

**Athletic Field Topdressing as a Commercial Market for Compost from Dairy  
Manure (Field of Dreams Project)  
FY04 CWA Section 319  
Project #04-3**

**Nonpoint Source Summary Page**

1. **PROJECT GOALS/OBJECTIVES:** The overall project goal is to gain commercial acceptance of a blend of compost and sand for topdressing of athletic fields through demonstration on athletic fields. The blend of 50% compost and 50% sand is superior in many respects to the sand that is now used for the periodic topdressing of athletic fields, and is easily affordable by the municipal, school district, college/university, and sports associations that maintain the fields. Erath County will be the source of the compost, so removal of the compost from the watershed would contribute toward TMDL objectives for the impaired water bodies.
2. **PROJECT TASKS:** (1) Apply compost-sand topdressing to athletic fields managed by counties, cities, school districts, colleges/universities, and/or sports associations. (2) Evaluate the performance of the compost-sand topdressing blend. (3) Through participation in the project, inform the relatively small athletic field supply and maintenance industry of the performance and affordable cost of the premium topdressing blend.
3. **MEASURES OF SUCCESS:** Acceptance by the industry that supplies materials and maintenance for athletic fields would result in a significant commercial market for compost from dairy operations in the Bosque River Watershed, helping achieve 50% haul out of dairy manure from the watershed as described in the TMDL implementation plan. This project has the potential to stimulate the export several thousands of tons of compost annually in a sustainable commercial venture.
4. **PROJECT TYPE:** Statewide (); Watershed (X); Demonstration (X)
5. **WATERBODY TYPE:** River (X); Groundwater (); Other ()
6. **PROJECT LOCATION:** Erath County, with demonstration fields throughout Texas.
7. **NPS MANAGEMENT PROGRAM REFERENCE:** State of Texas Agricultural/Silvicultural Nonpoint Source Management Program approved February 25, 2000
8. **NPS ASSESSMENT REPORT STATUS:** Impaired (X); Impacted (); Threatened (); TMDL (X); Other()
9. **KEY PROJECT ACTIVITIES:** Hire Staff (X); Monitoring (); Regulatory Assistance (); Technical Assistance (); Education (); Implementation (); Demonstration (X); Other ()
10. **NPS MANAGEMENT PROGRAM ELEMENTS:** The milestone from the "1999 Texas Nonpoint Source Pollution Assessment Report and Management Program" that will be implemented is "Committing to technology transfer, technical support, administrative support and cooperation between agencies and programs for the prevention of NPS pollution."
11. **PROJECT COSTS:** Federal (\$300,000); Non-Federal Match (\$282,500); Total Project (\$582,500)
12. **PROJECT MANAGEMENT:** The project will be managed by the TSSWCB and carried out by the Leon-Bosque RC&D Council, a non-profit organization dedicated to improvement of the environment, improvement of the local economy, and the quality of life in rural Texas.
13. **PROJECT PERIOD:** July 1, 2004 to June 30, 2006.

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**WORKPLAN**

**Project Area Description and Background:** In 1998, segments 1226 and 1255 (corresponding to the North Bosque River and Upper North Bosque River segments) were deemed "impaired segments" on the State of Texas Clean Water Act Section 303(d) under water quality standards related to nutrients and aquatic plant growth. Studies have demonstrated that high levels of phosphorus (P) and other nutrients from point and nonpoint sources degrade water quality in the North Bosque River. Point sources consist primarily of municipal wastewater treatment plant effluent from the six cities that discharge near or directly into the North Bosque River. Nonpoint nutrient sources in this rural, agriculture dominated watershed include confined animal feeding operations such as the large number of dairies and turkey raising operations, rangeland that hosts many thousands of head of beef cattle, crop land, woodlands, individual homeowners septic systems, and an abundance of wildlife. Some of the potential sources of nutrients that could be entering the watershed, such as dairy waste application fields, dairy lagoons, and municipal wastewater treatment plants have been considered controllable sources of phosphorus.

