
**National Alliance of State
Animal and Agricultural
Emergency Programs
(NASAAEP)**

**Emergency Animal Decontamination
Best Practices**

**NASAAEP Decontamination
Best Practices Working Group**

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This document was developed by the NASAAEP Animal Decontamination Best Practices Working Group with the support of multiple individuals, agencies, and organizations.

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1 Purpose of document

This document provides an overview of the challenges, options, and resources involved in the development and implementation of emergency contamination plans for the following animals:

- Service animals
- Working animals (search and rescue, police)
- Pets (from households and those from facilities such as veterinary hospitals, animal shelters, kennels, etc.).
 - FEMA Policy 9523.19 defines a household pet as 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.
 - State and local jurisdictions may choose to use an expanded definition when determining which animals will be decontaminated.
- Livestock (commercial herds as well as personal livestock kept for other than food purposes)
 - Cattle, sheep, swine, donkeys, mules, llamas, alpacas, and alternate livestock such as bison or deer/elk.
 - Equine
- Poultry (commercial, small subsistence flocks, show/recreational)
- Wildlife
 - Native
 - Managed (zoos, aquaria, sanctuaries, rehabilitation facilities)
- Biomedical research animals
- Other animals

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 potentially 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 may mandate the ability to utilize flexible and scalable methodologies that will achieve a level of decontamination acceptable for the incident conditions. No single set of operational procedures will fully cover the potential variety of animal species, hazards, environmental conditions, and available resources, necessitating an array of options that can be tailored to various incidents.

Animal decontamination is an important addition to emergency response plans for the following reasons:

- The PETS Act of 2006, an amendment to the Stafford Act which is the primary Federal statute on disaster response, now mandates accommodating the needs of people with household pets and service animals in state, county and local emergency plans, and the needs of those animals.
- Service animals, such as guide dogs or hearing assistance dogs or miniature horses, are essential to mitigating disabilities for certain persons as defined under the Americans with Disabilities Act. With a few exceptions, plans must be in place to manage service animals with their owners.
- Emergency response often includes working animals, such as search and rescue dogs, patrol or search horses, and detection dogs. Such working animals are critical to mission success and plans should be made for addressing any contamination issues such animal responders may encounter.
- Pets are an integral component of many families. Data from the American Veterinary Medical Association and the American Pet Product Association show that there are approximately 59% as many household pets in the US as people. Communities in the U.S. and many countries that must evacuate will almost assuredly evacuate with a substantial number of pets. If accommodations are not made for people with pets, some owners may refuse to evacuate, fail to follow official instructions, or circumvent reception/monitoring sites.
- Agricultural animals (livestock, poultry, and farmed wildlife) put food on our table as well as producing fiber (wool), leather, and other products. Agricultural animals must be managed in a complex array of priorities that include public health and safety, food supply safety, animal welfare, agricultural economics, and the environment. Decisions made on the disposition of these animals must include dialogue with state and federal authorities.
- Wildlife facilities¹ are environmentally and culturally important and are also managed within a complex array of priorities, including public health and safety, conservation and environmental factors, cultural value, animal welfare, and economic impacts. Free-ranging native wildlife can be contaminated in emergency incidents, creating challenges in assessment, capture, monitoring, decontamination, and treatment. Wildlife impacted by petroleum spills is a classic example of such challenges. As with agricultural animals, decisions made on the disposition of these animals also must include dialogue with state and federal authorities.
- Animal facilities housing biomedical research animals can vary from small operations to major research facilities housing tens of thousands of rodents or over a thousand non-human primates. Such facilities present substantial challenges pertaining to public health and safety

¹ Wildlife facilities include zoos, aquaria, sanctuaries, wildlife hospitals/rehabilitation centers, and more. Such facilities may house both native and exotic wildlife species.

critical biomedical research, economic concerns, and animal welfare. Some research facilities may also work with hazardous disease agents or other hazardous materials.

- Animal facilities can include veterinary hospitals, animal shelters, kennels, aviaries, pet retail establishments, breeders, or pet wholesale facilities. Such facilities could have an impact on public health and safety, as well as involve animal welfare concerns. Management will depend on available resources, incident priorities, and public/media concerns. Thoughtful and practiced facility emergency plans are critical to successful support of such locations.
- Tactical operations for animal decontamination will fall most commonly to local jurisdictional Incident Management Teams. In some cases, however, particularly where foreign animal disease agents or wildlife are involved, State and Federal agencies may bear primary responsibility for organizing such missions in cooperation with local jurisdictions.

Current state of animal decontamination science:

There are substantial knowledge gaps pertaining to the science of managing contaminated animals. A significant amount of extrapolation from veterinary and human experience is necessary, pending additional research specific to the management and decontamination of animals. Many of the procedures discussed in this document are based on extrapolation and experience from past incidents. At some future point, 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. The authors have endeavored to identify areas of extrapolation or empirical assumptions and where additional research or operational validation is necessary. Details of research needs are provided in Section 4 – Operations.

2 Planning

Planning Assumptions:

1. Commitment of resources for planning

- a. Animal decontamination is a complex mission area that requires a commitment of time and the engagement of those with expertise in the science and management of animals and hazard incidents. Without such commitments, responders may be exposed to additional health risks and animal suffering may be increased.
- b. 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:
 - i. Emphasize integration into the jurisdictional planning processes at all levels.
 - ii. Work to integrate animal decontamination into the envisioned incident command organization.

c. Stakeholder identification and engagement

Within communities, states, and the nation, there are many agencies, organizations and individuals that can bring authority, expertise, or resources to the planning process for developing an animal decontamination capability. The following table reflects examples of such stakeholders that may need to collaborate during this process.

