Practice: 629 - Waste Treatment

Scenario: #1 - Litter Windrow Pasteurization

Scenario Description: This practice scenario includes the in house windrowing of poultry litter to promote pasteurization between flocks. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient and pathogens) and air quality impacts (PM &PM precursors, and objectionable odors). Associated practices: Amendments for Treatment of Agricultural Waste (591), Waste Storage Facility (313), &Nutrient Management (590)

Before Situation: A poultry operation typically removes part of the litter and bedding between flocks, called a cakeout. A full cleanout of litter and bedding is typically done once every 1-3 years depending on the operation. Over time, the accumulation of poultry waste in the litter contributes to an increase in odors and high ammonia emissions in the house contribute to impacts on bird health.

After Situation: This scenario assumes 4 flocks per year in an operation with 2 - 42 x 500 square foot houses. Three (3) in-house pasteurization events will be performed annually. There will be a full cleanout after the 4th flock. Formula to calculate the total number of pasteurization events per year on a 1000 SF basis: (Square Feet of house) / 1000 SF X (Number of houses) X (Number of pasteurization events) = Number of 1000SF. 21,000 SF / 1000 SF X 2 houses X 3 events = 126 units of 1000SF In house pasteurization of poultry litter is achieved by windrowing the litter in the house. The process takes approximately one week. This process successfully addresses the air quality impacts (ammonia emissions, PM and PM precursors) and bird health resource concerns. This process also improves the quality of poultry litter that must be spread on farmland. Bird health is improved and bird mortality is reduced.

Scenario Feature Measure: Surface Area of housing floor windrowed per year in 1000 SF

Scenario Unit: 1,000 Square Foot

Scenario Typical Size: 126

Total Scenario Cost: $5,808.51

Scenario Cost/Unit: $46.10

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$25.96	66	$1,713.22
Equipment Installation						
Aerator Attachment, 8", PTO	1707	Aerator attachment for mounting to tractor and PTO, 8" diameter. Equipment cost only with out tractor. Brown Bear R24C-8' or equivalent	Hour	$9.84	30	$295.20
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$57.58	66	$3,800.10

Practice: 629 - Waste Treatment

Scenario: #2 - Milking Parlor Waste Treatment System with Dosing System and Bark Beds

Scenario Description: This practice scenario includes a dosed treatment system with bark bed for milking parlor wastewater. Bark beds may be used where the following minimum separations can be achieved to the bottom of the treatment area after grading: two feet to seasonal groundwater and three feet to bedrock. Bark beds rely on the soil profile to reduce BOD5 levels in the wastewater. Bark materials provide some aeration of the soil surface and insulate the infiltration area in the winter and allows for evaporation in the summer.The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient, salts and pathogens). Associated practices: Nutrient Management (590), Pumping Plant (533), Fence (382), Waste Storage Facility (313), Diversion (362), Critical Area Seeding (342), Waste Transfer (634)

Before Situation: Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns.

After Situation: This scenario assumes that the treatment system is designed for 500 gal/day of wastewater from the milking parlor. It assumes pre-treatment in two tanks. The pumping tank is under PS 634-Waste Transfer and the 2" solid handling sewage pump is under PS 533-Pumping Plant. The grease trap acts as the primary settling basin. The settling tanks are equiped with effluent filters. The wastewater is pressure dosed from the pumping tank to the treatment bed (bark bed or leaching gallery). This treatment method relies primarily on the soil profile to reduce BOD5 levels. This scenario assumes that the treatment bed is dosed at 0.16 gal/square ft (3125 sq ft). To maintain bark bed performance, bark needs to be replaced or added every 3 to 5 years as an O&Mtask. This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improve air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Bark Bed Treatment Area (SF)

Scenario Unit: Square Foot

Scenario Typical Size: 3125

Total Scenario Cost: $29,598.24

Scenario Cost/Unit: $9.47

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic Yard	$24.08	350	$8,426.88
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.90	250	$1,475.14
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.77	402	$1,514.00
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.89	116	$102.79
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	460	$637.80
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	80	$3,375.06
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$24.86	130	$3,231.84
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$355.12	2	$710.24
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.17	400	$469.22
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.42	290	$412.94
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.18	260	$1,086.86
Pipe, PVC, 6", SCH 40	980	Materials: - 6" - PVC - SCH 40 - ASTM D1785	Foot	$6.82	200	$1,363.89
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,663.59	2	$3,327.18