These findings led to the US Environmental Protection Agency approval for the two Total Maximum Daily Loads (TMDLs) for P in the North Bosque River. In December 2002, the Texas Commission on Environmental Quality (TCEQ) approved the implementation plan for the two TMDLs, and the TSSWCB approved them in January 2003. The goal of these TMDLs is to achieve a reduction of total annual loading and annual average concentrations of soluble reactive P (SRP) by approximately 50%. It is anticipated that SRP reductions of this magnitude will reduce the potential for problematic algal growth in the North Bosque River and Lake Waco.

**Problem/Need Statement:** In order to achieve the necessary phosphorous reductions, a sustainable commercial market is needed to economically utilize the compost produced from dairies in the Upper North Bosque watershed. This project will develop a self-sustaining commercial market for significant volumes of compost.

**General Project Description:** Composting of dairy manure and exporting of the compost out of the watershed have been advanced as a solution to the problem of the impaired water quality in the Upper North Bosque River watershed. The composting facilities have been established and the infrastructure to move manure from dairies to these facilities is in place. Existing markets for the compost, such as bagged compost for homeowner use and roadside application by Texas Department of Highways, have not kept pace with compost production. Consequently, the compost is piling up and the pressure on the dairy industry continues. A high-volume market is needed that can afford the production and transportation costs of the compost. This project seeks to develop that market by demonstrating the value of compost as a component to a premium blend of compost and sand for use in topdressing of athletic fields.

There are more than 1000 communities, school districts, and universities/colleges in Texas with athletic fields, including municipal sports fields, school district athletic fields, and university athletic complexes. Football, softball, baseball, and soccer fields are the athletic fields of concern. Typical areas of each are 30,000 ft<sup>2</sup> for softball, 60,000 ft<sup>2</sup> for football and soccer, and 80,000 ft<sup>2</sup> for baseball. Granbury provides an example of the potential for the compost-sand topdressing.

The school district, city and two sports associations have a total of 23 athletic fields, with additional fields at the Brazos River Authority sports complex.

Each grassed field should be maintained periodically (annually for high use and high profile fields) to preserve the quality and safety of the playing surface. The maintenance, in addition to the normal cultural practices of irrigation and fertilization, includes aeration and topdressing. Topdressing is almost always done with sand. A blend of compost and sand has several advantages over sand alone as a topdressing material. The major advantage is that the compost adds structure to the sand, with the result that the topdressing blend stays in place and improves the playing quality of the field. Compost also adds major and micro nutrients, improves infiltration and percolation, and should reduce the water requirements. The cost is not that much greater for compost (only about \$10 per cubic yard more at the source), so a premium blend of sand and compost should be readily marketable.

Normal rates for topdressing, as described by the regional athletic field maintenance firms, are 50 to 100 tons per acre (a cubic yard of 50-50 blend compost and sand will weigh about one ton). At a rate of 100 tons per acre, the depth of application is less than one inch. The rate of 100 tons per acre will be a starting point for this project, because "everyone will know that the field was topdressed" and the response will be clearly noticeable. The actual rate may be location specific and will be determined by the regional athletic field maintenance business and the organization with the athletic field. We anticipate that the initial topdressing will be at the 100 tons/acre rate, with subsequent rates determined by the individual conditions of each field.

A blend of 50% compost and 50% sand was sent to the Texas Plant and Soil Lab in Edinburg, Texas for analysis. The lab uses a carbon dioxide extraction method, instead of much stronger reagents used by other testing labs, so the nutrient values are typically lower. The analysis for the 50-50 blend shows an organic matter content of 2.55%, which indicates that the blend will not oxidize away in the Texas summers. The pounds per acre of nitrate ( $\text{NO}_3$ ) and polyphosphate ( $\text{P}_2\text{O}_5$ ) in a 12 inch depth of the blend are 1013 and 292 respectively, according to the analysis. The micronutrient analysis shows 36 ppm zinc, 24 ppm iron, 4 ppm manganese, and 1.5 ppm copper. Although not analyzed by the laboratory, the cation exchange capacity (CEC) of compost is very high and virtually negligible for sand. The high CEC of the blend provides sorption surfaces that will bind herbicides and pesticides that are applied to the field, as well as providing sorption sites for nitrogen and phosphorus fertilizer materials. A result is a lower potential for degraded water quality from runoff from athletic fields in urban areas. This will not be evaluated in this project, however. The only negative aspect of the blend is the high sodium adsorption ratio (SAR) of 28. Normally, a high SAR indicates decreased infiltration and decreased soil structure. We do not believe this to be a factor, as a result of the existing high structure of the sand and the compost. Samples of compost from a free-stall with sand bedding have been sent to the Texas Plant and Soil Lab; results are expected by March 25, 2004. This compost is from a separate source than the first sample of compost. The EC and SAR are expected to be lower, as a result of the compost being subjected to rainfall leaching for over two years.