Local	State	Federal	Non-governmental
Emergency management	State emergency management	DHS/Federal Emergency Management Agency	Veterinarians and veterinary organizations
Animal control agencies	State animal health and agricultural officials	Dept. of Agriculture: APHIS, NIFA/EDEN, FSIS, other	Animal welfare and voluntary organizations
Law enforcement	State public health and environmental health	Dept. of Health and Human Services (CDC, FDA, USPHS, other)	Animal agricultural producers and organizations
Fire/HAZMAT	State public safety	Environmental Protection Agency	Chemical, petroleum fuel, and nuclear power plant industry
EMS agencies	National Guard	Department of Defense DHS/Coast Guard	Other professional associations (animal control, zoological, wildlife rescue and rehab organizations)
Public works/facilities	State Universities & Cooperative Extension	Department of Energy	Animal retail, services and wholesale businesses
Public	State wildlife agencies	Advisory Team on	

Local	State	Federal	Non-governmental
health/environment		Environment, Food & Health	
Local colleges/universities		Department of Interior (USFWS, USGS, NPS)	
Local Emergency Planning Committees (LEPC)		Dept. of Commerce (NOAA Marine Fisheries)	

2. Planning for specific hazards

a. Biological

- i. Biological hazards include naturally occurring and intentionally introduced infectious diseases caused by viruses, bacteria, fungus, protozoa, or biologically produced toxins that pose a threat to human or animal health. Soil, water, insects, plants, animals and/or humans can be the source of the infectious disease or be a carrier that transmits the infectious disease to another organism allowing the disease to spread.
- ii. Examples: severe acute respiratory syndrome (SARS), rift valley fever, *E. Coli*, tuberculosis, Lyme disease, *Aspergillus*, anthrax, and ricin.

b. Chemical

- i. 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).
- ii. Examples: pesticides, herbicides, mercury, carbon monoxide, lead

c. Petroleum

Petroleum hazards are a subset of chemical hazards. Due to the thick viscous 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.

d. Floodwaters and debris

- i. Floodwater is a combination of biological and chemical hazards plus physical injury hazards from the chemical mixtures in the water.
- ii. Debris can cause physical injuries leading to chemical and biological hazards entering into the animal's body through puncture wounds or lacerations. Dust particles from debris may also enter via the respiratory system (for example, asbestos fibers.)

e. Radiological

Radiological hazards result from accidental release of ionizing radiation such as from a nuclear power plant or the intentional detonation of a device containing radioactive material (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 plant release
- Transportation accident
- Radiological dispersion device (RDD) or improvised nuclear device (IND)

3. Planning considerations

a. Regulatory authorities

- Every emergency situation involving hazardous materials falls under the authority of specific local, State or Federal agencies, often with interfacing authorities among several agencies or levels of government.
- Planners should consider what agencies have authorities for various hazards and scenarios and engage them in the planning process. As an example, for nuclear power plants, the Department of Energy supervises onsite planning and offsite community planning is supported through the FEMA Radiological Emergency Preparedness (REP) program.
- As an example, for nuclear power plants, the Nuclear Regulatory Commission supervises onsite planning and the Department of Energy offsite emergency planning, and radiological monitoring and surveillance training, whereas community planning is supported through the FEMA Radiological Emergency Preparedness (REP) program.
- Other agencies may have authorities pertaining to various types of animals, including pets (animal control, animal health), agricultural animals (animal health/agricultural agencies), and wildlife agencies.
- Collaboration is essential between those having authority to regulate or respond to hazards and those with authorities specific to animals.

b. Responsible parties:

- While response in many incidents may be primarily funded through local, state, or Federal agencies, in some incidents, certain corporations may bear a financial responsibility for some or all of the 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 such hazards exist, discussing animal decontamination issues with such entities may be useful (for example, the continuing dialogue with American Nuclear Insurers concerning indemnity issues, and community recovery from a nuclear power plant release).
- These corporations may also be financially responsible for part or all of the costs of planning and training, including equipment and supplies. This may be a source of funding for response agencies to purchase needed equipment.

- iii. Such 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 such industries, expertise might be available to support the planning process.
- c. Integration of animal decontamination into overall ICS organization
 - i. Animal response missions in general and particularly animal decontamination should be integrated into the overall Incident Command System for both exercises and actual incidents. Emergency planners, stakeholder agencies, and organizations must identify the mechanisms for such integration:
 - Local or State Incident Management Teams (IMT) may consider 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. Such participation facilitates familiarity with all aspects of hazardous materials incidents, identifies additional capability/training needs, and enhances both communication and trust.
 - Part 3, Section 14 provides examples of integration of animal decontamination into ICS organizations
 - d. Planning for diverse animal groups. **Note:** Operational challenges will be discussed in Part IV: Operations later in this document.
 - i. Because multiple types of animals require different management operations, it is critical that emergency planners engage the appropriate authorities and stakeholders for the various animal types. The actual response operations will be detailed in Part IV: Operations.
 - ii. Service animals: Service animals, as defined under the Americans with Disabilities Act, are an extension of the person they serve and must be managed with the person, including any decontamination services. Planners should engage both jurisdictional animal resources as well as the functional and special needs community in planning for service animals.
 - iii. Working animals (law enforcement, search and rescue, etc.): These animals, typically dogs and horses, are an element of the emergency response community and should be treated as responders. Typically, the numbers of these animals are small. First response agencies that utilize animals need to include decontamination capabilities for these animals within their overall SOPs.