Riser, Septic Tank	2067	24" HDPE riser with cover. Materials only.	Each	$171.77	4	$687.09

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	4	$1,949.55
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$171.69	4	$686.77
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.49	2	$140.98

Practice: 629 - Waste Treatment

Scenario: #3 - Milkhouse Wastewater Treatment with Dosing System and Bark Mounds

Scenario Description: This practice scenario includes a dosed treatment system with bark mounds for milking parlor wastewater. The unit refers to the square footage of the organic filter mound foot print. Bark mounds may be used on level area requiring no grading where the following minimum separations can be achieved to the bottom of the mound: two feet to seasonal groundwater and three feet to bedrock. This treatment method relies primarily on the bark media to reduce BOD5 levels. Treatment takes place primarily in the above-ground mounds and at the mound/soil interface. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient, salts and pathogens). Associated practices: Nutrient Management (590), Pumping Plant (533), Fence (382), Waste Storage Facility (313), Diversion (362), Critical Area Seeding (342), Waste Transfer (634)

Before Situation: Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns.

After Situation: This scenario assumes that the treatment system is designed for 500 gal/day of wastewater from the milking parlor. It assumes pre-treatment in two tanks. The pumping tank is under PS 634-Waste Transfer and the 2" solid handling sewage pump is under PS 533-Pumping Plant. The grease trap acts as the primary settling basin. The settling tanks are equiped with effluent filters. The wastewater is then pressure dosed from the pumping tank to the treatment filter. Effluent is directed to separate bark mound(s) with a sequencing valve and manifold. The bark filter mounds are typically trapezoidal in shape with a 23ft base, 5ft depth and 8ft top width, 50ft long. The wastewater distribution pipe is placed in the mound on top of 3ft of compacted shredded bark. A spray chamber is placed over the distribution pipe to promote effluent distribution across the bark mound and enhance aeration for treatment. The spray chambers are then covered with 1ft of shredded bark to minimize oders and provide insulation during cold weather operation. This scenario for a 500gpd system assumes that the treatment area is dosed at 0.16 gal/square ft (3125 sq ft). To maintain bark mound performance, bark needs o be replaced or added every 3 to 5 years as an O&Mtask. This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improve air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Bark Bed Treatment Area (SF)

Scenario Unit: Square Foot

Scenario Typical Size: 3125

Total Scenario Cost: $30,470.35

Scenario Cost/Unit: $9.75

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Aggregate, Wood Chips	1098	Includes materials, equipment and labor	Cubic Yard	$24.08	550	$13,242.24
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.90	250	$1,475.14
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.77	316	$1,190.11
Skidsteer, 80 HP	933	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	$44.50	10	$445.04
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	450	$623.94
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	48	$2,025.04
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$24.86	12	$298.32
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	$39.75	17	$675.79
Arch septic leaching chamber, HDPE	2066	HDPE leaching galley, 2.5' to 3' wide x 6' to 8' long. Materials only.	Foot	$5.86	270	$1,581.58
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$355.12	2	$710.24
Pipe, PE, 2", DR 9	1000	Materials: - 2" - PE - 160 psi - ASTM D3035 DR 9	Foot	$1.72	250	$429.23

Pipe, PVC, 1", SCH 40	973	Materials: - 1" - PVC - SCH 40 - ASTM D1785	Foot	$0.67	640	$429.62
Pipe, PVC, 2", SCH 40	976	Materials: - 2" - PVC - SCH 40 - ASTM D1785	Foot	$1.42	100	$142.39
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.18	250	$1,045.06
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,663.59	2	$3,327.18
Riser, Septic Tank	2067	24" HDPE riser with cover. Materials only.	Each	$171.77	4	$687.09
Valve, distribution	2064	Sequencing valve, 4 or 6 way, for pressure dosing wastewater. Includes materials and shipping only.	Each	$146.48	1	$146.48

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	$255.27	4	$1,021.10

Practice: 629 - Waste Treatment

Scenario: #4 - Milking Parlor Wastewater Treatment System with Dosing System

Scenario Description: This practice scenario includes a dosed treatment system for milking parlor wastewater that will outlet to a constructed wetland and/or vegetated treatment area and/or other acceptable treatment. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient, salts and pathogens). Associated practices: Constructed Wetland (656), Vegetated Treatment Area (635), Waste Transfer (634), Nutrient Management (590), Pumping Plant (533), Fence (382), &Waste Storage Facility (313), Waste Transfer (634)

Before Situation: Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns.

