamination:
    - Depending on the incident, the owner or receiving shelter or veterinary clinic will need to monitor signs of internal contamination. Consumption of flood waters can result in exposure to raw sewage bacteria, causing gastrointestinal illness. Chemical toxin exposures can result in illness requiring veterinary medical intervention (administering absorbents, fluids, or specific medications as indicated by veterinary medical assessment).
  - Isolation and quarantine
    - In animals that ingest contaminants, the animal's waste may be contaminated and need to be disposed of as directed by veterinarians and public health officials. Consideration in some cases should be given to collecting and testing the animals for contamination.

## Stabilization – Veterinary Support and Stabilization

- A triage area for veterinary care should be planned before the decontamination line to determine if the animal is contaminated or has any life, limb, or eyesight injuries that need to be treated. Stabilization of animals with significant injuries may need to occur before decontamination, when resources are available.
- Euthanasia may need to be considered if stabilization resources are unavailable, veterinary care creates an unacceptable risk to responders, or the animal is severely injured or ill.
  - Chemical restraint
    - In some circumstances, frightened, aggressive, injured, or ill animals (for example, animals with seizures secondary to a toxic contaminant) may need to be sedated or tranquilized to proceed with decontamination. Sedated animals will typically lose much of their thermoregulatory capacity and will be susceptible to hypothermia or hyperthermia.
      - Veterinarians must evaluate each animal, provide appropriate dosage of drugs, and provide adequate supportive care during decontamination and recovery.
    - Animals that seemed behaviorally sound at the start but then became fearful or aggressive should not be “manhandled” through the process – this increases the risk to both personnel and the animal and increases the stress to all other personnel and animals in the area.
      - When an animal in the decontamination line is not cooperative, the group must recognize the need for veterinary intervention (e.g., moving to a holding area to allow the animal to calm down or moving to a quieter location).
  - Physical restraint
    - Animal handlers must be experienced in handling animals under duress. Veterinary professionals, animal control officers, animal sheltering staff, and experienced volunteers are likely to have excellent animal handling skills.
    - Livestock handling should be assigned only to those with adequate experience in work. Veterinarians and Cooperative Extension agents may be very helpful in identifying personnel.
    - Having owners restrain and decontaminate their animals, with or without assistance, may work in limited circumstances. However, the potential for decontamination failure, escape, animal injury, and human injury may escalate dramatically.

- While local fire/Hazmat response personnel will have an excellent understanding of hazards and decontamination operations for humans, they may have little knowledge of animal handling safe decontamination products for animals or decontamination procedures for different types of animals. It is essential to forge collaborative operations to protect owners and responders as well as to accomplish the animal decontamination operation.
- Pre-existing medical conditions:
  - Pets and other animals commonly have pre-existing conditions. Conditions could complicate triage and some, such as congestive heart failure, would warrant extra care in handling and decontamination.

## Decontamination

- Decontamination is the process of reducing contamination to non-hazardous levels. It may be nearly impossible to remove all contamination.
  - When preparing to stand up animal decontamination operations, it is essential to estimate the scale of resources that will be needed. By calculating the required time per animal for each step in the decontamination process, one can determine how long it takes to process a single animal and identify potential bottlenecks to determine if multiple parallel lines are needed in the processing of animals.
  - Site preparation considerations for safety
    - Containment of decontamination bathing area (tents, plastic sheeting, tarps)
    - Perimeter fencing, if possible, is extremely valuable.
    - Containment or controlled discharge of water effluent as directed by IC (in some cases, discharge into storm sewers may be approved)
  - An area for preparation for decontamination should be established after the triage area. At this location, all animals have their eyes/noses rinsed (followed by placement of muzzle in dogs), eye lubricants placed (to protect from accidental soap exposure), and if appropriate (dry particulates are present) – have a moist microfiber towel wipe down (gross decontamination).
  - Animal decontamination is most effectively and safely done by individuals trained in animal handling and decontamination.
  - When the contaminant creates a food safety concern, decontaminated livestock species that could contribute to human food supplies should be identified and managed in accordance with direction from state or federal animal health officials to prohibit the diversion of animals into human food systems.



- Radiological-specific decontamination considerations:
  - Coordinated planning for animals to enter the reception center following decontamination.
  - Radiologic incidents will require an animal holding area in the warm zone for those not considered clean enough to leave the area.

## Drying

- Drying is a species-specific task that is highly dependent on the environmental conditions. In mild or warm environments (above 65 degrees), simple towel drying can be adequate for dogs, who can complete drying in a wire kennel/cage. For smaller animals or colder temperatures, electric grooming dryers may be necessary, although extreme caution must be observed to avoid hyperthermia (overheating).
- Drying towels should be disposable or collected for disposal or laundering, depending on the hazard.
- Sedated animals will need to be dried more quickly and thoroughly to avoid hypothermia. This is especially critical in animals with low body mass.

## Evaluation of Monitoring

- Monitoring may be visual, or it may employ instruments for radiological measurements
  - This post-decontamination assessment area should be planned and located to reassess the animals after decontamination to determine if they are healthy enough for transport or “clean” enough to leave.
    - This is also the recovery area for sedated animals, after drying, or continued care for those with ongoing medical needs post-decontamination.
  - In large-scale radiological incidents, the numbers of people and animals who are contaminated may necessitate increasing the allowable amount of contamination from 2x background. Even at 20x background or more, levels should not be harmful in the short term.
    - Owners should be instructed to bathe themselves and their pets at the first convenience to remove this additional contamination. This step is critical, since in a large-scale incident, temporary low-dose exposure to radiation will not harm people or pets, particularly when compared to life-safety issues such as the need for shelter, water, food, safety/security, and general medical or veterinary attention.
  - Animals monitoring above incident standards or with continued visible contamination should be cycled back through the decontamination line

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- or held in a warm zone holding cage until resources are available for repeating decontamination.
  - Animals repeatedly monitored high in radiological incidents may be internally contaminated.
  - Assessment of health impacts (dose assessment)
    - In radiological and other incidents, veterinary personnel and Hazmat personnel should collaborate to identify possible health impacts on animals and to provide information to survivors and the veterinary medical community. In some cases, follow-up studies of people or animals in the incident might be important.

## Disposition

- Return to owner or owner's agent and discharge
- Transfer
  - Mass care (animal sheltering)
  - Veterinary medical facility
  - Wildlife rehabilitation (applicable to wildlife decontamination operations, such as oil spill response)
  - Animal control facility (strays, bite holds)
- Euthanasia
  - Euthanasia is the act of ending an animal's life following the AVMA Guidelines on euthanasia. In some circumstances, particularly in incidents involving a large population of livestock or poultry, it may not be realistic to follow the AVMA guidelines for reasons of responder safety or resource availability. In these cases, life-ending operations are typically referred to as depopulation rather than euthanasia.
  - Decision process/authority: Performing euthanasia or depopulation as part of an emergency response requires owner permission or a statutory/regulatory authority decision.
  - Euthanasia/depopulation decisions may be influenced by the following:
    - Agent/incident-specific issues: Do contaminated animals present a risk to public health and safety due to the potential for transmitting animal or zoonotic disease or through food supply contamination? In some cases, infected or contaminated animals may present a direct threat to the public and responders, as in poultry infected with an influenza virus that also infects people.
      - In these cases, animals may need to be destroyed to protect unaffected people and animals. Depopulation

techniques, such as fire-fighting foam to kill houses of broiler chickens, may be appropriate to reduce human exposure to the disease. The AVMA publishes a policy guide on both euthanasia and depopulation, which can be used to guide decisions in this subject area.

- Indemnity issues: Whenever privately owned animals, primarily livestock and poultry, are destroyed during an emergency, utilizing emergency management or public health authorities, the need for appraisal and indemnity must be considered. This does not apply to pets that are euthanatized with the owner's permission to relieve suffering.
  - Under what authority are these actions ordered?
  - Is there funding for indemnification of the owners of animals by government agencies?
  - Are there other financial tools for helping mitigate the loss of the animals (e.g., insurance, low-interest loan programs, etc.)
- Before euthanasia or depopulation, animals must be identified and appraised (the latter only if indemnity is applicable).
  - If pets are to be euthanized, owners must provide permission, or response organizations must obtain alternate approval from a statutory or regulatory authority.
  - Other animals, such as animals in zoological collections and research facilities, may need to be evaluated carefully before deciding to perform euthanasia or depopulation. Some individual zoological animals may be critical to species conservation (such as endangered species) or belong to foreign governments. Some research animals are of genetic strains upon which necessary biomedical research is dependent.
  - Recently, some court decisions have identified pets lost in a disaster as lost property rather than stray animals. Owners typically have years to reclaim lost property compared to a few days of holding time for stray pets.
    - While it is unlikely that resources would allow the keeping of unclaimed contaminated pets for an extended time, it may be prudent to explore the long-term legal consequences of euthanasia of contaminated pets without a known owner.

## Demobilization

- Team Demobilization
  - Ongoing situational reporting from the animal decontamination team should keep the Operations Section leadership informed about the level of capability needed. Is the need increasing or decreasing? Are team members still capable of sustained response? Are additional teams/resources needed?
  - Demobilization planning should start early in response. The demobilization of one or more teams may have to be timed with the mobilization of replacement resources. Sustained resource management actions can be complex to manage.
  - Near the end of the mission life cycle (which could be a day or two to weeks), the team should make plans to demobilize. As individuals or teams demobilize, they need to formally check out of the incident. In some cases, teams may rotate, but equipment from the initial/jurisdictional team may still be needed. Close communication will be needed to ensure at the end of the mission, equipment, and supplies will be properly restored and restocked (see below)
- Facility restoration
  - An important element of response is restoration of the facility during the demobilization process. The use agreement/lease should be clear about damages and restoration responsibility, including radiological decontamination of facilities.
  - Jurisdictional emergency management should be consulted during the development of use agreements since radiological mitigations may be expensive and beyond the financial resources of most animal decontamination teams.
  - Restoration may include cleaning (including decontamination), repairs, and mitigations.
  - Mitigation might include:
    - Resurfacing areas with adherent contamination with paint or other suitable materials.
    - Removal of contaminated soil or materials
  - A signed release should be obtained from the facility owner/manager after restoration is completed to the satisfaction of the facility.
- Equipment repairs, maintenance, and supply restocking
  - During demobilization, equipment needs to be cleaned (including any necessary radiological decontamination), inspected, serviced, and repackaged for storage. In some cases, heavily contaminated equipment

that cannot be adequately cleaned may need to be disposed of according to the incident waste plan.

- Supplies should be inspected, monitored for contamination, inventoried, replenished, and restocked into a cache.
- The full cost of facility restoration, equipment repairs/replacement and supply restocking are response costs. Any possible Federal cost-sharing grants, however, are highly dependent on the quality of records kept about this process.

## After-Action Process Planning

- Planning should include developing processes for after-action analysis of exercises and incident deployments. After-action processes are described in detail in the FEMA HSEEP materials and can be adapted to any animal emergency management mission. Critical elements of after-action processes include:
  - Conduct a hot-wash discussion immediately after the exercise, as each team demobilizes (if rotating in), or at the end of an incident. In-person hot-washes are ideal, but virtual participation is also useful to pull in additional input.
  - Hot wash discussions typically collect oral and/or written input and focus on three questions:
    - What went well, or what did we do right?
    - What did not go as well, or what problems did we encounter?
    - What could we do better next time?
  - The After-Action Report (AAR) development will take more time and collect more detailed information as compared to the hot wash discussion. One or more meetings should be scheduled and the team developing the report may need to have various conversations with individuals, agencies, or organizations. The AAR should be a written document and should be shared with partners, lead agencies, and emergency managers.
  - Develop a Corrective Action Report, which lists the needed actions, responsible party, and timeline for corrections. Team leaders and lead agencies should continue to follow up on these corrective actions.