- iv. Pets: The Stafford Act was amended by the 2006 Pet Evacuation and Transportation Standards (PETS) Act and now requires that State, Territorial, Tribal, and local jurisdictions accommodate the needs of people with pets and service animals within their emergency plans. Emergency managers should identify the lead jurisdictional authority for pets (example: animal control in many local communities or State Veterinarian in many states) as well as the various stakeholders who interface with pet issues or provide resources. Development of animal decontamination capabilities matching jurisdictional hazards should be one element of planning and preparedness process for every jurisdiction. While FEMA has a definition of household pet, emergency planners should be aware that many other animals might be in the community, including snakes, lizards, amphibians, fish, and exotic wildlife kept as pets. In some areas, it is not uncommon for livestock such as horses, goats and potbellied pigs to be kept as pets. While such animals may not fit the Federal definition, such animals they might affect the choices and behaviors of their owners during a disaster.
- v. Pet animal facilities can include veterinary hospitals, animal control/shelter facilities, boarding kennels, and pet breeding facilities, as well as other types of facilities. These facilities should be encouraged to develop their own emergency plans. In many cases, however, these facilities and the expert staff working associated with such operations can be invaluable assets in the community planning process. Veterinary and animal control expertise provides essential resources when developing animal decontamination capabilities.
- vi. Livestock and poultry used for food: Emergency planner must engage Federal, State, Tribal, or Territorial animal health officials on this issue. Such officials, in concert with USDA and FDA, will be charged with protecting human food and animal feed from contamination, ensuring that contaminated animals and animal products do not enter the food supply. In addition, it is important to engage other stakeholders include agricultural producers, Cooperative Extension, veterinarians, and others.
- vii. Horses, donkeys, mules, llamas, and alpacas are livestock species that typically do not enter the U.S. food supply, although they may potentially enter international food markets. Owners of such animals often have a profound attachment to these animals, necessitating thoughtful planning for their management, including decontamination. Equestrian organizations, for example, can be dynamic planning partners in helping to engage the owners of such animals in preparedness efforts.
- viii. Wildlife: Two distinct classes of wildlife need to be examined by emergency planners:
 - Native/free-ranging wildlife: Free ranging wildlife may be impacted by hazardous materials, with petroleum spills being the most publicly recognizable example. State and Federal wildlife agencies are typically the primary authorities for wildlife issues and must be engaged in planning efforts. Wildlife impacts can be complex, affecting species conservation, hunting and fishing economies, food chain concerns, and environmental issues.

- Wildlife in facilities (zoos, aquariums, sanctuaries, rehabilitation facilities, circuses, animal trainers, etc.): Wildlife facilities can range from small operations to very large zoos, aquaria, and sanctuaries. Such facilities can present complex emergency management challenges, particularly as they relate to animal decontamination. Wildlife facility operators should engage in contingency planning for their facility and the larger facilities need to be active participants in coordination of their facility plan with the community emergency plan. The Zoo Animal Health Network has an excellent set of best-practice documents available for wildlife facilities at www.zooanimalhealthnetwork.org.
- ix. Research facilities: Many universities as well as some private sector companies have biomedical research facilities which may house from a few to thousands of animals used in research. While the majority of research animals are mice and rats, other animals can include fish, birds, dogs, cats, rabbits, ferrets, primates (including monkeys and chimpanzees), livestock, and other animals. Research facilities should be encouraged to develop their internal emergency plans and capabilities. As with other animal facilities, the expert staff and resources at such institutions could provide assistance in developing animal decontamination capabilities and procedures.
- e. Planning for animal handling issues
- i. Behavioral issues:

Animals in an emergency may be frightened, injured, ill, and confused. Owners may be similarly under duress and can add to the stress levels of animals. Under such circumstances, animals may injure owners and responders, including biting, scratching, kicking, or trampling in an effort to escape. Less commonly, overt aggression by animals can inflict serious injuries. Injuries from animals can result in serious injury or death, making behavioral triage a critical element of animal decontamination.

- Chemical restraint

In some circumstances, frightened, aggressive, injured, or ill animals (for example, animals with seizures secondary to a toxic contaminant), animals may need to be sedated or tranquilized in order to proceed with decontamination. It is critical that veterinarians evaluate each animal, provide appropriate dosage of such drugs, and provide adequate supportive care during decontamination and recovery. Sedated animals will typically lose much of their thermoregulatory capacity and will be susceptible to hypothermia or hyperthermia.

- 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 such work. Veterinarians and Cooperative Extension agents may be very helpful in identifying such personnel.

Having owners restrain and decontaminate their own animals, with or without assistance, may work in some circumstances. The potential for decontamination failure, escape, animal injury, and human injury, however, may escalate dramatically.

While local fire/HAZMAT response personnel will have excellent understanding of hazards and decontamination operations, they may have little knowledge of animal handling. It is essential to forge collaborative operations in order to protect owners and responders as well as to accomplish the animal decontamination operation.

- ii. Personal protective equipment (PPE): Veterinary and animal care personnel working anywhere in the animal decontamination line should at a minimum be in the same PPE as the unit conducting the decontamination. The HAZMAT team, Safety Officer, or Incident Commander will determine the appropriate level of PPE.
- f. A triage tent for veterinary care should be planned prior to 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 major injuries may need to occur prior to decontamination when resources are available. When stabilization resources are not available or providing veterinary care creates an unacceptable risk to responders, if the animal is severely injured or ill, euthanasia may need to be considered. Some uncooperative or dangerous animals may need to be sedated prior to decontamination.
- g. External contamination
 - Removing external contamination is the first priority so that the animal does not contaminate itself, other animals, humans, or the environment. The animal may need to be decontaminated several times before it is considered “clean” enough to be near unprotected people. If possible, veterinary personnel should provide oversight of animal decontamination.
- h. A triage tent for veterinary care should be planned for at the end decontamination line to reassess the animals after decontamination to determine if they are healthy enough for transport or “clean” enough to leave.
- i. Internal contamination:
 - Depending on the incident, signs of internal contamination will need to be monitored for by the owner or receiving shelter or veterinary clinic. Radiologic incidents will require an animal holding area in the warm zone for those animals that are not considered clean enough to leave the area. Internally radiologically contaminated animals will require monitoring and testing prior to being released back to the owner. Euthanasia should be considered if symptoms of radiation sickness develop. Gastrointestinal effects of stress should not be mistaken for acute

radiation sickness and the former should be expected to be much more prevalent than the latter.

