

Catastrophic Animal Mortality Management (Burial Method)

Technical Guidance

USDA/Natural Resources Conservation Service
Texas State Soil and Water Conservation Board

October 26, 2005

General Information Relating To All Type Animals

This guidance applies to all catastrophic animal mortality with the exception of diseased animal carcasses. Texas law has separate requirements for disposal of animal carcasses when death results from one of the diseases listed in Appendix C. Appendix C contains information for disposal of these diseased carcasses.

Each producer should have an established method to handle day-to-day mortality. However, in the event of an unexpected disaster, each producer should have a Catastrophic Animal Mortality Management Plan. The plan should include a detailed action plan and a list of emergency phone numbers of contact persons. The Texas Natural Resources Conservation Commission (TNRCC), Industrial and Hazardous **Waste Permits Section must be contacted before burial of catastrophic mortality:**

TNRCC
Industrial and Hazardous Waste Permits Section, MC-130
PO Box 13087
Austin, TX, 78711-3087
phone: 512/239-6595, fax: 512/239-6383

Further information concerning regulations pertaining to mortality management can be obtained from TNRCC. Proper disposal of carcasses is important to prevent disease transmission, avoid nuisance problems, and protect air and water quality. TNRCC Rules require disposal of dead animals within 72 hours in a manner which prevents contamination of waters of the state or creation of a nuisance or public health hazard.

Disposal by a rendering company is the preferred method of carcass disposal. Before planning this option contact the rendering facility or its representative to ensure the producer is informed of special handling procedures, equipment needs, scheduling requirements, etc. The producer should maintain a list of contact phone numbers so information will be readily available following a catastrophic die-off. Verify that local companies which have previously picked up and/or rendered dead animals are still doing so. A number of rendering companies across the state have stopped dead animal pick up service, and others have raised their fees significantly. The producer should periodically review the availability and cost of rendering so that the plan can be modified if necessary. This can be an excellent option if mortality can be loaded and transported while still fresh, or the mortality can be refrigerated until loaded and transported.

Disposal in a landfill may be an option in some locations. Before planning this option the closest commercial, regional, county, or municipal landfill should be contacted to determine if the landfill has a permit which would allow acceptance of dead animals (poultry, sheep, cattle, etc.). Also ask if there are any restrictions on type and volume of animal mortality that will be accepted at the facility. Landfill fees and transport, offloading, and handling procedures should be discussed with landfill managers and included in the plan. The use of a landfill is an excellent option if mortality can be loaded and transported while still fresh, or can be refrigerated until transport. The landfill is not a viable option if the producer does not own or have access to a vehicle capable of transporting mortality quickly in an emergency situation. After a catastrophic die-off is not a good time to find out that a driver and truck

to transport mortality will not be available for several weeks (MAKE ARRANGEMENTS NOW, NOT AFTER THE ANIMALS ARE DEAD).

On-farm disposal of catastrophic mortality may be considered if site conditions permit. On-farm methods include burial, composting, and incineration. Incinerators and composters are excellent options for routine mortality but usually do not have the capacity to handle mortality volumes associated with catastrophic events. Composting and incineration should not be relied on for catastrophic mortality handling without a documented evaluation of worst anticipated mortality condition (number, type, and weight of animals), and the anticipated capacity of the system (i.e., lb./hr. incineration rate, hrs/day of operation).

Information Specific To Poultry

For purposes of mortality disposal, Texas Law defines poultry as chickens and ducks (Texas Water Code § 26.301). TNRCC Rules allow storage of carcasses on-site for no more than 72 hours, provided that storage is in a varmint-proof receptacle to prevent odor, leakage, or spillage. Storage beyond 72 hours must be in a freezer or refrigerator at 40 degrees Fahrenheit or lower. Burial of birds is not allowed for day-to-day mortality under Texas law. Rules prohibit on-site burial of poultry carcasses, except in the event of a major die-off, which is defined as a mortality rate of 0.3% of the total poultry inventory or more per day. **Only the die-off that exceeds the capacity of the normal means of mortality management may be buried.**

Planning For Burial Of Catastrophic Animal Mortality For All Type Animals (excluding disposal of diseased carcasses)

The producer, with assistance from NRCS, Texas State Soil and Water Conservation Board personnel, or other qualified professionals should select burial pit sites. During the planning process, the proposed burial site should be evaluated for the following:

