State Water Resources Control Board's and Regional Water Quality Control Boards' Interim Recommendations for Disposal of Animal Carcasses Associated with Fires

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Purpose and Use of Guidance

This document provides guidance to individuals and to federal, State, and local agencies dealing with the disposal of animal mortality resulting from a fire in an area where the Governor of California has declared a State of Emergency. The mortality of primary concern is large animals such as cows and horses and large numbers of smaller animals such as sheep, dogs, and poultry. Following the guidance should result in the use of disposal practices that are most likely to avoid the need for a regulatory action, after the emergency, by a Regional Water Quality Control Board (**RWQCB**).

Waste Disposal: Normal Conditions and Emergency Conditions

Under normal circumstances, the disposal waste to land at a landfill or on private property is an action subject to restrictions adopted as individual or general Waste Discharge Requirements (**WDRs**) by a RWQCB. Alternatively, the RWQCB may adopt a conditional waiver of WDRs for properties where waste management practices meet specified conditions.

Under emergency conditions, there is usually not time for a RWQCB to go through the process of adopting new WDRs or conditional waivers, or of revising existing WDRs or waivers. California Water Code (**CWC**) Sections 13269(c) and (d) allow a RWQCB, upon notification, to dispense with the formal process for emergency discharges needed to protect life and property. However, CWC Section 13269(c) requires that the appropriate RWQCB be notified in advance of any emergency waste discharge not covered by WDRs. Furthermore, that RWQCB retains the right to adopt WDRs or to take enforcement action, after the fact, for any discharge that results in a threat to water quality.

The following discussion addresses State Water Resource Control Board and RWQCBs (collectively, **Water Boards**) concerns by identifying waste-management options that might be appropriate. The characteristics of a particular emergency or a particular location may invalidate one or more of these options. Furthermore, other regulatory agencies may have requirements or concerns that affect the selection of a waste management option. Therefore, for any given emergency situation, the Water Boards expect persons and agencies intending to discharge wastes to consider all applicable State and local agency restrictions to determine what disposal options are allowable and the constraints that apply to the disposal options. Given the generic nature of the management options described in this document, it is recommended that local RWQCB staff be contacted (see the list at the end of this document) and solicited for site-specific disposal suggestions. Such contact should help eliminate the need for post-emergency regulatory or enforcement actions by the RWQCB.

Alternate Disposal Options, Concerns, and Mitigative Measures

Rendering, cremation, and disposal in a permitted landfill are the primary and preferred methods utilized for disposing of animal mortality. Composting, incineration, and open burning may also be acceptable alternative disposal options in instances where the preferred methods are impractical and where the alternative meets the requirements of regulatory agencies. On-site burial (i.e., landfilling at an unpermitted site) is a disposal method that has significant restrictions that limit its applicability.

The generic water quality concerns posed by each of these disposal options is discussed below, together with some of the means to mitigate their possible adverse impacts on water quality. Implementing these appropriate mitigative measures, together with others that RWQCB personnel may suggest, will help to eliminate regulatory action and/or enforcement that could become necessary after the emergency is over.

Rendering — The Water Boards have no concerns regarding rendering as a disposal option for animal mortality. This option is generally applicable to large animals or a large quantity of smaller animals and may not be a viable option if the mortality is partially decomposed. Rendering is one of the disposal options least likely to result in any water quality problems. Rendering plants with WDRs and/or requirements established by local agencies must continue to comply with those requirements during the emergency.

Cremation — Cremation is commonly used for the disposal of deceased small animals such as cats and dogs. Pet crematories have limited capacity and may not be able to accommodate large numbers of mortality. The Water Boards have no concerns regarding cremating animal mortality as a disposal option when the crematories follow any applicable permit conditions. Biological incineration and open burning are related disposal options that are described below.

Municipal Landfill Disposal — Under normal circumstances, the volume of animal carcasses going to municipal landfills is relatively small, and such disposal is generally allowed under permits and WDRs issued for the landfills. If a large quantity of animal mortality is proposed for disposal at a landfill, the person shipping the waste and the landfill operator should consult with RWQCB staff prior to shipment. Also, the California Department of Food and Agriculture (**CDFA**) and local environmental health agencies may have restrictions on the transportation of animal mortality.

In the United Kingdom (**UK**), the disposal of large quantities of bovine mortality at landfills resulted in the production of large amounts of viscous organic-rich fluids that clogged the landfills' fluid collection systems. Therefore, large quantities of animal carcasses may require special consideration and handling at landfills to ensure proper disposal.