- j. Pre-existing medical conditions: Pets and other animals commonly have pre-existing conditions. Such conditions may require continued therapy and could confuse observers monitoring potential hazard impacts on animals.
- k. Post decontamination veterinary care will be needed to address the toxic hazard, incidental injuries, or pre-existing veterinary medical issues. The exact methodologies for delivery of such care are beyond this document, but should be considered by planners.
- l. Public/responders health and safety planning considerations
 - i. Owners
 - If pets or service animals are contaminated, there is a high probability that the owner will be also. Plans should address separation of pets from their owners early in the process to avoid either from re-contaminating the other unless it is determined that owner and pet can be decontaminated simultaneously. For example, under certain circumstances, owners decontaminating their pets.
 - ii. Handlers
 - Planners should consider what contaminants are likely found in the area and if local responders are equipped and trained to deal with these contaminants.
 - Safety planning should include actions to be taken in the event of an animal caused injury, such as bites, scratches or kicks. If livestock or other large animals are likely to be encountered, wranglers familiar with those species should be sought out ahead of time.
 - iii. Zoonotic Disease
 - Zoonotic diseases can transmit 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 expose.
 - 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 likelihood of early detection.
 - iv. Animal Bites

- All animal bites should be treated by medical personnel.
 - Domestic animals that bite humans should be quarantined for rabies observation according to local and state policies.
 - Wildlife bites may require euthanasia and rabies testing of the biting animal or other options per local and state policies.
- v. Separation Anxiety/Mental Health of Owner
- Separation anxiety can affect both the mental and physical health of pets and animal owners.
 - Other factors, such as loss of friends, family members, pets or property, can have detrimental effects on a person's mental health.
 - Often, organizations such as the American Red Cross, Salvation Army or certain government agencies may have counselors available to victims.
- vi. Personal protective equipment
- 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, should be kept available.
 - Animal handling PPE, like bite prevention gloves, catch poles and muzzles, will be required.
 - Response personnel should be trained in advance on proper use of both general and animal handling PPE.
- vii. Environmental Hazards (Climate, etc.)
- Decontamination and temporary sheltering should be set in an area that will not be affected by the disaster should conditions change. Ensure 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 risk of increased flooding, etc.
 - Natural and man-made wind break, such as mountains, woods or buildings, can be used to protect 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 decon areas.
 - Mist systems and evaporative coolers are affective in drier climates for cooling.

- Cooling stations should be planned for decon workers and breaks scheduled as needed.

m. Emergency housing and sheltering

- i. Facilities that may be used for emergency housing and sheltering should be identified and visited in advance so the owners or operators will understand the extent of operations. When choosing a location for housing/sheltering, the following must be identified:

- Water source
- Drainage
- Area suitable for decontamination shelters
- Area suitable for temporary housing
- Proximity to human sheltering should also be considered. Co-location sheltering is preferred whenever possible.

4. Resource management

- a. Resource typing: A critical element of the National Incident Management System (NIMS) is effective resource management, including resource typing and individual credentialing. The NASAAEP Planning and Resource Management Best Practice Working Group has produced a document titled “Planning and Resource Management Roadmap” which should be referenced concerning these general concepts. Specific to animal decontamination, however, the following comments are important:

- i. Currently, there are no resource types specific to animal decontamination team.

- ii. Individual animal emergency management job titles (<http://www.fema.gov/national-incident-management-system/resource-management-animal-emergency-response>) that can be used as components of animal decontamination teams include:

- Veterinarian
- Animal technician
- Animal Handling Specialist
- Animal control specialist

- b. 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. Mutual aid, state aid, and Federal assistance must, however, be available to meet the demands of large scale incidents. For example, if a

community has a nuclear power plant and predicts the need to decontaminate up to 1000 pets over 48 hours, then such a resource should be developed. If a catastrophic incident requires a 10 fold increase in that scale, then external resources must be mobilized to meet that need.

- c. Mutual aid (local, state, and intrastate): Local mutual aid should be the most readily available resource pool on animal decontamination. Teams and equipment caches could also be developed by State (such as through a veterinary medical reserve program) or through state to state mutual aid requests (Emergency Management Assistance Compact.) Since there is no specific resource types for animal decontamination, the requesting jurisdiction should be very thorough in describing the capability and resource needed.
- d. Federal resources: At the writing of this document, there is no immediately deployable, significant animal decontamination resource available. This gap has been clear on recent large scale exercises involving radiological or other contamination hazards. It is hoped that the Federal government will continue to identify and take active steps towards remediating this gap.
- e. NGO resources: Non-governmental organizations may have a significant role in animal decontamination, particularly flood water contamination and petroleum contamination.
 - i. Local, state, and national animal welfare NGOs involved in disaster response should be able to perform floodwater decontamination of animals, particularly pets. Such organizations, however, are not typically prepared to provide decontamination of other bio-hazards, chemical hazard, and radiological contaminants
 - ii. Petroleum decontamination capabilities are excellent within the non-governmental, specifically within organizations that decontaminate and rehabilitate oiled wildlife. The two organizations that most commonly provide this resource are:
 - Tri-State Bird Rescue: (<https://www.tristatebird.org/>)
 - International Bird Rescue and Research (<http://www.bird-rescue.org/>)
- f. Equipment and supplies
 - i. Equipment used in the decontamination of people or equipment may be applicable to animal decontamination. Water delivery systems, water heaters, tents, pools, sump pumps/water collection equipment, radiation monitoring equipment, etc. may be available from vendors of emergency management equipment.
 - ii. Alternative equipment of a less expensive nature can include items such as portable wading pools, garden hoses and sprayers, etc.

