Chapter 7 – Transportation

The successful transportation of biosolids is an essential component of a reliable program. In addition to complying with local, state and federal regulations, the transportation portion of a program must be acceptable to the public.

Transportation is often the largest cost associated with a biosolids management program. However, "cutting corners" on transportation may not always result in lowering the overall program cost, and can even lead to program failure due to the public and political ramifications.

7.1 Critical Control Points / Operational Controls

Controls that should be considered in the implementation of a biosolids transportation program include:

- Quantity of material to transport
- Solids concentration of material being transported
- Distance to transport
- Number and capacity of vehicles
- Vehicle maintenance
- Vehicle appearance
- Accident and spill control programs

Determining the size, type and number of vehicles needed for transporting biosolids to use/disposal sites is critical to maintaining the desired flow of material.

Transport methods include truck, railroad, barges, pipeline, or a combination thereof. Methods selected and accompanying costs depend on such factors as biosolids characteristics, amounts to be transported, distance to travel, availability and flexibility.

Size, Type and Number of Trucks
Determining the size, type and number of trucks needed for transporting biosolids to use/disposal sites is critical to maintaining the desired flow of material. (USEPA 2000) Such decisions depend on:

- quantities to be used/disposed
- distances
- road conditions
- vehicle maintenance schedules
- seasonal needs and
- percentage of time in use

Peak Use/Disposal Periods
The transport system should have the capacity to handle the maximum levels of biosolids production during peak use/disposal periods, taking into account any storage capacity that is part of the overall biosolids management plan.

Keeping Trucks Clean
Develop and implement procedures for keeping trucks clean during transport. Each vehicle should be equipped with a scraper, shovel, broom and absorbents so drivers can clean vehicles

before they enter public roads and clean up any biosolids drips or small spills. Transport vehicles that frequently are taken off paved surfaces to unload in fields should also be equipped with splashguards to keep any mud adhering to tires from splattering other vehicles when they return to the road.

Equipment must be selected based on size needed, types of biosolids to transport and hauling distances.

Community Relations
Regulations regarding vehicle weight limits and other road safety limitations must be known and observed for all operations. It is advisable to inform potentially affected communities about traffic resulting from operations, and make every effort to avoid significant or prolonged impact on these communities. Flexibility in haul routes, timing of operations and careful adherence to traffic management are essential to address community concerns. These considerations, regardless of whether they are regulatory requirements, should be operational requirements for biosolids programs to succeed.

7.2 Transport Method

Liquid Transport
Sealed tanks are used for transporting liquid biosolids, which typically (although not always) contain less than 10 percent solids. Systems range from tank wagons attached to farm tractors for short distances and small quantities, to 6,000-gallon tankers for over-the road transport. For land application, if tankers are not used for field application, they function as "nurse trucks" to supply field application vehicles or an irrigation system. (USEPA 1995)

Tankers should be equipped with internal baffles to minimize the movement of liquids inside the tanks. Biosolids are loaded into tankers with pumps and hoses. Standard pumps capable of handling solids can transfer the biosolids, or tankers may contain built-in vacuum-pressure pumps. The vacuum systems are a benefit when transferring liquids containing higher percent solids.

Dewatered Biosolids Transport
Dewatered biosolids generally have a solids content above 15 percent. Dried materials like compost or heat-dried pellets usually have much higher percent solids -- 50 and 90 percent respectively. Dewatered biosolids can be transported in rail cars, specialized highway trucks (dump trucks), tractor-trailers and roll-off containers. Trailers are usually loaded at treatment facilities using conveyor belts or storage hoppers, or with front-end loaders for stockpiled material. Truck capacities vary from 10 to 25 tons (8 to 30 cubic yards). To reduce odors and spills, truck covers (hard top or tarped) should be provided. Other necessary features include leak-proof tailgates with seals and wide anti-splash shields.

Transporting dewatered biosolids reduces hauling and storage costs, but entails increased costs associated with dewatering. Cake material also can be land applied at higher rates with a single pass of the spreading equipment, improving operational efficiency. (USEPA 1979) Cake biosolids are land applied with spreading vehicles that resemble those used in agriculture for

applying animal manure, although larger projects usually require more heavy-duty, commercially available specialized equipment designed for biosolids operations. Although cake operations typically can be conducted for longer periods of the year, seasonal restrictions still apply in most cases, and must be addressed in the transport component of overall project planning.

7.3 Other Transport Methods

While less commonly used, transport by pipeline, rail and barge also may be employed for biosolids projects. Pipelines, generally feasible only for liquid biosolids, have limited application due to their high capital cost and limited flexibility in terms of land application site accessibility. Rail and barge transports are economical for high volumes and long hauling distances. Rail transport has become more common in recent years. When contemplating use of these transport methods, biosolids managers will need to consider appropriate loading and unloading facilities, not neglecting the local community's regulations and sensibilities regarding the activities involved in operating such facilities.

