ACKNOWLEDGEMENTS

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The following sources are gratefully acknowledged:
2. H.M. Keener and D.L. Elwell “Dead Animal Composting”; II.C keenerpresentation.doc ; Ohio Agricultural Research and Development Center, Ohio State University.
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I. INTRODUCTION

The New York State Department of Transportation (DOT) is obliged to keep New York's state highway system safe for the traveling public. Highway safety requires that dead animals be removed from the roadways and adjacent areas. Maintenance residencies frequently respond to calls from the public, which demand that dead animals be removed from the roadways as soon as possible.

New York State is home of an estimated one million deer. In fiscal year 2001, DOT responded to almost 25,000 deer mortalities. Notably high rates of deer/vehicle accidents occur in the lower Hudson Valley, where dense vehicle traffic and growing deer populations collide. DOT Region 8, reported approximately 8,000 dead deer in fiscal year 2000. DOT Region 8 responds to about one-third of all deer kills along DOT's highways, although it maintains only about 12% of DOT's center lane miles.

Deer disposal issues have become a growing concern to Region 8. There has been a decrease in the number of rendering companies available to collect and dispose of the carcasses and some solid waste facilities are no longer accepting them. With growing developmental pressures and more stringent environmental regulations, deer cannot simply be disposed of in wooded areas. Deer picked up during weekend hours must be kept at a yard site until transfer to a landfill or other disposal option is possible.

Multiple handling of the deer carcasses causes additional hours of labor and adds to the disposal cost of deer. Deer that are stored at a yard for more than 12 hours start the decomposition process. Handling a decomposing carcass is an unpleasant experience to the workers. In order to reduce the duplication of carcass handling, DOT Region 8 has proposed some trial efforts for deer composting in close cooperation with the New York State Department of Environmental Conservation (NYSDEC).

Composting of livestock mortalities with woodchips or sawdust has been utilized on farms for many years. Hunting clubs and public entities have engaged in dead game animal composting as well. It seems logical that DOT would incorporate some composting practices into its activities to reduce disposal cost and handling of decomposing animals. Also, if composting is done according to environmental guidelines, there may be added benefit to the environment by returning nutrients to the soil.

Some current deer disposal practices involve the use of deer pits. Exhuming of pits has revealed that complete decomposition of carcasses does not occur for many years. Deer burial pits also pose a concern for groundwater contamination. Deer pit burial is presently allowed as described in the Environmental Handbook for Operations published by DOT.

While decomposition is slow via burial, total body decomposition can be achieved by composting, notably within a relatively short period of time. Preliminary results from a pilot project carried out at the Greenhaven Correctional Facility in Dutchess County indicate that complete deer composting can be achieved within a few months. The compost end product, once deemed safe, has potential re-use within the highway environment.

The following Guidelines and Operations and Maintenance Plan provide basic steps that must be
taken in order to achieve optimal results and ensure human health and environmental protection. It is ascertained that some operational procedures must always be followed, but it is possible that over the course of the trial period certain amendments to operations will be made. Testing of the end product will be performed during the trial period, but will likely not be required for future efforts.

Feasibility and cost will be considered as part of the final evaluation at the end of the trial period. Depending on the results of the trial operation, after consultation with DEC, other sites may be added to the program. Potential sites may include yards in Residency 8-3, Putnam and Southern Dutchess County, and Residency 8-8, Northern Westchester County. Two sites within the highway right-of-way in Northern Westchester County (Residency 8-8) are presently used for deer burial. Composting at these sites may be feasible and welcomed by the public and the New York City Department of Environmental Protection (NYCDEP), who have voiced concerns over present burial practices. Questions regarding roads-killed deer carcass composting may be directed to me at 845/575-6158 or ekolb@dot.state.ny.us.

Elisabeth Kolb

Starting a deer compost pile in Highland, NY.
II. GUIDELINES

1. Choose a well-drained site with minimal slope, at least 200 feet from water courses or other hydrologically sensitive landscape features including streams and wetlands. Separation distances shall be 500 feet from a residence and 200 feet from a property line. Siting should also consider prevailing winds and aesthetic impacts on neighbors.