3 Training and Exercises

1. Challenges

- a. Surrogates: Surrogates are important tools for training and exercises. Surrogate substances must be non-toxic for animals and people, must provide some objective or at least subjective measurement of decontamination, and should generally provide similar challenges to live agents of concern. The identification of suitable surrogates is a huge challenge in the science of animal decontamination and requires additional research to develop a useful array of surrogate options. The following list offers some ideas for surrogates, along with strength and weaknesses of each:
 - i. Glo-Germ powder and oil: The Glo-Germ Company manufactures a fluorescent product in the form of a very fine powder and in an oil preparation. Primarily, Glo-Germ products are used in public health for biosecurity training. The product is a good test for hand washing or other cleaning processes. In animal decontamination, Glo-Germ could be useful to simulate dry contaminants or flood water contaminants, dry disaster debris, etc. Getting Glo-Germ distributed appropriately may be a challenge. Glo-Germ could also be used to simulate radiological contamination but may have deficiencies when being used to simulate fallout from a nuclear detonation. Such fallout tends to be composed of insoluble spheroid particles that range from a few millimeters to about 50 microns. Glo-Germ powder is a uniform particle of less than 50 microns. In the absence of a better option, however, Glo-Germ can be useful for even nuclear fallout decontamination exercises. Glo-Germ use requires the investment of ultraviolet flashlights or fluorescent lamps in order to evaluate both control animals and contaminated animals.
 - ii. Mineral oil for oil spill simulation.
 - iii. Tempera or fingerpaint may be useful to simulate contaminants, as it is non-toxic and can be washed off readily.
 - iv. Live radioactive agents: In very controlled circumstances, live radioactive agents could be used in animal decontamination exercises. Use of radioisotopes with short half-lives are used in medical diagnostics as well as emergency management exercises. While such agents could be used safely in animal exercises, such uses would be limited to institutions that work with such agents regularly and that can implement an appropriate safety and monitoring program for animals and people involved in the exercise.

2. Exercises: It is critical for animal response authorities and stakeholders to become involved in local, State, or national exercises that involve animal decontamination. Participation in exercises will increase awareness of animal issues within the broader emergency management community and identify gaps in capabilities related to animals. A detailed description of emergency management exercises is beyond the scope of this document, but can be obtained

through FEMA Independent Study Courses (<http://training.fema.gov/IS/crslist.aspx>) and the DHS Homeland Security Exercise and Evaluation Program (HSEEP) <https://www.llis.dhs.gov/hseep>. Examples of exercises that may provide an opportunity for animal response stakeholders include:

- a. Participation in local or regional exercises can serve multiple purposes. It can familiarize first responders with the personnel, equipment and processes used for animal emergency response. Animal emergency responders will learn how their procedures fit into the ICS system. These exercises also help open dialogues between those responding to assist humans with those who assist the animals. Some examples of exercises that may be beneficial to have animal responders included are:
 - i. Local HAZMAT exercises – Chemicals that are commonly transported by rail or highway may affect large numbers of pets or livestock if spilled in transit.
 - ii. Airport/Plane crash – Some of these exercise scenarios involve aircraft crashes in residential neighborhoods where pets or service animals may be involved.
 - iii. Nuclear Power Plant – Events at nuclear power plants are likely to involve a large and diverse animal population. Pets, service animals, livestock and wildlife will all be affected.
 - iv. Terrorism/Hostile action exercises – INDs, RDDs, chemical weapons and biological agents can all affect animals in the area of the release or detonation.
- b. Foreign animal disease response exercises

3. Training resources:

- a. Non-governmental organizations that may provide general animal response or animal decontamination training for emergency responders include:
 - i. The National Animal Rescue and Sheltering Coalition (www.narsc.net), including the American Society for the Prevention of Cruelty to Animals (ASPCA), Code 3 Associates, and others.
 - ii. Community Emergency Response Team programs (CERT) and Medical Reserve Corps (MRC).
 - iii. State/County/Community Animal Response Team programs (SART/CART) and similar programs.
 - iv. American Veterinary Medical Association – Veterinary Medical Assistance Teams (VMAT).
 - v. State veterinary medical reserve programs.
- b. HAZMAT and radiation training resources for animal/veterinary personnel include:

- i. Local HAZMAT/Fire departments
 - ii. Local/State emergency management agencies
 - iii. Academic institutions with emergency management/fire science programs
 - iv. State radiological agency
 - c. Federal programs with training resources include:
 - i. DHS Center for Domestic Preparedness, Anniston, Alabama.
 - ii. USDA National Animal Health Emergency Response Corps online training program (use of PPE).
- 4. Just in time training considerations:
 - a. Training methods must accommodate varied training environments, such as utilizing warehouses, tents or gymnasiums for venues.
 - b. Training modules should be limited in time to ensure quick response.

Regulatory concerns pertaining to the use of animals in training and exercises: The use of animals in research 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 pets belonging to participants in a single exercise and without the use of a “live agent” may not be expected to be of concern to USDA. However, the use of research animals, the participation of a research institution (such as a university), the use of live agents, or the regular use of individual animals in training or exercises may require compliance with the Animal Welfare Act. Partnering with a university already regulated by USDA may be an expedient way to obtain compliance. Such partnership will include having the exercise/training program reviewed by the Institutional Animal Care and Use Committee (IACUC).

4 Operations

As discussed in the sections above, decontamination for animals and its appropriate tactics and techniques is currently an inexact and insufficiently tested science, yet not impossible to accomplish. Decontamination techniques for people typically also work for animals, with slight modifications. Decontamination of pets and service animals tends to be a very different operation than that for livestock. Horse decontamination processes fall somewhere in between. Scale of operations could vary from a few contaminated pets arriving at a shelter at some distance from the incident to mass pet decontamination of pets involving tens of thousands of pets being processed at reception centers when populations sheltering in place are asked to evacuate in stages.

