

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	6
Scenario Name	Agrichemical Storage & Handling for Greenhouses

Scenario Description	This practice scenario is an agrichemical storage and handling facility for mixing and loading operations within a greenhouse. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)
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Before Practice Situation	Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.
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After Practice Situation	This scenario is an agrichemical handling facility storage an impermeable barrier poly pad for mixing and loading operations. The average size of the agrichemical handling storage is for a pallet drum on a 5 ft x 5 ft containment pallet with sump capacity included. A poly pad is used for mixing and loading that is 8ft x 8ft with an application equipment length of 4 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.
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Scenario Feature Measure	Storage Containment Area + Handling pad
Scenario Unit	Square Foot
Scenario Typical Size	89

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,650.90	\$18.55
Equipment/Installation	\$0.00	\$0.00
Labor	\$205.68	\$2.31
Mobilization	\$0.00	\$0.00
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$1,856.58	\$20.86

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1610	2 Drum Spill Pallet, 66 Gallon	Pre fabricated containment basin with a capacity of approximately 66 gal. Materials only.	Each	\$428.50	1	\$428.50		2- 55 gallon drum agrichemicals requiring containment
Materials	1611	PVC Containment Basin, 6' x 6'	Poly containment basin typically 8" to 12" deep with area dimensions in the range of 6' x 6' or larger.	Square Foot	\$19.10	64	\$1,222.40		mixing and loading of equipment containment pad
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	8	\$205.68	setting up site for placement of agrichemical storage and handling storage and containment	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	1
Scenario Name	Agrichemical Storage with Handling Pad inside an enclosed building
Scenario Description	This practice scenario is an agrichemical handling facility for storage and mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, storing and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Roof Runoff Management (558), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)
Before Practice Situation	Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.
After Practice Situation	An agrichemical storage and handling facility is constructed inside an enclosed building. The average size of the agrichemical handling facility for storage and mixing and loading is 35' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading with proper storage of associated dry and/or liquid agrichemicals. The concrete is sealed and sloped to a collection sump, facility containment is surrounded by square and ramped curbs. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.
Scenario Feature Measure	Total Containment Area
Scenario Unit	Square Foot
Scenario Typical Size	1400

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$19,586.80	\$13.99
Equipment/Installation	\$10,635.79	\$7.60
Labor	\$753.44	\$0.54
Mobilization	\$461.56	\$0.33
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$31,437.59	\$22.46

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	1499	Emergency shower and eye wash station	Emergency shower and eye wash station unit. Materials only.	Each	\$655.98	1	\$655.98	Provide safety features for AHF	1 shower and eyewash station
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	22	\$587.62	4" compacted sand under concrete slab	[35 ft x 40 ft x 4"/12] / 27 = 17.3 cy (use 22cy due to compaction)
Materials	1046	Post Frame Building, enclosed 4 sides	Enclosed post frame building, four walls. Includes materials, labor and equipment costs.	Square Foot	\$9.77	1760	\$17,195.20	Metal sides NEED to be included for walls	Building contains agrichemicals and protects operation from precipitation. Based on a 40 ft x 44 ft building
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	1400	\$1,148.00	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	Painting containment area 35 ft x 40 ft for mixing and loading and storage of agrichemicals

Equipment/Installation	37	Concrete, CIP, slab on grade, reinforced	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$316.71	17	\$5,384.07	5" concrete containment slab	slab size minus 1ft r/c curbing footer = [1050 sq.ft x 5"/12] / 27 = 16.2 cy concrete (use 16.5 cy)
Equipment/Installation	929	Dozer, 80 HP	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$55.58	4	\$222.32	half day to clean up site to grade surrounding area and provide drainage away from agrichemical storage site (dozer 4 hrs)	
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	10	\$5,029.40	1 ft reinforced concrete wall around facility for containment building walls are independent of containment area	150 linear feet of curbing x 0.067 cy/ft of wall = 10.05 cy (use 10cy)
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	4	\$136.40	dozer hrs for final grading and shaping	
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	24	\$617.04	Labor for installation of emergency shower and eyewash station	Assumes 3 days to install shower and eyewash station (at common labor rate - could be less if skilled labor rate available)

