

TECHNICAL NOTE

Subject: Watershed Planning

Series No.: 1705

Reference: Plan Formulation for Animal Waste
Management Systems

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Formulation of Animal Waste Management Systems

The purpose of this Technical Note is to provide guidance to assist in formulation of PL-566 and other watershed projects. Specifically, the guidance will assist in formulating alternative animal waste management systems. The guidance in this document assumes that preliminary planning steps (identify problems; determine objectives; inventory resources; and analyze resource data) have been accomplished. It assumes that:

- A water resource (lake, stream, aquifer) has been identified that has a water quality problem (impaired use) significant enough to warrant project action.
- The impaired water use is being caused by animal waste from confined animal operations.
- Waste management systems are an option to using the waste. (Note: If other sources of pollution are evident they also need to be considered in developing a plan to solve the problem.)
- Resource information such as soils, geology, climate, land use and cover, has been gathered and analyzed. Information pertaining to the confined animal operations has also been gathered and analyzed.

To formulate alternative waste management systems, the following step-by-step procedure should be used:

1. Assemble an interdisciplinary planning team. The team should at least consist of the district conservationist or soil conservationist, environmental engineer, soil scientist, agronomist, economist, and project team leader. Depending on the situation, other disciplines including those outside of the SCS may to be included.
2. Review the water quality problems and the sponsors objectives and the resource information with the team members. Also review the Agricultural Waste Management Field Handbook or most current NRCS policy, standards, and related resource material with the team.

3. Decide whether or not to develop alternatives for each operation or to group similar operations into evaluation units and develop alternatives based on representative conditions. If numerous operations are in the watershed and if they are similar, developing alternatives for representative conditions (evaluation units) generally expedites planning. An evaluation unit is a group of problems or opportunities such as confined animal operations, that require similar treatment measures. Grouping allows evaluation of treatment measures for the group instead of for each individual situation. Where evaluation units are used, detailed site inventory and adjustments of components or specifications will be made at the time of final design and installation.

4. For each evaluation unit, the team should identify all possible practices that could be used in a waste management system. All possible practices should be listed initially so that a complete evaluation is possible. Involvement by the clients at this step is essential. Coordination with other agencies, research institutes, universities, and others is recommended.

The practices should be grouped according to function. The major functions of a waste management system are production, collection, storage, treatment, transfer, and utilization. The Agriculture Waste Management Field Handbook provides more detailed information on each function.

An example worksheet is attached that can be used to record the information and make a preliminary evaluation.

5. Evaluate the identified practices considering the site conditions of the evaluation unit. Select the practices that warrant further consideration. Make a note on the worksheet why a practice was not considered further.

Items to consider:

- Physical features (soils, geography, and topography);
- Installation, replacement, and operation and maintenance costs;
- Operator management capabilities and operator management requirements of the component; and
- Effectiveness on identified problems.

6. Using the results of the preliminary screening, as recorded in step 5 above, develop Alternative Waste Management Systems by combining individual practices

into a waste management system. Be sure that all needed components are included so that the system will function as planned. (Four Principles and Guideline Tests) The number of alternatives formulated will vary, but will generally be more than one. Reasons should be documented for not including one or more of the practices identified in steps 4 and 5 as warranting further consideration.

7. Develop a cost estimate for each component for each alternative. Include installation costs as well as replacement costs and operation and maintenance costs.

The formulation of alternative waste systems has been completed. The systems are ready to be evaluated, which is Element 6 of the planning process and is not the subject of this instruction.

Evaluation Unit: Describe and list representative conditions

Functions and practices

Applicable
Yes or No

I. Collection of animal waste

Alleys where waste is collected by mechanical collectors
such as automated metal sweeps or tractor blades.....

Gravity flow collection from concrete sloping lots.....

Gravity flow collection with open channels and drain grates.....

Gravity flow to intermediate collection points with a sump-pump.....

Transporting waste to storage facility.....

Various water flush systems, such as large pumps or tanks that tip....
..... Slatted
floor system can be used in conjunction with.....
most of the above

II. Storage

Above ground structural system such as wood, concrete, fiberglass, steel,
or similar upright tank storage system.....

Below ground structural (concrete) system.....

Excavated earth, embankment earth, or a combination of these.....

III. Treatment

Constructed wetlands.....

Composting.....

Lagoons:

Anaerobic lagoons (usually deep - 8' to 12').....

Aerobic lagoons (large, shallow and naturally aerobic) or artificially aerated with a surface aerator.....

Multiple cells; one for treatment and a secondary lagoon for recycling water.....

Drying or dewatering waste.....

Separators - A separator might be employed in conjunction with the collection and treatment process.....

Different types of separators include:

Mechanical:

Pump and screen system.....

Shaking screen system.....

Cyclone system.....

Settling basins:

Concrete or slatted wood system.....

V-shaped structure with gated pipe.....

IV. Transfer

Pipelines to a travelling gun irrigation system.....

Pipelines to a solid.....

Solid manure spreader.....

Tank wagon (may be self loading).....

V. Use

Composting.....
 Land application plan based on crop nitrogen requirements
 Land application plan based on phosphorus requirements.....
 Land application plan based on.....

Note: This is not a complete listing of possible components and design considerations. However, it provides an idea of the various options available for dairy animal waste systems. The Agricultural Waste Management Field Handbook is an excellent, complete reference.