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 and reduce anxiety and to 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 owner.

Tactical Considerations:

- Animals 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 has 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:

1. Triage
 - a. 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 appropriately.

- b. Behavioral triage should identify animals that pose a risk to owner and responder such as bite or attack.
2. Intake
 - a. Signalment (history, animal data)
 - b. Animal identification/record creation
 3. Monitoring (dependent on contaminant, for example radioactive contamination will require monitoring with appropriate instruments before and after decontamination)
 4. Decontamination
 5. Re-monitoring/assessment
 6. Treatment (non-critical treatment)
 7. Reunion with owner or transfer to emergency animal sheltering operations.

Livestock Decontamination:

Operational objectives should aim to accomplish the following:

- Ensure the safety of responders, animal owners, and animals.
- Decontaminate animals to return them to their purpose or, if animals have to be killed, to render their carcasses less than hazardous or dispose of appropriately. Movement control strategies.
- Even if decontaminated, some livestock may not be allowed to enter the food supply. Such animals may be decontaminated to reduce spread of the hazard, but might later need to be destroyed in order to preserve the safety and marketability of food products.
- Strategies might include processes or techniques that livestock are already used to such as hosing down for horses and going through chutes for cattle, pigs, sheep and goats.

Tactical Considerations:

- Animals 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 liquid has to be applied to the animal to ensure penetration of the animal's haircoat to remove the agent from its skin.
- When the contaminant creates a food safety concern, decontaminated livestock species that could potentially contribute to human food supplies should be identified and managed to prohibit diversion of such animals into human food systems.

Estimating tactical scale of resources:

- When preparing to stand up animal decontamination operations, it is essential to estimate the scale of resources that will be needed. By estimating the time needed 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. As an example, we have provided the following chart that looks at 200 pets for radiological decontamination:

Operational step	Time to perform	# of personnel to perform
Triage/intake	5 minutes	2 x 2 lines = 4
Monitoring (non portal)	3 minutes	2
Decontaminate (bathe and dry)	10 minutes	3 x 3 lines =9
Re-monitor	3 minutes	2
Return to owner or transfer to shelter	3 minutes	1
Total	24 minutes	10 in sequence, 18 total

The longest step is decontamination and drying, which is twice the intake time and three times the other times (approximately). By having three lines for decon and two lines for intake/triage, theoretically the operation would be able to process approximately 20 animals per hour. 200 animals would take 10 hours. Two parallel entire units could achieve the results in 5 hours. Since stay times in PPE and the need for rest times can also have profound impacts on the numbers of personnel needed for the operation. For example, if one “shift” needed to rest 50% of the time, then either the time needed to perform the task or the numbers of personnel needed would double. In the scenario in the table, in order to achieve the mission in 5 hours with only 50% stay time, the operation would take 72 responders with additional personnel to provide logistical and transportation support.

1. Qualification of shortcomings of research and operational validation.
 - a. As of the date of this document, very limited scientific investigation has been performed in support of animal decontamination operations. Most current thinking has been based on extrapolation from human decontamination operations, limited empirical observations, and application of broader veterinary medical and animal science concepts within the context of animal decontamination. The exception is decontamination of wildlife in petroleum contamination of marine environments, where significant scientific investigations provide the foundation of current practices.
 - b. Critical issues that need to be investigated include:
 - i. 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 (e.g. ear canals, paws/pads, face, etc.)?

- ii. Efficiency needs to be studied for various types of contamination (insoluble dry particulates, water soluble chemicals/floodwaters, etc.)
 - iii. Efficiency in various environmental conditions: Decontamination could be a need in conditions of heat, cold, wind, precipitation (snow, rain, etc.). These conditions may change efficiency and may create thermoregulatory hazards for responders and animals.
 - iv. Appropriate live agents and surrogates must be identified that provide relatively close behavior to various radiological and other contaminants, providing at least a qualitative assessment of decontamination for exercise purposes.
 - v. Gross animal decontamination may be operationally applicable in some scenarios where the objective is to quickly reduce the contamination levels on animals and then hold them in a safe manner pending additional monitoring or more complete decontamination.
 - vi. Mass animal decontamination is another key issue requiring research and to validate operational procedures in exercises that simulate high throughput. If a community reception center expects to see 1000 persons per hour, then pet decontamination, for example, should parallel that number with perhaps 500-600 pets per hour as a target. If such rates are not achievable, then alternates, such as gross decontamination and/or temporary sheltering in a “warm zone” may be the alternative. To date, this work group is unaware of any animal decontamination exercises for radiological or other incidents that remotely approached 500 per hour throughput of pets.
2. Situational assessment and hazard identification
 - a. When possible, assessment teams should include animal responders
 - i. Site and resource identification
 - The American Red Cross often uses schools for temporary shelters, most schools would have water sources and drainage that may be used for decontamination
 - Assessment team should be trained to identify locations fitting needs of animal decontamination
3. Activation and integration within ICS
 - a. Preplanning with local and state emergency management officials is essential
 - b. Be prepared to show the need for animal responders
 - c. Be able to show what resources animal responders can bring and how this will benefit EM and response officials
4. Radiological contamination

Reception Centers for nuclear plant evacuations are pre-designated. Four reception center locations with emergency management and radiological regulators. Discuss decon location, setup, needs and resources. Similar setups would be used in other radiological incidents (terrorism, transportation accidents), but may not have the opportunity to find a decon location in advance. May need portable water supply which would require an agreement or contract in advance.

5. Isolation and quarantine

In animals that ingest contaminants, the animal's waste may then be contaminated and need to be handled as such. Consideration should be given into a method of collecting and testing the animals for contamination.