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	2
Scenario Name	Earthen Liquid Agrichemical Storage with a Handling Pad

Scenario Description	This practice scenario is an agrichemical handling facility for storage of liquid agrichemicals along with a mixing and loading pad. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A)
Before Practice Situation	Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.
After Practice Situation	An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in an earthen lined containment with bottom dimensions of 30 ft x 40 ft. A handling pad for mixing and loading is located next to the liquid containment and is 20' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure	Floor surface area of Liquid Containment Area + Handling pad
Scenario Unit	Square Foot
Scenario Typical Size	2000

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,253.07	\$0.63
Equipment/Installation	\$7,216.62	\$3.61
Labor	\$205.68	\$0.10
Mobilization	\$700.58	\$0.35
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$9,375.95	\$4.69

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	13	\$347.23	4" compacted sand under concrete slab	[20 x 40 x 4"/12] / 27 = 9.8 cy (use 13 cy due to compaction)
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	9	\$249.84	pea gravel under liquid agrichemical tanks	2 horizontal tanks; 30ft x 8ft with 6" of pea gravel under tank. 120cf/27 = 4.5 cy x 2 tanks = 9cy
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	800	\$656.00	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	painting only the 20 ft x 40 ft mixing and loading pad

Equipment/Installation	48	Excavation, Common Earth, side cast, small equipment	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.16	235	\$507.60	excavation of liquid containment area	3:1 side slopes; top dimensions are 50ft x 60ft with 3 ft depth = 235 cy
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	70	\$170.80	geotextile between liquid storage liner and pea gravel	30'x 10' / 9 = 33 sq.yds x 2 tanks = 66.6 sq.yds (use 70 sq.yds)
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	13	\$6,538.22	mix load pad only, 5" reinforced concrete	[20 x 40 x 5"/12] / 27 = 12.3 cy of concrete (use 13 cy)
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	8	\$205.68	labor to place pea gravel, paint concrete surface.	
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$274.33	2	\$548.66	Mob 45, 46 & 48	1 dozer for 45, and 1 backhoe for 46 & 48
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	\$75.96	2	\$151.92	Mob for concrete 38, geotextile 42	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	3
Scenario Name	Fabricated Liquid Agrichemical Storage with a Handling Pad

Scenario Description	This practice scenario is an agrichemical handling facility for storage of liquid agrichemicals along with a mixing and loading pad. Due to topography, limited site space and/or geological conditions a fabricated structure is needed. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A)
Before Practice Situation	Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.
After Practice Situation	An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in fabricated containment that is 30 ft x 40 ft with flexible membrane lined walls. The walls are of modular blocks stacked two for a 4ft wall height on four sides. A handling pad for mixing and loading is located next to the liquid containment and is 16' x 32' with an application equipment length of 28 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure	Liquid Containment Area + Handling Pad
Scenario Unit	Square Foot
Scenario Typical Size	1712

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$5,726.73	\$3.35
Equipment/Installation	\$10,804.89	\$6.31
Labor	\$464.00	\$0.27
Mobilization	\$613.48	\$0.36
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$17,609.10	\$10.29

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	27	\$721.17	4" compacted sand under concrete surfaces	[30ft x 40 ft x 4"12] +[16ft x 32ft x 4"/12]/27 = 21.1 cy (use 27 cy due to compaction)
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	4	\$111.04	8" pea gravel in liquid storage area for tank support under the tank	8 vertical tanks on a 4ft x 4ft x 8"/12 box of pea gravel (use 4 cy)
Materials	1496	Block, pre-cast concrete, modular	Pre-cast concrete blocks, typically 2ft x 2ft x 6ft, includes installation and delivery.	Cubic Yard	\$106.54	42	\$4,474.68	Modulare blocks are stacked 2 high = 4ft wall	modular blocks are 2ft x 2ft x 6ft dimensions; containment is 140 linear ft/ 6 ft block length = 23 blocks stacked 2 high = 47
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	512	\$419.84	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	painting only the 16 ft x 32 ft mixing and loading pad