2. Composting bin or windrow should be placed on a hard surface made of paved asphalt, concrete, or compacted millings. The pad needs to provide a good working surface in all weather conditions and protection of ground water. Sufficient amounts of amendments should be added to piles to minimize the movement of liquids (blood, etc.) from the carcasses. Any liquid that leaves the pad must be absorbed in woodchips or other acceptable materials and must be kept away from sensitive areas (streams etc.).

3. Prepare a foundation layer of wood chips or recycled deer compost in the bottom of the windrow or bin before adding carcasses. This initial layer should be at least 18-24 inches deep. Sufficient quantities of woodchips and/or finished compost must be at the site before any carcasses arrive to ensure the piles can be formed in a timely manner.

4. Place deer carcasses back to back in a single layer on the foundation leaving at least 6 inches between the carcasses and the bin walls. Completely surround and cover the carcasses with at least 6 inches of damp wood chips or recycled deer compost. If there are not sufficient carcasses for a full layer, cover the edges of the available carcasses with at least 6 inches of wood chips or recycled deer compost and begin adding carcasses at that point as they become available. Never leave any part of a carcass exposed even if extra wood chips or recycled deer compost must be added.

5. Continue this layering procedure until a windrow or bin is full. The last layer used to cap the bin should be 24 inches of wood chips or recycled deer compost. This layer should curtail odors and dissuade scavengers. Do not stack windrows/bins over 6 feet high. A temperature rise in the compost pile to 125°F or higher indicates that the process is working.

6. Allow the pile to remain idle for several months. The pile can be broken down sooner, if the carcasses are clearly fully degraded. The internal temperature of the pile should be 120°F to 150°F during the active composting phase. For pathogen reduction, it must be shown that the carcass achieved a temperature of 131°F or greater for three consecutive days. The temperature probe used must be able to record temperatures in the areas of the pile where the carcasses are located.

7. Once the material is fully composted, it can be reused in starting new compost piles or used within a highway right-of-way with appropriate setbacks. DEC approval will be required for uses outside of the compost area.
III. FACILITY REQUIREMENTS

- Suitable site allowing for setbacks (see Guidelines)
- Hard surface made of asphalt, concrete or compacted millings for compost windrow
  or
- Compost bins on asphalt, concrete or compacted millings work pads
- Sufficient supply of wood chips
- Provisions for monitoring temperatures within the compost pile. (Thermocouple probe, thermister probe or similar device may be used.)
- Rubber gloves and face masks
- Loader
- Water
- Before composting, contact the DOT Maintenance Environmental Coordinator (MEC).

IV. FACILITY CONTROLS

The compost piles will be segregated from other facility operations, utilities, farming activities and main traffic areas. A sign designating the compost pile as such will be clearly visible at each compost area. The sign may state “Deer Carcass Compost”.

All workers at the assigned locations shall be made aware of the compost windrow or bin. Safety instructions will be given via classroom or field setting.

V. PERSONNEL TRAINING

The Highway Maintenance Supervisor assigned to the yard where the composting facility is located will inform all yard employees of the composting facility. All yard employees will be made aware of safety precautions required. Employees working with the compost will be informed of the Operations and Maintenance procedures described herein.
VI. LOADING PROCEDURES

Deer typically get collected by manually lifting the carcass into the back of a pick-up truck. While the first carcasses may be added to the fresh compost pile manually, any subsequent additions should be added via heavy equipment, such as a loader. It is allowable to park the pick-up truck as close as possible to the compost pile and manually place the carcass from the truck to the pile, as long as workers will not have to step onto the compost pile. Woodchips shall be added via heavy equipment or off a pick-up truck.

- It could be challenging placing the deer back to back with heavy equipment.
- The boards on one side of the bins should be removable to make loading and unloading the bins easier.

VII. HANDLING INSTRUCTIONS

Handling of the compost pile will be accomplished via heavy equipment. Handling of the compost should be performed in a manner that would prevent dispersion of the compost material on the ground and prevent dispersion of compost particles in the air.

VIII. COMPOST MANAGEMENT

A carcass may be added to the compost pile as ordered by the Resident Engineer. In general, any deer collected from the roadside may be added to the composting facility as long as it does not show any overt signs of disease. A deer that appears emaciated or showed untypical behavior prior to becoming killed should not be added to the compost pile as it may be diseased. Emaciated deer should be reported to NYSDEC Wildlife Pathology Unit in Albany (Phone number 518/478-3032) for testing.

