ERP Table 1

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW TYPE	IMPACT SIZE	IMPACT CODE	WL & SW TYPE	IMPACT SIZE	IMPACT CODE	
W1	441W	48.19	19.54		28.65					MA 1 / Enhancement
W1	630	84.21	76.32		7.89					MA 1 / Enhancement
W2	641	0.10	0.00		0.10					No mitigation required - Isolated, less than 0.5 acre
W3	441W	12.85	0.00		12.85					MA 1
W3	630	1.25	0.00		1.25					MA 1
W3	641	8.89	0.00		8.89					MA 1
W4	641	0.04	0.00		0.04					No mitigation required - Isolated, less than 0.5 acre
W5	630	119.27	10.50		108.77					MA 1 / Enhancement
W6	441W	13.29	9.04		4.25					MA 3 / Enhancement
W6	630	28.08	25.58		2.50					MA 3 / Enhancement
W7	441W	4.99	0.00		4.99					MA 1 / Enhancement
W7	630	4.90	0.00		4.90					MA 1 / Enhancement
W8	441W	0.41	0.00		0.41					MA 1 / Enhancement
W8	630	11.02	0.00		11.02					MA 1 / Enhancement
W9	441W	0.89	0.00		0.89					MA 1 / Enhancement
W9	641	2.88	0.00		2.88					MA 1 / Enhancement
W10	641	1.87	0.00		1.87					MA 2 / Enhancement
W11	630	0.40	0.00		0.40					No mitigation required - Isolated, less than 0.5 acre
W12	631	4.44	0.00		4.44					MA 1 / Enhancement
W13	631	0.02	0.00		0.02					No mitigation required - Isolated, less than 0.5 acre
W14	641	0.36	0.00		0.36					MA 1 / Enhancement
W15	631	0.08	0.08							Undisturbed
W16	631	12.57	1.19		11.38					MA 1 / Enhancement
W16	641	5.61	0.00		5.61					MA 1 / Enhancement
W17	441W	4.08	0.00		4.08					MA 4, 5, 6 / Enhancement
W18	441W	10.23	3.66		6.57					MA 4, 5, 6 / Enhancement
W18	630	0.29	0.00		0.29					MA 4, 5, 6 / Enhancement
W18	621	0.84	0.84							Undisturbed
W19	441W	63.03	4.54		58.49					MA 1 / Enhancement
W19	630	92.11	43.60		48.51					MA 1 / Enhancement
W19	641	26.42	0.00		26.42					MA 1 / Enhancement
W20	611	1.29	0.00		1.29					MA 1 / Enhancement
W21	630	98.32	37.81		60.51					MA 1 and 12 / Enhancement
W21	641	25.57	14.77		10.80					MA 1 / Enhancement
W22	441W	6.70	6.60		0.10					MA 11 / Enhancement
W22	630	8.48	8.37		0.11					MA 11 / Enhancement
W23	441W	0.67	0.00		0.67					MA 1 / Enhancement
W24	441W	89.37	53.42		35.95					MA 1 and 7 / Enhancement
W24	613	0.21	0.00		0.21					MA 7 / Enhancement
W24	630	241.56	172.82		68.74					MA 1 and 7 / Enhancement
W25	441W	0.23	0.00		0.23					MA 1 / Enhancement
W26	441W	10.89	4.74		6.15					MA 1 / Enhancement
W27	441W	9.82	0.00		9.82					MA 1 / Enhancement
W28	630	11.82	0.00		11.82					MA 1 / Enhancement
W29	441W	2.73	2.73							Undisturbed
W30	441W	0.87	0.00		0.87					MA 8 / Enhancement
W30	621	0.51	0.00		0.51					MA 8 / Enhancement
W31	621	1.67	1.67							Undisturbed
W32	630	2.77	0.00		2.77					MA 1 / Enhancement
W33	441W	15.28	5.33		9.95					MA 1 / Enhancement
W33	641	5.13	1.11		4.02					MA 1 / Enhancement
W34	441W	33.48	0.00		33.48					MA 1 / Enhancement
W34	630	46.42	0.00		46.42					MA 1 / Enhancement
W34	641	23.52	0.00		23.52					MA 1 / Enhancement
W35	441W	20.48	20.48							Undisturbed
W35	621	4.12	4.12							Undisturbed
W36	441W	4.33	3.04		1.29					MA 1 / Enhancement
W37	441W	0.52	0.00		0.52					MA 1 / Enhancement
W37	641	1.82	0.00		1.82					MA 10 / Enhancement
W38	441W	34.13	28.53		5.60					MA 1 / Enhancement
W38	630	8.33	8.33							Undisturbed
W39	641	0.43	0.00		0.43					MA 9 / Enhancement
W41	441W	1.72	0.00		1.72					MA 1 / Enhancement

ERP Table 1

WL & SW ID	WL & SW TYPE	WL & SW SIZE	WL & SW NOT IMPACTED	TEMPORARY WL & SW IMPACTS			PERMANENT WL & SW IMPACTS			MITIGATION AREA ID
				WL & SW	IMPACT	IMPACT	WL & SW	IMPACT	IMPACT	
				TYPE	SIZE	CODE	TYPE	SIZE	CODE	
W42	641	0.70	0.00		0.70					MA 1 / Enhancement
W43	641	1.16	0.00		1.16					MA 1 / Enhancement
W45	630	0.69	0.00		0.69					MA 1 / Enhancement
W46	630	0.06	0.06							Undisturbed
W47	630	0.33	0.33							Undisturbed
W48	630	2.34	2.34							Undisturbed
W49	441W	2.79	2.79							Undisturbed
W50	441W	0.37	0.37							Undisturbed
W51	630	1.48	1.48							Undisturbed
W52	441W	0.94	0.94							Undisturbed
W53	441W	72.26	72.26							Undisturbed
W53	621	4.30	4.30							Undisturbed
W53	630	33.38	33.38							Undisturbed
W54	441W	3.67	3.67							Undisturbed
W54	621	5.92	5.92							Undisturbed
W55	441W	11.55	11.55							Undisturbed
SW1	524	1.60	1.60							Undisturbed
SW2	524	0.67	0.00		0.67					No Mitigation required less than 1 ac
SW3	523	13.65	13.65							Undisturbed
D1	510d	0.43	0.00		0.43					Upland Cut Ditch - No Mitigation required
D1	510d	0.77	0.08		0.69					Wetland Cut Ditch - Enhancement
D2	510d	0.005	0.00		0.005					Upland Cut Ditch - No Mitigation required
D3	510d	0.34	0.00		0.34					Upland Cut Ditch - No Mitigation required
D3	510d	0.14	0.03		0.11					Wetland Cut Ditch - Enhancement
D4	510d	0.13	0.00		0.13					Upland Cut Ditch - No Mitigation required
D4	510d	0.12	0.00		0.12					Wetland Cut Ditch - Enhancement
D5	510d	0.17	0.00		0.17					Upland Cut Ditch - No Mitigation required
D5	510d	0.05	0.05							Wetland Cut Ditch - Undisturbed
D6	510d	0.01	0.00		0.01					Upland Cut Ditch - No Mitigation required
D7	510d	0.08	0.00		0.08					Upland Cut Ditch - No Mitigation required
D8	510d	0.08	0.00		0.08					Upland Cut Ditch - No Mitigation required
D8	510d	0.41	0.29		0.12					Wetland Cut Ditch - Enhancement
D9	510d	0.13	0.00		0.13					Wetland Cut Ditch - Enhancement
D10	510d	0.11	0.00		0.11					Upland Cut Ditch - No Mitigation required
D10	510d	0.07	0.00		0.07					Wetland Cut Ditch - Enhancement
D11	510d	0.11	0.02		0.09					Upland Cut Ditch - No Mitigation required
D11	510d	0.09	0.01		0.08					Wetland Cut Ditch - Enhancement
D12	510d	0.17	0.03		0.14					Upland Cut Ditch - No Mitigation required
D12	510d	0.001	0.001							Wetland Cut Ditch - Undisturbed
D13	510d	0.38	0.00		0.38					Upland Cut Ditch - No Mitigation required
D13	510d	0.05	0.00		0.05					Wetland Cut Ditch - Enhancement
D14	510d	0.01	0.00		0.01					Upland Cut Ditch - No Mitigation required
D14	510d	0.0002	0.00		0.0002					Wetland Cut Ditch - Enhancement
D15	510d	0.36	0.00		0.36					Wetland Cut Ditch - Enhancement
D16	510d	0.02	0.00		0.02					Upland Cut Ditch - No Mitigation required
D16	510d	0.01	0.00		0.01					Wetland Cut Ditch - Enhancement
D17	510d	0.04	0.00		0.04					Upland Cut Ditch - No Mitigation required
D17	510d	0.10	0.00		0.10					Wetland Cut Ditch - Enhancement
D18	510d	0.65	0.00		0.65					Upland Cut Ditch - No Mitigation required
D18	510d	0.15	0.00		0.15					Wetland Cut Ditch - Enhancement
D19	510d	0.29	0.00		0.29					Upland Cut Ditch - No Mitigation required
D19	510d	0.32	0.00		0.32					Wetland Cut Ditch - Enhancement
D20	510d	0.29	0.04		0.25					Upland Cut Ditch - No Mitigation required
D20	510d	0.68	0.14		0.54					Wetland Cut Ditch - Enhancement
D21	510d	0.09	0.03		0.06					Upland Cut Ditch - No Mitigation required
D21	510d	0.04	0.03		0.01					Wetland Cut Ditch - Enhancement
D22	510d	0.51	0.00		0.51					Upland Cut Ditch - No Mitigation required
D22	510d	0.13	0.00		0.13					Wetland Cut Ditch - Enhancement
D23	510d	0.04	0.01		0.03					Upland Cut Ditch - No Mitigation required
D23	510d	0.01	0.00		0.01					Wetland Cut Ditch - Enhancement
D24	510d	0.32	0.00		0.32					Upland Cut Ditch - No Mitigation required
D24	510d	0.72	0.00		0.72					Wetland Cut Ditch - Enhancement
D25	510d	9.32	0.00		9.32					Upland Cut Ditch - No Mitigation required
D26	510d	11.22	1.80		9.42					Upland Cut Ditch - No Mitigation required
D27	510d	2.58	0.00		2.58					Upland Cut Ditch - No Mitigation required
TOTALS										
		1466.41	**725.96**		**740.45**			**0.00**		

Wetland Type: from an established wetland classification system
Impact Type: D=dredge; F=Fill; H=change hydrology; S=shading; C=clearing; O=other

ERP Table 2

Mitigation Area ID	Creation		Restoration		Enhancement		Wetland Preserve		Upland Preserve	
	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE	AREA	TARGET TYPE
1A	36.21	630								
1B	46.78	630								
1B	13.18	641								
1C	65.40	630								
1D	48.25	630								
1D	3.25	641								
1D	1.29	611								
1E	55.18	630								
1E	6.38	641								
1F	32.23	630								
1F	0.94	641								
1G	29.57	630								
1G	2.89	641								
1H	7.67	630								
1I	21.94	630								
1J	12.64	630								
1K	34.16	630								
1K	28.27	641								
1L	57.52	630								
1M	34.86	630								
1N	8.55	630								
1O	5.49	630								
1O	0.29	641								
1P	13.99	630								
1P	9.45	641								
1Q	65.80	630								
1Q	1.44	641								
1R	10.67	630								
1R	15.89	641								
1S	1.81	630								
1T	5.61	630								
2	1.63	630								
2	1.55	641								
3	5.67	630								
4	1.65	630								
5	3.20	630								
6	7.43	630								
7	1.54	630								
7	0.21	613								
8	3.21	630								
8	0.51	621								
9	0.97	641								
10	4.12	641								
11	0.33	630								
12	0.97	630								
ENHANCEMENT					136.49	630				
Totals	**710.59**		**0.00**		**136.49**		**0.00**		**0.00**	

Table 3
Pre-Mining Land Use

FLUCFCS CODE	LAND USE	TOTAL ACREAGE	%
160	Extractive	117.06	4.06%
173	Military	6.88	0.24%
421	Xeric Oak	28.16	0.98%
434	Hardwood, Coniferous Mixed	4.04	0.14%
441	Confierous Plantation	1,216.91	42.19%
441W	Coniferous Plantations Wetland	480.76	16.67%
510d	Wetland Cut Ditches	31.75	1.10%
523	Lake>10 acres but<100 acres	13.65	0.47%
524	Lake<10 acres	2.27	0.08%
611	Bay Swamps	1.29	0.04%
613	Gum Swamps	0.21	0.01%
621	Cypress	17.36	0.60%
630	Wetland Forested Mixed	797.51	27.65%
631	Wetland Shrub	17.11	0.59%
641	Freshwater Marshes	104.50	3.62%
8146	Primitive Roads/Trails	44.94	1.56%
	Total	**2,884.40**	**100.00**

Table 4
Post-Mining Land Use

FLUCFCS CODE	LAND USE	TOTAL ACREAGE	%
411	Pine Flatwoods	954.99	33.11%
434	Hardwood, Coniferous Mixed	106.92	3.71%
524	Lake <10 acres	1.38	0.05%
611	Bay Swamps	1.29	0.04%
613	Gum Swamps	0.21	0.01%
621	Cypress	0.51	0.02%
630	Wetland Forested Mixed	619.96	21.49%
641	Freshwater Marshes	88.62	3.07%
8145	Graded and Drained	5.03	0.17%
8146	Primitive Roads/Trails	1.07	0.04%
600	Undisturbed Wetlands	708.15	24.55%
500	Undisturbed Surface Water	17.81	0.62%
400	Undisturbed Uplands	378.46	13.12%
	Total	**2884.40**	**100.00%**

Table 5
Mitigation Planting

LAND USE	PLANTING ZONE	Elevation Relative to Adjacent Uplands	SHWE	TREE SPECIES
630/611	A	± 1' lower	≤ 1' above ground surface	Sweet bay (*Magnolia virginiana*) Swamp bay (*Persea palustris*) Dahoon holly (*Ilex cassine*) Green ash (*Fraxinus pennsylvanica*) Sweet gum (*Liquidambar styraciflua*) Red maple (*Acer rubrum*)
613/621	B	± 2' lower	≤ 18" above ground surface	Bald cypress (*Taxodium distichum*) Pond cypress (*Taxodium ascendens*) Blackgum (*Nyssa sylvatica* var. *biflora*) Sweet bay (*Magnolia virginiana*) Swamp bay (*Persea palustris*) Green ash (*Fraxinus pennsylvanica*) Sweet gum (*Liquidambar styraciflua*)
641	C	± 3' lower	≤ 2' above ground surface	Natural herbaceous recruitement through topsoil/muck replacement

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Plant Site Boundary (± 44.1 Ac.)
- County Boundary
- Section, Township, Range

N

ORIGINAL MAP SIZE: 22" x 34"

0 650 1,300 Feet

1 inch = 1,300 feet

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FILE NAME:	See File Path

Location Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure **1**

Document Path: G:\DPT_CHM\FM\1_MXD\129491_TRS\2019 FDEP Application\ERP Application Figures\Fig 1_Location Map.mxd

2,-7,22
1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
8,-7,23
Bradford
Clay
14,-7,22
13,-7,22
18,-7,23
17,-7,23
23,-7,22
24,-7,22
19,-7,23
20,-7,23
25,-7,22
30,-7,23

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- County Boundary
- Section, Township, Range

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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Aerial Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure
2

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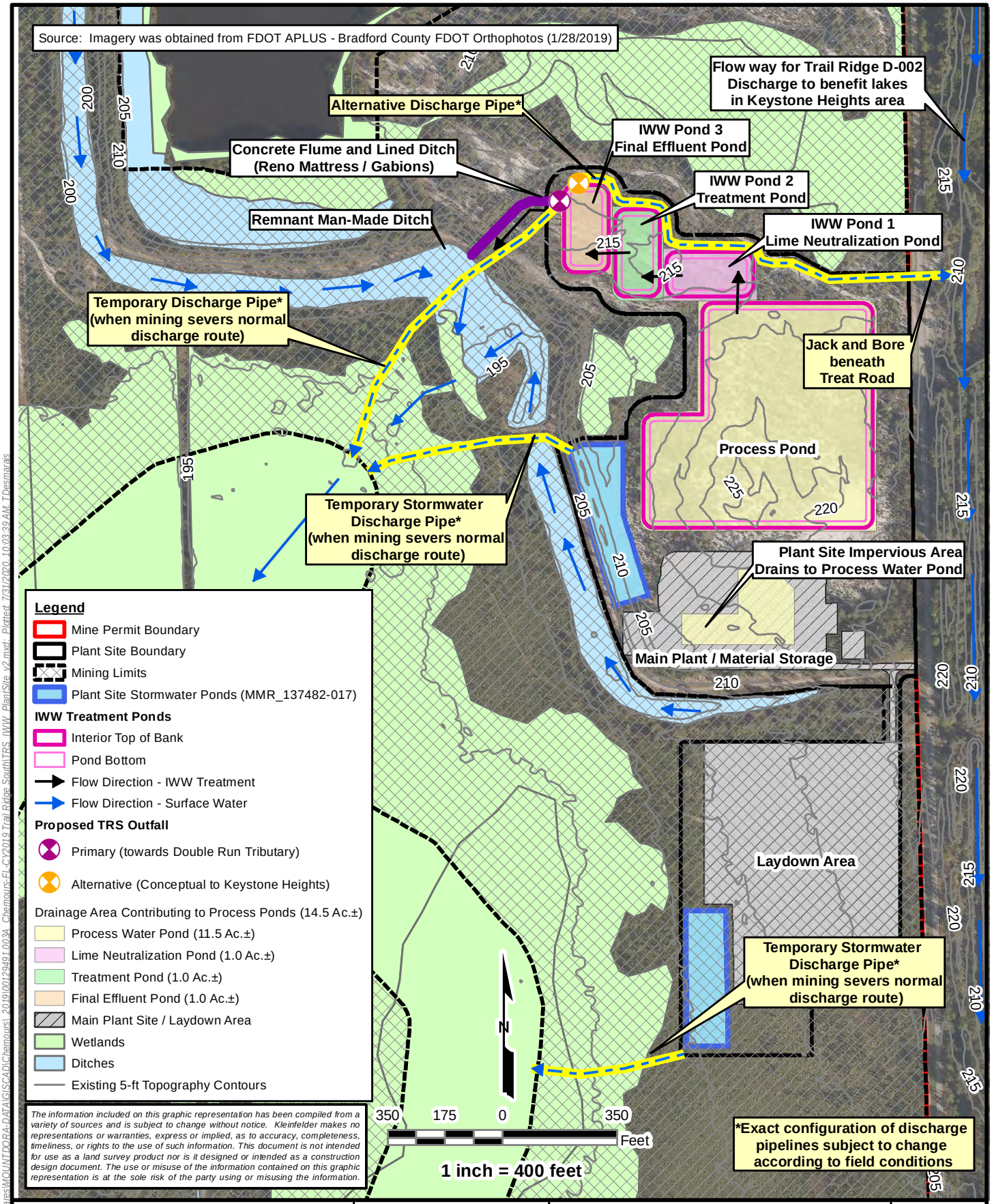

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FILE NAME:	TRS_IWW_PlantSite_v2.mxd

Plant Site Layout

Trail Ridge South
The Chemours Company FC, LLC
Bradford and Clay Counties, FL

FIGURE
2

Bradford

Clay

Legend

Mine Permit Boundary (± 2,884.4 Ac.)

County Boundary

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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Source: Imagery was obtained from USGS Topographic Map, Starke and Keystone Heights Quadrangles.

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USGS Topographic Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure **3**

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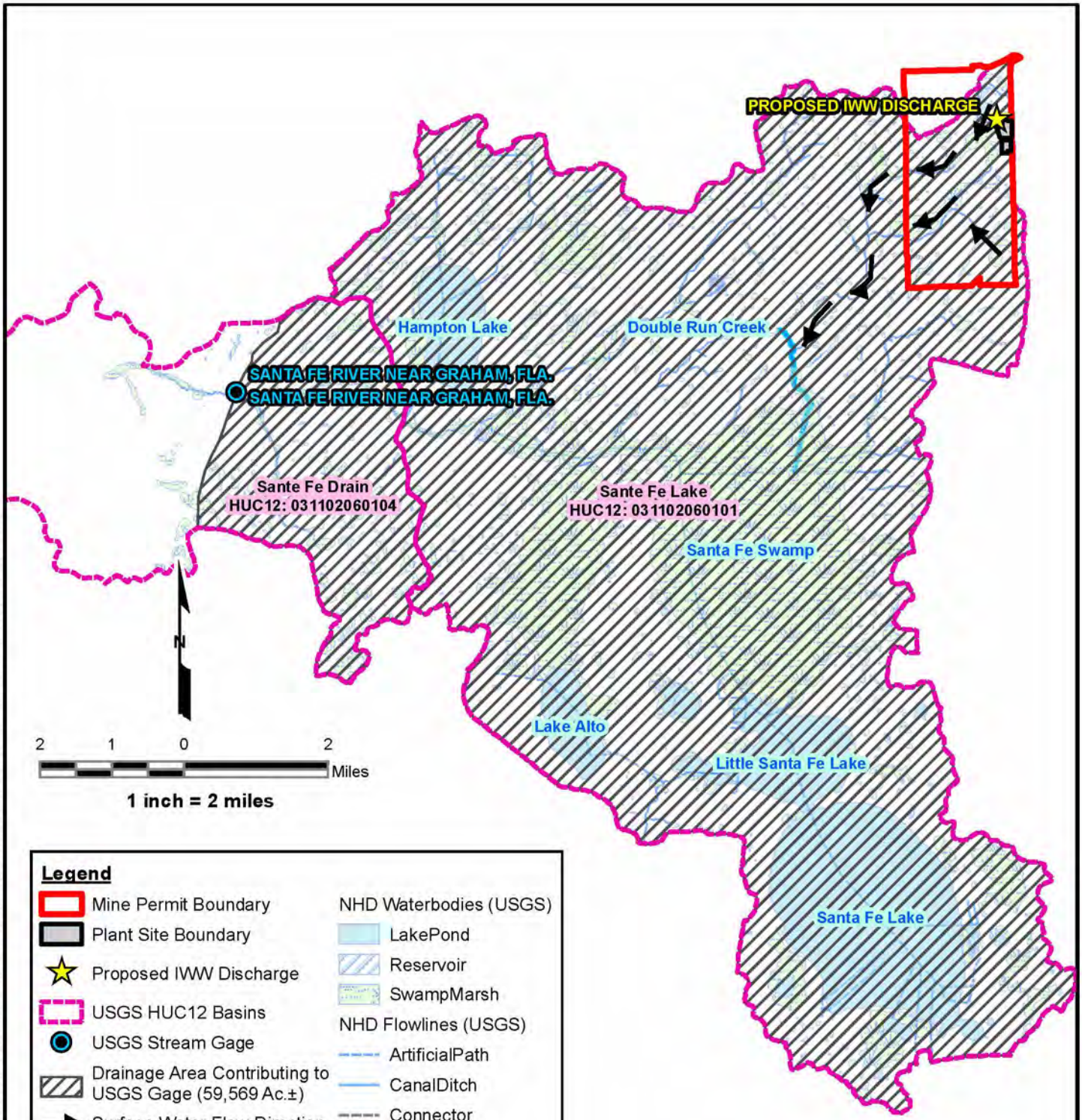
Received FDEP MMP Tallahassee 11-01-2019



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Regional Hydrology

Trail Ridge South
The Chemours Company FC, LLC
Bradford and Clay Counties, FL

FIGURE
3

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2,-7,22

1,-7,22

6,-7,23

11,-7,22

12,-7,22

7,-7,23

Bradford

Clay

14,-7,22

13,-7,22

18,-7,23

24,-7,22

19,-7,23

25,-7,22

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- County Boundary
- Section, Township, Range

Bradford County Soils

- 4-Mascotte sand, 0 to 2 percent slopes
- 6-Plummer-Plummer wet, sands
- 7-Surrency and Pantego soils, depressional
- 9-Leon fine sand, 0 to 2 percent slopes
- 11-Allanton loamy sand
- 12-Sapelo sand
- 14-Pamlico and Croatan mucks
- 15-Pottsburg sand
- 19-Leon sand, 0 to 2 percent slopes
- 23-Pelham complex, 0 to 2 percent slopes
- 24-Starke mucky fine sand, depressional
- 31-Pottsburg fine sand
- 45-Meadowbrook and Allanton soils, frequently flooded
- 58-Allanton fine sand, frequently flooded

Clay County Soils

- 3-Hurricane fine sand, 0 to 5 percent slopes
- 5-Penney fine sand, 0 to 5 percent slopes
- 6-Mandarin fine sand, 0 to 2 percent slopes
- 7-Centenary fine sand, 0 to 5 percent slopes
- 9-Leon fine sand, 0 to 2 percent slopes
- 11-Allanton and Rutlege mucky fine sands, depressional
- 27-Pamlico muck
- 31-Pottsburg fine sand
- 58-Allanton fine sand, frequently flooded
- 62-Neilhurst fine sand, undulating
- 63-Solite fine sand
- 99-Water

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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Soil Data: USDA, Natural resource Conservation Service, 2018.
Origin: State of Florida Orthos for Bradford and Clay Counties.
Date: Bradford County 2016, Clay County 2017.

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Soils Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure **4**

Document Path: G:\DPT_CHM\FM\1_MXD\129491_TRS\2019 FDEP Application\ERP Application Figures\Fig 4_Soils Map.mxd

2,-7,22
1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
8,-7,23
Bradford
Clay
14,-7,22
13,-7,22
18,-7,23
17,-7,23
23,-7,22
24,-7,22
19,-7,23
20,-7,23
25,-7,22
30,-7,23
29,-7,23

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- County Boundary
- Section, Township, Range

Flood Zone

- A - 1% Annual Chance of Flood Hazard
- AE - Floodway
- Zone X - Areas of Minimal Flood Hazard

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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Image Source: Image was obtained from ESRI Basemap.
Origin: State of Florida Orthos for Bradford and Clay Counties.
Date: Bradford County 2016, Clay County 2017.
Flood Zone Source: FEMA- Flood Insurance Rate Map (FIRM) Panels: 12007C, & 12019C

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FEMA Floodplain Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure **5**

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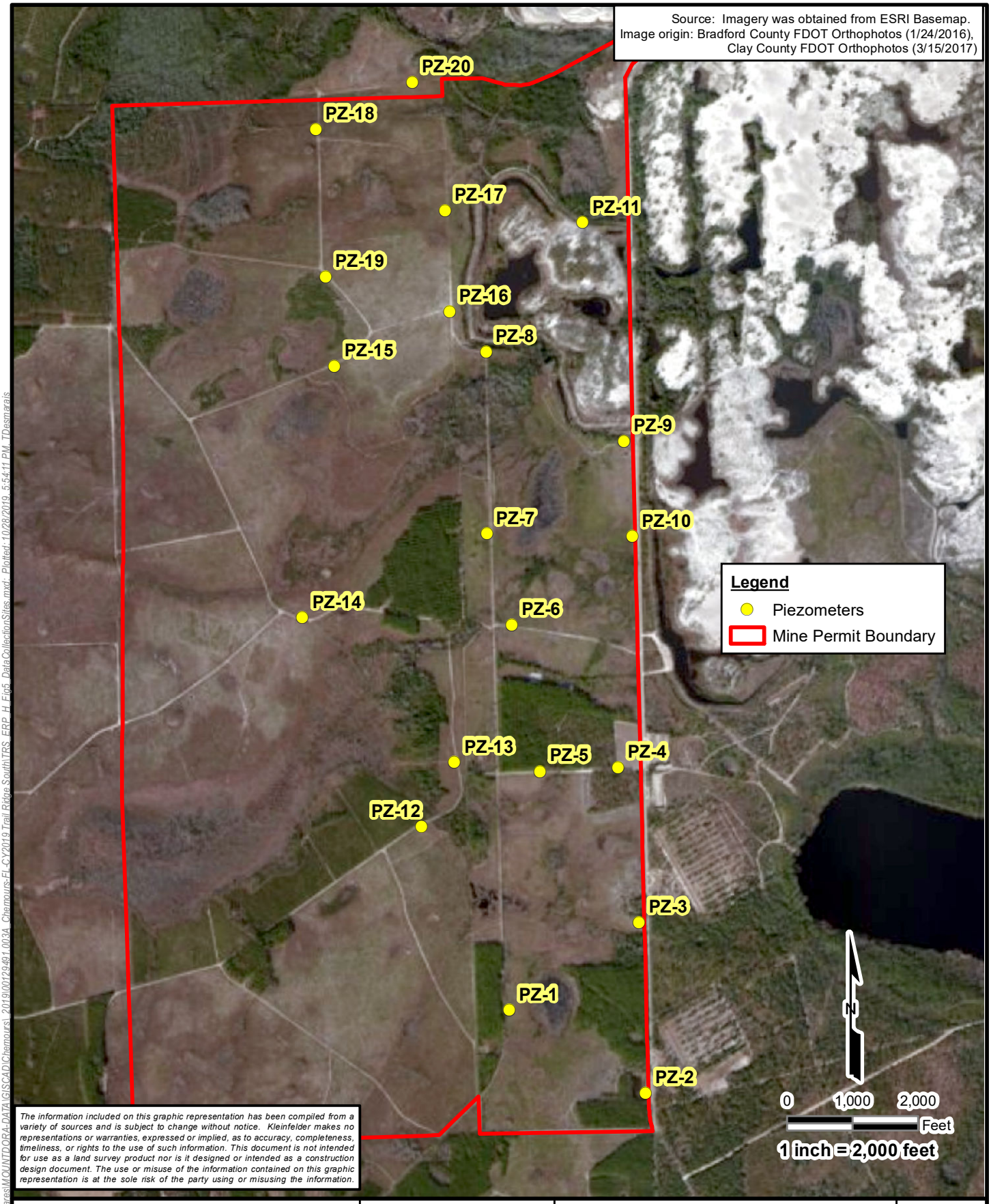

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Location of Existing Piezometers

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

FIGURE
5

Document Path: \\kleinfelder.com\Shares\MOUNTDORA-DATA\GISCAD\Chemours_2019\00129491.003A_Chemours-FL-CY2019 Trail Ridge South\TRS_ESD_Fig6_AvgDWT.mxd; Plotted: 10/25/2019, 4:08:44 PM, TDesmarais

Source: USA Topo Maps was obtained from ESRI Basemap. National Geographic Society, i-cubed

PZ-20
PZ-18
PZ-19
PZ-11
PZ-16
PZ-8
PZ-15
PZ-9
PZ-7
PZ-10
PZ-14
PZ-6
PZ-13
PZ-5
PZ-4
PZ-12
PZ-3
PZ-1
PZ-2

0.25 0.125 0 0.25 Miles

1 inch = 0.25 miles

Legend

- Mine Permit Boundary (± 2884.4 Ac.)
- Pre-Mining Average Water Table Depth (ft)
- Piezometers

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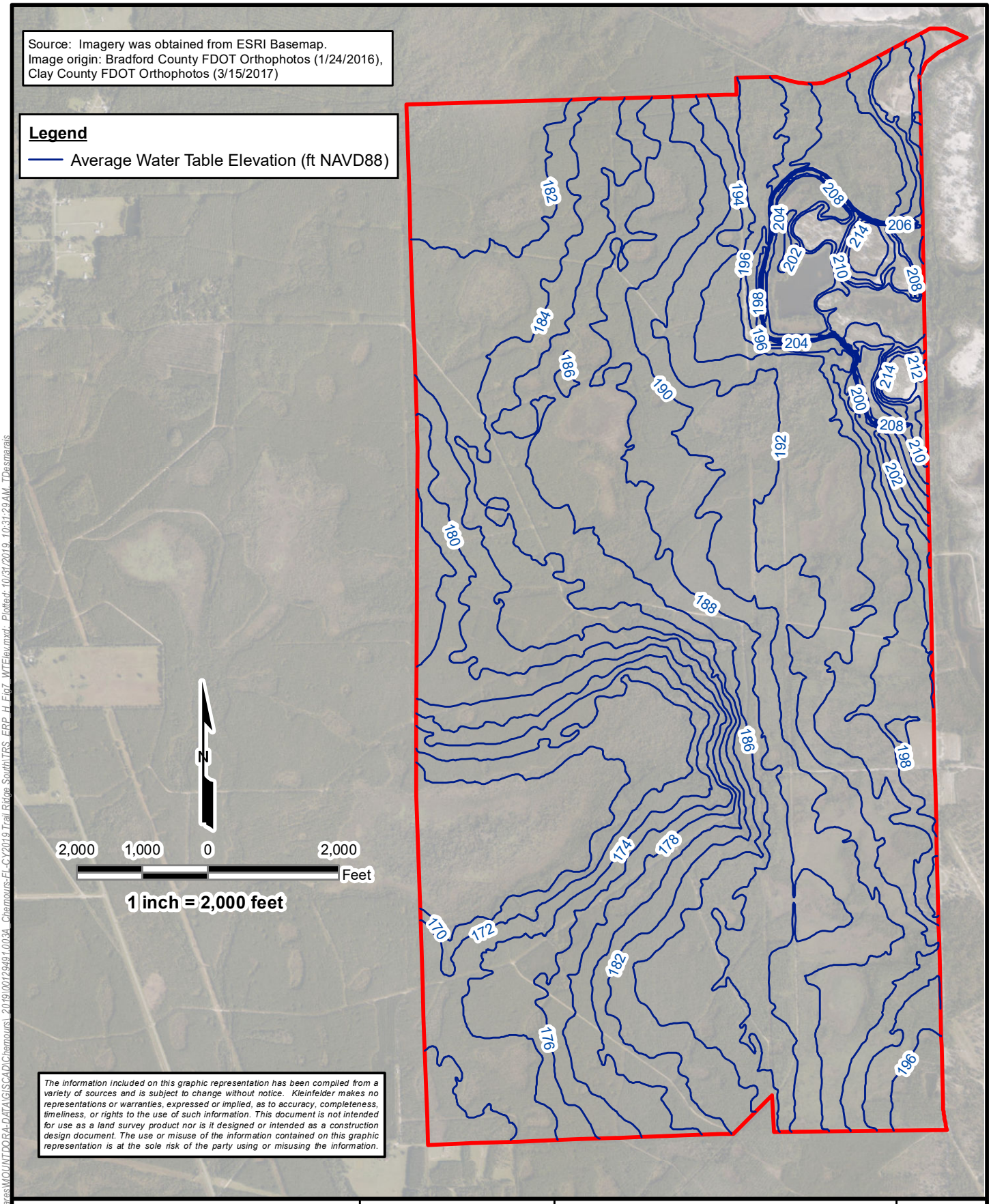
Pre-Mining Average Depth to Water

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

FIGURE
6



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Average Water Table Elevation Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

FIGURE
7

Document Path: \\kleinfelder.com\Shares\MOUNTDORA-DATA\GIS\CAD\Chemours_2019\00129491.003A_Chemours-FL-CY2019\Trail Rdge South\TRS_ERP_H_Fig7_WTElev.mxd - Plotted: 10/31/2019, 10:31:29 AM, TDesmarais

2,-7,22

1,-7,22

6,-7,23

5,-7,23

11,-7,22

12,-7,22

7,-7,23

Area 1

Area 3

Area 7

Area 8

Area 2

Bradford

Clay

18,-7,23

14,-7,22

13,-7,22

Area 4

24,-7,22

Area 5

19,-7,23

Area 6

25,-7,22

30,-

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Watershed Drainage Basins
- County Boundary
- Section, Township, Range

Pre-Mining Land Use (± 2,884.4 Ac.)

- 160-Extractive (± 117.06 Ac.)
- 173-Military (± 6.88 Ac.)
- 421-Xeric Oak (± 28.16 Ac.)
- 434- Hardwood, Coniferous Mixed (± 4.04 Ac.)
- 441-Coniferous Plantation (± 1,216.91 Ac.)
- 441W-Coniferous Plantation Wetland (± 480.76 Ac.)
- 510d-Ditches (± 31.75 Ac.)
- 523-Lakes Greater than 10 Acres (± 13.65 Ac.)
- 524-Lakes Less than 10 Acres (± 2.27 Ac.)
- 611-Bay Swamp (± 1.29 Ac.)
- 613-Gum Swamp (± 0.21 Ac.)
- 621-Cypress (± 17.36 Ac.)
- 630-Wetland Forested Mixed (± 797.51 Ac.)
- 631-Wetland Scrub (± 17.11 Ac.)
- 641-Freshwater Marsh (± 104.50 Ac.)
- 8146-Primitive Roads/Trails (± 44.94 Ac.)

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700

Feet

1 inch = 700 feet

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2019.10.31

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Pre-Mining Land Use and Vegetation Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure **7**

2,-7,22

1,-7,22

6,-7,23

11,-7,22

12,-7,22

Bradford

Clay

14,-7,22

13,-7,22

18,-7,23

19,-7,23

24,-7,22

23,-7,22

25,-7,22

30,-7,23

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Formal Determination Boundary (± 2,212.3 Ac.)
- County Boundary
- Section, Township, Range
- **Pre-Mining Wetlands (± 1,466.41 Ac.)**
- 441W-Coniferous Plantation Wetland (± 480.76 Ac.)
- 510d-Ditches (± 31.75 Ac.)
- 523-Lakes Greater than 10 Acres (± 13.65 Ac.)
- 524-Lakes Less than 10 Acres (± 2.27 Ac.)
- 611-Bay Swamp (± 1.29 Ac.)
- 613-Gum Swamp (± 0.21 Ac.)
- 621-Cypress (± 17.36 Ac.)
- 630-Wetland Forested Mix (± 797.51 Ac.)
- 631-Wetland Scrub (± 17.11 Ac.)
- 641-Freshwater Marsh (± 104.50 Ac.)

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700

Feet

1 inch = 700 feet

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Pre-Mining Wetlands

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure
8
Revised

Document Path: G:\DPT_CHM\FM1_MXD\129491_TRS_FDEP mining\Fig 8_Pre-Mining Wetlands.mxd

2,-7,22
1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
8,-7,23
Bradford
Clay
14,-7,22
13,-7,22
18,-7,23
17,-7,23
23,-7,22
24,-7,22
19,-7,23
20,-7,23
25,-7,22
30,-7,23

Area 1
Area 2
Area 3
Area 4
Area 5
Area 6
Area 7
Area 8

215
200
205
195
190
185
180
175
170

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Watershed Drainage Basins
- Time of Concentration
- 1 Ft. Elevation Contours
- 5 Ft. Elevation Contours
- County Boundary
- Section, Township, Range
- Flow Directions

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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PROFESSIONAL ENGINEER
2020.02.18

Source: Southern Resource Mapping, Inc. Date: 2011 & 2012. Datum: NAVD 88.

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Pre-Mining Topography and Drainage Basins Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure **9** **Revised**

Document Path: \\jacksonville.kleinfelder.com\JACKSONVILLE-DATA\GISCAD\DPT_CHM\FM\1_MXD\129491_TRS_FDEP mining\Fig 9_PreMining Topo and Drainage.mxd

Received FDEP MMP Tallahassee 6/10/2020

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1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
8,-7,23
14,-7,22
13,-7,22
18,-7,23
17,-7,23
20,-7,23
23,-7,22
24,-7,22
19,-7,23
25,-7,22
30,-7,23

Bradford

Clay

Year 1

Year 2

Year 3

Year 4

Year 5

Year 6

Year 7

Year 8

A

B

Cross Section A-B

E

F

Cross Section E-F

C

D

Cross Section C-D

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Limits of Disturbance (± 1,749.92 Ac.)
- County Boundary
- Section, Township, Range
- Cross Sections

Mine Plan-Year of Disturbance

- YEAR 1
- YEAR 2
- YEAR 3
- YEAR 4
- YEAR 5
- YEAR 6
- YEAR 7
- YEAR 8

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

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Mine Plan Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure
10

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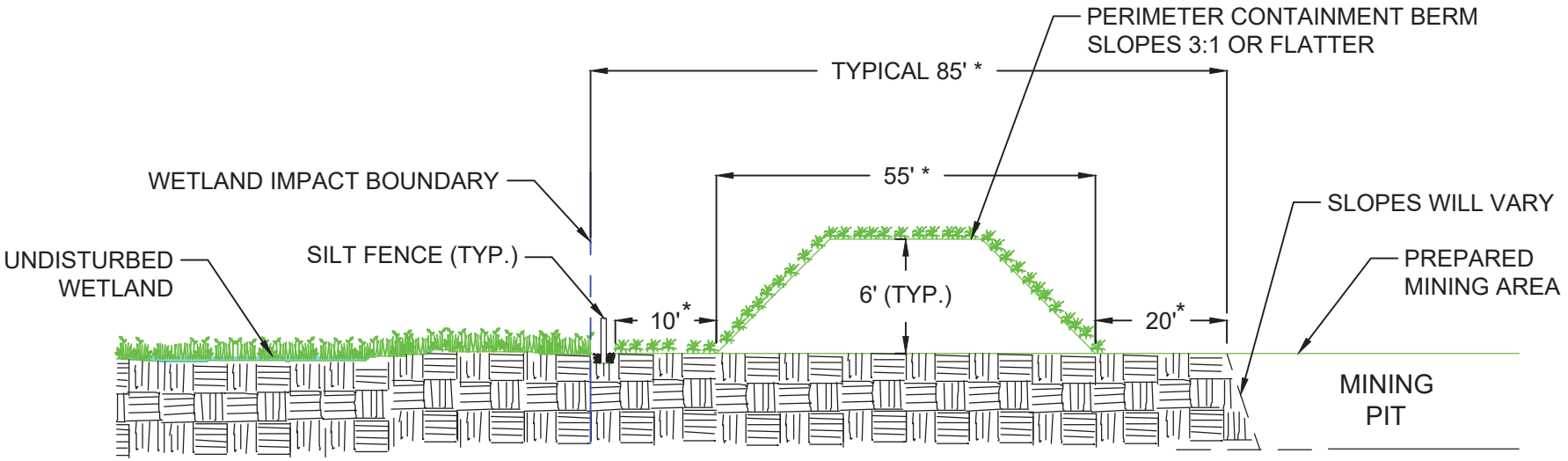
Received FDEP MMP Tallahassee 11-01-2019



*DISTANCES MAY CHANGE WITH CHANGE IN SLOPE

CROSS SECTION A-B - WETLAND IMPACT BOUNDARY

NOT TO SCALE

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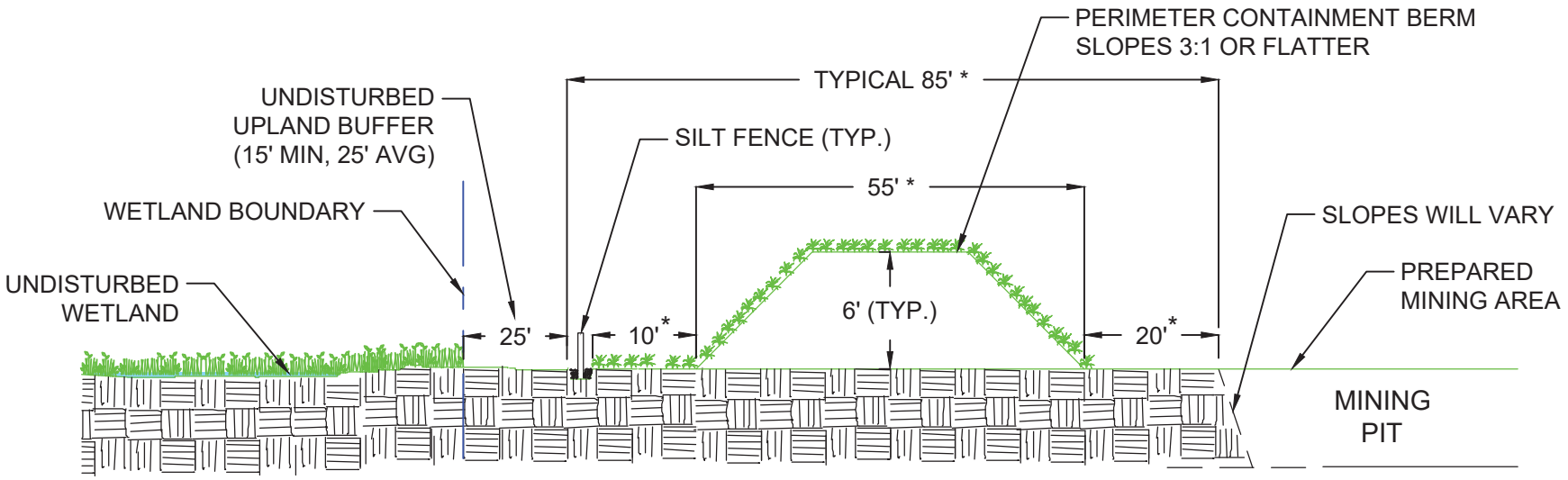
CROSS SECTION A - B

TRAIL RIDGE SOUTH
THE CHEMOURS COMPANY FC, LLC.
BRADFORD AND CLAY COUNTIES, FL

FIGURE

10A



*DISTANCES MAY CHANGE WITH CHANGE IN SLOPE

CROSS SECTION C-D - UNDISTURBED WETLAND BOUNDARY

NOT TO SCALE

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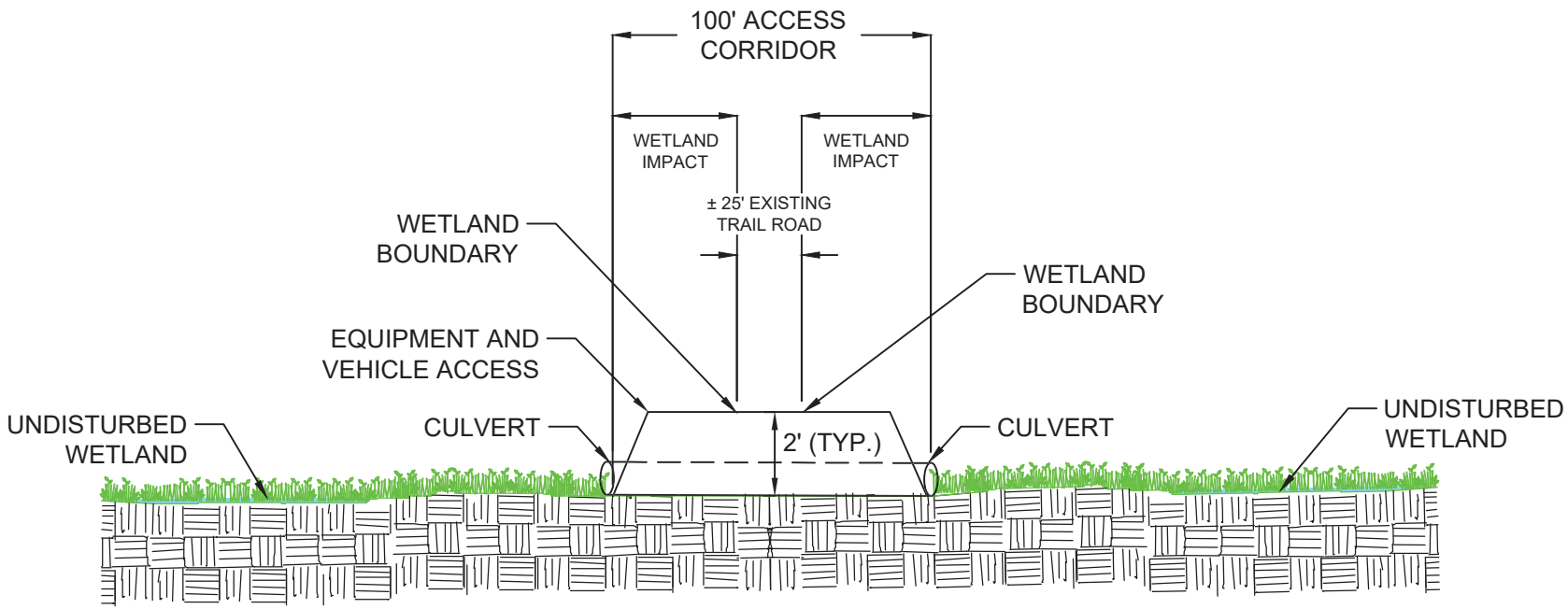
CROSS SECTION C - D

TRAIL RIDGE SOUTH
THE CHEMOURS COMPANY FC, LLC.
BRADFORD AND CLAY COUNTIES, FL

FIGURE

10B



CROSS SECTION E-F - CULVERTED ROAD WETLAND CROSSING
NOT TO SCALE

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2019.10.31

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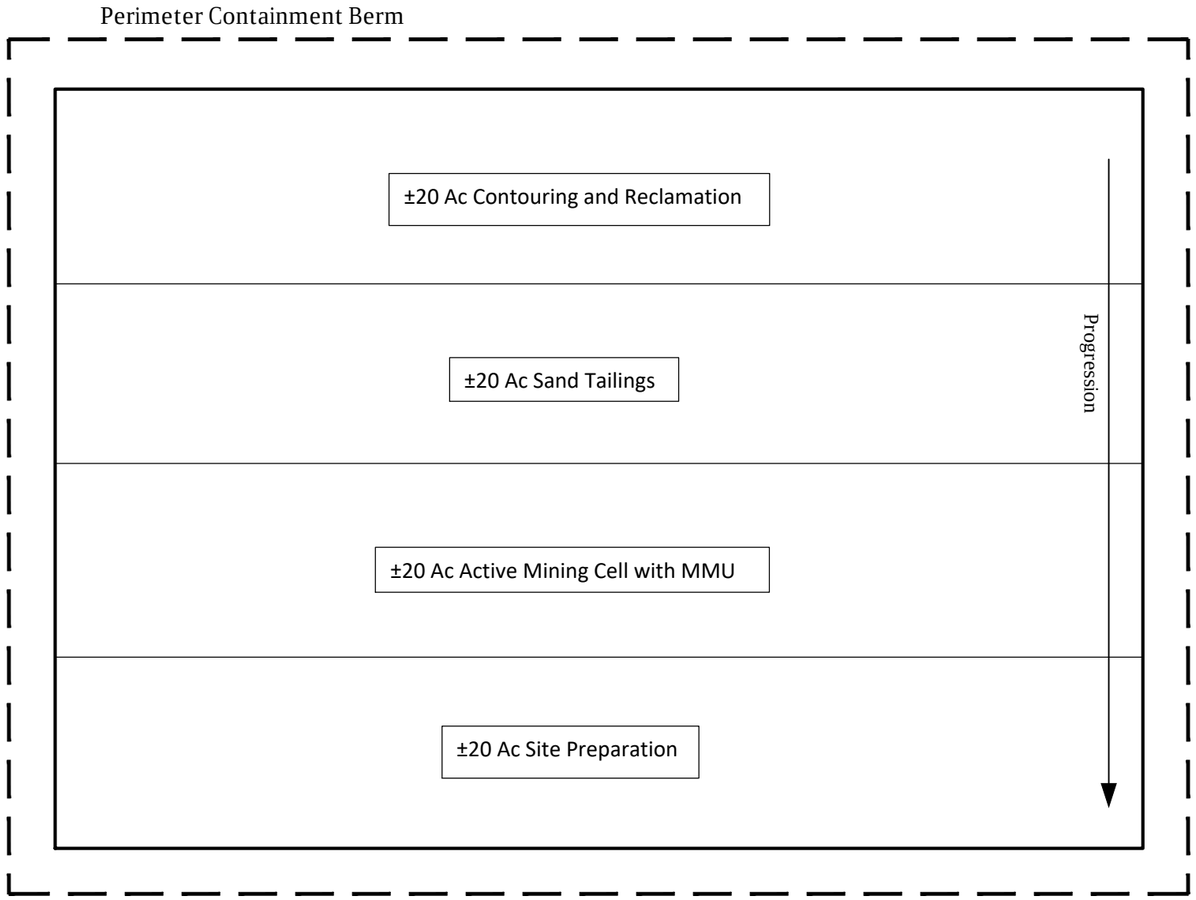
CROSS SECTION E - F

TRAIL RIDGE SOUTH
THE CHEMOURS COMPANY FC, LLC.
BRADFORD AND CLAY COUNTIES, FL

FIGURE
10C

Typical Mining Footprint

±80 acres per Mobile Mining Unit (MMU)



Contouring and Reclamation

Once the tailings are sufficiently dewatered, reclamation activities, including recontouring of the site (mined area) so the topography is similar to pre-mining conditions, topsoil placement, and revegetation will be conducted. Native herbaceous vegetation will be reestablished from the replaced topsoil. Temporary groundcover may be seeded/planted (millet or rye) to assist with erosion control, if needed.

Active Mining

The removal of the ore will be in 7- to 10-foot lifts or benches. The excavation will progress through the cells using multiple excavators to feed an MMU. This unit will process the feed and slurry the ore to the near-by MC. The mine cells will be dewatered as excavation progresses and the water incorporated into the process water for reuse. Mining depth will average approximately 22 feet with a maximum depth of 40 feet.

Sand Tailings Return

Once the ore has been separated from the quartz at the MC, the lighter SG quartz sands (approximately 98% by volume) will become tailings and will be pumped to mined-out cells via HDPE pipeline where they are dewatered and utilized for reclamation activities.

Site Preparation

All merchantable timber is harvested in a manner consistent with silviculture best management practices (BMPs) and area is “root raked” with all wooden material burned per appropriate State/County regulations. Silt fencing and other applicable erosion control measures will be installed around the proposed mine cells. The top 12 inches of topsoil will be removed and used to form the perimeter or containment berms around the mining area for control of storm water runoff.

The Trail Ridge South mining footprint will consist of two (2) MMUs and a land-based separation plant site, Mobile Concentrator (MC). The MMUs move as mining progresses. The MMUs consist of a feed hopper and shredder to break apart oversize (roots, rocks and hardpan) from the excavated material prior to being slurried and pumped via High-density polyethylene (HDPE) pipeline to a single deck vibrating screen which also moves around the ore body as mining progresses to remove oversize. The oversize material from the screen will be used as backfill in the mined-out cells.

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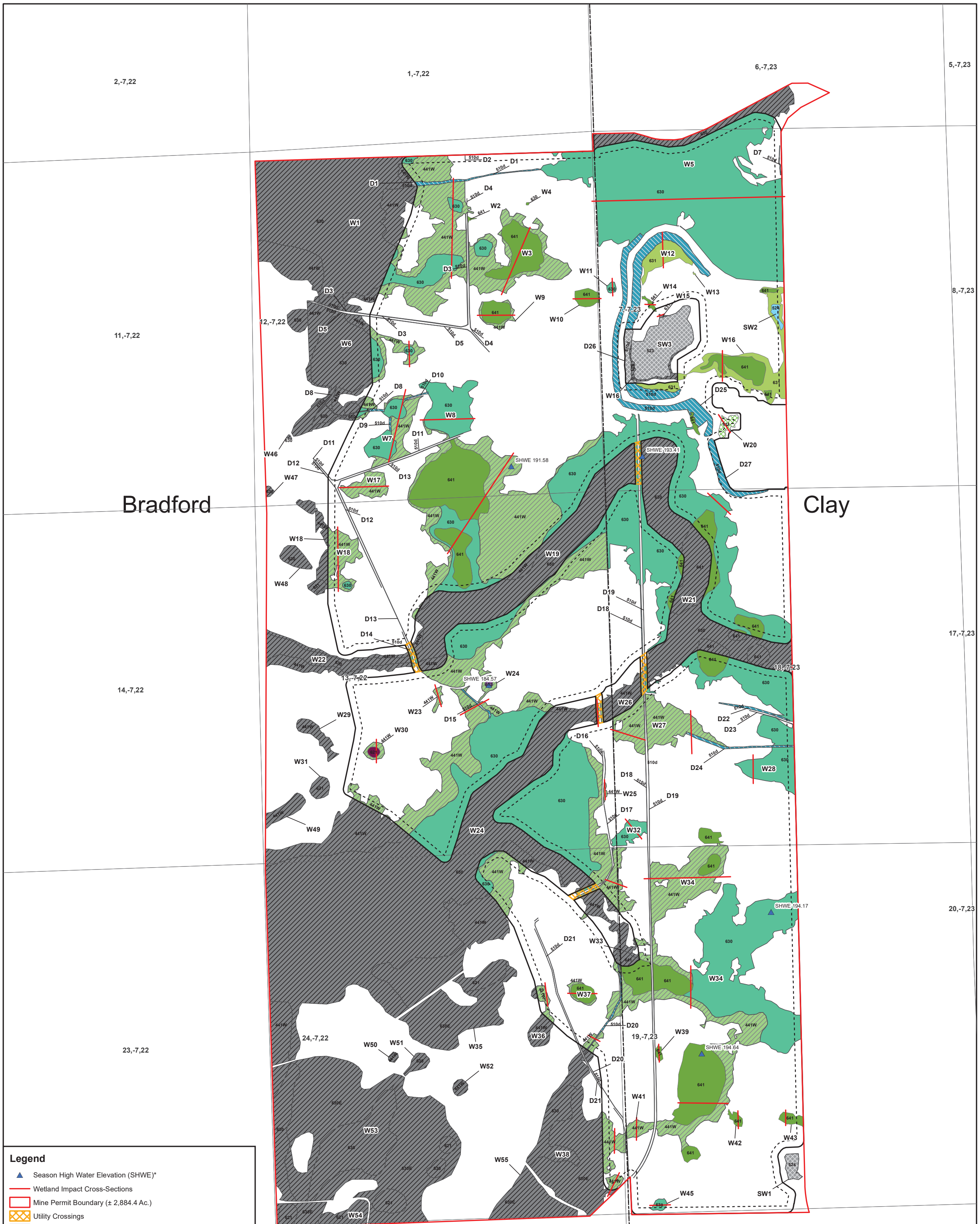
REVISED:	

TYPICAL MINING FOOTPRINT

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
10D



Legend

- Season High Water Elevation (SHWE)*
- Wetland Impact Cross-Sections
- Mine Permit Boundary (± 2,884.4 Ac.)
- Utility Crossings
- Limits of Disturbance (± 1,749.92 Ac.)
- Limits of Mining (± 1,548.99 Ac.)
- County Boundary
- Section, Township, Range

Impacted Wetlands and Other Surface Waters (± 740.45 Ac.)

- 441W-Coniferous Plantation Wetland (± 227.53 Ac.)
- 510d-Ditches (± 29.19 Ac.)
- 524-Lakes Less than 10 Acres (± 0.67 Ac.)
- 611-Bay Swamp (± 1.29 Ac.)
- 613-Gum Swamp (± 0.21 Ac.)
- 621-Cypress (± 0.51 Ac.)
- 630-Wetland Forested Mix (± 376.59 Ac.)
- 631-Wetland Scrub (± 15.84 Ac.)
- 641-Freshwater Marsh (± 88.62 Ac.)

Undisturbed Wetlands (± 708.15 Ac.)

- Undisturbed Wetlands

Undisturbed Surface Water (± 17.81 Ac.)

- Undisturbed Surface Water

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

E. Brian Burkhart
This item has been digitally signed and sealed by E. Brian Burkhart on the date provided using a Digital Signature. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.
2021.04.22
08:18:57-04'00'

E. BRIAN BURKHART LICENSE No. 79054 STATE OF FLORIDA PROFESSIONAL ENGINEER

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*Season High Water Elevation (SHWE) measured from the average elevation of 3-4 points within the wetland. SHWE were set and surveyed in wetlands with appropreate above ground biological indicators.
If SHWE is not shown, then SHWE is about ground surface.