- Soil Properties
 - Soil texture
 - Soil permeability
 - Surface fragments (Cobbles or Stones)
 - Slope
 - Depth to high water table (perched) **1/**
 - Depth to high water table (apparent) **2/**
 - Depth to bedrock
 - Flooding hazard
 - Ponding
- Presence of fractured or cavernous bedrock
- Proximity to water bodies (rivers, streams, ponds, lakes, etc.)
- Proximity to wells
- Distance to public areas
- Distance to residences and property lines

1/ Perched high water table is defined as a zone of saturation above an unsaturated zone at the highest average depth during the wettest season.

2/ Apparent high water table is the level at which water stands in a freshly dug unlined bore hole after adequate time for adjustments in the surrounding soil at the highest average depth during the wettest season (actual ground water level).

Where applicable, local NRCS offices maintain a listing of suitability for Animal Mortality Burial (Catastrophic) by soil map unit. Each soil that is mapped in the county will fall into one of the following categories:

- **Not Limited**—Soils are expected to be suitable for burial. These soils are preferred areas for locating burial pits.
- **Somewhat Limited**—Soils may be used for burial, as long as limitations shown in the FOTG, Section 2, Animal Mortality Burial (Catastrophic) Interpretation are addressed. Soils in this category may have slight to moderate limitations. Care should be taken in evaluating a potential burial site on these soils (See Table 1, below).
- **Very Limited**—Soils are generally not suited for burial pits without overcoming major limitations. These locations are not recommended for burial. Alternative methods of disposal will normally be required if these are the only available soils on the farm.

It should be noted that Soil Interpretations are a preliminary planning tool. They only provide flags for things that need to be considered. Soil Interpretations do not provide criteria for pit design or construction. The chance of an inclusion of a contrasting soil at a particular soil map location varies. For this reason a planned site for burial of catastrophic mortality should never be selected without a site visit to verify assumptions about the location. When a building is full of dead birds is not a good time to discover a high water table at the planned animal burial site.

Site Evaluation Criteria

- Watch for perched water tables. A site would not be acceptable without cutoffs and drainage or other special design features if any water table (apparent, perched, seasonal, etc.) is likely to result in water being above the level of the bottom of the pit or flowing down gradient into the pit.
- Soils rated “Not Limited” for Animal Mortality Burial (Catastrophic), FOTG, Section 2, are suitable for burial sites.
- Soils that have a Unified Soil Classification of CH, MH, CL, GC, or SC are suitable for burial sites. Some of these soils will, however, have limitations relating to high clay content (i.e. difficulty in excavation, handling and compacting fill).
- Do not locate the burial pit on soil mapping units that are frequently or occasionally flooded.
- Do not locate the burial pit on soil mapping units that are rarely flooded without constructing measures to protect the site from flood waters.
- Do not locate the burial pit with planned bottom elevation within 2 feet of an apparent water table, highly permeable soils, or fractured bedrock.
- Do not locate the burial pit within 150 feet of private wells, springs, streams, public areas, or within 500 feet of a public well.
- Do not locate the burial pit where surface runoff could enter the pit.
- Do not locate the burial pit within 50 ft of residences or property lines; a distance of 200 ft is recommended if space allows.
- Assess potential impact of and existing hydraulic connections (i.e. tile drains, or drainage ditches)

Table 1—Required Practices for Burial Pits located in Soils that are “Somewhat Limited”