Through the trial composting effort, DOT will be able to determine how many deer carcasses
each compost bin/windrow can handle within a given time frame. Potentially, each composting bin could handle up to 30 carcasses per composting effort, depending on the size of the work pad. Compost windrows, extended lengthwise, would be able to accommodate more carcasses. Each composting bin/windrow can accept up to three layers of carcasses to a maximum height of 6 feet.

The first layer should consist of 18-24” of woodchips, followed by a layer of carcasses. Carcasses should be placed back to back. This arrangement aids in achieving higher composting temperatures. The carcasses should be covered by 6” of woodchips. Repeat this process until three layers are complete. Finish top layer with 24” of woodchips. For windrows, repeat this process in 10-15 foot long sections, adding on to the existing windrow.

The moisture content of the pile contributes to proper composting temperatures. The moisture content of the wood chips or recycled deer compost added to the mix should be about 60 percent, which is the point where a handful of the material will just begin to stay together when squeezed (wear rubber gloves if it is compost!).

The wood chips or recycled deer compost should have the proper moisture content before adding it to the bin/windrow. It is difficult to uniformly add water to the mix in the composter.

If the material falls apart after being squeezed, it is too dry. Water should be sprinkled and mixed into the wood chips.

If free water drips from the squeezed material, or if a film of free water is left on the hand, the material is too wet. The material should be spread to air dry or mixed with drier material to lower the moisture content before adding to the compost mix.

If a compost pile does not properly heat, it is probably too wet or too dry or was filled improperly.

IX. RECORDKEEPING

Compost monitoring and record keeping is necessary in order to document proper functioning of the compost pile. If dysfunction is evident, steps can be taken to correct poor conditions. Compost monitoring will let DOT learn more about the composting process and create optimal composting conditions in the future.

Any deer composting activities must be approved by NYSDEC.

Record the number of carcasses added to the pile along with date.

Temperatures within the compost pile will be monitored and recorded once a day. A sample data log sheet is attached for use. See Temperature Monitoring section.

Odors should be recorded daily. Indicate whether there are odors disseminating in the downwind direction and if an odor is present, estimate how many feet downwind it is noticeable.

State when last carcass was added.
X. TEMPERATURE MONITORING

Proper composting requires sustained elevated temperatures (120°F - 170°F). High temperatures also achieve desired pathogen reduction and a physically stabilized compost material at the end of the process.

Ideally, a continuous temperature monitoring device should be utilized. A thermocouple probe, thermistor probe or similar device can be embedded in the compost pile. This device should be connected to a lead wire and data logger, where temperature variations can be recorded over a period of time.

A temperature probe (bimetal thermometer) with a four foot extension may also be used. The probe should be placed so that readings are taken at 12"-36" from the top of the pile in areas where the carcasses are located. As the pile grows, the probe will need to be repositioned.

Compost temperatures reach above 160 degrees Fahrenheit.
XI. SAMPLING PLAN

Testing of finished compost will document the presence of certain pathogens and ascertain what re-use the compost product is suitable for. Sampling parameters include pathogenic organisms and pathogen indicator organisms.

The Maintenance Environmental Coordinator will be in charge of sampling. Within 3 months after start-up of the project, a compost sampling and analysis plan will be submitted to DEC for approval. Parameters to be analyzed may include total coliform, fecal coliform, E.coli, Salmonella, Cryptosporidium, total carbon and total Kjehldal nitrogen.

Bacteria causing Lyme disease will not survive temperatures above 130F and as long as composting achieved proper temperatures, testing for this pathogen will not be necessary.

XII. RECYCLING OF FINAL COMPOST PRODUCT

Material that is fully composted may be re-used as a base for a new compost pile. Compost that has been determined safe by inspection of records and the sampling analysis, can be land applied within the highway right-of-way subject to DEC approval. The following conditions apply for using the compost product as a soil amendment:

- The deer are thoroughly composted.
- The end product is stable.
- Use on state highway properties only.
- Do not use compost near sensitive environmental areas such as streams, ponds and wetlands.