NO.	REVISION	BY	DATE
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△	FDEP Revisions	LS	4/12/2021
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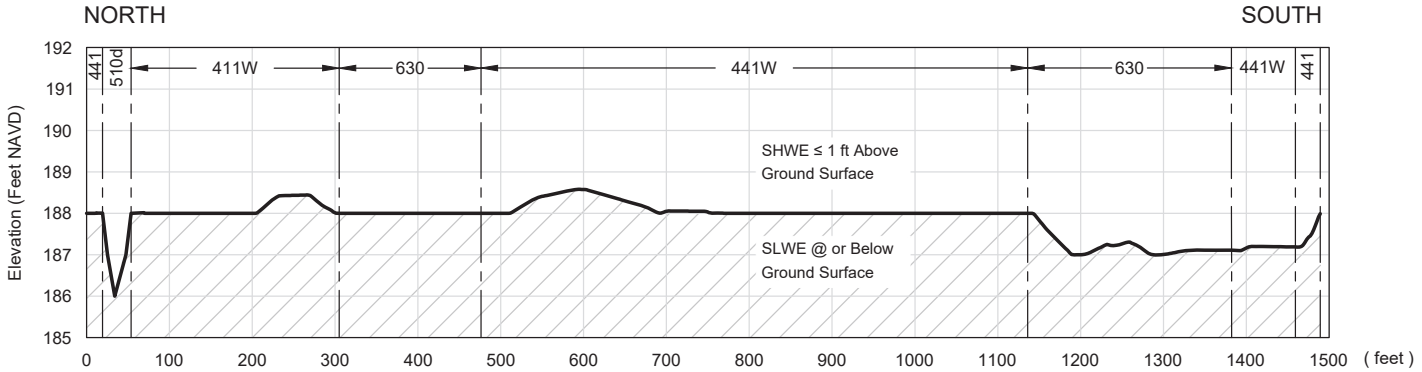
Wetland Impacts Map

Trail Ridge South
The Chemours Company FC, LLC
Bradford and Clay Counties, FL

Figure
11
Revised

Received FDEP MMP Tallahassee 4/22/2021

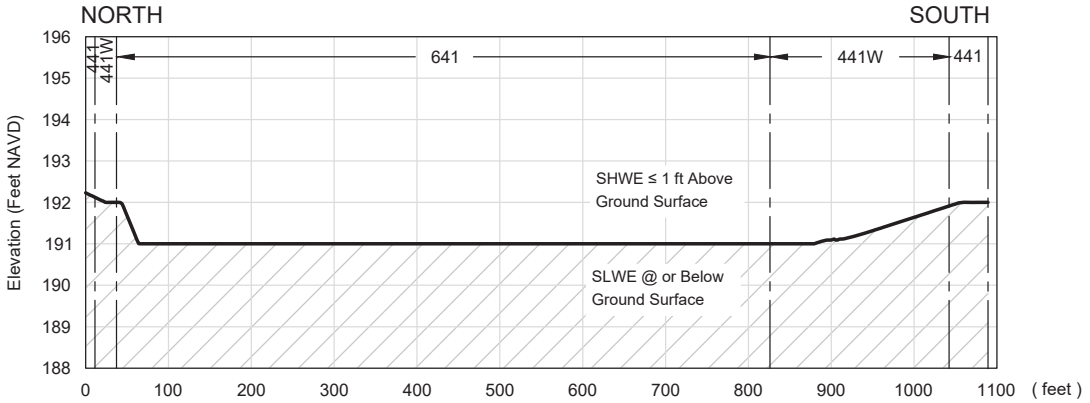


Wetland 1

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 3

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2019.10.31
STATE OF
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PROFESSIONAL ENGINEER

Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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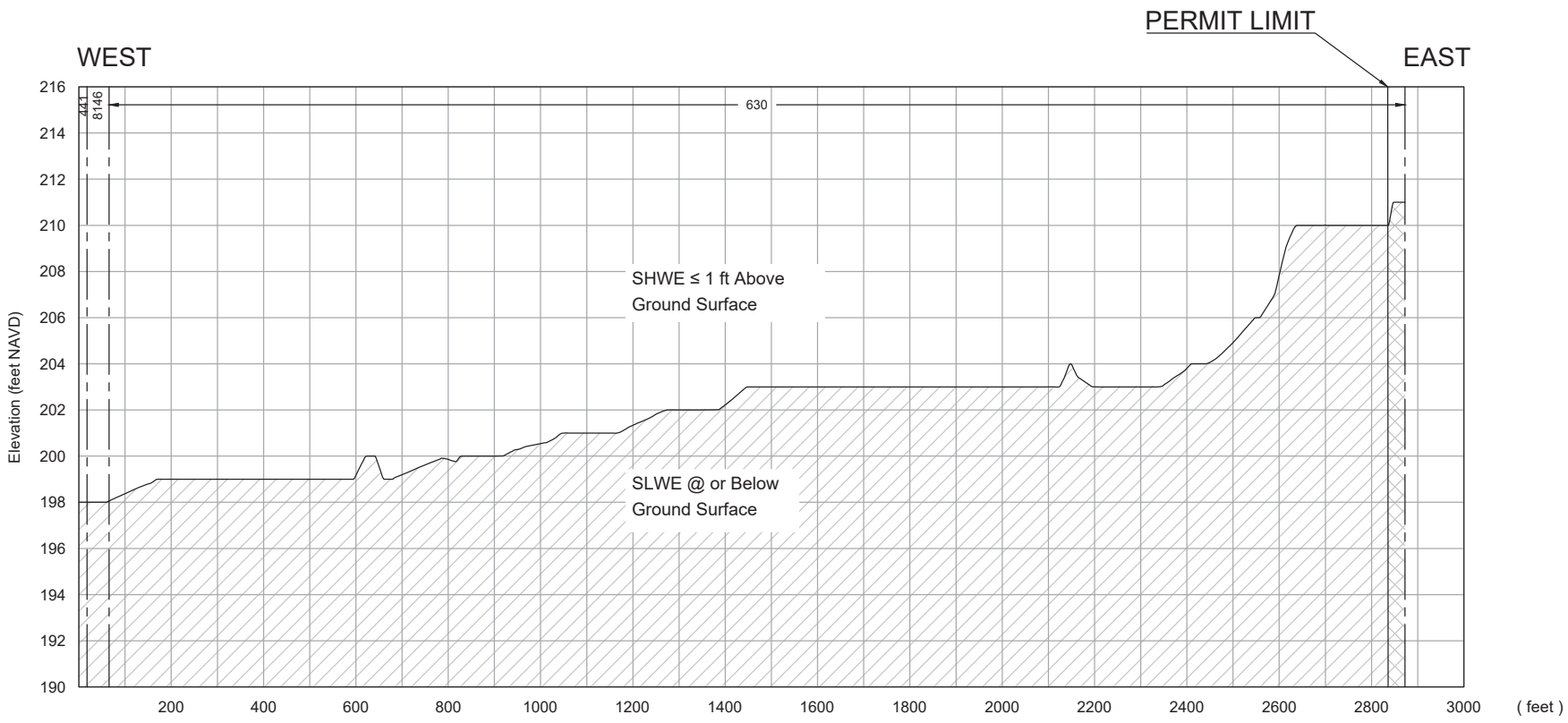
REVISED:	

WETLAND IMPACT CROSS-SECTION
WETLAND 1 & 3

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11A



Wetland 5

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

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No. 63104
2019.10.31
STATE OF
FLORIDA
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Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 100'
VERT. 1"=5'

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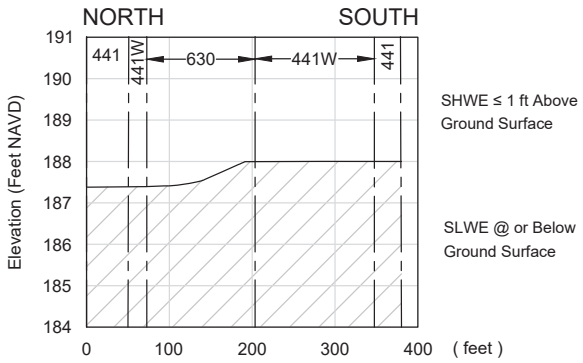
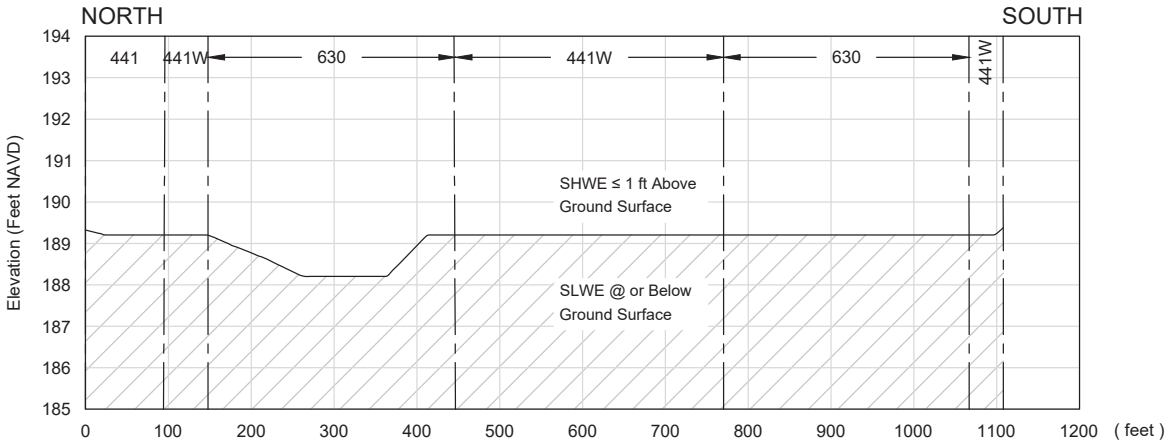
WETLAND IMPACT CROSS-SECTION
WETLAND 5

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11B



Wetland 6



Wetland 7

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

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2019.10.31

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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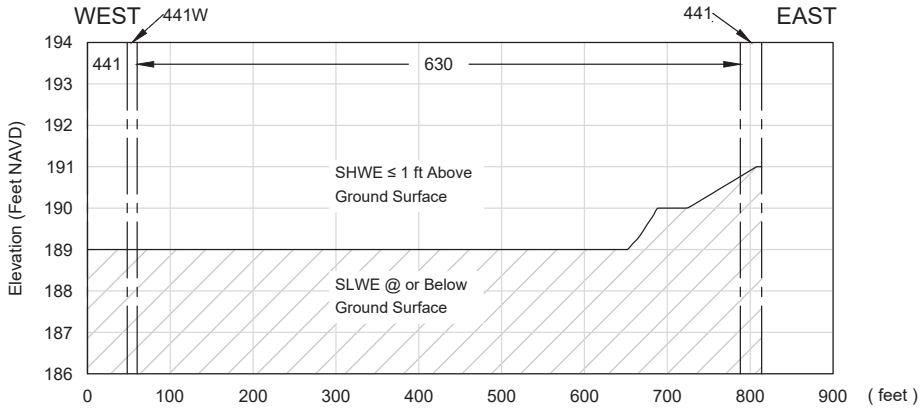
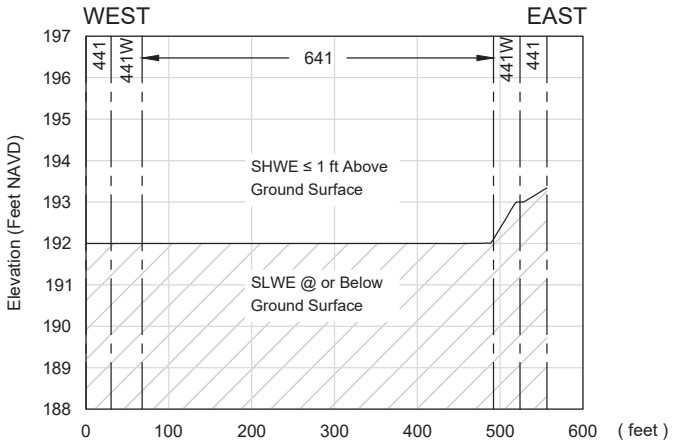
WETLAND IMPACT CROSS-SECTION
WETLAND 6 & 7

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11C



Wetland 8



Wetland 9

LEGEND

IMPACT

UNDISTURBED

EXISTING GROUND

LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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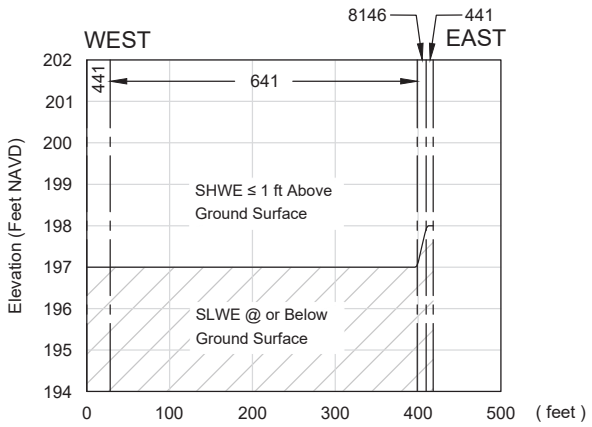
WETLAND IMPACT CROSS-SECTION
WETLAND 8 & 9

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11D

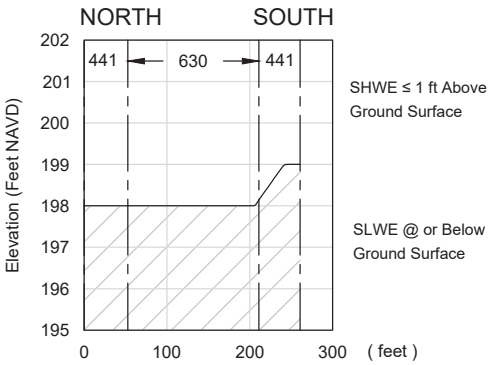


Wetland 10

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 11

Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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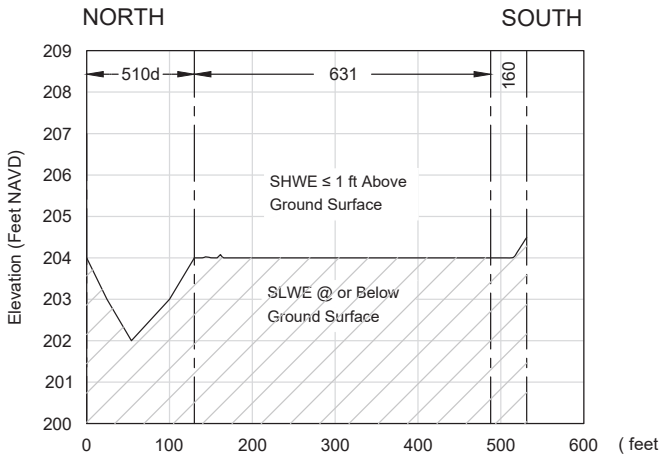
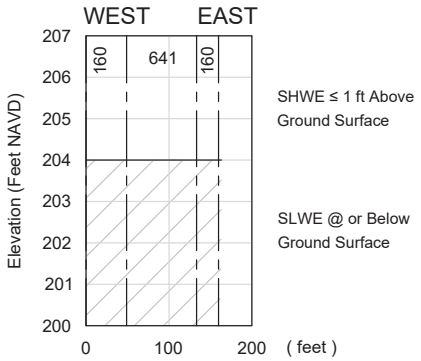
WETLAND IMPACT CROSS-SECTION
WETLAND 10 & 11

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11E



Wetland 12



Wetland 14

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

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SCALE:
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VERT. 1"=3'

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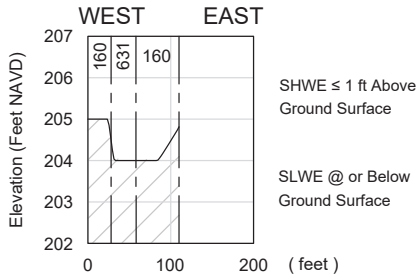
WETLAND IMPACT CROSS-SECTION
WETLAND 12 & 14

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11F

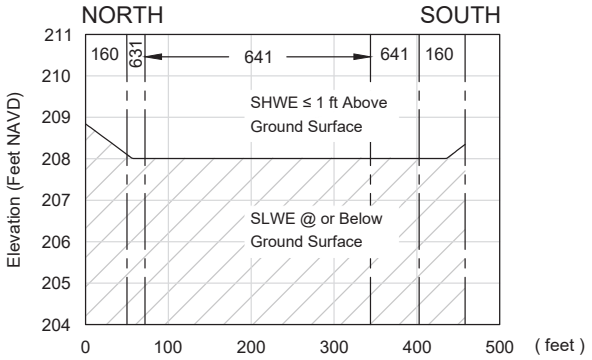


Wetland 15

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 16

Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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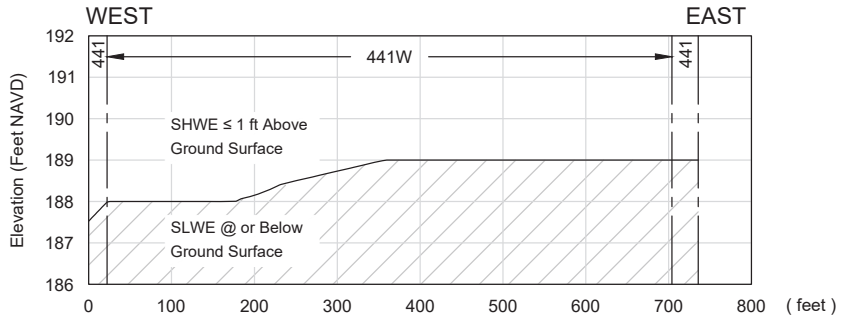
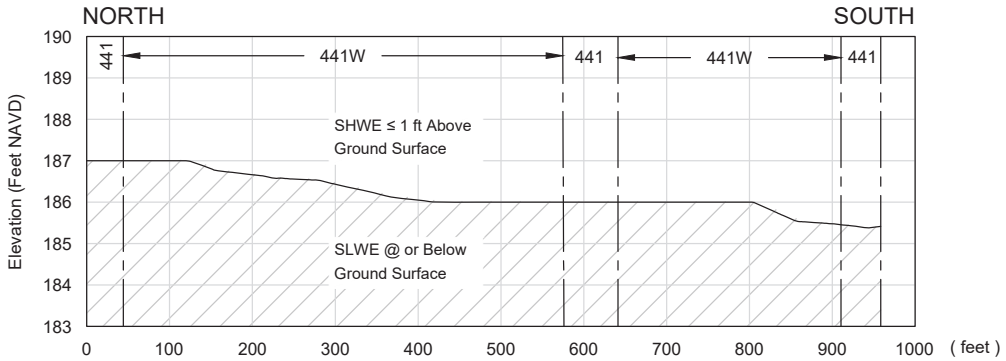
WETLAND IMPACT CROSS-SECTION
WETLAND 15 & 16

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11G



Wetland 17



Wetland 18

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

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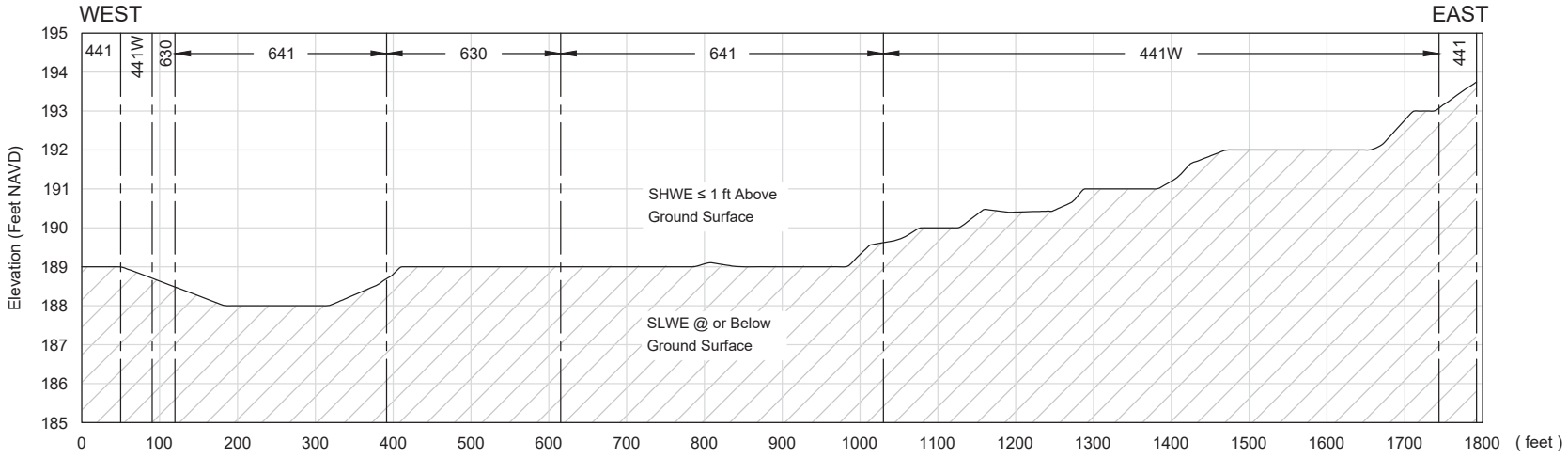
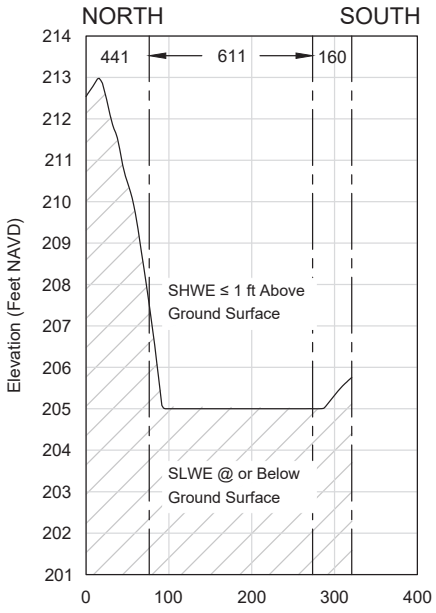
WETLAND IMPACT CROSS-SECTION
WETLAND 17 & 18

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11H



Wetland 19



Wetland 20

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

Source: Topography - Southern Resources Mapping, Inc. 2012.

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

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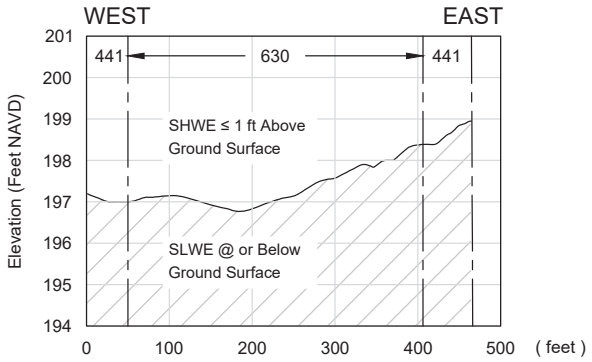
WETLAND IMPACT CROSS-SECTION
WETLAND 19 & 20

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11I



Wetland 21

LEGEND

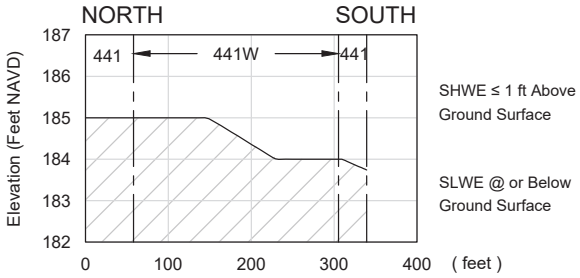
IMPACT

UNDISTURBED

EXISTING GROUND

LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 23

TIMOTHY R DESMARAIS
LICENSE
No. 63104
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Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
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VERT. 1"=3'

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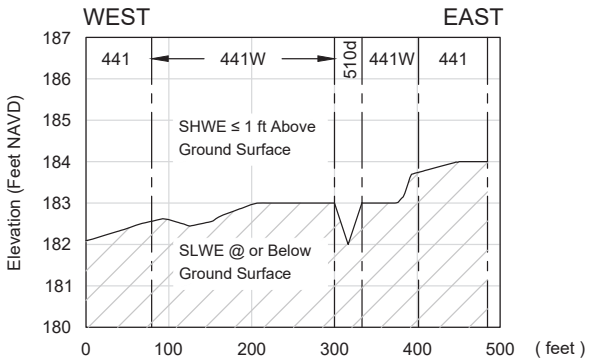
WETLAND IMPACT CROSS-SECTION
WETLAND 21 & 23

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11J

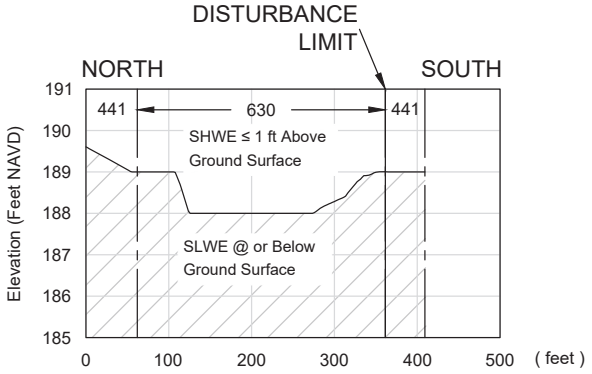


Wetland 24-1

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 24-2

Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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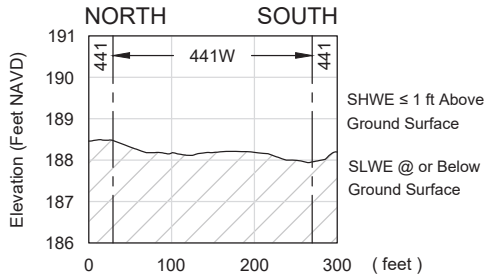
WETLAND IMPACT CROSS-SECTION
WETLAND 24

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11K

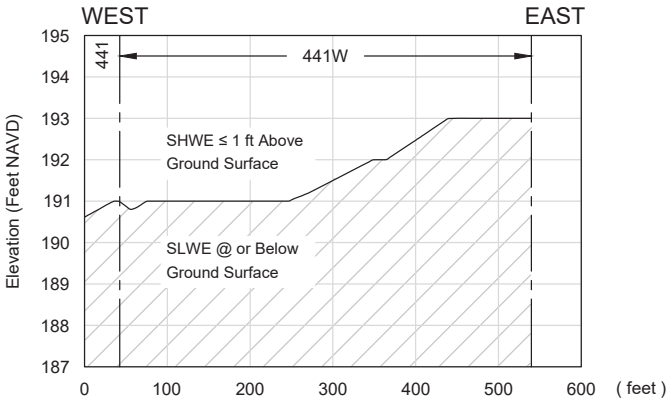


Wetland 25

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 26

Source: Topography - Southern Resources Mapping, Inc. 2012.

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SCALE:
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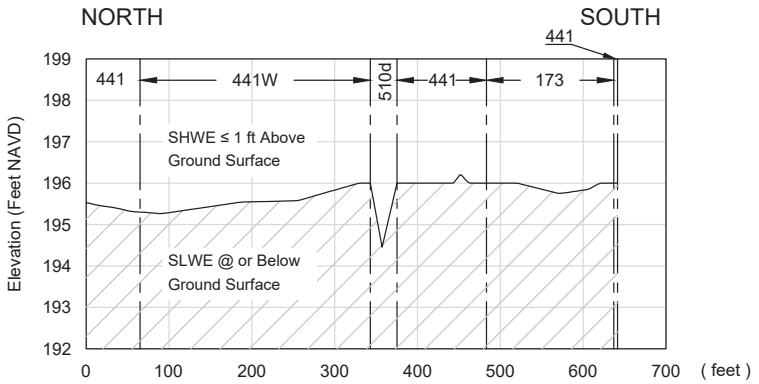
WETLAND IMPACT CROSS-SECTION
WETLAND 25 & 26

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11L

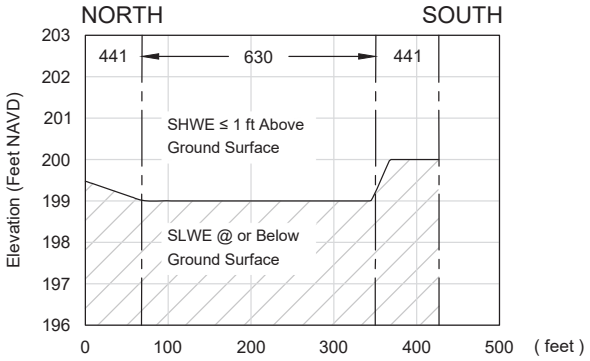


Wetland 27

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 28

Source: Topography - Southern Resources Mapping, Inc. 2012.

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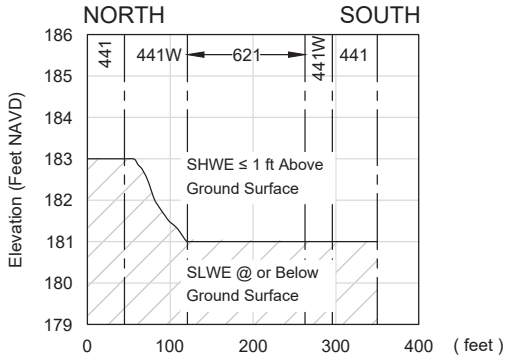
WETLAND IMPACT CROSS-SECTION
WETLAND 27 & 28

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11M



Wetland 30

LEGEND

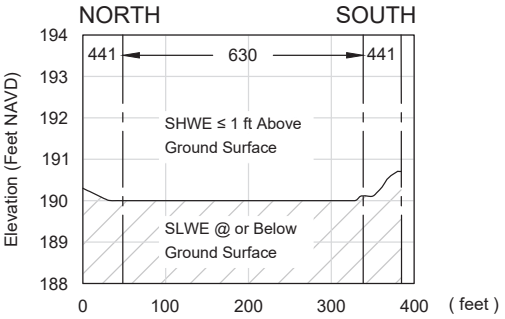
IMPACT

UNDISTURBED

EXISTING GROUND

LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 32

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Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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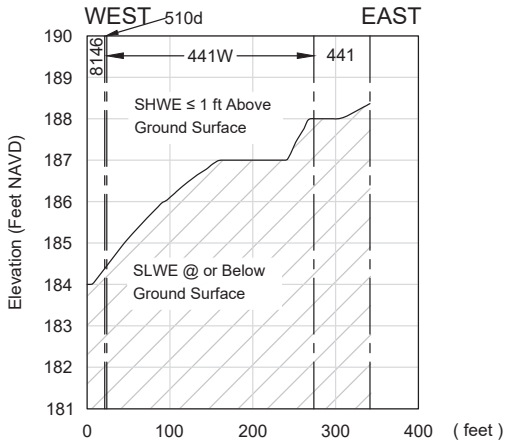
WETLAND IMPACT CROSS-SECTION
WETLAND 30 & 32

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11N

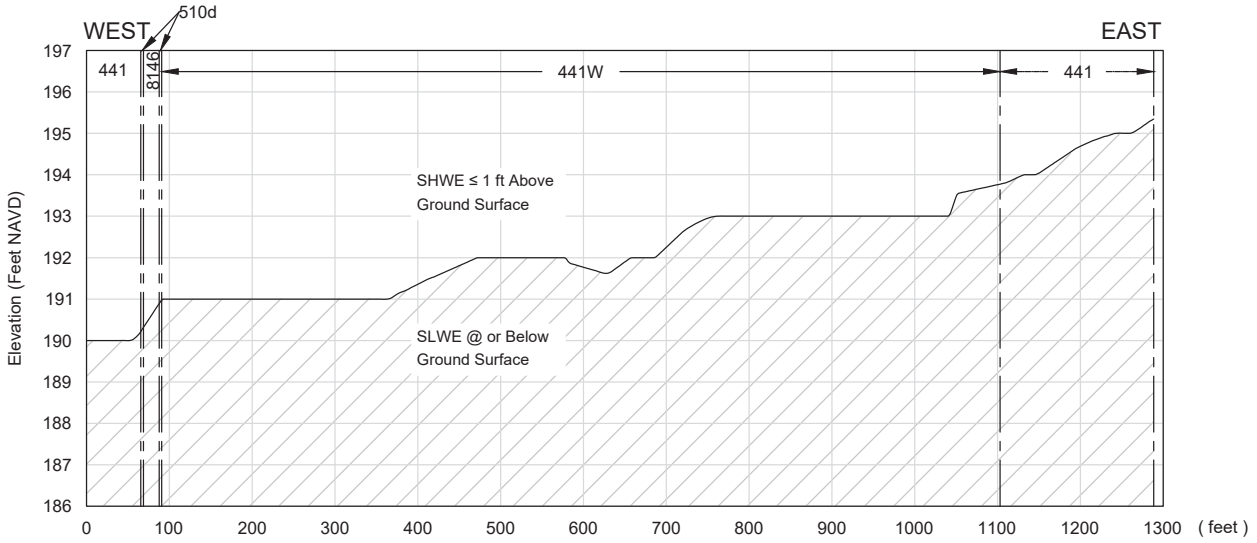


Wetland 33

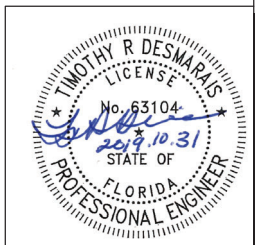
LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 34-1



Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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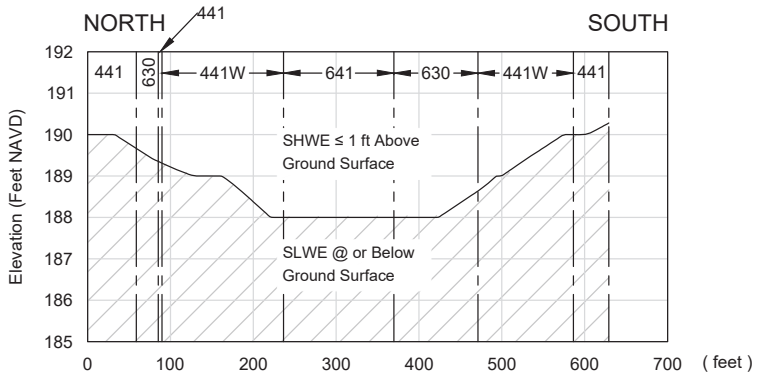
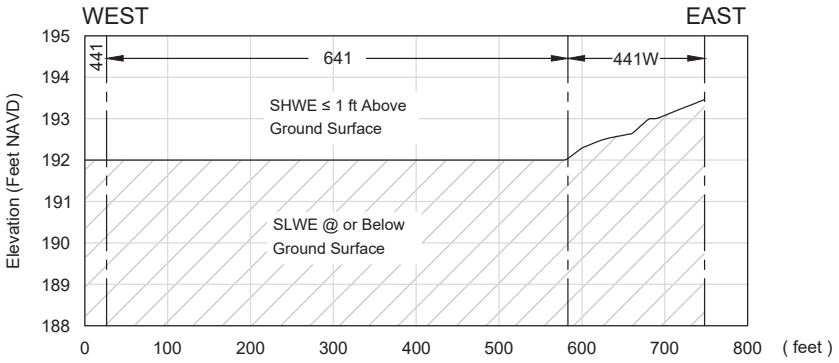
WETLAND IMPACT CROSS-SECTION
WETLAND 33 & 34

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11O



Wetland 34-2



Wetland-34-3

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

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SCALE:
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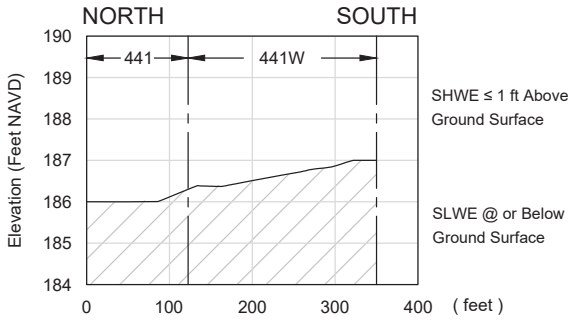
WETLAND IMPACT CROSS-SECTION
WETLAND 34

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11P

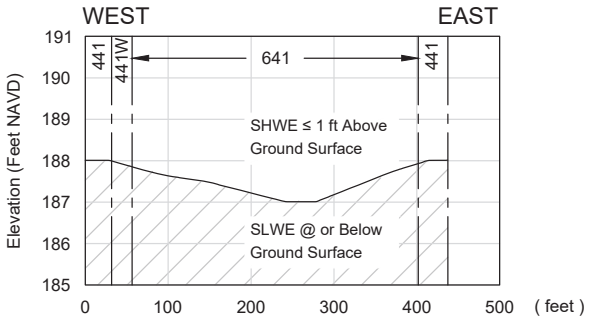


Wetland 36

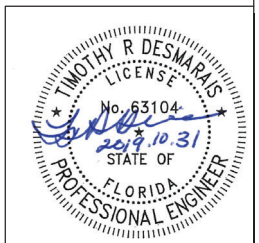
LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 37



Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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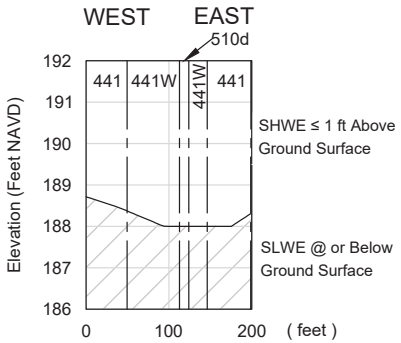
WETLAND IMPACT CROSS-SECTION
WETLAND 36 & 37

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11Q

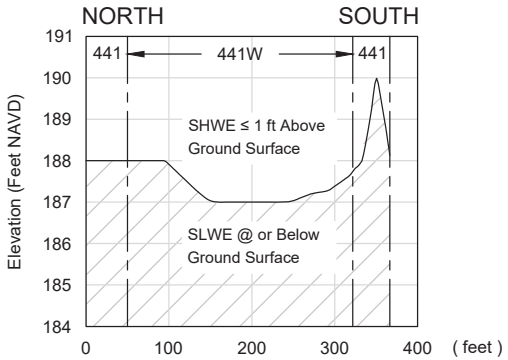


Wetland 38 -1

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 38-2

Source: Topography - Southern Resources Mapping, Inc. 2012.

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VERT. 1"=3'

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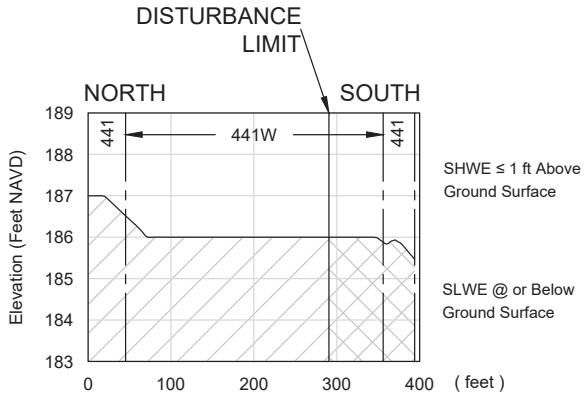
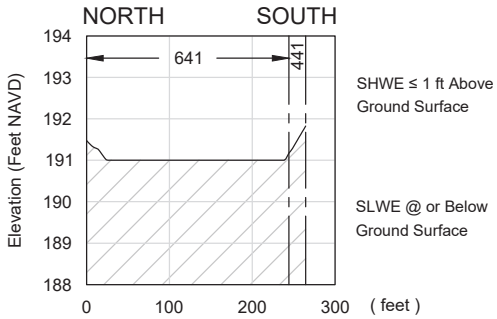
WETLAND IMPACT CROSS-SECTION
WETLAND 38

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11R



Wetland 38-3



Wetland 39

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails

Source: Topography - Southern Resources Mapping, Inc. 2012.

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VERT. 1"=3'

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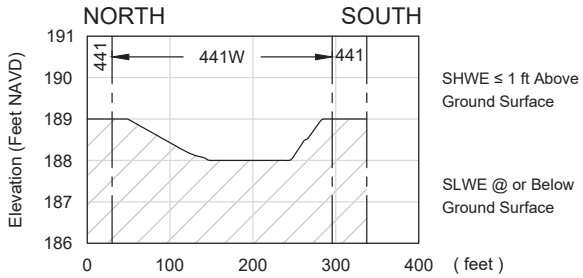
WETLAND IMPACT CROSS-SECTION
WETLAND 38 & 39

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11S

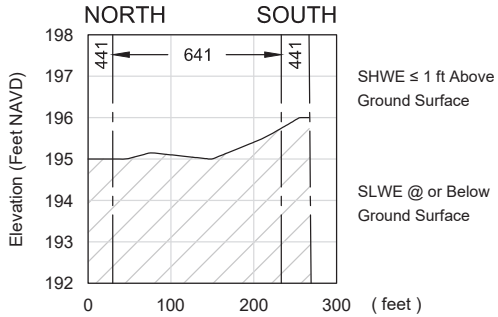


Wetland 41

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 42

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Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
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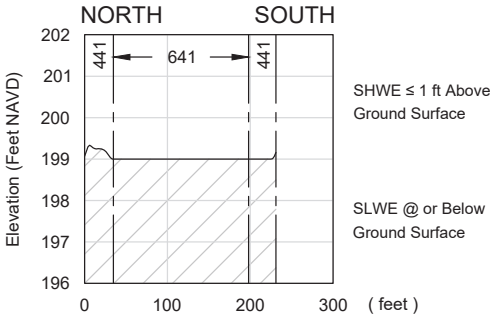
WETLAND IMPACT CROSS-SECTION
WETLAND 41 & 42

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11T

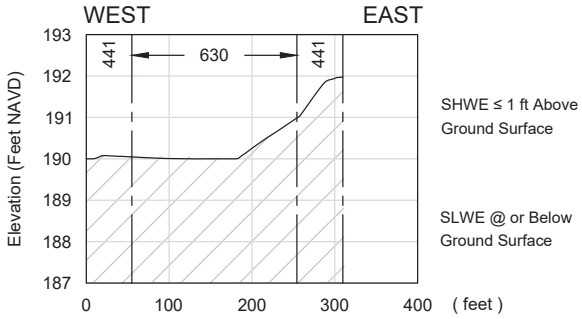


Wetland 43

LEGEND

- IMPACT
- UNDISTURBED
- EXISTING GROUND
- LAND USE CODE

160 - Extractive
173 - Military
441 - Coniferous Plantation
441W- Coniferous Plantation Wetland
510d - Ditch/Canal
611 - Bay Swamps
630 - Wetland Forested Mixed
631 - Wetland Scrub
641 - Freshwater Marsh
8146- Primitive Roads/Trails



Wetland 45

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Source: Topography - Southern Resources Mapping, Inc. 2012.

SCALE:
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WETLAND IMPACT CROSS-SECTION
WETLAND 43 & 45

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
11U

Document Path: \\kleinfelder.com\Shares\MOUNTDORA-DATA\GISCAD\Chemours_2019\00129491.003A_Chemours-FL-CY2019 Trail Ridge South\TRS_ESD_Fig12_Post_AvgDWT.mxd; Plotted: 10/25/2019, 4:03:24 PM, TDesmarais

Source: USA Topo Maps was obtained from ESRI Basemap. National Geographic Society, i-cubed

PZ-20
PZ-18
PZ-17
PZ-11
PZ-19
PZ-16
PZ-8
PZ-15
PZ-9
PZ-7
PZ-10
PZ-14
PZ-6
PZ-13
PZ-5
PZ-4
PZ-12
PZ-3
PZ-1
PZ-2

0.25 0.125 0 0.25 Miles

1 inch = 0.25 miles

Legend

- Mine Permit Boundary (± 2884.4 Ac.)
- Post-Mining Average Water Table Depth (ft)
- Piezometers

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Post-Mining Average Depth to Water

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

FIGURE
12

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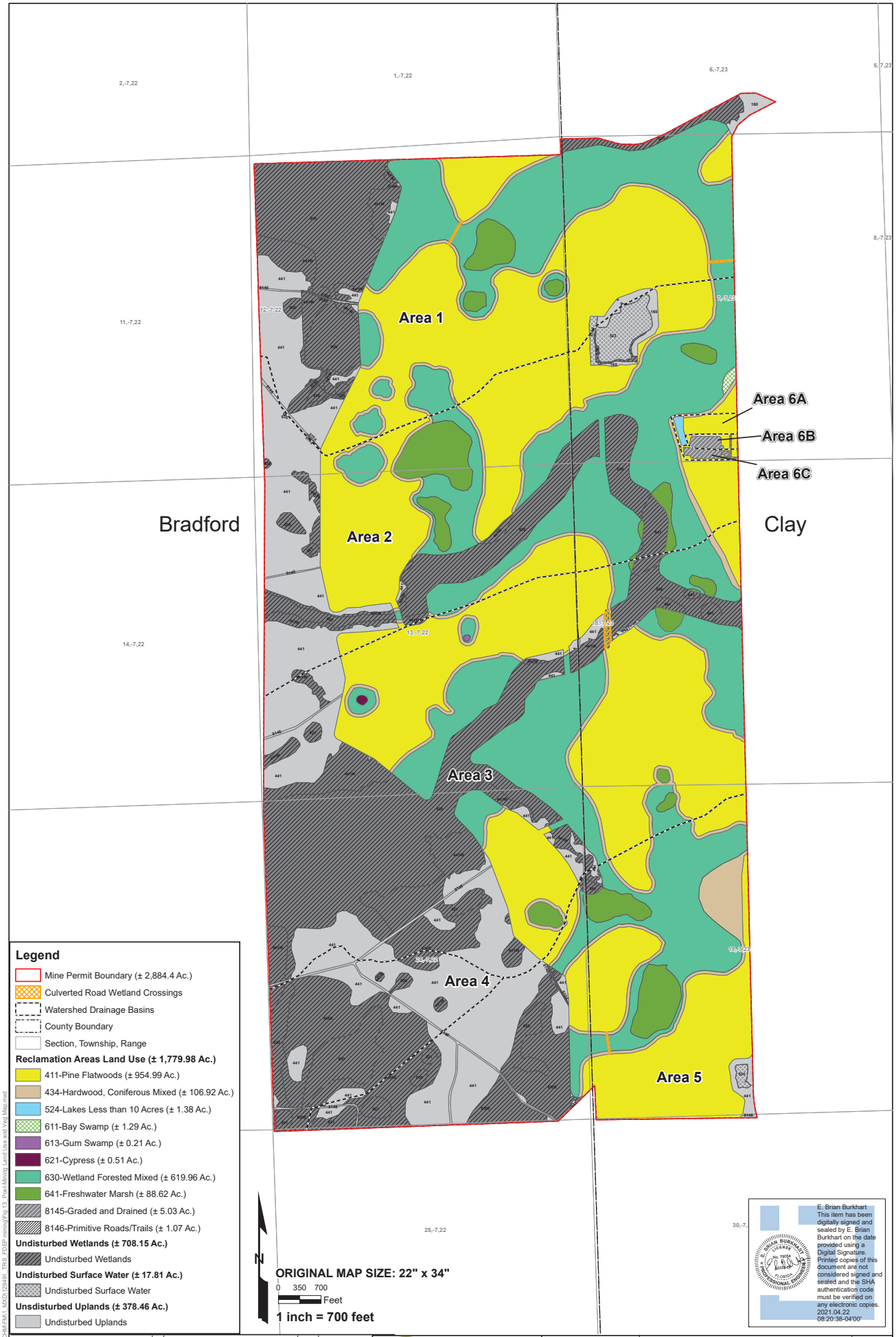

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NO.	REVISION	BY	DATE
1	FDEP RAI #1	LS	2/20/2020
2	FDEP Revisions	LS	4/12/2021

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Post-Mining Land Use and Vegetation Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure **13** **Revised**

Area 1

Area 2

Area 3

Area 4

Area 5

Area 6A

Area 6B

Area 6C

0 150 300
Feet

Watershed Drainage Basins
Area 6 - Detail

Bradford

Clay

2,-7,22
1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
14,-7,22
13,-7,22
18,-7,23
17,-7,23
23,-7,22
24,-7,22
19,-7,23
20,-7,23
25,-7,22
30,-7,23

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Watershed Drainage Basins
- Time of Concentration
- 5 Ft Elevation Contours
- Flow Directions
- County Boundary
- Section, Township, Range

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700
Feet

1 inch = 700 feet

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2020.02.21

Source: Southern Resource Mapping, Inc. Date: 2011 & 2012.
Datum: NAVD 88

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△			
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Post-Mining Topography and Drainage Basins Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure
14
Revised

Document Path: G:\DPT_CHM\FM1_MXD\129491_TRS_FDEP mining\Fig 14_Post-Mining Topo and Drainage.mxd

Bradford

Clay

2,-7,22

1,-7,22

6,-7,23

5,-7,23

8,-7,23

7,-7,23

11,-7,22

12,-7,22

13,-7,22

14,-7,22

17,-7,23

18,-7,23

19,-7,23

23,-7,22

24,-7,22

25,-7,22

30,-7,2

1A 1B 1C 1D 1E 1F 1G 1H 1I 1J 1K 1L 1M 1N 1O 1P 1Q 1R 1S

1 2 3 4 5 6 7 8 9 10 11 12

MM

160 441 441W 510d 510s 523 524 530 621 630 641 8146

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Limits of Disturbance (± 1,749.92 Ac.)
- County Boundary
- Section, Township, Range
- MM Mitigation Area

Mitigation Areas Land Use (± 847.08 Ac.)

- 611-Bay Swamp (± 1.29 Ac.)
- 613-Gum Swamp (± 0.21 Ac.)
- 621-Cypress (± 0.51 Ac.)
- 630-Wetland Forested Mixed (± 619.96 Ac.)
- 630E - Wetland Forested Mixed, Enhanced (± 136.49 Ac.)
- 641-Freshwater Marsh (± 88.62 Ac.)
- Wetland Mitigation Cross-Sections

Undisturbed Wetlands (± 571.66 Ac.)

- Undisturbed Wetlands

Undisturbed Surface Water (± 17.81 Ac.)

- Undisturbed Surface Water

Undisturbed Uplands (± 378.46 Ac.)

- Undisturbed Uplands

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700

Feet

1 inch = 700 feet

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Wetland Mitigation Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure **15**

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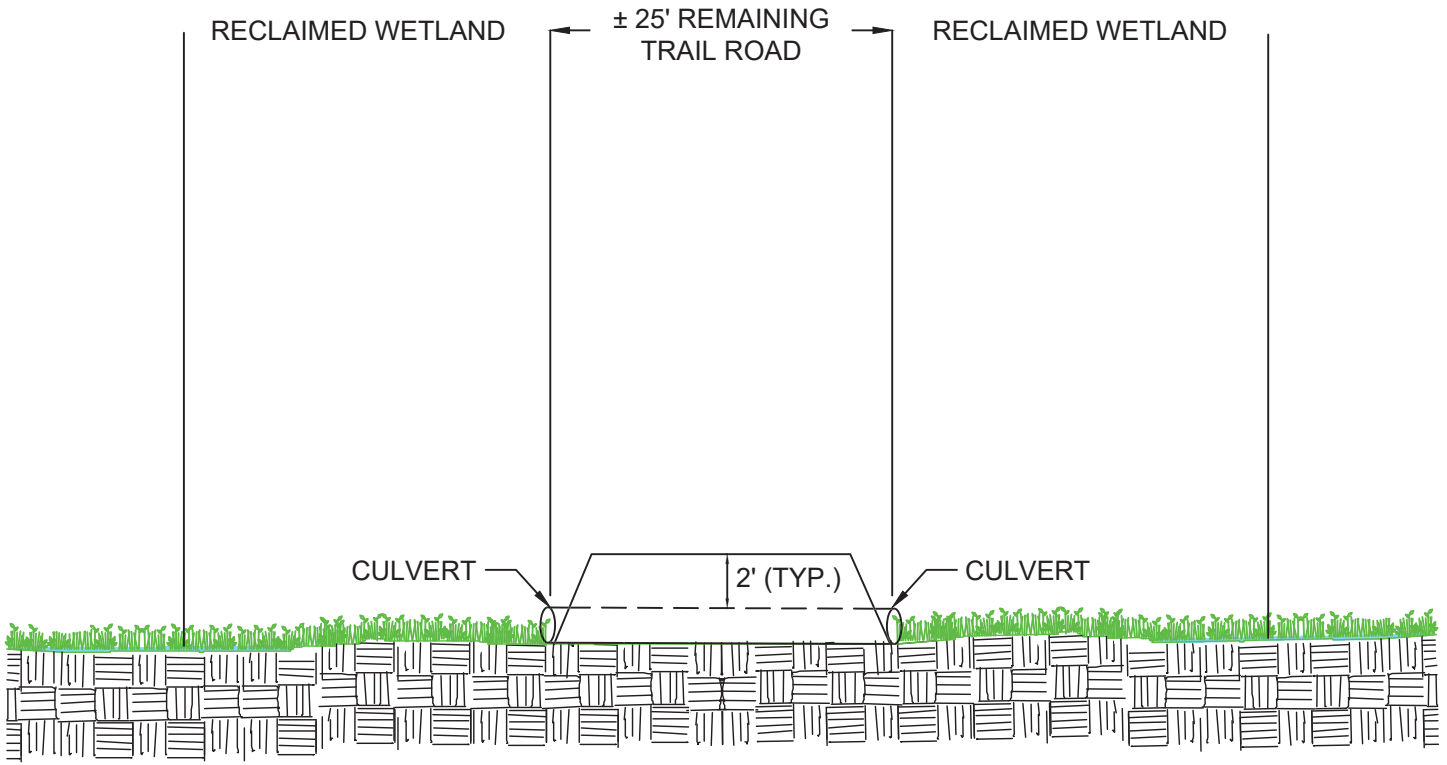

CROSS SECTION G-H - CULVERTED ROAD WETLAND CROSSING
NOT TO SCALE

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CROSS SECTION G - H
Culverted Road Wetland Crossing

TRAIL RIDGE SOUTH
THE CHEMOURS COMPANY FC, LLC.
BRADFORD AND CLAY COUNTIES, FL

FIGURE
16

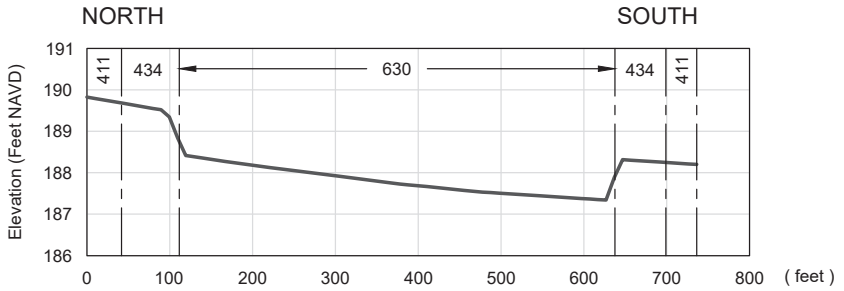
Note:

611, 630 : SHWE ≤ 1' Above Ground Surface

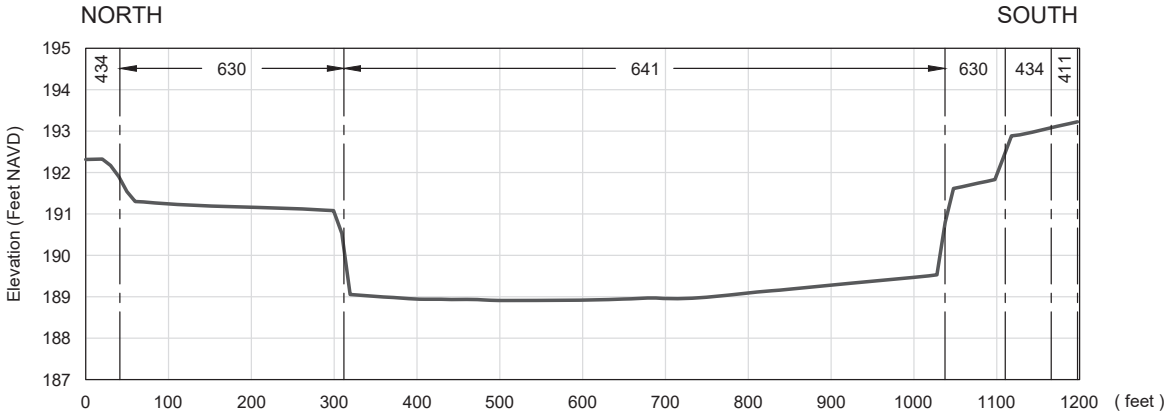
621, 613 : SHWE ≤ 18" Above Ground Surface

641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1A



Cross-Section 1B

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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WETLAND MITIGATION
CROSS-SECTION 1A & 1B

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16A

PAGE: 1 of 16

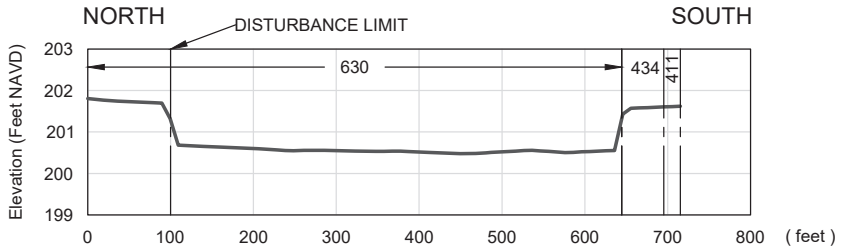
Note:

611, 630 : SHWE ≤ 1' Above Ground Surface

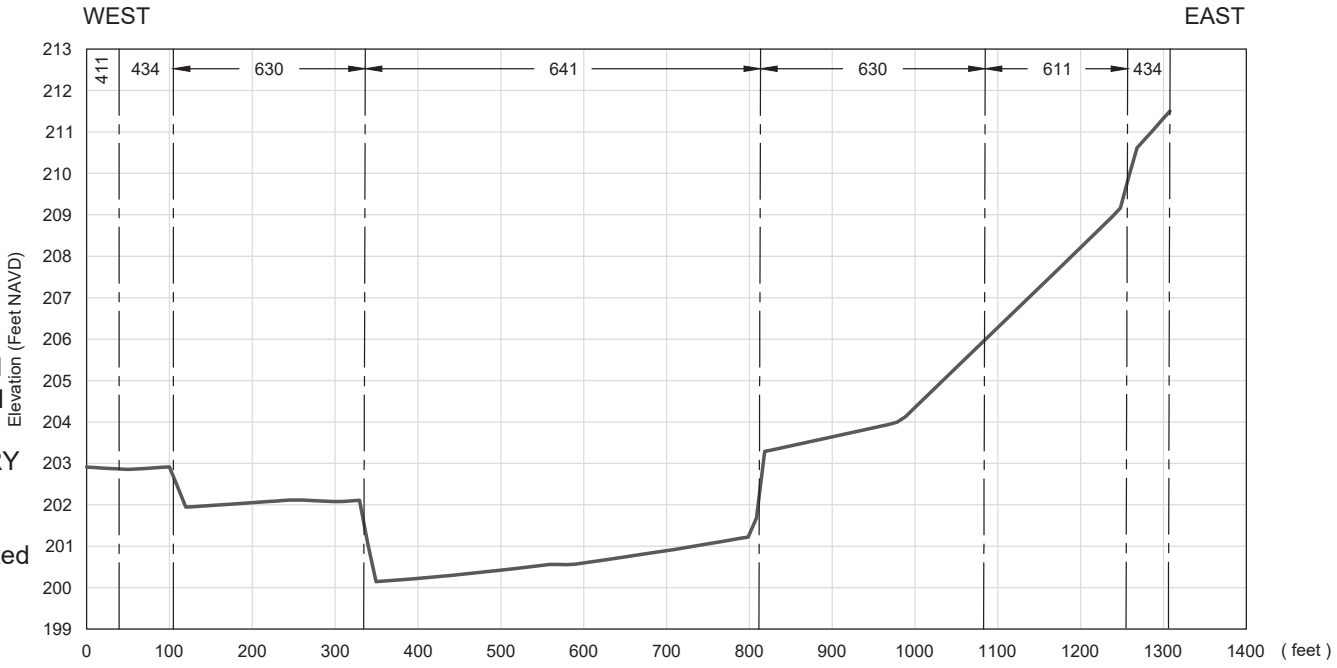
621, 613 : SHWE ≤ 18" Above Ground Surface

641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1C



Cross-Section 1D

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 1C & 1D

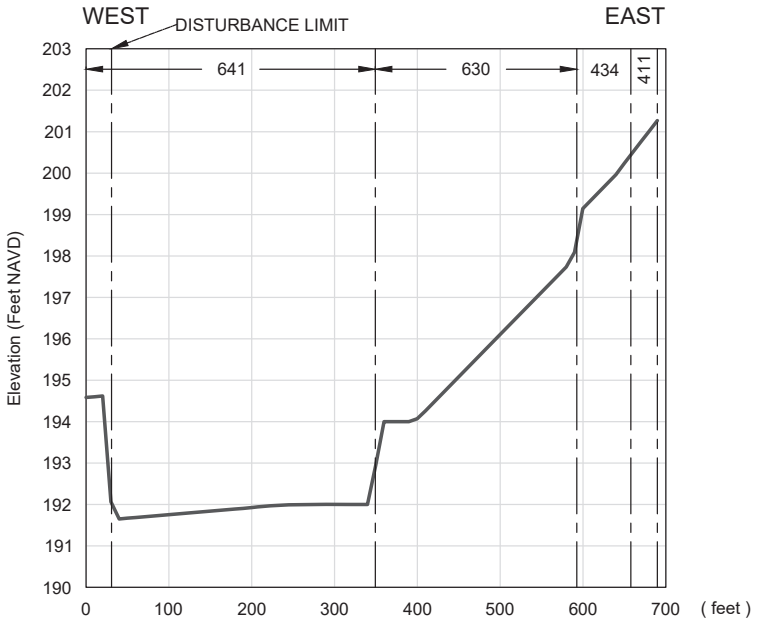
Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16B

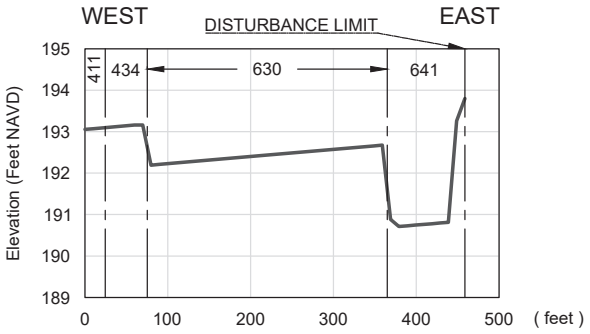
PAGE: 2 of 16

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1E



Cross-Section 1F

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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VERT. 1"=3'

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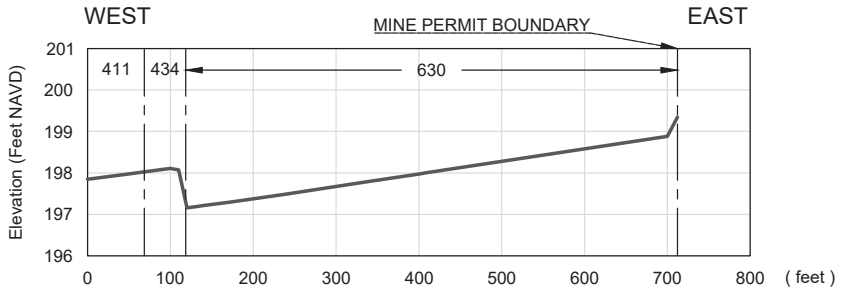
WETLAND MITIGATION
CROSS-SECTION 1E &1F