Equipment/Installation	37	Concrete, CIP, slab on grade, reinforced	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$316.71	19	\$6,017.49	liquid agrichemical containment floor	[30ft x 40ft x 5"/12] / 27 = 18.5cy concrete (use 19 cy)
Equipment/Installation	929	Dozer, 80 HP	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$55.58	8	\$444.64	1/2 day to clean up site to grade surrounding area and provide drainage away from agrichemical storage site. 1/2 day to prepare mix/load pad site (dozer 8hrs)	
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	15	\$36.60	geotextile between liquid storage liner and pea gravel	8 vertical tanks in 4x4 box area; (4x4)x 8 tanks = 128 sqft/9 = 14.2 sq yds (use 15 sq.yds)
Equipment/Installation	38	Concrete, CIP, formed reinforced	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,	Cubic yard	\$502.94	8	\$4,023.52	reinforced concrete mixing and loading floor with formed curbs for containment	[16ft x 32ft x 5"/12] / 27 = 7.9 cy (use 8 cy)
Equipment/Installation	933	Skidsteer, 80 HP	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$35.33	8	\$282.64	grading and shaping of site 1-day	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	4
Scenario Name	Outdoor Liquid Agrichemical Storage with a Roofed Building for Dry Chemical Storage and Handling Pad

Scenario Description
 This practice scenario is an agrichemical handling facility for storage of liquid agrichemicals along with a roofed mixing and loading pad that is also sized to store dry chemicals. This practice addresses water quality degradation and due to mis-handling, storing, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Pond Sealing or Lining Flexible Membrane (521A), Roof Runoff Management (558)

Before Practice Situation
 Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Practice Situation
 An agrichemical handling facility is constructed for storage of liquid agrichemicals along with a roofed building to store dry agrichemicals with a handling pad for mixing and loading operations. The average size of the agrichemical handling facility for proper storage of liquid agrichemicals is in an earthen lined containment with bottom dimensions of 60 ft x 40 ft. A roofed building for dry agrichemicals and handling pad for mixing and loading is located next to the liquid containment and is 30' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is roofed and sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump, facility containment has at least two sides constructed of 5 ft post and plant walls. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure	Floor surface area of Liquid Containment Area + Handling pad
Scenario Unit	Square Foot
Scenario Typical Size	3600

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$22,662.07	\$6.30
Equipment/Installation	\$8,156.34	\$2.27
Labor	\$3,085.20	\$0.86
Mobilization	\$700.58	\$0.19
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$34,604.19	\$9.61

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	19	\$507.49	4" compacted sand under the concrete surfaces	[30ft x 40ft x 4"/12] / 27 = 14.8 cy (use 19 cy due to compaction)
Materials	46	Aggregate, Gravel, Graded	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.76	36	\$999.36	8" pea gravel to support liquid agrichemical tanks	4 horizontal tanks; 2 tanks: 60ft x 10ft; 2 tanks 20ft x 8ft. [60ft x 10ft x 8"/12] x 2+ [20ft x 8ft x 8"/12] x 2 = 1013.33 cuft/27 = 37.5cy (use 36 cy)

Materials	1046	Post Frame Building, enclosed 4 sides	Enclosed post frame building, four walls. Includes materials, labor and equipment costs.	Square Foot	\$9.77	2000	\$19,540.00	Roofed structure over dry chemicals and mix/load pad	roof structure is larger than containment area; 40ft x 50ft
Materials	1044	Dimension Lumber, Treated	Treated dimension lumber with nominal thickness equal or less than 2". Includes lumber and fasteners	Board Foot	\$0.74	853	\$631.22	5 ft treated post and plant walls; tongue & groove. On 2 sides of the building; each side is 40 ft	(2" x 8" boards x 80 linear feet of wall) / 12 = 106.67 BF x 8 boards needed to obtain 5ft wall height = 853.33 Board Feet
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	1200	\$984.00	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	Painting containment area 30 ft x 40 ft for mixing and loading and storage of agrichemicals
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	1.5	\$754.41	Freeformed 6" curbing around perimeter for containment inside building	[80' x 6"/12 x 1'] / 27 = 1.5cy
Equipment/Installation	48	Excavation, Common Earth, side cast, small equipment	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.16	380	\$820.80	liquid storage containment excavation	Top dimensions; 72ft x 52ft x 3ft deep; 3:1 sides slopes, bottom dimensions 60ft x 40ft. = 378.7 cy (use 380 cy)
Equipment/Installation	42	Geotextile, woven	Woven Geotextile Fabric. Includes materials, equipment and labor	Square Yard	\$2.44	231	\$563.64	geotextile between liquid storage liner and pea gravel- separation barrier	horizontal tanks are placed directly under the tanks for support; [60ft x 14ft] x 2 + [20ft x 10ft] x 2 = 2080 sqft/9 = 231 sq yds
Equipment/Installation	37	Concrete, CIP, slab on grade, reinforced	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$316.71	19	\$6,017.49	mixload pad concrete containment	[30ft x 40ft x 5"/12] / 27 = 18.5cy (use 19 cy)