6. Euthanasia and depopulation: Euthanasia is the process of ending an animal's life in accordance with the AVMA Guidelines on euthanasia (see references). 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 reason of responder safety or resource availability. In such cases, life-ending operations are typically referred to as depopulation, rather than euthanasia.

- a. Decision process/authority: Performing euthanasia or depopulation as part of an emergency response requires owner permission or the invocation of some statutory/regulatory authority for such decisions. Euthanasia/depopulation decisions may be influenced by the following:
 - i. Agent/incident specific issues: Do contaminated animals present a risk to public health and safety due to potential for transmitting animal or zoonotic disease or through contamination of the food supply. In such cases, animals may need to be destroyed to protect unaffected people and animals. 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. Depopulation techniques, such as the use of fire-fighting foam to kill houses of broiler chickens may appropriate to reduce human exposure to the disease. In other cases, chemicals such as sodium nitrite, could be added to swine feed in concentrated feeding operations to kill all the pigs rapidly without exposing responders to diseases, excessive heat, or other hazards.
 - ii. Indemnity issues: Whenever privately owned animals are destroyed during an emergency incident, utilizing emergency management or public health authorities, the question of appraisal and indemnity must be considered.
 - Under what authority are such actions ordered?
 - Is there funding for indemnification of the owners of such animals by government agencies.
 - Are there other financial tools for helping mitigating the loss of the animals (e.g. insurance, low interest loan programs, etc.)

- Prior to euthanasia or depopulation, animals must be identified and appraised.
- iii. If pets are to be euthanatized, owners must either provide permission, or response organizations must obtain an alternate approval from a statutory or regulatory authority.
 - iv. Some other animals, such as animals in zoological collections and research facilities may need to be evaluated carefully prior to making a decision to perform euthanasia or depopulation. Some individual zoological animals may be critical to species conservation (such as endangered species) or may belong to foreign governments. Some research animals are of genetic strains upon which critical biomedical research is dependent.
 - v. 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 as compared to the holding time of a few days for stray pets. While it is unlikely that resources would allow the keeping of unclaimed contaminated pets for an extended period of time; it may be prudent to at least briefly explore the long-term legal consequences of euthanasia of contaminated pets without a known owner.

i. References

1. AVMA euthanasia guidelines <https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>
2. AAZV euthanasia guidelines <http://www.aazv.org/?441>

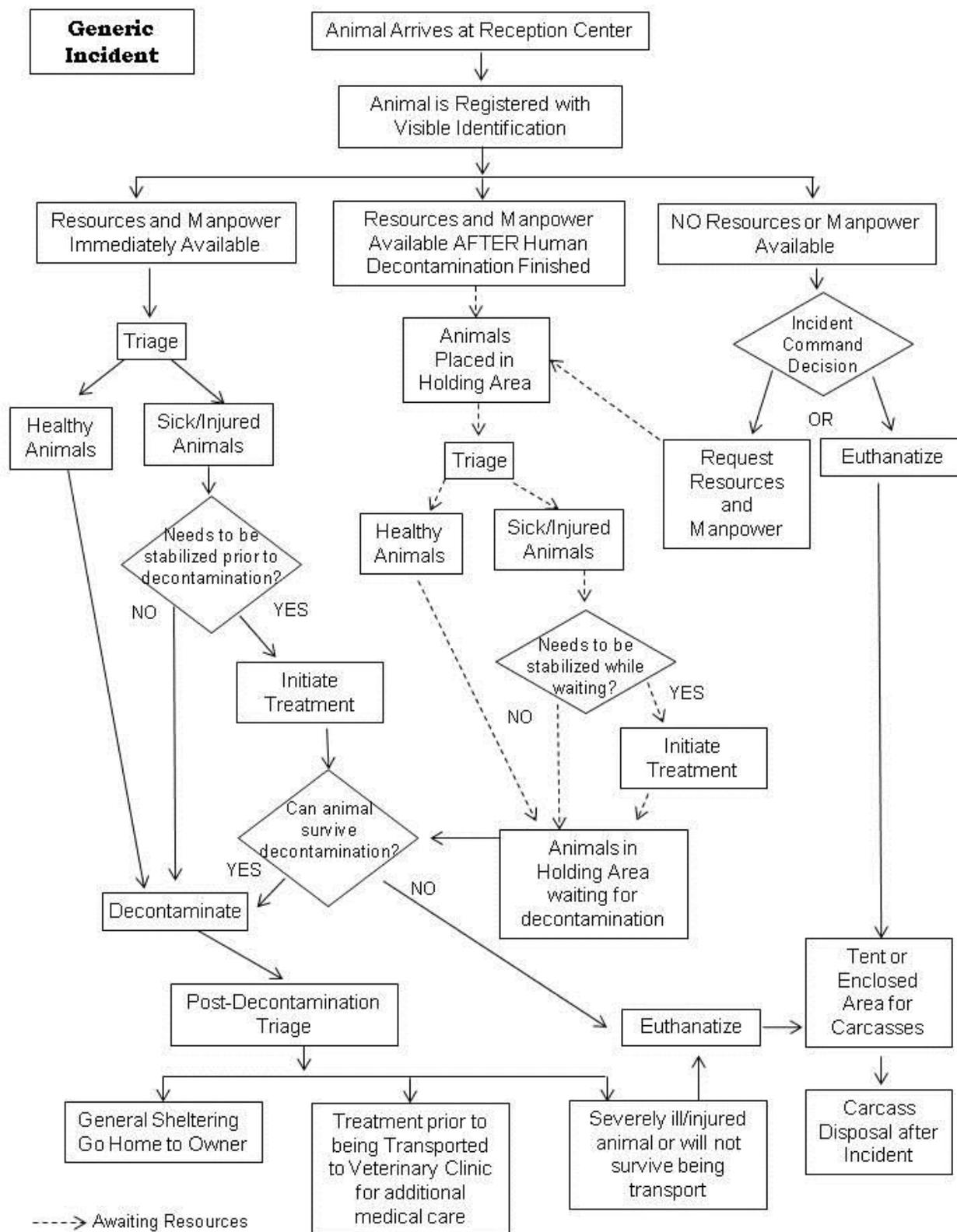
7. Critical incident stress management (CISM)

Emergency incidents may involve fear, uncertainty, destruction, death, suffering, and compromise the ability of normal individuals to cope with the anxiety and heightened or prolonged emotionally 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 severe stress for response personnel. Incident supervisors should have at least an awareness of critical incident stress and signs that might indicate their personnel could be affected. The details of critical incident stress and its management are beyond the scope of this document, but detailed information is available through the cited references below. In addition, there are several excellent psychological first aid courses that 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.