The primary suggestion for protection of water quality related to landfill disposal is that the discharge of the mortality be done in a manner that is consistent with the moisture holding capacity of the solid wastes underlying the carcass layer in the landfill. The following options, in addition to any others suggested by local RWQCB staff, should help avoid the fluid-production-related problems that the disposal of animal mortality at an existing landfill could otherwise create:

- Limit the thickness of each animal mortality layer to no more than two feet or in the case of large animals such as cows, to one animal thickness;
- Cover each layer of animal mortality with an even thicker layer of soil or other absorbent waste;
- If the portion of the landfill receiving the animal mortality is composite-lined, deposit no more than two layers (with a thicker layer of other waste or soil in-between) in any given area;
- If the portion of the landfill receiving the animal mortality is not composite-lined, deposit no more than one layer in any given area;
- Discharge animal mortality only to portions of the landfill underlain by a considerable thickness of other waste;

- If the animal mortality is mixed with material containing a significant percentage of water (such as saturated debris) reduce the potential for leaching by mixing the waste with an absorbent material (e.g., soil, saw dust, etc.) prior to discharge.
- Temporary storage — If the animal mortality is not discharged to the landfill immediately upon delivery:
  - Implement a plan that assures that any storm water runoff from animal mortality piled at the landfill, prior to discharge, will be handled with landfill leachate rather than as "normal" storm water runoff from the facility;
  - Implement a plan to prevent wildlife from coming in contact with the animal mortality (e.g., provide fencing or a temporary covering of soil);
  - Always discharge this temporary stockpile to the landfill prior to the end of the working day; and cover it.
- Cover animal mortality with soil or other waste immediately after it is discharged to the landfill.

Composting — The California Integrated Waste Management Board (**CIWMB**) has a prohibition against composting mammals[1], but composting under controlled conditions (i.e., in-vessel composting) is a disposal option applicable for poultry mortality. If the composting process does not include a discharge of waste to land and results in a compost product that does not pose a threat to water quality when properly utilized, the Water Boards should have little or no concern for water quality impacts. Coordinate with the local RWQCB regarding any proposed composting practices.

Biological Incineration — This is a method of thermal destruction of animal mortality and is most applicable when pathogens are a concern. Biological incinerators operate at extremely high temperatures (in excess of 2000^{o}F in some cases), and convert volatile gases, vapors, and particulate matter to carbon dioxide, water, and ash. In a properly designed and operated incinerator, the animal mortality is burned, producing a residue free of pathogens. Adding a properly designed and operated afterburner produces a stack gas virtually free of odors and particulate matter emissions.

So long as any produced ash (or other solid waste) is properly managed and there are no temporary animal mortality piles created during the process, the Water Boards generally consider that biological incineration does not pose a threat to water quality. However, such incineration is expensive, there are few large biological incinerators in California, and incinerators may not fall under an emergency exemption for open burning. Furthermore, it is essential to coordinate such disposal with local Air District personnel.

Open Burning — Section 41801(f) of the Health and Safety Code allows open burning for the purpose of disease abatement and prevention. Anyone proposing open burning of animal mortality should coordinate with the local Air District and RWQCB regarding this option. Open burning is typically conducted in pyres and trenches. Addition of accelerants such as diesel fuel and use of auxiliary fuels such as wood or straw is necessary to achieve combustion temperatures sufficient for complete burning of animal mortality. Water quality concerns and mitigations regarding this disposal option include:

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1 See California Code of Regulations, Title 14, §§17852(i) & 17867(a)(1).

- The application of effective best management practices (**BMPs**) to mitigate effects from storm water runoff from any temporary waste piles created prior to burning the wastes; and
- Excavation and treatment of the underlying soil after burning is completed in order to eliminate excess fuel hydrocarbons. Soil treatment options would be similar to those used for the cleanup of soil resulting from an underground fuel tank leak. Your RWQCB contact can help identify suitable options.

The efficiency and effectiveness of open burning can be significantly enhanced by using a mechanical device called an air curtain destructor that forcefully projects a high-volume curtain of air into a pit or trench while open burning is conducted. The use of an air curtain destructor may decrease the potential for water quality impacts by reducing the quantity of accelerants needed. However, air curtain destructors may have limited availability on short notice.

On-Site Burial at an Emergency Landfill — For the purpose of this document, an "emergency landfill" is a new landfill created under emergency conditions for the disposal of animal mortality. From a water quality protection standpoint, this is by far the least desirable disposal option. On-site burial should only be used when the preceding disposal options are infeasible. As discussed below, the practices used for on-site burial depend on the number of carcasses requiring disposal.

Only a Few Animals

Preferably, on-site burial should be limited to instances where only a few small-animal carcasses or a very limited number of large-animal carcasses need disposal. Such disposal is typically done by excavating a pit or trench that will accommodate one or more animals and allowing for three feet of backfill to bring the burial site to original grade. Extra soil is then mounded over the burial site. The precautions associated with disposal of a large quantity of animals as described below should be considered and incorporated as appropriate.