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

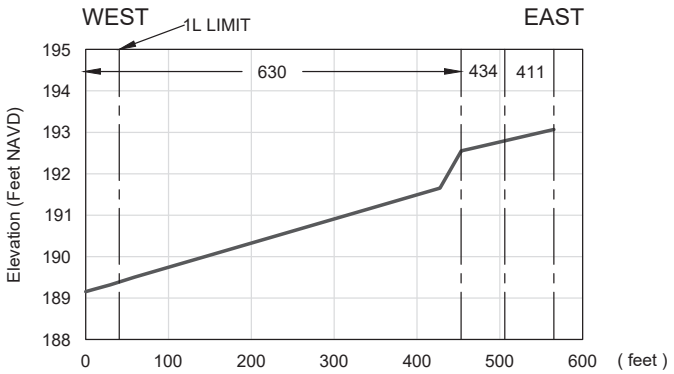
FIGURE
16C

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1G



Cross-Section 1H

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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SCALE:
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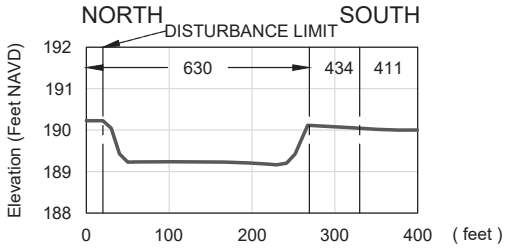
WETLAND MITIGATION
CROSS-SECTION 1G & 1H

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

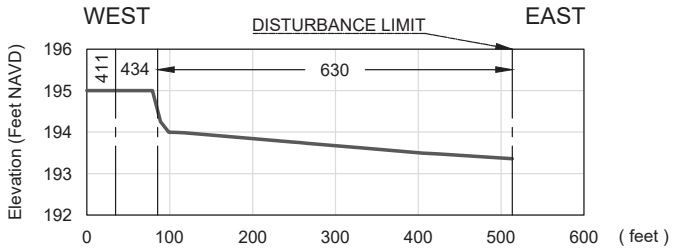
FIGURE
16D

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1I



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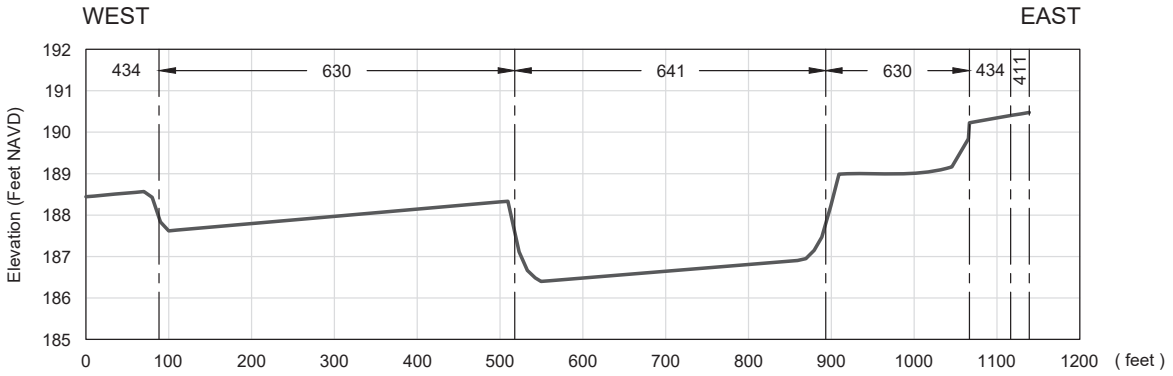

Cross-Section 1K

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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DATE:	10-25-2019
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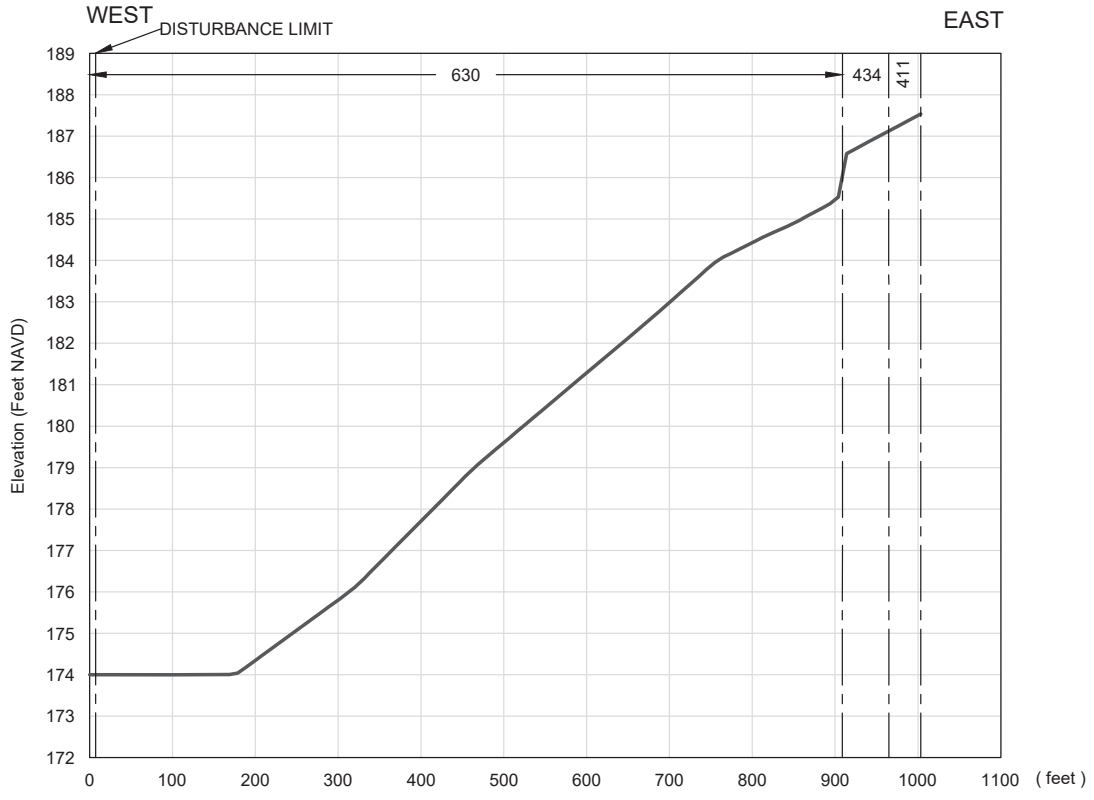
WETLAND MITIGATION
CROSS-SECTION 1I ,1J, 1K

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16E

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1L

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS LICENSE No. 63104 2019.10.31 STATE OF FLORIDA PROFESSIONAL ENGINEER

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 1L

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

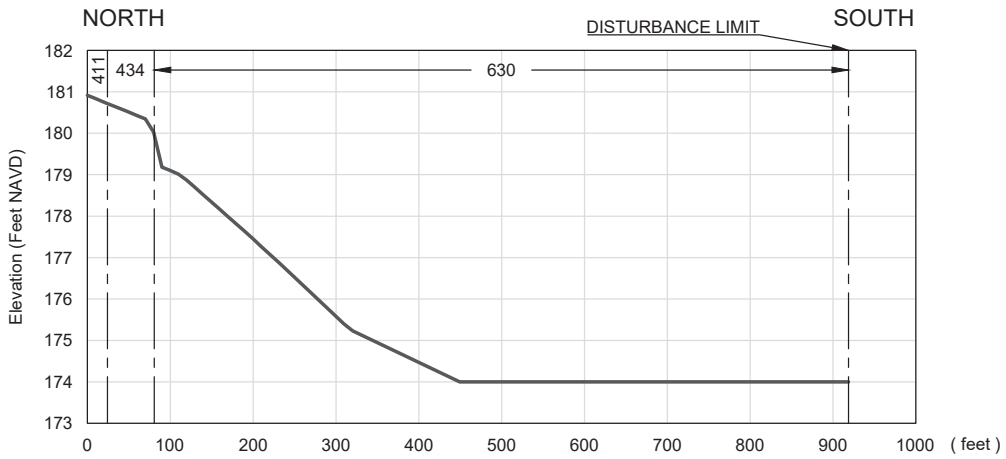
FIGURE
16F

Received FDEP MMP Tallahassee 11/01/2019

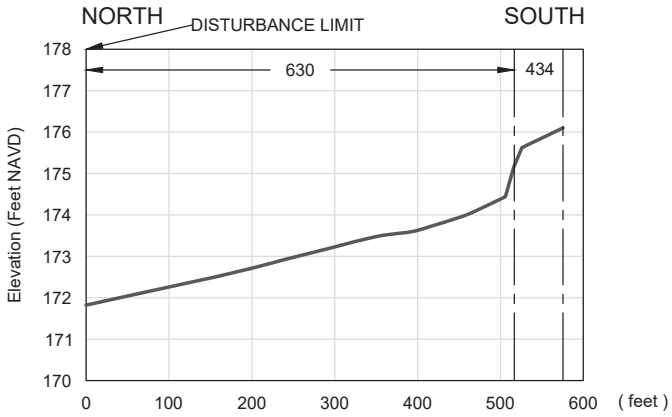
CAD FILE: G:\Chemours_2019\00129491.003A_Chemours-FL-CY2019 Trail Ridge South\CAD\TRS_Post_LU_CrossSections.dwg LAYOUT: Wetland Mitigation1K & 1L PLOTTED: 10/25/2019 2:58 PM BY: yixin qi

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1M



Cross-Section 1N

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
No. 63104
2019.10.31
STATE OF
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PROFESSIONAL ENGINEER

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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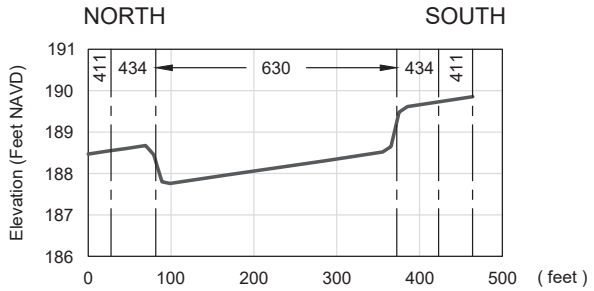
WETLAND MITIGATION
CROSS-SECTION 1M &1N

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

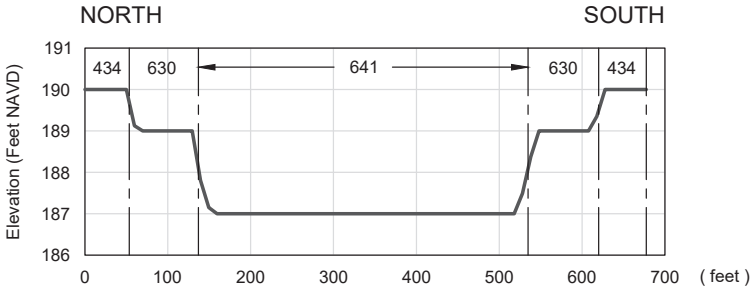
FIGURE
16G

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1O



Cross-Section 1P

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
No. 63104
2019.10.31
STATE OF
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PROFESSIONAL ENGINEER

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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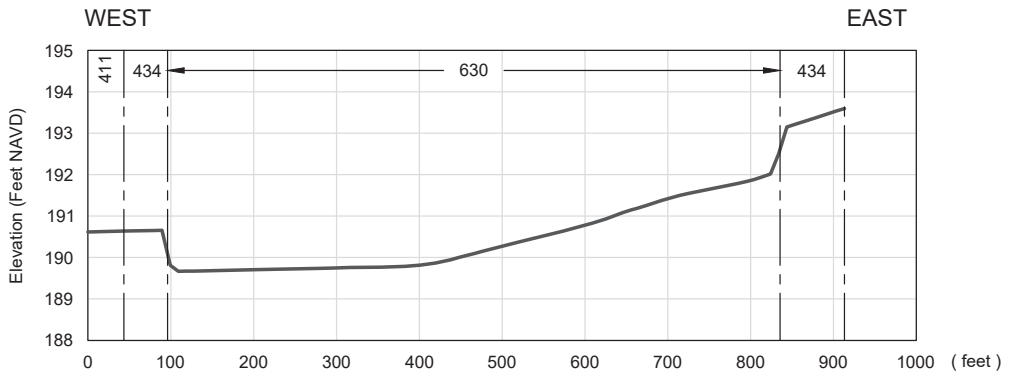
WETLAND MITIGATION
CROSS-SECTION 1O & 1P

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

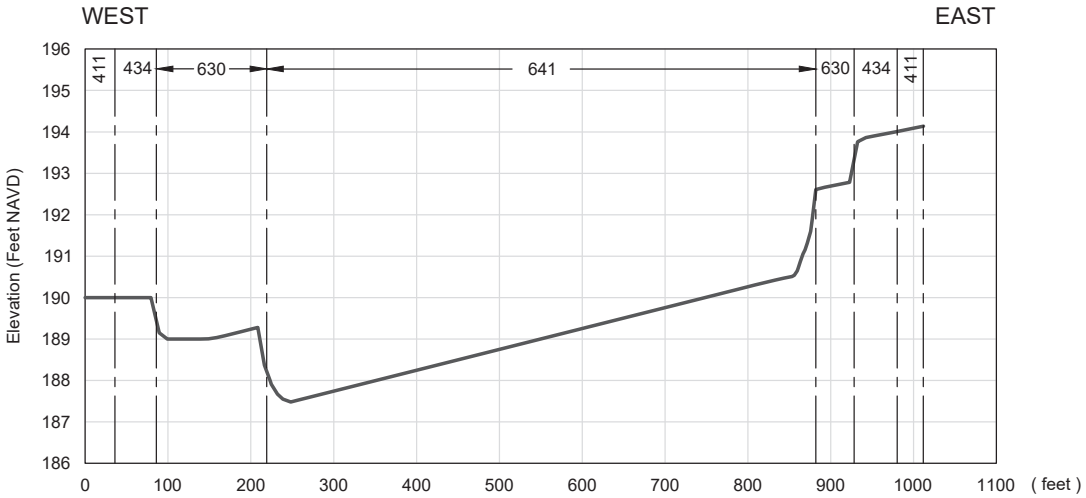
FIGURE
16H

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1Q



Cross-Section 1R

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
No. 63104
2019.10.31
STATE OF
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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 1Q & 1R

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16I

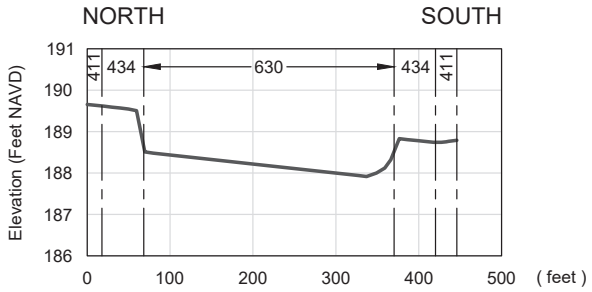
Note:

611, 630 : SHWE ≤ 1' Above Ground Surface

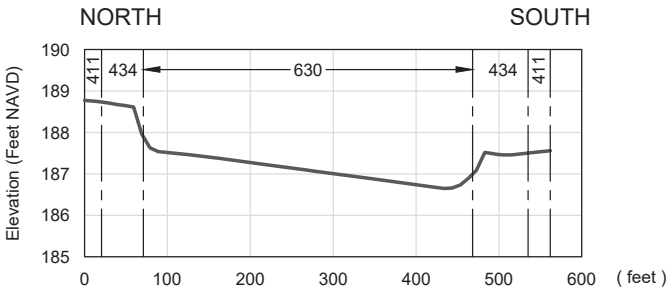
621, 613 : SHWE ≤ 18" Above Ground Surface

641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 1S



Cross-Section 1T

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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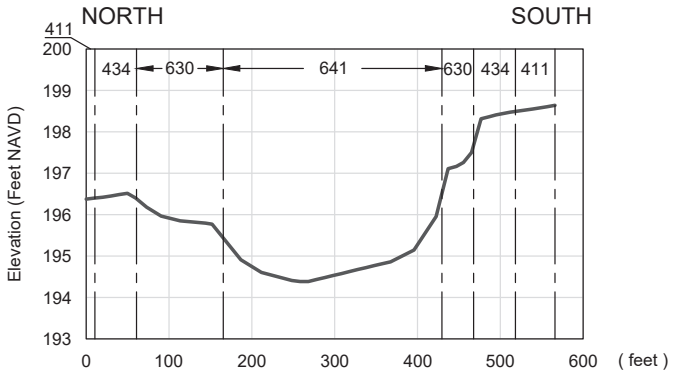
WETLAND MITIGATION
CROSS-SECTION 1S & 1T

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16J

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



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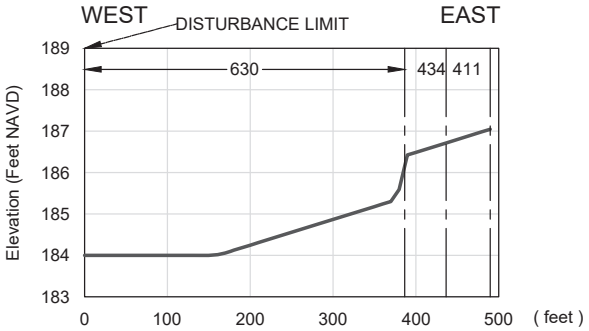

Cross-Section 3

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
No. 63104
2019.10.31
STATE OF
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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 2 & 3

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16K

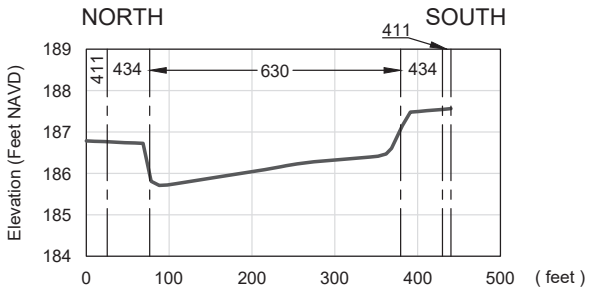
Note:

611, 630 : SHWE ≤ 1' Above Ground Surface

621, 613 : SHWE ≤ 18" Above Ground Surface

641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



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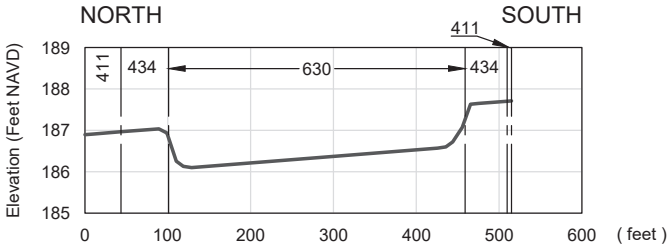

Cross-Section 5

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
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2019.10.31
STATE OF
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PROFESSIONAL ENGINEER

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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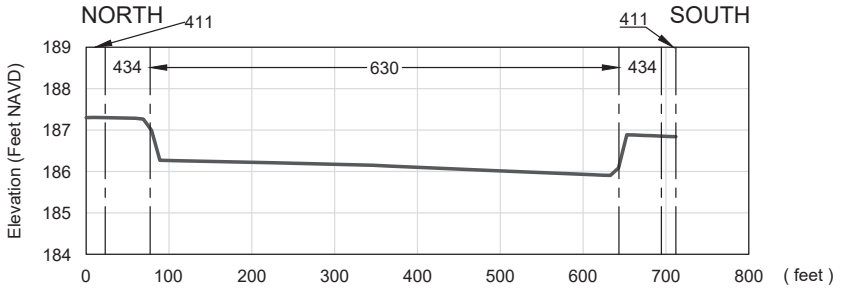
WETLAND MITIGATION
CROSS-SECTION 4 & 5

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16L

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



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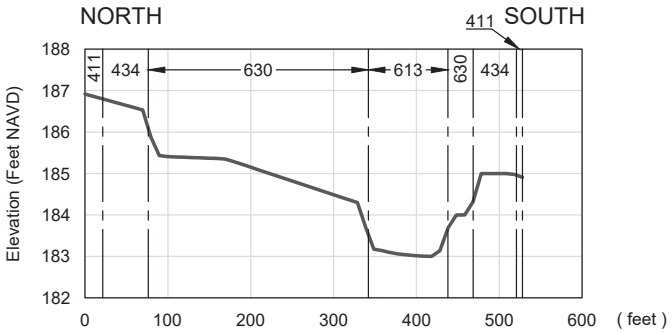

Cross-Section 7

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS
LICENSE
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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 6 & 7

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16M

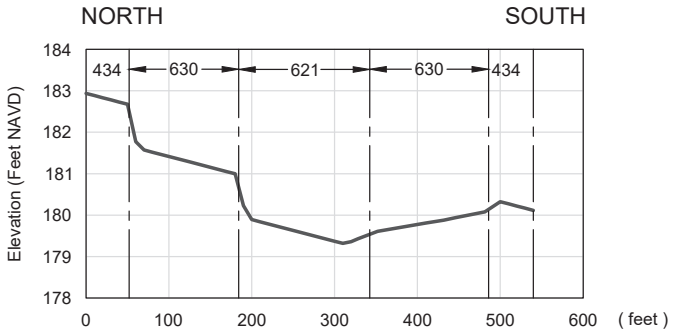
Note:

611, 630 : SHWE ≤ 1' Above Ground Surface

621, 613 : SHWE ≤ 18" Above Ground Surface

641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



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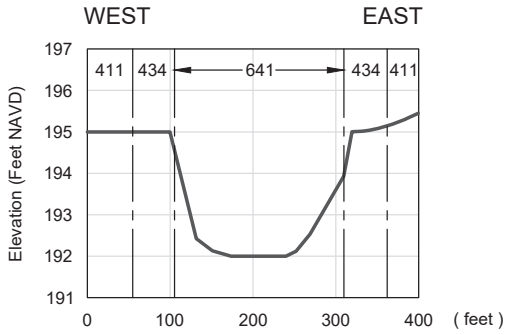

Cross-Section 9

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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WETLAND MITIGATION
CROSS-SECTION 8 & 9

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16N

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
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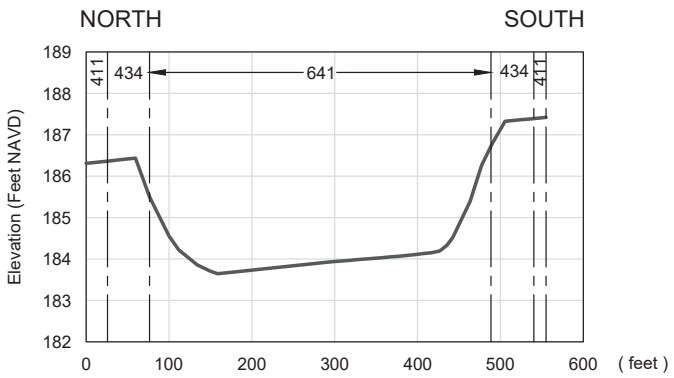
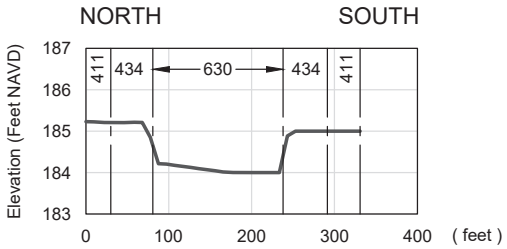
SLWE @ Or Below Ground Surface



Cross-Section 10



Cross-Section 11

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

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LICENSE
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SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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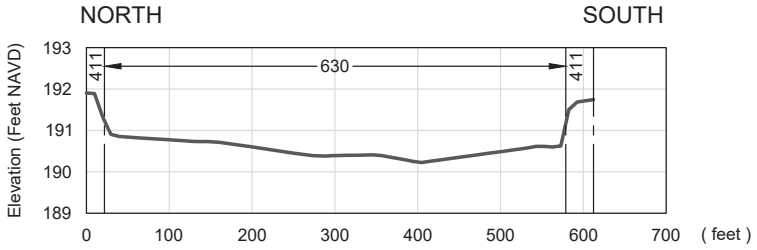
WETLAND MITIGATION
CROSS-SECTION 10 & 11

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16O

Note:
611, 630 : SHWE ≤ 1' Above Ground Surface
621, 613 : SHWE ≤ 18" Above Ground Surface
641 : SHWE ≤ 2' Above Ground Surface

SLWE @ Or Below Ground Surface



Cross-Section 12

LEGEND

POST-RECLAMATION GROUND ELEVATION

LAND USE BOUNDARY

411 - Pine Flatwoods
434 - Hardwood-Coniferous Mixed
611 - Bay Swamps
613 - Gum Swamp
621 - Cypress
641 - Freshwater Marsh

TIMOTHY R DESMARAIS LICENSE No. 63104 2019.10.31 STATE OF FLORIDA PROFESSIONAL ENGINEER

SCALE:
HORIZ. 1"= 150'
VERT. 1"=3'

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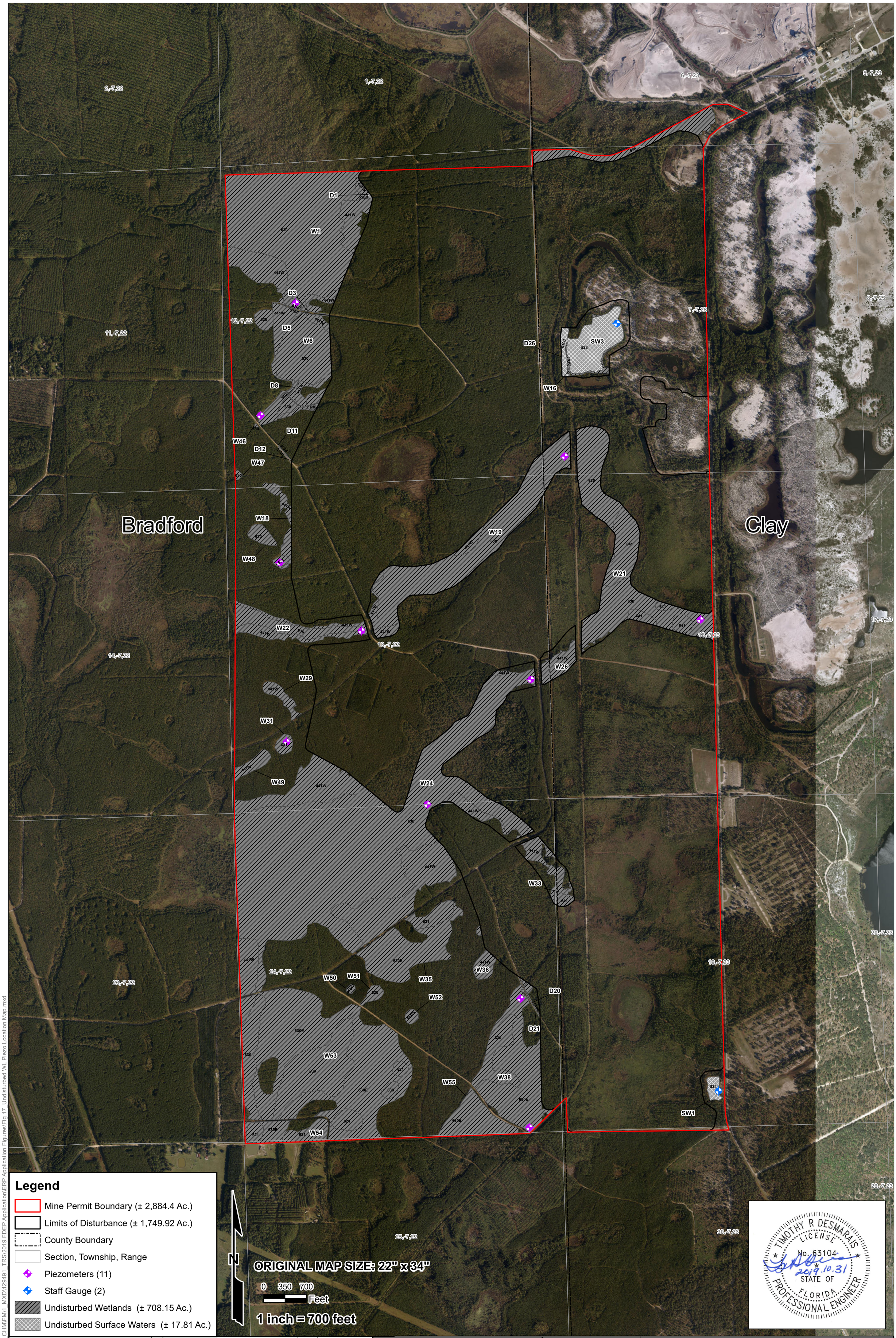
WETLAND MITIGATION
CROSS-SECTION 12

Trail Ridge South
The Chemours Company FC LLC
Bradford and Clay Counties, FL

FIGURE
16P



Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- Limits of Disturbance (± 1,749.92 Ac.)
- County Boundary
- Section, Township, Range
- Piezometers (11)
- Staff Gauge (2)
- Undisturbed Wetlands (± 708.15 Ac.)
- Undisturbed Surface Waters (± 17.81 Ac.)

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Source: Imagery was obtained from ESRI Basemap, Aerial Imagery. Image Date: 1/28/2019 & 3/15/2017.

NO.	REVISION	BY	DATE
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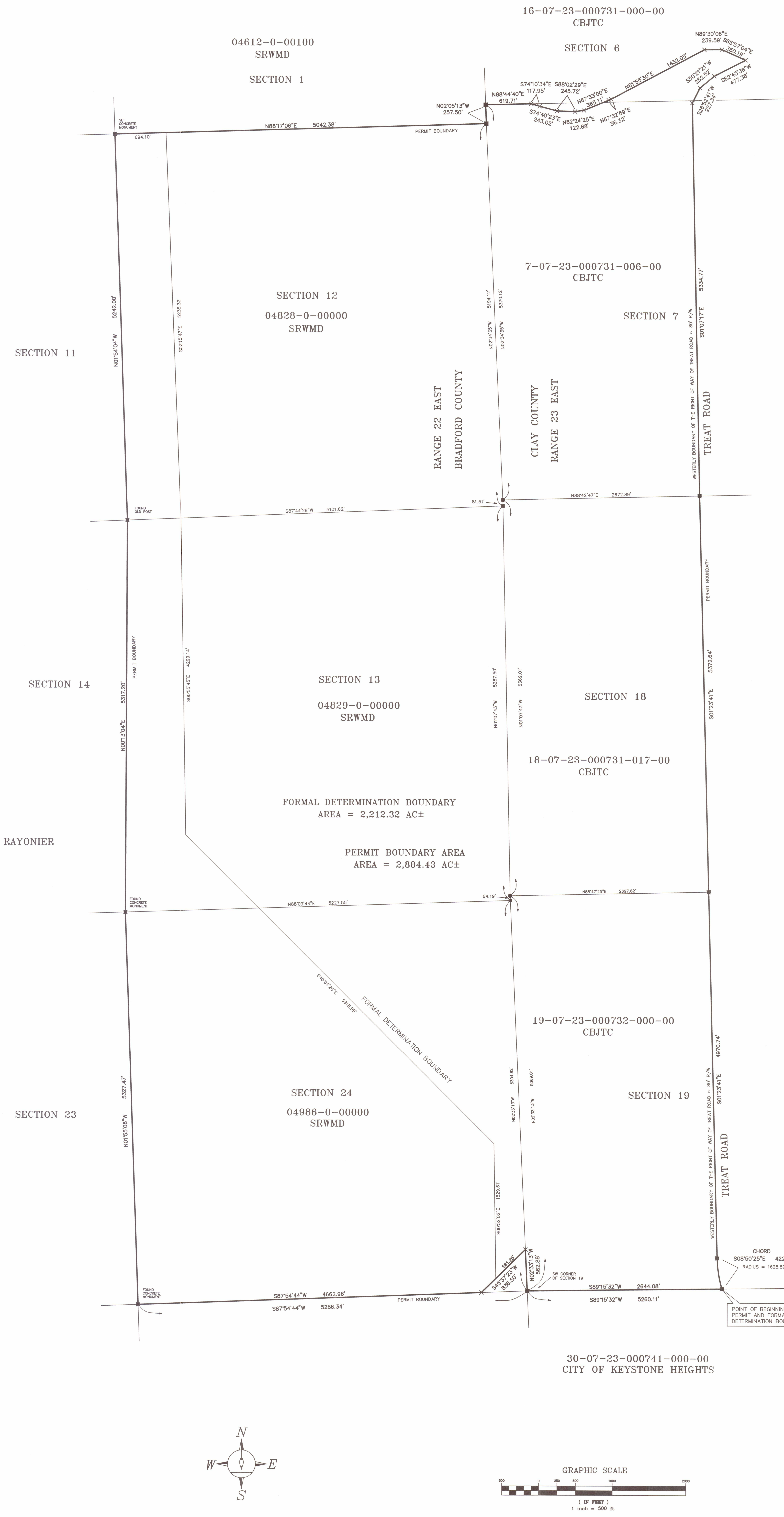
PROJECT NO.	129491.003
DRAWN:	10/23/2019
DRAWN BY:	LS
CHECKED BY:	NA
FILE NAME:	See File Path

Undisturbed Wetland Monitoring Piezometer Locations Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford and Clay Counties, FL

Figure **17**

Document Path: G:\DPT_CHM\FM1_MXD\129491_TRS\2019 FDEP Application\ERP Application Figures\Fig 17_Undisturbed WL Piezo Location Map.mxd



19
20
2616.03'
FOUND 1/2" IRON ROD (LB 4012)
29
30

SKETCH OF DESCRIPTION

OF LANDS LYING IN SECTIONS 12, 13 & 24 OF TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA AND IN SECTIONS 6, 7, 18 & 19 OF TOWNSHIP 7 SOUTH, RANGE 23 EAST, CLAY COUNTY, FLORIDA

DESCRIPTION ~ PERMIT BOUNDARY

A parcel of land lying in Sections 12, 13 & 24 of Township 7 South, Range 22 East, Bradford County, Florida and in Sections 6, 7, 18 & 19 of Township 7 South, Range 23 East, Clay County, Florida; said parcel being more particularly described as follows:

Commence at an iron rod located at the intersection of the Southerly boundary of said Section 19 with the Westerly boundary of the right of way of Treat Road (80' right of way) for the Point of Beginning and run South 89 degrees 15 minutes 32 seconds West, along said Southerly boundary, 2644.08 feet to a ½" iron pipe found at the Southwest corner of said Section 19; thence North 02 degrees 33 minutes 13 seconds West, along the Westerly boundary of Section 19 (the Easterly boundary of Section 24), a distance of 562.88 feet; thence South 45 degrees 37 minutes 23 seconds West, 836.50 feet to the Southerly boundary of said Section 24; thence South 87 degrees 54 minutes 44 seconds West, along said Southerly boundary, 4662.96 feet to a concrete monument found at the Southwest corner thereof; thence North 01 degree 55 minutes 08 seconds West, along the Westerly boundary of said Section 27, a distance of 5327.47 feet to a concrete monument found at the Northwest corner thereof (SW Corner of Section 13); thence North 00 degrees 13 minutes 04 seconds East, along the Westerly boundary of said Section 13, a distance of 5317.20 feet to a concrete monument located at the Northwest corner of said Section 13 (the SW Corner of Section 12); thence North 01 degree 54 minutes 04 seconds West, 5242.01 feet to a concrete monument located at the Northwest corner of said Section 12; thence North 88 degrees 17 minutes 06 seconds East, along the Northerly boundary thereof, 5042.38 feet to a concrete monument found at the Northeast corner thereof; thence North 02 degrees 05 minutes 13 seconds West, along the Westerly boundary of said Section 7 (the Easterly boundary of Section 1) a distance of 257.50 feet to a concrete monument located at the Northwest corner of said Section 7, thence North 88 degrees 44 minutes 40 seconds East, along the Northerly boundary of said Section 7, a distance of 619.71 feet; thence South 74 degrees 10 minutes 34 seconds East, 117.95 feet; thence South 74 degrees 40 minutes 23 seconds East, 243.02 feet; thence South 88 degrees 02 minutes 29 seconds East, 245.72 feet; thence North 82 degrees 24 minutes 25 seconds East, 122.68 feet; thence North 67 degrees 33 minutes 00 seconds East, 365.11 East; thence North 67 degrees 32 minutes 59 seconds East, 36.32 feet; thence North 61 degrees 55 minutes 30 seconds East, 1432.05 feet; thence North 89 degrees 30 minutes 06 seconds East, 239.59 feet; thence South 65 degrees 57 minutes 04 seconds East, 350.19 feet to the Westerly boundary of the right of way of Treat Road (80' right of way); thence Southerly along said Westerly boundary the following courses: South 62 degrees 43 minutes 36 seconds West, 477.38 feet; thence South 50 degrees 21 minutes 21 seconds West, 252.52 feet; thence South 26 degrees 52 minutes 41 seconds West, 227.34 feet; thence South 01 degree 07 minutes 17 seconds East, 5334.77 feet to an iron rod on the Southerly boundary of said Section 17; thence South 01 degree 23 minutes 41 seconds East, 5372.64 feet to an iron rod on the Southerly boundary of said Section 18; thence South 01 degree 23 minutes 41 seconds East, 4970.74 feet to an iron rod located at the beginning of a curve, concave to the East and having a radius of 1628.89 feet; thence Southerly alone said westerly boundary and along the arc of said curve, 422.17 feet as measured along a chord having a bearing of South 08 degrees 50 minutes 25 seconds East, to the Point of Beginning.

Containing 2884.43 acres, more or less.

DESCRIPTION ~ FORMAL DETERMINATION BOUNDARY

A parcel of land lying in Sections 12, 13 & 24 of Township 7 South, Range 22 East, Bradford County, Florida and in Sections 6, 7, 18 & 19 of Township 7 South, Range 23 East, Clay County, Florida; said parcel being more particularly described as follows:

Commence at an iron rod located at the intersection of the Southerly boundary of said Section 19 with the Westerly boundary of the right of way of Treat Road (80' R/W) for the Point of Beginning and run South 89 degrees 15 minutes 32 seconds West, along said Southerly boundary, 2644.08 feet to an ½" iron pipe found at the SW Corner of said Section 19; thence North 02 degrees 33 minutes 13 seconds West, along the Westerly boundary of Section 19 (Easterly boundary of Section 24), a distance of 562.88 feet; thence South 45 degrees 37 minutes 23 seconds West, 561.25 feet; thence North 00 degrees 52 minutes 02 seconds West, 1829.61 feet; thence North 45 degrees 04 minutes 26 seconds West, 5918.99 feet; thence North 00 degrees 55 minutes 45 seconds West, 4299.14 feet to a point on the Northerly boundary of said Section 13, said point being 727.20 feet Easterly of the Northwest corner of said section 13 on a bearing of North 87 degrees 44 minutes 28 seconds East; thence North 02 degrees 15 minutes 47 seconds West, 5235.32 feet to a point on the Northerly boundary of said Section 12, being 694.10 feet Easterly of the NW corner thereof on a bearing of North 88 degrees 17 minutes 08 seconds East; thence North 88 degrees 17 minutes 06 seconds East, along said Northerly boundary, 4348.28 feet to a concrete monument located at the NE corner of said Section 12; thence North 02 degrees 05 minutes 13 seconds West, along the Westerly boundary of said Section 7 (Easterly boundary of Section 1, Township 7 South, Range 22 East) 257.50 feet to a concrete monument located at the Northwest corner of said Section 7, thence North 88 degrees 44 minutes 40 seconds East, along the Northerly boundary of said Section 7, a distance of 619.71 feet; thence South 74 degrees 10 minutes 34 seconds East, 117.95 feet; thence South 74 degrees 40 minutes 23 seconds East, 243.02 feet; thence South 88 degrees 02 minutes 29 seconds East, 245.72 feet; thence North 82 degrees 24 minutes 25 seconds East, 122.68 feet; thence North 67 degrees 33 minutes 00 seconds East, 365.11 East; thence North 67 degrees 32 minutes 59 seconds East, 36.32 feet; thence North 61 degrees 55 minutes 30 seconds East, 1432.05 feet; thence North 89 degrees 30 minutes 06 seconds East, 239.59 feet; thence South 65 degrees 57 minutes 04 seconds East, 350.19 feet to the Westerly boundary of the right of way of Treat Road (80' right of way); thence Southerly along said Westerly boundary the following courses: South 62 degrees 43 minutes 36 seconds West, 477.38 feet; thence South 50 degrees 21 minutes 21 seconds West, 252.52 feet; thence South 26 degrees 52 minutes 41 seconds West, 227.34 feet; thence South 01 degree 07 minutes 17 seconds East, 5334.77 feet to an iron rod on the Southerly boundary of said Section 17; thence South 01 degree 23 minutes 41 seconds East, 5372.64 feet to an iron rod on the Southerly boundary of said Section 18; thence South 01 degree 23 minutes 41 seconds East, 4970.74 feet to an iron rod located at the beginning of a curve, concave to the East and having a radius of 1628.89 feet; thence Southerly alone said westerly boundary and along the arc of said curve, 422.17 feet as measured along a chord having a bearing of South 08 degrees 50 minutes 25 seconds East, to the Point of Beginning.

Containing 2212.32 acres, more or less.

NOTES

This map not valid without the signature and the original raised seal of a Florida licensed surveyor and mapper.

This sketch does not represent a field survey.

Bearings based on State Plane Coordinates NAD 1983 Florida North Datum as projected using RTK network GPS.

Additions or deletions to survey maps or reports by other than the signing party is prohibited without the written consent of Patrick B. Welch & Associates, Inc.

CBJTC = CAMP BLANDING JOINT TRAINING CENTER
SRWMD – SUWANNEE RIVER WATER MANAGEMENT DISTRICT

SURVEYOR'S CERTIFICATION

I hereby certify that this survey meets the minimum technical standards as set forth by the Florida Board of Professional Surveyors and Mappers in Chapter 61G17-6, Florida Administrative Code, pursuant to Section 472.027, Florida Statutes.

By [signature] 07/02/19

PATRICK B. WELCH, PSM
FLORIDA CERTIFICATE NO. 2714
BUSINESS NO. LB 4012

DATE SIGNED

FOR : THE CHEMOURS COMPANY FC, LLC		
DRAWN BY : MTB	CHECKED BY : PBW	FIELD BOOK : N/A
SCALE : 1" = 500'	JOB NO. : 05-14-26G	MAP NO. : 1D-106

PATRICK B. WELCH & ASSOCIATES, INC.
LAND SURVEYING, PLANNING & DRAFTING SERVICES
P.O. BOX 809 *870 WEST MACMAHON STREET*
STARKE, FLORIDA 32091 *(904) 964-8292*

During-DA1
During-DA6
During-DA5
During-DA4
During-DA3
During-DA2
During-DA11
During-DA7
During-DA10c
During-DA10a
During-DA8
Curbed Area
During-DA10b
During-DA12
During-DA9

LANDUSE	AREA	PERCENTAGE
	[ACRE]	[%]
Extractive	2.4	5%
Mineral Processing	6.1	14%
Spoil Areas	18.9	43%
Pond	14.6	33%
Hardwood - Coniferous Mixed	0.1	0%
Coniferous Plantation	2.0	5%

Legend

Plant Site Permit Boundary

Mine Permit Boundary

Application No. MMR_137482-018

Area To be Permitted Separately

During Operations Basins

Landuse

Bay Swamps

Coniferous Plantation

Ditch/Canal

Extractive

Freshwater Marsh

Hardwood - Coniferous Mixed

Impervious

Pond

Spoil Areas

Wetland Scrub

0 0.03 0.06 0.12 Miles

N

W:\Civil\Chemours\Trail Ridge South\GIS\Report Figures\Plant Site\FigI.mxd

Source: Imagery was obtained from ESRI Basemap.

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PROJECT NO.	00129491.003A
DRAWN:	2/27/2020
DRAWN BY:	KC
CHECKED BY:	BB
FILE NAME:	FigI

During Operations Landuse Map

Trail Ridge South Mine Plant Site
The Chemours Company
Clay County, Florida

APPENDIX

F

Santa Fe Basin

Lower St. Johns Basin

Northwest Stormwater Outlet

During-DA1

During-DA6

During-DA5

During-DA4

During-DA3

During-DA2

West Stormwater Outlet

During-DA11

Pond Outlet

During-DA7

During-DA10c

During-DA10a

During-DA8

Curbed Area

During-DA10b

During-DA12

See note in Appendix N Sheet 3 for details

During-DA9

Southwest Stormwater Outlet

Pond Outlet

BASIN	DRAINAGE AREA (AC)
Dur-DA1	20.7
Dur-DA2	2.5
Dur-DA3	1.0
Dur-DA4	1.0
Dur-DA5	1.0
Dur-DA6	1.7
Dur-DA7	10.3
Dur-DA8	1.4
Dur-DA9	16.5
Dur-DA10a	3.7
Dur-DA10b	3.5
Dur-DA10c	2.2
Dur-DA11	3.9
Dur-DA12	5.5
Curb	1.2

Legend

- Modeled Stormwater Outlets
- Plant Site Permit Boundary
- Sheet Flow Drainage Direction
- During Operations Tc
- Ditch/Swale
- During Operations Basins
- Mine Permit Boundary

Application No. MMR_137482-018

- Area to be Permitted Separately
- Stormwater Ponds
- FL HUC Basins

Pre-Construction Topography

Ft - NAVD

High : 228

Low : 193

0 0.03 0.06 0.12 Miles

N

W:\Civil\Chemours\Trail Ridge South\GIS\Report Figures\Plant Site\FigJ2.mxd

Source: Imagery was obtained from ESRI Basemap.

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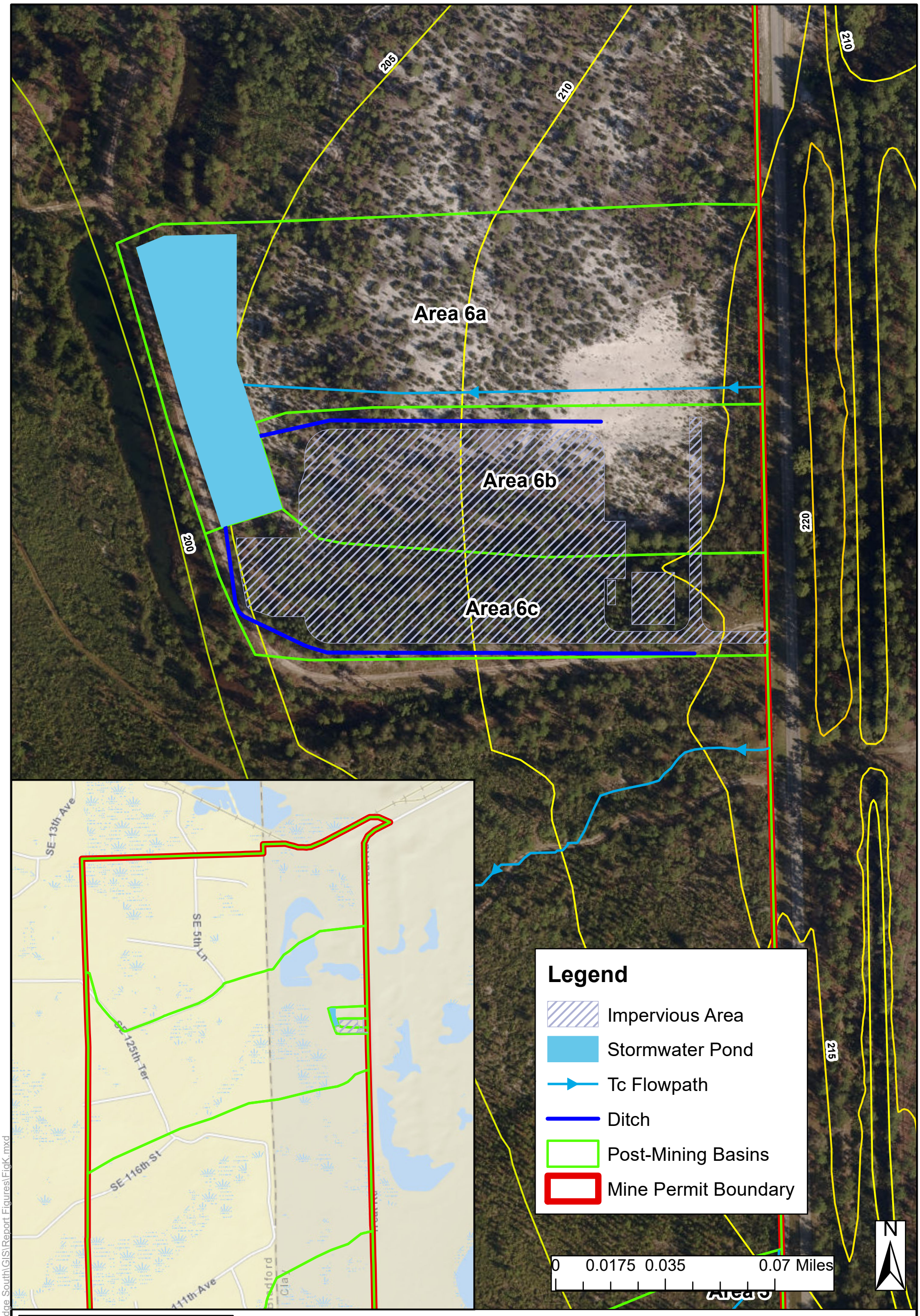
During Operations Drainage Map

Trail Ridge South Mine Plant Site
The Chemours Company
Clay County, Florida

APPENDIX H



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CHECKED BY:	BB
FILE NAME:	Layout.mxd

Post-Mining Stormwater Pond Drainage Map

Trail Ridge South
The Chemours Company
Bradford and Clay Counties, Florida

APPENDIX
K

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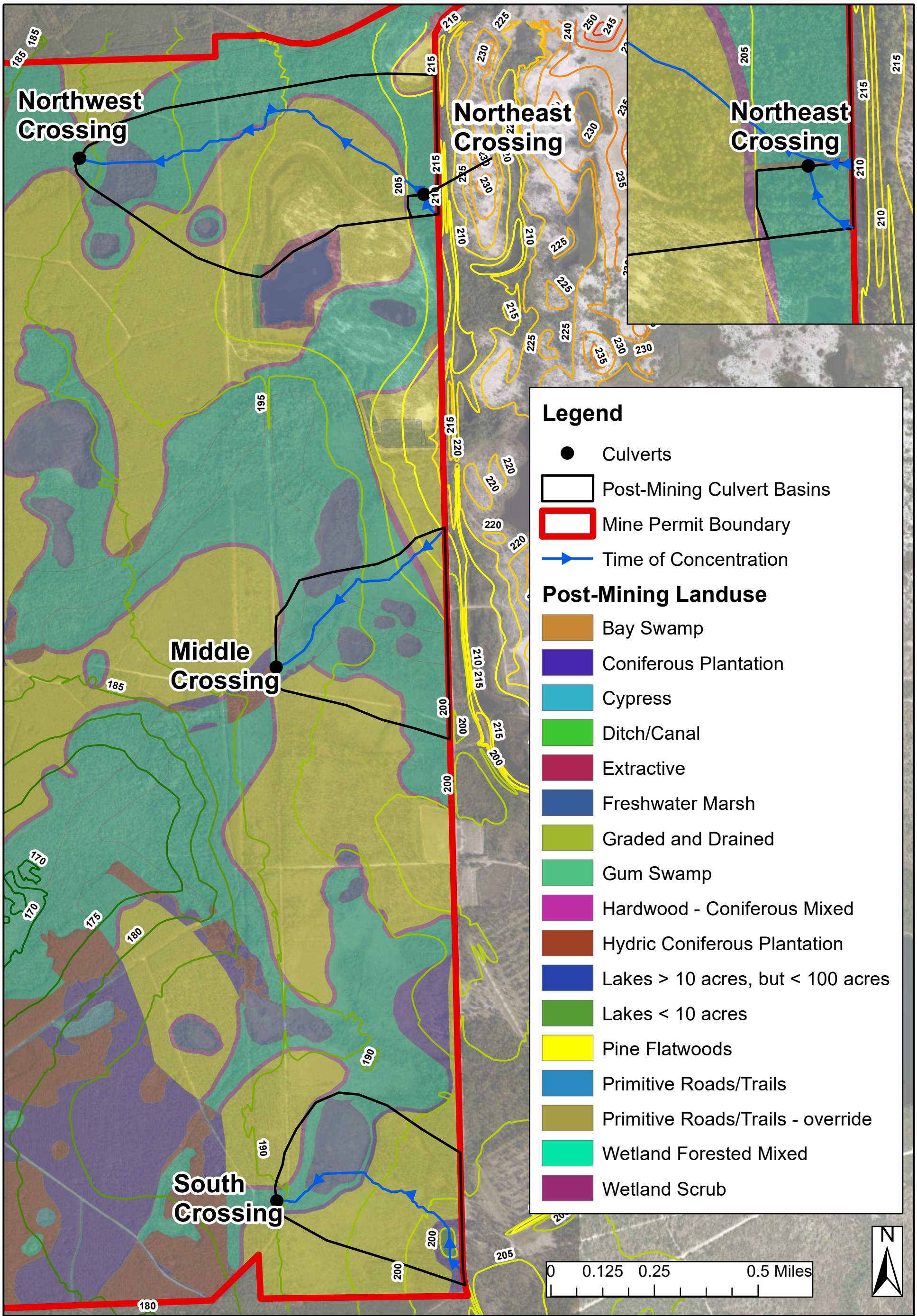

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Post-Mining Road Crossing Drainage Map

Trail Ridge South
The Chemours Company
Bradford and Clay Counties, Florida

APPENDIX
O

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ATTACHMENT 4

Ambient Groundwater Quality Data

ATTACHMENT 4
Ambient Groundwater Quality Data

Per Section H Part 1.i of the Florida Department of Environmental Protection's (FDEP) application form, the applicant is providing the Ambient Groundwater Quality Data as Attachment 4 of the application.

Per the March 12, 2020 email approving the enclosed scope (Appendix A), the sample well was installed to a depth of 38 ft below land surface (bls) under the supervision of a Florida Licensed Professional Geologist on March 27, 2020. The lithology of the sample well location is representative of the overall mine site.

Intermediate ground water sampling (14 to 19 ft bls screen interval) took place on March 27, 2020. In situ field parameters including pH, temperature, conductivity, dissolved oxygen, turbidity, color and odor were recorded on DEP Form FD 9000-27: Groundwater Sampling Log. A wet chemistry sample was collected for sulfate and sent for laboratory analysis. Deep groundwater sampling (33 to 38 ft bls screen interval) took place on April 1, 2020. In situ field parameters including pH, temperature, conductivity, dissolved oxygen, turbidity, color and odor were recorded on DEP Form FD 9000-27: Groundwater Sampling Log. Wet chemistry samples were collected for sulfate, chloride, nitrate, nitrite, total suspended solids, gross alpha particle activity, combined radionuclides (radium-226, radium-228), and uranium and sent for laboratory analysis. Sampling results, sample logs, well construction log, soil boring log, and the equipment calibration log are attached as appendices B-H.

Based on the sample data collected all parameters are within state water quality standards.

Tables

Table 1 Groundwater Sample Data

Figures

Figure 1 Monitoring Well Location

Appendices

Appendix A Well Installation and Sampling Scope
Appendix B Intermediate Groundwater Sample Analytical Results
Appendix C Deep Groundwater Sample Analytical Results
Appendix D Intermediate Groundwater Sample Log
Appendix E Deep Groundwater Sample Log
Appendix F Monitoring Well Construction Log
Appendix G Soil Boring Log
Appendix H Equipment Calibration Log

TABLES

		Analyte	MW-1A
LABORATORY ANALYSIS		Sulfate Mid mg/L	0.50U
		Chloride mg/L	2.5
		Nitrate mg/L	0.12
		Nitrite mg/L	0.050U
		Sulfate mg/L	0.50U
		TSS mg/L	31
		Gross Alpha pCi/l	4.7 +/- 0.9
		Combined Radium pCi/l	2.6 +/- 0.7
		Radium-226 pCi/l	1.4 +/- 0.5
		Radium-228 pCi/l	1.2 +/- 0.7
		Uranium pCi/l	0.3 +/- 0.2
		Uranium ppb	0.4 +/- 0.3
MID DEPTH FIELD TESTING DATA		pH -log[H+]	4.47
		Temperature (C)	22.03
		Conductivity (uS/cm)	75
		Dissolved Oxygen (mg/L)	0.19
		Tubidity (NTUs)	151
		Color	Brown
		Odor	None
MINING DEPTH FIELD TESTING DATA		pH -log[H+]	4.3
		Temperature (C)	22.76
		Conductivity (uS/cm)	35
		Dissolved Oxygen (mg/L)	0.79
		Tubidity (NTUs)	138
		Color	Light Brown
		Odor	None

FIGURES

2,-7,22
1,-7,22
6,-7,23
5,-7,23
11,-7,22
12,-7,22
7,-7,23
8,-7,23
Bradford
Well1a
Clay
14,-7,22
13,-7,22
18,-7,23
17,-7,23
23,-7,22
24,-7,22
19,-7,23
20,-7,23
25,-7,22
30,-7,23

Legend

- Mine Permit Boundary (± 2,884.4 Ac.)
- County Boundary
- Section, Township, Range
- Monitoring Well 1A

N

ORIGINAL MAP SIZE: 22" x 34"

0 350 700 Feet

1 inch = 700 feet

Source: Imagery was obtained from ESRI Basemap, Aerial Imagery. Image Date: 1/28/2019 & 3/15/2017.

NO.	REVISION	BY	DATE
△			
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Monitoring Well Location Map

Trail Ridge South
The Chemours Company FC, LLC.
Bradford & Clay Counties, FL

Figure
1

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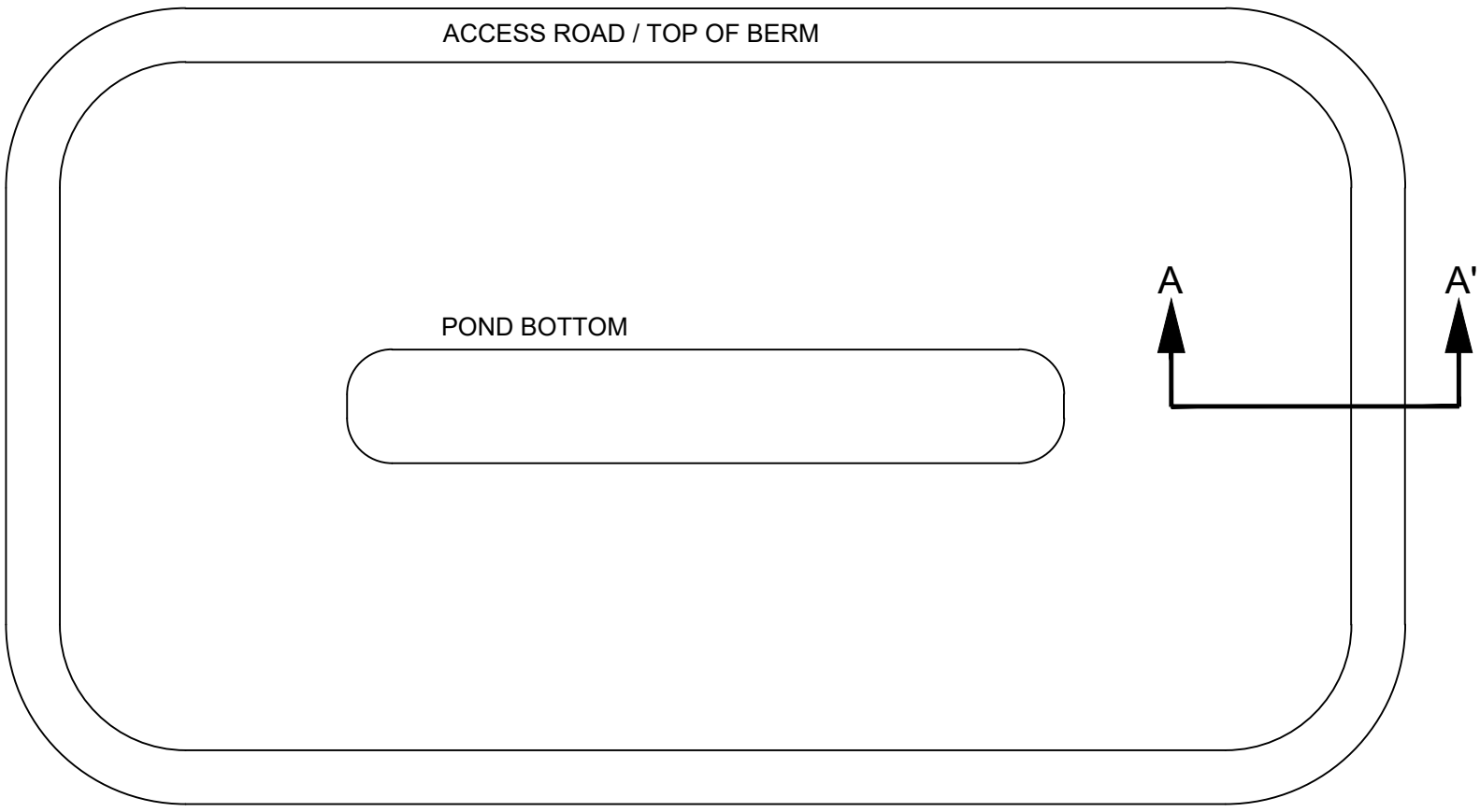
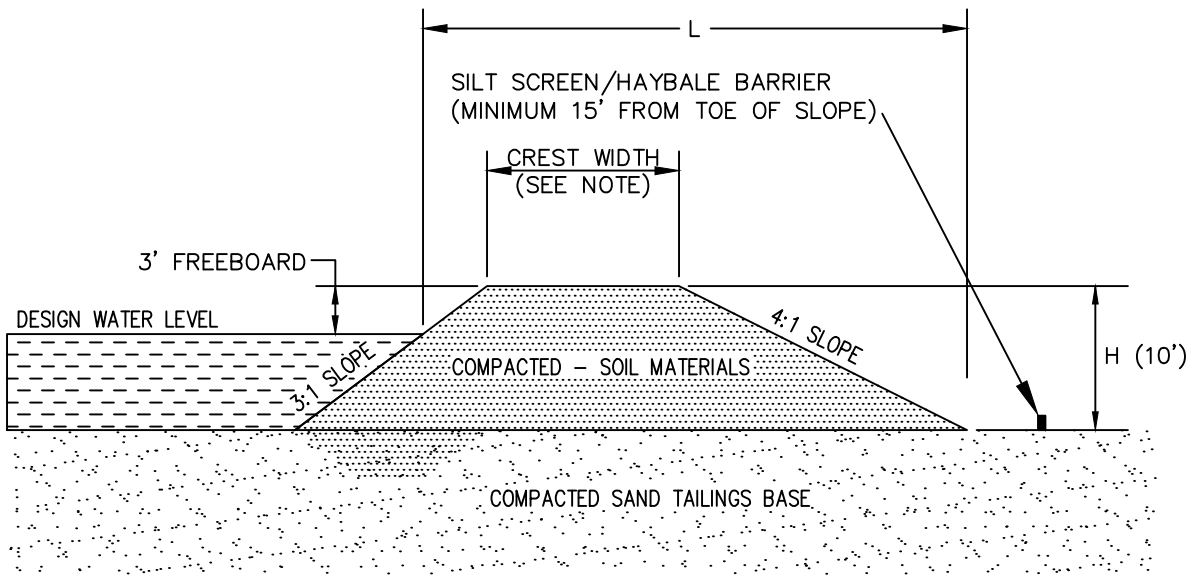
APPENDIX A – IWW POND DESIGN AND OPERATING INFORMATION



PLAN VIEW



TYPICAL ABOVE-GRADE WATER STORAGE

NOTES:
1. H = HEAD DIFFERENCE BETWEEN POND WATER LEVEL AND LOWEST ELEVATION OF OUTSIDE TOE OF BERM (MAXIMUM 8FT)
2. L = HORIZONTAL DISTANCE BETWEEN EDGE OF MAXIMUM WATER SURFACE AND OUTSIDE TOE OF BERM
3. SET CREST WIDTH (MINIMUM 15FT) SO THAT THE RATIO OF H / L IS LESS THAN OR EQUAL TO 0.10
4. ALL BERMS TO BE DESIGNED AND CONSTRUCTED PER "RECOMMENDED BEST MANAGEMENT PRACTICES (BMP'S) FOR DESIGN AND CONSTRUCTION OF STORAGE PONDS" (ARDAMAN & ASSOCIATES, INC. APRIL 2003)

SECTION A-A'

TYPICAL STORAGE POND

N.T.S.