Limitation	Method to Overcome Limitation
Slope	Overhead water must be diverted away from the burial area.
Depth to Rock	Bottom of pit must be at least 2 feet above bedrock. If additional depth of pit is needed it must be created by “mounding” of sidewalls above original ground elevation. Cover over the animals must consist of a minimum of one foot of soil on intermediate layers and two feet of compacted soil on top.
Flooding and Ponding	Areas subject to frequent or occasional flooding or ponding are not suited. Rarely flooded or ponded areas are not to be used during periods of high flooding and ponding probability (see soil survey for dates likely to flood). Alternate areas should be planned for use during these periods.
Fragments or Stones	The main problem with these soils is difficulty in mechanical excavation of pit. Implements suited to working in rocky soil should be used. Soils with high percentages of fragments and stones are not suitable.
Perched Water Table	Do not use during wet seasons unless drainage is provided.
Apparent Water Table	Bottom of pit must be at least 2 feet above apparent water table (see soil survey for apparent water table depth). If additional depth of pit is needed it must be created by “mounding” of side walls above original ground elevation. Cover over the animals must consist of a minimum of one foot of soil on intermediate layers and two feet of compacted soil on top.
Seepage	Clay or synthetic liner can be used to prevent or control seepage.
Texture	<p>Sandy—Cut-banks cave: Extra care will be needed during construction to prevent safety problems. Pit top dimensions may have to be enlarged and side slopes flattened (over-sizing the hole) in order to physically construct the pit. Flattened side slopes and vegetation establishment can be used to address potential erosion of burial pit covers.</p> <p>Clayey—Sticky when wet: Select alternate burial sites in case of wet conditions. If no other sites are available, be aware that digging a pit when wet conditions prevail is going to be more difficult, time consuming, and expensive, than if conditions were drier.</p>

Procedures for Estimating Burial Pit Volume

Document design assumptions for the worst case scenario (maximum number of animals to be buried and maximum expected average weight of animals). Determine total weight of mortality for disposal in pounds (lb.). Divide total weight of mortality by 62.4 lb./cu. ft. The result is the approximate volume of mortality to be buried in cu. ft. Additional pit volume will be required to account for voids in placed

mortality. In addition, the burial pit should be excavated large enough for both mortality and (where planned) alternate layers of approximately equal thickness of soil (see Appendix A). The volume of pit excavation required to provide for burial of the mortality would be between 2 and 4 times the mortality volume. A spreadsheet developed for computing volumes of sediment removed from ponds is available on request for aid in determining planned trench dimensions for anticipated volumes of animals and fill.

Evaluate the site to determine areas with suitable soils. Determine practical and safe pit width, depth, and side slopes for the equipment available. Select a cross-sectional geometry for the pit. Determine the pit length with assumed cross sectional area that would be required to provide the total required excavated volume in cu.ft.

An area of suitable soil must be available that is larger than the total planned burial pit surface area before burial is a viable option. Depending on shape of the area containing suitable soils this might require multiple pits. If adequate suitable soils are not available, an alternative or secondary method of catastrophic mortality disposal must be planned.

Actual application would involve a similar analysis. However, when determining pit size, the actual number and weight of animals for burial should be considered rather than worst case. The rest of the procedure would be identical. When a portion of the land area devoted to or planned for catastrophic mortality is utilized, the area should be surveyed (not necessarily a legal survey) and recorded in the producer's plan, or the area should be staked with reference points and survey notes included in the producers plan. This provides the producer with information needed to manage the burial area. With this information it should be possible to avoid a previously utilized area should another catastrophic event occur.

Sample calculations are included in Appendix B.

Additional Burial Considerations and Recommendations

Burial of dead animals (all animal types) requires a backhoe, scraper, bulldozer or other equipment capable of excavation and/or trenching for construction of a burial pit. Burial pits should be dug to an appropriate depth for the specific soil and geologic conditions. Burial pits should be a minimum of 4 ft wide and 3 ft deep with a length adequate to accommodate mortality. Pit bottoms should be relatively level. If excavation depths greater than 6 ft below existing natural ground are anticipated, test pits and/or augured soil samples should be examined to a depth two ft below lowest planned excavation. Site limitations may dictate the use of multiple pits. If more than one pit is required, they should be separated by 3 ft. of undisturbed or compacted soil.

Excavation and trench safety should be taken into account when selecting planned geometry of a burial pit. If there is any chance of the producer or his employees getting into a trench to place or rearrange animals, shovel dirt, or anything else, trench safety must be considered. Trenches or pits 5 ft or deeper are covered by OSHA trench safety criteria and shallower excavations can be dangerous. People constructing or working in or around these burial pits should be aware of trench cave-in hazards (See referenced web sites at the end of this document). Appropriate OSHA safety measures shall be used during excavation and material placement. Excavations greater than 5 feet deep should have a minimum side slopes of 1.5 (horizontal) to 1 (vertical).

For small animals (poultry, nursery pigs, etc.) place carcasses in a layer no thicker than one foot and cover each layer with at least one foot of soil. Carcasses of large animals (hogs, cattle, etc.) should be placed in one layer and covered with a minimum of two feet of soil. For deep soils (where bedrock is not a concern), carcasses and soil can be placed in multiple layers up to a total depth of eight feet.