Large Quantity of Animals

In an emergency where a large quantity of animal mortality exists and landfill disposal is the best option, but it is not feasible to transport the mortality to a Class II or Class III landfill, a responding agency may consider creating an emergency landfill either on-site or nearby. Developing and using such a disposal site must be done in close coordination with local RWQCB staff. In the UK, bovine carcasses disposed in on-site burial trenches during outbreaks of foot and mouth disease and "mad cow" disease often had to be exhumed because these emergency landfills either threatened ground water quality or produced ground water contamination. Significant effort was necessary to collect, treat, and dispose of body fluids produced during decomposition.

The following precautions, in addition to any others suggested by RWQCB personnel, can help avoid threats to water quality at an emergency landfill:

1. Place the emergency landfill at least 500 feet from any surface water bodies and any wells.
2. Keep the base of the excavation at least 10 feet above the historical high ground water level. *Notes: Except in favorable terrain, this precaution may make it necessary to be more than 500 feet away from any standing water body. Also, be aware that mottled soil (soil that exhibits multi-color curvilinear banding) indicates that that the soil is subject to alternating wet and dry cycles, making it unsuitable for use as an emergency landfill site*.
3. Avoid burial in highly permeable soils such as gravels, sands, or loamy sands, and also avoid burial at facilities that may be characterized by such soils (e.g., old gravel quarries).

4. Minimize liquid production by:
   - Limiting the thickness of each layer of animal mortality to no more than 2 feet or, for large animals, one animal thickness;
   - Sprinkling a covering of lime over the carcasses sufficient to help limit liquid production; and
   - Covering each limed layer with a thicker layer of soil (e.g., 3 feet) prior to starting another layer of animal mortality.
5. Have no more than two layers of animals in the landfill.
6. Keep the top of the uppermost layer of animal mortality three feet or more below the original soil surface elevation (i.e., the "original grade), with all remaining excavated soil shaped into a mound that:
   - Overlaps the top layer of animals by several feet on each edge;
   - Is at least 3 feet thick over all portions of the top layer of animal mortality; and
   - Is sloped to provide good surface drainage.
7. The most practical approach may be:
   - Excavating the area to a depth of 10 feet, using a bulldozer;
   - Building the first "lift" by dumping a load of animal mortality contiguous to prior loads and using a backhoe or hydraulic excavator to spread it to the right thickness;
   - Spreading lime over the mortality, then covering it with enough soil to occlude the waste from view;
   - Dumping the next load of animal mortality adjacent to the covered mortality and proceeding through the above steps until the entire layer of mortality is in place;
   - Spreading and lightly compacting (sufficient for truck access) the covering soil (three feet minimum thickness) for that layer and then, if applicable, placing another layer of animal mortality; and
   - Using all the remaining soil to create a mounded area over, and overlapping the edge of, the disposal area. The "fluffing effect" of excavating the soil, in combination with the space taken up by the animal mortality, will assure that you have plenty of soil for making this "final cover."

   Note: Using this approach, a one-acre area excavated to a depth of 10 feet and constructed with two layers of animal mortality, as described above, should accommodate over 1500 tons of mortality. The site will end up having a soil mound about four feet above the original grade, with the top of the uppermost animal mortality layer three feet below the original grade.
8. Discharge only animal mortality, cover soil, and lime or other liquid-abatement materials to the emergency landfill.
9. For animal mortality mixed with wastes containing a significant percentage of water (such as saturated debris) reduce the potential for leaching by mixing the waste of raw eggs, reduce the moisture content, prior to discharge, by mixing the waste with an absorbent material (e.g., soil, saw dust, etc.).