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PROJECT NO. 00129491.003A	
DRAWN: 2/11/2020	
DRAWN BY: NCD	
CHECKED BY: MNA	
FILE NAME: TRS_Ponds.dwg	

Typical Storage Pond Schematic

Trail Ridge South
The Chemours Company FC, LLC
Bradford & Clay Counties, Florida

FIGURE
18

TABLE 1. TRAIL RIDGE SOUTH IWW PONDS CAPACITY ANALYSIS FOR THE 25-YEAR, 24-HOUR STORM EVENT - CONCEPTUAL PRE-CONSTRUCTION*

Pond ID	Levee Top Elevation (feet-NAVD)	Drainage Area (acres)	Spillway Invert Elevation (feet-NAVD)	Max. Stage (feet-NAVD)	Pond Area @ Max. Stage (acres)	Freeboard (feet)	Discharge (cfs)	Humate Level (feet-NAVD)	Maximum Operational Level (feet-NAVD)	Operational Level (feet-NAVD)
Process Pond	X	11.50	X - 3	X - 3	9.24	3.00	0.00	X - 8	X-3.81	X - 5.87
Lime Neutralization Pond	X	1.00	X - 3	X - 3	0.71	3.00	0.00	X - 8	X-3.94	X - 5.90
Treatment Pond	X	1.00	X - 3	X - 3	0.71	3.00	0.00	X - 8	X-3.94	X - 5.90
Final Effluent Pond	**X**	1.00	X - 3	X - 3	0.71	3.00	0.00	X - 8	X-3.94	X - 5.90

Definitions:

Levee Top Elevation - minimum top of bank elevation surveyed on each levee.

Drainage area - stormwater contributing area.

Spillway Invert Elevation - The minimum elevation surveyed on the emergency spillway.

Max. Stage - maximum water surface elevation generated by the 25-yr, 24-hr storm event.

Pond Area @ Max. Stage - total area covered by the water in the pond at the Maximum Stage of the 25-yr, 24-hr storm event

Freeboard - difference between the Levee Top Elevation and the Max. Stage

Discharge - outflow from the pond generated by the 25-yr, 24-hr event

Humate Level - humate/sediment level surveyed in the pond

Maximum Operational Level - level in the pond below which humate, sediment, and incidental water or rainfall/runoff may be stored as a normal facility operation.

Operational Level - level in the pond below which discharge from the pond does not occur. For manually-controlled systems, this is the target water elevation and is subject to operator judgement (e.g., hurricane prep). For passive systems, this would be the invert elevation of the lowest bleed-down device (e.g., weir, flashboard, or orifice).

Notes:

25-Yr, 24-hr Rainfall Depth (in) (SJRWMD) 7.75
Freeboard(ft) 3

***Conceptual Pre-Construction Notes:**

1. Final elevations will be provided following as-built certification. The values provided are relative to an arbitrary Levee Top Elevation "X".
2. Humate level corresponds to an allowable accumulation depth of 2 feet.

TABLE 2. TRAIL RIDGE SOUTH IWW POND WEEKLY MANAGEMENT REPORT - TEMPLATE

Final Effluent Discharging? | Rainfall Last 48 Hrs | Rainfall Since Last Report | Rainfall YTD | Inspector EXAMPLE | Wind Condition

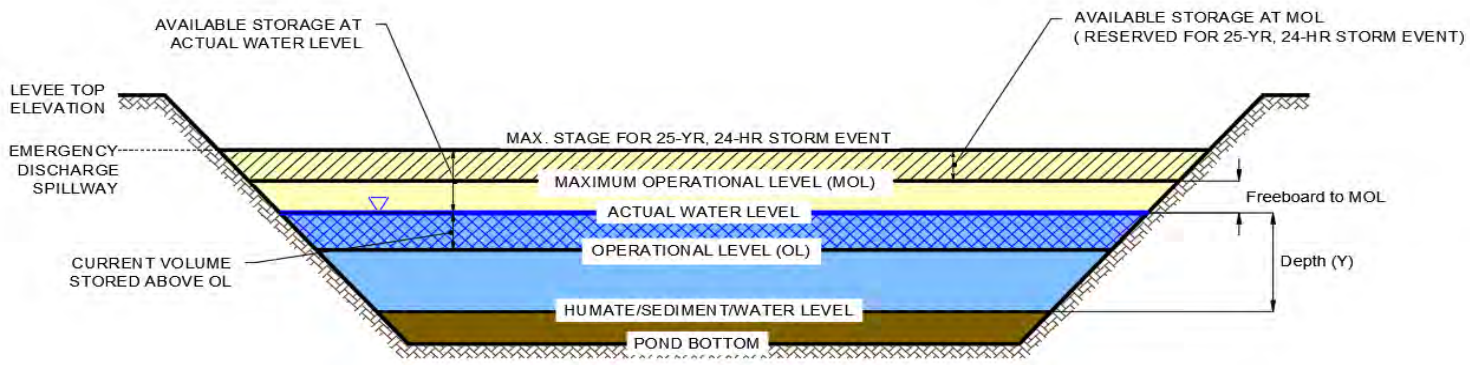
OL - Operational Level
MOL - Maximum Operational Level

Perimeter Pond Number	Actual Water Elevation	Freeboard To Max Water Level	Levee Top Elevation (NAVD)	Max Stage (Ft -NAVD)	Operational Level (OL) (Ft-NAVD)	Maxium Operational Level (MOL) (Ft-NAVD)	Pond Area (Ac.) @ Max. Stage	Available Storage (Ac-Ft) @ Operational Level	Available Storage (Ac-Ft) @ Max Operational Level	Available Storage (Ac-Ft) @ Actual Water Level	Current Pond Storage Capacity Remaining (%)[1]	Pond Storage Capacity Remaining (inches of rain)[1]	Current Volume Stored Above OL (Gallons)
Process Pond	Y	(X-3) - Y	X	X-3	X - 3.81	X - 5.87	9.24	26.05	7.43	See note 2	See note 2	See note 2	See note 2
Lime Neutralization Pond	Y	(X-3) - Y	X	X-3	X - 3.94	X - 5.9	0.71	1.93	0.65				
Treatment Pond	Y	(X-3) - Y	X	X-3	X - 3.94	X - 5.9	0.71	1.93	0.65				
Final Effluent Pond	Y	(X-3) - Y	X	X-3	X - 3.94	X - 5.9	0.71	1.93	0.65				

[1]Pond Storage Capacity Remaining is based on the Available Storage between the MOL and OL.
[2]Current storage values will be determined based on final as-built pond stage-area-storage relationships

Rating Code Perimeter Ponds

Green - greater than 12" below maximum operational level
No action needed
Yellow - 6-12" below maximum operational level
Action needed: Begin pumping
Red - within 6" of maximum operation level
Action needed: Begin pumping immediately



Trail Ridge South IWW Pond Stage-Area-Storage Relationships and Operating Levels

Rain Event Volume (in) **7.75**

Process Pond

Drainage Area (acres) 11.5

25yr Rain Volume (ac-ft) 7.4

Depth (ft)	Area (ac)	Vol (ac-ft)	Comment
0	8.40	0	
1	8.52	0	dead storage
2	8.64	0	begin storage
3	8.76	8.7	
4	8.88	17.5	
4.13	8.90	18.7	Normal Operating WL
5	9.00	26.5	
6	9.12	35.5	
6.19	9.14	37.3	Max Operating Depth
7	9.24	44.7	Max Operating Depth + 25-yr Rain Event
8	9.36	54.0	
9	9.48	63.4	
10	9.60	73.0	

IWW Pond 1 - Lime Neutralization

Drainage Area (acres) 1

25yr Rain Volume (ac-ft) 0.6

Depth (ft)	Area (ac)	Vol (ac-ft)	Comment
0	0.50		
1	0.53		dead storage
2	0.56	0.0	begin storage
3	0.59	0.6	
4	0.62	1.2	
4.10	0.62	1.2	Normal Operating WL
5	0.65	1.8	
6	0.68	2.5	
6.06	0.68	2.5	Max Operating Depth
7	0.71	3.2	Max Operating Depth + 25-yr Rain Event
8	0.74	3.9	
9	0.77	4.7	
10	0.80	5.4	

Trail Ridge South IWW Pond Stage-Area-Storage Relationships and Operating Levels

Rain Event Volume (in) **7.75**

IWW Pond 2 - Treatment

Drainage Area (acres) 1

25yr Rain Volume (ac-ft) 0.6

Depth (ft)	Area (ac)	Vol (ac-ft)	Comment
0	0.50		
1	0.53		dead storage
2	0.56	0.0	begin storage
3	0.59	0.6	
4	0.62	1.2	
4.10	0.62	1.2	Normal Operating WL
5	0.65	1.8	
6	0.68	2.5	
6.06	0.68	2.5	Max Operating Depth
7	0.71	3.2	Max Operating Depth + 25-yr Rain Event
8	0.74	3.9	
9	0.77	4.7	
10	0.80	5.4	

IWW Pond 3 - Final Effluent

Drainage Area (acres) 1

Depth (ft)	Area (ac)	Vol (ac-ft)	Comment
0	0.50		
1	0.53		dead storage
2	0.56	0.0	begin storage
3	0.59	0.6	
4	0.62	1.2	
4.10	0.62	1.2	Normal Operating WL
5	0.65	1.8	
6	0.68	2.5	
6.06	0.68	2.5	Max Operating Depth
7	0.71	3.2	Max Operating Depth + 25-yr Rain Event
8	0.74	3.9	
9	0.77	4.7	
10	0.80	5.4	

EXHIBIT I

CBJTC Integrated Natural Resources Management Plan (INRMP)

&

SRWMD/CBJTC Cooperative Management Agreement

FINAL

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN (INRMP)

CAMP BLANDING

JOINT TRAINING CENTER

CLAY COUNTY, FLORIDA

FLORIDA ARMY NATIONAL GUARD

DECEMBER 2014

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UPDATED
INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN
CAMP BLANDING JOINT TRAINING CENTER
CLAY COUNTY, FLORIDA

SIGNATURE PAGE

This Integrated Natural Resources Management Plan (INRMP) is an update of the 2007 Camp Blanding Joint Training Center (CBJTC) INRMP that has been reviewed for operation and effect and recommended for update and continued implementation. It meets the requirements for INRMPs as specified in the Sikes Act, as amended (16 USC §670a *et seq.*). It has set appropriate and adequate guidelines for conserving and protecting the natural resources of CBJTC.

Approving Officials:

MICHAEL C. AHN
Colonel, US Army
Chief, Environmental Programs Division
Army National Guard
Date: 25Feb14

MAJ GEN EMMETT R. TITSHAW, JR.
The Adjutant General
Florida National Guard
Date: 15 DEC 2014

LTC MARK WIDENER
Construction & Facilities Management Officer
Florida Army National Guard
Date: 11 DEC 2014

R. DWAYNE JARRELL, Colonel
Training Site Commander
Camp Blanding Joint Training Center
Date: 6 NOV 14

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Environmental Program Manager
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Executive Summary

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Florida Army National Guard's (FLARNG's) Camp Blanding Joint Training Center (CBJTC). CBJTC includes approximately 73,000 acres of land owned and operated by the State of Florida Armory Board in Clay County, Florida. CBJTC must provide a variety of environmental conditions and habitats in which to train soldiers. The management of CBJTC must be conducted in a way that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. Installation commanders can use INRMPs to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission over the long term.

This updated INRMP is intended to be consistent with the Sikes Act Improvement Act (SAIA) of 1997, 16 US Code (USC) §670a *et seq.*, as amended, Department of Defense Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*, Army Regulation (AR) 200-1 *Environmental Protection and Enhancement*, Army National Guard (ARNG) Directorate Environmental Programs Division (ARNG-ILE), Memorandum dated 9 April 2012, *Guidance for the Creation, Implementation, Review, Revision and Update of INRMPs*, Department of the Army (DA), Memorandum dated 25 May 2006, *Guidance for Implementation of the SAIA*, and Department of Defense (DoD) Office of the Deputy Under Secretary of Defense (DUSD) Memorandum dated 1 November 2004. This INRMP integrates all aspects of natural resources management with the rest of CBJTC's mission, and therefore becomes the primary tool for managing CBJTC's ecosystems and habitats while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency.

This INRMP is an update and reorganization of the 2007 CBJTC INRMP and is the result of a review for operation and effect done by US Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC), and FLARNG. The review for operation and effect determined that only an update is required since there are no military mission changes, no program or management philosophy changes, and no input received from USFWS or FFWCC that resulted in changes to the way natural resources are managed at CBJTC. Based on the desire to update the INRMP, FLARNG updated and reorganized the plan in accordance with the DoD INRMP template guidance and incorporated updated natural resources data.

Goals and objectives provide the framework for the natural resources management programs. Goals provide a general guiding direction for each technical area and logical objectives that facilitate achieving those goals are described for any priority issues within each technical area.

> GOAL PM: Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and DA regulations and policies.
>
> GOAL SO: Manage soil to minimize sediment loss and erosion, while protecting water quality.
>
> GOAL WA: Maintain water resources so they remain resilient, functional, and with no net loss of acreage.

GOAL VE: Manage vegetation to provide a variety of habitats to support the military mission, maintain native species, provide a sustainable forestry program, and enhance wildlife habitat.

GOAL FI: Implement a wildland fire program that minimizes safety concerns and wildfire risk, enhances the military mission, benefits rare species, protects cultural resources, and maximizes habitat management and ecological benefits.

GOAL FW: Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

GOAL TE: Manage rare species using an ecosystem approach while maintaining the military mission at CBJTC.

GOAL IN: Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an integrated pest management approach.

These goals are supported in the INRMP by objectives and projects, as well as management strategies and specific actions to achieve these goals. Goals and objectives are listed in **Section 4.0** of the INRMP, and activities and projects are summarized in **Tables 15** and **16** of **Section 5.0**. These goals will ensure the success of the military mission and conservation of natural resources. The general philosophies and methodologies used throughout CBJTC natural resources management program are focused on conducting doctrinally required military training while maintaining ecosystem viability and sustainability.

This INRMP provides a description of the installation and the military mission, information regarding the environment on CBJTC, and specific natural resource management programs designed for successful and sustainable military training. The implementation of this INRMP at CBJTC will ensure the successful accomplishment of FLARNG's military missions while promoting adaptive management that sustains ecosystem and biological integrity and provides for multiple uses of natural resources.

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APPENDICES

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ABBREVIATIONS AND ACRONYMS

AEDB-EQ	Army Environmental Database - Environmental Quality
AERO	Army Environmental Reporting Online
AFP	Artillery Firing Point
amsl	above mean sea level
AR	Army Regulation
ARNG	Army National Guard
ARNG-ILE	ARNG Directorate Environmental Programs Division
AT	Annual Training
ATAG	Assistant Adjutant General
ATV	All-Terrain Vehicle
BMP	Best Management Practice
BO	Biological Opinion
CBFI	Camp Blanding Forever Initiative
CBMTF	Camp Blanding Management Trust Fund
CBJTC	Camp Blanding Joint Training Center
CBJTC-DPW	CBJTC Department of Public Works
CBJTC-ED	CBJTC Environmental Division
CCVI	Climate Change Vulnerability Index
CEC	Commission for Environmental Cooperation
CFMO	Construction and Facilities Management Officer
CFR	Code of Federal Regulations
CIP	Common Installation Picture
CWA	Clean Water Act
DA	Department of the Army
DA Pam	Department of the Army Pamphlet
DoD	Department of Defense
DoDI	DoD Instruction
DUSD	Deputy Under Secretary of Defense
DZ	Drop Zone
EA	Environmental Assessment
ECO	Environmental Compliance Officer
EIS	Environmental Impact Statement
EMS	Environmental Management System
EO	Executive Order
EPRWeb	Environmental Program Requirements Web
EQCC	Environmental Quality Control Committee
EQR	Environmental Quality Report
ERP	Environmental Resource Permit
ESA	Endangered Species Act
ESMC	Endangered Species Management Component
° F	degrees Fahrenheit
FAC	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDMA	Florida Department of Military Affairs
FEMA	Federal Emergency Management Agency
FFS	Florida Forest Service
FFWCC	Florida Fish and Wildlife Conservation Commission
FIRM	Flood Insurance Rate Map
FLARNG	Florida Army National Guard
FLEPPC	Florida Exotic Pest Plant Council

FLMNH	Florida Museum of Natural History
FLNG	Florida National Guard
FMA	Fish Management Area
FMO-ENV	Facility Management Office Environmental Section
FNAI	Florida Natural Areas Inventory
FNSI	Finding of No Significant Impact
FRMP	Forest Resources Management Plan
F.S.	Florida Statute
FTA	Florida Trail Association
FY	Fiscal Year
GIS	Geographic Information Systems
HUC	Hydrologic Unit Code
ICRMP	Integrated Cultural Resources Management Plan
IDT	Inactive Duty Training
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Plan
ISO	International Standards Organization
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JFHQ-FL	Florida Joint Forces Headquarters
LRAM	Land Rehabilitation and Maintenance
LZ	Landing Zone
MBTA	Migratory Bird Treaty Act
METL	Mission Essential Task List
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOUT	Military Operations on Urban Terrain
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act of 1969
NGB	National Guard Bureau
NGB-ARI	NGB Army Installation Division
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
NWI	National Wetland Inventory
NWP	Nationwide Permit
OFW	Outstanding Florida Water
ONRW	Outstanding Natural Resource Water
PAO	Public Affairs Officer
PBG	Potential Breeding Group
PLS	Planning Level Survey
POTO	Plans, Operations, and Training Officer
RCMP	Range Complex Master Plan
RCW	Red-cockaded Woodpecker
REC	Record of Environmental Consideration
RTLA	Range and Training Land Analysis
RTLP	Range and Training Land Program
SAIA	Sikes Act Improvement Act
SERCC	Southeast Regional Climate Center

SGCN	Species of Greatest Conservation Need
SJA	Staff Judge Advocate
SMZ	Special Management Zone
SOP	Standard Operating Procedure
SPCCP	Spill Prevention Control Countermeasure Plan
SPGP	State Programmatic General Permit
sq-ft	square feet
SR	State Road
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
STEP	Status Tool for Environmental Progress
STRAC	Standards in Training Commission
SWAP	State Wildlife Action Plan
SWPPP	Stormwater Pollution Prevention Plan
TA	Training Area
TAG	The Adjutant General
TRI	Training Requirements Integration
TSC	Training Site Commander
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USFS	United States Forest Service
USGS	United States Geological Survey
UXO	Unexploded Ordnance
WEA	Wildlife and Environmental Area
WMA	Wildlife Management Area
WMD	Water Management District

1.0 INRMP OVERVIEW AND POLICIES

1.1 Purpose

The Integrated Natural Resources Management Plan (INRMP) is the primary guidance document and tool for managing natural resources at Florida Army National Guard's (FLARNG's) Camp Blanding Joint Training Center (CBJTC). CBJTC includes approximately 73,000 acres of land owned and operated by the State of Florida Armory Board in Clay County, Florida (see **Section 2.1** for details). CBJTC must provide a variety of environmental conditions and habitats in which to train soldiers. The management of CBJTC must be conducted in a way that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation. Installation commanders can use INRMPs to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation's military mission over the long term.

This updated INRMP is intended to be consistent with the Sikes Act Improvement Act (SAIA) of 1997, 16 US Code (USC) §670 *et seq.*, as amended, Department of Defense Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*, Army Regulation (AR) 200-1 *Environmental Protection and Enhancement*, Army National Guard (ARNG) Directorate Environmental Programs Division (ARNG-ILE), Memorandum dated 9 April 2012, *Guidance for the Creation, Implementation, Review, Revision and Update of INRMPs*, Department of the Army (DA), Memorandum dated 25 May 2006, *Guidance for Implementation of the SAIA*, and Department of Defense (DoD) Office of the Deputy Under Secretary of Defense (DUSD) Memorandum dated 1 November 2004. This INRMP integrates all aspects of natural resources management with the rest of CBJTC's mission, and therefore becomes the primary tool for managing CBJTC's ecosystems and habitats while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency. The INRMP is the guide for the management and stewardship of all natural resources present on CBJTC. A multiple-use approach will be implemented to allow for the presence of mission-oriented activities, as well as protecting environmental quality through the efficient management of natural resources.

This INRMP is an update and reorganization of the 2007 CBJTC INRMP and is the result of a review for operation and effect done by the US Fish and Wildlife Service (USFWS), Florida Fish and Wildlife Conservation Commission (FFWCC), and FLARNG. The review for operation and effect determined that only an update is required since there are no military mission changes, no program or management philosophy changes, and no input received from USFWS or FFWCC that resulted in changes to the way natural resources are managed at CBJTC. Both FLARNG's environmental office and military trainers were included in the review. The projects identified in **Section 5** include recurring or ongoing projects as well as some newly identified projects needed for the implementation of the existing program.

FLARNG updated and reorganized this INRMP in accordance with the DoD INRMP template guidance and incorporated updated natural resources data. These templates were used to ensure the plan content would meet ARNG-ILE requirements and to provide an easy to follow and logical organization for the INRMP. The INRMP has been updated and reorganized as follows.

To determine what projects and programs have been implemented, an INRMP Implementation Analysis was developed and included in **Section 3.9** (see **Table 11**).

- Management goals and objectives have been reorganized and consolidated by resource area in **Section 4.0**.
- The list of implementation projects has been updated from the 2007 INRMP. See **Table 11** in **Section 3.0** for a summary on 2007 project implementation and **Tables 15** and **16** in **Section 5.0** for activities and projects to be carried out under this INRMP.
- Natural resources data and species lists have been updated to include new data and to include changes in the status of rare species (see **Section 2.0**).
- The Florida State Wildlife Action Plan (SWAP) has been incorporated (see **Section 3.8**).

1.2 Authority and Legal Requirements

The **SAIA** requires federal military installations and state-owned National Guard facilities with adequate wildlife habitat to develop a long-range INRMP and implement cooperative agreements with other agencies. All of CBJTC land is state-owned.

The **DoDI 4715.03**, *Natural Resources Conservation Program*, dated 18 March 2011, establishes polices and assigns responsibilities for complying with applicable federal, state, and local laws and regulations, executive orders (EOs), presidential memorandums, and DoD policies for the integrated management of natural resources on facilities managed or controlled by DoD. This instruction also implements new natural resources conservation metrics and provides procedures for developing, implementing, and evaluating effective natural resources management programs.

AR 200-1, *Environmental Protection and Enhancement*, dated 13 December 2007, addresses the environmental responsibilities of all Army organizations and agencies, and provides a framework for the Army Environmental Management System (EMS). This regulation provides guidance on when to develop and implement an INRMP and discusses associated coordination requirements.

The **DoD DUSD Memorandum**, *Supplemental Guidance concerning INRMP Reviews*, dated 1 November 2004, identifies the DoD policies and procedures concerning natural resources management and INRMP reviews, public comment, and endangered species consultation. INRMPs are required to be jointly reviewed by USFWS, the state conservation agency, and a military proponent for operation and effect on a regular basis, but not less often than every five years. Minor updates and continued implementation of an existing INRMP do not require an opportunity for public comment. Major revisions to an INRMP do require an opportunity for public review. The degree of endangered species consultation when updating or revising an INRMP depends upon the management strategies identified in the INRMP and the amount of past consultation. Most updates and revisions will not require formal consultation. Endangered Species Act (ESA) Section 7 consultation is required for INRMPs that contain management strategies that may affect federally listed species or critical habitat. The need for such consultation should become apparent during the review for operation and effect and be implemented if necessary as part of a revision. USFWS issued a Biological Opinion (BO) for the red-cockaded woodpecker (RCW; *Picoides borealis*) on Army Installations in 2007 (Costa 2007). A revision to this BO was made in 2008 (Hankla 2008) for CBJTC

based on FLARNG's Endangered Species Management Component (ESMC) Update for Incidental Take (Robinson 2008) (see **Appendix D**).

DA Memorandum, *Guidance for Implementation of the SAIA*, dated 25 May 2006, establishes guidance for implementing existing DoD SAIA guidance on Army lands.

ARNG-ILE Memorandum, *Guidance for the Creation, Implementation, Review, Revision and Update of INRMPs*, dated 9 April 2012, is intended to supplement the SAIA and AR 200-1 and supersede all previous ARNG INRMP guidance. The memorandum provides guidance for state ARNG Environmental Programs on when an INRMP is required, coordination requirements for new and revised INRMPs, INRMP format, integration of component plans (e.g., Integrated Wildland Fire Management Plan [IWFMP]), integration with other programs, critical habitat designations, INRMP implementation and funding, annual reviews and reviews for operation and effect, reporting and tracking, plan updates and revisions, when public review is necessary, and National Environmental Policy Act of 1969 (NEPA) requirements.

In accordance with **NEPA** (42 USC §4321 *et seq*.), an Environmental Assessment (EA) of the 2000 CBJTC INRMP was completed. The EA presented the *Preferred Alternative* (implementation of the INRMP) and other alternatives, summarized the affected environment, and assessed the environmental consequences of INRMP implementation. The EA concluded that implementation of the INRMP under the *Preferred Alternative* was expected to result in net positive effects by sustaining and enhancing the natural resources while providing for no net loss in training lands. A Finding of No Significant Impact (FNSI) was signed by the National Guard Bureau (NGB), and the 2000 CBJTC INRMP was implemented. In 2007, FLARNG updated the original 2000 CBJTC INRMP. At that time, it was determined no significant changes would occur as a result of the INRMP update and that the 2000 EA and FNSI were still valid.

Similarly, this INRMP is an update and reorganization of the 2007 CBJTC INRMP. The review for operation and effect determined that only an update is required since there are no military mission changes, no program or management philosophy changes, and no input received from USFWS or FFWCC that resulted in changes to the way natural resources are managed at CBJTC. An Environmental Checklist and a Record of Environmental Consideration (REC) were prepared and are included in **Appendix M**. The Environmental Checklist describes the Proposed Action (update and continued implementation of the 2007 CBJTC INRMP), identifies that the updated INRMP is addressed in the 2000 CBJTC INRMP EA, identifies potential impacts to various environmental media, and concludes that a REC is the appropriate level of NEPA documentation. The REC that accompanies the Environmental Checklist cites the EA for the 2000 CBJTC INRMP as adequately covering the updated INRMP.

In addition to these laws, regulations and directives, a number of others apply to natural resources management at CBJTC and are summarized in **Appendix J**.

1.3 Responsibilities

1.3.1 ARNG Headquarters

ARNG-ILE is responsible for review and approval of this INRMP. ARNG-ILE is also involved in programming, funding, and reviewing implementation projects set forth in the INRMP.

1.3.2 FLARNG

The Adjutant General (TAG) is directly responsible for the operation and maintenance of CBJTC, including implementation of this INRMP. Under the direction of TAG, the force structure (e.g., types and number of units, types of equipment, training events), projects, construction, and budgets at CBJTC are determined throughout the 5-year period of the INRMP. Under the leadership of TAG, all CBJTC personnel are trained in environmental awareness and as such, comply with policies, procedures, requirements, and applicable laws and regulations that accomplish the goals and objectives of the INRMP. TAG also ensures coordination of projects and construction between environmental, training, and engineering staffs. The office of TAG is located at FLARNG's headquarters in St. Augustine, Florida.

Two key positions within TAG's Office are the **Assistant Adjutant General (ATAG)** and the **Construction and Facilities Management Officer (CFMO)**. These positions ensure that natural resource issues are considered in Florida Department of Military Affairs (FDMA) budget and policies. The ATAG also serves as chairman of the FDMA Environmental Quality Control Committee, which provides overall guidance and policy direction to the environmental program, including management of CBJTC's natural resources.

The **Plans, Operations, and Training Officer (POTO)** has the primary responsibility of scheduling military training and safety of all personnel while training exercises are being conducted. The POTO and the **Training Site Commander (TSC)** determine the training load of CBJTC based upon the force structure determined by TAG. CBJTC Operations staff is familiar with all aspects of the training center, including training scheduling and conflicts, locations of training facilities, impairments, or problems with human-made structures or natural functions and needs for improvement or maintenance of the training land. Secondary to scheduling is maintaining a high-quality training environment, which is also a primary goal of this INRMP. The **Integrated Training Area Management (ITAM) Coordinator**, with oversight from the POTO, identifies construction and maintenance priorities, determines ITAM projects, and submits an annual ITAM work plan.

CBJTC Department of Public Works (CBJTC-DPW), along with the CFMO located at headquarters in St. Augustine, Florida, provides a full range of environmental, financial, and engineering disciplines for all facilities under the jurisdiction of the FDMA, including CBJTC. The CFMO is responsible for master planning and ensuring that all construction projects comply with environmental regulations by consulting with the CBJTC-ED and FMO-ENV prior to implementing any construction projects. The CBJTC-DPW also provides expertise in the development and production of environmental awareness materials for distribution to troop commanders.

CBJTC Environmental Division (CBJTC-ED), with support from the statewide **Facility Management Office Environmental Section (FMO-ENV)**, is assigned day-to-day responsibility for development and

implementation of the revised INRMP. CBJTC-ED, housed in the Land Management Center at CBJTC, is composed of three primary sections: Conservation (including Forestry), Compliance, and Geographic Information Systems (GIS). The FMO-ENV is located at FLARNG's headquarters in St. Augustine, Florida. CBJTC-ED is responsible for directing the management of natural resources on CBJTC, identifying compliance requirements, and providing guidance to the TSC and other training site personnel. Specifically, CBJTC-ED provides technical assistance to the TSC and the training site personnel to develop projects, secure required permits, conduct field studies, provide environmental awareness materials, identify and map natural and cultural resources, direct the NEPA process, and manage the development and revision of the INRMP. CBJTC staff is responsible for providing input to the plan and implementing specific elements of the plan.

The **Public Affairs Officer (PAO)** serves as a liaison between FLARNG and the public. The PAO represents FLARNG in public meetings, prepares media presentations, and promotes the personnel and events occurring at various FLARNG locations. The PAO also offers photography services for natural resources projects and community educational events.

The **Staff Judge Advocate (SJA)** is the legal advisor to TAG and FLARNG staff on laws and regulations that affect training land use, environmental compliance, and policy.

1.3.3 Other Organizations

USFWS provides technical assistance to CBJTC-ED and is a cooperator during preparation of this INRMP. Specifically, the USFWS is the principal advisor to FLARNG on issues regarding federally protected rare, threatened, and endangered species.

FFWCC provides guidance to CBJTC-ED on species and habitats of special state concern and is a cooperator during the preparation of this INRMP. They also provide information for the management of fish and wildlife**,** water quality protection, and recreation.

1.4 Conditions for Implementation and Revision

1.4.1 Implementation and Annual Reviews

In accordance with DoD and Army policy, FLARNG will review the INRMP annually in cooperation with USFWS and FFWCC. On an annual basis, FLARNG will coordinate with USFWS local field office and FFWCC to review the previous year's INRMP implementation and discuss implementation of upcoming programs and projects. Coordination will be done through a meeting or by letter or email. A memorandum of record detailing each annual review will be prepared by FLARNG, and these annual review documents will be appended in **Appendix L**. Additionally, CBJTC-ED will ensure that completed annual reviews are tracked and reported in the annual Army Environmental Database Environmental Quality (AEDB-EQ) data submission (see **Section 5.5.2** for more details).

During this annual review, the need for updates or revisions will be discussed. If minor updates are needed, the requesting party will initiate the updates. After agreement of all three parties, these will be added to the INRMP. If it is determined that major changes are needed, all three parties will provide input and an INRMP revision and associated NEPA review will be initiated with FLARNG acting as the lead

coordinating agency. The annual meeting will be used to help expedite the more formal review for operation and effect and if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual meetings, by the fourth year annual review a determination will be jointly made to continue implementation of the existing INRMP with minor updates or to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

As part of the annual review, FLARNG will specifically:

- Invite feedback from USFWS and FFWCC on the effectiveness of the INRMP
- Inform USFWS and FFWCC which INRMP projects and activities are required to meet current natural resources compliance needs
- Document specific INRMP action accomplishments from the previous year and discuss upcoming projects and activities
- Verify that all must-fund projects and activities are budgeted and on schedule, all trained natural resources positions are either filled or in the process of being filled, INRMP goals and objectives are still valid, no significant changes to natural resources or the mission have occurred, and no net loss to CBJTC's training capability has occurred in accordance with DA and ARNG Policy

Information for the annual reviews comes from FLARNG environmental staff, CBJTC military leadership, cooperating agencies, project files, and ARNG-ILE as applicable. Natural resources data and program and project information are available to cooperating agencies. They may request to see project folders or to have a site visit to view natural resources projects in progress at any time.

1.4.2 INRMP Review for Operation and Effect

Not less than every five years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented to meet the requirements of the SAIA and Army Policy and contributing to the conservation and rehabilitation of natural resources at CBJTC. The review will be conducted by the three cooperating parties to include the commander responsible for the INRMP, the Regional Director of USFWS, and the Director of FFWCC. These agencies all have technical representatives who actually perform the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the SAIA and it can be updated and implementation can continue; or that it is not effective in meeting the intent of the SAIA to conserve natural resources while providing for no net loss in training capability and it must be revised. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some other way that reflects mutual agreement.

If only minor updates are needed, they will be done in a manner agreed to by all parties. The updated INRMP will be reviewed by the local USFWS office, USFWS Regional Director, and FFWCC Director.

Once concurrence letters or signatures are received from USFWS's Regional Director and FFWCC's Director, the INRMP will continue to be implemented. A new NEPA review is not necessary for an update and the continued implementation of an existing INRMP that has previously undergone NEPA review. In this case, an Environmental Checklist and REC citing the previous NEPA-compliant document is needed.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and FFWCC concur with the revised INRMP. FLARNG will endeavor to complete such revisions within 18 months depending upon funding availability. Revisions to the INRMP will go through a more detailed review process similar to development of the initial INRMP to ensure FLARNG's military mission and USFWS and FFWCC concerns are adequately addressed, and the plan meets the intention of the SAIA and Army Policy. Revisions will usually require a new NEPA-compliant analysis. An EA will be done as part of the revision process if determined by ARNG-ILE to be necessary.

1.5 Management Philosophy

This INRMP update for CBJTC has been developed in cooperation with USFWS and FFWCC. Developed using an interdisciplinary approach, information has been gathered from various FLARNG directorates, CBJTC staff, as well as other federal, state, and local agencies and special interest groups with an interest in the management of CBJTC natural resources. Agencies and organizations consulted during the development of this INRMP update, as well as initial agency coordination and response letters, have been included in **Appendix K**.

1.5.1 Support of the Military Mission

The overall policies and philosophy of land management at CBJTC support AR 200-1 and 32 Code of Federal Regulations (CFR) 651, *Environmental Effects of Army Actions*, which are based on the concept that natural resources management is an integral component of the military training environment. Management of natural resources using an ecosystem approach ensures the sustainable use of training lands while considering the effects on the surrounding environment and public concern. FLARNG shall maintain sustainable natural resources as a critical training asset upon which to accomplish CBJTC's mission. To accomplish this, FLARNG will:

- Ensure no net loss in the capability of installation lands to support existing and projected military training and operations at CBJTC
- Maintain quality training lands through proactive management, range and training land monitoring and damage minimization, mitigation, and rehabilitation

1.5.2 Environmental Management System

The ARNG-ILE and FLARNG consider CBJTC to be part of the combined FLARNG operations in Florida. The EMS is part of the overall FLARNG management system and includes organizational structure, planning, responsibilities, practices, procedures, and processes, and resource allocation for developing, implementing, achieving, reviewing, and maintaining environmental commitments. The International Standards Organization (ISO)-14001 EMS model used by FLARNG leads to continual improvement based upon a cycle of "plan, do, check, act" (also known as adaptive management):

Developing and implementing an EMS is required at all ARNG installations.

In 2000, EO 13148, *Greening the Government through Leadership in Environmental Management,* established a 5-year EMS implementation goal for federal facilities.

- Planning, including identifying environmental aspects and establishing goals [plan]
- Implementing, including training and operational controls [do]
- Checking, including monitoring and corrective action [check]
- Reviewing, including progress reviews and acting to make needed changes to the EMS [act]

Figure 1. EMS Process from US Environmental Protection Agency (USEPA)

The EMS is continually updated through this cycle by fine-tuning its management of operations that may harm the environment. This continual improvement cycle is a fundamental attribute of the EMS that allows the system to adapt to the dynamic nature of the organization's operations.

This INRMP directly supports FLARNG's EMS. FLARNG personnel will perform annual reviews of the INRMP in conjunction with USFWS, FFWCC and other agencies in order to support the concept of EMS. Annual reviews are discussed in **Section 1.4.1** and monitoring of implementation is discussed in **Section 5.5**.

1.5.3 Ecosystem Management

Natural resources at CBJTC will be managed with an ecosystem management approach as directed by AR 200-1 and DoDI 4715.03. Ecosystem management may be defined as management to restore and maintain the health, sustainability, and biological diversity of ecosystems while supporting sustainable economies and communities. The goal of ecosystem management on military lands is to ensure that

military lands support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. As described in DoDI 4715.03, ecosystem management will incorporate the following elements as described in **Table 1**.

Table 1. Elements of Ecosystem Management	
Elements	
1	Avoid single-species management and implement an ecosystem-based multiple species management approach, insofar as that is consistent with the requirements of the ESA
2	Use an adaptive management approach to manage natural resources in response to conditions such as climate change
3	Evaluate and engage in the formation of local or regional partnerships that benefit the goals and objectives of the INRMP
4	Use the best available scientific information in decision-making and adaptive management techniques in natural resource management
5	Foster long-term sustainability of ecosystem services

Biodiversity is the degree of variation of life forms within a given ecosystem, biome, or an entire planet. The DoD's challenge is to manage for biodiversity in a way that supports the military mission. The INRMP is identified by DoD as the primary vehicle for conserving biodiversity on military installations. Specific management practices identified in this INRMP have been developed to enhance and maintain biological diversity within the ecosystems at CBJTC. The outcome of biodiversity conversation on DoD land includes the items listed in **Table 2**.

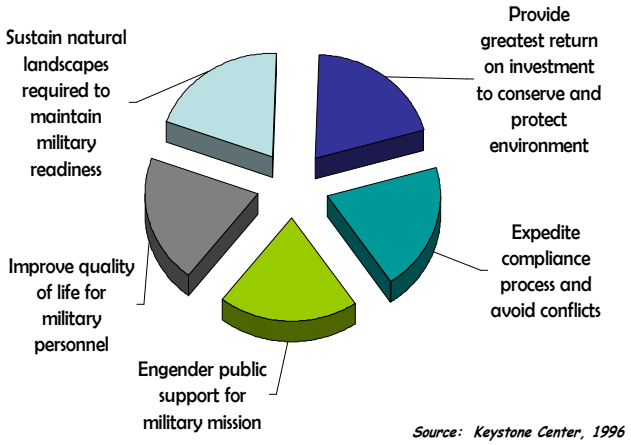

Figure 2. Why Conserve Biodiversity on Military Lands?

Table 2. Outcomes of Biodiversity Conservation	
Outcomes	
1	Maintain or restore remaining native ecosystem types across their natural range of variation
2	Maintain or reestablish viable populations of native species on an installation, when practical
3	Maintain ecological processes, such as disturbance regimes, hydrological processes, and nutrient cycles, to the extent practicable
4	Manage and monitor resources over sufficiently long time periods to allow for adaptive management and assessment of changing ecosystem dynamics (i.e., incorporate a monitoring component to management plans)

1.5.4 Sustainable Range Program

The Sustainable Range Program (SRP) is the Army's overall approach for improving the way in which it designs, manages, and uses its ranges to ensure long-term sustainability. Requirements for the SRP are set forth in AR 350-19, *Army Sustainable Range Program*, dated 30 August 2005. The SRP is defined by its two core programs, the Range and Training Land Program (RTLP) and the ITAM Program, which focus on the doctrinal capability of the Army's ranges and training land. To ensure the accessibility and availability of Army ranges and training land, the SRP core programs are integrated with the facilities management, environmental management, munitions management, and safety program functions supporting the doctrinal capability.

1.5.5 Range and Training Land Program

The RTLP provides a range operations and modernization capability for the central management and programming of live-fire training ranges and maneuver training lands, including the design and construction activities associated with them. The RTLP planning process integrates mission support, environmental stewardship, and economic feasibility and defines procedures for determining range projects and training land requirements to support live-fire and maneuver training. The RTLP defines the quality assurance and inspection milestones for range development projects and the Standard Operating Procedures (SOPs) to safely operate military training, recreational, or approved civilian ranges under Army control and supports the Commanders' Mission Essential Task List (METL) and Army training strategies. RTLP also establishes the procedures and means by which the Army range infrastructure is managed and maintained on a daily basis in support of the training mission.

1.5.6 Integrated Training Area Management Program

The ITAM program provides for the management and maintenance of training lands by integrating mission requirements derived from the RTLP with environmental requirements and environmental management practices. The objectives of FLARNG's ITAM program are to:

- Achieve optimal sustained use of lands for realistic training by providing a sustainable core capability that balances usage, condition, and level of maintenance
- Implement a management process that integrates FLARNG training and other mission requirements for land use with sound natural resources management
- Advocate proactive conservation and land management practices by aligning FLARNG land management priorities with FLARNG training and readiness priorities

ITAM consists of four proactive subprograms designed to facilitate these processes.

1) **Range and Training Land Analysis** (RTLA) is the ecological monitoring component that serves to characterize and monitor installation natural resources. RTLA provides a means to collect and maintain GIS data for CBJTC.
2) **Training Requirements Integration** (TRI) uses information generated and assimilated from RTLA to assist with military exercise scheduling and logistics to minimize harmful practices or activities within training areas.
3) **Land Rehabilitation and Maintenance** (LRAM) provides mitigation measures and land rehabilitation where needed or desired.
4) **Sustainable Range Awareness** (SRA) activities serve to promote awareness of environmentally sensitive issues and instill a stewardship ethic among unit commanders, soldiers, and neighboring communities.

The ITAM Program at CBJTC is administered by the ITAM Coordinator with review and approval by the POTO. The ITAM Program at CBJTC was formally initiated in Fiscal Years (FYs) 1992-1993, when a floral inventory was conducted and RTLA plots were established to collect baseline data on CBJTC's flora and fauna. CBJTC is a Category III installation (i.e., an installation with important training missions and significant environmental sensitivity to missions). ITAM requirements for CBJTC are identified yearly and submitted to ARNG-ILE, so that projects can be validated and funded through the ITAM Work Plan budgeting process.

The requirements of the ITAM Program for CBJTC are detailed in the ITAM Plan and Work Plan. Project information relevant to INRMP implementation from the ITAM Work Plan has been incorporated into this INRMP. Together, ITAM and natural resources management as outlined in this INRMP ensure sustainable use of training lands.

In this updated INRMP, the only projects included from programs other than natural resources are those that directly satisfy an objective and are integral to INRMP implementation. There were several projects included in the 2007 INRMP that were part of the ITAM program but were not integral to INRMP implementation. The requirement to coordinate ITAM projects, construction, and all other land uses with

CBJTC-ED and FMO-ENV, to implement effective natural resources management practices, and to ensure regulatory compliance is inherent in the INRMP implementation and retained in this updated INRMP. A detailed analysis of 2007 INRMP project implementation status, including ITAM projects, is provided in **Section 3.9**.

1.5.7 Goals and Objectives

Goals and objectives provide the framework for the natural resources management programs. Goals provide a general guiding direction for each technical area and logical objectives that facilitate achieving those goals are described for any priority issues within each technical area. The objectives then drive the development of activities and projects to achieve those objectives. Goals and objectives are described in **Section 4.0** under each technical area. Activities and projects, and the objectives they support, are described in **Tables 15 and 16** in **Section 5.0**. Below are the goals identified in **Section 4.0**:

GOAL PM: Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and DA regulations and policies.

GOAL SO: Manage soil to minimize sediment loss and erosion, while protecting water quality.

GOAL WA: Maintain water resources so they remain resilient, functional, and with no net loss of acreage.

GOAL VE: Manage vegetation to provide a variety of habitats to support the military mission, maintain native species, provide a sustainable forestry program, and enhance wildlife habitat.

GOAL FI: Implement a wildland fire program that minimizes safety concerns and wildfire risk, enhances the military mission, benefits rare species, protects cultural resources, and maximizes habitat management and ecological benefits.

GOAL FW: Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

GOAL TE: Manage rare species using an ecosystem approach, while maintaining the military mission at CBJTC.

GOAL IN: Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an integrated pest management approach.

1.5.8 Integration with Other Plans

By its nature, an INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans help identify management priorities and potential impacts to natural resources. The INRMP is integrated with a number of FLARNG plans including:

- Integrated Cultural Resources Management Plan (ICRMP) for Installations of FLARNG – plan for management of cultural resources, including consultation and other legal requirements, known cultural resources, processes, and responsibilities at FLARNG facilities (ARNG-ILE 2011).

- Integrated Pest Management Plan (IPMP) – plan for management of pest species, including nuisance wildlife and invasive species, to minimize impact to mission, natural resources, and the environment (FLARNG 2011b).
- Integrated Wildland Fire Management Plan (IWFMP) for CBJTC – plan lays out specific guidance, procedures, and protocols in the prevention, detection, and suppression of wildfires and the planning and operating procedures involved with prescribed burning on CBJTC (Florida National Guard [FLNG] 2011a).
- Stormwater Pollution Prevention Plan (SWPPP) for CBJTC – plan for management of stormwater and water-borne pollution (FLARNG 2000).
- Spill Prevention Control Countermeasure Plan (SPCCP) – plan for managing oil spill prevention, preparedness, and response to prevent oil discharges to surface waters (FLARNG 2012).
- Forest Resources Management Plan (FRMP) for CBJTC – plan establishes management strategies focused on providing a variety of habitat and stand conditions for the purpose of military training, maintaining a sustainable revenue from harvest of forest products, and other resource uses, and enhancing the quality of wildlife habitat for both recreational game and non-game species (FLNG 2005).
- Range Complex Master Plan (RCMP) for the State of Florida – plan establishes the range and maneuver land requirements for the State of Florida to support the installation training missions (FLNG 2011b).
- Master Plan for CBJTC – plan identifies future needs and requirements of the installation as it relates to the use and/or designation of lands, facilities, and resources and establishes a guide for installation growth and development (FLARNG 2006).

2.0 INSTALLATION INFORMATION

2.1 General Description

The 73,000-acre CBJTC is located in northeast Florida (see **Figure 3**). The installation lies completely within Clay County and is roughly 45 miles equidistant from the cities of Gainesville to the southwest, Jacksonville to the northeast, and St. Augustine to the east. The main gate is located on State Road (SR) 16 approximately 12 miles east of the City of Starke. Middleburg is located adjacent to the northeast of CBJTC, while the town of Keystone Heights lies adjacent to the southwest (see **Maps 1** and **2**; **Appendix B**). *All maps are provided in **Appendix B** and only the map number is referenced in the remainder of the document.*

CBJTC land is owned and operated on behalf of FLARNG by the Florida Armory Board. FLARNG is responsible for the management of the entire site, with the exception of game management, hunting activities, and leased areas. Since its establishment in 1939, CBJTC has fluctuated in size from approximately 39,000 to 125,000 acres, and presently encompasses approximately 73,000 acres. CBJTC is divided into a Cantonment Area, Impact Area, and 37 maneuver training areas (TAs) (see **Map 2**). TAs are often referred to by location within the installation. North Post includes the TAs north of SR 16. TAs to the east of the Cantonment Area and Impact Area are in East Post, while the remainder of the site is characterized as South Post.

Figure 3. Location of CBJTC within Florida

2.1.1 Regional Land Use

According to the US Census Bureau's *2010 Census*, Clay County has an estimated population of 190,865, which is about 1 percent of Florida's total population (18,801,310). Clay County is part of the Jacksonville metropolitan area, which comprises the five counties in the northeastern corner of Florida. The installation is adjacent to the city of Middleburg (population 13,008) and the city of Keystone Heights (population 1,350). CBJTC lies along the eastern boundary of Bradford County (population 28,520). The city of Starke (population 5,449) and town of Lawtey (population 730) are located within approximately 3 miles and 1 mile, respectively, to the west of CBJTC (see **Map 1**).

In general, Florida's population increased by approximately 45.4 percent from 1990 to 2010, which is nearly two times more than the overall US population increase (24.1 percent) during this time. Clay County has experienced tremendous population growth; it increased in population between 1990 (population 105,986) and 2010 (population 190,865) by about 80 percent, while the populations of the cities of Middleburg and Keystone Heights have more than doubled. Despite Bradford County's population increase of 26.7 percent between 1990 and 2010, the growth of Bradford County, the city of Starke and town of Lawtey were much lower than Clay County. Population growth in the immediate vicinity of CBJTC appeared to slow slightly between 2000 and 2010 in comparison to 1990 and 2000. For example, Starke's population declined slightly (about 2 percent) and Keystone Heights stayed essentially the same between 2000 and 2010. The city of Middleburg's population increased by 25.8 percent between 2000 and 2010; however, in comparison, the city experienced a 66 percent increase during the previous 10 years (US Census 1990, 2000 and 2010). CBJTC is in an area where development is approaching from several directions. CBJTC has been partnering with ARNG-ILE and the State of Florida through the Florida Forever program since 2003 to establish a three-mile compatible use buffer around the installation to manage encroachment (see **Section 3.5**).

Regional land use is relatively rural, being mostly undeveloped and forested. CBJTC is located in a region of strategic importance to the southeastern US and statewide conservation system. The installation is situated approximately 25 miles northwest of Ocala National Forest and 25 miles southeast of Osceola National Forest (see **Map 1**). CBJTC is bordered to the southeast by Gold Head Branch State Park, to the north by Jennings State Forest Wildlife Management Area (WMA) and to the east by private timberlands. Additionally, the Santa Fe Swamp Wildlife and Environmental Area (WEA), Belmore State Forest WMA, and Raiford WMA occur within approximately 4 miles of the installation (see **Map 1**). CBJTC contributes directly to regional conservation since approximately 56,197 acres, or 77 percent, of CBJTC is managed by FFWCC as a WMA (see **Section 2.2.3**). A brief description of the natural areas adjacent to and in the immediate vicinity of CBJTC is provided below.

Jennings State Forest WMA

The Jennings State Forest WMA is located in northwest Clay County north of CBJTC, and includes approximately 24,000 acres that encompass the headwaters of Black Creek. An upland ecosystem restoration project is underway to restore habitat for the gopher tortoise (*Gopherus polyphemus*), northern bobwhite (*Colinus virginianus*) and other upland species. Hunting, fishing, wildlife viewing, primitive camping, hiking, horseback riding, bicycling, and canoeing are allowed (FFWCC 2012).

Gold Head Branch State Park

The Mike Roess Gold Head Branch State Park was one of the first Florida state parks developed by the Civilian Conservation Corps during the 1930s. The 2,000-acre park is situated on rolling sandhills containing marshes, lakes, and scrub habitat, and is situated directly adjacent to CBJTC to the southeast. Visitors to the park can enjoy hiking and wildlife viewing along the park´s nature trails and a 5.44-mile stretch of the Florida National Scenic Trail, which also passes through CBJTC. Group and primitive campsites are available as are fully equipped lakefront cabins (Florida State Parks 2012).

Santa Fe Swamp WEA

The Santa Fe Swamp WEA is approximately 5,627 acres of floodplain swamp located approximately 2.5 miles southwest of CBJTC in Bradford County; the WEA protects the water quality and quantity of the Santa Fe River and Lake. Only primitive weapons (e.g., bow and arrow and muzzleloader) hunting of white-tailed deer (*Odocoileus virginianus*), feral hog (*Sus scrofa*), wild turkey (*Meleagris gallopavo*), gray squirrel (*Sciurus carolinensis*), and eastern cottontail rabbit (*Sylvilagus floridanus*) is allowed on this area during specified seasons. Falconry is also permitted. Fishing, wildlife viewing, horseback riding, hiking, and bicycling are permitted throughout the year (FFWCC 2012).

Belmore State Forest WMA

The Belmore State Forest WMA occupies 8,737 acres in south-central Clay County, approximately 3 miles southeast of CBJTC. Ates Creek, a tributary of the South Fork of Black Creek, flows through the forest for six miles. The variety of natural communities here provides public recreation opportunities and wildlife habitat while performing essential roles in the protection of water quality, groundwater recharge, flood control, and aquatic habitat (FFWCC 2012).

Raiford WMA

Raiford WMA consists of 9,141 acres in Bradford County approximately 4 miles northwest of CBJTC. The WMA is dominated by pine flatwoods, pine plantations, and lowland hardwoods, and is bisected by the New River. A portion of the area is only open during hunting seasons (FFWCC 2012).

2.1.2 Installation History

Before the Spaniards arrived in 1821, the Timucuan Indians occupied the area. However, by 1728 the Timucuan Indians had been nearly eliminated by a succession of raids by the English and their Lower Creek and Seminole Indian allies. Spanish ownership of Florida continued until 1763, when the English acquired it and kept ownership until 1783. During this period, a Seminole village was on the Old Spanish road in what is now Clay County. For details on prehistoric land use, refer to the FLARNG ICRMP (ARNG-ILE 2011).

Permanent settlement of Clay County began during the second Spanish rule. Examination of US Rectangular Surveys from 1833 and 1855 suggest that the location of CBJTC was little altered by humans at the time of the 1833 survey, but was beginning to be substantially altered by the time of the 1855 survey. In 1860 the population of the county was 1,914. Much of Clay County's prosperity and growth during this period was associated with the expansion of woodland production and other agricultural cash crops.

In the 1910s the Dowling-Shands Lumber Company operated a logging railroad that extended from Green Cove Springs to the western region of the lands soon to be occupied by CBJTC. Beginning in 1919, the Florida Essential Oil Company harvested the outer leaves from more than 2,000 camphor (*Cinnamomum camphora*) trees and distilled them to extract camphor, which was used in the manufacturing of smokeless gunpowder. By 1940 the timber company had gone out of business, in part due to the over-logging of the area. During that time, the lands that became CBJTC were turpentined by a number of firms, including Dowling-Shands Lumber Company, Powell-Smill Company, and O.J. Griffin and Brothers. Turpentine involves obtaining crude gum from living long leaf pine (*Pinus palustris*) trees by removing a section of bark, wounding the tree, and collecting the secreted sap for distillation into spirits of turpentine and rosin. After turpentining and then cutting all the timber, these companies sold their land to the Southern Cattle Feeding Company, and the clear-cut land was then used as pasture. The emphasis on forestry has continued in Clay County, but today the trees are typically planted slash pine (*Pinus elliotti*), the major product is pulp, and the land is usually owned by national paper companies. For more details on historic land use, refer to the FLARNG ICRMP (ARNG-ILE 2011).

The State of Florida Armory Board began acquiring real estate for the establishment of CBJTC during 1939-1940. As United States (US) involvement in World War II became imminent, the federal government launched a hasty building program that employed up to 21,311 workers. At peak occupancy during World War II, CBJTC operated a 20,000-man capacity dry cleaning plant (Harris and McCally 1995).

By enacting Public Law 493 in 1954 (effective in 1955), Congress established the present boundaries of CBJTC under the sponsorship of FDMA. The following phases of expansion occurred after 1955:

1. The State Armory Board acquired what is now most of the southern portion of CBJTC, which includes the Cantonment Area, the Impact Area, and “South Post”.
2. The federal government acquired (in two phases) what is now known as “North Post”.
3. The property was extended eastward to what is now SR 21.
4. Land leases for various areas were made for airfields, including the area that is presently Keystone Airpark.
5. Land is leased to the south and east from J.C. Penney of Penney Farms (which staved off bankruptcy for the national chain retailer), but with many excisions (including Penney Farms itself) to accommodate dwellings and landholdings.
6. A westward reduction in the leases occurred resulting in the current boundary configuration.

2.1.3 Military Mission

The **Federal Mission** is to maintain properly trained and equipped units, available for prompt mobilization for war, national emergency, or as otherwise needed. The ARNG is a partner with the Active Army and the Army Reserves in fulfilling the country’s military needs. During times of national emergency, National Guard members may be called into active federal service by the President of the US.

The **State Mission** is to provide trained and disciplined forces for domestic emergencies or as otherwise provided by state law to ensure the protection of life and property and the preservation of public safety. The National Guard’s “state role” is to assist local law enforcement agencies during emergencies at the

direction of the governor through the Florida Adjutant General. This dual federal-state mission is unique within the US military and sets the National Guard apart from any other regular or reserve component.

CBJTC Mission is to support both federal and state missions. In support of the federal mission, CBJTC provides personnel, training, logistical and administrative support, and serves as a training base for improving individual solider skills, collective training, overall unit readiness, and other essential needs to valued customers. In support of the state mission, CBJTC is to be prepared to respond to State Active Duty missions. The installation has serves as a site for continuation of government and continuity of operations for state government and Florida Joint Forces Headquarters (JFHQ-FL). The community-level mission is to be a "good neighbor" which is shown by civilian and government agency use of various facilities for outdoor recreation, education, and controlled public hunting (FLNG 2011b).

2.1.4 Training Operations and Infrastructure

CBJTC presently serves as a logistical support base during federal and state emergencies, such as hurricanes and disastrous wildfires. The installation is structured to command, operate, manage, and administer services of the facilities and assign use of resources to ensure training and logistical support is provided to FLARNG units. Because the installation is a joint training center, it also provides training support to units from other states, other reserve components, certain elements of active components, federal government organizations, state and local agencies, and civic groups. This support is provided during 5 major annual training (AT) periods, 50 inactive duty training (IDT) weekends per year and Monday through Friday for approximately 50 plus weeks per year.

CBJTC is the major training area for the FLNG and home to a variety of Army and Air National Guard units along with the Florida Youth Challenge Academy, the 211th Regiment Florida Regional Training Institute, and other military and civilian operations. CBJTC has been used for more than a half century for a variety of military training activities. CBJTC routinely supports the following units:

- 202nd REDHORSE and Weather Readiness Training Center, which are Florida Air National Guard tenant units.
- 820th Security Forces Group from Moody Air Force Base in Georgia in support of their ground security missions during deployments.
- Navy rotary wing units based at Naval Air Station Jacksonville and Mayport Naval Station that conduct door gunnery and ground-based crew-served weapons training throughout the year.
- Active and reserve Marine Corps units from the local area (active: Kings Bay, reserve: Jacksonville, Tampa, and Tallahassee) use the live fire ranges and training lands.
- Active and reserve Coast Guard units throughout the country conduct training at CBJTC for helicopter door gunnery, sniper training, and waterborne live fire on Lowry Lake.

Civilian tenants occur within CBJTC as well (e.g., truck driving school and lightning research facility). Prior to 2008, Du Pont Corporation had leased up to 10,686 acres since the late 1940s on the western boundary of CBJTC for mining operations.

Approximately 56,200 acres of CBJTC is also known as Camp Blanding WMA, which is managed by FFWCC. A memorandum of agreement (MOA) was developed between FDMA and FFWCC for hunting, fishing, and outdoor recreation within the 56,197 acres. Another MOA also exists between FFWCC and FDMA for use of CBJTC as a Fish Management Area (FMA), specifically for Lowry Lake and Magnolia Lake. A copy of the MOAs is provided in **Appendix I**, and additional detail about Camp Blanding WMA is provided in **Section 4.6.2**.

A brief summary of CBJTC training facilities, activities, and land use is provided below. For more detailed information on existing and potential future training operations and infrastructure, refer to the *RCMP for the State of Florida* (FLNG 2011b) and *Master Plan for CBJTC* (FLARNG 2006).

Military Training Facilities and Activities

CBJTC specializes in supporting military training for light infantry exercises. The 73,000-acre CBJTC is divided into a Cantonment Area, Impact Area, and 37 maneuver TAs in North, East, and South Post (see **Map 2**).

