

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	5
Scenario Name	Medium Complete Mix 1000-2500 AU
Scenario Description	A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems between 1,000 and 2,500 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical Design Scenario: 1,890 animal units (1,350 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	1,890

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$779,489.00	\$412.43
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$768.08	\$0.41
Acquisition of Technical Knowledge	\$233.34	\$0.12
Foregone Income	\$0.00	\$0.00
Total	\$780,490.42	\$412.96

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1658	Complete Mix Flare, medium	Flare excess gas to convert from methane to carbon dioxide (1000-2000 AU). Includes labor and equipment.	Each	\$12,313.00	1	\$12,313.00
Materials	1657	Complete Mix Control Building, medium	Controls for operating digester and boiler system (1000-2000 AU). Includes labor and equipment.	Each	\$69,259.00	1	\$69,259.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Materials	1656	Complete Mix Gas Collection System, medium	Piping and collection system for biogas. Includes labor and equipment (1000-2000 AU).	Each	\$40,273.00	1	\$40,273.00
Materials	1655	Complete Mix Heat Piping System, medium	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (1000-2000 AU). Includes labor and equipment.	Each	\$191,680.00	1	\$191,680.00
Materials	1654	Complete Mix Digester, medium	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks (1000-2000 AU). Sized for medium sized livestock operations (1000-2500 AU). Includes labor and equipment.	Each	\$444,064.00	1	\$444,064.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	4	\$370.40
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	4
Scenario Name	Small Complete Mix <1000 AU
Scenario Description	A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems with less than 1,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical Design Scenario: 1,039 animal units (742 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	1,039

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$674,090.00	\$648.79
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$582.88	\$0.56
Acquisition of Technical Knowledge	\$233.34	\$0.22
Foregone Income	\$0.00	\$0.00
Total	\$674,906.22	\$649.57

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1649	Complete Mix Digester, small	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks (<1000 AU). Sized for smaller livestock operations (<1000 AU). Includes labor and equipment.	Each	\$393,903.00	1	\$393,903.00
Materials	1650	Complete Mix Heat Piping System, small	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (<1000 AU). Includes labor and equipment.	Each	\$138,494.00	1	\$138,494.00
Materials	1651	Complete Mix Gas Collection System, small	Piping and collection system for biogas (<1000 AU). Includes labor and equipment.	Each	\$38,221.00	1	\$38,221.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Materials	1653	Complete Mix Flare, small	Flare excess gas to convert from methane to carbon dioxide (<1000 AU). Includes labor and equipment.	Each	\$12,313.00	1	\$12,313.00
Materials	1652	Complete Mix Control Building, small	Controls for operating digester and boiler system (<1000 AU). Includes labor and equipment.	Each	\$69,259.00	1	\$69,259.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	2	\$185.20
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34

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Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	6
Scenario Name	Large Complete Mix >2,500 AU
Scenario Description	A complete mix anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for complete mix systems with more than 2,500 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A complete mix digester is typically a round above ground structure constructed of concrete or steel. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical Design Scenario: 3,220 animal units (2,300 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	3,220

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,047,190.00	\$325.21
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$953.28	\$0.30
Acquisition of Technical Knowledge	\$233.34	\$0.07
Foregone Income	\$0.00	\$0.00
Total	\$1,048,376.62	\$325.58

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1663	Complete Mix Flare, large	Flare excess gas to convert from methane to carbon dioxide (>2000 AU). Includes labor and equipment.	Each	\$19,495.00	1	\$19,495.00
Materials	1659	Complete Mix Digester, large	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks (>2000 AU). Sized for large livestock operations (>2500 AU). Includes labor and equipment.	Each	\$536,018.00	1	\$536,018.00
Materials	1662	Complete Mix Control Building, large	Controls for operating digester and boiler system (>2000 AU). Includes labor and equipment.	Each	\$157,853.00	1	\$157,853.00
Materials	1660	Complete Mix Heat Piping System, large	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (>2000 AU). Includes labor and equipment.	Each	\$236,764.00	1	\$236,764.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Materials	1661	Complete Mix Gas Collection System, large	Piping and collection system for biogas (>2000 AU). Includes labor and equipment.	Each	\$75,160.00	1	\$75,160.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	6	\$555.60
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34

