

**Practice: 366 - Anaerobic Digester**

**Scenario: #1 - Small Plug Flow <1000 AU**

**Scenario Description:**

A plug flow anaerobic digester that is part of a waste management system for the 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 for a livestock operation with less than 1,000 animal units. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure: Animals Units Contributing to Digester**

**Scenario Unit: Animal Unit**

**Scenario Typical Size: 910**

**Scenario Cost: \$643,911.33**

**Scenario Cost/Unit: \$707.59**

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Plug Flow, Small (less than 1,000 animal units)	2478	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	#####	1	\$642,998.32
<b>Mobilization</b>						
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	\$71.49	1	\$71.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28

**Practice: 366 - Anaerobic Digester**

**Scenario: #2 - Medium Plug Flow 1000-2000 AU**

**Scenario Description:**

A plug flow anaerobic digester that is part of a waste management system for the 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 for a livestock operation with 1,000 to 2,000 animal units. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure:** Animals Units Contributing to Digester

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 1,750

**Scenario Cost:** \$881,194.74

**Scenario Cost/Unit:** \$503.54

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Plug Flow, Medium (between 1,000 and 2,000 animal units)	2479	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	#####	1	\$880,281.73
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
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	\$71.49	1	\$71.49
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28

**Practice: 366 - Anaerobic Digester**

**Scenario: #3 - Large Plug Flow >2000 AU**

**Scenario Description:**

A plug flow anaerobic digester that is part of a waste management system for the 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 for a livestock operation with more than 2,000 animal units. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure:** Animals Units Contributing to Digester

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 3,920

**Scenario Cost:** \$1,318,383.23

**Scenario Cost/Unit:** \$336.32

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Plug Flow, Large (more than 2,000 animal units)	2480	Concrete plug flow anaerobic digester which includes poured walls, floor and top, reception and mixing tanks, piping installed in and/or around the digester for circulating heated liquid to maintain the necessary temperatures for efficient digester operat	Each	#####	1	#####
<b>Mobilization</b>						
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	\$71.49	1	\$71.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28

**Practice: 366 - Anaerobic Digester**

**Scenario: #4 - Small Complete Mix <1000 AU**

**Scenario Description:**

A complete mix anaerobic digester that is part of a waste management system for the 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 complete mix system for a livestock operation with less than 1,000 animal units. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure: Animals Units Contributing to Digester**

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 1,039

**Scenario Cost:** \$738,679.03

**Scenario Cost/Unit:** \$710.95

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Complete Mix, Small (less than 1,000 animal units)	2481	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	#####	1	\$737,766.02
<b>Mobilization</b>						
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
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	\$71.49	1	\$71.49

**Practice: 366 - Anaerobic Digester**

**Scenario: #5 - Medium Complete Mix 1000-2000 AU**

**Scenario Description:**

A complete mix anaerobic digester that is part of a waste management system for the 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 complete mix system for a livestock operation with 1,000 to 2,000 animal units. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure: Animals Units Contributing to Digester**

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 1,890

**Scenario Cost:** \$1,288,587.70

**Scenario Cost/Unit:** \$681.79

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Complete Mix, Medium (between 1,000 and 2,500 animal units)	2482	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	#####	1	#####
<b>Mobilization</b>						
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	\$71.49	1	\$71.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28

**Practice: 366 - Anaerobic Digester**

**Scenario: #6 - Large Complete Mix >2,000 AU**

**Scenario Description:**

A complete mix anaerobic digester that is part of a waste management system for the 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 complete mix system for a livestock operation with more than 2,000 animal units. Energy generation is not included with this scenario.

**Before 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 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 mesophylic or thermophylic 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).

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).

**Scenario Feature Measure:** Animals Units Contributing to Digester

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 3,220

**Scenario Cost:** \$1,496,414.31

**Scenario Cost/Unit:** \$464.72

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	2	\$88.36
<b>Equipment/Installation</b>						
Complete Mix, Large (more than 2,500 animal units)	2483	A complete mix flow anaerobic digester includes the containment facility, agitation or stirring equipment, and any necessary reception and mixing tanks, Piping installed in and/or around the digester for circulating heated liquid to maintain the necessary	Each	#####	1	#####
<b>Mobilization</b>						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88
Mobilization, large equipment	1140	Equipment >150HP or typical weights greater than 30,000 pounds or loads requiring over width or over length permits.	Each	\$494.28	1	\$494.28
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	\$71.49	1	\$71.49

**Practice: 366 - Anaerobic Digester**

**Scenario: #7 - Covered Lagoon/Holding Pond**

**Scenario Description:**

A covered lagoon that is part of a waste management system to provide 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. Scenario applies to retrofitting an existing anaerobic lagoon, or as an addition to a new construction using waste treatment lagoon (359) or waste storage facility (313), and roofs and covers (367). Payment includes system controls, gas collection, and flaring system. Energy generation is not included with this scenario.

**Before 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 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).

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).

**Scenario Feature Measure:** Animals Units Contributing to Digester

**Scenario Unit:** Animal Unit

**Scenario Typical Size:** 1,000

**Scenario Cost:** \$107,374.55

**Scenario Cost/Unit:** \$107.37

**Cost Details (by category):**

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<b>Acquisition of Technical Knowledge</b>						
Training, Workshops	294	Educational seminar or series of meetings emphasizing interaction and exchange of information among a usually small number of participants.	Each	\$44.18	1	\$44.18
<b>Equipment/Installation</b>						
Covered Lagoon (not including the lagoon or the associated cover)	2484	Piping and collection system for biogas, controls for operating the digester system, flare excess gas to convert from methane to carbon dioxide Includes material, labor, and equipment.	Each	#####	1	\$107,000.00
<b>Mobilization</b>						
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	\$71.49	1	\$71.49
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$258.88	1	\$258.88