XIII. CONTINGENCY PLAN

If any activity does not go according to plan, contact the Resident Engineer. In the event that problems develop which result or may result in environmental or public health impacts or nuisance conditions, the compost operation shall be suspended and corrective measures shall be taken to mitigate impacts. Problems which will trigger implementation of the contingency plan will include, but not be limited to, odors detected beyond the facility boundary, animals scavenging in the compost piles or receipt of deer carcasses at a rate which exceeds the handling capacity of the compost facility. Corrective measures will include, but not be limited to, covering with additional woodchips and/or addition of lime to control odors, fencing the area to prevent access by animals, temporarily covering the piles with a tarp, cessation of operation until the adverse impacts have been mitigated and, if other measures fail, removal and disposal of the pile contents by pit burial in accordance with applicable DEC regulations and DOT guidelines or disposal of pit contents at an approved solid waste management facility.
XIV. CLOSURE PLAN

The Maintenance Environmental Coordinator (MEC) is contacted before composting is started and needs to be contacted in order to officially close out a composting activity. The MEC will schedule a site visit at that time, possibly with NYSDEC. Composting records should be made available at that time and elements of the process should be discussed. At that time it should be determined, whether composting appears complete and final sampling should be ordered. If yes, the MEC will initiate the sampling process. Sampling results and monitoring records will be provided to NYSDEC. Depending on results, the compost will be recommended for re-use as composting amendment or determined to be suitable as a soil amendment.

If the finished compost will be used as soil amendment, the site approval by the MEC and by DEC is required.

To permanently close a composting site, bins should be disassembled and taken to a landfill. The workpad may be kept for other uses, but must be decontaminated using a 5% or 10% solution of sodium hypochlorite (household bleach) in water.

The MEC and NYSDEC will be notified that the deer composting facility has been discontinued.

XV. PERSONAL PROTECTION

Employees should follow the personal protective equipment requirements outlined in the Safety Bulletins, “Rabies Virus” (92-1) and “Handling of Animal Carcasses” (05-1, attached) when working with any road kill. The safety bulletin recommends that rubber gloves be worn. Questions in regard to the Safety Bulletin should be directed to the Regional Safety Officer (see Contact Information).

If a worker will be in immediate contact with the compost for the purpose of taking a temperature reading or other, personal protective equipment, such as rubber gloves. Disposable face mask shall be available and worn at the discretion of the employee.

Emaciated deer or deer showing untypical behaviors (either alive or before becoming roadkill) should be reported to NYSDEC Wildlife Pathology Unit in Albany (Phone number 518/478-3032).

Do not add animals other than deer to the compost!
XVI. DETAILS

[Diagram showing the composting process]

- Animal carcass is layered with organic amendment (wood chips).
- Primary composting and mixing occur.
- Secondary composting and storage.
- Recycle process.

[Diagram showing side view of composting windrow]

- Woodchips 24” thick.
- Carcasses 6” thick.
- Woodchips 6” thick.
- Carcasses 6” thick.
- Woodchips 18”-24” thick.

[Diagram showing deer carcass composting bin showing layers]

- Wood chips or recycled compost.
- Deer carcasses 6” thick.
- Deer carcasses 6” thick.
- Deer carcasses 6” thick.
- Deer carcasses 18”-24” thick.

- Concrete, asphalt, or compacted millings.

DEER CARCASS COMPOSTING BIN SHOWING LAYERS
XVII. ENVIRONMENTAL CONTROLS

Environmental quality will be addressed by carefully choosing a site (see Guidelines II.1.). In order to ensure proper site selection, the Maintenance Environmental Coordinator should conduct a site screening via a physical walk-over. To ensure that the active compost pile does not pose risks not addressed through proper setbacks, the following should be considered:

- If nuisance vectors, such as flies etc are attracted to the pile, more woodchips should be added to cover the pile.
- Any leachate that may have puddled around the pile needs to be absorbed by woodchips and adequately covered.
- Odors would also indicate that additional woodchip coverage is necessary.
- Experiences of various entities utilizing composting has shown that carnivorous animals will not be attracted to compost piles as long as the pile is adequately covered.