After Situation: This scenario assumes that the treatment system is designed for 500 gal/day of wastewater from the milking parlor. It assumes pre-treatment in two tanks. The grease trap acts as the primary settling basin. The settling tanks are equiped with effluent filters. The wastewater is dosed from a wastewater holding tank (under PS 634-Waste Transfer) with a mechanical floating outlet to a final treatment and discharge area (constructed wetland and/or vegetated treatment area and/or other acceptable treatment). This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improve air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Design Flow

Scenario Unit

Scenario Typical Size: 500

Total Scenario Cost: $13,421.59

Scenario Cost/Unit: $26.84

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.90	185	$1,091.60
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.77	286	$1,077.13
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	400	$554.61
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	16	$675.01
Materials						
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$24.86	12	$298.32
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$355.12	2	$710.24
Floating Outlet	2065	4" diameter floating chamber with flexible connector for gravity dosing from a septic tank. Includes materials and shipping only.	Gallon	$275.50	2	$551.01
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.18	400	$1,672.09
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,663.59	2	$3,327.18
Riser, Septic Tank	2067	24" HDPE riser with cover. Materials only.	Each	$171.77	4	$687.09
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	4	$1,949.55
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$171.69	4	$686.77

Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.49	2	$140.98

Practice: 629 - Waste Treatment

Scenario: #5 - Aerator less than or equal to 5 hp

Scenario Description: This practice scenario includes installation of an aerator into a liquid storage pond or tank that has a surface area less than 1 acre. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient and pathogens) and air quality impacts (PM &PM precursors, and objectionable odors). Associated practices: Nutrient Management (590) and Waste Storage Facility (313)

Before Situation: A dairy, swine, or other agricultural operation in which the waste goes into a storage pond. The pond is not managed as an anaerobic lagoon and the nutrients stratify over time and odors are objectionable. It is difficult to properly estimate the nutrient content being pumped onto the land because of the stratification. There is also not enough aerobic microbial activity in the pond to prevent objectionable odors.

After Situation: This scenario assumes that the producer would like to increase oxygen content in the storage pond and mix the waste for even nutrient distribution. Under aerobic conditions microorganisms can convert nutrients and odors will be reduced. Nutrient content of the liquid waste is more uniform which is better for uniform agronomic application rates improving nutrient management and to protect air and water quality resources.

Scenario Feature Measure: Horse Power of aerator

Scenario Unit: Horsepower

Scenario Typical Size: 1

Total Scenario Cost: $1,300.15

Scenario Cost/Unit: $1,300.15

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	2	$84.38
Materials						
Aerator, pond, 1 hp	1708	1 hp Aerator for pond or tank with less than 10 acres of surface area. Materials only.	Each	$1,215.77	1	$1,215.77

Practice: 629 - Waste Treatment

Scenario: #6 - Aerator greater than 5 hp

Scenario Description: This practice scenario includes installation of an aerator into a liquid storage pond or tank with a surface area larger than 1 acre. The purpose of the practice is to address resource concerns related to water quality degradation due to (excess nutrient and pathogens) and air quality impacts (PM &PM precursors, and objectionable odors). Associated practices: Nutrient Management (590) and Waste Storage Facility (313)

Before Situation: A dairy, swine, or other agricultural operation in which the waste goes into a storage pond. The pond is not managed as an anaerobic lagoon and the nutrients stratify over time and odors are objectionable. It is difficult to properly estimate the nutrient content being pumped onto the land because of the stratification. There is also not enough aerobic microbial activity in the pond to prevent objectionable odors.

After Situation: This scenario assumes that the producer would like to increase oxygen content in the storage pond and mix the waste for even nutrient distribution. Under aerobic conditions microorganisms can convert nutrients and odors will be reduced. Nutrient content of the liquid waste is more uniform which is better for uniform agronomic applications rates improving nutrient management and to protect air and water quality resources.