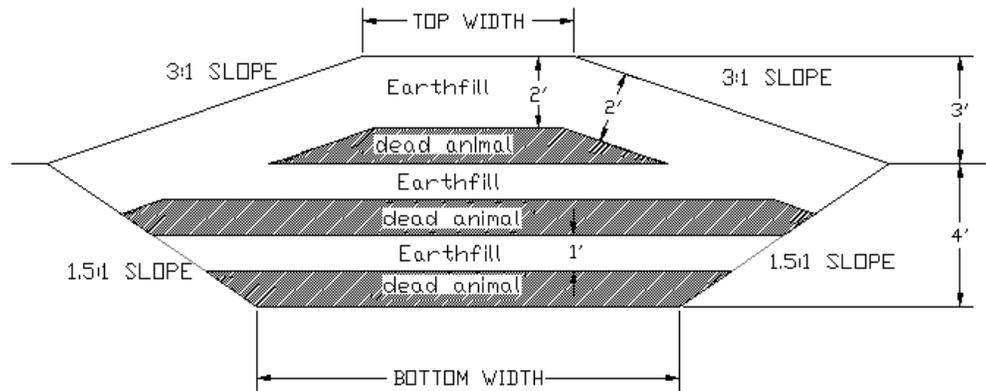
The burial site should be mounded with a covering of at least two feet of soil, and surface water should be diverted away from the mound. Specifying earth fill compaction is not recommended. Compaction will be very difficult to achieve and could have a negative impact on the natural decay process. As animals

begin to decay, it may be necessary to place additional soil material in areas that subside. If a potential exists for varmints such as coyotes, dogs, opossums, etc., to dig into the burial site, either use more than the two feet of cover material (recommended) or use an appropriate temporary fence to exclude these animal types.

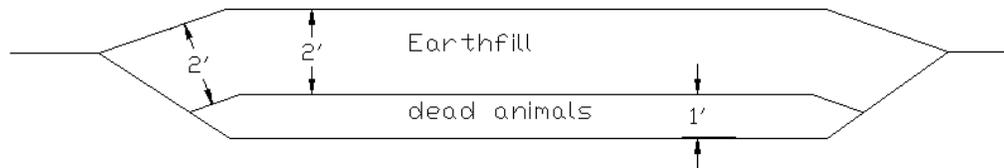
The burial site should be vegetated as soon as practical to prevent erosion of the soil cover.

Personnel planning mortality management must follow current state policy concerning utilities found in the National Engineering Manual, Part 503(Safety), Subpart A (Engineering Activities Affecting Utilities). The State of Texas has initiated a One Call System to help excavators locate pipelines and utilities. The One Call Board of Texas (1-800-545-6005) or other State approved notification center, should be called before excavation to ascertain the existence of underground utilities in the general work area.

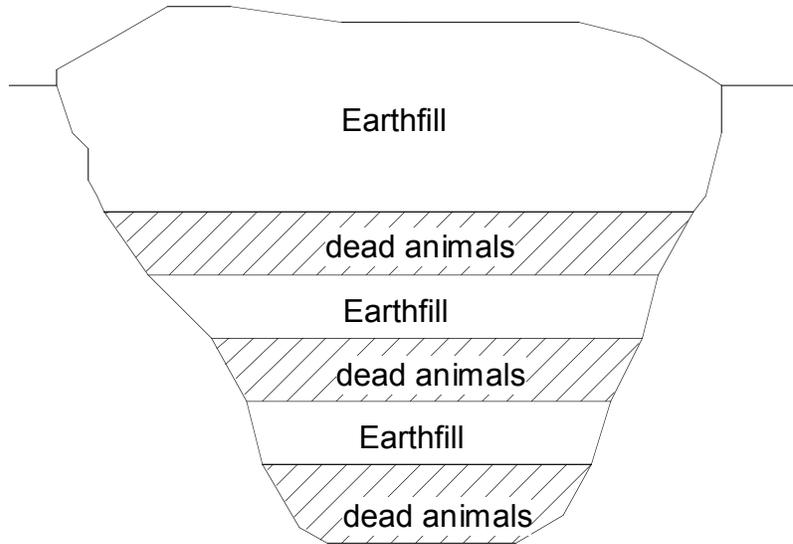
APPENDIX A
A Few Possible Cross Sections For Burial Pits