A 100 ton application to an acre of athletic field would require five semi truckloads of the blend, each holding about 20 tons. The cost of the sand, compost, and blending is estimated at \$625 per truckload, FOB Granbury. Transportation costs vary, but have a minimum of \$4 per semi per loaded mile. Application costs, when the athletic field manager does not have application capability, are about \$0.03 per square foot, or \$1307 per acre. Transportation and application would increase the cost to about \$1000 per truckload. Actual costs for each athletic field will depend on transportation costs, which will be calculated as the candidate sites are identified.

The athletic field maintenance industry is fairly small, so the target audience will be easy to reach with a demonstration project. Tomlinson Ball Field Supplies (Ronnie Tomlinson) provides materials to over 400 athletic fields each year throughout the state and region. Tomlinson Ball Field Supply provided the clay for the infield of The Ballpark at Arlington, the former Enron Field in Houston, and several other major league baseball fields from San Diego to Toronto. In addition, he provides clay for the ball fields of all major universities in Texas and for most of the municipal ball fields in the Dallas-Fort Worth Metroplex. Tomlinson has the contacts with the athletic field maintenance industry to identify candidate athletic fields in all areas of Texas. Regional athletic field maintenance businesses apply the materials. The major regional businesses in Texas include TexSand Sports Turf (Jim Brown) in Hawkins, Texas MultiChem (Steve Caraway) in Kerrville, and Turf Grass of America (Randy Price) with major offices in Granbury, Lubbock, and San Antonio. Any of the composting facilities in Erath County (e.g., Erath Earth and Producer's Compost) could provide the compost.

The Leon-Bosque Resource Conservation and Development (RC&D) Council, a 501(c)3 organization, will carry out this project. The Leon-Bosque RC&D Council area of responsibility covers 13 counties in north central Texas, including Erath County and is part of a statewide network of 22 funded and one unfunded RC&D Council. The RC&D program is federally funded and administered by the Natural Resources Conservation Service (NRCS). NRCS provides operating expenses and a full-time NRCS employee who serves as the coordinator of RC&D projects.

FY02 Section 319(h) funding (\$52,500 federal funding) was obtained for ten demonstration fields within 100 miles of Granbury. The program has met with considerable acceptance. Eight of the ten budgeted MOAs have been signed to date (March 15, 2004), and application is expected to occur within the next few months. The first eight entities included cities, independent school districts, and universities. The fields for the topdressing included soccer, football, and baseball, so the initial evaluation will be broad-based. Over 30 entities have expressed interest in the program, with several expressing interest in using the topdressing on all of their athletic fields.

In just the first few months of the existing contract, we have learned several things that indicate a strong need for increased funding to continue the project beyond the current scope. The need was very real to demonstrate the value of a compost-sand blend as a premium mix for athletic field topdressing to the athletic field topdressing supply and maintenance industry. The first phase of this project, already funded, is addressing that need. There is also a need to demonstrate to each of the managers of the athletic fields that the premium blend of compost and sand is indeed superior to sand alone or to sand plus an organic addition (such as peat moss). The athletic field managers in the cities and school districts have not had a direct access to the composting industry (and vice-versa), so the use of compost as an amendment has not gained acceptance. Demonstration is the key to acceptance.

Funding is requested to expand the demonstration to additional areas of the state and to increase the number of athletic fields that could be topdressed with the compost-sand blend for a single entity (e.g., city, county, college/university, or sports organization).