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	5
Scenario Name	Agrichemical Handling Pad for mixing and loading

Scenario Description	This practice scenario is an agrichemical handling facility for mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water. Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595), Roofs and Covers (367)
Before Practice Situation	Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.
After Practice Situation	This scenario is an agrichemical handling facility pad for mixing and loading operations. The average size of the agrichemical handling pad for mixing and loading is 16' x 40' with an application equipment length of 36 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading. The concrete is sealed and sloped to a collection sump, containment of the pad is surrounded by sloped and ramped reinforced concrete. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure	Total Containment Area
Scenario Unit	Square Foot
Scenario Typical Size	640

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$791.90	\$1.24
Equipment/Installation	\$7,207.92	\$11.26
Labor	\$478.48	\$0.75
Mobilization	\$350.29	\$0.55
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$8,828.59	\$13.79

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	10	\$267.10	4 " compacted sand under concrete surface	[16ft x 40ft x 4"/12]/27 = 7.9 cy (use 10 cy due to compaction)
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	640	\$524.80	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	Painting containment area 16 ft x 40 ft for mixing and loading containment
Equipment/Installation	37	Concrete, CIP, slab on grade, reinforced	Steel reinforced concrete formed and cast-in-place as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$316.71	10	\$3,167.10	containment mix/load pad concrete	[16ft x 40ft x 5"/12]/27 = 9.8 cy
Equipment/Installation	929	Dozer, 80 HP	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$55.58	8	\$444.64	1/2 day for site preparation grading and 1/2 day for final shaping of site	

Equipment/Installation	48	Excavation, Common Earth, side cast, small equipment	Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor.	Cubic yard	\$2.16	35	\$75.60	Grade site - assumes 1ft average excavation depth to 2' beyond facility footprint to allow clearance for form work	(1'x20'x44')/27=32.6 - use 35CY
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	7	\$3,520.58	Formed 3'x3'x3' sump 8" concrete Formed 6" high straight perimeter curbs with footings Formed 4" high x 12' long drive-over curbs with footings	(((8/12)x12fx3ft side depth)+((8/12)x3'x'3 floor))/27 = 1.1 cy (88 lf x0.77 cf/lf)/27 = 2.5cy (24 lf x3 cf/lf)/27 = 2.7 cy - use 7 cy total
Labor	233	Equipment Operators, Heavy	Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons.	Hour	\$34.10	8	\$272.80	dozer operator hours	
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	8	\$205.68	site work, grade check	
Mobilization	1139	Mobilization, medium equipment	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$274.33	1	\$274.33	1 mob for dozer, 929	

Scenario Worksheet

Practice and Scenario Description:

Information Type	Data
Region	New England
State	Connecticut
Discipline Group	Environmental Engineering
Practice Code/Name	309 - Agrichemical Handling Facility
Scenario ID	7
Scenario Name	Agrichemical Storage with Handling Pad in an Existing Building

Scenario Description
 This practice scenario is an agrichemical handling facility for storage and mixing and loading operations. This practice addresses water quality degradation and due to mis-handling, storing and mixing of agrichemicals where nutrients and/or chemicals are running off into surface waters or leaching into ground water.
 Associated practices: Heavy Use Area Protection (561), Diversion (362), Access Road (560), Pipeline (516), Roof Runoff Management (558), Pumping Plant for Water Control (533), Nutrient Management (590), Pest Management (595)

Before Practice Situation
 Agrichemicals are improperly stored on the ground or next to a well. Operator mixes the agrichemicals and fills the sprayer tank next to a hydrant. Spills or overflows of agrichemicals contaminate the soil, runoff to surface waters and leaching to ground water.