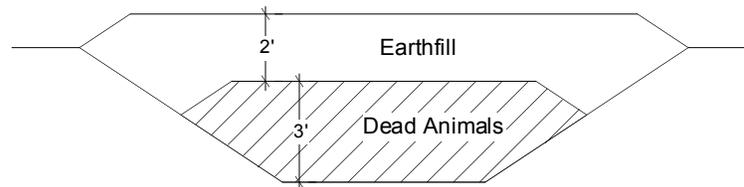
Typical for greater depth and wider pit with variable length.



Typical for shallower depth and wider pit with variable length.



Typical for backhoe trench with 4-6 ft depth, at least 3 ft width, and variable length.



Typical for deeper depth for larger animals.

Appendix B

Sample Calculations

Symbols:

W_b = bottom width	A_{xs} = cross-sectional area
W_t = top width	$Z_s:1$ = side slope
L_b = bottom length	$Z_e:1$ = end slope
L_t = top length	V_e = excavation volume
A_b = bottom area	V_m = mortality volume
A_t = top area	

Basic Assumptions:

Bulk density of chickens = 62.4 lb/cu ft
Average weight of chickens at die-off = 3 lb
$V_e = 3 \times V_m$
Farm contains 5 houses with 20,000 birds/house or 100,000 birds total

Case 1: 0.3% of Chickens Die.

Number of mortality = 100,000 x 0.003 = 300 birds

$V_m = 300 \times 3 \text{ lb/bird} \times (1 \text{ cu ft}/62.4 \text{ lb}) = 14.4 \text{ cu ft}$

$V_e = 3 \times 14.4 = 43.2 \text{ cu ft} (1.6 \text{ cu yd})$

Assume

$W_b = 4 \text{ ft}$

$D = 3 \text{ ft}$

Vertical Side and End Slopes (backhoe construction, depth < 3.5 ft): $Z_s = Z_e = 0$

Then $L_b = 43.2 / (4 \times 3) = 3.6 \text{ ft. (round to 4 ft)}$

The pit size then would be 4 ft x 4 ft x 3 ft. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 48 ft.³ (1.8 yd³)

Case 2: 20% of Chickens Die.

Number of mortality = 100,000 x 0.2 = 20,000 birds

$V_m = 20,000 \times 3 \text{ lb/bird} \times (1 \text{ cu ft}/62.4 \text{ lb}) = 962 \text{ cu ft}$

$V_e = 3 \times 962 = 2886 \text{ ft}^3 (107 \text{ yd}^3)$

Assume

$W_b = 6 \text{ ft}$

$D = 5$

$Z_s = 2$

$Z_e = 4$

$A_{xs} = Z_s D^2 + W_b D = 80 \text{ ft}^2$

Then $L_b = 2886 / 80 = 36 \text{ ft}$

$W_t = W_b + 2Z_s D = 6 + (2 \times 2 \times 5) = 26 \text{ ft}$

$L_t = L_b + 2Z_e D = 36 + (2 \times 4 \times 5) = 76 \text{ ft}$

$A_t = W_t \times L_t = 26 \times 76 = 1976 \text{ sq. ft.}$

The pit size would be 6 ft. bottom width, 36 ft. bottom length, 26 ft. top width, 76 ft top length, 5 ft. depth, 2:1 side slopes, and 4:1 end slopes. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 4813 ft.³ (178 yd³). If desired, the Burial Pit Volume Calculator can be used through trial and error to find a volume closer to the requirement. (Other dimensions same as given with 12 ft bottom length, and 52 ft top length would yield 2893 ft.³ (107 yd³).

Case 3: 50% of Chickens Die.