Section 319 funding is required to provide both financial assistance and incentives to encourage the use of compost in topdressing of athletic fields for athletic field managers. We propose to provide 50% of the end-user cost of the topdressing blend to the athletic fields, with the entity contributing the other 50% of the total cost. This rate is less than the cost of an equivalent topdressing of sand, so will encourage participation. The financial commitment on the part of the manager will leave ownership of the project with the athletic field manager and will encourage an

active participation. The financial contribution by the non-profit entities will also provide the required cost-share of a 319(h) project. The federal funding for the Leon-Bosque RC&D Council cannot be used as cost share. In-kind cost share will be provided by the project director's involvement with the project as a non-paid volunteer. A total of \$10,000 is requested for on-site evaluation and report preparation assistance by an independent contractor to be named later. No salary support is requested.

The primary need that this project addresses is to use the existing commercial infrastructure to demonstrate the use of a premium blend of compost and sand for athletic fields. The target audiences will be the entities that manage athletic fields and the regional commercial firms that apply topdressing. The desired end result will be a significant commercial market for compost from Erath County.

### **Tasks, Objectives, and Schedules:**

#### **Task 1: Project Administration**

Costs: \$7,500 (Federal); \$0 (Non-Federal Match); \$7,500 (Total)

**Objective:** Provide project reporting and management.

**Subtask 1.1: Quarterly reports.** Quarterly reports will be submitted at the end each quarter of the federal fiscal years.

**Subtask 1.2: Final report.** A final report will be submitted June 30, 2006.

#### **Deliverables**

- Quarterly reports (7)
- Final report

#### **Task 2: Demonstration of compost / sand blend as athletic field topdressing**

Costs: \$282,500 (Federal); \$282,500 (Non-Federal Match); \$565,000 (Total)

**Objective:** Use the existing commercial infrastructure to demonstrate the use of a premium blend of compost and sand for athletic fields.

**Subtask 2.1: Identification of athletic fields.** The athletic field maintenance industry, primarily Tomlinson Ballfield Supply, will identify at least 50 athletic fields in high-profile locations in all areas of Texas. The initial list of candidate athletic fields included City of Farmers Branch, Palmer ISD, Granbury ISD, City of Rowlette, Ferris ISD, Texas State University, Baylor University, University of Texas-Arlington, Neuman Smith ISD, University of Texas-Dallas, Dallas Baptist University, City of Arlington, City of Cedar Hill, Gatesville ISD, Richardson ISD, Waxahachie ISD, City of Allen, Weatherford ISD, Weatherford College, Graham ISD, Boswell ISD, City of Richardson, Ennis ISD, Carrollton-Farmers Branch ISD, Tarleton State University, Austin ISD, and Goldthwaite ISD. Additional entities include Dallas ISD, City of Dallas, Lewisville ISD, Cistercian ISD, City of Plano, Garland ISD, Grand Prairie ISD, Navarro College, City of Carrollton, Wylie ISD, Coppell ISD, Garland Christian Academy, City of Frisco, Grapevine-Colleyville ISD,

City of Grapevine, Southlake ISD, Waco ISD, City of DeSoto, City of Lancaster, Texas Women's University, and City of Flower Mound. This task will be completed within six months of project start date.

**Subtask 2.2: Development of MOA.** A memorandum of agreement has been developed for the athletic field manager and the Leon-Bosque RC&D Council. This agreement specifies the details of the financial agreement on cost-sharing of the topdressing, and will specify requirements for evaluations. This MOA will be revised, as necessary, for this project.

**Subtask 2.3: Development of evaluation instrument.** An evaluation instrument has been developed for the athletic field managers to complete at or before the application of topdressing to the athletic field. Three evaluations will be required: an initial evaluation at application, an evaluation at the beginning of the seasonal use of the field, and an evaluation at the end of the season of use of the athletic field. The evaluation will be based on a Likert Scale (responses to specific questions will be rated on a scale of 1 (strongly disagree) to 5 (strongly agree), which will allow a statistical analysis. The evaluation instrument will take split applications into account.