## Equipment and Supplies

- Site preparation
  - 10'x15' canopy with tie-down weights for each corner
  - 100'x10' heavy-weight plastic roll
  - Spring clamps

- Various-sized wire cages/ plastic carriers, portable open wire cages with handles (cats and small dogs could go through decontamination in the cage and get washed). Wire cages can be used for:
  - Temporary housing contaminated animals waiting for decontamination
  - Temporary housing post-decontamination animals needed final monitoring
- Technology/office supplies
  - Digital camera and one or more laptop computers with internet access
  - Plastic sheeting, tape, signs, tables, chairs, fans, office supplies, forms, or animal management software
- PPE – Tyvek/Tychem jumpsuits, nitrile gloves, rubber gloves, face shields/eye protection, shoe covers, duct tape, dust masks or respirators (depending on the hazard)
- Disposal containers for contaminated waste: hoses, hose nozzles, shower heads
- Non-medicated pet shampoo, baby shampoo, or original Dawn dish detergent (diluted). Judicial use of Dawn is recommended for working dogs as it has been shown to cause excessive drying of canine skin.
- Gross decontamination of animals that may not be easily handled
  - Control pole, bite gloves
  - Multiple muzzle sizes
  - Cat sacks
  - Towels
  - Slip leads – red, yellow, and green. Red lead is used for contaminated dogs, yellow for bathed but not checked for contamination, and green for post-decontamination
  - EZ Nabber for containing cats for gross decontamination
- Decontamination corridor
  - Wash tub and pool, rinse tub and pool, dog bathing tub, booster bath elevated dog bathing and grooming center, plastic 50-gallon stock tank paired with a larger plastic stock tank on the bottom, mixing tub, grooming table, PVC shower drain, PVC tubing, drainage mat, evaporative cooler drain
    - The shower drain can be installed in the bottom of the stock tank or grooming table for the bottom drain, or the cooler drain can be installed on the lower side for the side drain
    - The drainage mat can be trimmed to fit the stock tank to minimize the animal standing in contaminated water
  - Wash and rinse in the same tub, or if desired, a second stock tank or grooming bath and table can be used for rinse
  - Canopies placed end to end for a total 30'x10' corridor

- Spring clamps are used to hold the plastic to canopies. The plastic is used to create sides for canopies to contain water. A center divider may be designed to separate clean and contaminated sides of the corridor.
- Veterinary medical supplies
- See *Appendix D: Canine Decontamination Equipment List* for additional information.

## Safety

### Zoonotic Disease

- Zoonotic diseases can be transmitted from animals to humans through various routes, including ingestion and inhalation while handling or caring for animals. Incident-specific protective measures should be implemented, and proper PPE can mitigate the risk of exposure.
- Rabies, plague, tularemia, or other zoonotic diseases common in wildlife can threaten handler safety. State and federal wildlife officials can assist and advise when planning for wildlife issues.
- Some diseases that may be potential bioterrorist weapons are zoonotic. Animal health surveillance, included in plans for response to a terrorist attack, may increase the likelihood of early detection.
- The *NASAAEP 2023 Current Best Practices in Animal Emergency Management Disaster Veterinary Medical Response* document contains extensive information on zoonotic diseases and disease control measures.

### Animal Bites

- All animal bites should be treated by medical personnel.
- If known, documentation of the animal's rabies vaccination status should be obtained from the owner or owner's agent.
- Animals that bite humans may need to be quarantined for rabies observation.
- Wildlife bites may require euthanasia and rabies testing of the biting animal or other options per local and state policies.

### Personal Protective Equipment (PPE)

Veterinary and animal care personnel working the animal decontamination line should be in the same level of PPE as the individuals performing the decontamination. The HAZMAT team, Safety Officer, or Incident Commander will determine the appropriate level of PPE and set proper work/rest cycles in PPE based on environmental conditions.

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The time limits on work in PPE will impact the number of personnel needed to complete the process.

- PPE should be acquired in advance of an emergency. Knowing what hazards exist, e.g., what chemicals are stored or manufactured in an area, may help when planning what PPE may be needed.
- PPE for general use, such as Tyvek and Tychem jumpsuits/hooded coveralls, should be available.
- Animal handling PPE, like bite prevention gloves, catch poles, and muzzles, will be required.
- Response personnel should be trained on the proper use of general and animal-handling PPE

### **Respiratory Protection Program**

- According to the OSHA General Duty Clause, “Each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.”
- This should be applied to volunteers as well as employees
- Recognized hazards must be mitigated through various controls, including the use of PPE.
- If an inhalation hazard exists, then an animal decontamination team member must be included in a respiratory protection program, including medical clearance, fit testing, and appropriate respirators.
- OSHA guides [respiratory protection programs](#). Animal decontamination teams should work with local emergency management and public health agencies to identify the exact need for the team.

### **Responder – Critical Incident Stress Management (CISM)**

Emergency incidents may involve fear, uncertainty, destruction, death, and suffering and compromise the ability of ordinary individuals to cope with anxiety and heightened or prolonged emotional challenges. Specific to animal response in hazardous materials incidents, severe animal suffering and the potential need for euthanasia of large numbers of animals can cause extreme stress for response personnel. Incident supervisors should be aware of critical incident stress and signs that might indicate their personnel could be affected.

In addition, several excellent psychological first-aid courses can assist responders and first-line supervisors in recognizing signs of psychological distress and taking appropriate actions to ensure that response personnel and survivors are provided with appropriate mitigating resources. The details of acute incident stress and its



management are beyond the scope of this document, but detailed information is available through the cited references below.

Animals can be severely impacted by the stress of emergencies, well beyond the direct effects of chemical, biological, or radiological hazards. Stress can lead to secondary physical disorders, such as gastrointestinal upset, or work to suppress the immune system, leading to an increased risk of infectious diseases.

There are many CISM resources available. A select few include:

- Federal Occupational Health:  
<http://www.foh.dhhs.gov/NYCU/CISMInfo.asp>
- OSHA Critical Incident Stress Guide:  
<https://www.osha.gov/SLTC/emergencypreparedness/guides/critical.html>
- CISM International: <http://www.criticalincidentstress.com/>
- International Critical Incident Stress Foundation: <http://www.icisf.org/>
- Psychological First Aid self-study course:  
[http://pfa.naccho.org/pfa/pfa\\_start.html](http://pfa.naccho.org/pfa/pfa_start.html)
- Medical Reserve Corps: Psychological First Aid Field Guide:  
[https://www.medicalreservecorps.gov/File/Promising\\_Practices\\_Toolkit/Guidance\\_Documents/Emergency\\_Preparedness\\_Response/MRC\\_PFA\\_04-02-08.pdf](https://www.medicalreservecorps.gov/File/Promising_Practices_Toolkit/Guidance_Documents/Emergency_Preparedness_Response/MRC_PFA_04-02-08.pdf)

### **Owners – CISM**

- Separation Anxiety/Mental Health of the Owner
  - Separation anxiety can affect both the mental and physical health of household pets and animal owners. Other factors, such as losing friends, family members, household pets, or property, can negatively affect a person's mental health.
  - Organizations, such as the American Red Cross, Salvation Army, and other government agencies might have counselors available to victims.

### **Psychological First Aid (PFA)**

- The American Psychological Association defines PFA as “an initial disaster response intervention to promote safety, stabilize survivors of disasters, and connect individuals to help and resources.”
- Psychological first aid may apply to both survivors and responders in distress.

- A large number of resources are available for PFA:
  - <https://www.apa.org/practice/programs/dmhi/psychological-first-aid>
  - <https://www.samhsa.gov/dtac>
  - <https://rems.ed.gov/IHEPsychFirstAid.aspx?AspxAutoDetectCookieSupport=1>

## Public Health

Animal decontamination is associated with various hazards that can impact owners and handlers of the animals. In addition, owners or handlers may have been exposed to the same hazard. Human, animal, and environmental health are all strongly linked, and the term “One Health” has been described as managing these interrelationships across various disciplines. The *NASAAEP 2023 Current Best Practices in Animal Emergency Management Disaster Veterinary Medical Response* document contains an overview of One Health.

If animals are not adequately decontaminated, or if they have internal contamination, then there could be additional risk to that animal and the people around the animal. For this reason, animal decontamination mitigates risk for animals and people.

In some incidents, such as the September 11, 2001, attack in New York City, long-term monitoring of search and rescue dogs was conducted along with long-term monitoring of responders. Since dogs have a much more limited lifespan, the results of monitoring may be apparent well before that of human monitoring.

The safety and well-being of pet, service, and assistance animals have a direct impact on the psychological and physical well-being of their owners.

## Public Messaging

Disasters are challenged with chaos, confusion, and miscommunication. The decontamination of people and animals needs to be supported with pre-scripted messaging that can be used or modified to provide:

- Information on the location(s) where decontamination is available, such as a planned Community Reception Center in a radiological incident.
- Instructions for the public on preparing to leave their homes for the decontamination site, including (when possible and if appropriate)
  - Bathing animals at home before leaving to reduce the demand for animal decontamination.
  - What animal-related items with which to evacuate, including veterinary records, prescription or other medications, carriers, leashes, collars, tags, etc?

- How to leave the house when evacuating, for example:
  - Cover seats with clean blankets or plastic
  - Carry small pets/carriers to the car
  - Wipe off large dogs' feet just before getting in a car
  - Place any easily contaminated items (clean blankets, dog bedding, toys) in plastic bags before leaving the house
- The veterinary community across a wide region should be provided information as to what they should do if presented with an animal that may still be contaminated. In some cases, such as floodwater or debris exposure, thorough bathing may be the recommended action.
- In radiological incidents, local authorities may need to establish monitoring locations where owners and their animals can be monitored for radiological contamination. An animal decontamination capability may be needed at that site for those found contaminated above incident recommendations.
- Animal owners and the public should be provided with information on the hazard and the short and long-term potential effects of the hazard. Some message drafts can be pre-scripted, such as flood water and radiological hazards.
  - Some people may evacuate without adequate decontamination of their pets or other animals.
- Hotels may be reluctant to allow survivors and pets in if the hotel staff cannot confirm that the family was monitored and/or decontaminated. Messaging should include information for hotels on incident hazards and decontamination and monitoring actions. Two-way conversations with the lodging industry would be important to avoid stigmatization of survivors who have been through appropriate monitoring and decontamination. Providing written confirmation to survivors upon leaving the decontamination site may be useful in this regard.



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## Training and Preparation

Training and exercises are critical to developing animal decontamination plans and procedures based on what is available locally, the hazards most likely to be expected in that area, local animal populations, and local animal expertise. First responders, emergency management, and agricultural/veterinary personnel can learn from each other even if the training or exercise is not animal-focused or has an animal component.

Determining which animal response stakeholders and expertise is local or regional and which may need to be requested from federal, national, or international organizations is one of the key lessons learned that may come from participating in training and exercises.

### Training and Exercises

Training and exercises are among the best ways to determine the stakeholders at the local, state, federal, national, or international levels. Any disaster response or emergency management training or exercise that includes humans will most likely include some issues about some animal species.

Emergency managers should invite groups and individuals with animal handling, animal response, species-specific experience, and animal regulatory authority to participate, even if the primary focus of the training or exercise is not animal or animal decontamination. Including these groups will increase awareness of animal response and decontamination issues and identify organizations that can assist with animal decontamination or provide information on the hazards that may be faced during an incident in the jurisdiction.

A detailed description of emergency management exercises is beyond the scope of this document. Additional information can be obtained through the FEMA [Emergency Management Institute's Independent Study Courses](#) and the [DHS Homeland Security Exercise and Evaluation Program \(HSEEP\)](#).

Training and exercises provide the opportunity for information to be shared between all involved stakeholders. Participation in local or regional training and exercises familiarizes first responders with the animal response personnel, equipment, and procedures. Animal emergency responders can learn when, where, and how their practices can fit into the local or regional ICS for different disasters.

Examples of training or exercises where it would be beneficial to involve animal responder stakeholders include:

- Local Hazmat exercises: Chemicals commonly transported by rail or highway may affect large numbers of pets, livestock, or wildlife if spilled in transit.
- Aircraft crash scenarios: Crashes may occur at airports or residential neighborhoods where pets or service animals may be involved.
- Nuclear Power Plant: Incidents are likely to involve a large, diverse animal population (e.g., pets, service animals, livestock, and wildlife).
- Terrorism or hostile action exercises: Chemical, biological, radiological, nuclear, or explosive agents can affect animals around the release or detonation.
- Foreign animal disease or other infectious disease response exercises

Federal programs with training resources include:

- Department of Homeland Security (DHS) Center for Domestic Preparedness, Anniston, Alabama
- United States Department of Agriculture's (USDA) National Veterinary Accreditation online training program includes the use of personal protective equipment (PPE) as well as many other important topics.