The approximately 4,900-acre Cantonment Area is the developed portion of the training site and is designed with a network of streets dividing it into city block-sized units. This area also encompasses Kingsley Lake and Kingsley Village along its western boundary.

The approximately 15,500-acre Impact Area is considered a high hazard impact area due to unexploded ordnance (UXO) from weapon systems ranging from 20mm grenades to 8-inch artillery. Due to safety concerns, no public access is allowed in this portion of the installation. CBJTC currently has over 100 ranges located on the installation. The majority of these ranges occur within or in the immediate vicinity of the Impact Area. Ranges include, but are not limited to, 31 small arms ranges, 5 infantry squad battle courses, 5 infantry platoon battle courses, 36 artillery points, 27 mortar points, 2 demo ranges, 1 modular shoot house, and 2 Military Operations on Urban Terrain (MOUT) facilities. Refer to the *RCMP for the State of Florida* (FLNG 2011b) for a more detailed summary of CBJTC ranges. Weapon system qualification standards are detailed in DA Pamphlet (DA Pam) 350-38, *Standards in Training Commission (STRAC)* (US Army 2009).

The remainder of the site is divided into 37 maneuver TAs that are connected by an extensive vehicular trail network. The TAs along the western boundary of CBJTC (i.e., MA1, MA2, S11, S12 and S13) were previously leased by DuPont for mining (see **Map 2**). Training activities are conducted in accordance with SOP 210-4.

CBJTC facilities are used to conduct command post exercises, logistical exercises, specialized training, and training conferences; tracked and wheeled operations on roads and major trails; mounted and dismounted maneuvers; and weapons firing (FLNG 2011b). A summary of training activities and their potential impacts to CBJTC natural resources is provided in **Table 3**.

In addition, CBJTC has a complete Air Assault training facility to support a Warrior Training Center Air Assault Course for FLARNG. A grass airfield, 62 Landing Zones (LZs), and a 229-acre Weinberg Drop Zone (DZ) support aviation and airborne operations. CBJTC currently has an active airfield primarily in support of helicopter operations. The airfield has two grass runways with directions of 070/250 and 010/190 that are located in the Cantonment Area. The 2/111th Aviation Regiment provides airfield

operations support during IDT weekends to include active air traffic control for flight following and radar supported Precision Approach Radar. CBJTC also has the Anderson-Bartlett Flight Landing Strip, an unimproved air strip that can support C-130 field operations and a concrete skid strip for helicopter operations. Both are located on the north portion of the post. CBJTC has restricted airspace, which allows artillery, mortars, and small arms to fire at maximum altitudes and aviation assets to conduct tactical flight training (FLNG 2011b). Aviation operations are conducted in accordance with SOP 95-1.

Table 3. Potential Impacts to Natural Resources from Training Activities at CBJTC

Type Training	Minimum Effect Training Activities	Training Activities with the Potential to Disturb Soils and/or Vegetation
Soldier Skills Training	Small unit infantry tactics Reconnaissance Terrain/map analysis Survival, escape, resistance, & evasion Day or night land navigation training Individual weapons familiarization and qualification Setting up communication links Infiltration Patrolling	Tactical bivouac occupation/displacement Wet weather operations Command post exercises without troops Cover and concealment Field fortifications Battle-focused individual training Mobility and counter mobility Fording operations Bridging and rafting operations
Engineer Training	Engineer reconnaissance	Emplace and clear minefields Emplace obstacles Demolitions training and qualification Cut, fill, and haul (horizontal operations) Breaching operations Clearing operations Construct and maintain roads Construct and maintain main supply routes Nonstandard fixed bridges

Installation Land Use

Training lands can be defined using the following land use categories: improved, semi-improved, and unimproved grounds. Improved grounds are developed areas that have either an impervious surface (e.g., sidewalks, buildings) or landscape plantings that require intensive maintenance and upkeep. Semi-improved grounds are where periodic grading or maintenance is performed for operational reasons (e.g., LZs, wildlife food plots). Unimproved grounds receive little to no grounds maintenance (e.g., streams, wetlands, forests). Land use is summarized for CBJTC in **Table 4**.

Improved grounds include the developed portions of CBJTC, which are primarily located within the central Cantonment Area. However, a few scattered areas of development are found outside this area, which are

associated with transportation and utility corridors and the range complex. Improved grounds make up less than 5 percent of the installation. Semi-improved lands on CBJTC (or 29 percent of the land) include areas that require periodic management or maintenance; they include tree plantations, agricultural lands, previously mined lands, and trails. The remainder of CBJTC (or 66 percent of the land) is classified as unimproved grounds that are used for military training, forestry, wildlife management, and recreation. Unimproved grounds include forests, shrubland, streams, lakes, and wetlands.

Table 4. Land Use on CBJTC

Land Use Category	Description	Area (acres)[2]
Improved Grounds	Developed areas (Cantonment Area, portions of the range complex, and mining spoil areas)	4,944
Semi-Improved Grounds	Pastureland maintained as artillery firing points, landing zones, and drop zones	2,041
	Tree Plantations	16,538
	Trails (~327 miles)	595[1]
Unimproved Grounds	Forested habitat (includes sandhill, hardwood, and natural upland coniferous woodlands)	32,037
	Wetlands (includes saturated forests, marshes, bogs, wet prairies, and ephemeral ponds)	12,310
	Open water	4,531
	Scrub	340

[1] Unpaved road areas assume 15-foot road surface width

[2] The primary source for land use estimates is Florida Natural Areas Inventory (FNAI) 2010a, 2010b. Acreages do not add up to 73,000 acres because GIS data equal 73,336 acres and trails overlay FNAI 2010a, 2010b estimates. Road and trail data were obtained from FLARNG.

Source: FNAI 2010a, 2010b with corrections by CBJTC-ED

2.1.5 Constraints and Opportunities

While there are many constraints to activities on CBJTC, not all of them are applicable for a given situation. For example, a constraint for new building construction may not be a constraint at all - may even be a benefit - for infantry training. Environmental constraints to training include:

- Wildfire risk (**Section 4.5**)
- Federal and state listed species, in particular RCW and gopher tortoise (*Gopherus polyphemus*) (**Section 2.3.4 and 4.7**)
- Special Management Zones (SMZs) and associated wetlands and riparian habitat (**Section 4.3.3**)
- Cemeteries
- Protected cultural resources

Constraints due to military training that can impact natural resources management include:

- Restricted access to Impact Area (permanent)
- Restricted access in active range fans (temporary)

There are no major topographic or soil erosion concerns that limit the military mission on CBJTC with the exception of some of the previously mined areas along the western boundary. No significant new development or military missions are currently planned, thus no opportunity map is provided.

2.2 Physical Environment

2.2.1 Climate

CBJTC lies within the subtropical division of the humid temperate domain and is characterized by high humidity especially in the summer and an absence of extremely cold winters (Bailey 1995). Within Clay County relative humidity is typically about 75 percent (Weatherspoon et al. 1989). The nearest National Climatic Data Center (NCDC) weather station is located in Starke, Florida, which is approximately 3 miles west of the installation. Average temperature and rainfall data for Starke, Florida is provided in **Table 5**. Temperatures range from an average high of 93 degrees Fahrenheit (°F) in July and August to an average low of 43.9°F in January. Average annual precipitation is about 53 inches. About 50 percent of the annual rainfall occurs in the summer (June – September) as a result of afternoon and evening thunderstorms, which can produce 2 to 3 inches of rainfall within a couple hours (Southeast Regional Climate Center [SERCC] 2012, Weatherspoon et al. 1989). Tropical storms are possible between June and November but typically do not generate hurricane-force winds at CBJTC due to its inland location (Weatherspoon et al. 1989).

Table 5. NCDC Monthly Normals for Starke, FL (1971-2000)

Month	Average Maximum Temperature (îF)	Average Minimum Temperature (îF)	24-hr Average Temperature (îF)	Average Rainfall (inches)
Jan	65.4	43.9	52.8	3.31
Feb	67.6	45.5	55.1	3.32
Mar	74.2	56.2	61.1	3.87
Apr	79.0	62.0	66.1	2.89
May	85.5	70.1	73.0	3.76
Jun	89.2	75.4	78.2	6.32
Jul	90.9	77.6	80.3	6.28
Aug	90.1	78.3	79.9	6.76
Sep	87.4	74.9	77.7	5.82
Oct	80.7	64.0	70.0	1.95
Nov	73.6	54.7	61.8	2.58
Dec	67.1	47.9	55.1	3.48
Total	**79.2**	**43.9**	**67.6**	**50.34**

Source: SERCC 2012; Starke, Florida NCDC Station # 088527

2.2.2 Topography

CBJTC lies in western Clay County within the Trail Ridge physiographic region of the state. The Trail Ridge is an ancient coastal terrace, which is part of the oldest terrestrial formation in Florida, dating from the early Pleistocene about 25 million years ago. These formations traverse CBJTC from the northwest boundary in a southeasterly direction. This ridge is located on top of a calcium carbonate reef platform, which results in the chemical interaction between acidified waters and calcium-rich rocks creating a land surface marked by sinkholes (Webb 1990).

The land surface of CBJTC is level to gently rolling, with only very slight sloping areas in the southern portion of the site. Elevations on CBJTC range from approximately 40 feet above mean sea level (amsl) to 285 feet amsl (or 12 meters to 87 meters asml). Elevations of 40 feet amsl generally occur along creek channels, while elevations of 200 feet amsl and higher are characteristic of the sandhill areas located south of Kingsley Lake. The highest point in Clay County is on the summit of the Trail Ridge at an elevation of 285 feet asml, just south of Kingsley Lake. East of the Trail Ridge, the land slopes to sea level at the St. Johns River. South of the Trail Ridge, the highland fans out into a wide area of sandhills dotted with lakes (see **Map 3**).

2.2.3 Geology

Clay County is geomorphically situated in the northern or proximal zone of northeastern peninsular Florida. The late Tertiary, Late Pliocene Cypresshead Formation occurs in the central portion of Clay County. The Cypresshead Formation consists of quartz sands ranging from fine to very course with common occurrences of quartz gravel. This formation was deposited in a shallow, nearshore setting. Undifferentiated Quaternary Pleistocene sands overlay the Cypresshead Formation to form the Trail Ridge in the western portion of Clay County. The Trail Ridge sands contain economically important ore grade heavy-mineral concentrations, and were deposited as beach ridges and sands. CBJTC is underlain primarily by undifferentiated quaternary sands; however, in some areas the Cypresshead Formation is near the surface (Scott et al. 2001, Scott 2001).

In the western portion of the county, the Cypresshead sands are underlain by the Hawthorn Formation. The Hawthorn Group (100 to 300 feet) is of Miocene age and composed of many discontinuous lenses of clay, quartz sand, carbonates, and phosphates. The phosphates, which are found throughout the deposits, give the group a low permeability (Scott et al. 2001, Weatherspoon et al. 1989). The Hawthorn Formation is underlain by the Oligocene Suwannee Limestone Formation and the Eocene Ocala Limestone and Avon Park Formations. The Ocala Limestone and Avon Park Formations are part of the Floridan Aquifer, which is one of the most productive aquifers in the world (Scott 2001, Scott et al. 2001, Weatherspoon et al. 1989).

A large portion of the region has been mined for heavy minerals (Weatherspoon et al. 1989). Mining activities on CBJTC began in the late 1940s and have been concentrated on the western boundary of the property. The Du Pont Corporation began leasing property on CBJTC in the mid-1940s for mineral sand mining and ceased in 2008. During this time, they mined ilmenite, zircon, and staurolite, which were used for military and commercial applications.

2.2.4 Soils

According to the Natural Resources Conservation Service (NRCS) (Weatherspoon et al. 1989, NRCS 2010), 36 soil series occur either singularly or in combination with other series in 50 distinct soil mapping units that have been identified on CBJTC (**Table 6** and **Map 4**). Of the 50 soil map units, 27 of them are considered hydric soils. NRCS defines hydric soils as soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season (NRCS 2012). Soils within CBJTC are divided into three major groups based on their location on the landscape.

- Soils on sandy ridges occur on approximately 32 percent (21,978 acres) of CBJTC. They are common in the southern sandhill areas of the installation. Soil map units in this category include Centenary, Kershaw, Ortega, Penney, and Troup.
- Soils in pine flatwoods, slight knolls, and in transitional areas between uplands and flatwoods occur on 55 percent (38,050 acres) of the installation. Soil map units in this category include Albany, Blanton, Goldhead, Hurricane, Leon, Lynn Haven, Mandarin, Meadowbrook, Neilhurst, Newnan, Ocilla, Ona, Osier, Pelham, Plummer, Pottsburg, Ridgeland, Ridgewood, Sapelo, Scranton, Solite, Surrency, and Wesconnett.
- Soils within floodplains occur on 12 percent (8,505 acres) of the installation. Soil map units in this category include Allanton, Ousley, Pamlico, and Rutlege.

Less than 1 percent (760 acres) of the installation is considered urban land and/or excavated areas (quartzipsamments or Arents sandy soil). The remaining land is characterized as open water.

When determining the potential for soil erosion or compaction, it is important to consider the ability of the soil to withstand or recover from the effects of military training that occur at CBJTC. Erosion can result in sedimentation of streams and loss of productivity of training lands. Unchecked erosion can eventually impact infrastructure and ability to train. Intensive training can also cause disruption to and compaction of the soil surface. There are several indices that incorporate the physical and chemical factors into numeric scales or broad categories that are more easily related to the potential effects of military training and land management activities: K-factor, Land Use Capability Class, and Hydrologic Soil Groups. An in-depth review of these factors can be found in the *Soil Survey for Clay County, Florida* (Weatherspoon et al. 1989).

Soil Erodibility

The K-factor indicates a soils susceptibility to water erosion. A K-factor or “erodibility factor” of 0.34 or greater indicates a highly erodible soil. Soils at CBJTC range between a K-factor of 0.1 to 0.32. A soil map unit is highly erodible from wind if the wind erodibility index value is 3 or less. Soils at CBJTC are all classified as 1 or 2; thus, they have the potential to be highly susceptible to wind erosion when they are not vegetated. One area on CBJTC with visible wind erosion concerns is the previously mined Du Pont lease area in the western portion of the installation (see **Section 4.4.5** for rehabilitation guidelines for this area). However, in general, soil erosion resulting from military training at CBJTC is rather limited because slopes are generally minimal, tracked and wheeled vehicle usage is low, and revegetation of bare areas is relatively easy due to an abundance of rainfall and warm temperatures (Hall et al. 1997).

Land Use Capability Classification System

Since intensive tracked vehicle use can disrupt and compact the soil (similar in ways to the effects of cultivation), the Land Use Capability Classification System can be used as an index for military training. In this system, the class numerals (1 - 8) indicate progressively greater limitations and narrower choices for practical use. The subclass letter (e, w, or s) designates limitations due to erosion (e), water (w), and shallowness, drought, or stoniness (s).

The capability class/subclasses from the soil survey reveal that only 1 percent of CBJTC requires very careful management due to risk of erosion (Albany fine sand, 0 to 5 percent slopes). Approximately 48 percent of the installation requires careful management due to being shallow, droughty, or stony, while 49 percent requires special conservation practices due to wetness (NRCS 2010, Weatherspoon et al. 1989). Most soils on CBJTC require special treatment and consideration when planning for land use and rehabilitation.

Hydrologic Soil Groups

Hydrologic soil group classifications refer to soils grouped by their runoff-producing characteristics. Since infiltration rate generally is inversely related to runoff and erosion, the hydrologic soil group is an indirect index to site erodibility. Group A soils have a high infiltration rate when thoroughly wet and have a low runoff potential (i.e. they are the least erodible). Group B soils have moderate infiltration rates when thoroughly wet. Group A and Group B soils are most desirable for military training activities. Group C soils have slow infiltration rates when thoroughly wet and are borderline for military training activities. Group D soils have a very slow infiltration rate when thoroughly wet and are marginally suitable for military training activities. Some soils are assigned two soil groups. For example, B/D indicates the soil may have a seasonally high water table, but also drain easily. Thus, this soil type would need further onsite investigation to determine its hydrologic group in a particular location. The soils on CBJTC are distributed across all groups with 40 percent in Group A, less than 1 percent in Group B, 24 percent in Group C, 10 percent in Group D, and 25 percent in Group B/D (NRCS 2010, Weatherspoon et al. 1989).

Woodland Management and Productivity

Approximately 316,500 acres (approximately 80 percent) of Clay County and more than 40,000 acres of CBJTC is forested. Most woodland areas are on Hurricane, Leon, Pottsburg, and Sapelo soils on the flatwoods; Penney, Centenary, and Ortega soils on the sand ridges; and Rutlege, Osier, and Meadowbrook soils on the floodplains. In this system, the numerical value indicates a progressively greater potential for woodland productivity and less limitations. The subclass letter (w or s) indicates excessive water either seasonally or year-round and dry, sandy soil. Approximately 53 percent of the soils are limited by excessive water and 46 percent are hindered by dry sandy soil.

Prime Farmland

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops using acceptable farming methods. None of the soil types found on CBJTC are designated as prime farmland soils (NRCS 2010).

Table 6. NRCS Soil Map Units on CBJTC

Soil Map Unit	Description	Acres	Hydric Soil	K-factor	Wind Erodibility Index	Land Use Capability Class	Hydrologic Soil Group	Woodland Productivity
1	Albany fine sand, 0 to 5 percent slopes	844.0	No	0.24	2	3e	C	11w
2	Blanton fine sand, 0 to 5 percent slopes	194.4	No	0.2	2	3s	A	11s
3	Hurricane fine sand, 0 to 5 percent slopes	9766.0	No	0.1	2	3w	C	11w
4	Ocilla loamy fine sand, 0 to 5 percent slopes	68.9	No	0.24	2	3w	C	11w
5	Penney fine sand, 0 to 5 percent slopes	5878.2	No	0.1	2	4s	A	8s
6	Mandarin fine sand	4178.3	No	0.15	2	6s	C	8s
7	Centenary fine sand, 0 to 5 percent slopes	4081.0	No	0.1	2	3s	A	11s
8	Sapelo fine sand	542.8	Yes	0.24	2	4w	D	10w
9	Leon fine sand	7049.1	Yes	0.15	2	4w	B/D	8w
10	Ortega fine sand, 0 to 5 percent slopes	3592.6	No	0.1	2	3s	A	10s
11	Allanton and Rutlege mucky fine sands, depressional	775.3	Yes	0.17	2	7w	D AND B/D	2w
14	Ortega-Urban land complex, 0 to 5 percent slopes	283.4	No	0.1	2	-	A	-
15	Quartzipsaments, excavated	145.1	No	-	-	-		-
16	Hurricane-Urban land complex, 0 to 5 percent slopes	107.5	No	0.1	2	-	C	-
17	Plummer fine sand	26.0	Yes	0.015	2	4w	B/D	11w
18	Ridgewood fine sand, 0 to 5 percent slopes	1615.1	No	0.1	2	4s	C	10w
19	Osier fine sand	167.0	Yes	0.1	2	5w	B/D	11w
20	Scranton fine sand	60.3	Yes	0.1	2	5w	B/D	11w
21	Goldhead fine sand	3.3	Yes	0.24	2	3w	B/D	10w
22	Pelham fine sand	18.0	Yes	0.24	2	3w	B/D	11w
24	Urban land	176.0	No	-	-	-	-	-

Table 6. NRCS Soil Map Units on CBJTC

Soil Map Unit	Description	Acres	Hydric Soil	K-factor	Wind Erodibility Index	Land Use Capability Class	Hydrologic Soil Group	Woodland Productivity
27	Pamlico muck	421.4	Yes	0.1	2	7w	D	2w
29	Rutlege-Osier complex, frequently flooded	3011.5	No	0.17	2	5w	B/D	7w
30	Arents, sandy	47.6	No	-	2	-	B	-
31	Pottsburg fine sand	1904.2	Yes	0.15	2	4w	B/D	8w
32	Blanton fine sand, 5 to 8 percent slopes	214.4	No	0.2	2	4s	B	11s
34	Penney fine sand, 5 to 8 percent slopes	715.0	No	0.1	2	6s	A	8s
36	Ortega fine sand, 5 to 8 percent slopes	64.3	No	0.1	2	4s	A	10s
37	Ridgewood fine sand, 5 to 8 percent slopes	36.7	No	0.1	2	4s	C	10w
38	Surrency fine sand, frequently flooded	10.6	Yes	0.15	2	6w	D	11w
39	Meadowbrook sand, frequently flooded	307.6	Yes	0.15	2	6w	B/D	10w
40	Ousley fine sand, occasionally flooded	118.8	Yes	0.1	2	3w	C	10s
41	Albany fine sand, 0 to 5 percent slopes, occasionally flooded	27.8	Yes	0.24	2	3w	C	11w
42	Osier fine sand, occasionally flooded	171.7	Yes	0.1	2	5w	B/D	11w
43	Pamlico muck, frequently flooded	54.9	Yes	0.1	2	7w	D	7w
46	Plummer fine sand, depressional	61.8	Yes	0.32	2	5w	B/D	2w
47	Newnan fine sand	118.2	No	0.24	2	3s	C	10w
49	Sapelo-Meadowbrook frequently flooded, complex	7.9	Yes	0.24	2	6w	D AND B/D	10w
50	Leon fine sand, frequently flooded	696.6	Yes	0.15	2	6w	B/D	8w
51	Pottsburg fine sand, occasionally flooded	32.4	Yes	0.15	2	4w	B/D	8w
54	Troup sand, 0 to 5 percent slopes	118.6	No	0.2	2	3s	A	8s
56	Kershaw sand, 0 to 8 percent slopes	7528.3	No	0.1	1	3s	A	8s
58	Allanton fine sand, frequently flooded	4123.7	Yes	0.1	2	5w	D	10w

Table 6. NRCS Soil Map Units on CBJTC

Soil Map Unit	Description	Acres	Hydric Soil	K-factor	Wind Erodibility Index	Land Use Capability Class	Hydrologic Soil Group	Woodland Productivity
59	Lynn Haven fine sand	1607.9	Yes	0.15	2	4w	B/D	11w
60	Ridgeland fine sand	113.1	Yes	0.15	1	3w	B/D	10w
61	Wesconnett fine sand, frequently flooded	1597.0	Yes	0.15	2	4w	D	11w
62	Neilhurst fine sand, undulating	5016.5	No	0.1	1	6s	A	8s
63	Solite fine sand	1409.3	Yes	0.1	2	4w	B/D	8w
64	Ona fine sand	182.7	Yes	0.15	2	3w	B/D	10w
CBJTC Total Acreage		**69,292.8****						

** CBJTC is approximately 73,000. Acreage not accounted for in this table is designated as open water.

Source: NRCS 2010, Weatherspoon et al. 1989

2.2.5 Water Resources

Water resources considered in this INRMP include both surface and groundwater. Surface water resources are lakes, rivers, and streams and are important for a variety of reasons including ecological, economic, recreational, and human health. Groundwater is an essential resource in many areas because it is used as a source of potable water, for agricultural irrigation, and for industrial purposes.

Florida Department of Environmental Protection (FDEP) manages the quality and quantity of water resources in Florida through its association with the five Water Management Districts (WMDs). The WMDs administer flood protection programs and develop water management plans. Regulatory programs for consumptive use of water, aquifer recharge, well construction, and surface water management have been delegated to the WMDs. As part of the surface water program, the WMDs administer FDEP's storm water management program as well. Clay County is located in the St. John's River WMD.

Groundwater Resources

CBJTC is underlain by two aquifer systems: surficial aquifer and Floridan aquifer. The surficial aquifer system is primarily composed of unconsolidated sands that are under an unconfined condition. Precipitation is the primary source of water entering this system, although in some areas of Florida water leaks upward from the underlying Floridan aquifer when the clayey confining unit separating these aquifers is thin or absent. The majority of the water moves laterally within the system before discharging into a surface waterbody; however, some water does percolate downward into the Floridan aquifer in some areas. Within Clay County, groundwater flows to the east toward the Atlantic Ocean. Freshwater withdrawals from the surficial aquifer in Florida during 1985 were estimated to be approximately 361 million gallons per day, and were used for the following purposes: public supply (47 percent), domestic and commercial use (48 percent), agriculture (4 percent), and industrial, mining, and thermoelectric-power uses (1 percent) (Miller 1990).

The Floridan aquifer system consists of limestone and dolomite, and is the most productive of the aquifers within Florida. During 1985, a total of 3 billion gallons per day were pumped from this aquifer for multiple purposes (Miller 1990). The Floridan Aquifer is the primary source of potable water in the area. It is recharged partly by lakes and by seepage from the surficial aquifer through confining beds in areas where the potentiometric surface of the aquifer is lower than that of the surficial aquifer. Groundwater levels fluctuate in response to variations in rainfall and surface water levels in nearby lakes and streams. Groundwater flow in the vicinity of CBJTC occurs generally to the east and northeast towards the St. Johns River (Motz et al. 1991, Miller 1990).

According to Motz et al. (1993), there is also an intermediate aquifer within the Hawthorn Formation (see **Section 2.2.3**) that is semi-confined by clay layers. This artisan aquifer occurs between the primary aquifers and provides freshwater to some residential areas within Clay County (Annable et al. 1996).

Surface Waters

CBJTC is situated within five watersheds: North Fork of Black Creek watershed (US Geological Survey [USGS] Hydrologic Unit Code [HUC] #0308010310), South Fork of Black Creek watershed (HUC #0308010309), Levys Prairie watershed (HUC #0308010305), Santa Fe River Headwaters watershed

(HUC #0311020601), and New River watershed (HUC #0311020602). These watersheds initiate at the topographic high in the west-central portion of the installation (see **Map 5**). North Fork and South Fork of Black Creek and Levys Prairie watersheds drain off-Post to the north, east, and south, respectively, eventually draining into the St. John's River, which occurs along the eastern boundary of Clay County. The Santa Fe River Headwaters and New River watersheds drain off-Post to the west and south, respectively, into the Santa Fe River, which flows westward ultimately discharging into the Suwannee River northwest of Gainesville.

Approximately 175 miles of streams and 4,585 acres of lakes and ponds occur within CBJTC. The most significant waterbodies within CBJTC (from largest to smallest) include: Kingsley Lake (1,620 acres), Lowry Lake (1,237 acres), Varnes Lake (298 acres), Stevens Lake (222 acres), Magnolia Lake (203 acres), Blue Pond (198 acres), Whitmore Lake (138 acres), and Perch Pond (19 acres).

The primary surface water features in the northern part of CBJTC are North Fork Black Creek, which has its headwaters in Kingsley Lake, and Bull Creek. Both of these creek systems drain toward the north-northeast. Kingsley Lake is located in the west-central part of CBJTC, and is the largest lake on the installation, encompassing approximately 1,620 acres. North Fork Black Creek and Kingsley Lake are designated as Outstanding Florida Waters (OFWs) through the "Special Waters" rulemaking that is outlined in rule 62-302.700 of the Florida Administrative Code (FAC). South Fork Black Creek, which has its headwaters in Stevens Lake (220 acres), is the primary surface water drainage feature in the central part of CBJTC. South Fork Black Creek drains toward the east within CBJTC boundaries, and then turns to the northeast to join North Fork Black Creek near Middleburg, Florida where it forms Black Creek. The Santa Fe River Headwaters and New River Watersheds encompass much of the former Du Pont mining area, and include the headwaters of the Santa Fe River and Alligator Creek, respectively. Finally, the Levys Prairie watershed encompasses the interconnected lakes in the southern part of CBJTC. These lakes are hydrologically connected to a chain of lakes south of CBJTC. This watershed is part of the Upper Etonia Creek Drainage Basin, which encompasses portions of Alachua, Bradford, Clay, and Putnam Counties. None of the surface water features are listed on the Clean Water Act (CWA) 303(d) list of impaired waters for Florida (FDEP 1998).

Several lakes within the Upper Etonia Creek Drainage Basin have been experiencing a decline in water levels over the past few decades. Studies have been conducted to examine the potential causes for this decline. Motz and Heaney (1993) identified rainfall, lake-bottom leakage, and regional water level declines within the Floridan aquifer. Annable et al. (1996) conducted a follow up study to assess the interactions between the lakes and the surficial aquifer within the basin, which included Lowry Lake (also called Sandhill Lake), Blue Pond, and Magnolia Lake. Inflow from the surficial aquifer was found to be a small percentage of the overall lake water budget. A more detailed analysis was recommended to better examine these interactions (Annable et al. 1996).

On CBJTC, Lowry Lake receives surface water inflow from Blue Pond via a creek channel, from the spring located northeast of the lake, and from the surrounding surficial aquifer. Lowry Lake loses water to surface water outflow and vertical leakage to the underlying upper Floridan aquifer. Water levels in Lowry Lake are very stable. Magnolia Lake receives surface water inflow from Lowry Lake and surficial aquifer inflow from the north; it loses water via leakage to the upper Floridan aquifer (Annable et al. 1996, Motz and Heaney 1993). See below for more information on regional groundwater aquifers.

The 650-acre Brooklyn Lake, located south of CBJTC in the city of Keystone Heights, is one of the lakes that has experienced a large decline in water levels. Surface water from CBJTC flows south toward this lake. In comparison to the lakes on CBJTC, it has a very limited confining layer, which makes this lake more likely to lose water as aquifer levels decline. Groundwater extraction has been cited as one of the primary causes (FLARNG 2011a). CBJTC has been actively involved with the City of Keystone Heights since 1997 to help find a way to restore water levels (see **Section 3.7**).

Floodplains

Floodplains are generally areas of low, level ground present on one or both sides of a stream channel that are subject to periodic inundation by flood waters. Floodplains are typically the result of lateral erosion and deposition that occurs as a river valley is widened. The porous material that composes the floodplain is conducive to retaining water that enters the soil via flooding events and elevated groundwater tables. Inundation dangers associated with floodplains have prompted federal, state, and local legislation limiting the development in these areas to recreation, agriculture, and preservation activities. Floodplains are regulated by the Federal Emergency Management Agency (FEMA) with standards outlined in 44 CFR Part 60.3. EO 11988 (Floodplain Management) requires agencies to assess the effects that their actions may have on floodplains and to consider alternatives to avoid adverse effects and incompatible development on floodplains. FEMA has identified 100-year floodplains throughout CBJTC that are associated with the various surface water features as shown in the Flood Insurance Rate Maps (FIRMs) 1200640100D, 1200640115D, 1200640120D, 1200640200D, 1200640225D, 1200640325D, and 1200640350D (FEMA 1992).

Wetlands

EO 11990 (Protection of Wetlands) requires federal agencies to take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the beneficial values of wetlands. Wetlands are an important natural system because of the diverse biological and hydrologic functions they perform. These functions may include water quality improvement, groundwater recharge, pollution treatment, nutrient cycling, the provision of wildlife habitat and niches for unique flora and fauna, storm water storage, and erosion protection. The United States Army Corps of Engineers (USACE) defines wetlands as

> "those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328)."

Wetlands are protected as a subset of the "waters of the United States" under Section 404 of the CWA. Jurisdictional waters of the United States are areas regulated under the CWA and may also include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, and other waters, that if degraded or destroyed could affect interstate commerce. For an area to be classified as a wetland, three conditions must be present: (1) wetland hydrology; (2) hydric soil; and (3) hydrophytic vegetation. Areas that may be periodically wet, but that do not meet the requisite criteria, are not classified as wetlands.

Section 404 of the CWA authorizes the USACE to issue permits for the discharge of dredged or fill material into the "waters of the United States," including wetlands. Section 401 of the CWA gives the State of Florida the authority to regulate, through the state water quality certification program, proposed federally-permitted activities that may result in a discharge to water bodies, including wetlands. Section 373.414 of the Florida Statutes (F.S.) sets forth provisions that give the State jurisdiction over those areas that are delineated wetlands, including all isolated wetlands (i.e., non-jurisdictional wetlands). Further discussion on regulatory authority and protection of wetlands is included in **Section 4.3.1**.

Wetland surveys have been conducted at CBJTC on a project-by-project basis. However, no installation-wide survey has been conducted. To provide a general summary of wetland coverage on CBJTC, a summary of wetlands on CBJTC identified in the National Wetland Inventory (NWI) is presented in **Table 7** and illustrated in **Map 6**. Natural vegetation communities, including wetland communities, have also been mapped by FNAI. See **Section 2.3.2** for more detail on FNAI wetland community types mapped within CBJTC.

Table 7. Summary of NWI Wetlands within CBJTC

Wetland Type	Cowardin Classification	Description	Acres
Lake	L1UBHx	Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Excavated	4,476
	L2UB	Lacustrine, Littoral, Unconsolidated Bottom	89
Freshwater Pond	PAB3	Palustrine, Aquatic Bed, Rooted Vascular	155
	PEM1	Palustrine, Emergent, Persistent	647
	PUBH	Palustrine, Unconsolidated Bottom, Permanently Flooded	409
Freshwater Emergent Wetland	PEM5	Palustrine, Emergent, Phragmites	1
Freshwater Forested Wetland	PFO1	Palustrine, Forested, Broad-leaved Deciduous	1,117
	PFO2	Palustrine, Forested, Needle-leaved Deciduous	11
	PFO3	Palustrine, Forested, Broad-leaved Evergreen	1,050
	PFO4	Palustrine, Forested, Needle-leaved Evergreen	654
	PFO6	Palustrine, Forested, Deciduous	1,403
	PFO7	Palustrine, Forested, Evergreen	1,234
Freshwater Scrub-Shrub Wetland	PSS1	Palustrine, Scrub-Shrub, Broad-leaved Deciduous	20
	PSS3	Palustrine, Scrub-Shrub, Broad-leaved Evergreen	501
	PSS6	Palustrine, Scrub-Shrub, Deciduous	40
	PSS7	Palustrine, Scrub-Shrub, Evergreen	58
		Total	**11,865**

Source: USFWS 2010, Cowardin et al. 1979

2.3 Ecosystem and Biotic Environment

2.3.1 Ecosystem Classification

CBJTC is located in the US Ecoregion – Humid Temperate Domain – Subtropical Division – Outer Coastal Plain Mixed Forest Province (Bailey 1995), which is equivalent to the USEPA Level II Ecoregion[1] – Eastern Temperate Forests – Mississippi Alluvial and Southeast US Coastal Plains (Commission for Environmental Cooperation [CEC] 1997). Outer Coastal Plain Mixed Forest Province covers the flat and irregular coastal plains along the Atlantic Ocean and Gulf of Mexico, including an area from as far north as Maryland and as far west as eastern Texas. The region is dominated by flat plains, but is also a diverse region containing barrier islands, coastal lagoons, swamps, marshes and numerous lakes (Bailey 1995).

Based on USEPA ecoregions mapping, CBJTC is located in the Level III Southern Coastal Plain ecoregion (75). More specifically, the installation spans two Level IV ecoregions, which include the Central Florida Ridges and Uplands (75c) and Sea Island Flatwoods (75f) (Griffith et al. 2011). The Southern Coastal Plain was historically covered by an assortment of forest communities that included longleaf pine (*Pinus palustris*), slash pine (*Pinus taeda*), pond pine (*Pinus serotina*), American beech (*Fagus gradifolia*), sweetgum (*Liquidambar styraciflua*), southern magnolia (*Magnolia grandiflora*), white oak (*Quercus alba*), and laurel oak (*Quercus laurifolia*). However, the region is now mostly slash and loblolly pine with oak-gum-cypress forest in some low lying areas.

2.3.2 Vegetation

Natural communities at CBJTC are largely influenced by soil drainage. Although most soils are sandy in texture, some in low-lying swampy areas contain a significant organic matter component (see **Section 2.2.4** for soils information). The very poorly drained soils often have standing water during wet seasons and generally support cypress-dominated communities (cypress ponds) and mixed hardwoods in wet swamps or river and stream bottomlands. Scattered pine may occur in these communities, but are more likely to occur in adjacent very-poorly drained soils that are dominated by various "bay" species but seldom have standing water. These wetland communities support many wildlife species and provide water quality protection to the rivers and streams that flow off CBJTC (FLNG 2005).

Poorly to moderately drained soils cover much of the forested land at CBJTC. These soils support mesic hammocks of mixed hardwoods and pine-hardwood communities, as well as the extensive pineland (flatwoods) forests dominated by longleaf and slash pine. Natural vegetation in the mesic hammocks is a mixture of hardwoods and shrubs, dominated by laurel, live and water oaks, several bays and hickories, sweetgum, and mature pines, especially loblolly and pond pine. The mixed hardwood-pine forests represent stages in ecological succession in which naturally regenerated pines are gradually replaced by hardwoods. The pineland forests grade from poorly drained flatwoods with dense bay understories to well-drained uplands with longleaf pine and saw palmetto/wiregrass understories or oak hammocks

[1] Ecoregions are identified through the analysis of the patterns and the composition of biotic and abiotic features, such as geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. The relative importance of each characteristic varies from one ecological region to another regardless of the hierarchical level. Level I is the coarsest level, while Level IV is the most detailed level.

(FLNG 2005). For more details on CBJTC forest stands, their history and their desired future condition, refer to the *FRMP for CBJTC* (FLNG 2005) included in **Appendix F**.

FNAI has identified and mapped natural communities in Florida based on their landscape position, vegetation composition, soil conditions, hydrology, and fire regime (FNAI 2010a). When the natural community type is ambiguous for an area, a broader level category is applied to the area. FNAI defines a natural community as "a distinct and recurring assemblage of populations of plants, animals, fungi, and microorganisms naturally associated with each other and their physical environment."

A total of 16 natural communities and 8 altered land types are found on CBJTC (FNAI 2010b). Approximately 63 percent of the installation is composed of natural communities, including four rare global and/or state community types. Rare communities include sandhill (GS/S2), scrub (G2/S2), upland mixed woodland (G2/S2), and wet prairie (G2/S2)[2]. Natural communities and other land cover at CBJTC may be grouped into three broad categories: Mesic to Xeric Natural Upland Communities, Forested and Non-Forested Natural Wetland Communities, and Altered Land. The most abundant natural community is the sandhill community (20 percent of CBJTC), while tree plantations are the most abundant altered land cover type (22 percent of CBJTC). Brief descriptions of the natural communities and other land cover found on CBJTC are summarized in **Table 8** and illustrated in **Map 7**. For more detailed information on the natural communities, including pictures, refer to FNAI's *Guide to Natural Communities of Florida 2010 Edition* available at http://www.fnai.org/.

Table 8. Natural Communities and Altered Land Cover Types within CBJTC

Community / Land Cover Type	Description	Acres	Percent Cover
Natural Upland Communities			
Sandhill	Xeric upland savanna of widely spaced longleaf pine and/or turkey oak (*Quercus laevis*) with wiregrass understory, deep sand substrate, and frequent fire (1 to 3 years). This natural community (G3/S2) is found in the Panhandle to central Florida.	14,676	19.9
Mesic Flatwoods	Characterized by flatland with sand substrate, frequent fire (2 to 4 years) and mesic woodland with an open pine canopy, and a layer of low shrubs and herbs. Common species include longleaf pine and/or slash pine, saw palmetto (*Serenoa repens*), gallberry (*Illex glabra*), dwarf live oak (*Quercus minima*), and wiregrass (*Aristida stricta*). This natural community (G4/S4) is found throughout Florida with the exception of the extreme southern peninsula and Keys.	8,095	11

[2] **G2** = Imperiled globally because of rarity or vulnerability to extinction due to some natural or man-made factor; **G3** = either very rare and local throughout its range or found locally in a restricted range or vulnerable to extinction from other factors; **S2** = Imperiled in Florida because of rarity or vulnerability to extinction due to some natural or man-made factor.

Table 8. Natural Communities and Altered Land Cover Types within CBJTC

Community / Land Cover Type	Description	Acres	Percent Cover
Upland Mixed Woodland	Mesic-xeric upland with loamy soils and open to partially closed canopy over an open understory of mixed herbs and scattered shrubs that experiences fire at a variable interval (2 to 20 years). Species include a mixture of southern red oak (*Quercus falcata*), mockernut hickory (*Carya tomentosa)*, and longleaf or shortleaf pine (*Pinus enchinata*) with other mixed hardwoods and infrequent wiregrass. This natural community (G2/S2) is found in the central Panhandle to extreme northern central Florida.	6,483	8.8
Scrub	Xeric upland with deep sand substrate, rare to occasional fire (5 to 20 years), and open or dense shrubland with or without a pine canopy consisting of sand pine (*Pinus clausa*) and/or scrub oaks and/or Florida rosemary (*Ceratiola ericoides*). This natural community (G2/S2) is found throughout Florida with the exception of the extreme southern peninsula and Keys.	340	0.5
Xeric Hammock	Xeric upland community with a deep sand substrate and a closed canopy of evergreen hardwoods including sand live oak (*Quercus geminata*) and saw palmetto that experience rare or no fire. This natural community (G3/S3) is found primarily in the eastern Panhandle to central Florida.	74	0.1
Upland Hardwood Forest	Mesic upland community with sand/clay and/or calcareous substrate and a closed deciduous or mixed deciduous / evergreen canopy that experiences rare or no fire. Common species include American beech, southern magnolia, hackberry (*Celtis* spp.), swamp chestnut oak (*Quercus michauxii*), white oak, horse sugar (*Symplocos tinctoria*), flowering dogwood (*Cornus florida*), and mixed hardwoods. This natural community (G5/S3) is found primarily in the Panhandle to central Florida.	57	0.1
Natural Wetland Communities			
Freshwater Wetland Forested Mixed	Floodplains or depressions dominated by a mix of hydrophytic coniferous and hardwood trees	4,961	6.7
Open Water	Natural streams, lakes, and rivers.	3,961	5.4
Wet Flatwoods	Characterized by flatland with sand substrate, frequent fire (2 to 4 years) for grassy wet flatwoods and 5 to 10 years for shrubby wet flatwoods, seasonally inundated, closed to open pine canopy with grassy or shrubby understory. Common species include slash pine, pond pine, large gallberry (*Illex coriacea*), fetterbush (*Lyonia lucida*), sweetbay (*Magnolia virginiana*), cabbage palm (*Sabal palmetto*), wiregrass, toothache grass. This natural community (G4/S4) is found throughout Florida with the exception of the extreme southern peninsula and Keys. Characterized as hydric pine flatwoods within CBJTC.	3,559	4.8

Table 8. Natural Communities and Altered Land Cover Types within CBJTC			
Community / Land Cover Type	**Description**	**Acres**	**Percent Cover**
Freshwater Mixed Wetland Hardwoods	Floodplains or depressions dominated by hydrophytic hardwood trees.	1,876	2.5
Mixed Scrub-Shrub Wetland	Non-forested wetlands with a short hydroperiod that are dominated by shrubby palustrine plant communities, grasses, sedges, and/or titi (*Cyrilla* spp).	855	1.1
Freshwater Marshes	Non-forested wetlands with a long hydroperiod that are dominated by grasses, sedges, broadleaf emergents, floating aquatics, or shrubs.	380	0.5
Wet Prairie	Characterized by flatland with sand or clayey sand substrate that is usually saturated, but only occasionally inundated. This treeless, dense herbaceous community with few shrubs experiences frequent fire (2 to 3 years). Common species include: wiregrass, blue maidencane (*Amphicarpum muhlenbergianum*), cutthroat grass (*Panicum abscissum*), wiry beaksedges (*Rhynchospora* spp.), flattened pipewort (*Eriocaulon compressum*), toothache grass (*Ctenium aromaticum*), pitcherplants (*Sarracenia* spp.), and coastal plain yelloweyed grass (*Xyris ambigua*). This natural community (G2/S2) is found throughout Florida with the exception of the extreme southern peninsula and Keys.	332	0.4
Cypress	A type of freshwater forested wetland that is dominated by cypress and has a long hydroperiod.	269	0.4
Bay Swamp	A specific variant of the baygall (GS/S4) community that is characterized as a large or small peat filled forested depression dominated by bay species that experience rare or no fire. Bay swamps are found mainly in the eastern Panhandle and central Florida.	144	0.2
Freshwater Non-Forested Wetlands (Other)	Includes floating/emergent aquatic vegetation.	13	<0.1
	Total Natural Communities	**46,075**	**62.4**
Altered Land Cover Types			
Tree Plantations	Areas altered by silvicultural activities. Tree plantations on CBJTC land are composed of coniferous trees.	17,078	23.1
Extractive	Areas include strip mines and spoil areas.	2,948	4.0
High Intensity Urban	This land category consists of medium density residential areas, and commercial, industrial and institutional land uses.	2,679	3.6

Table 8. Natural Communities and Altered Land Cover Types within CBJTC

Community / Land Cover Type	Description	Acres	Percent Cover
Pasture – Improved	Areas cleared of their native vegetation and that have been planted with bahiagrass (*Paspalum notatum*) and to a lesser extent with Bermudagrass (*Cynodon dactylon*) or pangolagrass (*Digitaria eriantha*). Weedy native species are often common and include dogfennel (*Eupatorium capillifolium*), many species of flatsedge (*Cyperus* spp.), carpetgrasses (*Axonopus* spp.), crabgrasses (*Digitaria* spp.), and rustweed (*Polypremum procumbens*) among many others.	2,041	2.8
Shrub / Brush land	Includes saw palmetto, gallberry, wax myrtle (*Morella cerifera),* coastal scrub, and other shrubs and brush. Generally, saw palmetto is the most prevalent plant cover intermixed with a wide variety of other woody scrub plant species as well as various types of short herbs and grasses.	1,828	2.5
Open Water (Artificial)	Open water that is altered or man-made. Includes farm ponds, impoundments/reservoirs, quarry ponds, sewage treatment ponds and industrial cooling ponds.	572	0.8
Low Intensity Urban	Includes low density residential areas, cemeteries and community recreational facilities at CBJTC.	324	0.4
Other (roads, utilities, etc)	Includes transportation network (paved and unpaved roads), communications, and utilities.	299	0.4
Successional Hardwood Forest	Closed canopy forest dominated by fast growing hardwoods such as laurel oak, water oak, and/or sweetgum, often with remnant pines. This category represents invaded natural habitat due to fire suppression or old fields that succeeded to forest.	21	<0.1
	Total Altered Land Cover	**27,790**	**37.6**

Note: CBJTC GIS Boundary equals approximately 73,865.

Key: Global and State Ranks
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range).
G5 = Demonstrably secure globally.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range).

Source: FNAI 2010a, 2010b

Plant surveys have been conducted previously to identify rare plants occurring on CBJTC (Bio-tech 2009, Florida Museum of Natural History [FLMNH] 1996b), but no comprehensive plant surveys have been conducted. A total of 25 rare species have been documented on the installation, including the federally endangered and state threatened Chapman's rhododendron (*Rhododendron chapmanii*). Rare plant species known to occur on the installation are discussed further in **Section 2.3.4** and in the rare species survey by Bio-tech (2009).

To date, 44 invasive and/or exotic species have been documented at CBJTC. Invasive species management is discussed further in **Section 4.8**. A list of common vascular plant species observed during previous surveys is included in **Appendix C**.

A nonvascular plant survey including bryophytes and lichens was conducted from August 1998 through March 1999 by botanists from the University of Florida at CBJTC (Griffin 1999). A total of 172 species were gathered from six distinct habitats (scrub, sandhill, xeric hammock, baygall, bottomland forest[3], and ruderal[4]). Species were collected in the following proportions: 55 percent lichens (94 species), 25 percent mosses (43 species), and 20 percent liverworts (35 species). The ecological requirements of the three groups are sufficiently distinct that many species appear in only a few habitats. For instance, lichen diversity reaches its height in open sunny habitats with abundant shrub and tree growth (scrub and sandhill). Mosses and liverworts show their greatest diversity and abundance in habitats that maintain higher humidity and shade. Bottomland forests and baygalls are rich in these groups, with bottomland forests being the optimal habitat for bryophytes. Bottomland forests at CBJTC support basically twice as many species overall as scrub or baygall and 3 to 4 times as many as sandhill or xeric hammock. Xeric hammocks, while supporting representatives of all three groups, have limited diversity and abundance.

2.3.3 Fish and Wildlife

The following sections provide an overview of the fish and wildlife found within CBJTC. Fauna surveys and other studies have been conducted onsite for amphibians and reptiles (Bio-tech 2009, FLMNH 1996b, Hall et al. 1994a), birds (Bio-tech 2009, FLMNH 1996a, Hall et al. 1994b), fish (Nelson and Floyd 2011, CH2MHill 1999, Burgess and Matter 1994), aquatic macroinvertebrates (Nelson and Floyd 2011, CH2MHill 1999, Eco-Cognizant 1996a), Lepidoptera (Eco-Cognizant 1996b), and mammals (Bio-tech 2009, Finn 2008, Finn 2001, FLMNH 1996a). Additionally, surveys have been conducted previously to identify rare animals occurring on CBJTC (Bio-tech 2009, FLMNH 1996a). A summary of these findings is provided below. Fauna species lists are presented in **Appendix C**.

Amphibians and Reptiles

More than 20 amphibian species are known to occur within CBJTC including the gopher frog (*Rana capito*), state species of special concern. Amphibians include 17 frogs, 2 toads, and 4 salamanders (Bio-tech 2009, FLMNH 1996a, Hall et al. 1994a).

At total of 27 reptile species are known to occur within CBJTC, including the federally threatened Eastern indigo snake (*Drymarchon corais couperi*), the federally threatened American alligator (*Alligator*

[3] Bottomland Forest = seasonally flooded forests located along waterways.

[4] Ruderal = Disturbed or altered lands

mississippiensis) due to similarity of appearance, the federal candidate and state threatened gopher tortoise (*Gopherus polyphemus*), the federal candidate striped newt (*Notophthalmus perstriatus*) and the state species of special concern Florida pine snake (*Pituophis melanoleucus mugitus*). Reptiles include 12 snakes, 5 turtles, 5 lizards, 3 skinks, 1 tortoise, and 1 alligator (Bio-tech 2009, FLMNH 1996a, Hall et al. 1994a). A list of amphibians and reptiles found on CBJTC is provided in **Appendix C**.

Birds

More than 130 bird species are known to occur at CBJTC, including the federally endangered RCW, federally endangered wood stork (*Mycteria americana*), federally threatened Florida scrub-jay (*Aphelocoma coerulescens*) and seven state listed species (see **Table 9**) (Bio-tech 2009, FLMNH 1996a, Moulton and Justice 1996, Hall et al. 1994b). A list of bird species found on CBJTC is included in **Appendix C**.

Fish

During 1993-1995, fish surveys were conducted at 20 sites within three drainage sub-regions on CBJTC: North Fork Black Creek, South Fork Black Creek, and sandhill lakes areas (Burgess and Matter 1994). Fish surveys were conducted again in January 1999 at 24 collection sites (CH2MHill 1999). Most recently during a baseline survey for the Black Creek crayfish (see below), Nelson and Floyd (2011) documented additional fish species. More than 35 fish species from 14 families have been observed during the surveys at CBJTC. No unusual or rare species of fish were collected. The most abundant species were the mosquitofish (*Gambusia holbrooki*), sailfin shiner (*Pteronotropis hypselopterus*), and bluegill (*Lepomis macrochirus*).

All three major habitat types were sampled during these studies: man-made borrow pits, lakes, and headwater streams. Fish were collected at only two of the borrow pit sites and included five species. Twenty species were collected within the lake habitat, which offered the greatest relative fish abundance. Headwater streams hosted 22 species; however, abundances were low when compared to lake collections. Species diversity was similar within the three drainage sub-regions (CH2MHill 1999, Burgess and Matter 1994). See **Appendix C** for fish species list on CBJTC, showing locations identified on the site.

Aquatic Macroinvertebrates

In 1995, 112 sites in the following habitats were sampled for aquatic macroinvertebrates (Eco-Cognizant 1996a). The following aquatic habitats were surveyed: blackwater streams, clearwater streams, marshy stream headwaters, seeps, lakes, small pools, wet prairies, cypress dome swamps, ponds, and roadside ditches. At least 83 families and approximately 250 species of aquatic macroinvertebrates were observed, which included a freshwater sponge (Porifera); snails and clams (Mollusca); aquatic earthworms, oligochaetes, and leeches (Annelida); scuds, a fairy shrimp, crayfish, shrimp, isopods, and seed shrimp (Crustacea); water mites (Acariformes); and 12 orders of insects (Insecta). Blackwater streams, roadside ditches, clearwater titanium mine ponds, borrow pit ponds, wet prairies, and cypress domes had the highest species richness. Brownwater titanium mine ponds had the lowest diversity.

During a subsequent survey in the late 1990s, sampling stations supported a wide variety of macroinvertebrate taxa, ranging from 71 taxa at one station to 17 taxa at another (CH2MHill 1999). The

Black Creek crayfish (*Procambarus pictus*), a state species of special concern, was widespread and abundant in blackwater streams of the Black Creek drainage system (CH2MHill 1999). The rare Say's spiketail dragonfly (*Cordulegaster sayii*) was infrequently found in blackwater streams, especially in the Bull Creek basin. Two other rare species, the southeastern spinyleg dragonfly (*Dromogomphus armatus*) and tawny sanddragon (*Progomphus alachuensis*), were occasionally found in blackwater streams and lakes, respectively.

Most recently, Nelson and Floyd (2011) conducted a baseline survey for the Black Creek crayfish to obtain a better understanding of the distribution and relative abundance of this species at CBJTC and to identify new sites. Sampling was performed within the North and South Forks of Black Creek and their tributaries, Bull Creek, and Alligator Creek and its tributaries, with the exception of the Impact Area due to safety concerns. Black Creek crayfish were observed at over half of the 245 survey sites (52 percent), while Peninsula crayfish (*Procambarus paeninsulanus*) / Slough crayfish (*Procambarus fallax*) and White Tubercled crayfish (*Procambarus spiculifer*) were found at 15 percent at 2 percent of the sites, respectively. No crayfish were observed at 7 percent of the sites and 30 percent of the sites were dry. Generally, Black Creek crayfish were observed at sites with low turbidity and siltation, high dissolved oxygen and water flow, and clear water color. Black Creek crayfish occurrence in Alligator Creek and its tributaries on the south post of CBJTC documents a range extension for the species outside of the Black Creek Drainage, and into the Half Moon Lake Outlet drainage. See **Appendix C** for aquatic macroinvertebrate species documented on CBJTC.

Mammals

Approximately 45 mammal species have been observed at CBJTC, including the state threatened black bear (*Ursus americanus floridanus*) (Bio-tech 2009, Finn 2008, Finn 2001, FLMNH 1996a). The Florida mouse (*Podomys floridanus*) and Sherman's fox squirrel (*Sciurus niger shermani*), which are state listed species of special concern, are also know to occur onsite. A number of legal game mammals are hunted at CBJTC, including large and small game (see **Section 4.6.4**).

Eleven bat species have the potential to occur within CBJTC, but resident populations are unlikely for two migratory species, Hoary bat (*Lasiurus cinereus*) and silver-haired bats (*Lasionycteris noctivagans*). Six of the nine species with the potential to reside on CBJTC were captured or found roosting during a 2001 survey (Finn 2001), while all nine species were acoustically documented during the 2008 survey (Finn 2008). A list of mammal species is provided in **Appendix C**.

Lepidoptera (Butterflies)

A lepidopteran survey at CBJTC was conducted in 1995 (Eco-Cognizant 1996b). A total of 81 species of butterflies were found during the survey, which included 38 skippers (Hesperiidae), 7 swallowtails (Papilionidae), 8 sulfurs and whites (Pieridae), 8 hairstreaks and blues (Lycaenidae), 1 metalmark (Riodinidae), and 19 brushfoots (Nymphalidae). Rare or uncommon Florida butterflies found at CBJTC were: cobweb little skipper (*Amblyscirtes aesculapias*), southern swamp skipper (*Poanes yehl*), Zabulon skipper (*Poanes zabulon*), dotted skipper (*Hesperia attalus*), Meske's skipper (*Hesperia meskei*), gemmed satyr (*Cyllopsis gemma*), brown broken dash (*Wallengrenia egeremet*), Cofaqui giant skipper (*Megathymus cofaqui*), and yucca giant skipper (*Megathymus yuccae*).

Butterfly diversity was greatest in late spring/early summer and fall. Similarly, butterfly abundance was greatest in March/April and August through December, with about three times as many individuals occurring during the fall than other seasons. Overall, phaon crescent (*Phyciodes phaon*) was the most abundant species. At least 120 species of plants are utilized for nectar and larval hosts at CBJTC. See **Appendix C** for butterfly species documented on CBJTC.

2.3.4 Threatened and Endangered Species

Federal status as a threatened or endangered species is derived from the ESA (16 USC §1531 *et seq*.) and is administered by USFWS. They maintain a current list of federally endangered and threatened species, candidate species, and species of concern. Candidate species and species of concern designated by USFWS receive no statutory protection under the ESA. The Florida Endangered and Threatened Species Act (Chapter 379.2291, F.S.) further conserves and protects federal and state listed fish and wildlife. FFWCC maintains the state list of animals designated as federally endangered or threatened, state threatened, or state species of special concern in accordance with rules 68A-27.003 and 68A-27.005 FAC, respectively. Florida Department of Agriculture and Consumer Services (FDACS) Division of Plant Industry administers and maintains a list of endangered, threatened, and commercially exploited plants in accordance with chapter 5B-40, FAC. FNAI maintains a list of species and natural communities documented by location. However, it should be noted that the FNAI database is not a comprehensive list as it is dependent on reported occurrences.

In accordance with AR 200-1 and DoDI 4715.03, FLARNG has conducted surveys for federally threatened and endangered species, federal species of concern and candidate species, and state listed species at CBJTC (e.g., FLMNH 1996a, FLMNH 1996b, Bio-tech 2009). Currently, FFWCC lists 46 federally endangered animal species, 20 federally threatened animal species, 1 federal experimental population, 21 state-designated threatened animal species, and 43 state species of special concern (Gruver and Murphy 2011). Of these 131 listed animal species in Florida, 19 are known to occur at CBJTC (see **Table 9**). The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal ESA list in June 2007 and is not state listed. However, protections under the Bald and Golden Eagle Act are still in effect. Bald eagle nests have been found in several places on the installation. No federally designated critical habitat occurs within CBJTC. FDACS currently lists 440 endangered plants – 117 threatened plants and 8 commercially exploited planted species (Weaver and Anderson 2010). Of these 565 listed plant species in Florida, 25 are known to occur at CBJTC (see **Table 10**).

For wildlife species with a calculated climate change vulnerability index (CCVI), the status is included in **Table 9** (see **Section 3.4** for more details). A CCVI is not available for any of the plants.

Field guide excerpts from Hipes et al. (2000) and Chafin (2000) for listed species known to occur on-site and species specific management plans developed for CBJTC, when available, are included in **Appendix E**. **Tables 9** and **10** provide information regarding CBJTC's management priority for each of the rare animal and plant species, respectively, known to occur or with the potential to occur at CBJTC. For additional information, refer also to Bio-tech's (2009) *Threatened and Endangered Species Survey Report for Camp Blanding Joint Training Center*. Management priorities and recommendations are discussed in **Section 4.7**.

The RCW is the only federally listed species at CBJTC with a BO for the DoD. USFWS issued a BO for the RCW on Army Installations in 2007 (Costa 2007). A revision to this BO was made in 2008 (Hankla 2008) for CBJTC based on FLARNG's ESMC Update for Incidental Take (Robinson 2008). For a copy of the above listed documents and other information related to the RCW at CBJTC, refer to **Appendix D**.

Table 9. Federal and State Listed Animal Species Documented on CBJTC or with the Potential to Occur in Clay County

Scientific Name	Common Name	Known to Occur at CBJTC	Federal / State Listing Status	CCVI	CBJTC Management Priority	Habitat				
						Pinelands	Flatwoods	Sandhill	Scrub	Wetlands
Amphibians										
Notophthalmus perstriatus	Striped Newt	✓	FC	-	Medium	✓	✓	✓		
Rana capito	Gopher frog	✓	SSC	HV	Medium	✓	✓	✓	✓	
Birds										
Aphelocoma coerulescens	Florida scrub-jay	✓	FT	-	High				✓	
Aramus guarauna	Limpkin		SSC	PS	Low					✓
Egretta caerulea	Little blue heron	✓	SSC	-	Low					✓
Egretta thula	Snowy egret	✓	SSC	-	Low					✓
Egretta tricolor	Tricolored heron	✓	SSC	-	Low					✓
Eudocimus albus	White ibis	✓	SSC	-	Low					✓
Falco sparverius paulus	Southeast American kestrel	✓	ST	-	Medium	✓		✓		
Grus canadensis pratensis	Florida sandhill crane	✓	ST	-	Low					✓
Mycteria americana	Wood stork	✓	FE	-	Low					✓
Picoides borealis	Red-cockaded woodpecker	✓	FE	-	High	✓	✓	✓		
Crustaceans										
Procambarus pictus	Black Creek crayfish	✓	SSC	-	Low					✓

Table 9. Federal and State Listed Animal Species Documented on CBJTC or with the Potential to Occur in Clay County

Scientific Name	Common Name	Known to Occur at CBJTC	Federal / State Listing Status	CCVI	CBJTC Management Priority	Habitat				
						Pinelands	Flatwoods	Sandhill	Scrub	Wetlands
Mammals										
Podomys floridanus	Florida mouse	✓	SSC	-	Medium			✓	✓	
Puma concolor coryi	Florida panther		FE	PS	N/A	Variety				
Sciurus niger shermani	Sherman's fox squirrel	✓	SSC	-	Medium	✓	✓	✓		
Ursus americanus floridanus	Florida black bear	✓	ST	-	High	Variety				
Reptiles										
Alligator mississippiensis	American alligator	✓	FT (S/A)	-	N/A					✓
Drymarchon corais couperi	Eastern indigo snake	✓	FT	-	High	Variety				
Gopherus polyphemus	Gopher tortoise	✓	FC / ST	-	High	✓	✓	✓	✓	
Pituophis melanoleucus mugitus	Florida pine snake	✓	SSC	-	Low		✓	✓	✓	

STATUS: FE – Federally Endangered; FT – Federally Threatened; FT (S/A) = Federally Threatened due to Similarity of Appearance; FC – Federal Candidate; ST = State Threatened; SSC = Species of Special Concern

CCVI: HV = Highly Vulnerable = Abundance and/or range extent within geographical area assessed is likely to decrease significantly by 2050; PS = Not vulnerable / Presumed Stable = Available evidence does not suggest that abundance and/or range extent within the geographic area assessed will change by 2050; however, actual range boundaries may change.