10. Implement BMPs, including:
    - Installing run-on control features on the upgradient side of the landfill to divert stormwater from the emergency landfill;
    - Providing a runoff collection and conveyance system to prevent impacts to surface waters;
    - Grading the final cover to eliminate ponding;
    - Providing some sort of erosion control for the final cover. *Note: Common options include installing a straw mulch cover or a vegetative cover*;
    - Providing signage that clearly identifies the area as an emergency landfill for animal mortality. The information on the sign should warn against trespass and should include the reason for the emergency landfill, the types of waste buried at the site (e.g., carcasses, fire debris, manure, etc.), and the name and phone number of the current land-owner; and
    - Installing a "deer fence" around the completed emergency landfill sufficient to deter access and digging by carnivores.
11. Establish the duration of time that the area must remain undisturbed and provide for periodic inspections and submission of reports to the local RWQCB and other appropriate agencies.
12. Document the location and construction of the emergency landfill, together with any long-term restrictions applicable to the landowner. Copies of this documentation should be provided to the landowner and the local RWQCB. The following items may be included in the documentation:
    - A short description of the conditions that made an emergency landfill necessary;
    - The identity, address, and phone number of the landowner;
    - Photographs taken to show the emergency landfill's location, practices used for placement of wastes and soil layers, and the unit's appearance after installation of the final cover;
    - A map, based upon surveying or Geographical Information System (**GIS**) data, showing the landfill's perimeter in relation to local topographic, biological, and cultural features (e.g., roads, large trees, stream channels, etc);
    - A simple cross-section, coupled with a narrative description of the landfill's construction (depth, layers and their thickness, and final cover);
    - A description of the measures taken (such as those listed above and any others utilized) to prevent migration of waste constituents from the emergency landfill;
    - The date after which the land owner can remove the deer fence and resume use of the land; and
    - Any necessary restrictions deemed appropriate regarding future use of the site (e.g., allow only shallow tilling and nonirrigated rangeland use for the first five years).

Failure to contact the appropriate RWQCB prior to disposal at an emergency landfill constitutes a violation of the California Water Code (CWC). Furthermore, whether or not notified beforehand, the RWQCB can adopt WDRs or a Cleanup and Abatement Order after the end of the emergency. Informal coordination between persons or agencies discharging animal mortality

and RWQCB personnel regarding the siting and design of any emergency landfill can all but eliminate the likelihood of such problems.

RWQCB CONTACT LIST

There are nine RWQCBs in California, based upon major watershed boundaries. In addition to the nine main offices, there are three RWQCBs satellite offices. To help determine which of the twelve RWQCB offices is responsible for the area of concern, look in the State Government pages, at the beginning of the White Pages of your local phone book, under the title **Water Quality Control Board**. This will be followed by the office's regional designation — e.g., **Central Valley Region**. You can then either call the general number listed there or call a direct contact as listed below. The RWQCB office or direct contact will be able to identify the appropriate contacts for waste disposal questions.

Direct Contacts for Waste Disposal Issues:

RWQCB Region 1 — North Coast Region: Terri Kinney [707-576-2668, KinnT@rb1.swrcb.ca.gov] or William Winchester [707-576-2682, WincB@rb1.swrcb.ca.gov]

RWQCB Region 2 — San Francisco Bay Region: Terry Seward [510-622-2416, TS@rb2.swrcb.ca.gov], or Curtis Scott [510-622-2414, or CTS@rb2.swrcb.ca.gov]

RWQCB Region 3 — Central Coast Region: Michael LeBrun [805-542-4645, Mlebrun@rb3.swrcb.ca.gov]

RWQCB Region 4 — Los Angeles Region: Rod Nelson [213-620-6119, RNELSON@rb4.swrcb.ca.gov]

RWQCB Region 5 — Central Valley Region, Redding Office: Karen Clementsen [530-224-4852, CLEMENK@rb5r.swrcb.ca.gov], or Dale Stultz [530-224-4786, StultzD@rb5r.swrcb.ca.gov]

RWQCB Region 5 — Central Valley Region, Sacramento Office: Steve Rosenbaum [916-255-3131, RosenbS@rb5s.swrcb.ca.gov], Victor Izzo [916-255-3126, IzzoV@rb5s.swrcb.ca.gov], or Jack Del Conte [916-255-3083, DelconJ@rb5s.swrcb.ca.gov]

RWQCB Region 5 — Central Valley Region, Fresno Office: Shelton Gray [559-445-5508, GrayS@rb5f.swrcb.ca.gov]

RWQCB Region 6 — Lahontan Region, South Lake Tahoe Office: George Cella [530-542-5426, GCella@rb6s.swrcb.ca.gov]

RWQCB Region 6 — Lahontan Region, Victorville Office: Joe Koutsky [760-241-7391, jkoutsky@rb6v.swrcb.ca.gov]

RWQCB Region 7 — Colorado River Basin Region: Liann Chavez [760-776-8945, chavl@rb7.swrcb.ca.gov], or Michele Ochs [760-776-8962, ochsm@rb7.swrcb.ca.gov]

RWQCB Region 8 — Santa Ana Region: Dixie Lass [909-782-3295, dlass@rb8.swrcb.ca.gov], or Thea Tryon [909-248-0376, TTryon@rb8.swrcb.ca.gov]

RWQCB Region 9 — San Diego Region: John Odermatt [858-637-5595, oderj@rb9.swrcb.ca.gov], or Carol Tamaki [858-467-2982, tamac@rb9.swrcb.ca.gov]