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Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	7
Scenario Name	Covered Lagoon/Holding Pond
Scenario Description	A covered lagoon can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for all livestock operation sizes. The waste holding/treatment area is covered by waste treatment lagoon (359) or waste storage facility (313) and the cover is addressed under roofs and covers (367). Selection of digester type will be based on effluent consistency. Costs for this scenario are only for system controls, gas collection, and flaring system. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A covered lagoon/holding pond typically has a flexible top installed over an earthen storage/treatment facility for the purpose of capturing the biogas. Typical Design Scenario: 1,000 animal units (715 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	1,000

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$119,793.00	\$119.79
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$236.48	\$0.24
Acquisition of Technical Knowledge	\$116.67	\$0.12
Foregone Income	\$0.00	\$0.00
Total	\$120,146.15	\$120.15

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1666	Covered Lagoon Flare	Flare excess gas to convert from methane to carbon dioxide. Includes labor and equipment.	Each	\$12,313.00	1	\$12,313.00
Materials	1665	Covered Lagoon Control Building	Controls for operating the digester system. Includes labor and equipment.	Each	\$69,259.00	1	\$69,259.00
Materials	1664	Covered Lagoon Gas Collection System	Piping and collection system for biogas. Includes labor and equipment.	Each	\$38,221.00	1	\$38,221.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	2	\$185.20
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	1	\$116.67

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	1
Scenario Name	Small Plug Flow <1000 AU
Scenario Description	A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for a plug flow digester with less than 1,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical Design Scenario: 910 animal units (650 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	910

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$280,187.00	\$307.90
Equipment/Installation	\$316,874.00	\$348.21
Labor	\$0.00	\$0.00
Mobilization	\$582.88	\$0.64
Acquisition of Technical Knowledge	\$233.34	\$0.26
Foregone Income	\$0.00	\$0.00
Total	\$597,877.22	\$657.01

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1635	Plug Flow Heat Piping System, small	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (<1000 AU). Includes labor and equipment.	Each	\$138,494.00	1	\$138,494.00
Materials	1638	Plug Flow Flare, small	Flare excess gas to convert from methane to carbon dioxide (<1000 AU). Includes labor and equipment.	Each	\$12,313.00	1	\$12,313.00
Materials	1637	Plug Flow Control Building, small	Controls for operating digester and boiler system (<1000 AU). Includes labor and equipment.	Each	\$69,259.00	1	\$69,259.00
Materials	1636	Plug Flow Gas Collection System, small	Piping and collection system for biogas (<1000 AU). Includes labor and equipment.	Each	\$38,221.00	1	\$38,221.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Equipment/Installation	1634	Small Plug Flow Digester	Concrete plug flow anaerobic digester which includes poured walls, floor and top. Sized for smaller livestock operations (<1000 AU). Also included are any necessary reception and mixing tanks. Includes labor and equipment.	Each	\$316,874.00	1	\$316,874.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	2	\$185.20
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	2
Scenario Name	Medium Plug Flow 1000-2000 AU
Scenario Description	A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for plug flow digesters with livestock operations between 1,000 and 2,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical design scenario: 1,750 animal units (1,250 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	1,750

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$825,474.00	\$471.70
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$768.08	\$0.44
Acquisition of Technical Knowledge	\$233.34	\$0.13
Foregone Income	\$0.00	\$0.00
Total	\$826,475.42	\$472.27