Scenario Feature Measure: Each aerator

Scenario Unit: Each

Scenario Typical Size: 1

Total Scenario Cost: $9,784.85

Scenario Cost/Unit: $9,784.85

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	3	$126.56
Materials						
Aerator, pond, 10 hp	1709	10 hp Aerator for pond or tank with 10 or more acres of surface area. Materials only	Each	$9,658.29	1	$9,658.29

Practice: 629 - Waste Treatment

Scenario: #7 - Straw Pond Cover

Scenario Description: This practice scenario is a permeable organic cover applied to the liquid surface of a waste storage facility that has a surface area less than or equal to 2 acres. Straw cover applications can remain on top of the pond for between 2 and 6 months. The cover will reduce radiation and wind velocity over the surface of a manure storage to reduce transmission of odors and act as a medium for growth of microorganisms that utilize carbon, nitrogen, and sulfur to decompose odorous compounds. Associated practices include Waste Storage Facility (313).

Before Situation: This practice is applicable on a dairy or swine operation in which the waste goes into a liquid storage pond or tank and the bio-treatment of emissions will improve air quality. The maximum recommended surface area is 2 acres.

After Situation: Permeable organic cover applied to the liquid surface of a waste storage or treatment facility. Organic materials often used as covers include straws, cornstalks and peat moss. Typical application is an 8" straw application on a 120' diameter storage tank every 3 months. The scenario unit calculation is (Surface Area of Pond)*(Number of applications per year). For this scenario, the calculation is: (120/2)^2*pi *4 = 45,239sf Organic covers can reduce odors up to 90 percent if the straw cover is 12" deep.

Scenario Feature Measure: Surface Area of Pond or Tank per application

Scenario Unit: Square Foot

Scenario Typical Size: 45239

Total Scenario Cost: $33,395.87

Scenario Cost/Unit: $0.74

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Equipment Operators, Light	232	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12”, Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	$25.96	16	$415.33
Equipment Installation						
Brush Chipper, 6" capacity	938	Brush Chipper, 6" capacity, typically 35 HP. Includes chipper and power unit. Labor not included.	Hour	$21.20	40	$848.02
Tractor, agricultural, 120 HP	962	Agricultural tractor with horsepower range of 90 to 140. Equipment and power unit costs. Labor not included.	Hour	$57.58	16	$921.24
Mobilization						
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$171.69	8	$1,373.55
Materials						
Straw	1237	Small grain straw (non organic and certified organic). Includes materials only.	Ton	$122.89	242.8	$29,837.74

Practice: 629 - Waste Treatment

Scenario: #8 - Swine Waste, Phosphorus Reduction System

Scenario Description: This practice scenario includes infrastructure to remove phosphorus from swine operation wastewater in watersheds with limited land for application and the phophorus index is rated High or greater. The purpose of the practice is to address resource concerns related to water quality degradation (excess nutrients). Associated practices: Nutrient Management (590), Waste Storage Facility (313), Irrigation Water Conveyance, Pipeline (430), Irrigation System, Spinkler (442), Irrigation System, Microirrigation (442)

Before Situation: Untreated wwine lagoon water is applied to fields in a watershed where the phosphorus index is rated High or greater.

After Situation: This scenario assumes that swine wastewater is treated with a phosphorus reduction system. The precipitated phosphorus, in the form of struvite, can be collected and sold to commercial fertilizer producers. The treated wastewater may be able to be agronomically applied at higher application rates and/or on fewer acres. This system has been shown to decrease movement of phosphorus particles into waterways.

Scenario Feature Measure: gallons per minute treated

Scenario Unit: Gallon per Minute

Scenario Typical Size: 600

Total Scenario Cost: $392,360.59

Scenario Cost/Unit: $653.93

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Labor						
Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	803.5	$33,898.25
Specialist Labor	235	Labor requiring a specialized skill set: Includes Agronomists, Foresters, Biologists, etc. to provide additional technical information during the planning and implementation of the practice. Does not include NRCS or TSP services.	Hour	$108.54	149.2	$16,194.78
Mobilization						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	1	$487.39
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	7442	$7,442.00
Materials						
Struvite extraction system	1865	Struvite extraction system (magnesium ammonium phosphate) Phred components including fabricated parts, off the shelf parts, and installation materials.	Each	$334,338.17	1	$334,338.17

Practice: 629 - Waste Treatment

Scenario: #9 - Dairy - MHMP STS Leaching Galleries

Scenario Description: This practice scenario consists of a subsurface treatment system using leaching galleries to treat wastewater from a small milk house and milking parlor. This system would apply to small dairy farms (up to 25 cows). This system assumes manure is scraped and removed. Raw milk also should not be allowed into this treatment system. Scraped manure and raw milk should be handled using other practices such as 313 Waste Storage Facility. Leaching galleries may be used where the following minimum separations can be achieved to the bottom of the gallery: two feet to seasonal high groundwater and four feet to bedrock. Possible associated practices include but are not limited to 533 Pumping Plant, 342 Critical Area Planting, 634 Waste Transfer. 313 Waste Storage Facility, or 362 Diversion.