After Practice Situation
 An agrichemical storage and handling facility is constructed inside an existing building. The average size of the agrichemical handling facility for storage and mixing and loading is 24 ft x 36 ft with an application equipment length of 30 ft. The handling pad for mixing and loading operations is sized to contain the length of the agrichemical spray tank and its volume. Install a curbed reinforced concrete handling pad for mixing and loading with proper storage of associated dry and/or liquid agrichemicals. The concrete is sealed and sloped to a collection sump, facility containment is surrounded by square and ramped curbs and independent of the existing building. This practice will contain agrichemicals and prevent contamination of surface and ground water resources.

Scenario Feature Measure	Total Containment Area
Scenario Unit	Square Foot
Scenario Typical Size	864

Cost Summary:

Cost Category	Scenario Cost	Scenario Cost/Unit
Materials	\$1,082.42	\$1.25
Equipment/Installation	\$9,152.01	\$10.59
Labor	\$745.96	\$0.86
Mobilization	\$537.52	\$0.62
Acquisition of Technical Knowledge	\$0.00	\$0.00
Foregone Income	\$0.00	\$0.00
Total	\$11,517.91	\$13.33

Cost Details:

Cost Category	Component ID	Component Name	Component Description	Unit	Price (\$/unit)	Quantity	Cost	Component Justification	Quantity Justification
Materials	45	Aggregate, Sand, Graded, Washed	Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place	Cubic yard	\$26.71	14	\$373.94	4" compacted sand under concrete slab	$[24 \text{ ft} \times 36 \text{ ft} \times 4"/12] / 27 = 10.7 \text{ cy}$ (use 14cy due to compaction)
Materials	1497	Painting, concrete surface, impermeable	Painting of concrete surfaces with an impermeable coating. Includes materials and application.	Square Foot	\$0.82	864	\$708.48	When fly ash or other approved concrete mix products are not used a concrete coating is required per cps 309	Painting containment area 24 ft x 36 ft for mixing and loading containment
Equipment/Installation	1498	Demolition, concrete	Demolition and disposal of reinforced concrete structures including slabs and walls. Includes labor and equipment.	Cubic Yard	\$16.99	7	\$118.93	removal of old concrete so an existing roofed structure can be utilized for proper storage and mixing and loading of agrichemicals	Assume existing concrete is 5" thick; $[24\text{ft} \times 36\text{ft} \times 5"/12] / 27 = 13.3 \text{ cy} \times 50\%$ (use 7 cy)

Equipment/Installation	37	Concrete, CIP, slab on grade, reinforced	Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish.	Cubic yard	\$316.71	14	\$4,433.94	5" concrete containment slab	[24ft x 36ft x 5"/12] / 27 = 13.3 cy (use 14 cy)
Equipment/Installation	929	Dozer, 80 HP	Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$55.58	4	\$222.32	1/2 day work reshaping area to grade	
Equipment/Installation	38	Concrete, CIP, formed reinforced	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	\$502.94	8	\$4,023.52	1 ft reinforced concrete wall around facility for containment building walls are independent of containment area	120 linear feet of curbing x 0.067 cy/ft of wall = 8 cy
Equipment/Installation	933	Skidsteer, 80 HP	Skidsteer loader with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included.	Hour	\$35.33	10	\$353.30	1 day work reshaping area	
Labor	232	Equipment Operators, Light	Includes: Skid Steer Loaders, Hydraulic Excavators <50 HP, Trenchers <12", Ag Equipment <150 HP, Pickup Trucks, Forklifts, Mulchers	Hour	\$23.90	14	\$334.60	dozer & skidsteer operator	
Labor	231	General Labor	Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc.	Hour	\$25.71	16	\$411.36	site work	