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1643	Plug Flow Flare, medium	Flare excess gas to convert from methane to carbon dioxide (1000-2000 AU). Includes labor and equipment.	Each	\$12,313.00	1	\$12,313.00
Materials	1642	Plug Flow Control Building, medium	Controls for operating digester and boiler system (1000-2000 AU). Includes labor and equipment.	Each	\$69,259.00	1	\$69,259.00
Materials	1641	Plug Flow Gas Collection System, medium	Piping and collection system for biogas (1000-2000 AU). Includes labor and equipment.	Each	\$40,273.00	1	\$40,273.00
Materials	1640	Plug Flow Heat Piping System, medium	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (1000-2000 AU). Includes labor and equipment.	Each	\$191,680.00	1	\$191,680.00
Materials	1639	Plug Flow Digester, medium	Concrete plug flow anaerobic digester which includes poured walls, floor and top. Sized for medium sized livestock operations (1000-2000 AU). Also included are any necessary reception and mixing tanks. Includes labor and equipment.	Each	\$490,049.00	1	\$490,049.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	4	\$370.40
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	Appalachian
State	North Carolina
Discipline Group	Environmental Engineering
Practice Code/Name	366 - Anaerobic Digester
Scenario ID	3
Scenario Name	Large Plug Flow >2000 AU
Scenario Description	A plug flow anaerobic digester can be part of a waste management system. It provides biological treatment of the waste in the absence of oxygen. This process for manure and other byproducts of animal agricultural operations will manage odors, reduce the net effect of greenhouse gas emissions, and/or reduce pathogens. This scenario is for plug flow digesters with more than 2,000 animal units. Selection of digester type will be based on effluent consistency. Energy generation is not included with this scenario. Potential Associated Practices: Fence (382), Critical Area Planting (342), Nutrient Management (590), Waste Transfer (634), Heavy Use Area Protection (561), Roof and Covers (367), Solid/Liquid Waste Separation Facility (632), Waste Treatment Lagoon (359), and Waste Storage Facility (313).
Before Practice Situation	Manure and other agricultural by-products are not being utilized or controlled in an environmentally safe manner. The wastes are either accumulating at the source, or other location, or are being transported but not properly utilized or disposed of. This situation poses an environmental threat of excessive nutrients, organics, and pathogens being transported into surface and ground waters, in addition to the use of excessive amounts of fertilizers. The treatment of manure and other agricultural by-products is desired in order to manage odors, and/or reduce pathogens.
After Practice Situation	Manure and other agricultural by-products are being treated such that odors are managed and/or pathogens are reduced. Effluent from the digester is disposed of or utilized in a proper manner in accordance with a nutrient management plan. A plug flow digester is typically constructed of concrete with vertical side walls and solid or flexible top. The typical scenario also includes items necessary to maintain mesophilic or thermophilic temperatures for bacterial activity (i.e. piping and boiler or other heat source). Typical Design Scenario: 3,920 animal units (2,800 - 1,400 lbs dairy cows).
Scenario Feature Measure	Animals Units Contributing to Digester
Scenario Unit	Animal Unit
Scenario Typical Size	3,920

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,063,865.00	\$271.39
Equipment/Installation	\$0.00	\$0.00
Labor	\$0.00	\$0.00
Mobilization	\$953.28	\$0.24
Acquisition of Technical Knowledge	\$233.34	\$0.06
Foregone Income	\$0.00	\$0.00
Total	\$1,065,051.62	\$271.70

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Materials	1648	Plug Flow Flare, large	Flare excess gas to convert from methane to carbon dioxide (>2000 AU). Includes labor and equipment.	Each	\$22,943.00	1	\$22,943.00
Materials	1647	Plug Flow Control Building, large	Controls for operating digester and boiler system (>2000 AU). Includes labor and equipment.	Each	\$170,946.00	1	\$170,946.00
Materials	1646	Plug Flow Gas Collection System, large	Piping and collection system for biogas (>2000 AU). Includes labor and equipment.	Each	\$88,450.00	1	\$88,450.00
Materials	1645	Plug Flow Heat Piping System, large	Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operation (>2000 AU). Includes labor and equipment.	Each	\$269,577.00	1	\$269,577.00
Materials	1644	Plug Flow Digester, large	Concrete plug flow anaerobic digester which includes poured walls, floor and top. Sized for large livestock operations (>2000 AU). Also included are any necessary reception and mixing tanks. Includes labor and equipment.	Each	\$490,049.00	1	\$490,049.00
Materials	2019	Boiler	Typical boiler needed to maintain digester temperature.	Each	\$21,900.00	1	\$21,900.00
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$92.60	6	\$555.60
Mobilization	1140	Mobilization, large equipment	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$173.20	2	\$346.40
Mobilization	1137	Mobilization, very small equipment	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	\$25.64	2	\$51.28
Acquisition of Technical Knowledge	294	Training, Workshops	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$116.67	2	\$233.34