Non-governmental organizations that may provide hands-on general animal response or animal decontamination training for emergency responders include:

- The National Animal Rescue and Sheltering Coalition (<http://www.thenarsc.org>) includes the American Society for the Prevention of Cruelty to Animals (ASPCA), Code 3 Associates, ASAR Training and Response, and others.
- Community Emergency Response Team programs (CERT) and Medical Reserve Corps (MRC) may have animal response teams or training.
- State/County/Community Animal Response Team programs (SART/CART) or similar programs
- State veterinary medical reserve programs

Chemical, biological, radiological, nuclear, and explosives training resources for animal and veterinary personnel include:

- Local Hazmat/Fire departments
- Local/state emergency management agencies
- Academic institutions with emergency management/fire science programs
- State radiation protection agency
- National Center for Biomedical Research and Training/Academy of Counter Terrorist Education (NCBRT/ACE) (hosted by Louisiana State University)
- The Center for Food Security and Public Health (hosted by Iowa State University <https://www.cfsph.iastate.edu>)

## Regulatory Concerns Pertaining to the Use of Live Animals in Training and Exercises

The use of animals in research, tests, evaluations, training, and instruction is regulated under the Animal Welfare Act, enforced by USDA. The details of the [Animal Welfare Act and Regulations](#) are beyond the scope of this document.

The use of purpose-bred research animals, the participation of a research institution (such as a university), the use of live agents or simulants, or the regular use of any individual animals in training or exercises may require compliance with the Animal Welfare Act. Using pets or other privately owned animals belonging to individuals who retain custody of the animal during the exercise or training (without the use of a “live radiological agent”) may be exempt from USDA oversight.

Nonetheless, the USDA or an Institutional Animal Care and Use Committee (IACUC) should be consulted before using animals. Partnering with a university or organization already regulated by USDA may be a practical way to obtain compliance. Partnerships will include having the exercise or training program reviewed and approved by the university’s or organization’s IACUC.

- Simulant (surrogate contaminant) Use for Training and Exercises
  - Due to human and animal health, safety, and welfare concerns, the actual substance should never be used during training and exercises. The simulants used must be non-hazardous and safe for use on humans and animals, provide some objective (visual, use of black light, or other equipment) or subjective measurement of decontamination, and should generally provide similar challenges to the hazardous substance of concern selected for the training or exercise.
  - Identifying suitable simulants that represent different hazards for the decontamination of humans, animals, and equipment is a considerable challenge. It requires research to develop a helpful array of simulant training aid options.
    - The authors are unaware of very low levels of short half-life radionuclides being used in animal decontamination training or research on live animals, but use may be possible under very strict controls in a research environment.

### Note

Care must be taken when applying any simulant to a live animal to avoid getting it into the eye, around the mouth and nose, or inner ear. Animals must be prevented from licking themselves to avoid ingestion of the simulant, even if it is nontoxic.


- The following list offers some ideas for simulants used for human and animal decontamination. Simulants should be tailored to match the properties of potential hazards to the degree possible.
  - Glo-Germ Powder and Oil
    - The Glo-Germ Company manufactures a fluorescent product in the form of a very fine powder and an oil preparation. Glo-Germ products are used for biosecurity training, requiring ultraviolet flashlights or fluorescent lamps to evaluate control and contaminated animals. The product is a good test for hand washing or other cleaning processes and demonstrates cross-contamination. For animal decontamination, Glo-Germ could be helpful to simulate dry contaminants, flood water contaminants, or dry disaster debris.
    - Glo-Germ could also be used to simulate radiological contamination but may have deficiencies when simulating fallout from a nuclear detonation. Fallout tends to be composed of insoluble spheroid particles that range from a few millimeters to about 50 microns. The Glo-Germ powder is a very fine uniform plastic particle of less than 50 microns. In the absence of a better option, however, Glo-Germ can be helpful for even nuclear fallout decontamination exercises.
  - Mineral oil for oil spill simulation
    - Mineral oil can be used to simulate any chemical which is thick and viscous. Mineral oil is cheap to use; however, it may be difficult to remove from hair coats and require multiple baths. Evaluation of mineral oil removal is usually visual.
  - Water-soluble, non-toxic paint
    - Water-soluble, non-toxic paints may be helpful to simulate contaminants since it is non-toxic and can be washed off readily. Evaluation of Glo-Germ products, tempera paint, or fingerpaint removal is usually visual.

## Just-In-Time Training

All jurisdictional animal decontamination capabilities have limitations and could be overwhelmed in large incidents. If mutual aid or national assets are not readily available, then a pre-designed just-in-time training program, while not ideal, could provide some level of resources for the mission.

Just-in-time training should be focused on taking people with strong background skills (veterinary professionals, animal control, animal shelter staff, university staff, fire department personnel, and others) and providing enough additional training to allow





them to safely support the mission. Pre-designed training based on the base training for the team should be modularized and ready to utilize if needed. Not every person would necessarily need every module.

Additional elements would be rapid access to medical clearance and fit testing, necessitating that JIT trained personnel would need to be relatively healthy in order not to have to undergo an occupational physical, possibly with diagnostic testing. The [Center for Food Security and Public Health](#) has several animal JIT training resources for first responders.

Training modules should be concise to ensure quick completion and response, providing the critical information and tasks needed. Documents, decision trees, job-associated task lists, and templates should be ready to be used and refined during training and exercises. Documents can be generally applicable to all disasters and/or written for specific disasters.



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## Challenges and Possible Courses of Action

Since the 2014 version of this document, some research has been conducted on canine decontamination. Published results are included in the References that follow this section. Elements of animal decontamination, however, continue to rely on extrapolation from human decontamination doctrine, empirical observation, and the application of the principles of general veterinary toxicology and animal sciences.

Considerable research and publications exist on the decontamination of wildlife in petroleum contamination of marine environments, which provide the foundation for current practices.

Critical issues that need to be investigated include the following:

- The efficiency of decontamination on individual animals: What methods are the most efficient in animals of various species and hair coat types? Are there predictable problem areas for decontamination that could be emphasized in training?
- Efficiency needs to be studied for various types of contamination
- Efficiency in various environmental conditions: Decontamination could be a need in conditions of heat, cold, wind, and precipitation. These conditions may change efficiency and create thermoregulatory hazards for responders and animals.
- Surrogates that provide similar behavior to various hazardous contaminants must be identified, providing at least a qualitative assessment of decontamination for exercise purposes.
- Comparative studies on methods of gross animal decontamination are needed, including tacky cloth, dry decontamination products, wet towels, and vacuum technologies.
- Mass animal decontamination is another critical issue requiring research and validation of operational procedures in exercises that simulate high throughput. If a community reception center expects to see 1,000 persons per hour, then pet decontamination, for example, should parallel that number with perhaps 500 to 600 household pets per hour as a target.
  - If these rates are not achievable, then alternates, such as gross decontamination or temporary sheltering in a “warm zone,” may be the alternative. There have been no animal decontamination exercises for radiological or other incidents to adequately test high-throughput scenarios.



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## Resources

The Primary Response Incident Scene Management (PRISM) series was written to provide authoritative, evidence-based guidance on mass patient disrobing and decontamination during a chemical incident. The PRISM documentation comprises three volumes.

- The underpinning basis of the PRISM guidance documentation is scientific evidence accrued from a six-year program of research sponsored by the Biomedical Advanced Research and Development Authority (BARDA), the aim of which is to ensure that all patients exposed to potentially hazardous chemicals receive the most effective treatment possible at the earliest opportunity.
  - [Volume 1 is Strategic Guidance \(142 pages\)](#)
  - [Volume 2 is Tactical Guidance \(49 pages\)](#)
  - [Volume 3 is Operation Guidance \(9 pages\)](#)

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# Appendix A: Acronyms, Key Terms, and Definitions

## Acronyms

An asterisk indicates the term has a more complete definition in the following section.

AAR	After Action Report
ACO	Animal Control Officer
ADA	Americans with Disabilities Act (defines service animals)
AHJ	Authority Having Jurisdiction
APHIS	Animal and Plant Health Inspection Service (USDA)
ASAR	Animal Search and Rescue
CART	County/Community Animal Response Team*
CBRN or CBRNE	Chemical, biological, radiological, nuclear (explosive)
CERT	Community Emergency Response Team (Citizen Corps program)
CONOPS	Concept of Operations
DHS	Department of Homeland Security
DOD	Department of Defense
DOI	Department of Interior
EIEIO	The chorus from “Old MacDonald Had a Farm”
EMA	Emergency Management Agency
EMAC	Emergency Management Assistance Compact*
EOC	Emergency Operation Center* (also termed Coordination Center)
EOP	Emergency Operations Plan (may be preceded by jurisdictional identifier)
ESF	Emergency Support Function*
ESF6	Emergency Support Function 6 (Mass Care, Emergency Assistance, Housing, and Human Services)
ESF8	Emergency Support Function 8 (Public Health and Medical Services)
ESF9	Emergency Support Function 9 (Search and Rescue, SAR)
ESF11	Emergency Support Function 11 (Agriculture and Natural Resources)
FEMA	Federal Emergency Management Agency
HAZMAT	Hazardous Materials
HHS or DHHS	Health and Human Services (U.S. Department of)
HVAC	Heating, Ventilating, and Air Conditioning
IA	Individual Assistance (FEMA)
IAP	Incident Action Plan*
IC	Incident Commander
ICC	Incident Command and Coordination

ICP	Incident Command Post
ICS	Incident Command System*
IMT	Incident Management Team*
IMAT	Incident Management Assistance Team (FEMA)
IOF	Interim Operating Facility (precursor to Joint Field Office)
IT	Information Technology
JFO	Joint Field Office (FEMA)
JIC	Joint Information Center
JIS	Joint Information System (multiple locations)
MA	Mission Assignment*
MAA	Mutual Aid Agreement
MAC Group	Multi-agency coordination group (policy level)
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MRC	Medical Reserve Corps (a program within Citizen Corps)
NARSC	National Animal Rescue and Sheltering Coalition
NASAAEP	National Alliance of State Animal and Agricultural Emergency Programs
NDMS	National Disaster Medical System
NGO	Non-Governmental Organization
NIMS	National Incident Management System
NRCC	National Response Coordination Center
NRF	National Response Framework
NSS	National Shelter System
NVRT	National Veterinary Response Team
OSHA	Occupational Safety and Health Administration
PA	Public Assistance (FEMA)
PAPPG	Public Assistance Program and Policy Guide (FEMA)
PETS Act	Pets Evacuation and Transportation Standards Act (amendment to the Robert T. Stafford Act of 1974)
PIO	Public Information Officer
POC	Point of contact
PPE	Personal Protective Equipment
RRCC	Regional Response Coordination Center (FEMA)
RRF	Resource Request Form (FEMA)
RSF	Recovery Support Function
SAHO	State Animal Health Official
SAR	Search and Rescue
SART	State Animal/Agricultural Response Team*



SME	Subject matter expert
SOG	Standard Operating Guidelines
SOP	Standard Operation Procedures
STT	State, Tribal and Territorial
STTI	State, Tribal, Territorial and Insular
STTL	State, Tribal, Territorial and Local
THIRA	Threat and Hazard Identification and Risk Assessment
USAR or US&R	Urban Search and Rescue
USDA	United States Department of Agriculture
VOAD AND NVOAD	(National) Voluntary Organizations Active in Disasters
VERT, VRC or VMRC	Veterinary Emergency Response Team, Veterinary (Medical) Reserve Corps
Web EOC	Software platform for EOC management (used by FEMA and many other jurisdictions)
ZAHP	Zoo and Aquarium All Hazards Partnership

## Key Terms and Definitions

Legal definitions of different types of animals vary across jurisdictions. To provide consistency across the Animal Emergency Management Best Practice Working Group documents, animal classifications and definitions are provided as common-use definitions.