* FFWCC is in the process of updating their species listings. The SSC category is being maintained until all the species have been reviewed, and those species are either designated as a state threatened species or given a management plan and removed from the list.

Source:
USFWS 2012, Gruver and Murphy 2011, DuBois et al. 2001, Weaver and Anderson 2010, Bio-tech 2009, FLMNH 1996a, Hall 1994a, Christman and Means 1992, Godley 1992, Layne 1992, Kantola 1992, Maehr 1992, and Franz 1992

Table 10. Federal and State Listed Plant Species Documented on CBJTC or Known to Occur in Clay County

Scientific Name	Common Name	Observed at CBJTC	Federal / State Listing Status	CBJTC Management Priority	Habitat						
					Mixed Forests	Flatwoods	Pinelands	Sandhill	Scrub	Floodplains	Wetlands
Agrimonia incisa	Harvest-lice		SE	Low	✓		✓	✓			
Arnoglossum diversifolium	Indian plantain		ST	Low						✓	✓
Andropogon arctatus	Pinewoods bluestem		ST	Low		✓					
Asclepias curtissii	Curtiss' milkweed	✓	SE	Medium					✓		
Asclepias viridula	Green milkweed		ST	Low		✓	✓				
Athyrium filix-femina	Southern lady fern	✓	ST	Low						✓	
Balduina atropurpurea	Purple balduina		SE	Low			✓				✓
Baptisia calycosa	Canby's wild-indigo		SE	Low		✓		✓			
Brickellia cordifolia	Flyer's Brickell-bush		SE	Low	✓						
Calopogon multiflorus	Many-flowered grass pink		SE	Low			✓				
Carex chapmanii	Baltzell's sedge		ST	Low	✓						
Centrosema arenicola	Sand butterfly-pea		SE	Low	✓						
Cleistes bifaria	Spreading pogonia	✓	ST	Low							
Cleistes divaricata	Spreading pogonia		ST	Low			✓				✓
Ctenium floridanum	Florida toothache grass	✓	SE	Low			✓	✓			
Drosera intermedia	Water sundew	✓	ST	Low							✓
Epidendrum conopseum	Green-fly orchid	✓	CE	Low							✓
Garberia heterophylla	Garberia		ST	Low					✓		

Table 10. Federal and State Listed Plant Species Documented on CBJTC or Known to Occur in Clay County

Scientific Name	Common Name	Observed at CBJTC	Federal / State Listing Status	CBJTC Management Priority	Habitat						
					Mixed Forests	Flatwoods	Pinelands	Sandhill	Scrub	Floodplains	Wetlands
Hartwrightia floridana	Florida hartwright	✓	ST	Low		✓					
Helianthus carnosus	Flatwoods sunflower		SE	Low		✓					
Lilium catesbaei	Catesby lily	✓	ST	Low		✓					
Linum westii	West's flax		SE	Low		✓					✓
Litsea aestivalis	Pond-spice		SE	Low							✓
Lobelia cardinalis	Cardinal flower		ST	Low						✓	
Marshallia ramosA	Southern Barbara's buttons		SE	Low	✓						
Matelea floridanum	Florida spiny-pod	✓	SE	Medium				✓			
Matelea pubifloria	Florida spiny-pod	✓	SE	Medium							
Osmunda cinnamomea	Cinnamon fern	✓	CE	Low							✓
Osmunda regalis	Royal fern	✓	CE	Low							✓
Pinckneya bracteata	Hairy fever-tree	✓	ST	Low							✓
Pinguicula caerulea	Blue butterwort	✓	ST	Low							✓
Pinguicula lutea	Yellow butterwort	✓	ST	Low							✓
Platanthera blephariglottis	White-fringed orchid		ST	Low							✓
Platanthera ciliaris	Yellow fringed orchid	✓	ST	Low		✓					
Platanthera cristata	Golden fringed orchid	✓	ST	Low							✓
Platanthera flava	Gypsy-spikes		ST	Low						✓	✓
Platanthera nivea	Snowy orchid		ST	Low						✓	✓

Table 10. Federal and State Listed Plant Species Documented on CBJTC or Known to Occur in Clay County

Scientific Name	Common Name	Observed at CBJTC	Federal / State Listing Status	CBJTC Management Priority	Habitat						
					Mixed Forests	Flatwoods	Pinelands	Sandhill	Scrub	Floodplains	Wetlands
Pogonia ophioglossoides	Rose pogonia	✓	ST	Low		✓					
Pteroglossapsis ecristata	Giant orchid	✓	ST	Low		✓					
Pycnanthemum floridanum	Florida mountain-mint		ST	Low			✓	✓			
Rhapidophyllum hystrix	Needle palm	✓	CE	Low						✓	
Rhododendron canescens	Pink azalea	✓	CE	Low	✓						
Rhododendron chapmanii	Chapman's rhododendron	✓	FE / SE	High		✓					
Rudbeckia nitida	St. John's black-eyed susan	✓	SE	Medium		✓					
Ruellia noctiflora	Night-flowering wild petunia		SE	Low		✓					
Salix floridana	Florida willow		SE	Low						✓	✓
Sarracenia minor	Hooded pitcher plant	✓	ST	Medium		✓					
Sideroxylon alachuense	Clark's buckthorn		SE	Low	✓						
Sideroxylon lycioides	Gopherwood buckthorn		SE	Low						✓	
Sphenostigma coelestinum	Bartram's ixia	✓	SE	Medium		✓					
Spiranthes tuberosa	Little ladies'-tresses	✓	ST	Medium					✓		
Stylisma abdita	Hidden stylisma		SE	Low			✓		✓		
Zephyranthes atamasco	Atamasco-lily	✓	ST	Medium						✓	
Zephyranthes treatiae	Treat's zephyr-lily		ST	Low		✓					

Key: FE – Federally Endangered; SE – State Endangered; FT - Federally Threatened; ST = State Threatened; CE – Commercially Exploited

Source: FNAI 2012, Gruver and Murphy 2011, Weaver and Anderson 2010, Bio-tech 2009, FLMNH 1996a

3.0 MISSION SUSTAINABILITY

3.1 Integrating Natural Resources Management and Military Mission

An effective INRMP integrates aspects of natural resources management into the military mission. As such, it becomes the primary tool for ecosystem management at CBJTC while ensuring the successful, efficient accomplishment of the military mission. A multiple-use ecosystem management approach will be implemented to accommodate mission-oriented activities and provide for good stewardship, thereby maintaining and improving the quality, aesthetic values, and ecological relationships of the environment.

The purpose of the CBJTC is to ***maintain sustainable natural resources as a critical training asset*** upon which to accomplish the FLARNG mission. To accomplish this goal, natural resource managers need to:

- Ensure ***no net loss*** in capability to support existing and projected military training.
- Maintain ***quality training lands*** through monitoring, minimizing damage, mitigation, and rehabilitation.

Specific military missions and training requirements are fluid and change from time to time with realignments, transformations, and changes in equipment and tactics. This requires the establishment of basic underlying natural resource management principles and practices that have broad application and can be adapted for multiple situations. Implementation of this INRMP will successfully promote adaptive stewardship practices that protect and enhance natural resources for multiple use, sustainable yield, and biological integrity, while supporting the military mission.

As part of implementing this approach, there are two interrelated programs that are used: ITAM and Environmental Programs. ITAM and Environmental integrate the military mission and natural resources in different ways and together ensure sustainable use of training lands while providing strong consideration for environmental and public concerns.

3.1.1 Operations Planning & Review

Projects, activities, new development, and mission changes are typically reviewed by multiple entities within FLARNG including CBJTC-DPW and CBJTC-ED. New construction projects and work orders are reviewed every other Monday by CFMO, FMO-ENV, and CBJTC-DPW. Larger scale projects are also reviewed by the Environmental Quality Control Committee (EQCC) (see **Section 1.3.1**). If there is potential for environmental impacts, the NEPA process is started, as described in **Section 3.3.** If there are additional environmental compliance requirements, CBJTC-ED or FMO-ENV facilitates any required consultation or permit applications, as described in **Section 3.2**.

3.1.2 Natural Resources Management Actions

There are two primary areas of potential impacts to natural resources from the military mission on CBJTC: wildland fire and listed species. In addition, there are significant requirements for management of vegetation and water resources to support the military mission, although the military mission does not generally impact them directly. The military mission can result in wildfires; therefore, managing wildland fire risk and fuel loads is an important part of the natural resources management program on CBJTC. There are also a number of listed species present on CBJTC. While some of them benefit from the effects of the military mission, there are still regulatory requirements and a general contribution to the recovery of

listed species to meet as required by the ESA for all federal agencies. In addition to the impacts from the mission on natural resources, the active management of vegetation (see **Section 3.1.4** below) is a critical and necessary component of natural resources management on CBJTC. Furthermore, despite the fact that water resources are in good to excellent condition on CBJTC, they could be put at risk without the current natural resources management program.

The ultimate goal of this INRMP, as well as its subsequent updates or revisions, is to ensure long-term capability for FLARNG to meet their missions and training requirements, while managing for sustainable natural resources at CBJTC. The development and implementation of an active natural resources management program will accommodate the military mission, while emphasizing integrated, adaptive management that focuses on maintaining ecosystem function and stability.

All the landscapes at CBJTC are important in supporting training activities. Realistic training is dependent upon an intact natural setting. Degradation of natural resources can result in unintended impacts to the military mission, impaired readiness, and funds spent on natural resources crisis management and interventions rather than the military mission. FLARNG needs the land and its natural resources to function together in a healthy ecosystem to support the military mission. Management activities in this INRMP are designed to support the desired habitats and ecosystem functions.

3.1.3 Environmental Awareness

The primary means of environmental awareness for CBJTC is the ITAM program (see **Section 1.5.7**). For military users of CBJTC, a core component of the ITAM program is Environmental Awareness aimed at minimizing environmental impacts. The ITAM program provides day-to-day environmental awareness for CBJTC through solider cards and handbooks developed with input from CBJTC-ED. Environmental Compliance Officer (ECO) Training provides another opportunity to discuss natural resources and other environmental resources on CBJTC. CBJTC-ED also maintains an entrance room on the way to Range Control with brochures, animal displays, and other educational materials that provide an opportunity for soldiers and other site users to familiarize themselves with natural resources at CBJTC.

3.2 Consultation Requirements

FLARNG has multiple natural resources consultation requirements in addition to the INRMP development and review requirements identified in the SAIA (see **Section 1.0**). Federally listed threatened and endangered species management requires ESA Section 7 consultation with USFWS. State listed rare species management and game species management requires consultation with FFWCC. Actions that fall under the jurisdiction of Section 404 or 401 of the CWA necessitate permitting from USACE, FDEP and St John's River WMD. In addition to natural resources consultation requirements, there are National Historic Preservation Act (NHPA) and tribal consultation requirements, which are presented in full in the ICRMP for CBJTC (ARNG-ILE 2011).

3.3 NEPA

CBJTC follows the process established in the 2011 *ARNG NEPA Handbook, Guidance on Preparing Environmental Documentation for Army National Guard Actions in Compliance with the National Environmental Policy Act of 1969* (ARNG 2011). The initial step in compliance with NEPA for any activity that might impact the environment by FLARNG is to complete a *REC and Check Form*. The form is prepared to aid in the development of the assessment; it provides information on the proposed action and its alternatives, purpose, and potential environmental effects. This allows the proponent to identify potential environmental impacts early and facilitates making a determination about whether an EA or Environmental Impact Statement (EIS) might be required for a specific action. Some sections are prepared by the proponent and other sections are prepared by CBJTC-ED or FMO-ENV. For activities where a REC and Check is sufficient, CBJTC-ED completes and/or reviews the REC and Check. For activities where additional NEPA analysis is required, FMO-ENV prepares and manages the analysis.

If the action is not covered by a categorical exclusion, then an EA is prepared to determine if there are potential significant impacts. If potential significant impacts are identified while completing the REC and Check or during the EA, then an EIS is prepared. The majority of natural resources management actions are covered by categorical exclusions.

3.4 Encroachment Management

CBJTC has been partnering with ARNG-ILE and the State of Florida through the Florida Forever program since 2003 to establish a three-mile compatible use buffer around the installation. This effort is known as the Camp Blanding Forever Initiative (CBFI) and helps prevent development of lands adjacent to CBJTC and encroachment from becoming an impediment to training and natural resource management. By securing a buffer, CBJTC can continue to provide critically important high quality military training and operations to ensure combat readiness. Efforts to support CBJTC through the combination of CBFI and Florida Forever also contribute to a regional conservation corridor and regional coordination among all participating entities for land management success. At this time there are no plans to acquire additional acreage that increases the size of the training center; however, these efforts have added state land and conservation easements around CBJTC. See the Florida Forever website at http://www.dep.state.fl.us/lands/fl_forever.htm for more information about the state agencies involved and the planning and prioritization efforts that support this initiative.

3.5 Beneficial Partnerships and Collaborative Resource Planning

FLARNG is working with FDEP and St. John's River WMD to utilize some of the lands acquired as part of the CBFI program for conducting off-site wetland mitigation. Once the conditions and mitigation credits are established, FLARNG will be able to utilize this land for wetland mitigation requirements associated with CBJTC construction projects.

In addition to the CBFI and Florida Forever programs, there are other regional planning efforts that support CBJTC and resource management in the area. The State of Florida in §163.3175, F.S. (2011) recognized that certain military installations have a potential for experiencing compatibility and

coordination issues. For CBJTC, Clay, Bradford, and Putnam Counties were identified as affected local governments and each county has included CBJTC into their Comprehensive Plan.

Furthermore, the State of Florida finds that incompatible development of land close to military installations can adversely affect the ability of an installation to carry out its mission, public safety, and economic viability of a community if military operations and missions must relocate due to incompatible urban encroachment. In particular, the *2025 Clay County Comprehensive Plan* was amended pursuant to Ordinance No. 2009-65 to include objectives and policies to protect the current long-term viability of CBJTC from future land development (Clay County 2009), and the *2016 Bradford County Comprehensive Plan* has incorporated a CBJTC military zone on their 2016 future land use plan map (Bradford County Board of County Commissioners 2006). Currently, CBJTC maintains non-voting representation on the Zoning Board for Clay County to ensure that any impacts to CBJTC are articulated to the Zoning Board.

As discussed in **Section 2.2**, approximately 56,200 acres of CBJTC is also known as Camp Blanding WMA; through an MOA, hunting, fishing, and recreation are allowed during certain times of the year. A MOA also exists between FFWCC and FDMA for public use of Lowry Lake and Magnolia Lake for fishing. FFWCC manages the WMA. FFWCC retains all funds associated with hunting activities and in turn provides FLARNG with assistance with wildland fires, rare species management, fish and wildlife management, and other activities. FFWCC and FLARNG have had this collaborative arrangement since 1956. A copy of the MOAs is provided in **Appendix I**. Additional information pertaining to fish and wildlife management at CBJTC is included in **Section 4.6**.

CBJTC has both formal and informal agreements in place for wildland fire suppression and management activities, as described in the IWFMP for CBJTC (see **Appendix G**). Agreements include:

- ***North Central Florida Prescribed Fire Working Group Memorandum of Understanding (MOU)*** – this formal agreement entails the sharing of personnel and resources between the following agencies and municipalities: Alachua County, CBJTC, the City Of Gainesville, Florida Forest Service (FFS), Florida Park Service, FFWCC, St. John's River WMD, Suwannee River WMD, US Forest Service (USFS), The Nature Conservancy, University of Florida Board of Trustees, and USFWS. A copy of this agreement is found as an appendix to the IWFMP (see **Appendix G**).
- ***Informal Working Partnership with FFWCC*** – FFWCC staff located at CBJTC, when called upon, can assist with prescribed fire and wildfire events. FFWCC staff are located on-site due to the MOA for Camp Blanding WMA discussed above.
- ***Informal Partnership with the FFS Jacksonville District*** – this working mutual aid agreement allows for CBJTC to call on FFS resources for aid and vice versa if there is an immediate wildland fire concern.

At this time, CBJTC does not have an agreement with the National Wildfire Coordinating Group (NWCG) to supply personnel or equipment to federal fires. However, should that opportunity become available in the future, personnel and equipment would be sent off-Post at the Installation Wildland Fire Manager's discretion and related to the level of fire danger. Additional information pertaining to wildland fire management at CBJTC is included in **Section 4.5**.

The 650-acre Brooklyn Lake, located south of CBJTC in the City of Keystone Heights, has experienced a large decline in water levels (see **Section 2.2.6**). CBJTC, along with numerous other agencies and state and local representatives, has been actively involved with the City of Keystone Heights since 1997 to help find a way to restore lake levels.

3.6 Public Access and Outreach

CBJTC offers a variety of recreational and public access opportunities throughout the Post. However, the Impact Area is restricted due to safety concerns associated with UXO. No recreational activities or public access are authorized within the Impact Area.

As discussed above, the approximately 56,200 acres of CBJTC that is a WMA is open to hunting, fishing, wildlife viewing, and hiking during certain times of the year. Dogs are prohibited for purposes other than hunting. Public access is allowed during periods open to hunting. Fishing is allowed on Lowry Lake and Magnolia Lake per the Camp Blanding FMA MOA between FDMA and FFWCC. Scouting is prohibited prior to hunting seasons.

Camp Blanding Road and Gun Club, in conjunction with Range Control, manages hunting in areas not covered under FFWCC WMA. Hunting areas managed by this club represent areas of CBJTC where general public access is restricted. Hunting in these areas is open to National Guard members, retired military, and state employees. Hunting access is much more restrictive within these areas (i.e., availability of these areas can be canceled with short notice if they are needed for training). The club retains the funds generated from hunting, but uses it for public outreach activities that benefit the installation (e.g., Wounded Warrior, Beast Feast, etc). More details on the hunting and fishing activities are provided in **Section 4.6**.

A portion of the Florida National Scenic Trail runs through the southern portion of CBJTC and is governed by a MOA with the Florida Trail Association (FTA). The trail can be rerouted around the installation when the area is needed for training. FLARNG helps maintain the trail on CBJTC in conjunction with the FTA. A kiosk is located at the trail entrances within CBJTC to provide information on trail closures and any revised routes. Hiking and biking are allowed when the trail is open.

CBJTC-ED also regularly conducts local public outreach activities with Audubon, Boy Scouts, local schools, etc. Public outreach activities vary annually and typically center around natural resources awareness activities.

3.7 State Wildlife Action Plan

During the INRMP development process, FLARNG consulted the draft *Florida's Wildlife Legacy Initiative: Florida's State Wildlife Action Plan* (FFWCC 2011), as well as *Florida's Wildlife Legacy Initiative: Comprehensive Wildlife Conservation Strategy* (FFWCC 2005) to ensure INRMP goals, objectives, and strategies are consistent with Florida's overall statewide and habitat-specific plans. Florida's SWAP is a strategic vision of the integrated conservation efforts needed to sustain the broad array of wildlife in the state. The purpose of Florida's SWAP is to serve as a starting point for building a common framework for Florida's numerous wildlife conservation partners. Florida's SWAP is available at http://myfwc.com/conservation/special-initiatives/fwli/action-plan/download/.

The goals of Florida's SWAP are:

- Use Florida's Wildlife Legacy Initiative framework to coordinate natural resource conservation by (1) implementing and revising the 2005 State Wildlife Action Plan; (2) developing and maintaining partnerships; and (3) managing the State Wildlife Grants Program.
- Facilitate habitat conservation efforts on the following high-priority habitat categories to improve their health and resiliency and to achieve their long-term ecological sustainability statewide: sandhill, scrub, softwater stream, spring and spring run, coral reef, and seagrass.
- Obtain information on the life history, status, trend, population dynamics and management, and needs for Species of Greatest Conservation Need (SGCN).
- Enhance monitoring of priority species and habitats by developing a tracking system for species and habitats identified in the SWAP.
- Develop a GIS application that identifies the most important cooperative conservation focal areas for Florida's terrestrial, freshwater, and marine ecosystems. Merge the various existing GIS planning applications in order to generate an integrated land and water cover map for Florida. Make it available on Arc Internet Mapping Service.

Key statewide threats include alterations of the physical environment, degradation of water resources, incompatible fire management, and introduced plants and animals. Key conservation challenges include public awareness, information management, data gaps, and partnerships. While all INRMP goals, objectives, and strategies were found to be consistent with Florida's SWAP, not all of them contribute specifically to one of the SWAP's goals or conservation actions. The SWAP identifies very high, high, medium and low priority conservation actions and habitat types for Florida.

Very high priority habitats present on CBJTC include freshwater marsh-wet prairie, natural pinelands, sandhills, and scrub. High priority habitats present on CBJTC include bay swamp, cypress swamp, grassland/improved pasture, hardwood hammock, and hardwood swamp/mixed wetland forest. The Lower St John's River Basin is one of the highest ranking enhancement basins for watersheds within Florida's SWAP.

The SGCN list identifies the broad range of Florida's animal species that are imperiled or at risk of becoming imperiled in the future. After assessing all native freshwater, marine, and terrestrial wildlife species known to occur within Florida, 1,036 SGCN were identified, including 21 amphibians, 52 mammals, 56 reptiles, 161 birds, 78 fish, and 668 invertebrates. SGCNs include federal and state listed species as well as species that met the SWAP's definition of rare (10,000 or fewer individuals) or biologically vulnerable (vulnerable to extinction). SGCN also include keystone species that play a critical role in maintaining the structure of an ecological community, and taxa of concern that have at least a moderate risk of extinction in the future. Numerous SCGN occur within CBJTC that benefit from the natural resources program. Fish and wildlife management and rare species management are discussed in **Sections 4.6** and **4.7**, respectively. For a complete list of Florida SGCN, refer to the SWAP. Animal species known to occur within CBJTC are listed in **Appendix C**.

3.8 INRMP Implementation Analysis

The primary measure of INRMP effectiveness is whether it helps prevent net loss in the capability of military lands to support the military mission. FLARNG is preserving CBJTC's capability to support training through its natural resources management practices outlined in the 2007 INRMP and in this update. Long-term management effectiveness is also evaluated through periodic inventories of species populations, habitat quantity and quality, and habitat values through the recurring Planning Level Surveys (PLS). Trends can be used to indicate the degree of success. FLARNG will evaluate these recurring data as they become available.

A practical evaluation of INRMP implementation includes reviewing whether planned projects have been accomplished. An analysis of the FY 2007-2012 projects and their implementation status is included in **Table 11**.

Overall, CBJTC has benefited from the INRMP as a management tool. The program and goals in the 2007 INRMP are being addressed through implementation of management actions. Most of the specific management actions have been implemented through projects, while some have been in-house activities. A large number of the projects are recurring actions that are continued in this INRMP. See **Section 4.0** for topic-specific goals and objectives and **Section 5.0** for a complete summary of goals, objectives, and associated projects and activities.

Table 11. Implementation Status of the 2007 INRMP				
Program / Funding Category	**Funding Source***	**Project Description**	**Implementation Status**	**Included in Updated INRMP**
CBJTC Natural Resources Personnel	Env	Training Site Environmental Manager	Ongoing	Modified
	CBMTF	Forest Area Supervisor	Ongoing	Modified
	Env	Endangered Species Biologist	Ongoing	Modified
	CBMTF	Forester	Ongoing	Modified
	Env	Natural Resources Manager	Remove	Modified
	Env	Forest/Wildlife Tech	Annual	Modified
	Env	Administrative Assistant	Ongoing	Modified
	Env	Environmental Specialist 1	Ongoing	Modified
	CBMTF	4 Forest Rangers	Ongoing	Modified
	ITAM	RTLA Biologist	Remove	Modified
	Env	Professional Training & Education	Ongoing	Modified
	Env	GIS Systems Analyst	Ongoing	Modified
	FFWCC	Manage hunting and fishing program	Ongoing	Yes
	ITAM	RTLA Crews Salaries		No
	ITAM	LRAM Coordinator Salary		No
	ITAM	GIS Technician Salary		No
RTLA Program	ITAM	RTLA Database Management		No
	ITAM	Data Collection	Annual	Yes
	ITAM	RTLA Plot Management		No
	ITAM	Non-GIS Equipment		No

Table 11. Implementation Status of the 2007 INRMP				
Program / Funding Category	**Funding Source***	**Project Description**	**Implementation Status**	**Included in Updated INRMP**
RTLA continued	ITAM	GPS Equipment		No
	ITAM	Production/Imagery		No
	ITAM	Digital Video Camera		No
	None	Impact Area Assessment		No
GIS Program	ITAM	GIS External Support		No
	ITAM	GIS Equipment		No
	ITAM	Imagery Acquisition		No
	ITAM	Data Collection		No
	ITAM	GPS Equipment		No
	ITAM	GIS Operator		No
TRI Program	ITAM	TRI Management		No
	ITAM	TRI ADP (Communication) Equipment		No
	ITAM	TRI Training		No
	ITAM	TRI Equipment		No
	ITAM	TRI Imagery Equipment		No
LRAM Program	ITAM	Fencing		No
	ITAM	LRAM Project Design		No
	ITAM	Soil Rehabilitation		Yes
	ITAM	Non-GIS Equipment		No

Table 11. Implementation Status of the 2007 INRMP				
Program / Funding Category	**Funding Source***	**Project Description**	**Implementation Status**	**Included in Updated INRMP**
LRAM continued	ITAM	LRAM Equipment		No
	ITAM	Hydro Seeder		No
	ITAM	LRAM Equipment - Seeder/Drill		No
	ITAM	LRAM Equipment - Skid Unit		No
	ITAM	Equipment Maintenance/Repair		No
	ITAM	Helicopter Erosion Control		No
Environmental Awareness Program	ITAM	EA Video/Automation		No
	ITAM	EA Signs		Yes
	Env	Taxidermy	Partially Complete	No
	Env	EA Training	Ongoing	Yes
	ITAM	EA Printing		No
Ecosystem Management	Env	Endangered Species Management Plan Implementation	Annual	Yes
	CBMTF/Env	Implement INRMP	Ongoing	Yes
	CBMTF/Env	Prescribe burning and thinning for endangered species habitat	Ongoing	Yes
	Env/FFWCC	Application for Prescribed Fire (Helicopter)	Annual	Yes
	Env	Threatened, Endangered Species monitoring	Annual	Yes
	Env	Update INRMP (existing staff)	Annual	Yes
	Env	RCW ecological research	Annual	Yes

Table 11. Implementation Status of the 2007 INRMP				
Program / Funding Category	**Funding Source***	**Project Description**	**Implementation Status**	**Included in Updated INRMP**
Ecosystem Management continued	Env	Control/eradicate alien and exotic plant species	Partally Complete	Yes
	Env	Conduct Planning Level Surveys for fauna	As Needed	Yes
	Env	Conduct Planning Level Surveys for flora	Partally Complete	Yes
	Env/DPW	Implement IPMP	Annual	Yes
	Env/DPW	Conduct wetlands delineation	As Needed	Yes
	Env	GIS hardware and software	As Needed	No
	Env	Aquatic communities Planning Level Survey	Partially Complete	Yes
	All	Develop GIS layers for Natural and Cultural Resources, using existing staff	Ongoing	Yes
	CBMTF/Env	Prescribed Fire Materials	Annual	Yes
	CBMTF/Env	Mining dune restoration	Partially Complete	Yes
	All	Brooklyn Lake Assistance	As Needed	Yes
Forestry Program	CBMTF/Env	Wildland fire training	As Needed	Yes
	CBMTF	Fire break maintainence	Ongoing	Yes
	CBMTF/Env	Stand site prep and planting	Annual	Yes
	CBMTF	Stand Fertilization	As Needed	Yes
*Key: CBMTF = Camp Blanding Management Trust Fund, Env = Environmental Funds, DPW = Department of Public Works				

4.0 NATURAL RESOURCES PROGRAM MANAGEMENT

The guiding philosophy of this INRMP is to take an ecosystem approach to managing the natural resources present on CBJTC (see **Section 1.5.3**). Ecosystem management provides a framework to link the military mission to local, regional, and global ecological integrity. Sustaining ecosystem integrity is the best way to protect and enhance biodiversity, ensure sustainable use, and minimize the effort and cost of management.

Ecosystem management is based on clearly stated goals and objectives, and associated activities and projects. This INRMP identifies goals and objectives, and presents the means to accomplish them as well as the methodologies to monitor results. Activities generally refer to in-house, no-cost actions undertaken by FLARNG and CBJTC personnel. Projects generally refer to actions that are performed by others, usually under contract or other agreement. In addition, projects can be performed using non-DoD funds or by volunteers. See **Section 5.3** for more details about funding.

This chapter summarizes each technical area of natural resources management. In a given section, relevant management strategies, practices, guidelines, best management practices (BMPs), and priorities will be presented, as applicable to the technical topic. Goals and objectives are presented below by section. Activities (i.e., recurring, in-house tasks) and projects (i.e., discrete and/or contracted tasks) associated with those goals and objectives are presented in **Tables 15 and 16** respectively in **Section 5.0**. Laws and regulations are not summarized in each sub-section, although primary legal drivers are identified. A summary of relevant laws, regulations, EOs, and policies is provided in **Appendix J**.

The following management sections are not included in this INRMP because they do not apply at CBJTC:

- Coastal/Marine Management – No coastal or marine habitat occurs within CBJTC.
- Agricultural Outleasing – CBJTC does not currently have cropland, hay, or grazing leases

4.1 Natural Resources Program Development

GOAL PM: Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws and DA regulations and policies.

- OBJECTIVE PM1: Initiate and/or continue programs and projects that enhance the training land and training opportunities and result in no net loss of training land availability.
- OBJECTIVE PM2: Use adaptive, ecosystem management as the primary natural resources management paradigm.
- OBJECTIVE PM3: Continue internal environmental awareness activities to minimize impacts to natural resources from FLARNG and visiting personnel.
- OBJECTIVE PM4: Continue public outreach activities in coordination with other regional entities as appropriate.
- OBJECTIVE PM5: Continue cooperating with other agencies to provide outdoor recreation opportunities, without impacting military mission or ecological health.

- OBJECTIVE PM6: Continue to cooperate with other agencies and local landowners on regional land and natural resources management efforts.
- OBJECTIVE PM7: Maintain and improve GIS data and access to that GIS data.

Programmatic management includes the overall program elements to implement a comprehensive natural resources management program. Elements included in this section generally include areas that intersect with all or most components of the program, such as environmental awareness, public outreach, GIS data management, natural resources law enforcement, INRMP annual reviews, adaptive management, and other objectives relating to implementing a natural resources management program.

Primary Regulatory Drivers

- SAIA
- DoDI 4715.03
- AR 200-1

4.1.1 Environmental Awareness and Public Outreach

There are several organizations within FLARNG that undertake environmental awareness and public outreach activities, including some specific to environmental and natural resources management. The ITAM program includes an Environmental Awareness component that has two target audiences: military users of CBJTC and non-military users of CBJTC. The ITAM Environmental Awareness program is designed to improve their understanding of the effects of CBJTC mission, training, and activities on the natural resources of CBJTC. The ITAM Environmental Awareness program can also serve as a public outreach tool to educate the public and garner their support by effectively communicating the military mission at CBJTC and the level of success of natural resources management at the installation. When military users and the public are informed and educated about management practices and their benefits, they tend to lend support to the practice even if those practices are controversial.

One of the keystone pieces of this program is the *Field Card* for military users. CBJTC maintains a small museum exhibit in the Land Management Center that showcases some of the plants and animals present on CBJTC. Presentations are also provided to various groups about CBJTC and the natural resources present. Additional information on environmental awareness, beneficial partnerships, and public outreach is in **Section 3.0**.

4.1.2 Outdoor Recreation

CBJTC has extensive outdoor recreation opportunities, ranging from fishing and boating to camping, hiking, and hunting. The fishing and hunting program is described under fish and wildlife management (see **Section 4.6.2**). A portion of the Florida National Scenic Trail runs through the southern portion of CBJTC, and provides hiking, biking, and wildlife viewing opportunities.

All-terrain vehicles (ATVs) have great potential for damage to natural resources. No off-road driving for recreational purposes is permitted on CBJTC. Trespass by motor vehicle (includes an automobile, truck, van, bus, recreational vehicle, camper, motorcycle, motor bike, moped, go-cart, all terrain vehicle, dune buggy, and any other vehicle propelled by motor) is covered under Section 375.251 FAC.

4.1.3 Public Access

AR 200-1 provides guidance for access to military lands and waters by recreational users. Based on this regulation, public access will be within manageable quotas subject to safety, military security, threatened or endangered species restrictions and cannot impair the natural resources. Limitations on public access will be enforced during training exercises to minimize safety risk.

Limitations on public access have been set in certain areas, particularly the Impact Area due to the presence of hazards related to training activities. Some possible threats to public safety related to training activities include active range use, UXO, and training infrastructure. For this reason, secured gates strictly control access to the Impact Area. As mentioned above, the Florida National Scenic Trail runs through the southern portion of CBJTC and is open to the public. When this area needs to be closed for training, the kiosk at the beginning of the trail is used to provide information on trail closures and any revised routes.

4.1.4 Natural Resources Law Enforcement

Many aspects of natural resources management require effective enforcement if they are to be successful. Such features as hunting/fishing harvest controls, protection of wetlands, water pollution prevention, rare species protection, and others are very dependent on law enforcement. At CBJTC, FFWCC law enforcement officers provide conservation and trespassing enforcement support. Military police and Range Control conduct routine patrols, observe all activities on the training site, and notify CBJTC-ED when environmental concerns are observed within CBJTC.

4.1.5 GIS Data Management

CBJTC has a significant amount of site-specific natural resources data. There is a dedicated GIS position for managing and maintaining environmental data at CBJTC. Access to maps generated from accurate and usable GIS data is essential for efficient natural resources management. In addition, it facilitates accurate analysis of potential effects of all future projects and activities. **Table 12** provides a summary of GIS data currently available for CBJTC.

Table 12. Summary of GIS Data Available for CBJTC

GIS Data	Source	Needs updating?
Boundary and training areas	CIP	No
Buildings	CIP	No
Fences & Gates	CIP	No
Transportation (pedestrian, roads, airfields, railroad, water docks)	CIP	Yes, helicopter landing zones
Utilities (electric, fuel, sewer, wastewater, utility poles, water hydrants, and tanks)	CIP	No

Table 12. Summary of GIS Data Available for CBJTC		
GIS Data	**Source**	**Needs updating?**
Communication (antennas)	CIP	No
Recreation (improved areas)	CIP	No
Elevations	CIP	No
Streams, lakes, watersheds, and other open water	National Hydrology Dataset	No
Wetlands	NWI	Yes
Floodplains	FEMA	No
Soils	NRCS	No
Natural Communities	FNAI	No
Rare species locations and areas	Biotech 2009, Nelson and Floyd 2011, and FLNG	Yes; periodically (as needed)
Aerial Imagery	Multiple Sources	Multiple years are available
Forest management (timber actions and planting activities)	FLNG	Yes; periodically (as needed)
Invasive species management (herbicide application, torpedo grass area)	FLNG	Yes; periodically (as needed)
Fire management (Including RxFire and firebreaks)	FLNG	Yes; periodically (as needed)
CIP = Common Installation Picture		

4.2 Soil Conservation and Sediment Management

GOAL SO: Manage soil to minimize sediment loss and erosion, while protecting water quality.

OBJECTIVE SO1: Maintain roads and parking areas to minimize the potential for erosion and sedimentation and to minimize establishment of invasive species.

OBJECTIVE SO2: Implement BMPs to minimize erosion, soil loss, and sediment deposition.

OBJECTIVE SO3: Maintain vegetation cover using native species.

OBJECTIVE SO4: Minimize nutrient and sediment inputs from soil to protect water quality.

OBJECTIVE SO5: Implement stabilization and recovery measures for areas not revegetating spontaneously.

Primary Regulatory Drivers

- Clean Water Act
- Florida Water Resources Act of 1972 (Chap 373 of F.S.)
- Section 403.0885 of F.S. (NPDES Program)

Surface water and groundwater quality is directly related to land management practices that affect stormwater runoff. Stormwater runoff is produced when rainfall during a storm exceeds the infiltration capacity of the soil or encounters an impervious surface. Stormwater runoff can be a significant source of pollutants as well as sediments to surface waters, especially in areas with impervious surface cover or where groundcover has been disturbed. Water quality also may be negatively impacted by disturbances causing increased sedimentation to wetlands and stream channels. Sources of stormwater runoff and pollution could originate from operational, maintenance, and/or administrative areas. Stormwater runoff from impervious surfaces has a high potential to carry pollutants into wetlands, surface waters, and groundwater. Impervious surfaces include roads, parking lots, taxiways, and buildings. On CBJTC, these areas are generally limited to the cantonment area and a few small areas with training infrastructure.

Two main types of soil erosion exist: wind erosion and water erosion. Several factors affect water erosion. These factors include rainfall, slope steepness and length, soil texture or erodibility, cover protecting the soil, and special practices such as terracing or planting on the contour. Sediment resulting from erosion affects surface water quality and aquatic organisms. These types of erosion can occur throughout CBJTC and can be a significant management concern, particularly in areas that have been disturbed for any reason. Erosion resulting from non-training activities is managed by either CBJTC-DPW or CBJTC-ED and erosion resulting from military training is managed by the ITAM program.

4.2.1 Regulatory Authority and BMPs

FDEP implements the National Pollutant Discharge Elimination System (NPDES) program in the State of Florida in accordance with Section 403.0855, F.S. The NPDES stormwater program regulates point source discharges of stormwater into surface waters of the State of Florida from certain municipal, industrial, and construction activities. As the NPDES stormwater permitting authority, FDEP is responsible

for promulgating rules and issuing permits, managing and reviewing permit applications, and performing compliance and enforcement activities.

Stormwater management could be a concern at CBJTC; however, there are a number of mechanisms in place to protect water quality and soils from negative impacts from stormwater. CBJTC maintains a SWPPP and SPCCP in compliance with Florida requirements (FLARNG 2012, FLARNG 2000). The SWPPP describes the programs, BMPs, monitoring and other measures already used on CBJTC. There are also dedicated conservation areas within the Cantonment Area that are designed specifically to protect the water resources that occur within the Cantonment Area.

In addition to compliance with requirements associated with existing SWPPP activities, construction or other land-disturbing activity that results in soil disturbance (e.g., clearing, grading or excavating) of 1-acre or more must be permitted by FDEP under the NPDES permit program. The NPDES permit establishes the required erosion control and revegetation standards.

USEPA and FDEP are good sources for stormwater BMPs. The FDEP's *Florida Stormwater Erosion and Sedimentation Control Inspector's Manual* (FDEP 2008), and the USEPA's *Developing your Stormwater Pollution Prevention Plan: A Guide for Construction Sites* (USEPA 2007) are both useful references. FDEP also offers a suite of additional resources for specific activities related to nonpoint-source management at http://www.dep.state.fl.us/water/nonpoint/pubs.htm.

Due to the extensive forestry program, silviculture BMPs are also applicable across most of CBJTC. The FDACS developed the *Silviculture BMPs Manual* (FDACS 2011). One of the key BMPs is the establishment of SMZs associated with water resources. CBJTC established SMZs around all water resources in the 1990s using the most protective buffers (see **Section 4.3.3** for additional discussion on SMZs). A copy of the FDACS manual can be found at: http://www.floridaforestservice.com/forest_management/bmp/index.html.

4.2.2 ITAM Program

A core component of the ITAM program is LRAM, which is specifically focused on preventing and recovering damage to vegetation and soils. CBJTC ITAM program representatives spend the majority of their time revegetating disturbed land (see **Section 4.2.4**) and monitoring the training site for potential erosion or sedimentation concerns. To a lesser degree, they also conduct trail stabilization and install low water crossings, when needed. Previously, cable concrete trail crossings were installed at various locations, which have reduced the amount of silt added as a result of routine traffic.

4.2.3 Erosion Control Guidelines

Improper erosion control can lead to CWA violations, thus potentially resulting in fines and other penalties, which may ultimately compromise the integrity of CBJTC as a viable training installation. Regardless of regulatory compliance, appropriate soil conservation and erosion control are vital to the military mission. Unmanaged and extensive soil erosion can threaten the military mission and require diversion of funds from other priorities. Delays in managing the erosion can increase the cost to repair by several orders of magnitude. Some examples of the potential effects of poor soil and erosion management include:

- Undermining of roads
- Loss of topsoil and vegetation, which further accelerates erosion
- Impacts to streams or other aquatic habitats, potentially resulting in water quality impairment
- Creation of unusable areas due to erosion.

As discussed in **Section 2.2.4**, soils at CBJTC are generally sandy with a high potential for erosion. However, in general, soil erosion at CBJTC is rather limited because slopes are generally minimal, tracked and wheeled vehicle usage is low, and revegetation of bare areas is relatively easy due to an abundance of rainfall and warm temperatures (Hall et al. 1997). Only 1 percent of CBJTC soils require very careful management due to risk of erosion (Albany fine sand, 0 to 5 percent slopes), but most soils on the training center require special treatment and consideration when planning for land use and rehabilitation, especially regarding wetness (see **Table 6** and **Map 4**). These sandy soils dry out rapidly and are generally nutrient poor, which strongly favors native plants adapted to those conditions. Sandy soils are also more likely to allow pollutants to leach into groundwater and water resources, so maintenance of vegetation buffers is essential to minimize this risk.

FLARNG will assess the potential erodibility of a site during planning of new development, training, and other land uses. FLARNG will continue soil erosion management practices including institutional, structural, and vegetative practices.

- **Institutional practices** are procedures, policies, or regulations that ensure operations are conducted in a manner that minimizes their impact.
- **Structural practices** include permanent construction to install erosion-resistant surfaces, stabilize drainage, and modify slopes to reduce runoff velocity and trap sediments on-site.
- **Vegetative practices** consist of establishing live plants on erosive or exposed surfaces. Plants stabilize slopes by binding soils with their roots, shielding soils from rainfall impact, interrupting surface runoff by roughening the surface, allowing more water to infiltrate rather than run off over the surface, trapping sediments in runoff, and wicking moisture out of soils by evapotranspiration. In addition, vegetative practices are self-regenerating and relatively maintenance free.

4.2.4 Revegetation Management Guidelines

Success in revegetating disturbed sites depends on the chemical and physical properties of the soil. Correct pH, phosphorus levels, and nitrogen fertilization are necessary for degraded lands to be re-vegetated. Application procedures should include soil analysis to determine proper nutrient application levels. Other factors to consider are soil moisture, soil organic matter, and weather patterns.

Generally, revegetation using native plants does not require fertilizer, which can favor non-native species. If fertilizer is applied, choose and apply fertilizer according to the soil test results. Fertilizers should be incorporated as appropriate for the plants being used, and should not be applied when soils are wet. In wet soils, salt forms from the fertilizer, which can significantly reduce the percentage of seed germination, especially with grasses.

Specific recommendations concerning revegetation at CBJTC are as follows.

- Maintain existing vegetation buffers around water resources.
- Generally, CBJTC will revegetate itself as long as the soil is stable. Mulch or other soil stabilization method can be used to stabilize soils until plants germinate.
- If an area does not revegetate readily, conduct a soil test and incorporate the minimum soil amendment necessary.
- If an area still does not revegetate spontaneously, only use native genotypes during restoration and landscaping projects. A list of native plants suitable for landscaping is available at and discussed in **Section 4.4.9**.
- Plants prohibited by FDEP or US Department of Agriculture (USDA) will not be used on CBJTC.

4.3 Water Resources Management

GOAL WA: Maintain water resources so they remain resilient, functional, and with no net loss of acreage.

OBJECTIVE WA1: Minimize impacts to water resources, including wetlands, and comply with all laws pertaining to water resources.

OBJECTIVE WA2: Minimize nonpoint-source pollution through implementation of BMPs and following existing spill prevention and hazardous materials management protocols.

OBJECTIVE WA3: Maintain or enhance vegetation buffers around water resources.

Primary Regulatory Drivers

- Clean Water Act
- AR 200-1
- EO 11990
- EO 11988
- Florida Water Resources Act of 1972 (Chap 373 of F.S.)
- Section 403.088 and 403.0885 of F.S. (NPDES Program)
- FAC 62-621.300

CBJTC has numerous and significant water resources, including wetlands, perennial streams, and perennial lakes. For a complete summary of water resources on CBJTC see **Section 2.5**. Wetlands are some of the most productive habitats, and often provide migration corridors for a variety of species. In addition to the goal, objectives, and management strategies presented here, those presented in **Section 4.2** also contribute to the management of water resources.

As described in **Section 3.5**, climate change is likely to increase the variability of precipitation and increase water temperature in Florida. Depending on how things change, water resources could be significantly impacted, either be expanding or shrinking. While water resources are highly likely to be impacted, it is impossible to determine at this time how they will be impacted.

4.3.1 Regulatory Requirements

The USACE regulates the discharge of dredged or fill material into “waters of the United States”, including wetlands, under Section 404 of the CWA. Even an inadvertent encroachment into waters of the US resulting in a displacement or movement of soil or fill material has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE. Waters of the US are defined under 33 CFR 328.3(a) and referred to as jurisdictional waters. Jurisdictional waters may include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, wetlands, and other waters, that if degraded or destroyed could affect interstate commerce. Section 401 of the CWA gives the State of Florida the authority to regulate, through the state water quality certification program, proposed federally-permitted activities that may result in a discharge to water bodies, including wetlands.

For an area to be classified as a delineated wetland, three conditions must be present: (1) wetland hydrology; (2) hydric soil; and (3) hydrophytic vegetation. Areas that may be periodically wet, but that do not meet all three criteria, are not classified as “delineated” wetlands. Once a delineation is complete, then a jurisdictional determination can be made, which is dependent upon the relationship of the wetland to waters of the US.

Chapter 373 of F.S. mandates the state agency to implement the State’s surface water regulatory program, which covers virtually any movement of soil surface or construction anywhere in the peninsula of Florida, from coast-to-coast, including uplands and wetlands. Pursuant to the environmental provisions of F.S. 373.414, the State has jurisdiction over those areas that are delineated as wetlands, including all isolated wetlands, under the State methodology. The Florida Water Resources Act established five WMDs within the State of Florida to assist in the management of state waters. Clay County is located in the St. John’s River WMD, which encompasses 18 counties in north central Florida. The St. Johns River WMD is responsible for managing the ground and surface water supplies of the region. Duties of the District include permit issuance, land acquisition, water quality and quantity research, ground and surface water mapping, and outreach and public education. Each of the five districts maintain a separate operating agreement with FDEP that outlines which agency will process Environmental Resource Permits (ERPs) for particular projects. The Florida ERP combines the former dredge and fill permit issued by FDEP (i.e., Section 401 CWA) and the management and storage of surface waters permit issued by the WMDs.

Management of wetlands on federal lands and military installations is further indicated by EO 11990 and DoDI 4715.03, respectively. Under those instructions, wetlands are required to be managed for “no net loss” on federal lands, including military installations. In support of these policies, long- and short-term adverse impacts associated with the destruction or modification of wetlands and support of new construction in wetlands should be avoided to the maximum extent possible.

FEMA-designated floodplains are protected under EO 11988 – *Floodplain Management*. The purpose of EO 11988 to reduce the risk of flood loss, minimize the impacts of flooding, and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of federal lands.

4.3.2 Permitting

As discussed above, USACE, FDEP and St. John's River WMD have jurisdiction over water resources. The USACE issues Nationwide Permits (NWPs) and a State Programmatic General Permit (SPGP) that cover many routine or minor projects. The USACE issues Individual Permits for larger projects, or those that do not meet the requirements of a NWP or SPGP. The USACE and Florida have adopted joint ERP and wetland resource application. Under the Operating Agreement between USACE Jacksonville District, FDEP and St. John's River WMD, all applications should be submitted to FDEP or WMD, as applicable. If the project does not qualify for a SPGP, the application will be forwarded to USACE by FDEP or WMD. The ERP Program regulates activities involving the alteration of surface water flows. This includes new activities in uplands that generate stormwater runoff from upland construction, as well as dredging and filling in wetlands and other surface waters.

Permitting requirements vary depending on type, location, and extent of disturbance. Prior to initiating projects or activities (e.g., dredging, filling, work in and around a stream or wetland) occurring within or with the potential to affect a floodplain, wetland, or other water body, the appropriate agencies (USACE, FDEP or St. John's River WMD) should be consulted to determine permitting requirements.

NPDES permits for construction are not integrated into the ERP permit, and are issued separately. Construction related NPDES permits are discussed in **Section 4.2.1** and the new NPDES Florida Pesticide Generic Permit is described below.

As a result of new USEPA ruling, FDEP has issued a new permit through its NPDES Program under the provisions of Section 403.088 and 403.0885, F.S. The new NPDES Florida Pesticide Generic Permit pertains to pesticide applications on waters of the state and land areas adjacent to waters of the state, and is consistent with the USEPA pesticide general permit requirements published under 40 CFR 122. This NPDES general permit is applicable to all persons who discharge pesticides to waters of the state from the application of biological pesticides or chemical pesticides, which leave a residue of the pesticide or its degradates. The following categories of pesticide discharges are covered under this general permit: (1) mosquitoes and other flying insect pest management, (2) aquatic weed and algae control, (3) aquatic nuisance animal control, and (4) forest canopy pest control. Waters that are designated as Outstanding National Resource Waters (ONRWs) or on the CWA 303(d) list do not qualify for this permit. No surface waters within CBJTC are currently classified as an ONRW or 303(d) water.

The submission of a notice of intent (NOI) and development of a Pesticide Discharge Management Plan under this general permit are required for certain operators in Florida pursuant to subsection 62-621.300(8)(b), FAC. Operators required to complete an NOI include mosquito control programs and districts, WMDs, USACE, USFWS, FFWCC, FDACS, USDA, USFS, and US National Park Service. A complete list of operators and other permit provisions are provided in 62-621.300, FAC.

4.3.3 Riparian Zones and SMZs

Riparian zones are lands adjacent to streams, rivers, lakes, and wetlands. They are important features within CBJTC as they intercept overland drainage, reduce streambank erosion, help trap sediments and

nutrients, filter water and replenish groundwater reserves, and help to moderate flooding. See **Section 4.4.7** for vegetation management guidelines associated with riparian zones.

A SMZ is a BMP that is designated and maintained during silviculture operations to protect water quality within nearby streams, lakes, and other waterbodies. The SMZ width is based on the size and type of the waterbody and the local soils type and percent slope, which include the likelihood of erosion and sedimentation concerns. In the 1990s, SMZs were designated around streams, lakes, and other waterways within CBJTC. The sizes of the SMZs were defined based on field observations and the criteria set forth in the *Silviculture BMPs Manual* (FDACS 2011). Wherever timber cruise lines cross a waterway, the stream width and the slope of the adjacent banks were measured and recorded. The highest value for width and slope along major stretches of each creek or tributary were used as the values for the full length of that stream or tributary. This conservative approach to SMZ delineation will assure maximum protection for the waterways.

SMZ widths range from 60 feet on each side on many streams (e.g., North and West branches of Bull Creek, all branches of South Fork Black Creek, and waters in the east unit and southeast corner of CBJTC) up to a maximum of 300 feet on each side of several streams with steep slopes (South branch of Bull Creek, South Fork Black Creek, Lowry Lake, Magnolia Lake, and streams between lakes). SMZ width was set at 200 feet throughout the drainage of the North Fork Black Creek, which has been designated as an OFW. SMZs were also delineated around each of the lakes at the south end of CBJTC as well as a small portion of the south shore of Kingsley Lake.

In most cases, the SMZs include both primary and secondary SMZs, which vary in the types of operations that are allowed or not allowed in them (see management criteria below). Primary zones are applied to OFWs, ONRWs, Class I Waters, wetlands (in some cases), and perennial streams, lakes and sinkholes. Primary zone widths range from 35 to 200 feet on either side of the waterbody, and have significant timber harvesting restrictions. Secondary zones are applied to intermittent streams, lakes, and sinkholes; they can also be added along primary zones for added protection. The secondary zone is always a minimum of 35 feet wide on each side of the waterbody and can be as much as 300 feet.

A brief summary of the primary and secondary management criteria are provided below. For more information on SMZ management criteria, refer to FDACS's (2011) *Silviculture BMPs Manual*.

Primary Zone Management Criteria

- Clearcut harvesting is prohibited except for special conditions described in the *Silviculture BMP Manual*. Clearcut harvesting is always prohibited within 35 feet of all perennial waters and within 50 feet of all waterbodies designated as an OFW, ONRW, or Class I Water.
- Selective harvesting may be conducted to the extent that 50 percent of a fully stocked stand is maintained. The residual stand should conform to the specific criteria in the *Silviculture BMP Manual*.
- Trees within stream channels or on the immediate stream bank should not be harvested.
- Special emphasis should be given to protection of very large trees and/or old trees, snags, cavity trees, and trees where any part of the canopy overhangs the water.

- The following are prohibited: mechanical site preparation; loading decks or landings and log bunching points; main skids or new road construction except to approach a designated stream crossing; aerial application or mist blowing of pesticide; cleaning spray equipment or discharging rinse water from pesticide or fertilizer applications; site preparation burning on slopes greater than 18 percent; and no plowed pre-suppression fire lines.

Secondary Zone Management Criteria

- No timber harvesting limitations exist within the secondary zone.
- The following are prohibited: mechanical site preparation; main skids or new road construction (except for stream crossing), loading decks or landings; site preparation burning on slopes greater than 18 percent; and no plowed pre-suppression fire lines.

4.3.4 Management Guidelines

In general, water resources are managed through conservation and impact avoidance. Although water quality monitoring is not required, it is a good way to measure ecosystem health. Land-based environmental degradation eventually affects water quality and aquatic ecosystems. The following strategies are implemented to ensure compliance with regulations and to protect and enhance water resources at CBJTC.

- Maintain riparian zones and SMZs around water resources in accordance with FDACS's (2011) *Silviculture BMPs Manual (*see **Section 4.3.3** above).
- Adhere to BMPs for construction and forestry activities as described in applicable manuals and CBJTC SWPPP and SPCCP (see **Section 4.2.1**).
- Do not allow vehicles within known wetland areas, unless on established roads and crossings.
- Restrict vehicles from within 30 feet of water resources except where established crossings and roads exist.
- Review operations and maintenance programs that potentially affect water resources, and develop procedures and guidelines to avoid the loss of function.
- Consult with CBJTC-ED prior to initiating projects with the potential to disturb water resources as far in advance as possible; permits are necessary for projects that result in temporary and/or permanent impacts (see **Section 4.3.2**).
- Avoid the net loss of size, function, or value of wetlands and modification of floodplains and wetlands where there are practicable alternatives. Where no practicable alternatives exist, obtain an ERP and mitigate unavoidable impacts on wetlands and water resources functions.
- Minimize the amount of impervious surfaces in newly developed areas.
- Manage invasive species to promote desirable native species.
- Minimize the use of pesticides and herbicides, and adhere to the NPDES Florida Pesticide Generic Permit (see **Section 4.3.2**).

4.4 Vegetation Management

GOAL VE: Manage vegetation to provide a variety of habitats to support the military mission, maintain native species, provide a sustainable forestry program, and enhance wildlife habitat

OBJECTIVE VE1: Provide a balanced and continuous array of forest types for both military training purposes, rare species, and wildlife habitat, including natural and plantation pine stands with open understories, natural mixed hardwood and pine-hardwood uneven-aged stands, and sandhill communities (from FRMP).

OBJECTIVE VE2: Maintain sustainable and even-flow revenue from harvest of forest products and other resource uses, primarily from the land base that already exists as plantations and natural stands that are in the process of being converted to plantations (from FRMP).

OBJECTIVE VE3: Maintain and enhance stand conditions favorable for RCW cluster sites and foraging habitat and for other threatened and endangered species (from FRMP).

OBJECTIVE VE4: Restore formerly mined lands that DuPont has returned to CBJTC (from FRMP).

OBJECTIVE VE5: Practice preservation management in ecosystems along, and around, waterways, with SMZs that meet or exceed Florida standards for BMPs (from FRMP).

OBJECTIVE VE6: Maintain and restore riparian and wetland habitat to benefit rare species, wildlife, and water quality.

OBJECTIVE VE7: Maintain and restore scrub habitat to benefit rare species, wildlife, and soil stabilization.

OBJECTIVE VE8: Conduct a vigorous prescribed burning program, as the weather allows, that will reduce wildfire hazards, enhance and improve military training, promote natural ecological processes and functions, improve wildlife habitat primarily for endangered species, and support continued recreational hunting (from FRMP).

OBJECTIVE VE9: Monitor the results of habitat management efforts, appropriate to the management objectives and projects completed for a given area.

OBJECTIVE VE10: Manage and, preferably, eradicate invasive, non-native plants to minimize their impact on CBJTC native species and ecological integrity.

OBJECTIVE VE11: Maximize native plants and avoid invasive non-native plants in landscaping and revegetation projects.

OBJECTIVE VE12: Minimize chemical and maintenance inputs during grounds maintenance.

Vegetation management includes riparian and forest management, fish and wildlife habitat management, and rare species habitat management. There is a significant overlap in the objectives and management strategies within this section and all other sections within the INRMP, which is indicative of the

Primary Regulatory Drivers

- SAIA
- AR 200-1

essential role vegetation plays in ecosystems and in natural resources management. The ecosystem management approach used at CBJTC incorporates multiple techniques including prescribed fire (see **Section 4.5**), forestry, and invasive plant control (see **Section 4.8**) to help maintain the habitat mosaic.

The majority of vegetation on CBJTC includes dense forests of wetland hardwoods that gradually change to extensive flatwoods of natural and planted pine, which ultimately grade into deep sandhill habitats dominated by longleaf pine or turkey oak. The desired future condition of CBJTC is to have vegetation appropriate to the soils and hydrology found within the natural ecosystem. All river, lake, and creek systems will be surrounded by functioning riparian zones, continuous throughout a watershed and connected to other watersheds by mixed species corridors. Pinelands will be a mosaic of mature flatwoods, mixed hardwoods stands, and pine plantations. Some existing plantations around RCW or other critical habitat zones will be restricted to only thinning, with a larger average diameter. Xeric habitats, primarily sandhill, will include both open longleaf pine and mixed pine-oak stands, with a substantial reduction in the moderately high densities of turkey oak that currently occupy many areas. Existing sand pine plantations will slowly be phased out and replanted with longleaf pine. The driest habitats will be scrub. Fire will be regularly applied throughout these habitats, as well as in many of the pineland and upland stands. See **Section 2.3.2** for a detailed discussion of vegetation communities on CBJTC. Rare communities found on CBJTC include sandhill (GS/S2), scrub (G2/S2), upland mixed woodland (G2/S2), and wet prairie (G2/S2)

4.4.1 Historic Vegetation

Following the clearing of most of the original forests in northern Florida in the late 1800s and early 1900s, repeated burning, extensive grazing, and turpentining operations kept much of the land open for extended periods of time (FLNG 2005). Eventually, natural regeneration produced the extensive secondary forests that covered CBJTC when it became a training site in the 1940s. In the decades that followed, many of the second growth stands developed into the older natural stands that cover much of CBJTC today.

Beginning in 1952, timber harvesting again became a major management activity at CBJTC with products including fence posts, hardwood timber, veneer, pulpwood, sawlogs, and poles. In 1962 the first documented forest management plan for CBJTC was developed for projected activities and levels of harvest that would likely be necessary for a sustained yield of forest products. Those levels were generally followed over the last 50 years, except for large harvests in 1967, 1968, 1983, and the early 1990s. Revenue from past timber cuts has supported many CBJTC operations, and sustained yield in forest products revenue is important for the continued support of these operations.

Since the early 1950s, harvesting has been conducted almost completely in naturally regenerated stands, and cutover sites have been historically restored with plantations of slash pine, but are now being restored with longleaf pine. Various combinations of broadcast seed or natural regeneration from seed trees or shelterwood overstories have also been used on several sites.

4.4.2 Forestry Program

There is an active forestry program on CBJTC, which is presented in detail in the FRMP (FLNG 2005) included as **Appendix F**. For planning purposes, CBJTC is divided into four management units (North,

East, Kingsley, and South) and 119 composite stands. Timber management is concentrated in forest types with a substantial pine component (for economic efficiency) and avoids both the very poorly drained (for water protection) and very well drained (because of low productivity) habitats. Timber production for commercial harvest is concentrated on slightly more than 12,000 acres that are currently covered by slash pine and longleaf pine plantations, or have been recently regenerated using seed tree methods. Locations of these plantation areas, as well as all other stands, are presented in the FRMP. The current plantation acreage will remain roughly the same in the future with slight adjustments to allow the conversion of certain plantations back to natural stands and still maintain constant plantation acreage. There are certain plantation acreages that are being shifted to new areas to allow those plantations to be thinned and converted into pseudo-natural stands for the RCW.

Plantation management is based on 40-year rotations with intermediate thinning at roughly 20 and 30 years into the rotation. Management practices include site preparation that relies on chopping, burning, and herbicide control of competing vegetation rather than the more intensive bedding practice used in much of northeastern Florida. FLARNG attempts to use prescribed fire and other non-chemical techniques as a first priority. However, occasionally herbicide application is necessary as a forestry management technique for pine release. Herbicide is only used to reduce competing vegetation as a last resort. Some years no herbicide usage is necessary for pine stand management, while during other years larger blocks of land may undergo herbicide application.