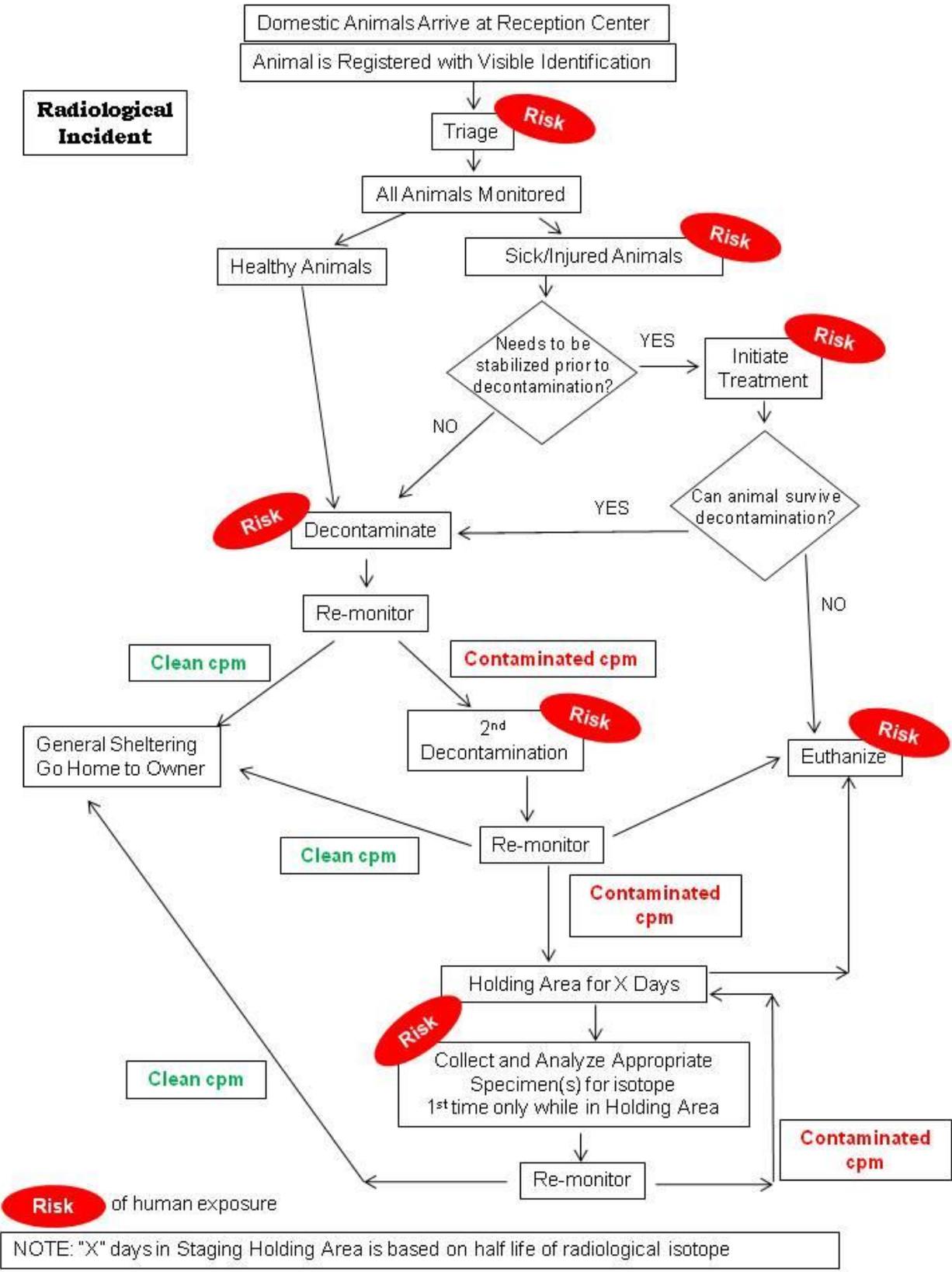
Animals themselves can be severely impacted by the stress of emergency situations, well beyond the primary effects of chemical, biological, or radiological hazards. Stress can lead to secondary physical disorders, such as gastrointestinal upset, or work to suppress the immune system, leading to increases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

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

1. Federal Occupational Health: <http://www.foh.dhhs.gov/NYCU/CISMInfo.asp>
2. OSHA Critical Incident Stress Guide:
<https://www.osha.gov/SLTC/emergencypreparedness/guides/critical.html>
3. CISM International: <http://www.criticalincidentstress.com/>
4. International Critical Incident Stress Foundation: <http://www.icisf.org/>
5. Psychological First Aid self-study course:
http://pfa.naccho.org/pfa/pfa_start.html
6. 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



Radiological Incident



5 Decision Trees and Job Aids

1. Biological contamination decision tree (Coming soon)
2. Petroleum contamination decision tree (Coming soon)
3. Chemical contamination decision tree (Coming soon)
4. Floodwaters and disaster debris contamination (Coming soon)
5. Radiological contamination (see above)