For a specific legal definition, refer to jurisdictional definitions. These definitions are generally accepted in the US and are sourced from global, state, and/or federal guidelines. Other key terms are used in animal emergency practices. This list addresses some common terms used during emergency response.

### • Animal Definitions

- **Animals:** Animals include household pets, service and assistance animals, working dogs, livestock, wildlife, exotic animals, zoo animals, research animals, and animals housed in shelters, rescue organizations, breeding facilities, and sanctuaries (source: [National Preparedness Goal](#)).
- **Assistance animals:** an assistance animal is not a pet. It is an animal that works, provides assistance, or performs tasks for the benefit of a person with a disability or provides emotional support that alleviates one or more identified symptoms or effects of a person’s disability (source: [Section 504 of the Fair Housing Act](#)).
  - Note – service animal definitions under the Americans with Disabilities Act (ADA) and assistance animal definitions under the Fair Housing

Act only differ by the exclusion of emotional support from the service animal definition.

- **Livestock:** The term livestock may have a specific definition within individual states and Federal programs. In the broadest use, including general ESF #11 use, livestock includes domestic livestock typically kept on farms and such as cattle, sheep, goats, swine, poultry, and other animals raised for food or fiber, as well as horses, donkeys, and mules. “Alternative livestock” may include wild cervids (elk, deer, etc.) as well as bison, ostrich, emu, or other wild species kept for food production. When discussing “livestock,” it is essential for all parties to work from the same definition.
- **Non-commercial livestock or “backyard” livestock:** This is another flexible term that may have a specific definition in local, State, Tribal, Territorial and/or Insular (STTI) emergency plans. In its broadest use, non-commercial livestock would include animals kept at residences for pleasure, companionship, sport (not commercial racing) or household food production which does not generate food or products intended to enter commerce.
- **Pets/Household pets:** Summarizing from the FEMA Public Assistance Policies, household pets are domesticated animals that:
  - Are traditionally kept in the home for pleasure rather than commercial purposes
  - Can travel in common carriers
  - Can be housed in temporary facilities
  - Examples are dogs, cats, birds, rabbits, rodents, hedgehogs, and turtles
  - FEMA Public Assistance excludes these species as household pets: farm animals (including horses), racing animals, reptiles (other than turtles), amphibians, fish, insects, and arachnids
  - *Note: This definition applies to expense eligibility under the FEMA Public Assistance Grant Program and in no way limits STTI, Local, and non-governmental entities from defining and managing all animal types per their own policies.*
- **Service animals:** Under the ADA, a service animal is defined as a dog that has been individually trained to do work or perform tasks for an individual with a disability. The task(s) performed by the dog must be directly related to the person's disability. In addition to the provisions about service dogs, the Department’s ADA regulations have a separate provision about miniature horses that have been individually trained to do work or perform tasks for people with disabilities (U.S. Department of Justice Civil Rights Division, 2020).

- **Working animals:** The term working animal can vary considerably within the situational context, but within an emergency management context, ESF #11 considers this group to include animals (typically dogs and horses) working in law enforcement (detection, patrol, apprehension, etc.) and animals working in search and rescue (primarily dogs used in search and recovery missions). Working dogs may include dogs used in hunting, guarding and for agriculture tasks.
- **Animal Emergency Management Annex:** A component of a jurisdictional emergency operations plan that provides information on how animals will be managed in disasters, including organizational responsibilities.
- **Biosecurity:** Measures that prevent the spread of disease to, from, or within a premises containing animals.
- **Community or County Animal Response Team (CART):** An organization developed to implement the animal elements of the jurisdictional emergency operations plan. The exact title and format vary considerably (a team of organizations, direct volunteers, etc.) The critical element is that the CART must be under the control of, or have an agreement with, the local government.
- **Coordination Center:** *FEMA EMI ICS Glossary* – A facility that is used for the coordination or agency or jurisdictional resources in support for one or more incidents.
- **Emergency Management Assistance Compact (EMAC):** EMAC is a national interstate mutual aid agreement that enables states to share resources during times of disaster. The thirteen (13) articles of the Compact sets the foundation for sharing resources from state to state that have been adopted by all 50 states, the District of Columbia, the U.S. Virgin Islands, Puerto Rico, and has been ratified by Congress (PL-104-321).
- **Emergency Operations Center (EOC):** See Coordination Center definition above.
- **Emergency Support Function (ESF) (Federal):** Some states, but not all, use ESF terminology. Some states use more than 15 ESFs and do not necessarily align with Federal ESFs.
- **Disaster Declaration:** A Disaster Declaration is a formal statement by a jurisdiction that a disaster or emergency exceeds the response and/or recovery capabilities.
- **Disaster/emergency:** An occurrence of a natural catastrophe, technological accident, or human-caused event that has resulted in severe property damage, deaths, and/or multiple injuries. Except for use in certain declarations, the terms are commonly used interchangeably.
- **Emergency manager:** The jurisdictionally appointed position that conducts analysis, planning, decision-making, and assignment of available resources to prevent/mitigate, prepare for, respond to, and recover from the effects of all hazards.

- **Emergency Operations Plan (EOP):** A document maintained by various jurisdictional levels describing the plan for responding to a wide variety of potential hazards.
- **Incident Action Plan (IAP):** *From the FEMA ICS Glossary* – An oral or written plan containing incident objectives which reflect the overall strategy for managing the incident. It may include the identification of operational resources and assignments. It may also include attachments that provide direction and important information for management of the incident during one or more operational periods.
- **Incident Command System (ICS):** *From the FEMA ICS Glossary* – A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations.
- **ICS forms:** Nationally standardized forms used to manage or document incident response under the Incident Command System. Forms can be found on FEMA's website.
- **Incident Management Team (IMT):** The Incident Commander and appropriate Command and General Staff personnel assigned to an incident. Key IMT positions include (source: FEMA ICS Glossary):
  - **Incident Commander (IC)** – assigned by jurisdictional authorities to oversee all aspects of the incident response
  - **Command Staff:** Safety Officer (SOFR), Liaison Officer (LOFR), Public Information Officer (PIO)
  - **General Staff:** Operations Section Chief (OSC), Planning Section Chief (PSC), Logistics Section Chief (LSC) and Finance and Administration Section Chief (FASC)
- **Isolation:** Segregation of animals to prevent disease exposure or spread.
- **Mission Assignment (MA):** A work order issued by FEMA to another Federal agency directing the completion of a specific task, and citing funding, other managerial controls, and guidance. There are two general types of MAs:
  - **Federal Operations Support (FOS)**—Requested by a Federal agency to support Federal operations.
  - **Direct Federal Assistance (DFA)**—Resources requested by and provided to affected State and local jurisdictions when they lack the resources to provide specific types of disaster assistance.

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- **Mutual aid:** emergency assistance provided from one jurisdiction or organization to a peer (local-local, state-state, NGO-NGO, etc.).
  - **Quarantine:** Isolation of animals that may have an infectious disease for a specified period to allow for testing or extended observation.
  - **Resource typing and credentialing:** Resource typing is defining and categorizing, by capability, the resources requested, deployed, and used in incidents. Resource typing definitions establish a common language and defines a resource's (for equipment, teams, and units) minimum capabilities.
  - **State Animal/Agricultural Response Team (SART):** SART organizations vary considerably in their structure, mission, and nomenclature (many don't use the SART name). In general, SART-type organizations provide a framework for State stakeholders to support the State animal emergency management plan. SART-type organizations generally are under the control of the state or have an agreement with the state.
  - **State veterinarian/animal health officials (SAHO):** The veterinary officer/official for a particular State or territory of the U.S. in charge of animal health activities (exact title varies).
  - **Zoonoses:** Disease that can be transmitted between animals and humans.



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## Appendix B: Veterinary Medical Response in Chemical, Biological, Radiological, and Nuclear (CBRN) Incidents

Veterinary professionals may be asked to respond to incidents that involve CBRN hazards, which add a host of complications to traditional clinical roles in disasters. There are overarching national plans for CBRN incidents, including:

- National Response Framework, including the main document, Emergency Support Function Annexes and Support Annexes:  
<https://www.fema.gov/emergency-managers/national-preparedness/frameworks/response>
- Incident-Specific Annexes, of which the following apply to CBRN incidents:
  - National Food and Agricultural Incident Annex:  
[https://www.fema.gov/sites/default/files/2020-07/fema\\_incident\\_annex\\_food-agriculture.pdf](https://www.fema.gov/sites/default/files/2020-07/fema_incident_annex_food-agriculture.pdf)
  - Oil and Chemical Incident Annex:  
[https://www.fema.gov/sites/default/files/documents/fema\\_incident-annex-oil-chemical.pdf](https://www.fema.gov/sites/default/files/documents/fema_incident-annex-oil-chemical.pdf)
  - Nuclear/Radiological Incident Annex:  
[https://www.fema.gov/sites/default/files/documents/fema\\_incident-annex\\_nuclear-radiological.pdf](https://www.fema.gov/sites/default/files/documents/fema_incident-annex_nuclear-radiological.pdf)
  - Biological Incident Annex (Human and zoonotic hazards):  
[https://www.fema.gov/sites/default/files/2020-07/fema\\_incident-annex\\_biological.pdf](https://www.fema.gov/sites/default/files/2020-07/fema_incident-annex_biological.pdf)

States, Tribal Nations, Territories (STT), and local jurisdictions may have similar incident-specific plans.

### Integration of Veterinary Response into CBRN Incidents

- To be effective, veterinary medical resources must be available to protect themselves during CBRN responses, which include:
  - Coverage in a respiratory protection program to include medical clearance, fit testing, and respirator training
  - Training in the use of barrier personal protective equipment as needed for the hazard
  - Hazardous Waste Operations Response (HAZWOPER) training at the awareness level or higher
  - Training in specific CBRN missions according to the jurisdictional threat analysis and risk assessment
- Training and exercises must be conducted for veterinary teams that may be asked to work in CBRN incidents

- Jurisdictions should analyze liability insurance and worker's compensation insurance coverage for veterinary teams, ensuring that veterinary professionals who are not jurisdictional employees are covered for liability, injury, or illness during the response.

It is beyond the scope of this document to provide a detailed operational guide for every aspect of veterinary medical response in CBRN incidents. The bibliography for this appendix provides additional resources for veterinarians on CBRN response. The five general focus areas for this appendix are:

1. Application of One Health principles to CBRN incidents
2. Biological Response – Human or Zoonotic Disease
3. Biological Response – Animal diseases, including zoonotic diseases
4. Oil and chemical incident response
5. Nuclear and radiological incident response

## **Application of One Health Principles to CBRN Incidents**

One Health is discussed in the main section of the main document. CBRN incidents are highly complex in the interface of human and animal health, environmental health, and food. Veterinary medical responders, and those providing coordination and support for veterinary medical response, must be fully aware of these interactions and should be prepared to collaborate with multiple other professional sectors on addressing complex health issues within the incident.

One Health relationships must be forged in the planning phase to be maximally effective. Examples of One Health approaches in CBRN response include:

- During the COVID-19 Pandemic, the CDC set up the One Health Federal Interagency Coordination Committee (OH-FICC) to coordinate among multiple Federal agencies on many complex issues. Issues included:
  - SARS-CoV-2 infection in animals, susceptibility of various species, including livestock, household pets, and wildlife.
  - Guidance development about people and their interface with animals
  - SARS-CoV-2 in the environment, including sewage
  - Monitoring One Health issues and scientific publication
  - Coordinating with USDA on animal case definition, testing, and reporting cases to the World Organization for Animal Health
  - Many SLTT entities featured similar One Health engagement
- Since the mid-1990s, the US Federal Government has maintained the Advisory Team for Environment, Food, and Health which includes subject matter experts from CDC, FDA, EPA, and USDA and provides protective action recommendations for nuclear or radiological incidents in a One Health collaboration.