Prior to releasing the finished compost product to the environment, monitoring records such as the temperature logs and pile records will be reviewed. The temperature log will indicate whether the material has properly composted and whether the temperature necessary for pathogen kill was reached. The operators of the pile should ensure that adequate temperatures are reached as outlined in the Guidelines. Composting shall not be considered complete unless adequate temperature data is collected after addition of the last carcass to demonstrate that a minimum temperature of 131 degrees F has been reached and maintained for a minimum of three consecutive days. The final sampling test results will also determine the safety of the compost.
XVIII. STAFFING PLAN AND CONTACT INFORMATION

The Highway Maintenance Supervisor II assigned to the yard is responsible for day to day operations, monitoring and proper functioning of the compost pile. Correspondence, composting performance evaluation, procedural guidance and sampling will be coordinated by the Maintenance Environmental Coordinator.

Regional Transportation Maintenance System Engineer
Pete Teliska, P.E. Tel. 845/575-6157

Regional Transportation Maintenance
Elisabeth Kolb, Maintenance Environmental Coordinator Tel. 845/575-6158

Regional Safety Office
Kevin Snyder Tel. 845/575-5721

Residency 8-7, Ulster County
Keith Savoury, P.E., Resident Engineer Tel. 845/331-5533
Tom Story, Asst. Resident Engineer Tel. 845/331-5533
Highland Yard - Mike Augustine, Highway Maintenance Supervisor Tel. 845/691-7035

Residency 8-1, Columbia County
Joe Noval, P.E., Resident Engineer Tel. 518/828-9402
Fran Pizza, Asst. Resident Engineer Tel. 518/828-9402
Martindale Yard - Wayne Shutts, Highway Maintenance Supervisor Tel. 518/851-9005

New York State Department of Environmental Conservation
Steve Parisio, Senior Geologist Tel. 845/256-3139
Terry Laibach, Senior Environmental Program Specialist Tel. 845/256-3141
Wildlife Pathology - Delmar Tel. 518/478-3032

If additional residencies or yards wish to participate in deer composting, their contact names will be added to this list.
XIX. SAMPLE DAILY LOG SHEET

<table>
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<tr>
<th>Date and Time</th>
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¹ Temperature in Fahrenheit to be taken 12”-36” from top of pile near carcasses.

² Record outside temperature.

³ If odor is present, record how many feet downwind.
INTRODUCTION

Employees engaged in removing animal carcasses from the right-of-way must be aware of the need to protect themselves, co-workers and others against potential exposure to, and inadvertent spread of, infectious agents. Careless handling of animal carcasses can create potentially harmful exposures for humans, causing serious diseases, including: rabies, lyme disease, salmonella, and e-coli. Improper disposal of carcasses and failure to properly disinfect tools and vehicles may also infect co-workers, as well as potentially spread disease to the general public and wildlife population. Diseases not known to be dangerous to humans (Chronic Wasting Disease in deer, for example) can be spread to unaffected deer populations by careless handling, inadequate disinfecting, or improper disposal.

GUIDELINES

• Confirm the animal is dead by prodding with a long-handled tool. Startling an injured, apparently lifeless animal, can increase potential for contamination, and can otherwise be dangerous.

• Injured/dying animals, or animals otherwise exhibiting abnormal behavior, should be reported to police.

• Numerous dead animals or birds in one location should be reported to supervision and environmental staff, and may warrant contacting other agencies (EnCon, Health).

• Do not allow the carcass or other contaminated surfaces to come in contact with bare skin.

• Employees with scratches or cuts that become contaminated from a carcass or its fluids should immediately wash thoroughly with soap and hot water. If not available, clean affected areas temporarily with waterless hand sanitizer, and later wash thoroughly with hot water and soap. Employees splashed by fluids should wash/rinse affected areas immediately. Wash eyes with eyewash or clean water. Immediately report to supervision, who may report it to the Regional Safety and Health Representative and ultimately to the
County Health Department. **If exposure to rabies is suspected, the carcass should immediately be iced and retained for examination by proper authorities.**

- As a precaution against Lyme disease and other tick-borne diseases, a thorough body examination for attached ticks should be done daily. Ticks can be picked-up from a dead animal host or from roadside vegetation (see Lyme & Related Diseases Safety Bulletin 99-1).

- Employees shall avoid contamination of clothes through use of personal protective equipment - - ideally disposable apparel. (Orange disposable coveralls could address the need for high visibility apparel.) In the event clothes become contaminated, they should be removed as quickly as possible, and washed separately from all other laundry, following normal washing instructions.