Regular prescribed burning schedules will reduce the dense understory that has developed in many forest stands. Slash pine plantations on suitable sites will be selectively harvested to maintain a base longleaf pine residual stand, and then underplanted with longleaf pine to restore native vegetation. Revenue from other forest management activities such as thinning hardwoods in RCW foraging habitat, or salvage harvest will be considered supplemental to the basic timber management plan. All other stands (approximately 70 percent of the forests) will be regenerated naturally and will be the primary resource for meeting forest management objectives, such as thinning natural pine and mixed pine-hardwood stands to enhance RCW habitat, improving military training functions, implementing salvage operations to limit fire damage or beetle outbreaks, or converting turkey oak dominated sandhills to longleaf pine ecosystems.

In general, longleaf pine is the species of choice for timber on CBJTC. This is due to several reasons. Longleaf pine was the dominant native pine species on CBJTC, and it has a higher resistance to prescribed fire and bug damage. Stands will be evaluated on a site by site basis for species recommendations in replanting. There are conditions when other species are more appropriate.

General Guidelines for Forestry Program

- Implement *Silviculture BMPs Manual* (FDACS 2011) during all forestry operations.
- Minimize soil erosion during harvesting by using selective harvesting as a primary harvesting method.
- Clearcut harvests in individual stands will be limited to a maximum size of 100 acres in almost all situations (the only exception being some specific sand pine harvests). Where stands are larger than 100 acres, they will be either subdivided into smaller cutting units by leaving residual buffer strips between cutting units, or they will be split into smaller units for harvesting.

- Do not clearcut outside plantation areas or where there are multiple habitat types
- Avoid wetland firebreaks when possible.
- Do not suppress fires in wetlands unless the organic matter poses a risk of long-term smoldering and smoke management.
- When fireplow lines must be used, reworking harrowing will lessen the impact to the landscape.
- Prevent conflicts between forest management and training activities by yearly coordination of forest management activities and training activities.
- Create connections or linkages between isolated wooded areas using riparian corridors, shelterbelts, and by planting trees in open areas surrounding forest patches.
- Minimize permanent clearings within existing large forest patches, and locate roads where they will not disconnect adjacent tracts of forest or impact riparian zones and streams.

Guidelines for Forestry to Benefit RCW (see Section 4.7)

- In all clearcut areas near RCW cluster sites or within foraging ranges, small clumps of mature trees will be retained in scattered locations to provide large, older trees within the stand for possible future RCW colonization.
- Plantations that provide RCW foraging habitat will only be periodically thinned and will gradually be converted to mixed-age stands. Approximately 2,000 plantation acres will be removed from the timber production base for this purpose, and will be replaced with conversion of 1,900 acres of mixed pine and pine hardwood stands to plantations. These conversions are located outside all RCW cluster buffer zones of ½ mile (500 acres). Natural pine stands in some of the RCW management areas provide sufficient foraging habitat and plantations within those RCW circles will continue to be managed as plantations.
- As long as a RCW cluster has 200 acres of high quality forage within the ½-mile buffer zone (500 acres), the remainder of the buffer zone can be actively managed for wood production using a modified clearcut harvest. A modified clearcut involves a heavy thinning to 25 – 35 square feet of basal area. The harvest will be accomplished in the form of a low thin, removing first the smaller diameter trees, but leaving the residual trees mainly in longleaf pine. This procedure is similar to a slightly less intense shelterwood cut. The remainder of the trees will be high quality, large diameter trees of a basal area still suitable for RCW forage. After a year, a light site preparation involving mainly raking is undertaken and the stand is underplanted with longleaf pine at around 300 to 500 trees per acre.

4.4.3 Restoration and Management of Longleaf Pine in Flatwoods

Due to the history of harvesting, overharvesting, and replanting with unsuitable pine species, CBJTC is currently undergoing a long-term, large-scale restoration of longleaf pine forest over more than 50 percent of the facility. Restoration is primarily occurring in the flatwoods (approximately 15 percent of CBJTC) and sandhills (approximately 20 percent of CBJTC) areas, although some will also occur on the former DuPont mining leases (TAs MA1, MA2, S11, S12 and S13). While there is still some longleaf pine throughout the flatwoods, some stands will require more significant input to restore longleaf pine as the

dominant tree species, while others may only require minor, but strategic efforts (e.g., prescribed fires) to encourage natural recovery.

- ***Natural Stands***: Composite stands that are predominately of natural origin will be maintained with their natural uneven-age or several-age structure. At cutting cycles of approximately 25 years, stand density will be reduced to basal areas between 60 and 80 square feet (sq-ft) per acre. These periodic removals will be used to maintain favorable densities for RCW foraging habitat where necessary, and to open all stands sufficiently for development of some natural regeneration. There are currently very few natural stands with average densities above 70 sq-ft of basal area, so these uneven age cutting cycles will not provide any substantial supplemental revenue in the near future. Removals should be across the range of stand diameters and species, except where RCW requires retention of large diameter trees or other objectives call for favoring particular species, such as longleaf pine. Specific guidelines will be developed for each composite stand based on stand-specific inventory information. Prescribed fire will be used on approximately 3- to 5-year cycles.

- ***Plantations***: Most existing plantations will continue to be managed as even-age stands for timber production with a rotation age of around 40 years. This provides the opportunity for intermediate thinning (at ages 20 and 30 years), which will favor production of higher value trees for final harvest than in typical pulpwood rotations. Stands with large trees will also provide longer periods of tree cover between clearcuts than with short rotation pulpwood management. The open stand structure with large trees will benefit wildlife species that favor overhead tree canopies for cover or foraging as well as military training exercises that require such conditions.

4.4.4 Restoration and Management of Longleaf Pine in Sandhills

Approximately 32 percent of CBJTC has well-drained to very well-drained sandy soils characteristic of higher points on the central Florida ridge, which support upland plant communities varying from longleaf pine-turkey oak-wiregrass to sand pine to xeric oak scrub. Due to the absence of fire and historical overharvesting of longleaf pine, turkey oak now dominates many of these sandhill areas.

On the North, Kingsley, and East Management Units much of this restoration will occur concurrent with regeneration in adjacent stands. The South Post of CBJTC will be the main focus for large scale longleaf pine restoration. Recent clearing of large sand pine stands in southern CBJTC has allowed for restoration of longleaf pine. A systematic reduction of turkey oak on South Post through natural, chemical, and harvest methods whenever possible will be undertaken. This will decrease the hardwood competition in these stands and allow for a release of the current stock of longleaf seedlings and saplings present. Underplanting will be used where necessary to boost the number of longleaf trees per acre to acceptable stocking levels. Fire will be used to control future hardwood resurgence and resprouting from the remaining root stock.

Strategies for Sandhills Restoration

- ***Sand Pine Stands:*** Harvest and remove on a large scale existing sand pine stands while retaining any volunteer or original longleaf pines. This operation is dependent upon market

fluctuations and may not always be a viable option. After a harvest there is generally 10 to 40 longleaf pines left per acre. Stands will sit for two to three years to allow the sand pine to recolonize. The stands will then be burned and/or chopped, and finally replanted with containerized longleaf pine.

- ***Turkey Oak Stands:*** Harvest turkey oak dominated stands. This operation is again largely dependent upon the available markets and may not be an option. These stands are generally underplanted with containerized longleaf pine seedlings if natural regeneration is less than 200 longleaf pine seedlings per acre. Combinations of fire and herbicides (primarily hexazinone, spot applied to control turkey oak sprouts) will be used either for site preparation or after planting to ensure seedling establishment. As mentioned above, herbicide applications are only used as a last resort when fire or other nonchemical methods do not sufficiently control competing vegetation.
- ***Other Areas:*** Areas where a certain amount of canopy is necessary at all times allows for a higher tree per acre underplanting of containerized longleaf pine. As the longleaf pine seedlings begin to grow and form an independent canopy, the original stand of turkey oak or sand pine will be controlled by whichever method is the most efficient, with a priority placed on nonchemical methods first: harvest, fire, or herbicide.

4.4.5 Restoration of Former DuPont Mining Lease

Mining activities on CBJTC began in the late 1940s and have been concentrated on the western boundary of the property (TAs MA1, MA2, S11, S12 and S13). E.I. du Pont Nemours and Company (DuPont) renewed earlier lease agreements in 1968 for mineral sand mining and most recently for mineral extraction. Mining activities at CBJTC ceased in 2008. As DuPont finished mining an area, they conducted reclamation to the level required by regulators at the time, which varied depending on when the original mining occurred. Some of these areas were not rehabilitated at all and are essentially sand dunes. Other areas are still being rehabilitated by DuPont, primarily with slash pine. With the expiration of these leases, CBJTC has taken on a significant management effort to complete restoration of these areas to longleaf pine over the long term (i.e., 40 or more years). It is unreasonable to expect that pre-mining conditions can be obtained without the re-creation of a hardpan and the moisture properties that a broad, relatively impervious soil horizon gives to the environment.

Beginning in 2004, CBJTC undertook a program to restore the ecologically sterile areas from the rehabilitated DuPont mining lease known as the DuPont Dunes. Taking advantage of abundant organic material after the hurricanes in 2004 and 2005, CBJTC placed chipped organic debris on the dune areas. The long-term goal is to create pine plantations in most of these areas. Depending on the rate the mulch breaks down, this may take as long as 10 years. These new plantations could eventually replace acreage lost to RCW management in other areas of CBJTC. Currently some areas are planted in unsuitable pine species; species selection for new plantation areas will take into account soil condition and hydrology.

These severely disturbed lands should also be considered a suitable choice for high impact activities such as tracked vehicle operations, rather than disturbing other areas.

Guidelines for Restoration of DuPont Mining Leases

- Place 18 to 24 inches of organic mulch and periodically disk into the sand to rebuild organic content and begin plant colonization process.
- Annually monitor areas with applied mulch for invasive plant infestation.
- Once soil condition has improved, introduce wiregrass and other herbaceous plants to assist with reestablishing a fire regime.
- Plant pine species suitable for the soil condition and hydrology, with an emphasis on longleaf pine.
- Evaluate the utility of mimicking scrub habitat in some of these areas to stabilize soil and provide wildlife habitat.
- Evaluate the utility of saw palmetto in the restoration and management of these areas.
- Once sufficient vegetation is established, initiate prescribed fire program to further natural regeneration.

4.4.6 Scrub Management

Scrub habitat covers approximately 3 percent of CBJTC. Scrub habitat on CBJTC is the northernmost example of interior scrub, an endangered plant community that is endemic to peninsular Florida. Three species, in particular, are dependent on the scrub ecosystem: the Florida scrub-jay, Curtiss' milkweed, and little ladies'-tresses, as well as many lichens and bryophytes.

The scrub vegetation community is usually dominated by shrubby oaks and/or Florida rosemary, often with an overstory of scattered sand pine. This habitat occurs at higher elevations, on well-drained, infertile, sandy soils. Scrub is a fire-dependent ecosystem that is adapted to periodic destruction by fire only to increase in stature until the next fire. Its physical structure and appearance varies with the length of time since the last fire. Infrequent fires, occurring once every 5 to100 years, maintain scrub habitat.

Guidelines for Scrub Management

- Use prescribed fire and mowing for maintenance of scrub habitat. Conduct prescribed burns (from February to July) in selected units to deter the invasion of off-site plants. Target burn parameters so as to encourage a mosaic effect. Never mow or burn the same area two years in a row.
- Allow prescribed head fires to burn into wetlands and die out naturally. This will maintain the natural variability. Head fires leave some areas intensely burned, some areas lightly burned, and some unburned, creating the habitat mosaic that ensures the survival of all scrub species.
- Monitor indicator species (i.e., Florida scrub-jay, Curtiss' milkweed) annually in scrub habitat in coordination with FFWCC.
- Manage, and eradicate if possible, invasive non-native plant and animal species.

4.4.7 Riparian and Wetland Management

Approximately 22 percent of CBJTC is covered by wetland and riparian habitat. Riparian zones are also important habitats for wildlife because the vegetation they support is often unique and very diverse. Due to the linear nature of riparian zones, they also tend to be used as travel corridors by wildlife. Composite stands that occupy cypress domes, hardwood or bay swamps, very poorly-drained pine-bay habitats, or other wetland habitats will be managed for protection of water resources and wildlife that occupy those habitats.

At CBJTC, SMZs have been designated around streams, lakes, and other waterways (see **Section 4.3.3**). The SMZs essentially protect riparian and wetland habitat on CBJTC during forestry operations. Military activities are also generally limited in these areas. Refer to **Section 4.3** for more details on water resources protection and management, including guidelines for protecting water quality. The guidelines presented here are specific to the vegetation management in these areas.

Guidelines for Riparian and Wetland Habitat Management

- Prescribed burning in adjacent stands will be allowed to burn into pine-bay stands whenever possible in order to reduce the extensive fuel loads and dense understories that have developed in those transitional communities in the absence of fire.
- Harvesting will only be used to meet objectives other than timber production, and in those situations it will be conducted as partial harvests followed by natural regeneration.
- Mechanized operations will be prohibited from causing adverse impacts, such as sediment loading in adjacent wetlands and watercourses.

4.4.8 Vegetation Management in Direct Support of Military Training

As described in the Range Complex Master Plan (FLNG 2011b), there are some vegetation management requirements specific to certain types of military training infrastructure. Vegetation management for these purposes is primarily accomplished through the ITAM Program. In general, key training areas should be maintained as open areas with little to no encroachment of woody species. The condition of training infrastructure is monitored by the ITAM program.

Guidelines for Vegetation Management for Military Training

- ***Artillery Firing Points (AFPs):*** AFPs requiring re-vegetation will need to be planted in either the winter or spring of the designated year, depending on the type of seed (native vs. non-native). If a firing point needs to be enlarged, ITAM personnel will coordinate with CBJTC-ED for the protection of the listed imperiled species. Enlargements are also coordinated with forestry operations to clear harvestable timber from the area.
- ***Landing Zones (LZs) and Weinberg Drop Zone (DZ):*** LZs and the DZ should remain fairly level without eroded pits from rotorwash. Woody species should be removed with herbicide treatment when uptake of the chemical by the plants is at its highest rate (during the summer months, typically May-July). LZ's requiring revegetation will need to be planted in either the winter or

spring of the designated year, depending on the type of seed (native vs. non-native). Topsoil is generally spread in rotor wash created cavitations during the winter months when heavy equipment is more readily available.

- ***Dismounted Training Areas:*** Established pine stands should be burned on a 3 to 5-year rotation to maintain an open understory for military training (see **Section 4.5** for more on the wildland fire program). Where practical and necessary, treatments such as mechanical thinning and herbicide treatment may be used to reduce the understory.
- ***Trails:*** Trails should be maintained so as not to become soft and should remain relatively free of potholes. Trails maintained by the ITAM program have a firm surface to reduce the frequency of mired vehicles, using limerock and similar substrates. Potholes and undercut areas should be maintained regularly for safety and to prevent degradation of trails.

4.4.9 Landscaping and Grounds Maintenance

Landscaping and grounds maintenance on CBJTC are limited to the Cantonment Area, with some grounds maintenance within range areas. All landscaping and ground maintenance activities must follow the IPMP (FLARNG 2011b). The following recommended landscaping practices should benefit the environment and generate long-term cost and maintenance time savings. The use of native plants not only protects biodiversity and provides wildlife habitat, but it can also reduce demands for fertilizer, pesticides, and irrigation and their associated costs.

Guidelines for Landscaping and Grounds Maintenance

- Plant shelterbelts of trees around the borders of parking lots and near buildings. Shade trees will decrease energy use by the facilities and lessen heat island effects of large parking lots. Choose shrubs and trees that provide food and cover for wildlife, with preference for native species. Shrubs should be spaced about 4 to 6 feet apart; and trees approximately 10 feet apart. To create shelterbelts, plant several rows of larger trees, smaller trees, and shrubs with rows about 15 feet apart.
- Where possible and when installing new landscaping, select native plants suitable to the site. Native plants suitable for planting in Florida are available at http://www.fnps.org/plants and additional guidance is available in *The Florida Yards & Neighborhoods Handbook* (IFAS Extension 2009) at http://floridayards.org/landscape/2009_FYN_Handbook_non-508_web_vSept09.pdf.
- Follow the nine Florida-Friendly Landscaping Principles (http://fyn.ifas.ufl.edu/): (1) Right Plant, Right Place, (2) Water Efficiently, (3) Fertilize Appropriately, (4) Mulch, (5) Attract Wildlife, (6) Manage Yard Pests Responsibly, (7) Recycle, (8) Reduce Storm Water Runoff, and (9) Protect the Waterfront.
- Maintain the nature trail in the Cantonment Area to minimize erosion and vegetation encroachment and provide for non-vehicular access between different areas.
- Maintain designated conservation areas to protect wetlands, endangered species, and cultural resources.

4.5 Wildland Fire Management

GOAL FI: Implement a wildland fire program that minimizes safety concerns and wildfire risk, enhances the military mission, benefits rare species, protects cultural resources, and maximizes habitat management and ecological benefits.

OBJECTIVE FI1: Implement all protocols and requirements of the IWFMP.

OBJECTIVE FI2: Ensure no deaths, injuries, property losses, or road closures occur because of wildland smoke or fire, including off-post property damage (from IWFMP).

OBJECTIVE FI3: Maintain or improve quality of training lands (from IWFMP).

OBJECTIVE FI4: Manage fuel loads by implementing dormant season burns in units with high fuel loads and conducting maintenance burns during the growing season (from IWFMP).

OBJECTIVE FI5: Coordinate and cooperate with other federal, state, local agencies, and directorates within the installation as needed (from IWFMP).

OBJECTIVE FI6: Use wildland fire to manage habitat for rare species, in particular the RCW.

OBJECTIVE FI7: Maintain and restore habitat using appropriate fire return intervals and growing season prescribed fire.

Primary Regulatory Drivers

- SAIA
- AR 200-1
- Florida Prescribed Burning Act (Section 590.125 of F.S.)
- FAC 5I-2 (Open Burning)

Fire is a natural process in Florida's vegetative communities and has been a major factor in ecosystem and vegetation development at CBJTC. Recurrent wildland fire is important for maintaining the majority of Florida's habitats including the longleaf pine/wiregrass, sandhill, flatwood, and scrub habitats on CBJTC, which are critical for many rare species. The IWFMP (FLNG 2011a) is the primary planning tool for the wildland fire program and presents the program in detail. This section of the INRMP is meant to integrate with the rest of the natural resources program and provide a summary of the wildland fire program, particularly fire ecology and prescribed fires, and associated guidelines.

The IWFMP lays out specific guidance, procedures, and protocols for the prevention, detection, and suppression of wildfires and the planning and operating procedures involved with prescribed burning on CBJTC. Its purpose is to convey the methods and protocols necessary to minimize wildfire frequency, severity, and size, while conducting beneficial prescribed burns and supporting the military mission. The IWFMP also defines the responsibilities of all offices, departments, and agencies involved. FFWCC plays a significant role in the wildland fire program, as well as managing wildlife, on CBJTC. A copy of CBJTC IWFMP is included as **Appendix G**.

Wildfires are typically controlled across most of CBJTC, although they are allowed to burn through the Impact Area due to the presence of UXO. Prescribed fires are used for fuel reduction to prevent intense wildfires, reduce hardwood competition, enhance wildlife forage, and promote native rare species habitat.

4.5.1 Fire Ecology

Approximately 63,200 acres or 85 percent of CBJTC is covered by natural vegetation communities and other land cover types (e.g., pine plantations) that require frequent prescribed fire to maintain vegetation composition and structure and to reduce fuel loads for protection against large, intense wildfires (see **Table 13**). Additionally, 655 acres or 1 percent of CBJTC requires rare to occasional prescribed fire. Historically, most wildfires occurred during the dry summer months, usually from May to early July. The most common natural source of ignition was lightning from summer thunderstorms.

Table 13. Fire Intervals for Vegetation Communities Requiring Regular Fire within CBJTC

Community / Land Cover Type	Natural Fire Frequency	Acres	Percent Cover
Sandhill	Frequent fire (1 to 3 years)	14,997	20
Mesic Flatwoods	Frequent fire (2 to 4 years)	8,134	11
Upland Mixed Woodland	Variable fire interval (2 to 20 years).	9,418	13
Dry Prairie	Frequent fire (1 to 3 years)	2,041	3
Scrub	Rare to occasional fire (5 to 100 years)	340	0.5
Wet Flatwoods	Frequent fire (2 to 4 years) for grassy wet flatwoods and 5 to 10 years for shrubby wet flatwoods	10,480	14
Wet Prairie and Bog	Frequent fire (2 to 3 years)	1,175	1.5
Tree Plantations	Frequent fire (3 to 5 years)	85	22
	Total Land Requiring Regular Fire	**63,207**	**85**
Note: CBJTC GIS Boundary equals approximately 73,764.			
Source: FNAI 2010a, 2010b			

Approximately 64,000 acres of CBJTC require prescribed fire at varying intervals. However, the majority of CBJTC, which includes established pine stands, sandhill, and flatwoods, should be burned on 3 to 5-year fire return intervals. To maintain this schedule, 11,000 to 18,000 acres must be burned annually, preferably in large blocks for efficiency. This is accomplished by burning with aerial ignition and including 8 to 10 personnel from multiple CBJTC offices and FFWCC. This burning schedule has been frequently disrupted by drought conditions or by intense hurricane activity. In general, fuel models present on CBJTC include (see **Appendix G** for fuel model descriptions):

- Fuel Model 1 – short grass--- prairie or savanna
- Fuel Model 2 - grass under timber—grass with some small shrub component with pine overstory
- Fuel Model 3 – high grass—cogongrass
- Fuel Model 4 - heavy rough—high shrub with dead limb wood, scrub
- Fuel Model 6 – brush with slash --- hardwood shrub with pine slash residues
- Fuel Model 7 - southern rough—Palmetto/gallberry under pine overstory

- Fuel Model 9 - blowy leaf—loose hardwood litter under closed canopy
- Fuel Model 10 – light logging slash --- timber decks

Fuel levels were estimated during the 2009 growing season. A fuel level map is provided in Figure 7 of the IWFMP (see **Appendix G**).

4.5.2 Wildland Fire History on CBJTC

Historically, the only fire management on CBJTC was fire suppression with little to no prescribed fire. As a result, a large build-up of fuels occurred over much of CBJTC. This fuel build-up still poses a problem for the wildland fire program on CBJTC. Heavy fuels not only make prescribed fires more difficult, but create much more dangerous wildfires when they inevitably occur. When CBJTC was formed and the military began to train, human fires became another common source of wildfire ignition. The military uses many pyrotechnic devices that can be ignition sources. CBJTC is a year-round training facility and wildfire starts can occur during the entire year. Annual Training events have a marked increase in troop activity, typically in the summer, and therefore a marked increase in military started wildfires. Beginning in the early 1990s, a prescribed burn program was implemented with the goal of returning the historic fire return interval to CBJTC. While the initial efforts focused on dormant season burns to reduce fuel loads, growing season burns have become a larger part of the program. In the last ten years, there are typically 5,500 to 14,000 acres burned each year.

4.5.3 Prescribed Fires

The single most important tool for managing the natural resources at CBJTC is prescribed fire. Most CBJTC habitats need regular prescribed burning to maintain forest composition and structure, and to reduce fuel loads for protection against large, intense wildfires. Prescribed fire is also essential for RCW management. The objective of the fire management program is to eventually conduct most prescribed burning during the growing season, except where winter burns may meet other objectives. Winter burns will be necessary initially to reduce thick understories and high fuel loads, and to meet annual burning targets. Growing season burns will be favored on sites where understory fuel loads are low enough to avoid intense fires and mortality in the mature pines. Objectives for prescribed fires include:

- Ecological Management
- Fuel Reduction for Wildfire Protection
- Maintenance and Restoration of Fire Dependant Species
- Control of Forest Diseases and Insects
- Site Preparation for Reforestation
- Piles (Logging Debris)
- Improvement of Wildlife Habitat
- Training
- Research
- Enhance Appearance
- Improve Access for Military
- Military (Ranges)

The first priority for prescribed fire is all composite pine stands, natural or plantation, which fall within RCW foraging habitat. The primary burning objectives are reduction of understory vegetation and the promotion of diverse herbaceous groundcover. In stands that have experienced a recent fire, growing season burns will be favored once dense palmetto and other shrubby vegetation is maintained at low densities and less than 3 feet in height. Burns in late spring and early summer also serve to encourage

desirable groundcover vegetation such as wiregrass. Burning in RCW areas will require special protection of cavity trees by mowing around and/or raking fuels away from each tree and igniting around the cavity tree prior to the fire's arrival. Thus, causing the fire to burn away from each tree when it is low intensity, rather than burning to the tree with high intensity and igniting the pitch on the side of the trees.

The second priority for understory burning will be those stands that were thinned during the previous year. The primary objective is to reduce brush that sprouts after thinning and residual slash left from the thinning.

Burning will generally be prescribed for large blocks that contain several complete or partial composite stands rather than for single composite stands. Although most blocks will be ignited with conventional drip torches (hand-held or mounted on 4-wheel drive vehicles), very large blocks may also be burned with helicopter ignition using delayed aerial ignition devices ("ping-pong" balls).

There are 49 burn units on CBJTC designed to facilitate burn planning, mapping, and record keeping. Additional consideration was given to delineating burn units according to fuel conditions, natural community types, existing roads, and natural firebreaks (mostly creeks and bayheads). To support the burn units, each forestry stand was assigned a subjective burn priority ranging from one to four, with one being the most urgent, with a target of a four-year rotation among units. Overall, 60 composite stands are ranked as Priority 1 stands; 82 are Priority 2 stands; 44 are Priority 3 stands; and 23 are Priority 4 stands.

Roads, natural barriers such as streams, and existing fire lines are used as primary fire lines, but new lines are also plowed where necessary to protect other stands or features, or to enhance burning logistics. Although plows may be necessary to initially create new lines, all plowed fire lines are maintained with discs rather than plows to avoid disrupting any natural drainage patterns. For prescribed fire, all considerations are made to use existing firebreaks. During a wildfire event, there are no restrictions of fire line placement. Placement is based upon urgency of suppression and actual fire behavior. If a new fire line is created it will be rehabilitated in a timely manner.

4.5.4 Smoke Management

Smoke is a significant constraint to the prescribed burn program on CBJTC. The greatest negative impact caused by prescribed burning is the potential for acute smoke impacts to the military and public, as well as regional impacts caused by releasing too much smoke into the airshed on a given day. Large quantities of smoke can cause health issues or visibility issues on major roads. State or county highways run along the edge of CBJTC on the east and south sides and are a major concern when affected by smoke created from a prescribed burn. Refer to Figure 3 of the IWFMP for smoke management concern areas within the vicinity of CBJTC (see **Appendix G**).

4.5.5 Management Guidelines

The following general wildland fire management guidelines should be implemented at CBJTC:

- Train at least four CBJTC personnel in habitat management prescribed fire techniques and maintain a sufficient crew of trained personnel.
- Allow patchiness (allow unburned areas to remain unburned) within burn units.
- Conduct prescribed burns during the growing season under low-humidity conditions.
- Coordinate the yearly aerial burn schedule and training activities with FFWCC in advance of each burn season.
- Conduct prescribed fires normally during the growing season and at least once every three years as weather, fuel conditions, and training area access allow. Missed burns will be scheduled in the growing season as soon as possible, but may require a return to dormant season burning until fuels are sufficiently reduced.
- RCW clusters are clearly marked by double white bands on each cavity tree and a plan should always be in place for their protection before a cluster can be burned. Flame length and fire intensity should be closely managed and monitored in the area around each cavity tree.

4.6 Fish and Wildlife Management

GOAL FW: Maintain fish and wildlife populations while minimizing potential impacts to the military mission.

OBJECTIVE FW1: Manage wildlife using a systematic approach that includes inventory, monitoring, management, and assessment.

OBJECTIVE FW2: Maintain populations of wildlife by providing healthy, diverse habitat types and corridors for movement between those habitats.

OBJECTIVE FW3: Maintain a sustainable wildlife harvest program using adaptive, ecosystem management.

OBJECTIVE FW4: Maintain fish species and suitable habitat in appropriate lakes.

OBJECTIVE FW5: Minimize wildlife-related health risks, safety risks, and environmental damage.

Primary Regulatory Drivers

- SAIA
- Migratory Bird Treaty Act
- AR 200-1
- FAC 68A (Freshwater Fish and Wildlife)
- Chapter 379, F.S. (Fish and Wildlife Conservation)

Fish and wildlife management at CBJTC is focused on maintaining and restoring natural habitats favorable for indigenous fish and wildlife in a manner consistent with the military mission and all applicable laws and regulations. There is sufficient habitat to support a healthy diversity of wildlife on CBJTC. The vegetation communities present on CBJTC and the active prescribed fire program support a high diversity of native wildlife and rare species (see **Section 4.7**). For a detailed summary of wildlife species and rare species, refer to **Sections 2.3.3** and **2.3.4**, respectively. This section of the INRMP provides a summary of the hunting and fishing program and wildlife and game species management.

4.6.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits, unless permitted by regulations, the pursuit, hunting, take, capture, killing or attempting to take, capture, kill, or possess any migratory bird included in the Migratory Bird Treaty, including any part, nest, or egg of any such bird (16 USC §703). The DoD has a MOU with USFWS pursuant to EO 13186 (*Responsibilities of Federal Agencies to Protect Migratory Birds*), which outlines a collaborative approach to promote the conservation of migratory bird populations. This MOU specifically pertains to natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, invasive weed management, and prescribed burning. It also pertains to installation support functions, operation of industrial activities, construction and demolition activities, and hazardous waste cleanup. In February 2007, USFWS finalized regulations for issuing incidental take permits to the DoD. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of migratory bird species, then they must confer and cooperate with USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21).

DoD's policy is to promote and support a partnership role in protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission. The Partners in Flight program is an umbrella network of which DoD's bird conservation program is a vital part. DoD works with the National Fish and Wildlife Foundation to develop cooperative programs and projects with other Federal, State, and non-governmental organizations. FFWCC is Florida's lead agency for the Partners in Flight Program. Migratory birds include species with at least some populations breeding in the continental United States and/or Canada, for example songbirds, shorebirds, waterbirds, and waterfowl. Attention has centered on migrants, since this group is experiencing steep rates of population decline. However, decreasing populations have also been observed in resident bird species, which do not migrate, and temperate-zone migrants, which only migrate within North America.

4.6.2 Hunting and Fishing at CBJTC and Public Access

Camp Blanding WMA

FFWCC manages approximately four million acres of public hunting land throughout the state of Florida. In 1956, FFWCC entered into an agreement with FDMA, which established Camp Blanding WMA. This MOA was renewed in 2006 (see **Appendix I**). As described in **Section 3.6**, approximately 56,200 acres of CBJTC is managed by FFWCC as Camp Blanding WMA. FFWCC receives all revenues obtained from permits issued to hunt and fish on Camp Blanding WMA. In exchange, FFWCC provides assistance to CBJTC with prescribed burning activities, management of public hunts, operating hunter check stations to monitor harvests and collect biological data, assistance with rare species management, removal of litter from hunting areas, technical assistance regarding fish and wildlife, and hunting and fishing law enforcement.

Annually, FFWCC provides CBJTC with actual hunting dates and quotas for that year and projected hunting dates for a five-year period. Range Control works closely with FFWCC to try to accommodate these schedules. However, areas are subject to closure for military training activities at any time if deemed necessary to meet the military mission.

Each year, hunting recommendations for the area are made based on population levels and trends, habitat indices, and past harvests. Camp Blanding WMA regulations summary and map are updated annually by FFWCC. The hunting season regulations summary and area map brochure for 1 July 2012 to 30 June 2013 is available at http://myfwc.com/hunting/wma-brochures/nc/camp-blanding/. The permit, license and stamp requirements; hunting seasons; permit schedules; and general hunting and fishing regulations for CBJTC are the same as established for the State of Florida and WMAs generally. The Wildlife Code of the State of Florida (FAC 68A) is the final authority on hunting and fishing laws.

Hunting areas are designated within Camp Blanding WMA with different allowed activities and regulations: archery-only, still hunt area 1 and 2, and a dog hunt area. All hunting is by quota permits only (no cost) and offers big game, small game, and waterfowl hunting. Trapping is allowed in the still hunt areas. Quota permits are available by entering a FFWCC lottery in June for certain types of hunts (e.g., turkey hunts), while other quota permits are available on a first-come first serve basis at the designated check station on a daily basis. All quota permits are no cost. Hunter demand is measured by the number of quota hunt permits issued for the first four days and the second five days of the general gun season.

Hunter Check Stations are open and staffed during all deer and turkey hunts. Check station hours are one hour before sunrise to one hour after sunset during the archery, supervised youth, muzzleloading gun and general gun seasons. During spring turkey season the check station is open at 5 a.m. and closes at 1 p.m. The purpose of check stations at CBJTC is to collect biological data from harvested animals (weights, other measurements, etc.), record hunter pressure, distribute information such as hunt maps and brochures, and check hunters for proper permits upon entering the WMA. Because hunters must enter through designated gates, an absolute count of hunters using the area and game harvested is obtained. Check station operators do not have any law enforcement powers or duties.

Quota Permits for Camp Blanding WMA for 2012 – 2013 Hunting Season

Quota permits generated through FFWCC lottery

- Muzzleloading Gun – 200 for each of 2 hunts.
- Supervised Youth – 40 (no exemptions) for each of 2 hunts.
- General Gun Still Area 1 (first 9 days) – 200 for each of 2 hunts.
- General Gun Still Area 2 (first 9 days) – 200 for each of 2 hunts.
- General Gun Dog – 320 for each of 2 hunts.
- Youth Turkey – 35 (no exemptions).
- Spring Turkey – 35 for each of 2 hunts.

Daily quota permits offered on a first-come, first serve basis at the WMA check station

- Archery-only Area – 150, each day of the season
- General Gun Still Area 1 (after first 9 days) – 200
- General Gun Still Area 2 (after first 9 days) – 200

The following public access requirements are in place when Camp Blanding WMA is open:

- When the area is open, hunting, fishing, wildlife viewing, and hiking are allowed. For purposes other than hunting, dogs are prohibited.
- Scouting is prohibited prior to open hunting seasons.
- Public access is prohibited in the artillery impact area and areas not open for hunting.
- Camping and the use of ATVs are prohibited.
- Vehicles may be operated only on named or numbered roads and only during periods open for hunting.
- Parked vehicles may not obstruct a road, gate, or fire line.
- No motor vehicle shall be operated on any part of any WMA that has been designated as closed to vehicular traffic.
- A marked footpath called the Florida Trail traverses the area. Persons accessing this trail must complete and return a no-cost daily trail permit at a trail entrance kiosk upon entering and leaving the trail (see **Section 3.7**).
- Unless exempted, all hunters on this wildlife management area must have the following in their possession and display them upon request: 1) Hunting License, 2) WMA Permit, and 3) Quota Hunt Permit.

Camp Blanding FMA

Under an MOA between FFWCC and FDMA, Lowry and Magnolia lakes are open to the public for fishing (see **Appendix I**). Magnolia and Lowry Lakes are open on Sundays, Mondays, and all days that Still Hunt Area 2 is open for hunting from 30 minutes before sunrise to 30 minutes after sunset, except when closed

for military training activities. Access to Magnolia and Lowry Lakes for fishing only shall be on Treat Road only, when allowed by CBJTC Range Control. A valid fishing license stamp is required for state residents between the ages of 16 and 65 when fishing on CBJTC. See FFWCC's current Freshwater Sport Fishing Guide and Regulations Summary at www.fwc.com for rules concerning exemptions and non-resident licenses, bag limits, and specific fish management area regulations.

The following public access requirements are in place when Camp Blanding FMA is open:

- All restrictions noted above for the WMA apply.
- All anglers will be required to check into and out of the area at a manned check station.
- Boat launching is permitted only at designated areas.
- Frogging is prohibited.
- All watercraft shall be operated at idle speed only.

Camp Blanding Rod and Gun Club

Camp Blanding Rod and Gun Club, Inc. (Club) in coordination with CBJTC Range Control operates and maintains 21 hunting areas on CBJTC that are not included in Camp Blanding WMA. The Club is responsible for posting signs on all hunting area boundaries. All areas are open to hunting by Honorary Members and Registered Paying Members with spouses and immediate family members as identified in the current By-laws of the Club. The Club is also approved for fishing in the following areas: Blue Pond, Perch Pond, OP Pond, Capps Pond, and Long Pond. The Club ensures that hunting, fishing, and plot preparation only occur during those times as published in the MOA and during prescribed seasons as published by FFWCC.

4.6.3 Wildlife Habitat Management

FFWCC is an important cooperating partner for wildlife management primarily as a result of the MOA that governs Camp Blanding WMA. FFWCC produces an annual report detailing wildlife management activities on CBJTC. FFWCC biologists: (1) develop, maintain, and analyze databases; (2) monitor selected species; (3) conduct and/or recommend habitat management activities that preserve or enhance the quality of these lands; and (4) recommend regulations to ensure perpetuation of game species. CBJTC personnel coordinate all wildlife management activities with FFWCC personnel.

FFWCC Annual Report Data / Information
(see Annual Report for detailed information)

- A summary of rule changes from the establishment of the WMA in 1956 to the present.
- Annual hunting season summary including areas hunted within the installation, types of hunts, and harvest data.
- Wildland fire support summary includes acres burned by method and purpose (e.g., aerial burns, RCW management).
- Wildlife management support summary includes the number and type of nest boxes, RCW artificial inserts, and bat houses developed, cleaned and maintained; the acreage of wildlife openings planted in the spring and fall; and other assistance provided throughout the year (e.g., assistance with species surveys or studies on CBJTC).

Principal management tools used by FFWCC and CBJTC-ED are game and wildlife regulations and habitat enhancement. Annual surveys are conducted for deer, turkey, and RCWs. Formal bald eagle surveys are conducted by FFWCC periodically. Informal bald eagle surveys are conducted during prescribed burning aerial ignitions by CBJTC-ED staff when conditions allow. Habitat management includes prescribed fires, maintenance of wildlife openings, and placement of nesting structures. A RCW survey is conducted annually to determine the activity of each cluster, each cavity tree, and to identify the nest trees.

Wildlife management involves manipulating various aspects of an ecosystem to benefit chosen wildlife species. Management of these habitats is focused to benefit indigenous species, particularly threatened and endangered species, and game species. FLARNG will continue to manage the wildlife and its habitats at CBJTC, in conjunction with FFWCC, by implementing the strategies listed below.

- Leave snags, den trees, and fallen logs undisturbed unless they are a safety hazard. Snags are standing dead trees, while den trees are live trees with cavities in them.
- Protect large, unfragmented quality habitat as territory for viable wildlife populations. Configuration of protected habitats should conform to shapes that minimize edge-to-area ratios. Circular shapes are preferable in achieving this goal. Narrow, linear, or small-acreage habitats should be avoided if possible.
- Use prescribed fire to restore sandhill, flatwoods, and other natural and rare communities dependent on a regular fire interval for indigenous and rare species (see **Sections 4.4 and 4.5**).
- Allow some unburned areas to remain unburned. This increases diversity and benefits terrestrial carnivores (bobcat, fox, and black bear).
- Minimize continually burning areas in the dormant season. Frequent dormant season burns can reduce valuable cover. Growing season burns provide the best benefits for terrestrial carnivores (bobcat, fox, and black bear) that use dense brush (palmetto) as den sites, foraging, and rest areas (Maehr et al. 2001)
- Maintain corridors between wetlands, lakes, and other waterbodies to provide for wildlife movement between areas.
- Minimize habitat fragmentation by minimizing land clearing, new road construction, and expansion of firebreaks and plow lines.
- Minimize the amount of herbicides used for invasive species control, particularly in or around surface waters and wetlands, by using mechanical methods to the extent possible avoiding impacts to fish and wildlife habitat.
- Limit mowing only to areas where it is necessary to implement the training mission.
- Conduct periodic surveys to assess native fauna populations.
- Maintain wildlife openings. FFWCC manages food plots throughout the installation; some of these openings were created naturally as a result of prescribed fire activities. FFWCC will sometimes plant native vegetation for wildlife in these openings after a burn. The military

mission also generates natural wildlife openings through regular maintenance of open areas for training (e.g., LZs, AFPs, and the DZ).

- Clean and maintain nesting wood duck, eastern blue bird, and southeast American kestrel, boxes prior to the nesting season and monitor reproductive success periodically.

4.6.4 Game Species Management

As discussed above, FFWCC is an important cooperating partner for wildlife management, particularly for games species management. FFWCC manages all quota hunts and fishing within Magnolia and Lowry lakes at CBJTC, and sets bag limits. Each year, hunting recommendations for the area are made based on population levels and trends, habitat indices, and past harvests. As a result, much of the data and management activities summarized here are the result of efforts by FFWCC personnel.

CBJTC is a major source of recreational use for hunting and fishing in north central Florida (see **Section 4.6.2**). Hunting alone attracts 10,000 to 13,000 man-days of use annually. These hunts determine population densities for the game species and provide outdoor recreation opportunities for Florida citizens and military personnel. A number of legal game mammals are hunted at CBJTC, including white-tailed deer, turkey, bobcat (*Lynx rufus*), and river otter (*Lutra canadensis*); these species have relatively low bag limits. Gray squirrel, northern bobwhite (*Colinus virginanus)*, and rabbits have moderate bag limits. Feral hogs, Virginia opossum (*Didelphis virginianus*), raccoon (*Procyon lotor*), beaver (*Castor candensis*), coyote (*Canis latrans*), nine-banded armadillo (*Dasypus novemcinctus*), striped skunk (*Mephitis mephitis*), and nutria (*Myocastor coypus*) may be taken during the general gun, archery, and muzzle-loading gun seasons and have no bag limits. Migratory game birds follow the state bag limits and include rails, common moorhen, mourning dove, white-winged dove (*Zenaida asiatica*), snipe, duck, geese, coot, woodcock, and crows. Fish occur primarily in Kingsley, Lowry, and Magnolia Lakes and FMA and state bag limits for game fish apply.

Bag and Possession Limits for Camp Blanding WMA and FMA (2012-2013)

- *Deer* – Daily limit 2, possession limit 4, except during the supervised youth season when only one deer may be taken (either antlered or antlerless) per youth. During archery season, the limit may include any combination of antlered and antlerless deer.
- *Turkey* – Daily limit 1, all fall seasons combined limit 2, spring season limit 2, possession limit 2.
- *Bobcat and otter* – Possession limit 1 unless in possession of a trapping license.
- *Gray squirrel, quail, and rabbit* – Daily limit 12, possession limit 24 for each.
- *Raccoon, opossum, armadillo, beaver, coyote, skunk, and nutria* – No bag limits.
- *Feral hog* – No size or bag limit.
- *Migratory birds* – See FFWCC Migratory Bird Hunting Regulations pamphlet.
- *Game fish* – State bag limits apply with the exception of channel catfish that has a bag limit of 6.

Deer are the preferred game species, although turkeys are also popular. Squirrel and hog hunting pressure is moderate. Quail were once harvested in large numbers, but are now seldom taken. Feral hogs are a non-native invasive wildlife species that can cause tremendous damage, especially in riparian and wetlands areas. For the long-term health of CBJTC, it is crucial to encourage feral hog harvesting.

White-tailed deer and wild turkey are monitored annually by FFWCC (see below). Annual quail call surveys were previously conducted during May. However, due to declining habitat quality caused by lack of prescribed burning for many years, the quail population dipped to extremely low levels and FFWCC ceased conducting these surveys. Hunter interest has paralleled the declining population because of poor success rates in finding birds. The quail population on CBJTC does seem to be improving but there are no recent estimates of population size. Habitat has notably improved and hunter success will provide one indicator of population response. A brief discussion on deer, turkey, and feral hog population monitoring at CBJTC is provided below.

White-Tailed Deer

The deer population is monitored by track counts and distance sampling by spotlight. These methods provide a population index. Data is also collected from hunter-harvested deer that provides age structure, mean weights, and antler parameters. Track counts are conducted on 11 miles of unpaved transect roads. Individual deer crossings are counted 12-15 hours following either dragging the road or a heavy rain. The population index typically ranges from 20 to 50 acres per deer. FFWCC established the requirement for a legal buck in the still hunt areas to have at least one antler with three or more points in 2004, in order to improve the overall quality of harvested buck deer. In the dog hunt area, a legal buck must have at least one antler measuring no less than 5 inches.

The existing hardwood forest provides adequate forage for quality white-tailed deer during years of good mast production. Forage plants available in hardwood and pine forests, combined with grasslands and agricultural food plot residues, adequately meet the needs of the present population. Wildlife habitat improvements resulting from planned forest management activities such as prescribed burning, timber stand improvement operations, and timber harvesting operations will upgrade the quality and quantity of forage that is now present.

Hunting on CBJTC mimics the effects that natural predators have on deer populations. Large predators, such as panthers, bobcats, and wolves preyed on deer and other game in pre-settlement times and are no longer as abundant in Florida. Without predation, deer populations may increase to the point where they are damaging habitat for other species in their search for food. The optimum carrying capacity for deer on CBJTC is approximately 1 deer per 20-50 acres based on many years of monitoring data.

Turkey

Surveys have been conducted annually in late summer along transect routes, with approximately 23 mobile bait stations since 1989. Bait stations are located in good turkey habitat and are a minimum of one mile apart. Stations are pre-baited for one week and then surveyed daily, by vehicle, for two weeks. The average number of turkeys per bait station is the index used for annual comparisons of the population. The index has ranged from 2.1 to 10.4 turkeys at a bait station per visit. Camp Blanding WMA has one of the highest turkey densities of all Florida WMAs.

The existing hardwood forest adequately meets the hard mast requirements for turkeys. The combined hardwood and pine forests adequately meet roosting requirements. Wildlife habitat improvements from planned forest management activities such as prescribed burning and thinning operations in pine plantations will increase the present brood range by providing a variety of age classes in the herbaceous

cover. This herbaceous cover will attract a variety of insects that are an important source of protein for young turkey poults. The management of grass openings for a variety of successional stages of vegetation will increase the availability of insect and herbaceous food as well as nesting cover.

Feral hogs

Feral hog harvest tends to parallel hog population trends; and therefore, may fluctuate from year to year. Hog densities have varied within CBJTC from moderate to low levels. There are no bag or size limits. Allowing dog hunting generally on CBJTC likely helps reduce damage from feral hogs even if they do not remove a large number of hogs; feral hogs generally respond to the presence of hunting dogs by moving around more and causing less damage in one place.

4.6.5 Nuisance Wildlife

As discussed above, feral hog harvesting is crucial to the long-term health of CBJTC as they have the ability to cause large-scale damage to wildlife habitat. Feral hogs are not currently a major problem, but should be closely monitored particularly in the northern portion of the installation where wetlands and other riparian areas are more abundant.

Bats have recently become a problem as they are roosting in buildings and the south MOUT site. In hopes of relocating the bats, FLARNG has installed bat houses. However, it is unclear at this time if this is helping or if this is creating additional bat habitat. FLARNG will continue to monitor this situation. Further efforts may be necessary to minimize negative impacts from bats within buildings and other training infrastructure.

Nuisance wildlife problems will be evaluated in conjunction with USFWS and FFWCC personnel, as appropriate. Any solutions to nuisance wildlife problems will follow the IPMP (see **Section 4.8**).

Diseases affecting fish and wildlife may occur on the installation. As outlined in AR 200-1, installation natural resources personnel will consult with appropriate Army Veterinary Corps personnel and, if appropriate, USFWS and FFWCC regarding large-scale fish and wildlife deaths and unnatural behavior occurring on the installation.

4.7 Threatened and Endangered Species Management

GOAL TE: Manage rare species using an ecosystem approach, while maintaining the military mission at CBJTC

OBJECTIVE TE1: Conduct flora and fauna surveys as needed particularly for federal and state special status species where potential habitat exists.

OBJECTIVE TE2: Maintain diversity of habitat patches to provide a variety of disturbance regimes and habitat types to support a variety of rare species.

OBJECTIVE TE3: Use prescribed fire to maintain natural vegetation communities at CBJTC as numerous rare species at CBJTC benefit from a regular fire disturbance interval.

OBJECTIVE TE4: Maintain populations of RCW, eastern indigo snake, and other rare species by managing for large tracts of forest.

OBJECTIVE TE5: Sustain the RCW population at 25 potential breeding groups (PBGs) or more to avoid re-implementation of all military training restrictions.

OBJECTIVE TE6: Maintain populations of Florida scrub-jay, Curtiss' milkweed, little ladies' tresses, and other rare species by managing scrub habitat.

OBJECTIVE TE7: Maintain populations of Florida sandhill crane, snowy egret, little blue heron, Florida black bear, black creek crayfish, bald eagle, and other rare species by protecting riparian and wetland habitats.

This section presents information about the management of threatened, endangered, and other rare species that are documented on CBJTC. FLARNG is required to manage federally and state listed threatened and endangered species. Failure to protect federally listed species could lead to an ESA violation, which could negatively impact training land availability. A complete summary of rare species is provided in **Section 2.3.4**.

Primary Regulatory Drivers

- Endangered Species Act
- Bald and Golden Eagle Protection Act
- Florida Endangered and Threatened Species Act (Chapter 379.2291, F.S.)
- FAC 68A-27.003 and 68A-27.005
- FAC 5B-40

In accordance with AR 200-1 and DoDI 4715.03, FLARNG has conducted surveys for federally threatened and endangered species, federal candidate species, and state listed species at CBJTC (e.g. FLMNH 1996a, FLMNH 1996b, Bio-tech 2009). Of the 113 listed animal species and 561 listed plant species in Florida, 34 species protected under the ESA and/or Florida law are known to occur at CBJTC and eight are considered "high priority" management species. Species include 2 amphibian, 9 birds, 1 crustacean, 3 mammals, 4 reptiles, and 25 plants. The bald eagle is no longer federally or state listed; however, protections under the Bald and Golden Eagle Act are still in effect. Bald eagle nests have been found in several locations on Camp Blanding.

No federally designated critical habitat occurs currently within CBJTC. The 2004 amendments to the ESA included provisions to exclude critical habitat designations on DoD lands. Section 4(a)(3)(B) is not discretionary and mandates that the Secretary of Interior exclude designating critical habitat on "any lands or other geographical areas owned or controlled by the DoD, or designated for its use, that are subject to an INRMP prepared under section 101 of the SAIA, if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation." Installations should request exclusion from critical habitat initially through ARNG-ILE for review and concurrence and then to the appropriate USFWS office.

This section of the INRMP focuses on the management requirements of rare species identified as 'high priority' management species on CBJTC in **Tables 9** and **10** (see **Section 2.3.4**). Species-specific management plans and fact sheets for several of the listed species, when available, are included in **Appendix E** for additional information. Furthermore, a brief section on managing nonvascular plants (bryophytes and lichens) is provided below due to several rare and noteworthy species occurring on CBJTC and their dependence on a variety of habitats (see **Section 2.3.2**).

High priority was given to federally listed species known to occur at CBJTC. Florida panthers were not documented directly or indirectly during the most recent survey (Bio-tech 2009). According to USFWS, a single wild population in south Florida of 100-160 adult panthers is all that remains of this species, which had previously been found in most of the southeastern US (Godsea 2011). High priority management species include:

- federally endangered RCW
- federally endangered wood stork
- federally endangered Chapman's rhododendron
- federally threatened Florida scrub-jay
- federally threatened Eastern indigo snake
- federally threatened (due to similarity of appearance) American alligator
- federal candidate and state threatened gopher tortoise
- federal candidate striped newt

4.7.1 Federally Endangered Species

Red-cockaded Woodpecker: RCWs occur in association with mature, open-canopied pine forests dominated by longleaf pine, slash pine, loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), and occasionally other pine species. RCWs construct nest and roost cavities in live, old-growth pine trees, often infected with red-heart fungus, which enables the birds to excavate the cavities with greater ease. Additionally, pine stands and pine trees are the preferred foraging habitat and substrate. As of the end of the 2012 breeding season, CBJTC had 30 active RCW clusters and 27 potential breeding groups within the installation boundary. RCW clusters are found north and east of the Cantonment Area. See **Map 8** for 2012 RCW cluster locations and **Appendix D** for more information on RCW populations at CBJTC.

CBJTC has been designated as an "essential support" population in the USFWS (2003) *RCW Recovery Plan, 2nd Revision*. The future expansion of foraging and cluster habitat will be dependent upon habitat

restoration regarding hardwood removal, plantation thinning, and time for the existing tree stands to mature to a suitable size for RCW cavity construction. Expansion will be a slow process as the Post is currently near carrying capacity. However, there is potential to establish cluster sites in additional areas once restoration is complete and the tree stands age. Habitat management at CBJTC includes habitat restoration, wildland fire use, hardwood removal, and plantation thinning. Banding RCWs for translocation and group composition monitoring are also major components of RCW management.

Management Guidelines: The primary documents that outline the management requirements and training restrictions associated with the RCW at CBJTC include the *USFWS Biological Opinion (BO) on the US Army's "Biological Assessment of the Effects of the Proposed Revision of the 1996 Management Guidelines for the Red-cockaded Woodpecker on Army Installations*" (Costa 2007), *Management Guidelines for the Red-cockaded Woodpecker on Army Installations* (US Army 2007), *Biological Evaluation for Incidental Take in the RCW ESMC Update for the INRMP 2007-2012 for Florida Army National Guard (FLARNG) - CBJTC* (Robinson 2008), and the USFWS letter that modifies the BO by Costa (2007) and allows incidental take in accordance with the ESMC update (Hankla 2008). These documents were prepared in accordance with the *USFWS RCW Recovery Plan, 2nd Revision* (USFWS 2003), and a copy of them is included in **Appendix D**.

US Army (2007) guidelines establish baseline standards for Army installations in managing the RCW and its habitat, and recommend the development of an installation RCW ESMC to supplement these guidelines. FLARNG updated their ESMC to establish incidental take guidelines for CBJTC based on the new guidance documents. The amended ESMC establishes the removal of **all** training restrictions from RCW clusters that are not necessary to maintain CBJTC's recovery goal of 25 PBGs. For example, if 30 clusters are required to maintain the 25 PBGs, then all 30 clusters will continue to be under the "protected" status in accordance with the RCW BO and management guidelines. In this example any cluster above the amount required to maintain the 25 PBGs (i.e., clusters >30) would go into the "unrestricted" status. The "unrestricted" clusters would be invisible to military personnel training in the field except for the nest tree during the breeding season (April – July), which will remain temporarily marked and considered "protected" (Robinson 2008). USFWS concurred on 3 December 2008 with the ESMC update for incidental take at CBJTC (Hankla 2008). CBJTC has currently met its recovery goal of 25 PBGs. The following management measures will be implemented for RCWs at CBJTC:

- Continue to implement habitat restoration efforts for the RCW to allow for the expansion of foraging and cluster habitat to the extent possible through the forestry and wildland fire management programs (see **Sections 4.4** and **4.5**).
- Manage and monitor flame length and fire intensity in the area around each cavity tree. In addition, all cavity trees should be cleared around before the fire and pre-lit if possible during the day of the burn.
- Continue to participate in the Southern Range Translocation Cooperative. Translocations of RCWs are critical to achieve recovery (Costa 2007).
- Prohibit training activities within "protected" RCW cluster sites and "protected" nest trees in "unrestricted" clusters in accordance with the *Management Guidelines for the RCW on Army Installations* (US Army 2007) (see **Appendix D**).

- Allow **all** types of training within "unrestricted" clusters in accordance with the ESMC update for incidental take at CBJTC (Robinson 2008) and USFWS's BO revision (Hankla 2008), with the exception of "protected" nest trees that will be temporarily double banded every year during the breeding season (April-June).
- Continue to identify all "protected" clusters by signs where roads and trails intersect cluster boundaries and double white tree banding on all start and cavity trees.
- Re-implement **all** training restrictions if CBJTC falls below the recovery goal of 25 PBGs, and contact the USFWS Jacksonville Field Office.

Wood Stork: Although previously observed, no wood storks were documented in the most recent rare species survey at CBJTC. The southeast US population of wood storks is believed to be a single population that responds to environmental changes and relocates its rookery sites accordingly. Although the federally endangered wood stork could potentially be found onsite foraging, it is unlikely that wood storks inhabit CBJTC because typical nesting and roosting habitat are not present. Furthermore, no roosting sites are known within 20 miles of the installation (Bio-tech 2009).

Management Guidelines: No specific management measures for the wood stork are included as this species would likely only be using CBJTC as a stopover location due to the lack of nesting and roosting habitat. Wetland and riparian habitat management will benefit this species (see **Section 4.4.7**) along with other state listed wading birds (e.g., snowy egrets, little blue herons).

Chapman's rhododendron: Chapman's rhododendron is endemic to Florida (Chafin 2000) and is known to occur currently within two areas of the panhandle and at CBJTC (Bio-tech 2009). This plant is found in pinelands that are favorable for commercial production and borders of bay swamps (Chafin 2000). Approximately 30 clumps of Chapman's rhododendron are located just east of Avenue B between Jacksonville Street and Arcadia Street (Bio-tech 2009).

Management Guidelines: Timber harvesting, site preparation and pine planting will harm this plant. To protect and enhance this species at CBJTC, the following management actions are recommended in areas where this species is known to occur:

- Use prescribed fire to stimulate the flowering and sprouting of this plant.
- Avoid tree planting, soil disturbance, and other land clearing activities (Chafin 2000).

4.7.2 Federally Threatened Species

Florida Scrub-Jay: CBJTC is located at the northern limits of the Florida scrub-jay's current population range; the nearest population of significant size is nearly 25 miles south of CBJTC (McMillian et al. 2010). The Florida scrub-jay generally inhabits fire maintained oak scrub on well-drained, sandy soils in open areas without a dense canopy. Saw palmetto, sand pine, and rosemary generally occur within their desired habitat. (Hipes et al. 2000, Bio-tech 2009). An isolated breeding pair occurs on CBJTC. However, it is unlikely even with the enhancement of scrub habitat on the installation that a substantial increase in population will occur due to CBJTC's distance from any significant populations making natural colonization unlikely (McMillian et al. 2010).

Management Guidelines: Population declines of the Florida scrub-jay are the result of habitat loss from agriculture, development, and fire suppression. Although a large-scale increase in population may not be possible, the following management actions are recommended to maintain and/or enhance suitable habitat for this species at CBJTC:

- Monitor the status of this species as its status could change rapidly.
- Maintain existing scrub habitat at CBJTC through the use of prescribed fire (see **Section 4.4.6**). Prescribed fire every 8 to15 years that burns patchily, where few territories are burned completely, is most favorable (Hipes et al. 2000).
- Consider expanding potential habitat by managing overgrown patches of sand pine scrub or establishing habitat in the former mining area assuming sufficient acreage is available. See **Section 4.4.5** for vegetation management within the mining area.
- Consider surrounding habitats before implementing measures to enhance Florida scrub-jay habitat and ensure sufficient buffers exist (e.g., minimum of 1,000 feet). For example, this species will not use scrub areas within 300 feet of heavily forested areas because avian predators are more likely to occur.

Eastern Indigo Snake: The eastern indigo snake uses a wide range of habitats including scrub, sandhill, and wetland habitat. However, this snake requires large tracts of land to survive. This snake is known to use gopher tortoise burrows (see below) as a refuge from the elements, including cold temperatures and fire, but is also known to take refuge in stump holes. In northern Florida, it winters mostly in gopher tortoise burrows (Hipes et al. 2000). Eastern indigo snakes have been documented in sandhill habitat, scrub, pine flatwoods, pine plantations, and near gopher tortoise burrows at CBJTC (Bio-tech 2009, FDMA 2011).

Management Guidelines: Eastern indigo snakes are threatened due to habitat loss and degradation resulting from land clearing activities, vehicular traffic, and other development. CBJTC contains a large amount of suitable habitat; however, FLARNG has limited information on indigo snakes locations and distributions as only a few have been observed during previous surveys (FDMA 2011, Bio-tech 2009).

The following management actions are recommended for this species at CBJTC:

- Obtain a better understanding of overall population abundance and distribution within CBJTC by implementing a multi-year survey and the new USFWS survey protocols for eastern indigo snakes.
- Protect large areas of suitable habitat (i.e., more than 5,000 acres).
- Avoid construction of new roads within unfragmented habitat.
- Maintain gopher tortoise populations, and protect gopher tortoise burrows and dead stumps as they are used as den habitat.
- Implement forest management strategies discussed in **Section 4.4**.
- Educate site users to prevent collection or harm to these snakes.

American Alligator: The American alligator is listed as threatened by USFWS due to its similarity in appearance to the federally endangered American crocodile (*Crocodylus acutus)*. The American alligator inhabits fresh and brackish marshes, ponds, lakes, rivers, swamps, bayous, and large spring runs. CBJTC contains habitat typically used by the alligator and was observed in several locations within South and East Post (Bio-tech 2009).

Management Guidelines: Although this species was once in danger of extinction, it was declared fully recovered in 1987. Because some related animals (e.g., crocodile and caimans) are similar and a concern, USFWS continues to regulate the harvest and trade of alligators (USFWS 2008). The American alligator will benefit from wetland and riparian habitat management (see **Section 4.4.7**).

4.7.3 Federal Candidate Species

Gopher Tortoise: The gopher tortoise is a federal candidate species for listing as a threatened species and a state-listed threatened species that is typically found in dry upland habitats, such as sandhill, scrub, and pine flatwoods. Gopher tortoises excavate deep burrows for refuge from predators, weather, and fire (Hipes et al. 2000). The gopher tortoise is considered a keystone species because their burrows provide refuge for more than 300 animal species that neither harm nor benefit the gopher tortoise, including listed species such as the eastern indigo snake, Florida pine snake, Florida mouse, and gopher frog (FDMA 2011). The gopher tortoise population is thriving at CBJTC; the installation has been used in the past for the relocation of gopher tortoises displaced by development in northeastern Florida.