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## Biological Response – Human or Zoonotic Disease

The COVID-19 pandemic is perhaps the most striking recent example of the potential scale of impact of biological incidents worldwide. The veterinary profession was challenged with hazards from client interactions, personal protective equipment availability, animal cases, economic impacts, challenges about mass care services in disasters, and many more issues.

While the SARS-CoV-2 virus was primarily a threat to people, the impact on the practice of veterinary medicine and the impact on veterinary disaster response was immense. Other examples of zoonotic disease incidents of significance to veterinary responders include, but are not limited to:

- Avian influenza variants with zoonotic potential (ability to infect people)
- Other influenza variants with other species origins and the ability to infect people
- Monkey Pox outbreaks of 2003 and 2022 (rodents and people)
- Ebola outbreaks (bats, people, monkeys)

## Biological Response – Animal Diseases, Including Zoonotic Diseases

Veterinary medical professionals lead the response to animal disease incidents. Animal disease outbreaks in recent history include:

- Highly pathogenic avian influenza (many outbreaks worldwide, including North American)
- Virulent Newcastle disease (US 2002 and 2020)
- African Swine Fever (Asia, Eastern Europe, Africa, Hispaniola)
- Foot and mouth disease (Africa, Asia, Europe, South America)
- Bovine Spongiform Myelopathy (many nations)

USDA Animal and Plant Health Inspection Service (APHIS) and STT Animal Health Officials lead response to animal disease outbreaks. USDA APHIS Veterinary Services publishes an extensive library of response tools for animal health emergency response at the [Foreign Animal Disease Preparedness and Response](#) website. Because so much material is provided, there is no need for this document to attempt to provide additional detail on this subject.

## Oil and Chemical Incident Response

Oil spill incidents have historically had a major impact on wildlife (particularly marine mammals, waterfowl, and shore birds). Other chemical incidents can include industrial accidents and transportation accidents. [CDC](#) provides an overview of chemical hazards as well as an index of the toxicology of many chemicals.

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Intentional attacks (terrorism) could employ a chemical agent to attack people and incidentally animals. Select chemical terrorism agents include:

- Nerve agents
- Vesicants (blistering agents)
- Blood agents (cyanogenic agents)
- Choking agents (pulmonary agents)
- Riot-control agents (tear gases)
- Psychomimetic agents
- Toxins

A detailed discussion of these agents is beyond the scope of this document, but additional information is available from many sources, including:

- Chemical warfare agents
- Handbook of Toxicology of Chemical Warfare Agents (Second Edition), 2015, Pages 791-807, Handbook of Toxicology of Chemical Warfare Agents
  - Chapter 54 - Chemical Warfare Agents and Risks to Animal Health

Initial and long-term treatment of animals exposed to toxic substances is covered in multiple veterinary toxicology texts and is beyond the scope of this document.

Information on select challenges, however, is provided here:

- **Opioid toxicity:** Veterinarians deployed in emergency response may potentially be presented with working animals that may have been exposed to opioid (narcotic) substances, with fentanyl being one of the most hazardous.
  - Treatment of potential opioid toxicity is with the use of naloxone, assisted ventilation as needed, and supportive care. Personal protection, including barrier PPE and respirators, is critical to all veterinary personnel during diagnosis and treatment.
  - Secondary opioid toxicity is possible and could even have fatal results for those treating fentanyl toxicity.
- **Nerve agents:** Nerve agents, such as Sarin or VX, could be used in a terrorist attack and could secondarily affect working dogs, pets, and service or assistance animals. Nerve agents have somewhat similar properties to organophosphate insecticides and humans are typically treated with atropine or 2-pam auto-injector medications.
  - It is critical to understand that the dose used for dogs is significantly higher than the recommended human dose, ranging from 2-4 injectors for 40-90# working dogs. 2-Pam doses are closer to human dosages. More information is provided at:  
<http://www.usarveterinarygroup.org/docs/Nerve%20Agent%20Antidote%20Administration%20in%20Dogs.pdf>

- Animal feed contamination has resulted in major incidents causing livestock morbidity, mortality, and serious contamination of the human food supply. As an example, in 1973, livestock feed in Michigan was accidentally contaminated with granules of PBB, which was mistakenly identified as a mineral supplement, but contained PBB for making firefighting foam.
  - Thousands of dairy cattle and other livestock consumed the feed and millions of people drank contaminated milk. People affected by the incident continue to have lingering health problems from the contamination and over 30,000 animals had to be culled and the carcasses buried securely to prevent further environmental contamination.

While during decontamination, veterinary triage, stabilization, and specific acute treatment are critical to emergency response, veterinarians should consider long-term impacts to animals exposed to hazardous chemicals, ranging from inhaled debris dust, cutaneous absorption by working dogs from debris fields, petroleum spills, and terrorist chemical weapons.

Long-term effects can be challenging to manage and could include organ system damage, carcinogenic effects, and reduction in lifespan. Animals exposed to hazardous chemicals in disasters should continue to be monitored by veterinarians, in consultation with veterinary toxicologists, after receiving acute care during the disaster

## **Nuclear and Radiological Incident Response**

Nuclear and radiological incidents may include:

- Medical or mishandled radiological source accidents of limited scale
- Nuclear power plant accidents or other larger-scale industrial accidents
- Intentional incidents including, but not limited to:
  - Radiological dispersion device (radioactive materials dispersed by a conventional explosive)
  - Nuclear detonation incidents

Veterinary professionals working in radiological incidents should have a basic understanding of radiation science and be able to protect themselves while managing animals or supporting public health during incidents. Basic personal protection prerequisites include certification for the use of respirators, including medical clearance, respirator fit testing, and the issuance of a personal dosimeter.

The exact requirement for personal protective equipment is established by the incident Safety Officer but is expected to include whole-body barrier protection, such as hooded Tyvek coveralls, gloves, boot/shoe coverings, and an N-95, N-100, or better respirator.

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Enrolling veterinary responders in a respiratory protection program before the incident is critical.

If veterinary responders are not pre-qualified for the use of respiratory PPE and are provided with basic radiation safety training, then the effectiveness of the veterinary response will be greatly limited.

Veterinary roles are consistent with roles in other incidents. Discussion of these roles is limited here to differences specific to nuclear or radiological incidents.

- Engaging in planning discussions with jurisdictional authorities
- Supporting mass care and emergency services as necessary (evacuation, sheltering, shelter-in-place, and animal search and rescue operations)
- Support of animal decontamination operations, including triage, stabilization, and potential sedation of difficult to handle animals
- Triage and treatment of injured, ill, or contaminated animals
- Supporting public health mission areas
- Protecting animal agriculture and the safety of the food supply through managing areas of concern for radiological contamination

In most nuclear and radiological incidents (the exception generally being a nuclear detonation), there will be few animals exposed to acutely dangerous levels of radiation. Triage, stabilization of animals, radiological monitoring, decontamination, and necessary additional treatments will typically involve radiation hazards that are readily mitigated with appropriate training, PPE, and individual dosimeter monitoring to ensure responders do not receive harmful doses or internalize contamination.

Isolated cases may include a contaminated animal with severe injuries, such as incidentally being hit by a car, having serious concurrent illness, or being very near an RDD explosion.

In nuclear detonation incidents, everything changes catastrophically. In exercise scenarios involving a 10-kiloton nuclear detonation, prompt human fatalities commonly are estimated in the tens of thousands, with many thousands of additional deaths anticipated from acute radiation sickness.

Evacuation efforts, reception/decontamination locations, and search and rescue operations are expected to support thousands of people, pets, and other animals, some of which may be heavily contaminated or have been exposed to high doses of gamma radiation.

Medical resources will be strained severely for the treatment of people and even more constrained in providing veterinary resources for affected animals.

Treatment needs of animals from nuclear detonation incidents will include the following:

- Thermal injuries: Intense infrared radiation, structure fire, and flash blindness will impact many animals.
- Acute radiation exposure injury, including doses that may range from rapidly fatal to morbidity but survival. Doses less than those causing morbidity may contribute to long-term cancer risk. Treatment of acute radiation syndrome (ARS) in animals will generally involve:
  - Supportive care: Maintaining fluid, electrolyte, and caloric support for affected animals. Animals with high exposures may have severe gastroenteritis, vomiting, diarrhea, hypovolemic shock, bone marrow suppression, and sepsis. Some medications have been developed in people to reduce the impacts of ARS and increase survival, but limited supplies and high demand for people leave little likelihood of availability for animals.
  - The following radiation exposure levels reflect the current understanding of the effects on humans. Dogs are generally slightly more susceptible with an LD-50 of approximately 300 Rem or 3 Sv. Cats have been noted by veterinary oncologists to possibly be more radio-resistant than dogs, but no research has been found to validate this observation. Dose effects vary considerably with the duration of time in which the dose is received. A dose of 1 Sv in one day will have more health effects than the same dose over 1 year.
    - Less than 0.1-Sievert (10 Rem) acute exposure – minimal effects and slight (if any) increase in cancer risk
    - 0.1 to 0.25 Sievert (10-25 Rem) – probably an increase in lifetime cancer risk
    - 0.25-1 Sievert – laboratory evidence of bone marrow damage without clinical signs
    - 1-4 Sievert (100-400 Rem) – illness with a high likelihood of recovery with treatment
    - 4 Sievert (400 Rem) – LD-50 (50% mortality) without treatment
    - 10 Sievert (1000 Rem) and higher – acute severe illness, neurological signs, and death
- Mechanical injuries from flying debris or from navigating the debris field
- Overpressure injuries are caused by acute increased air pressure from the blast followed rapidly by low-pressure rebound effects that compress then distend vital organs. Lungs are very susceptible to overpressure injury.

- Combined injuries are those that involve two or more of the above injury types. Severe combined injuries reduce prognosis and require high levels of veterinary resources beyond that of available resources

## Internal Contamination of Household Pets and Other Animals

Some animals may ingest or inhale radioactive elements and become internally contaminated. Small amounts of internal contamination may not need treatment, depending on the radioisotopes present and incident policy decisions. In some cases of low-dose contamination, the animal may naturally excrete those small amounts over time without presenting a public health hazard.

Currently, people and animals treated with diagnostic radioisotopes may leave hospital care once their emission drops below 0.02mSv/hr (2mrem/hr). This standard might be a starting point for the development of incident-specific policies.

Treatment for internal contamination is based on the nature of the radioactive element(s) internalized. Most treatments for internal contamination are based on medications used in veterinary toxicology for non-radioactive isotopes of the same element.

An excellent resource for identifying forms of treatment for internal contamination in people is found at the Department of Health and Human Services [Radiological Emergency Medical Management \(REMM\)](#) site.

There is often a similar treatment protocol for animals. If high numbers of people are internally contaminated and in need of specific medication with limited availability, it may not be possible to acquire those medications for animal treatment.

Select information on internal contamination treatments:

- Radioiodine:
  - Radioactive iodine (mostly iodine-131) is a byproduct of nuclear fission reactions. The element has a two-year half-life and decay primarily produces gamma (photon) radiation. Iodine accumulates in the thyroid gland, so exposure to iodine-131 can cause damage to the thyroid and predispose to thyroid cancer.
    - Taking stable (non-radioactive) iodine before exposure (or immediately after exposure) can saturate the thyroid with normal iodine and prevent the negative effects of radioactive iodine. One study in dogs suggested a protective dose for dogs is 1.4mg/kg,

- well below usage levels where oral iodine is used for cutaneous sporotrichosis in dogs and cats.
- FDA approved KI formulations include 30ml solution of 65mg/ml and tablets of 65mg and 130mg. One concern is the availability of the compound for animal use, given possible shortages for treating people in the incident area. Long-term internal contamination is self-limiting since iodine-131 has an 8-day half-life and is essentially gone from the system in 60 days or less.
  - References:
    - <https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=477&toxid=85>
  - Radiocesium:
    - Radiocesium, including CS-137 and CS-143, are also byproducts of nuclear fission reactions. CS-137 has a half-life of 30 years and CS-134 (which is produced at a much-reduced rate) is 2 years.
      - Cesium is a chemical analog for potassium and is readily absorbed but has a relatively short biological half-life (reflecting the time the element takes to be absorbed and then naturally excreted.) Radiocesium has a very strong gamma emission, making it a useful isotope for cancer radiation therapy purposes.
      - If animals are contaminated internally with radiocesium, they may continue to monitor over 2X background after two or more external decontamination efforts.
      - Radiocesium internal contamination can be treated with insoluble Prussian blue (ferric hexacyanoferrate), marketed under the trade name Radiogardase. The dosage for humans is 3gm daily per adult and 1gm daily for children aged 2 to 12. Little of the drug is absorbed and it works by binding cesium in the intestinal tract for excretion, speeding the elimination of the element from the body. Canine studies would indicate that similar doses per weight should be safe. Radiogardase is in limited supply and may not be available for animal use. Options might include:
        - Relying on natural bioelimination
        - Acquiring non-pharmaceutical Prussian blue that has been demonstrated as largely free of impurities and using it in animals. FDA concurrence would be needed for the compounding of this product in an emergency. This type of compound was used extensively in some countries in livestock during the Chernobyl incident response and recovery.
        - Bentonite clay also binds cesium, although not as efficiently as Prussian Blue. Judicious amounts (to avoid constipation)

mixed in highly palatable feeds might reduce the biological half-life of radiocesium in some livestock species.