**Subtask 2.4: Development of agreements.** The athletic field maintenance industry will develop agreements (probably with very little paperwork) with the managers of the athletic fields to apply the topdressing at the rates determined by the industry and the manager. This will be an on-going process until all demonstration sites are confirmed. The upper-end estimated cost is estimated to be \$6000 per field, with \$3000 provided by the athletic field manager and \$3000 provided by the project from Section 319(h) funding.

**Subtask 2.5: Application of topdressing.** The athletic field maintenance industry will apply the compost-sand topdressing to the athletic fields. This will occur within one month of the time of the agreement. For fields with a seeding of a winter grass (e.g., rye), this will continue through the winter. Otherwise, the topdressing will be done in spring. The application may be split according to industry practices.

**Subtask 2.6: Analysis.** The Leon-Bosque RC&D Council, with assistance from a qualified independent contractor, will evaluate the results from the evaluation instruments and from on-site visits during and after application.

### **Deliverables**

- List of athletic fields
- Documentation of amount of compost utilized
- Summary of the evaluations

### **Coordination, Roles, and Responsibilities:**

The TSSWCB will manage this project and the Leon-Bosque RC&D Council will conduct this project. The principals involved will be Joe McFarland, Board Member and USDA Earth Team volunteer, and the USDA-NRCS Coordinator (position currently is vacant) who provides technical assistance to the Council.

**Public Participation:**

The involvement of the public will be through their integral participation in the project. Specifically, the athletic field maintenance industry and the athletic field managers employed by cities, school districts, and colleges/universities. The industry will be involved as a commercial venture and the managers will be involved as the end users. The industry will use the demonstration sites to develop additional contracts.

**Measures of Success and Performance:**

The measure of success will be the development of a commercial, self-sustaining market for compost as an ingredient of a premium topdressing for athletic fields. If each of the ten original fields resulted in four additional fields (which could be in the same sports complex), an additional two thousand tons of compost would be removed from the Upper North Bosque River watershed. With state-wide demonstration and acceptance, several thousand tons of compost would be removed and put to beneficial use. If all interested entities would utilize a 50-50 blend of compost and sand for their fields, a conservative estimate by the industry shows a requirement for 25,000 tons of compost annually. The utilization of all excess compost that is produced in the watershed is within the realm of possibility.

**Reference to Project in the NPS Management Program:** The “1999 Texas Nonpoint Source Pollution Assessment Report and Management Program” milestone that will be implemented is “Committing to technology transfer, technical support, administrative support and cooperation between agencies and programs for the prevention of NPS pollution.”

**Project Management:**

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**OBJECT CLASS BUDGET**  
**for the**  
**CWA, Section 319(h) Agricultural/Silvicultural Nonpoint Source Program**  
**Athletic Field Topdressing as a Commercial Market for Compost from Dairy**  
**Manure**  
**Leon-Bosque RC&D Council**

<u>Object Class Category</u>	<u>Federal Funds</u>	<u>Non-Federal Match</u>	<u>Total Costs</u>
Personnel	0	0	0
Fringe Benefits (% of personnel)			
Subtotal Personnel and Fringe Benefits	0	0	0
Travel	0	0	0
Equipment	0	0	0
Supplies	0	0	0
Contractual - application	\$282,500	\$282,500	\$565,000
Contractual – evaluation	\$10,000	0	\$10,000
Construction	0	0	0
Miscellaneous	7,500	0	7,500
Subtotal Other Direct Costs	\$300,000	\$282,500	\$582,500
Total Direct Costs	\$300,000	\$282,500	\$582,500
Indirect Costs	0	0	0
Total Project Costs	\$300,000	\$282,500	\$582,500

**Budget Justification:**

The majority of the project direct costs will be used to reimburse non-profit/governmental organizations for 50% of the total costs of applying compost-sand topdressing to athletic fields. There are no personnel, travel, or supplies costs. A qualified independent contractor to be named will assist with on-site inspection, evaluation, and generation of reports. The miscellaneous cost of 2.5% is to offset the expenses of administering the project, including communications and publications. The Leon-Bosque RC&D Council receives federal financial assistance, which will be used to cover administrative assistant wages and travel. Joe McFarland, the project director, is a member of the board of directors of the Leon-Bosque RC&D Council. He will contribute his time to the project as a USDA Earth Team volunteer.