7.4 Spill Prevention

Spills are a reality in any biosolids program involving transportation. Consider the following scenario:

A medium size municipality contracted with a transporter to take biosolids to a landfill. The transport vehicle was a tractor with a 20 cubic yard roll off container. All of the transportation requirements were met and the container was covered. On the way to the landfill, the truck overturned in a ditch. The entire load of biosolids ended up in a ditch. It was a Friday afternoon, raining, and traffic was a mess. The local newspaper reporter arrived to find that the entire accident scene was in total confusion. When the municipal manager showed up, a plan was quickly prepared. However, the newspaper headline and front-page pictures were not positive. The reporter's concern…there was no plan to deal with the spill. Even the smallest incident can turn out badly if no thought has been given to how to respond.

The following should be considered before beginning to transport biosolids:

- If feasible, alert truck drivers to the need for making sure that biosolids are not unusually odorous, with directions about procedures to follow if they are.
- Make sure vehicles are clean before they leave the facility and before they leave the use/disposal site.
- Check for good haul routes that don’t have road and bridge weight restrictions or low overpasses that cannot accommodate delivery vehicles.
- Ensure that safe truck entrance and exit locations are used at the site.
- Use truck entrance warning signs and/or flag operators to prevent accidents.
- Cover and seal containers and truck boxes or trailers to reduce the potential for odors and spills.
- Maintain vehicles so breakdowns on the road are rare.
- Follow applicable state and local transportation rules and regulations.

Spill Control

A "spill control plan" is an essential part of transporting biosolids. The plan should be posted, explained to all personnel (including in-house and contract truckers) and a copy kept in each transport vehicle. It also is advisable that each transport vehicle has a Material Safety Data Sheet (MSDS) or equivalent to establish that the biosolids are not a hazardous or dangerous material. Drivers should be familiarized with basic facts relating to biosolids' properties (especially the fact that they are non-hazardous), in order to be able to respond to questions should a spill occur where no other project staff are present. Accessibility to radio/telephone communication among those involved in transporting and managing biosolids will enhance spill control measures. Project personnel should be familiar with procedures to follow if vehicles are involved in an accident, with particular emphasis on first making sure that individuals involved in the accident and any bystanders are safe and receive medical attention if needed.

Spill Prevention and Control Plan

A general spill prevention and control plan is presented below. The plan can be modified to meet a particular agency's needs.

Spill Prevention and Control Plan

Spill Prevention

Project operations staff will implement the following to prevent spills from occurring:

- Insure truck drivers receive instruction in the importance of observing weight limits, highway speed limits, and conservative driving practices.
- Insure that trailer hatches are closed and latched during transport.
- Inspect trailer seals daily and replace as needed.
- Insure unloading operations are conducted to avoid potential runoff or tracking of biosolids.

Management of Cleanup

The site project manager will take immediate charge to initiate and oversee cleanup efforts. Additional labor will be secured as needed to clean up the spill as expeditiously as possible. The project manager will communicate with adjacent neighbors and the public at the scene to answer questions and inform them of the progress of the cleanup. Immediate actions taken will be as follows:

- *Halt the source:*
  Immediately cease using any leaking or damaged unit that is causing the spill. The unit will remain out of service until repaired.
- *Containment*
  If large amounts of biosolids are spilled, straw bales will be used to form a barrier and/or absorb spilled biosolids.
- *Cleanup*
  Use appropriate equipment to remove the biosolids from the spill area. Such equipment may include front-end loaders, the vacuum equipment of liquid biosolids applicators and water trucks. A sufficient supply of shovels and brooms will also be provided to crewmembers cleaning up the spill. Biosolids removed form the spill area will be either spread on an approved application site or taken to a permitted disposal site.
- *Final Cleanup*
  Roadways will be swept or flushed with water as needed to clean the area. If the spill is on a non-paved and tillable area, the final residue will be incorporated into the soil. If it is on private property, final cleanup will be completed to the satisfaction of the property owner.
- *Reporting*
  All spills will be reported immediately to: (*List contact names and telephone numbers of law enforcement and other appropriate state/local agencies, internal management, the designated media contact person, any others identified as needed)*
  Within 24 hours, the site manager will send a written report detailing how the spill occurred, quantities and remedial action taken to:
  (*List contact names as above and/or others as appropriate)*

References

United States Environmental Protection Agency, (July, 2000), *"Guide to Field Storage of Biosolids"*, (4204) (USEPA/832-B-00-007)

United States Environmental Protection Agency, (September, 1979), *"Process Design Manual for Sludge Treatment and Disposal"*, (USEPA 625/1-79-011)

United States Environmental Protection Agency, (September, 1995), *"Process Design Manual for Land Application of Sewage Sludge and Domestic Septage"*, (USEPA/625/R-95/001)