- References:
  - <https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=575&toxicid=107>
- Radiostrontium:
  - Strontium behaves biologically like calcium. Strontium-90 has a half-life of approximately 28 years, creating some parallels between the duration of environmental hazards from both cesium and strontium. Strontium-90 decays by beta radiation, so internal contamination will not be detectable externally would take laboratory samples of feces, urine, or blood to estimate levels of internal contamination.
  - Calcium/strontium are stored in the bone matrix, and both are less mobile than cesium/potassium in the body.
  - Treatment of internal contamination with strontium-90 would typically be based on:
    - Getting animals on clean feed and water to eliminate additional exposure
    - Use of aluminum phosphate or barium sulfate to reduce strontium absorption from the GI tract and promote excretion of strontium
    - Long-term treatment with calcium supplementation products may potentially increase the elimination of strontium from bone
    - There is a possible approach to removal of Strontium-90 from animals early after internal exposure that would be based on adjustments in the dietary ration of key electrolytes. Referred to as Dietary Cation Anion Difference (DCAD), these diets can temporarily mobilize calcium (and potentially Strontium-90) from the bone. These methodologies are useful in dairy cattle for raising calcium in animals close to parturition. Extended loss of calcium, however, could result in problems from osteoporosis. This methodology has never been used to mitigate internal strontium contamination but might be a worthwhile concept to investigate for non-food animals internally contaminated with strontium-90.
  - References:
    - CDC Toxic Substances Portal – Strontium:  
<https://wwwn.cdc.gov/TSP/PHS/PHS.aspx?phsid=654&toxicid=120>



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## Management of Contamination in Agricultural Animals

When agricultural lands and animals are contaminated during a nuclear or radiological incident, they may present a food safety hazard. Generally, areas of concern for food and agricultural safety are much larger than evacuation areas, often estimated as 10-50 times larger.

These incidents will involve an immediate local, state, territorial, tribal, national, and international food safety concern and require the identification of the extent of the area of concern for the two most vulnerable types of agricultural production, which are:

1. Dairy operations, particularly those where livestock spend part of their day on pasture (grass-cow-milk-infant pathway)
2. Mature crops ready for harvest (with the highest immediate risk being leafy vegetables)

An initial food and agricultural control zone must be established as quickly as possible to restrict the exit of contaminated animals, food, or feed into commerce. Failure to do so may jeopardize public health and have an extensive impact on domestic and international trade, potentially costing millions or even billions of dollars in trade impacts.

Rapid establishment of agricultural control zones with the eventual refinement of the zone with release of animals, and food for feed that are not contaminated at unsafe levels protect the public as well as facilitate restoration of agricultural markets except for unsafe areas. Animals, crops, and food that are deemed unsafe will need to be depopulated/destroyed and disposed of according to plans developed in a One Health framework.

A detailed discussion of these issues is beyond the scope of this document. More information can be obtained from:

- [FEMA Radiological Emergency Preparedness Program Manual](#)
- [USDA members of the Advisory Team for Environment, Food, and Health](#)
- [USDA APHIS Veterinary Services National Training and Exercise Program](#)

Final work products of the State Radiological Incident Response Planning Work Group, which is available from State Veterinarians in the Southern Animal and Agricultural Disaster Response Alliance (SAADRA).



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## Appendix C: Working Dog Decontamination

- **Purpose:** Guide mitigation procedures to decontaminate working animals.
- **Working Animals Defined:** In this context, working dogs constitute canines that are utilized to detect contaminants, human remains, and live finds during a declared Federal, State, or Local Emergency.
- **Authorities:** FEMA, State, Local, and Health Department Directives
- **Planning Assumptions:**
  - Subject Matter Experts (SMEs) such as veterinarians, Canine Unit, Public Health personnel, etc. will collaborate within existing ICS to address the following tasks:
    - Operational coordination
    - Priorities of effort
    - Work schedules
    - Decontamination procedures
    - Logistics/Equipment site
    - Resource management
    - Provision of veterinary medical care
  - Working dog teams will be identified based on the following assumptions:
    - Capability required:
      - Search and rescue
      - Human remains detection
      - Medical
      - Explosive
      - Narcotics
      - Law enforcement/patrol
    - Environmental considerations – work cycle
    - Sustainability
  - Identification of medical and support equipment. Core team will assess and plan short (5-day) to long-range (15+ days) events.
  - Budget/funding
  - Inter-agency support agreements
  - Veterinary medical treatment matrix
  - Written animal decontamination protocols
- **Operational Coordination:**
  - Task organization will be tailored based on the nature of the event
  - Working dog strike team designations may need to account for the diversity of individual working dog units
  - Mission assignments will be evaluated and prioritized for every planning period

- Teams will be required to complete a decontamination process prior to being released
- Working dog teams will provide a post-work cycle out brief to the IC before going off-duty
- In large incidents where multiple working dog units are deployed, coordination among the various working dog support services could be achieved by assigning a working dog technical specialist to the Operations Section or an Operations Task Force to provide effective coordination of support across the entire incident.
- **Logistics:**
  - Canine teams – Responsible for bringing their basic load of canine equipment
  - There will be limited veterinary support brought by each team individually
  - Participating agencies and emergency management may provide limited quantities of equipment
- **Communications:**
  - Working dog teams will work within the established communications plan for the incident
  - All canine teams will be assigned call signs or unique identifiers
  - Communication officer will ensure replacement/spare radios
  - GPS mapping will be determined by capability
- **Veterinary Medical and Decontamination:**
  - After each work cycle, all working dogs will be thoroughly decontaminated
  - Decontamination protocols will be implemented directly by the canine team handlers, with any support from a dedicated decontamination team, veterinary team, and HAZMAT responders
  - Handlers will deploy with assigned PPE and canine first aid kits

## Appendix D: Canine Decontamination Equipment List

Information in this appendix is adapted from content provided by Lori Gordon, Massachusetts Task Force 1 (MATF1).

### Equipment – General

- Box container or area for decontamination equipment storage
  - Pack the K9 decontamination kit smaller items in one box.
  - The larger items (pools and shelving or tubs) are separate but kept in the same area.
- Waterproof tarp or preferably a tent (shade and prevent water spray) and berm (to collect water)
  - 1-2 tarps are laid on the ground, and the tubs or stations are placed on top.
  - The tarps can also be used in place of tents as walls to contain water spray from contamination of the surrounding area
  - Tents are excellent for shade and preventing water spray and will also help contain dogs
- Sealable industrial-strength plastic bags
  - These are used to contain contaminated items
  - Either one of these or a length of heavy plastic sheeting is placed over where the 2 pools meet to prevent contaminated water from leaking between the pools
- Hose
- Spray nozzle or wand
  - This allows for water to be better directed underneath the canine (belly wash)
  - An adjustable water flow (control water use and more gentle spray)
- Buckets
  - Used to throw in the contaminated collars, leashes, and used brushes until they can be collected in bags for disposal
  - Also can be used to decontaminate metal items that will be reused
- Water heater (propane water heater is invaluable if the temp is less than 72F)
  - To prevent hypothermia in a cold weather deployment
  - A tent or other environment that can be warmed and provides wind protection is needed as after a water decontamination the canines will not be completely dry for a while
  - If not available, consider acquiring a groomer drying unit to quickly dry the canine
- Pools – Can be used in place of a hazmat berm if not available

- A WMD or HazMat decontamination model uses two separate areas: one for the wash station and another for the rinse station
- MATF1 recommends the TVI Corp canine pools ([www.tvicorp.com](http://www.tvicorp.com)) that have a hose connection to divert contaminated water away, are easily set up, and fold down to a small unit for storage
- Elevated Wash Areas – can be tubs with holes to drain or plastic shelving (see below)
  - Advantages include keeping the canine out of contaminated water, preventing them from drinking that water, easier to decontaminate properly (especially under the belly and the paws), easier on your back, and easy to assemble
  - We used plastic shelving from Home Depot that was inexpensive, lightweight, and easily assembled but will probably not stand up to more than one 2-week deployment – also must be careful with the size of holes in plastic as can get toes caught in them.
- Shallow Pan or Box
  - If a biological hazard is suspected, walk the canine through a foot bath of dilute Clorox solution (0.5% sodium hypochlorite made by 1:10 dilution in water)

## Equipment – Human PPE

- Eye protection
  - 4-8 pairs of goggles if needed to protect from contaminated water spray
  - The canines will inevitably shake themselves at some point as well
  - Safety glasses with a face shield also is an option
  - Finally in appropriate situations must use full face protection (1/2 or full face respirator)
- Gloves – 2 boxes
  - Use non-latex (many folks have a latex allergy), these often tear with much use
  - A heavier over-glove if needed for protection from more hazardous materials
- Masks
  - Situation-appropriate issue – surgical mask or N95 at minimum to prevent exposure to wash in mouth/nose
- Tyvek Suits or situation-appropriate issue protective suit – at minimum use an apron or removable gown to protect clothes from water spray.

## Decontamination Supplies

- Mineral Oil – 1-2 bottles
  - Use smaller bottles for easy application to areas of petroleum-based contamination (usually on the paws and in between the toes)
  - The adage “like dissolves like” is the basis for using this oil to break up the contaminant, then applying a shampoo or soap to remove it from paws or hair
- Spray bottles – 2 – multiple uses
- Eye/Nose Rinse – 4 bottles
  - This is used for eye irritation or contamination
  - There are saline and purified water solutions that can be purchased off the shelf – or can use sterile saline wound irrigation solution and apply it with a syringe.
- Liquid soap
  - Dish detergents like Dawn or Palmolive are traditionally used in animal decontamination, but they do produce a lot of suds
  - For a low suds alternative, the military uses Prell, and we will be testing this out in the future
- Oatmeal-based (non-medicated) dog shampoo
  - After several soap washes, the oil-based protection on their skin is gone and the coat becomes dull
- Surgical scrub brushes (soft brush is important – stiff brushes can cause skin irritation)
  - The BD E-Z Scrub 160 Ref 1603 (2 boxes, 30/box) have a plastic bristle side and a sponge side
- Absorbent material
  - Baking soda or cornstarch is typically used to absorb a liquid contaminant and then be wiped off
  - This decreases the contaminant burden that must then be removed
- Moist towelettes or wet wipes
  - They can be used to wipe sensitive areas around the eyes, nose, mouth, and inner ears as well as prepuce and vulva where soaps can be very irritating
  - These can be used to wipe off powder contaminants before they aerosolize, as brushing may put powders into the air and further contaminate personnel, although a wet towel will do just as well
- Microfiber towels
  - Moisten and can be used to remove dry particulates before wet decontamination – helps reduce pushing particulates like insulation or other building materials deeper into the coat

- Large absorbent towels
  - Drying dog after decontamination

## **Canine Supplies**

- Dog dryer or shelter from the cold
  - In addition to warm water, a heated shelter area is good for continuing the drying process during cold weather
  - A groomer dryer will hasten the drying process, but a warm protected environment will be fine along with monitoring the canine for signs of hypothermia
- Emergency blankets
  - Protection if wet in a cold environment
- Eyewash/saline contact lens solution or sterile saline wound irrigation solution
  - Used to flush eyes (use the syringe if using a large container, contact lens bottles work well)
  - Used to flush external aspects of the nose
  - Can be used in other sensitive areas if needed
- Eye lube (veterinary) or sterile petrolatum
  - Place in eyes after flush to prevent accidental soap irritation or corneal injury during the process
- Scissors
  - Bandage scissors are preferred as they have a blunted tip that won't cut the skin when taking off bandages
  - Never shave or use clippers to remove hair to skin level, as this may cause abrasions and worsen contamination
- Muzzles
  - 6 cage muzzles, 2 each of various sizes
  - We use basket muzzles so the canines can still pant if needed
  - Intended use is for known aggressive canines, or questionable situations when the handler is not present and another handler is unavailable
  - Aggressive canines that cannot be muzzled may need to be contained in an area (tied in a safe spot or kenneled) until qualified personnel can help handle them
- Leashes
  - Disposable leashes can be used as a collar and leash combination to replace contaminated leashes and collars that must be removed
- Tent with plastic stand in berm/pool set up
- Tent with Rubbermaid tub set up



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# Appendix E: Requirements for Oiled Wildlife Response Facilities

## Introduction

The facility needs to focus on the majority of species affected by a petroleum discharge, which historically are avian. Facility requirements can vary significantly, depending on:

- Overall size of the spill and potential wildlife impact
- Species and age of wildlife affected
- Geographic location
- Season/ weather
- Type of contaminant(s)

The facility should be designated by a Qualified Wildlife Responder experienced in oil spill response work.