Before Situation: Milkhouse waste water currently outlets in an untreated manner which presents potential soil, water and air quality concerns..

After Situation: This scenario assumes that the treatment system has a design flow of 200 gal/day of wastewater from the milkhouse and milking parlor. Using typical soil conditions and typical waste characteristics this equates to approximately 750 sf of leaching area necessary. It assumes pre-treatment in two tanks. The grease trap acts as the primary settling basin. The secondary settling tank is equiped with an effluent filter. The wastewater then goes to a distribution box that apportions the wastewater to the subsurface treatment system consisting of leaching galleries with 1 foot of 1"stone either side. The combination of leaching gallery and stone treats 8.8 sf of leaching area per linear foot. This practice scenario reduces nutrient content, organic strength, or pathogen levels of agricultural waste; improves air quality by reducing odors and gaseous emissions (methane or ammonia).

Scenario Feature Measure: Design Flow in Gallons per Day

Scenario Unit: Gallon per Day

Scenario Typical Size: 200

Total Scenario Cost: $18,127.23

Scenario Cost/Unit: $90.64

Cost Details

Component Name	Id	Description	Unit	Cost	Qty	Total
Equipment Installation						
Concrete, CIP, formed reinforced	38	Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic Yard	$511.29	0.2	$102.26
Earthfill, Manually Compacted	50	Earthfill, manually compacted, includes equipment and labor	Cubic Yard	$5.90	130	$767.07
Excavation, common earth, large equipment, 150 ft	1223	Bulk excavation of common earth including sand and gravel with dozer >100 HP with average push distance of 150 feet. Includes equipment and labor.	Cubic Yard	$3.77	200	$753.24
Stripping and stockpiling, topsoil	1199	Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor.	Cubic Yard	$0.89	48	$42.54
Trenching, Earth, 12" x 48"	53	Trenching, earth, 12" wide x 48" depth, includes equipment and labor for trenching and backfilling	Foot	$1.39	150	$207.98
Materials						
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic Yard	$36.06	5	$180.31
Aggregate, Gravel, Ungraded, Quarry Run	1099	Includes materials, equipment and labor	Cubic Yard	$24.86	8	$198.88
Aggregate, Sand, Graded, Washed	45	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic Yard	$35.58	16	$569.26
Filter, effluent, municipal grade	2063	Effluent filter rated 8,000 to 10,000 gallons per day with 1/16" to 1/32" filtration. Includes materials and shipping only.	Each	$355.12	1	$355.12
Geotextile, non-woven, light weight	1209	Non-woven less than 8 ounce/square yard geotextile with staple anchoring. Materials and shipping only.	Square Yard	$1.17	60	$70.38
Leaching Galley, 4' X 4' X 3'	2575	Leaching galley, precast concrete 4' x 4' x 3', Materials only.	Each	$241.57	22	$5,314.54
Pipe, PVC, 4", SCH 40	978	Materials: - 4" - PVC - SCH 40 - ASTM D1785	Foot	$4.18	150	$627.03
Prefabricated concrete septic tank, 1500 gal	1738	Precast concrete septic tank, 1,500 gal. Materials only.	Each	$1,663.59	2	$3,327.18

Riser, Septic Tank	2067	24" HDPE riser with cover. Materials only.	Each	$171.77	5	$858.86

Labor

Skilled Labor	230	Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	$42.19	64	$2,700.05

Mobilization

Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	$487.39	2	$974.78
Mobilization, Material, distance > 50 miles	1043	Mobilization cost of materials for special cases where the distance from the supplier delivery point to the job site exceeds 50 miles. The costs for shipping by UPS or bulk freight shipping to a location within 50 miles of the job site have already been included in the component price.	Dollar	$1.00	250	$250.00
Mobilization, small equipment	1138	Equipment <70 HP but can't be transported by a pick-up truck or with typical weights between 3,500 to 14,000 pounds.	Each	$171.69	4	$686.77
Mobilization, very small equipment	1137	Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously.	Each	$70.49	2	$140.98