Number of mortality = $100,000 \times 0.5 = 50,000$ birds
 $V_m = 50,000 \times 3 \text{ lb/bird} \times (1 \text{ cu ft}/62.4 \text{ lb}) = 2404 \text{ cu ft}$
 $V_e = 3 \times 2404 = 7212 \text{ cu ft}$ (267 cu yd)

Assume

$$W_b = 10 \text{ ft}$$

$$D = 6 \text{ ft}$$

$$Z_s = : 1.5$$

$$Z_e = : 4$$

$$A_{xs} = Z_s D^2 + W_b D = 114 \text{ ft}^2$$

$$\text{Then } L_b = 7212 / 114 = 63 \text{ ft}$$

$$W_t = W_b + 2Z_s D = 10 + (2 \times 1.5 \times 6) = 28 \text{ ft}$$

$$L_t = L_b + 2Z_e D = 63 + (2 \times 4 \times 6) = 111 \text{ ft}$$

$$A_t = W_t \times L_t = 28 \times 111 = 3108 \text{ sq. ft.}$$

The pit size would be 10 ft. bottom width, 63 ft. bottom length, 28 ft. top width, 111 ft top length, 6 ft. depth, 1.5:1 side slopes and 4:1 end slopes. The Estimated Actual Constructed Volume from the Burial Pit Volume Calculator is 10350 ft.³. If desired the Burial Pit Volume Calculator can be used to trial and error to find a volume closer to that required. (Other dimensions same as given with a 36 ft bottom length, and 84 ft top length would yield a volume of 7272 ft.³ (269 yd³).

Appendix C

Statutes, Rules, and References

Disposal of Diseased Animal Carcasses

Animals that die from one of the following diseases have separate disposal requirements (Texas Agriculture Code §§161.004, 161.041):

tuberculosis	anthrax	glanders
infectious abortion	hemorrhagic septicemia	hog cholera
Malta fever	foot-and-mouth disease	rabies in animals other than canines
bacillary white diarrhea among fowl	equine infectious anemia	other diseases recognized as communicable by the veterinary profession

These carcasses must be disposed of within 24 hours by

1. digging a five foot deep grave and covering the carcass with lime and filling with dirt, or
2. setting fire to the carcass and burning until it is thoroughly consumed.

Specific Rules and Regulations Dealing with Poultry Mortality

Mortality is a normal part of animal feeding operations. Normal poultry mortality should be addressed with composters, incinerators, rendering or other approved carcass disposal methods (§335.25, Handling, Storing, Processing, Transporting, and disposal of Poultry Carcasses, of Title 30, Texas Administrative Code, Chapter 335, Industrial Solid Waste and Municipal Hazardous Waste). The local NRCS or conservation district office should be contacted for assistance in dealing with normal mortality. Note: burial of routine poultry mortality is not allowed by state law (Texas Water Code §26.303 Handling and Disposal of Poultry Carcasses).

State legislators passed SB 1910 during the 75th Texas Legislature (1997) which added “Subchapter H. Poultry Operations” to the Texas Water Code (§26.301 – 26.303). It applies to any facility where chickens or ducks are raised or kept for profit on any premises in the State, including commercial hatcheries for producing chicks or ducklings. TNRCC Rules (Texas Administrative Code (TAC), §335.25 Handling, Storing, Processing, Transporting, and Disposing of Poultry Carcasses) were developed to provide regulations for meeting requirements of SB 1910. These regulations are intended to ensure poultry facilities have an adequate means to handle and dispose of poultry carcasses. These regulations prohibit on-site burial of poultry carcasses, except in the event of a major die-off, which is defined as a mortality rate of 0.3% or more per day of the total poultry inventory. Only the die-off that exceeds the capacity of the normal means of mortality management may be buried.

SB 1339, 77th Texas Legislature, 2001, amended §26.302 of the Texas Water Code to require owners or operators of poultry facilities to implement and maintain certified water quality management plans from the State Soil and Water Conservation Board.

Additional References

NRCS TX Conservation Practice Standards: Code 316 - Animal Mortality Management

OSHA Construction rules: http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926.html

OSHA Excavation Rules: http://www.osha-slc.gov/OshStd_toc/OSHA_Std_toc_1926_SUBPART_P.html

State laws and regulations specific to poultry: Title 30, Texas Administrative Code, Chapter 335, Industrial Solid Waste and Municipal Hazardous Waste, §335.25, Handling, Storing, Processing, Transporting, and disposal of Poultry Carcasses: <http://lamb.sos.state.tx.us/tac/index.html>

Title 2, Texas Water Code, Chapter 26, Subchapter H, Poultry Operations:
<http://www.capitol.state.tx.us/statutes/statutes.html>

Texas Bills: SB 1339, HB 3355 (77th Legislature, 2001): <http://www.lrl.state.tx.us/isaf/lrlhome.cfm>