Wildlife response facilities do not need to be located at the spill site; under certain circumstances, they can be located several hours away. It is most important that the facility meet the requirements to safely provide medical and rehabilitative care for the animals. In remote areas or locations where an adequate facility cannot be identified near the spill site, temporary stabilization sites might be required to ensure that appropriate emergency care is provided to wildlife before transport.

Since large numbers of people and equipment are involved in the wildlife rescue effort, the facility must be one with controlled access, storage capability, parking availability, and nearby lodging for workers. Facilities must have adequate space and meet specific heat, ventilation, and water requirements (temperature, pressure, volume).

## Facility Description

Because facility requirements can vary significantly, a permanent facility is not always advisable and may impede providing the appropriate facility design for the situation. A suitable facility must have a large open space on the ground floor that can easily be configured and reconfigured to accommodate the changing needs of this unique form of wildlife rehabilitation.

Experience has taught that multiple buildings or a tent situation are ineffective and unsuitable. A warehouse, armory, motor pool, or convention hall that is accessible to a trained labor force, is within a reasonable distance from hotel accommodations, and has adequate parking and exterior grounds could meet this requirement. If a facility is

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situated in a secure site (e.g., military installation, refinery), accommodations for a fluctuating volunteer workforce must be addressed.

The facility may be located up to 3- 4 hours from the spill site, provided that on-scene stabilization is administered before transportation. An oil spill stabilization site can be located at the time of a spill.

It is recommended that a list be assembled of potential real estate within identified high-risk areas and that the sites be physically reviewed by a representative of a wildlife response group with major spill response experience. Once actual facilities have been identified, all costs, availability, and contact information should be reviewed every six months

## Site Safety

A site safety plan should be initiated as a part of the contingency plan and/or as a part of the site selection process. The safety plan must include checklists for the measures to avoid physical, chemical, and biological hazards, and it should contain emergency procedures and contact numbers.

## Space Requirements

This list represents the minimum facility needs for rehabilitating 100 - 150 oiled animals.

- Front desk/Admissions: 300 sq. ft./91.4 m<sup>2</sup>
- Operations office: 300 sq. ft./91.4 m<sup>2</sup>
- Kitchen/food storage: 300 sq. ft./91.4 m<sup>2</sup>
- Husbandry: 2,800 sq. ft./853.4 m<sup>2</sup>
- Supplies/storage: 500 sq. ft./152.4 m<sup>2</sup>
- Wildlife cleaning area: 750 sq. ft./228.6 m<sup>2</sup>
- Medical treatment/exam area: 300 sq. ft./91.4 m<sup>2</sup>
- Pathology/lab/cold storage: 150 sq. ft./45.7 m<sup>2</sup>
- Isolation ward: 300 sq. ft./91.4 m<sup>2</sup>
- Volunteer/worker rest room: 300 sq. ft./91.4 m<sup>2</sup>
- Bathrooms/decontamination/changing: 200 sq. ft./61.0 m<sup>2</sup>
- Outside pool areas @ one 10' x 15' x 2'
  - Pool per 15 birds plus access and maintenance space: 3,300 sq. ft./1,006 m<sup>2</sup>
- Non-hazardous and regulated trash
  - Indoor: 100 sq. ft./30.5 m<sup>2</sup>
  - Outdoor: 400 sq. ft./121.9 m<sup>2</sup>
- Outside area for oily wastewater: 300 sq. ft./91.4 m<sup>2</sup>

- Loading dock/parking for 50: 5,000 sq. ft./1,524.0 m<sup>2</sup>
- Total interior: 6,300 sq. ft./1,920.0 m<sup>2</sup>
- Total exterior: 9,000 sq. ft./2,743.3 m<sup>2</sup>
- Total: 15,300 sq. ft./4,663.4 m<sup>2</sup>

### Note

If an existing wildlife rehabilitation center were to be used, it would require the above space in addition to the space allocated for any existing caseload. Animals impacted by an oil spill must be cared for separately from the in-house population.

### Hot/Cold Water Capacity

When selecting a wildlife response facility it is important to ensure that the water supply not be contaminated by the oil spill. For preplanning purposes, potential facility locations should be selected in areas of low spill probability. All oily wastewater must be collected and disposed of under federal, state, and municipal regulations.

However, large quantities of rinse, pool, and general-use water are permitted access to most municipal systems. It is inadvisable to select a location that relies on a septic system to handle waste, for this large volume of water can exceed the designed capacity of most septic systems. Ideally, there should be external access to cold water supplies for filling pools.

Due to the nature of wildlife rehabilitation large amounts of water are used in many locations throughout the facility. The facility should have floors that can tolerate being wet and have drains at least in the areas designated for cleaning activities.

- Cold water volume (pools and general use): 23,360 gallons per day
- Hot water volume (animal cleaning only): 450 gallons per hour
  - At 104 degrees Fahrenheit: 6,750 gallons per day at 15 hours
  - Water pressure (animal cleaning only): 50 to 60 psi
  - Water hardness (animal cleaning only): 2.5 to 3.5 grains per gallon


True sea birds (diving and pelagic species) cannot be successfully rehabilitated unless the water is maintained at the proper water hardness.

A suitable facility in terms of size, availability, and location should not be discounted due to hot water and hardness capacities. Provided there is an adequate cold water supply, mobile hot water, and treatment systems can be retrofitted into existing equipment without much difficulty.

### Electric/Lighting

#### *Decontamination*

2023 Current Best Practices in Animal Emergency Management



The electric needs of a wildlife response facility are very similar to a conventional production operation. The facility requires general and task lighting with an adequate number of separately circuited outlets throughout the space capable of providing 20-amp protection. Because of the potential risk of electric shock in wet areas, the addition of a GFI circuit breaker in those areas is desirable.

In addition to lighting and the HVAC system, electric power will be used for freezers, refrigerators, heat lamps, pet dryers, office and medical equipment, pool pumps and filters, power tools, etc. The minimum electric requirements for the facility are:

- 200-amp 120/240-volt, 3-wire single-phase service with a minimum of ten 20-amp circuits in addition to the lighting and HVAC needs, with the ability to expand.

### **HVAC Systems**

The three main concerns regarding air quality are:

1. Eliminating thermal stress to debilitated animals by providing a stable, draft-free inside air temperature between 70 and 80 degrees Fahrenheit.
2. Minimizing human exposure to petroleum volatiles
3. Minimizing animal exposure to pathogenic organisms

The air within a wildlife response facility should be exchanged 6 times per hour within office space, 10 times per hour within large open areas involving animal care, and 20 times per hour within critical care and surgical areas.

Typical HVAC systems used in industrial space are often forced air or closed recirculating systems, which by themselves will not meet the above requirements. These systems will need to be augmented with portable filtration (HEPA) and air exchange units. The design of these systems should be determined by the wildlife response group once the facility has been selected and the particulars of the animal caseload are known.

Air quality in systems that employ return air filters can be enhanced through the replacement of the existing filters with an electrostatic type. This will not preclude the need for HEPA type filtration and regular air exchanges as outlined above.

### **Communications**

The facility requires a minimum of three telephone lines (public, private, fax/modem) with the ability to add as needed.

# Appendix F: Decontamination of Pets and Service Animals

## Operational Objectives

Pets and service animal decontamination operational objectives should accomplish the following:

- Ensure the safety of responders, animal owners, and animals.
- Decontaminate animals in concert with human decontamination to facilitate owner compliance reduce anxiety and maximize available resources.
- Ensure that animals are “clean” before returning them to their owners. Strategies might include:
  - Decontaminating pets with their owners in a consolidated decontamination line.
  - Alternating humans and animals through a single decontamination line.
  - Establishing parallel lines for human and animal decontamination with shared support.
  - Decontaminating people and animals at different locations.
  - If numbers are overwhelming, extremely contaminated, or hard to handle animals may need to be identified and held in “warm” shelter locations until sufficient resources are available to complete decontamination and return to the owner.

Tactical considerations include:

- Animal decontamination is most effectively and safely done by individuals trained in both animal handling and decontamination,
- If washing is the decontamination method of choice for the particular agent, enough water and surfactant have to be applied to the animal to ensure penetration of the animal’s haircoat to remove the agent from its skin.
- After decontamination, all pets must be checked to ensure that contaminants have been removed before returning them to their owners (including monitoring for radiological contaminants.)

Critical steps include:

- Triage
  - If critical veterinary care is needed immediately, then deliver care as resources permit, followed by decontamination after stable. Euthanasia may be appropriate for animals where resources are not sufficient to treat them appropriately.
  - Behavioral triage should identify animals that pose a risk to the owner and responder such as a bite or attack.

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- Intake
    - Signalment (history, animal data)
    - Animal identification/record creation
  - Monitoring (dependent on the contaminant, for example, radioactive contamination will require monitoring with appropriate instruments before and after decontamination)
  - Decontamination
  - Re-monitoring/assessment
  - Treatment (non-critical treatment)
  - Reunion with owner or transfer to emergency animal sheltering operations

## Example Standard Operating Procedure (SOP)

The following standard operating procedure (SOP) was provided courtesy of the State Radiological Incident Response Planning Work Group. The sample SOP can be used as a template for a jurisdiction to create an animal decontamination SOP. Not all statements in the sample SOP will apply to all jurisdictions. Use this document only as a guide to creating an SOP appropriate to your jurisdiction.

### -----Begin Sample SOP-----

The purpose of this SOP is to provide guidelines for any persons involved in household pet or service animal decontamination for the Great Gap Nuclear Generating Station in HawSaw County. This SOP is to be used in conjunction with the HawSaw County and City of Sheamus Emergency Operations Plan.

## Definitions

**\*\*Assistance Animal:** an animal that works, provides assistance, or performs tasks for the benefit of a person with a disability, or that provides emotional support that alleviates one or more identified effects of a person's disability. An assistance animal is not a pet.

**\*Congregate Household Pet Shelters:** any private or public facility that provides refuge to rescued household pets and the household pets of shelterees in response to a declared major disaster or emergency.

**Decontamination:** the act of removing, through brushing, bathing, submersion, use of chemicals, or any other means, surface contaminants from an animal.

**\*Household Pet:** a domesticated animal, such as a dog, cat, bird, rabbit, rodent, or turtle that is traditionally kept in the home for pleasure rather than for commercial purposes, can travel in commercial carriers, and be housed in temporary facilities. Household pets do not include reptiles (except turtles), amphibians, fish, insects/arachnids, farm animals (including horses), and animals kept for racing purposes.