- To effectively disinfect contaminated tools and equipment requires liberal application of a bleach solution (9 parts water, 1 part bleach), prepared fresh daily. Tools used for this purpose should be kept separately in a designated location. This work shall be done outdoors, and requires eye protection and gloves. Eyewash shall be available.

**PERSONAL PROTECTIVE EQUIPMENT**

- Protect the mucous membranes of the eyes, nose and mouth by wearing a full faceshield or a combination of goggles and disposable mask. Use of disposable coveralls and high boots are dictated by the extent of potential exposure. Disposable nitrile, vinyl or latex gloves under heavy water impermeable work gloves are required.

- All tools used for handling dead animals shall be dedicated to this purpose, have no pointed or sharp edges, and be clearly marked in some way.

- Portable eyewash and first aid kit shall be available.

**DISPOSAL**

- When proper disposal can not be achieved immediately, animal carcasses should be removed from the pavement or shoulder and left in a location in the right-of-way that does not create a public hazard or exposure.

- When animal carcasses are transported for disposal, care shall be taken to prevent leakage of body fluids during transport. Reasonable effort should be made to disinfect the vehicle after transport. Vehicles equipped with power lift gates are desirable for handling large carcasses. Suggestions for transporting animal carcasses:
Handling Animal Carcasses

- Small carcasses should be picked up by inverting heavy (at least 4 mil) doubled plastic bags over a leg or the tail, and pulling the bags (with bag between carcass and gloved hand) over the carcass as it is lifted. A shovel or other tool may be used to lift and push the carcass into the bags.

- Deer and other large carcasses should be placed on plastic sheets in the truck bed for transport to the disposal site (vs. bagging).

- Leak-proof containers, or trucks with bed liners, that would serve to contain fluids may be used (vs. plastic sheets).

- Contaminated gloves or other PPE, disposable coveralls and contaminated plastic bags or sheets shall be carefully discarded in tightly sealed double plastic bags, and placed in a proper solid-waste receptacle/location.
SAFETY BULLETIN
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

TO: 
SUBJECT: RABIES VIRUS

Code: SB 92-1
Date: May 12, 1992
Supersedes: 
APPROVED: 
DIRECTOR, Transportation Employee Safety & Health

Employees engaged in removing animal carcasses from the roadways and right-of-way should be aware of the spread of Rabies in New York State, and of the need to guard against exposure to animals infected with the Rabies virus. Any warm-blooded animal can be a carrier of the virus. For this reason, consider all animals as infected and use proper procedures to avoid becoming infected. Employees should receive training in the proper handling and disposal of carcasses, and be guided by the following information and precautions.

- Rabies is a virus that is found in the body fluid of an infected animal.

- The Rabies virus can survive for long periods of time in the carcass of a dead animal.

- Small animals should be collected in plastic bags for disposal. The bag should be strong (greater than 4mil) to avoid puncture by the teeth, claws or broken bones of the carcass. Employees can use heavy work gloves (gauntlet, if available) to protect the hands. By dropping the bag over the carcass, and grabbing the carcass through the bag, any possibility of personal contamination can be completely avoided.

- Seal the bag with a knot or twist tie to avoid contaminating the vehicle.

- Avoid allowing body fluids from contacting the eyes. Doctors consider this form of contact as serious as a bite.

- If you think that you have been infected DO NOT dispose of the carcass. Call the County Health Department or a veterinarian to discuss your concern, and they will decide the need to test the animal for the presence of the virus.
If you are bitten by a wild animal (or a domestic animal, given the current concern over Rabies in New York State), you should also seek advice from a credible source.

- Any contaminated equipment (hand tools, truck beds) can be decontaminated with a 5% to 10% solution of household bleach in water. The diluted bleach solution must be made up fresh when needed, due to its rapid loss of strength.

- Immunization is only recommended for people who work in high-hazard occupations (veterinary clinics, police and animal control). The immunization process is a series of three shots with a booster shot every two years.

- If animal body fluids contact your skin, wash the area with soap and water immediately.

- Deer are not usually infected with Rabies, but still should be handled in a way to avoid contamination of employees and equipment.

- Dispose of animal carcasses in accordance with local regulations.

- If there are any questions, or need for additional information, the Regional Safety Representative should be contacted.

This would be a timely opportunity to discuss this topic at tailgate safety and safety committee meetings.