**Inter-Governmental Agreement (IGA):** a written agreement or contract between governmental agencies for goods or services.

**Memorandum of Understanding (MOU):** a written agreement or contract between a governmental agency and a non-governmental entity.

**Non-Governmental Organization (NGO):** a non-for-profit, voluntary citizens' group, which is organized on a local, national, or international level to address issues in support of the public good.

**Owner:** any person practicing dominion over an animal.

**Quarantine:** to place or prevent a dog or cat from coming into contact with other non-related animals or human beings.

**Reception Center (RC):** a location used to register people evacuated from an emergency zone. Reception Centers may also provide decontamination and emergency services. Reception Centers generally do not provide evacuation housing but may be adjacent to housing shelters.

**\*Service Animal:** any guide dog, signal dog, or other animal individually trained to assist an individual with a disability including, but not limited to, guiding individuals with impaired vision, alerting individuals with impaired hearing to intruders or sounds, providing minimal protection or rescue work, pulling a wheelchair, or fetching dropped items.

**Stray animal:** any dog or cat running at large whose owner is unknown or undetermined.

**Vaccination:** the administration of an anti-rabies vaccine to animals by a veterinarian.

**Veterinarian:** any veterinarian licensed to practice in this state or any veterinarian employed in this state by a governmental agency.

**Veterinary Staff:** any persons employed or retained to assist a veterinarian.

**Working Animal:** any animal owned by a branch of the United States military, a law enforcement agency, or a registered search and rescue organization.

\*As defined in FEMA Disaster Assistance Policy 9523.19

\*\*As defined by the Fair Housing Act

## Planning

All planning will be done by county emergency management, with the assistance of the Department of Agriculture, Sheamus Fire Department HAZMAT team, HawSaw County animal control, Sheamus Humane Society, and HawSaw County Sheriff's Department.

This county/state does not regulate decontamination of humans or animals by statute, therefore it is determined that the county animal control along with the humane society will be trained and equipped to decontaminate household pets.

HawSaw County has IGAs with three schools to provide accommodations for Reception Centers in the event of an emergency. Locations are Mountain Wind High School, Sheamus Middle School, and HawSaw County Recreation Center. Addendums to these IGAs have been created to allow small animal decontamination at these schools. An MOU has been established with the Pratt's Peak Rodeo Grounds to provide housing and a decontamination area for livestock.

Training for anyone performing animal decontamination will be provided by the Sheamus Fire Department HAZMAT team. Initial training for new members will be



scheduled at least once a year and refresher training will be provided at least twice a year. All decontamination personnel must attend an initial training, plus annual refresher training.

## Procedure

When activated, all personnel will go immediately to the location specified by DEM. Upon arrival, all personnel will check in with the Household Pet Group (HPG) Supervisor and be assigned to a unit within the HPG. HPG units are designated as:

- Registration Unit – Registration of pets brought in by their owners or found as stray. Pets will be registered before the decontamination procedure begins if they are determined to be contaminated above allowable levels.
- Decontamination Unit – Operation and oversight of the decontamination procedure.
- Housing Unit – Temporary housing of pets while owners are in the RC.
- Transportation Unit – Transports pets from the Housing Unit to an offsite location as necessary.

The HPG Supervisor will assign a Unit Leader for each unit. The Unit Leader will maintain communication between the unit and the HPG Supervisor. The Unit Leader will coordinate with the incident Safety Officer and oversee the operational safety measures for the unit. The Unit Leader will immediately inform the HPG Supervisor of any incidents, accidents, or injuries to either a human or animal.

To reduce potential injuries to both pets and humans and to diminish the threat of contaminating staff and volunteers, only trained personnel will decontaminate pets. Stray pets that are brought to the decontamination area will be kenneled pending time for their decontamination, or when all pets with owners have been processed and decontaminated.

## Decontaminating Household Pets

### Registration

Evacuees with pets will go through monitoring provided by the Sheamus HAZMAT team. If the pet is determined to be contaminated, the owner will be directed to the pet registration area. The Registration Unit will complete the following steps:

1. Intake Form – This must be filled out entirely. The ID number will be determined by using a numbered sticker from the supplied sheet. No fields should be left blank, instead, use N/A or UNKNOWN. If the household pet is a stray brought in by someone other than the owner, be sure to note the address, intersection, or location found in the appropriate space. The form will be placed in a zipper seal bag and accompany the animal through the decontamination process.

2. Kennel Card – Note any medical or behavioral conditions on the kennel card to reduce the risk of injury to staff and volunteers and to ensure proper medical treatment if needed.
3. Plastic ID Collar – The ID number from the intake form and the owner’s last name will be written on the collar with a permanent marker. The collar will be placed on the household pet to identify it through the decontamination process.
4. Business Card – The ID number from the form will be written on the back of the business card. The business card will be placed in a zipper seal bag and sealed. It will be given to the household pet owner or RP to use as a claim check when retrieving the household pet.
5. Digital Photo – A digital photo should be taken of the animal and owner together. The owner should be given a 3x5 piece of paper with the ID number written on it to hold up in the photo. The paper with the ID number should be disposed of with contaminated items.

After registration is completed, the pet will be turned over to the decontamination group.

### **Decontamination**

Two methods of decontamination may be used. Whole-body decontamination requires bathing the animal. Spot decontamination may be used if only small areas are affected.

All leashes, collars, and other items being worn by the pet will be removed and placed in the appropriate container for contaminated items. Leashes, collars, and other items may not be able to be decontaminated and therefore not returned to the owner. If an item cannot be decontaminated, or if time does not permit decontamination of these items, the items will be disposed of along with other contaminated waste.

- Dogs – A disposable leash will be placed on the dog for decontamination.
- Cats – A wire cage will be supplied for decontamination. Indoor decontamination may be preferred to decrease the likelihood of escape.

If the pet appears ill or injured veterinary staff, if available, may examine the animal before decontamination to determine if the pet is healthy enough to decontaminate. If the pet’s condition is so poor that it cannot be decontaminated, the owner may elect to have the pet euthanized. If veterinary care services are not immediately available, the pet may need to be placed in a holding area until further veterinary medical treatment can be supplied.

### *Full Body Decontamination*

- Dogs – Place the dog in the first pool or tub. Flush the dog’s eyes with copious amounts of water, ophthalmic solution, or saline. Wash the dog with soap and water. Warm water is preferable.
  - NOTE: Start at the head cover eyes, ears, mouth, and nose with your hand, and continue down the dog’s back washing from top to bottom with special attention paid to washing inside the under the neck, ears, legs, belly, between legs, under the tail, and bottom of the feet.
  - Place a new disposable leash on the dog and move the dog to the second pool or tub. Remove the old disposable leash and place it in the appropriate container. Rinse the animal thoroughly with water. Warm water is preferable.
  - NOTE: Start at the head covering eyes, ears, mouth, and nose with your hand, and continue down the dog’s back washing from top to bottom with special attention paid to rinsing inside the under the neck, ears, legs, belly, between legs, under the tail, and bottom of the feet. Place a new disposable leash on the dog and move the dog to the drying area. Remove the old disposable leash and place it in the appropriate container. Dry the dog as much as possible with a towel or similar absorbent fabric.
- Cats – If the cat can be handled without injuries to either the cat or handler, flush the cat’s eyes with copious amounts of water, ophthalmic solution, or saline. The cat should be placed in a wire cage if it cannot be bathed with manual restraint using the protocol for dogs.
  - Diluted liquid soap/shampoo can be sprayed onto the cat using a small trigger sprayer. The cat in the wire cage should then be gently sprayed with water. Warm water is preferred. Do not use a strong stream of water as this may cause the cat to panic in the cage and be injured. The cat should not be removed from the wire cage to be dried. The wire cage should be placed inside a kennel in a warm area to allow the cat to dry.
- Other Household Pets – Some small pets, such as birds, can be very sensitive to rapid temperature changes. When possible, water and ambient air should be close to the same temperature and should be warm. Indoor decontamination may be preferred, particularly in colder climates to reduce the likelihood of animal escape.

All pets will be placed in a holding area while they dry so they can be monitored for radiation and observed for any medical illness or injury after decontamination.

Pets that cannot be decontaminated should be kenneled until other owned animals have been decontaminated. Only trained personnel should attempt to decontaminate

any animal. After all owned animals are decontaminated, or when slow time allows, stray pets should then be decontaminated. Any pet that cannot be safely decontaminated should be kenneled and held until adequate resources are available for restraint (including sedation).

If a veterinarian is available, fractious pets may be sedated before decontamination at the veterinarian's discretion. Sedated animals should never be submerged, and care must be taken that the pet's mouth and nose are never underwater.

After decontamination, all pets must be monitored again to ensure that radiological contaminants have been removed. If radiation levels remain above acceptable levels, the pets should be decontaminated again. Pets should be moved to the Housing Unit after successful decontamination.

Under some circumstances, it may be practical to allow owners to decontaminate their pets. In these cases, and before the owner goes through decontamination, the owner should be given proper PPE, shown how to don the PPE, and given instructions on how to decontaminate their pet. If possible, a member of the decontamination unit should supervise this operation.

#### *Decontaminating Service Animals and Assistance Animals*

Service animals should be allowed into all areas of the RC, including the human decontamination area. A decontamination trained person may accompany the owner and service animal into the human decontamination area and will direct or assist with the decontamination of the service animal if requested. The service animal may be decontaminated separately and/or held at the Housing Unit only at the owner's request.

#### *Decontaminating Working Animals*

Decontamination of working animals is the responsibility of the owner or handler.

#### *Decontamination of Any Other Animal*

Livestock, wildlife, and exotic pets require special handling. Only those with training and experience should handle these animals. Large animals can require a significant amount of water to wash and rinse. If done on dirt, this can lead to a muddy and slippery area that will become difficult to work within.

When possible, decontaminating large animals should be done on a gravel area, or a paved surface with appropriate drainage or method of impounding the wastewater. State Animal Health Officials (State Veterinarians) may have enacted embargos for the movement of food animals from leaving the incident zone and should be consulted for management of species commonly associated with food production.

## Precautions

All personnel actively assisting with decontamination must wear appropriate PPE. The HPG Supervisor or Decontamination Unit Leader will determine what PPE shall be worn, based on direction from the incident Safety Officer.

In general, the following PPE should be worn by any personnel that may come in contact with contaminated pets:

1. Respiration protection for any person handling animals that have not yet been through any stages of decontamination. This is to reduce the risk of inhaling any dust, hair, or dander that may be contaminated. Depending on the hazard, this may be an N95/N100 filter respirator or a half-face or full-face cartridge respirator.
2. Protective clothing appropriate to the role. This may be:
  - a. Coveralls made of Tyvek, Tychem, or similar, the preferred type has attached hood and foot covers
  - b. Water resistant apron
  - c. Combination of coveralls and apron
3. Latex or nitrile gloves
4. Long cuff rubber gloves
5. Shoe covers
6. Face shield and/or goggles
7. Duct tape for sealing cuffs if needed
8. Radiological dosimeters individual or area

Latex/nitrile gloves will be worn under the rubber gloves. Rubber gloves must be thoroughly rinsed after handling each animal. All other PPE should be changed when it becomes dirty or has any holes or tears.

Dogs will probably shake off excess water. Since this water may contain radiological contaminants, decontamination, and subsequent shake-off should be contained within a decontamination tunnel or by plastic curtains on all sides. Alternatively, a twenty-foot perimeter can be maintained around the decontamination area, and no personnel will be allowed within this perimeter without PPE.

Decontamination personnel must be monitored after removing PPE and before exiting the warm zone. If necessary, personnel may need to go through the human decontamination line to remove any contamination deposited during the animal decontamination work. Animal decontamination personnel should come with a clean set of clothing (left in the cold zone) and wear clothing that can be acceptably discarded.

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Valuables should be locked in a secure location in the cold zone before working in the animal decontamination area.

## **Wastewater**

The Sheamus HAZMAT team will determine the appropriate method of wastewater disposal. Disposal may be by impoundment, absorption, or running into a drain.