Through appropriate habitat management, CBJTC will manage existing high quality habitat as well as improve and restore degraded habitat in xeric uplands and natural communities that support the gopher tortoise (see **Sections 4.4.3, 4.4.4,** and **4.4.6**). Frequent prescribed fire will be the primary tool, but other treatments, such as mechanical and chemical removal of hardwoods, replanting longleaf pine or native grasses and other ground cover in appropriate areas, and plantation thinning will be used when necessary. Maintaining these communities in a manner that replicates their natural form and function helps ensure they meet the needs of the gopher tortoise and the other species dependent on these communities.

Management Guidelines: Gopher tortoises are vulnerable to several threats within their range, including habitat degradation and loss (FFWCC 2007). The following management actions are recommended.

- Maintain a 25-foot boundary around all gopher tortoise burrows within the vicinity of projects and military training that have the potential to collapse burrows.
- Identify these burrows with high visibility signs indicating the 25-foot boundary where gopher tortoises will not be relocated during a project or military training.
- Manage fuel loads by implementing dormant season burns in units with high fuel loads and conduct maintenance burns during the growing season on a 1-3 year rotation.
- Natural stands will be maintained with their uneven-age or several-age structure. At cutting cycles of approximately 25 years, and stand density will be reduced to basal areas between 60 and 80 square feet (sq-ft) per acre.

- Underplant turkey oak stands with containerized longleaf pine seedlings if natural regeneration is less than 200 longleaf pine seedlings per acre. Where practical and necessary, treatments such as mechanical thinning and herbicide treatment may be used to reduce the hardwood midstory.
- Harvest and remove on a large scale existing sand pine stands while retaining any volunteer or original longleaf pines. After 2-3 years the stands will then be burned and/or chopped, and replanted with containerized longleaf pine.
- Control invasive and exotic species and noxious weeds through early detection, isolation of infested areas, and control of individual plants with physical, chemical, or mechanical means, depending on the species.

Permitting: In addition to its status as a federal candidate species, the gopher tortoise is listed by the state of Florida as threatened. Because gopher tortoise habitat can overlap lands used by people for agriculture, industrial, or residential purposes, the FFWCC has created a permitting process for the relocation of gopher tortoises from locations where scheduled operations could endanger the animal or its burrows.

Military training and readiness activities on-post often develop rapidly, shift quickly, and bear unique mission requirements. This fact necessitated the development of a set of guidelines for CBJTC to successfully maintain its training mission while complying with the FFWCC's gopher tortoise permitting and management requirements. In order to sustain no net loss to training while maintaining gopher tortoise habitat and population numbers on the installation, Camp Blanding and FFWCC collaborated to develop in-depth parameters to comply with the Gopher Tortoise Permitting Guidelines, April 2008 – Revised September 2012. The details of this agreement and the data collected to support it can be found in **Appendix N**.

Striped Newt: In June 2011 the striped newt was announced as a federal candidate for listing as a threatened species. This pond breeding amphibian prefers ephemeral ponds surrounded by upland habitats of pine, scrubby flatwoods, and scrub (Christman and Means 1992). Longleaf pine stands with intact ground cover containing wiregrass are the preferred upland habitat, followed by scrub and then flatwoods. As land use changes have continued to eliminate the sandhill and scrub habitat of the striped newt, these populations have become more isolated and vulnerable (Means 2008). During 2005, FFWCC collaborated with several land managers to get a better understanding on known and potential breeding sites. CBJTC was identified as one of the five stronghold sites in Florida for the striped newt (Johnson and Owen 2005).

Management Guidelines: The loss of habitat through fragmentation, fire suppression, and ditching of ponds is considered the greatest risk to this species. The striped newt habitat is fire-dependent; fire is necessary to maintain an open canopy, reduce forest floor litter, and prevent hardwood invasion.

- Maintain and enhance natural upland and wetland vegetation communities using the management strategies set forth in **Section 4.4**.
- Use prescribed fire in dry breeding ponds and adjacent uplands to maintain suitable habitat for this fire-dependent species (see **Section 4.5**).

- Protect areas with open canopy longleaf pine and native ground cover.
- Avoid extensive silviculture operations and site preparation that alters hydrology.

4.7.4 General Management Strategies

The following general guidelines will be followed to facilitate the military mission and natural resources management objectives while minimizing negative impacts on rare species and their habitats:

- Conduct military training and natural resources management in accordance with the current RCW BO (Costa 2007), RCW management guidelines for Army installations (US Army 2007), CBJTC ESMC update for incidental take (Robinson 2008, Hankla 2008) (see **Appendix D**). If PBGs fall below the recovery goal of 25, **all** training restrictions must be re-implemented and CBJTC-ED will notify USFWS.
- Maintain a habitat mosaic using an ecosystem management approach that incorporates prescribed fire, forestry, and invasive species control to support a diversity of rare species.
- Continue to manage for large tracts of forest.
- Use prescribed fire to restore sandhill, flatwoods, and other natural and rare communities dependent on a regular fire interval for indigenous and rare species (see **Sections 4.4 and 4.5**).
- Minimize the amount of herbicides used for invasive species control.
- Maintain corridors between wetlands, lakes, and other waterbodies to provide for wildlife movement between areas.
- Update biological inventories as needed as the occurrence of threatened and endangered species is subject to change over time as a result of either recruitment, identification of additional protected species, or the change in status of species currently present at CBJTC.
- Implement a 1,500-foot radius protection zone around active bald eagle nests. If new land disturbing activities are proposed within 660 feet of a bald eagle nest, refer to FFWCC's (2008) *Bald Eagle Management Plan* which is included in **Appendix E**.
- Continue to coordinate and work with FFWCC on rare species management.
- Incorporate information on rare species protection and any related restrictions in environmental awareness documents and briefings to educate site users and prevent incidental take.

4.8 Invasive Species and Integrated Pest Management

GOAL IN: Minimize impacts of invasive and pest species, while minimizing use of chemicals to manage those species, utilizing an integrated pest management approach.

OBJECTIVE IN1: Control and minimize the impact of invasive plant and animal species.

OBJECTIVE IN2: Limit connectivity between disturbed sites to minimize spread of invasive species and pests.

OBJECTIVE IN3: Monitor low priority invasive species for their presence and/or spread and modify their priority as needed.

Primary Regulatory Drivers

- Federal Noxious Weed Act
- Federal Insecticide, Fungicide & Rodenticide Act
- National Aquatic Invasive Species Act
- AR 200-1
- EO 13112
- FAC 5B-57 (Noxious Weeds)
- FAC 5B-64 (Prohibited Aquatic Plants)

Invasive and exotic species may include plants, insects, or animals. An **invasive** species is defined as "any native or alien species whose lack of control or introduction does or is likely to cause economic or environmental harm or harm to human health." An alien (or **non-native**) species is defined as a "species including its seeds, eggs, spores, or other biological material capable of propagating that species that is not native to that ecosystem (EO 13112)." Because of their invasive capacity, many exotic species have the ability to spread rapidly through ecosystems since their natural predators are often not present. Such species often retard natural succession and reforestation and generally cause a reduction of biological diversity in natural ecosystems.

Noxious weeds are defined as "any living stage (e.g., seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to or not widely prevalent in the United States, and can directly or indirectly injure crops, other useful plants, livestock, or poultry or other interests of agriculture, including irrigation, or navigation or the fish and wildlife resources of the United States or the public health (Federal Noxious Weed Act of 1974)."

4.8.1 Integrated Pest Management

CBJTC has an Integrated Pest Management (IPM) Program implemented by FLARNG IPMP (FLARNG 2011b). IPM is the use of multiple techniques in a compatible manner to avoid damage and minimize adverse environmental affects while obtaining control of target pests. The goal of IPM is to utilize non-chemical procedures to control pests, including both invasive and exotic plant and animal species.

Typically a combination of the following IPM techniques is required to resolve a problem on a sustained basis:

- *mechanical control*, which alters environments in which pests live, traps or removes pests (*e.g.*, glue boards and live-traps) from where they are not wanted, or excludes pests from where they are not wanted (*i.e.,* screening);
- *cultural control*, which manipulates environmental conditions to suppress or eliminate pests (*e.g.,* removal of food scraps or spreading manure on fields);
- *biological control*, which uses predators, parasites, or disease organisms to control pests; and
- *chemical control*, which relies on pesticides and/or herbicides to kill pest and/or undesirable species of plants.

The IPMP includes pest identification and management requirements, outlines the resources necessary for surveillance and control, and describes the administrative, safety, and environmental requirements of the program. This plan serves as a tool to reduce pesticide use, enhance environmental protection, and maximize the use of IPM techniques. It is the policy of FLARNG to minimize the use of all pesticides, including herbicides, at the installation. CBJTC has no dedicated pest management personnel and meets these requirements by additional duty staffing, use of supervised inmate support, and contracted pest management.

FLARNG IPMP identifies all sites at CBJTC where pest control or pest management operations are conducted, which pests are controlled or have potential for causing pest problems, and areas of responsibility. The IPMP discusses the following priorities of pest control operations in great detail; therefore, information will not be duplicated in this plan:

- Disease Vectors and Public Health Pests: mosquitoes; ticks; widow spiders; fire ants; bees, hornets, yellow jackets, and wasps; scorpions; poisonous snakes; American alligators; skunks, raccoons, bats, stray cats, and dogs.
- Pest of Real Property: subterranean termites; birds and bats roosting in structures; squirrels, rats, and mice.
- Stored Food Product Pests: beetles, moths, and rodents.
- Other Undesirable Vegetation: weeds; oaks and other non climax forest species.
- Animal Pests: mice and rats; skunks and raccoons; stray dogs, and cats; Bird Aircraft Strike Hazard species.
- Household and Nuisance Pests: rodents, crawling insects, and spiders.
- Ornamental Plant and Turf Pests: insect pests such as southern pine beetle, etc.
- Other Pest Management Requirements: carcass removal, odor control.

A permitting program has been established under Chapter 62C-20, FAC for Aquatic Plant Management. No person or public agency shall control, eradicate, remove, or otherwise alter any aquatic weeds or

plants in waters of the state unless a permit for such activity has been issued by FDEP or unless the activity is in waters expressly exempted by FDEP rule. Before controlling aquatic plants, CBJTC must contact the appropriate regional office to determine if a permit is required.

4.8.2 Guidelines for Invasive Species Management

Invasive, non-native species and noxious weeds have the capability to significantly impact native vegetation by changing fuel loads, flammability, and outcompeting native species. A key element of INRMP implementation is to ensure “no net loss” of military training capability. Management of undesirable species is necessary to maintain military training areas in usable condition. In addition, uncontrolled animal pests can significantly damage the pine stands and impact the forestry program and/or become health hazards, which could threaten the military mission.

The task of controlling invasive and exotic species and noxious weeds is often expensive, lengthy, and risky because total eradication is required to prevent reestablishment. However, in accordance with laws and regulations pertaining to the management of these species, FLARNG will work to prevent the introduction of these species and take measures to control them in an economically and environmentally sound manner. General management strategies are as follows:

- Implement BMPs to minimize land disturbances that favor invasion and re-vegetate disturbed areas with native species.
- Local rock/substrate should be used instead of non-indigenous rock when practical for maintenance or construction projects.
- Utilize mulches from CBJTC or certified weed-free sources to facilitate the establishment of native groundcover on impoverished soils.
- Maintain biodiversity and undisturbed habitat to maximize resilience to and competition with invasive species.
- Control invasive and exotic species and noxious weeds through early detection, isolation of infested areas, and control of individual plants with physical, chemical, or mechanical means, depending on the species.
- Favor basal application and spot treatment, to the extent possible, to prevent adverse impacts to native plants and wildlife.
- Avoid herbicide use in and around wetlands and other surface waters (see **Section 4.3**).
- Do not use invasive plant, non-native species in landscaping (see **Section 4.4.9**).

It is important to prevent the initial spread of invasive and exotic species and address the spread of such species as early as possible to reduce the amount of required herbicide applications. CBJTC-ED should evaluate the threat of invasive species as well as the environmental impacts of herbicide usage (if required) to the environment prior to implementing any eradication and/or control program.

One of the most effective ways of preventing new invasive species is to limit all landscaping plants to only native species. Landscaping is limited to the cantonment area on CBJTC. For information about

landscaping on CBJTC, refer to **Section 4.4.9**. Native plants suitable for planting in Florida are available at http://www.fnps.org/plants and additional guidance is available in *The Florida Yards & Neighborhoods Handbook* (IFAS Extension 2009) at http://floridayards.org/landscape/2009_FYN_Handbook_non-508_web_vSept09.pdf.

4.8.3 Potential and Known Invasive Species

There have been numerous surveys that have identified non-native plants and animals on CBJTC, including in-house observations during other activities. Of the species documented on CBJTC, three species are on the USDA list for federal noxious weeds. There are eight species on the state noxious weed list (FDACS 2006) and four species that are prohibited aquatic plants (FDCAS 2008).

There are numerous sources discussing invasive species in Florida and that indicate county occurrences for invasive species. **Table 14** presents a list of invasive species with the potential to occur in Clay County; the list was compiled from the following sources:

- iMapInvasives geotracking invasive exotic species: http://www.imapinvasives.org/
- Early Detection and Distribution Mapping System: http://www.eddmaps.org/tools/countyplants.cfm?id=us_fl_12019
- Nonindigenous Aquatic Species: http://nas.er.usgs.gov/queries/SpeciesList.aspx?group=&size=50&sortBy=1&status=0&fmb=0&pathway=0&stcolist=FL%20--%20Clay
- First Coast Invasive Working Group: http://www.floridainvasives.org/FirstCoast/Distribution/index.html

Table 14 also indicates whether the species has been documented on CBJTC and what the management priority and goal is for that invasive species (if there is one). Most of the invasive species that are present are difficult to eradicate, so the focus is on maintaining healthy native habitats resilient to invasion by non-native species, with targeted eradication and control of high priority species.

Table 14. Potential Non-Native Species at CBJTC					
Scientific Name	**Common Name**	**Invasive Status**	**On CBJTC**	**Management Goal**	**Priority**
Plants					
Albizia julibrissin	Mimosa	FLEPPC1	✓	Monitor	4
Alternanthera philoxeroides	Alligatorweed	PAP1, FLEPPC2	✓		
Ardisia crenata	Coral ardisia	FLEPPC1	✓	Detect & Eradicate	5
Asparagus aethiopicus	Asparagus fern	FLEPPC1			
Begonia cucullata	Wax begonia	FLEPPC2	✓		
Bidens pilosa	Hairy beggarticks		✓		
Broussonetia papyrifera	Paper-mulberry	FLEPPC2	✓		
Casuarina equisetifolia	Australian pine	SNW, PAP1, FLEPPC1	✓	Detect & Eradicate	5
Cinnamomum camphora	Camphortree	FLEPPC1	✓	Monitor	4
Clematis terniflora	Sweet autumn virginsbower	FLEPPC2			
Cnicus benedictus	Blessed thistle				
Colocasia esculenta	Wild taro	FLEPPC1	✓	Control	2
Crotalaria spectabilis	Showy rattlebox		✓		
Cuphea carthagenensis	Tarweed cuphea				
Dactyloctenium aegyptium	Crow-foot grass	FLEPPC2	✓		
Dioscorea bulbifera	Air-potato	SNW, FLEPPC1	✓	Control	3
Eichhornia crassipes	Waterhyacinth	PAP1, FLEPPC1	✓	Monitor	4

Table 14. Potential Non-Native Species at CBJTC

Scientific Name	Common Name	Invasive Status	On CBJTC	Management Goal	Priority
Elaeagnus pungens	Thorny olive	FLEPPC2	✓		
Eleusine indica	Goosegrass		✓		
Emilia fosbergii	Cupid's-shaving-brush				
Eriobotrya japonica	Loquat				
Hedera helix	English ivy				
Hydrilla verticillata	Hydrilla	FNW, PAP1, FLEPPC1			
Hygrophila polysperma	Miramar weed	FNW, PAP2, FLEPPC1			
Imperata cylindrica	Cogongrass	FNW, SNW, FLEPPC1	✓	Eradication	1
Indigofera hirsuta	Hairy indigo		✓		
Kummerowia striata	Common lespedeza		✓		
Lantana camara	Lantana	FLEPPC1	✓	Monitor	4
Ligustrum lucidum	Glossy privet	FLEPPC1			
Ligustrum sinense	Chinese privet	FLEPPC1	✓		
Lonicera japonica	Japanese honeysuckle	FLEPPC1	✓	Detect & Eradicate	5
Ludwigia grandiflora	Water primrose				
Ludwigia peruviana	Primrose-willow	FLEPPC1			
Lygodium japonicum	Japanese climbing fern	SNW, FLEPPC1	✓	Eradicate	1
Lygodium microphyllum	Old world climbing fern	FNW, SNW, FLEPPC1			

Table 14. Potential Non-Native Species at CBJTC

Scientific Name	Common Name	Invasive Status	On CBJTC	Management Goal	Priority
Macfadyena unguis-cati	Catclaw-vine	FLEPPC1			
Medicago lupulina	Black medic		✓		
Melia azedarach	Chinaberry	FLEPPC2	✓	Control	2
Melilotus officinalis	Yellow sweetclover				
Melinis minutiflora	Molasses grass	FLEPPC2	✓		
Melinis repens	Natalgrass	FLEPPC1	✓	Monitor	4
Morus alba	White mulberry				
Myriophyllum aquaticum	Brazilian watermilfoil				
Myriophyllum spicatum	Eurasian watermilfoil	PAP1, FLEPPC2			
Nandina domestica	Sacred bamboo	FLEPPC1	✓		
Nasturtium officinale	Water-cress				
Nephrolepis cordifolia	Narrow swordfern	FLEPPC1			
Orobanche minor	Small broomrape	FNW, SNW			
Paederia foetida	Skunk-vine	SNW, FLEPPC1			
Panicum repens	Torpedo grass	FLEPPC1	✓	Monitor	4
Paspalum urvillei	Vaseygrass		✓		
Pennisetum purpureum	Elephant grass	FLEPPC1	✓	Detect & Eradicate	5
Phalaris canariensis	Canarygrass				
Phyllanthus urinaria	Chamber bitter		✓		

Table 14. Potential Non-Native Species at CBJTC

Scientific Name	Common Name	Invasive Status	On CBJTC	Management Goal	Priority
Phyllostachys aurea	Golden bamboo	FLEPPC2			
Pistia stratiotes	Waterlettuce	PAP2, FLEPPC1			
Plantago lanceolata	Buckhorn plantain		✓		
Polypogon monspeliensis	Rabbitfoot polypogon				
Pueraria montana	Kudzu	SNW, FLEPPC1	✓	Control	3
Ripidium ravennae	Ravennagrass				
Rosa bracteata	Macartney rose				
Ruellia simplex	Britton's wild petunia				
Rumex crispus	Curly dock		✓		
Sacciolepis indica	Glenwoodgrass		✓		
Salvinia minima	Water spangles	FLEPPC1			
Salvinia molesta	Giant salvinia	FNW, SNW, PAP1			
Schinus terebinthifolius	Brazilian pepper tree	SNW, PAP1, FLEPPC1	✓	Detect & Eradicate	5
Senna occidentalis	Coffee senna		✓		
Sesbania punicea	Red sesbania, rattlebox	FLEPPC2	✓	Eradicate	2
Setaria pumila	Yellow foxtail	FNW	✓		
Solanum viarum	Tropical soda apple	FNW, SNW, FLEPPC1	✓	Detect & Eradicate	5
Sorghum halepense	Johnson grass		✓	Detect & Eradicate	5
Tradescantia fluminensis	White-flowered spiderwort				

Table 14. Potential Non-Native Species at CBJTC

Scientific Name	Common Name	Invasive Status	On CBJTC	Management Goal	Priority
Triadica sebifera	Chinese tallowtree	SNW, FLEPPC1	✓	Eradicate	2
Trifolium campestre	Large hop clover		✓		
Urochloa mutica	Para grass	FLEPPC1	✓		
Verbena bonariensis	Tall vervain				
Vernicia fordii	Tungoil tree				
Wisteria sinensis	Chinese wisteria	FLEPPC2			
Xanthosoma sagittifolium	Arrowleaf elephant's ear	FLEPPC2			
Animals					
Canis familiaris	Feral dog		✓	Eradicate	3
Felis catus	Feral cat		✓	Eradicate	3
Mus musculus	House mouse				
Rattus norvegicus	Norway rat		✓	Eradicate from Structures	1
Rattus rattus	Black rat		✓	Eradicate from Structures	1
Sus scrofa	Feral hog		✓	Control	3
Vulpes vulpes	Red fox		✓		
Rhinella marina	Cane toad				
Osteopilus septentrionalis	Cuban treefrog				
Eleutherodactylus planirostris	Greenhouse frog		✓		

Table 14. Potential Non-Native Species at CBJTC

Scientific Name	Common Name	Invasive Status	On CBJTC	Management Goal	Priority
Anolis sagrei	Brown anole		✓		
Passer domesticus	House sparrow		✓		
Sturnus vulgaris	European starling		✓		
Xyleborus glabratus	Redbay ambrosia beetle				
Agrilus planipennis	Emerald ash borer				

FNW = Federal Noxious Weed from USDA Animal and Plant Health Inspection Service (USDA 2010)

SNW = State Noxious Weed (Rule 5B-57.007 FAC, FDACS 2006)

PAP1 = Prohibited aquatic plant, Class 1 (Prohibited from possession; Rule 5B-64.011 FAC; FDACS 2008)

PAP2 = Prohibited aquatic plant, Class 2 (Limited possession)

FLEPPC1 = Category 1 species identified by the Florida Exotic Pest Plant Council (FLEPPC) (invasive plant altering native communities) (FLEPPC 2011; http://www.fleppc.org/list/11list.html

FLEPPC2 = Category 2 species identified by the FLEPPC (invasive plant species increasing in abundance but not altering native plant communities)

Non-native animals from http://myfwc.com/wildlifehabitats/nonnatives/.

CBJTC Priority: 1 = programmed eradication, 2 = reasonable control efforts, 3 = opportunistic control, 4 = monitor and evaluate impact annually, 5 = early detection

4.8.4 Priority Invasive Plant Species

There are two invasive plant species considered very high (Priority 1) and four considered high priority (Priority 2) for management at CBJTC: cogongrass (*Imperata cylindrica*), Japanese climbing fern (*Lygodium japonicum*), Chinese tallow tree (*Triadica sebifera*), red sesbania (*Sesbania punicea)*, wild taro (*Colocasia esculenta*) and Chinaberry tree (*Melia azederach*). One of the primary sources of information about managing invasive plants in Florida is *Integrated Management of Nonnative Plants in Natural Areas of Florida* by Langeland et al. (2011) available at http://edis.ifas.ufl.edu/wg209.

Prescribed fire may be applied as an invasive plant management tool; however, prescribed burning affects whole plant communities, not just the target invasive plant species. Consequently, controlling invasive plants with fire requires strategies that address invasive plant species at the population level in addition to all plant species at the community level. In general, as an invasive species management tool, prescribed fire is used to both reduce the dominance of a target invasive plant species, and to increase the dominance and diversity of desirable plant species. However, the effect of fire on an invasive plant species depends on the biological characteristics of the target species. Furthermore, the immediate and long-term response of plant communities is influenced by pre- and post- fire climate variables, activities of other taxa, management activities, natural and human-caused disturbances, as well as other environmental variables. Available information regarding prescribed fire as a means of invasive species control is provided below for both high and medium priority invasive species.

4.8.4.1 Cogongrass (Priority 1)

Cogongrass, a perennial grass native to Southeastern Asia, has become a serious problem in the southeastern US and is considered one of the worst noxious weeds in the world. It spreads by both seed and rhizomes and can displace other vegetation in forests, rangelands, pastures, roadsides, and natural areas. There is the potential that it will invade areas that are not intensively managed, making it difficult to re-establish native habitat. It is fairly easy to kill the aboveground biomass; however, it is very difficult to get the herbicide to move to the belowground plant parts that are deep within the soil.

There are many sources of information about control methods and recommendations in Florida. The following is a brief list of available resources for cogongrass.

- Cogongrass Biology, Ecology and Management in Florida: http://www.cogongrass.org/WG20200.pdf
- Biology and Management of Cogongrass (University of Florida): http://edis.ifas.ufl.edu/fr252
- FFS, Beware of Cogongrass: http://www.floridaforestservice.com/forest_management/fh_invasives_cogon.html
- Cogongrass website: http://www.cogongrass.org
- A Cogongrass Management Guide (Conference Proceedings 2007): http://myfwc.com/media/132151/A_Cogongrass_Management_Guide.pdf

- Center for Aquatic and Invasive Plants: http://plants.ifas.ufl.edu/node/199
- FLEPPC: http://www.fleppc.org/ID_book/Imperata%20cylindrica.pdf
- FFWCC: http://myfwc.com/wildlifehabitats/invasive-plants/weed-alerts/cogon-grass/

Management recommendations for cogongrass generally include:

- ***Prevention:*** Avoid soil disturbance, timber harvest, fire, etc. unless as a part of a specific treatment regime. Always clean equipment after operating in infested areas.
- ***Control:*** To eliminate cogongrass, the rhizomes must be destroyed to avoid regrowth. An integrated approach that combines burning, tillage (mechanical disturbance) and chemical applications provide the best solution for cogongrass management.
    - Initially, cogongrass should be burned or mowed to remove excess thatch and older leaves. Do not mow when seed heads are present. Do not burn without a follow-up herbicide treatment. This initiates regrowth from the rhizomes, thereby reducing rhizome biomass. It also allows herbicides to be applied to only actively growing leaves, maximizing herbicide absorption into the plant. Ideally, burning should take place in the summer. A one-to-four month regrowth period has been shown to provide a sufficient level of leaf biomass for herbicide treatment. Thus, herbicide applications should be targeted in the late summer/early fall – approximately 1 month prior to the average killing frost. The herbicides glyphosate or imazapyr have been shown to provide the best control.
    - If tillage can be incorporated, then a discing treatment directly following a burn is the best approach. This will further deplete the rhizome reserve through dessication and increase the number of shoots per given area. A one-to-four month regrowth period before herbicide treatment is also needed with this approach as well.
    - Once good control of cogongrass has been achieved, it is essential to introduce desirable vegetation as quickly as possible to prevent cogongrass from re-infesting the area. However, cogongrass will eventually begin to re-infest, regardless of control. Therefore, diligence and persistence are essential to remove/treat re-infested areas before this grass regains a foothold.
- ***Timing:*** If you can only do one treatment a year, apply your treatment in the fall before the first frost. Otherwise, re-treat regularly whenever adequate foliar re-sprout has occurred.

4.8.4.2 Japanese climbing fern (Priority 1)

Japanese climbing fern is a non-native, invasive vine which since its introduction around 1900 has become established throughout the southeastern Coastal Plain from the Carolinas to Texas and Arkansas. This fern is native to eastern Asia from Japan and west to the Himalayas, and occurs in sunny

or shady locations, usually in damp areas such as the edges of swamps, marshes, lakes, creeks, hammocks, and upland woodlands.

There are many sources of information about control methods and recommendations in Florida. The following is a brief list of available resources for Japanese climbing fern.

- Center for Aquatic and Invasive Plants: http://plants.ifas.ufl.edu/node/639
- Biology and Control of Japanese climbing fern: http://edis.ifas.ufl.edu/fr280
- FLEPPC: http://www.fleppc.org/ID_book/Lygodium%20japonicum.pdf
- FFWCC: http://myfwc.com/wildlifehabitats/invasive-plants/weed-alerts/japanese-climbing-fern/

Management recommendations for Japanese climbing fern generally include:

- ***Prevention:*** Monitoring is very important in the strategy for the management of these climbing ferns. Constant monitoring can aid in the detection of new populations. Steps to prevent spore movement or formation are the key in controlling climbing fern. Since the microscopic spores are easily transported via clothing, wind, and possibly water, contamination is a constant threat. Control measures should be employed when the fern is not producing spores, which occurs in the late summer/early fall. If control measures must be employed during spore formation and dispersal, then these areas should be treated at a time when workers will not be traveling to other sites in the same day. Take care not to drive equipment through the fern foliage, as this will also help to minimize spore movement.
- ***Control:*** Fire is not thought to be an effective means for control because the fern re-grows quickly following fires. Chemical control is more effective. Combinations of glyphosate and metsulfuron methyl were generally more effective than combinations of glyphosate and imazapyr. Control of Japanese climbing fern improves linearly as the glyphosate product rate is increased from 1 percent to 4 percent of the spray solution. Be sure to include a non-ionic surfactant at 0.25 percent (10 milliliters or 2 teaspoons per gallon of spray solution). A combination of these herbicides has provided good control when applied in the fall of the year before a killing frost.

4.8.4.3 Chinese tallow tree (Priority 2)

Chinese tallow was introduced to the US from eastern Asia, where it has been cultivated for 14 centuries as an oilseed crop. This tree displaces native species and changes natural community structures on the lands it invades. Aggressive efforts have removed this species from all known localities in CBJTC, but monitoring for new sites and new seedlings sprouting at old sites needs to continue. Periodic visual inspections should be sufficient to monitor Chinese tallow tree populations.

There are many sources of information about control methods and recommendations in Florida. The following is a brief list of available resources for Chinese tallow tree.

- Chinese Tallow Management Plan For Florida 2005: http://www.fleppc.org/Manage_Plans/Tallow_Plan.pdf

- Center for Aquatic and Invasive Plants: http://plants.ifas.ufl.edu/node/399
- Biology and Management of Chinese Tallow Tree: http://edis.ifas.ufl.edu/fr251
- USFS: http://na.fs.fed.us/fhp/invasive_plants/weeds/chinese_tallow.pdf
- FLEPPC: http://www.fleppc.org/ID_book/sapium%20sebiferum.pdf
- FFWCC: http://myfwc.com/wildlifehabitats/invasive-plants/weed-alerts/chinese-tallow/

Control recommendations for Chinese tallow tree generally includes:

- ***Mechanical:*** Mature trees should be cut down with a chain saw. The final cut should be made as close to the ground as possible and as level as possible. This will make an herbicide application easier as well as prevent resprouting from the cut. Seedling trees can be mowed or disked when small.
- ***Fire:*** Fire provides partial control of Chinese tallow tree. Larger, mature trees are not impacted by fire because they have developed thick bark and are tall enough to escape the direct flames of the fire. Smaller, young infestations of tallow tree can be controlled by repeated burning. The fire will kill the above-ground stems, but root systems will re-sprout new growth. Thus, repeated burning every 2 to 3 years will be necessary to manage and eventually eliminate this tree.
- ***Chemical:*** Foliar applications are effective on smaller trees but cut-stump or basal bark treatments are commonly utilized. For foliar applications, fall treatments before seed shed is the optimum timing – this coincides with downward translocation of carbohydrates. However, basal bark or cut stump treatments can be performed at any time of the year. Control can be achieved with the use of triclopyr-ester applied in an oil diluent. For basal bark applications, apply an herbicide/oil mixture directly to the bark around the circumference of the tree up to 15 inches above the ground. For trees with stems less than 6 inches in basal diameter, a solution of 5 percent triclopyr with oil can be used.
- For trees over 6 inches in basal diameter a 15-20 percent triclopyr and oil solution should be used. To control resprouting of freshly cut stumps, a 20 percent solution of triclopyr is very effective. The root collar area, sides of the stump, and the outer portion of the cut surface should be sprayed until thoroughly wet, but not to the point of runoff. No more than 1/2 hour should elapse between cutting and applying herbicide. Do not attempt a cut stump or basal bark treatment during seed production (August to early September). This can increase the chance of spreading viable seed.

4.8.4.4 Red sesbania (Priority 2)

Red sesbania or rattlebox is native to South America. All parts of red sesbania are poisonous, particularly the seeds. Red sesbania displaces native vegetation and wildlife by forming dense thickets. The greatest environmental impacts are near water bodies or along river and stream banks. The Center for Aquatic and Invasive Plants is a good source of information for control methods and recommendations for red sesbania in Florida: http://plants.ifas.ufl.edu/node/418.

Management recommendations for red sesbania generally include:

- ***Prevention:*** The first step in preventative control of red sesbania is to limit planting and remove existing plants within the landscape. If possible, removal should occur before seeds are produced.
- ***Mechanical:*** Cut larger plants and treat stumps with herbicide. Pull young plants by hand or with a weed wrench. Mowing will help but is often not feasible due to wet soil conditions where this species prefers. Mechanical control prior to seed set will be helpful in controlling future infestations, but this must be practiced over a several year period as dormant seeds will continue to germinate.
- ***Chemical:*** Glyphosate has been unsuccessful in Florida when used alone (1 percent, as a foliar spray) and in combination with triclopyr (1 percent Glyphosate, 1 percent triclopyr).

4.8.4.5 Wild taro (Priority 2)

Wild taro was brought from Africa to the Americas as a food crop for slaves and introduced into Florida and other southern states in 1910 as a substitute crop for potatoes. Wild taro is found in swamps and along stream banks. The large leaves may shade and prevent regeneration of desired species. Wild taro is widespread and can frequently be observed along the shorelines of many central Florida lakes.

There are many sources of information about control methods and recommendations in Florida. The following is a brief list of available resources for wild taro.

- Center for Aquatic and Invasive Plants: http://plants.ifas.ufl.edu/node/108
- FLEPPC: http://www.fleppc.org/ID_book/Colocasia%20esculenta.pdf
- FFWCC: http://myfwc.com/wildlifehabitats/invasive-plants/weed-alerts/wild-taro/
- University of Florida: http://plants.ifas.ufl.edu/manage/why-manage-plants/floridas-most-invasive-plants/wild-taro

Management recommendations for wild taro generally include:

- ***Prevention:*** The first step in preventative control of elephant ear and taro is to limit planting and remove existing plants within the landscape.
- ***Mechanical:*** Dig out corms from the soil. Take care when cutting, as the leaves contain oxalic acid, which may cause irritation to exposed skin. Harvest floating mats, but be careful of root fragments that can start new plants.
- ***Chemical:*** Chemicals with known control are limited. Repeated applications of glyphosate (2 percent solution) with a surfactant may be effective, especially if coupled with other management strategies.

4.8.4.6 Chinaberry tree (Priority 2)

Chinaberry tree was introduced around 1830 as an ornamental in South Carolina and Georgia and widely planted in southern states. It occurs primarily in disturbed areas such as road right-of-ways and fencerows, but has also invaded floodplain hammocks, marshes, and upland woods, particularly in north Florida. The fruits are poisonous to humans and some other mammals. Chinaberry has the ability to grow rapidly and displace native vegetation. Through prolific reproduction via seed as well as vegetative reproduction, it is able to shade out other species by forming a dense thicket. The leaf litter produced by Chinaberry causes the soil to become more alkaline, giving an advantage to those species that fare well in alkaline soils. Chinaberry is also believed to have allelopathic properties, prohibiting other species to colonize the area in close proximity to Chinaberry. Overall Chinaberry reduces the plant diversity in any area in which it grows.

There are many sources of information about control methods and recommendations in Florida. The following is a brief list of available resources for Chinaberry tree.

- Center for Aquatic and Invasive Plants: http://plants.ifas.ufl.edu/node/266
- FLEPPC: http://www.fleppc.org/ID_book/melia%20azederach.pdf

Management recommendations for Chinaberry tree generally include:

- ***Prevention:*** Controlling Chinaberry is best accomplished when trees are very young, prior to seed production. Because the seed is very hard, it may remain dormant in the soil for several months or years. Therefore, be persistent and visit a clean site several times before declaring it “Chinaberry-free”. Another preventative measure is to control trees along fencerows and neighboring hedges, limiting seed introduction.
- ***Mechanical:*** Mechanical control is limited to cutting, although mowing prevents seedling establishment in pasture and rangeland settings. It is thought that Chinaberry may be susceptible to fire, but more research must be done to validate this claim. Cutting back Chinaberry must be integrated with chemical control because of its proclivity to resprout.
- ***Chemical:*** Herbicides prove to be the best method of control for Chinaberry. Foliar applications of glyphosate or triclopyr will be fairly effective on trees less than 10 feet tall. A dilution of triclopyr in water can be used. Be sure to include a non-ionic surfactant at 0.25 percent (10 milliliters or 2 teaspoons per gallon of spray solution). A 2 to 3 percent solution of glyphosate can also be effective. A basal bark application of triclopyr has also been shown to be an effective treatment. Triclopyr can be applied in a 4 to 8-inch band near the base of the trunk in a 15 percent solution. Studies have shown a cut stump treatment of 8 percent triclopyr is almost completely effective in eliminating Chinaberry. Herbicides should be applied before the onset of fruit production to prevent seed production. Repeat applications may also be necessary for complete control.

4.8.5 Priority Invasive Animal Species

The only very high or high priority invasive animal species are European rats – both Norway rats (*Rattus norvegicus*) and black rats (*Rattus rattus*). Both are best managed by trapping and removing, as well as using other IPM techniques to minimize rats in buildings.

5.0 PLAN IMPLEMENTATION

5.1 Project Development

Management goals and objectives were developed through a thorough evaluation of the natural resources present on CBJTC. In accordance with AR 200-1 and the principles of adaptive ecosystem management, subject areas were identified and management activities developed by an interdisciplinary team of ecologists, biologists, geologists, planners, and environmental scientists. **Section 4.0** presents the preferred management alternatives based on the professional opinions and information gathered from various FLARNG directorates, CBJTC staff, USFWS, FFWCC, as well as other federal, state, and local agencies and special interest groups with an interest in the management of CBJTC natural resources. Through these evaluations, a set of natural resources management goals and objectives, and implementing activities and projects, have been established based on the current understanding of CBJTC and the framework of adaptive ecosystem-based planning (see **Section 4.0**).

This INRMP will be implemented through the various policies and programs described throughout the document and accomplishment of the goals and objectives as described in **Section 4.0**. The implementation schedule, project and activity lists, and how the projects relate to INRMP implementation are detailed in **Tables 15 and 16**.

This INRMP is a living document that is based on short-, medium-, and long-term planning horizons. Short-term tasks include activities and projects that are planned to occur in less than 5 years, while medium-term tasks include activities and projects in a 6- to 10-year period. Long-term tasks are usually scheduled beyond 10 years. A majority of the tasks discussed in this INRMP are short and medium-term natural resources management tasks. Goals, objectives, and tasks should be revised over time to reflect evolving environmental conditions, adaptive management, and the completion of tasks as the INRMP is implemented. In addition, medium- and long-term tasks should eventually become short-term tasks over time.

5.1.1 Project Implementation

In accordance with Section 4-3(d)(1)(b) of AR 200-1, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for priority projects and activities.
- Ensures sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP.
- Coordinates annually with cooperating agencies.
- Documents specific INRMP activities and projects undertaken each year.
- Evaluates effectiveness of past and current management activities and adapts appropriately to implement future actions.

Natural resources and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Range management and other seemingly unrelated issues affect implementation. It is important to the implementation of this INRMP that CBJTC personnel take ownership of the INRMP by providing the necessary resources (i.e., personnel and equipment) and utilizing the appropriate funding to enact the plan. Funding for INRMP implementation is not limited to environmental funds. Responsibilities for funding natural resources management activities are outlined in the Army Sustainable Range/Installation Environmental Responsibilities Matrix, which is clarified in NGB Army Installations Division (NGB-ARI), Memorandum 17 April 2006, *Clarification of Funding Responsibilities*.

Table 15 provides an overview of recurring natural resource management activities. These activities are generally performed in-house by CBJTC-ED and ITAM staff. The implementation schedule and planned projects for this updated INRMP are detailed in **Table 16**. **Table 16** will be used to develop budget requests and schedule annual project requirements. Funding requests will be submitted in accordance with current ARNG-ILE procedures for conservation projects.

5.1.2 Priorities and Scheduling

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the SAIA, to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. Projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. As such, these projects have been placed into three priority-based categories: (1) high priority projects which are essential for maintaining compliance or for successful natural resources management, (2) medium priority projects with no immediate compliance requirement or less impact on the natural resources, and (3) low priority projects with a natural resources benefit but no legal driver. The prioritization of the projects is based on need, legal drivers, and ability to further implement the INRMP.

Recurring requirements include projects and activities needed to cover the recurring administrative, personnel, and other costs that are necessary to meet applicable compliance requirements (federal and state laws, regulations, Presidential EOs, and DoD policies) or which are in direct support of the military mission. Recurring costs include manpower, training, supplies; hazardous waste disposal; operating recycling activities; permits and fees; testing, monitoring, and/or sampling and analysis; reporting and record keeping; maintenance of environmental conservation equipment; and compliance self-assessments.

Current compliance includes projects and activities needed because an installation is currently or will be out of compliance if projects or activities are not implemented in the current program year. Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential effects of the military mission on conservation resources.
- Planning documents.

- Baseline inventories and surveys of natural and cultural resources (historical and archaeological sites).
- Biological Assessments, surveys, or habitat protection for a specific listed species.
- Mitigation to meet existing regulatory permit conditions or written agreements.
- Wetland delineations in support of subsequent jurisdictional determinations and consequent permitting.
- Efforts to achieve compliance with requirements that have deadlines that have already passed.
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those projects and activities needed that are not currently out of compliance but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Examples include:

- Compliance with future requirements that have deadlines.
- Conservation and GIS mapping to be in compliance.
- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives.
- Wetlands enhancement, in order to achieve the executive order for “no net loss” or to achieve enhancement of existing degraded wetlands.
- Public education programs that educate the public on the importance of protecting natural resources.

Lower priority project include those that enhance conservation resources of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO and are not of an immediate nature. These projects are generally funded after those of higher priority are funded. Examples include:

- Community outreach activities, such as “Earth Day” and “Historic Preservation Week” activities.
- Educational and public awareness projects, such as interpretive displays, oral histories, nature trails, wildlife checklists, and conservation teaching materials.
- Biological Assessments, surveys, or habitat protection for a non-listed species.
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action, and there is no impact to military mission.
- Re-interment of Native American remains on DoD managed or controlled land.
- Management and execution of volunteer and partnership programs.

5.2 Cooperative Agreements

Intra- and inter-agency cooperation, coordination, and communication at the federal, state, and local levels (e.g., USFWS and FFWCC) are requisite to the success of the INRMP. USFWS and FFWCC review the INRMP and its implementation. Specialized expertise is required to adequately manage natural resources at CBJTC. Technical assistance will be sought from federal and state agencies, universities, and special interest groups.

The DoD and subcommand entities have MOUs, MOAs, and other cooperative agreements with other federal agencies, conservation and special interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the US. Generally, these agreements allow installations and agencies or conservation and special interest groups to obtain mutual conservation objectives. The DoD agreements applicable to CBJTC include:

- MOU between DoD and USFWS concerning ecosystem-based management of fish, wildlife, and plant resources on military lands.
- Cooperative Agreement between the DoD and The Nature Conservancy for assistance in natural resources inventory.
- MOU between the DoD and the USEPA with respect to IPM.
- MOA for federal Neotropical Migratory Bird Conservation Program and addendum ("Partners in Flight-Aves De Las Americas") among DoD, through each of the Military Services, and over 110 other federal and state agencies and non-governmental organizations.
- MOU between the DoD and Ducks Unlimited, Inc. to provide a foundation for cooperative development of selected wetlands and associated uplands in order to maintain and increase waterfowl populations and to fulfill the objectives of the North American Waterfowl Management Plan, within the context of DoD's environmental security and military missions.
- MOU for Watchable Wildlife Programs.

CBJTC has MOAs with FFWCC for hunting, fishing, and outdoor recreation use, with FTA for the Florida National Scenic Trail segment within the installation boundaries (see **Appendix I**), and both informal and formal agreements with various agencies for wildland fire assistance (see **Appendix G**). Beneficial partnerships and cooperative agreements for CBJTC are discussed in greater detail in **Section 3.6**.

5.3 Funding

Implementation is subject to the availability of funding. The installation requests project validation and funding through FLARNG Environmental Office. Funding sources for specific projects can be grouped into four main categories by source: Forestry Program, ARNG funds, other federal funds, and non-federal funds. This is not an all-inclusive list of funding sources and available sources and criteria can change from year to year. When activities or projects cannot be completed due to lack of funding or other reasons, FLARNG will review the INRMP to determine whether adjustments are necessary.

5.3.1 Forestry Program

CBJTC's Forestry Program provides a major source of funding for the natural resources program. The program is funded through the Camp Blanding Management Trust Fund (CBMTF) established under Public Law 493, which governs royalties derived from timber harvest activities on the installation. Revenue derived from natural resources, such as forestry, is to be used for the management of natural resources at CBJTC and for its maintenance and preservation as a military installation. Annual timber revenues since 1956 are documented in the FRMP (see **Appendix F**).

5.3.2 ARNG Funding

ARNG is the primary source of funding that supports the management of natural resources at the CBMTC through a master cooperative agreement with FLARNG and managed by FLARNG Environmental Program Manager. Environmental funds typically can be used for core natural resources activities and projects and guidance is provided in funding documents issued yearly. DoDI 4715.03 also describes activities and projects that may be funded with Environmental funds. Projects paid for with environmental funds should be submitted through the Status Tool for Environmental Programs (STEP) maintained by the ARNG-ILE.

In addition to Environmental funds, Installation and ITAM funds can also be used to implement INRMP activities and projects. Installation funds support facilities operation and maintenance, including facility planning, maintenance of roads, vegetation management, wildfire management, pest management, construction, and master planning. All activities have an impact on natural resources. Installation funds can also be used for pest and noxious weed control, invasive species control, facilities vegetation control and controlled burns to manage vegetation and fuels on training areas and ranges. ITAM funds can be used for monitoring, maintenance of trails, vegetation restoration, land management, and water quality improvements related directly to military training.

The following natural resources management areas can be addressed with multiple funding sources: erosion control, invasive species management, and wildland fire. However, the type of funding used for these management areas depends on purpose. Current guidance should be referred to annually to determine the most appropriate source of funding for a specific activity or project.

5.3.3 Other Federal Funds

Cooperative agreements may be made with state or local governments, non-governmental organizations, and individuals for the improvement of natural resources or to foster research on military facilities. USFWS and FFWCC are cooperators in the development and implementation of the INRMP. In this capacity, they may facilitate access to matching funds and services.

The DoD Legacy Resource Management Program provides financial assistance for natural and cultural resources management efforts on DoD land. Legacy priority projects include regional ecosystem management initiatives, habitat preservation efforts, invasive species control, and/or rare species management. Legacy funds are generally awarded to projects that offer multiple installation applicability.

5.3.4 Non-Federal Funds

Opportunities exist to use state or local funds or private grants to support INRMP projects, particularly those relating to public access or natural resources education. For example, Public Lands Day grants are relatively easy to obtain and can be used for signs, native plant landscaping, trail construction, and other similar activities using the assistance of volunteers. Non-federal partnerships are beneficial to natural resources management and protection at CBJTC. Entering into cooperative or mutual aid agreements with states, local governments, non-governmental organizations, and other individuals is also a great source of additional resources.

5.4 Natural Resources Management Staffing

CBJTC-ED is composed of eight staff, with each individual possessing subject matter expertise in different areas including natural and cultural resources management, environmental compliance, and pollution prevention. Essential duties include assisting trainers, construction, and facilities personnel to ensure compliance with various federal and state laws. The ITAM program also implements portions of the INRMP; it supports five employees who are responsible for daily training area maintenance and rehabilitation activities (**Section 1.5.7**). Additionally, over 20 personnel at CBJTC are trained and available to participate in wildland fire activities.

When FLARNG does not have expertise or staff in-house to complete projects, other agencies and contractors are used, including FFWCC, FNAI, FLMNH, University of Florida, and private contractors.

Table 15. On-going Natural Resources Management Activities				
	Activity	**Priority[1]**	**Objective(s) in Section 4.0**	**Frequency**
1	Prepare budget to implement the natural resources management program	High	PM1, PM2	Annual
2	Conduct annual INRMP review with USFWS and FFWCC	High	PM1, PM2	Annual
3	Complete review for operation and effect and initiate INRMP update or revision as appropriate	High	PM1, PM2	At least every 5 years
4	Continue conducting briefings for CBJTC users	High	PM3	As Needed
5	Update educational materials for briefings	High	PM3	As Needed
6	Maintain and update Camp Blanding's Natural History Museum	Low	PM2, PM3	Monthly
7	Review new activities and development projects for the potential to impact water resources, including jurisdictional waters	High	WA1	As Needed
8	If an activity will impact a wetland or other water resource, coordination and permitting with USACE, FDEP, and /or St. John's River WMD will be completed and mitigation options identified	High	WA1	As Needed
9	When new activities are undertaken at CBJTC, a NEPA review for environmental impacts should be conducted by CBJTC-ED to determine if there are potential impacts and identify options to minimize those impacts.	High	PM6, TE1	As Needed
10	Continue to conduct public outreach with local community, groups and schools (e.g., Audubon, Earth Day events, Boy Scouts).	Low	PM4	Annual
11	Continue to maintain and establish beneficial partnerships (see **Section 3.6**).	High	PM5, PM6	As Needed
12	Maintain non-voting representation on the Zoning Board for Clay County	High	PM6	Annual
13	Continue collaborative working relationship with FFWCC on wildland fire, rare species, fish and wildlife management, and other activities.	High	PM5, PM6	Weekly
14	Coordinate with CBJTC Forestry to integrate ecosystem restoration and management goals when implementing the FRMP	High	PM2	Monthly
15	Maintain cooperative agreements for prescribed fire and wildfire support	High	PM6	Annual
16	Implement the IWFMP in accordance with prescribed fire goals	High	PM1, FI2	Ongoing
17	Continue to engage with city of Keystone Heights regarding Brooklyn Lake	Medium	PM4	As Needed

Table 15. On-going Natural Resources Management Activities				
	Activity	**Priority[1]**	**Objective(s) in Section 4.0**	**Frequency**
18	Coordinate with FTA and provide maintenance assistance for the Florida National Scenic Trail	Medium	PM5, PM6	As Needed
19	Maintain comprehensive, accurate natural resources GIS data in compliance with DoD and federal GIS data standards, including metadata	High	PM6	As Needed
20	Inspect riparian areas on a regular basis to ensure they are being maintained and that no incompatible activities (e.g., filling, modifying, draining, and construction) are occurring.	Medium	WA1, WA3	As Needed
21	Evaluate roads and firebreaks to identify areas with excessive erosion or maintenance issues, identify solutions to reduce problems and create GIS data of problem areas	Medium	SO1, PM7	Annual
22	Monitor at-risk sites to ensure erosion and sediment control measures are effective	High	SO5	As Needed
23	Work with FFWCC to determine actual hunt dates in advance of the hunting season to prevent training conflicts	High	FW4	Annual
24	Conduct deer, turkey, and quail surveys to assess populations (usually completed by FFWCC)	High	FW1, FW4	Annual
25	Clean and maintain nesting boxes prior to the season and monitor their success (usually completed by FFWCC)	Low	FW3	Annual
26	Record incidental observations of wildlife and listed species and compile data into a permanent record (i.e., spreadsheet with date, observer, location)	Medium	FW1, TE1	As Needed
27	Monitor federal and state changes to listed species	High	FW1	Annual
28	Implement IPMP, including methods for control and reporting requirements	High	IN1, IN2	As Needed
29	Assist with solutions to native bat infestations of in-use structures	High	PM6, IN1	As Needed
30	Use native plant species and materials for landscaping activities	Medium	VE11	As Needed
31	Monitor and control priority invasive and pest species, including their density and locations, and update GIS data	High	VE10, IN1	As Needed
32	Monitor regularly for new invasive species or sudden increases in density of existing lower priority invasive and pest species	High	VE10, IN1	As Needed
33	Maintain accurate fire log (with map and GIS data) of all wildfires and prescribed fires	High	FI1	As Needed
Priority Codes: Priority codes are roughly equivalent to funding priorities as described in DoDI 4715.03				

Table 16. Planned Projects[1]						
Project[2]		Objective(s) in Section 4.0	Primary Legal Driver	Funding Type[3]	Funding Priority[4]	Projected Date
1	Update/revise INRMP as determined by INRMP Task Force meeting during review for operation and effect	PM1, PM2	SAIA	CONS	High	2017
2	Incorporate existing GIS data into one GIS dataset with metadata	PM7	AR 200-1	CONS or ITAM	Medium	
3	If compensatory water resources mitigation is required, identify mitigation requirement and acquire support to implement mitigation requirements	WA1	CWA	CONS or INSTAL	High	As needed
4	Production of all types of printed environmental awareness products, including soldier and leader cards, soldier and leader pamphlets, posters, and signs	PM3	ESA, AR 350-19 or AR 200-1	ITAM	High	As needed
5	Revegetate exposed soils with native species to reduce erosion	SO3, SO5, VE11	AR 350-19	ITAM	High	As needed
6	Implement soil conservation BMPs (e.g., silt fences)	SO2, WA2	CWA, AR 350-19	ITAM	High	As needed
7	Maintain and install low water crossings	SO4	CWA, AR 350-19	ITAM	High	As needed
8	Maintain trails network to reduce the potential for erosion and sedimentation concerns	SO1, SO4	CWA, AR 350-19	ITAM	High	As needed
9	Conduct installation-wide surface waters and wetlands PLS	WA1. VE6	CWA	CONS	High	
10	Conduct wetland delineations for new construction projects	WA1, VE6	CWA	CONS or INSTAL	High	As needed
11	Implement restoration efforts within previously mined areas*	VE4	ESA, SAIA, AR 200-1	CONS	High	Annual
12	Implement Forestry Program	VE1, VE2, VE3, VE4, VE5, VE8, IN1, IN2	ESA, SAIA, AR 200-1	CBMTF	High	Annual

Table 16. Planned Projects[1]

	Project[2]	Objective(s) in Section 4.0	Primary Legal Driver	Funding Type[3]	Funding Priority[4]	Projected Date
13	Update FRMP	VE1, VE2, VE3, VE4, VE5, VE8	ESA, SAIA, AR 200-1	CBMTF	High	
14	Conduct forest inventories	VE9	SAIA, AR 200-1	CONS or CBMTF	High	
15	Vegetation management to reduce vegetation inhibiting training and ensure troop safety	VE12	AR 350-19	ITAM	High	As needed
16	Update IWFMP according to current policies and standards and include appropriate forms, processes, and protocols	VE8, FI1, FI2, FI3, FI4, FI5	SAIA, AR 200-1	CONS or INSTAL	High	
17	Implement IWFMP	VE8, FI1, FI2, FI3, FI4, FI5	SAIA, AR 200-1	CONS or INSTAL	High	Annual
18	Use prescribed fire to manage wildfire risk and maintain natural vegetation communities at CBJTC as numerous rare species at CBJTC benefit from a regular fire disturbance interval	VE1, VE3, VE7, VE8, FI3 FI4, FI6, FI7, FW2, TE2, TE6, IN1, IN2	ESA, SAIA, AR 200-1	CONS or INSTAL	High	Annual
19	Maintenance and development of firebreaks for wildland fire management	FI2	SAIA, AR 200-1	CONS or INSTAL	High	Annual
20	Wildland fire training	FI2, FI5	SAIA, AR 200-1	CONS or INSTAL	High	As needed
21	Update vegetation communities map (using FNAI or NVCS classifications depending on regional use) and GIS data regularly and no less than every 5 years	VE9	ESA, SAIA, AR 200-1	CONS	High	
22	Conduct bird survey	FW1, TE1	ESA	CONS	High	

Table 16. Planned Projects[1]

	Project[2]	Objective(s) in Section 4.0	Primary Legal Driver	Funding Type[3]	Funding Priority[4]	Projected Date
23	Conduct fish and aquatic habitat survey	FW1, FW4, TE1	ESA, SAIA, AR 200-1	CONS	High	
24	Conduct amphibian and reptile survey	FW1, TE1	ESA, SAIA, AR 200-1	CONS	High	
25	Conduct mammal survey	FW1, TE1	ESA, SAIA, AR 200-1	CONS	High	
26	Conduct rare plant survey regularly, and no less than every 5 years	FW1, TE1	ESA	CONS	High	2013
27	Conduct rare animal survey regularly, and no less than every 5 years	FW1, TE1, TE7	ESA	CONS	High	2013
28	Conduct threatened and endangered species monitoring as required by USFWS or FFWCC	FW1, TE1, TE7	ESA	CONS	High	As needed
29	Conduct bat surveys to assess population size and distribution within the installation*	FW1, FW6	SAIA, AR 200-1	CONS	Medium	
30	Develop a bat management protocol*	FW6	SAIA, AR 200-1	CONS	Medium	
31	Implement RCW ecological research	FW1, TE5, TE6	ESA		High	Annual
32	Implement RCW management guidelines and BO monitoring requirements	VE3, FI6, FI7, TE5, TE6	ESA	CONS	High	Annual
33	Implement invasive species and pest control methods (prescribed fire, mowing, cutting, and pesticide/herbicide use)	VE10, VE12	EO 13112	CONS or INSTAL	High	Annual
34	Conduct periodic surveys to identify new species and population densities of invasive and pest species	VE10, FW6	EO 13112	CONS	High	As needed

1 – Projects are subject to funding availability

2 – Projects denoted with an " ***** " are new. The remaining projects are continued from the 2007 INRMP

3 – CONS (Conservation [Environmental] or Forestry funds), INSTAL (Installation funds), ITAM (ITAM program funds), COMP (Compliance [Environmental] funds)

4 – Funding priorities are defined as High, Medium, and Low as described in DoDI 4715.03 and **Section 5.3**)

5.5 Monitoring INRMP Implementation

5.5.1 CBJTC INRMP Monitoring

Monitoring of INRMP implementation is necessary to facilitate the legal requirements of the SAIA for review for operation and effect (DoDI 4715.03 and see **Section 1.4.2**). These SAIA implementation criteria do not necessarily measure the effectiveness of an INRMP in facilitating mission accomplishment while conserving natural resources. INRMP implementation for CBJTC will be monitored for meeting the legal requirements of the SAIA as well as for other mission and biological measures of effectiveness.

The ultimate successful implementation of this INRMP is realized in no net loss in the capability of CBJTC training lands to support the military mission, while at the same time providing effective natural resources management. Initiation of projects is one measure that is used to monitor INRMP implementation, but it does not give the total picture of the effectiveness of the natural resources management program. Natural resources management is not simply the sum total of projects, interagency coordination, or program funding and staffing. Natural resources management at CBJTC is a program and a philosophy that guides FLARNG's approach to land use. A significant portion of INRMP implementation is done through internal coordination in regard to training site operations and land use decision making. This type of implementation cannot be measured by project implementation or funding levels. It is evidenced by such things as the ability to continually train, sustainable land use, ongoing regulatory compliance, retention of species diversity, retention of surface water quality, and the acknowledgement of sustainable natural resources management by partnering conservation agencies and other interested organizations and individuals.

In order to monitor and evaluate the effectiveness of INRMP implementation, the following will be reviewed as applicable and discussed within the context of the annual review and/or a formal review of operation and effect per DA Memorandum, *Guidance for Implementation of the SAIA,* dated 25 May 2006:

- Impacts to and from the military mission
- Conservation program budget
- Staff requirements
- Program and project implementation
- Trends in species and habitat diversity as evidenced by recurring biological surveys, land use changes, and opinions of natural resource experts
- Compliance with regulatory requirements
- Feedback from military trainers, USFWS, FFWCC, and others

Some of these areas may not be looked at every year due to lack of data or pertinent information. The effectiveness of the INRMP as a mission enabling conservation tool will be decided by mutual agreement of USFWS, FFWCC, and FLARNG during annual reviews and/or reviews for operation and effect.

5.5.2 DA and DoD INRMP Monitoring

The Army uses the Environmental Quality Report (EQR) to monitor SAIA compliance throughout the department. EQR is the automated system used to collect installation environmental information for reporting to DoD and Congress. The EQR system moved to the Army Environmental Reporting Online (AERO) portal in February 2005, creating a day-to-day management tool. The AEDB-EQ module is a full update of the Web-based software EQR application used to convey the Army's environmental status to senior Army leadership, DoD, and Congress since 1997.

Established to fulfill a semi-annual requirement to report the status of DoD's Environmental Quality program to Congress, EQR collects information on enforcement actions, inspections, and other performance measures for high-level reports and quarterly reviews. EQR also helps the Army track fulfillment of DoD Measures of Merit requirements.

The module is designed to coordinate information management for conservation, compliance, pollution prevention, and other Army environmental reporting. It can adapt easily to future changes in command structure or measures of merit. AEDB-EQ provides for the collection, review, and retrieval of data in 14 program areas, from enforcement actions to conservation program metrics. The Environmental Program Requirements Web (EPRWeb) reporting system is a module of AEDB.

The DoDI 4715.03 updated the natural resources conservation metrics for preparing and implementing INRMPs. Progress toward meeting these measures of merit is reported in the annual EQR to Congress. DoDI 4715.03 reporting requirements currently include:

- Are INRMP projects, including follow-up inventorying and monitoring work, properly identified, developed, and submitted for funding?
- Has project funding been received, obligated, and expended?
- Have projects been completed and do they meet expected objectives?
- Are conservation efforts effective?
- Does the INRMP provide conservation benefits necessary to preclude a critical habitat designation?
- Are species at risk identified and are steps being undertaken to preclude listing?
- Has the INRMP review team (i.e., DoD, USFWS, and FFWCC) been effective in ensuring the INRMP's implementation?
- Are other partnerships needed to meet the INRMP goals?
- Have other partnerships been effectively used to meet INRMP goals?
- Are public recreational opportunities such as hunting, fishing, and wildlife viewing available to base residents and employees?
- Are public recreational opportunities such as hunting, fishing, and wildlife viewing available to the public?
- Is the installation's natural resources team adequately resourced to fully implement the INRMP?

- Is the installation's natural resources team adequately trained to fully implement the INRMP?
- Does the installation encourage retaining existing natural resources personnel to maintain corporate knowledge and manage resources with the most qualified professionals to support the military mission?
- To what extent are the installation's native ecological systems currently intact?
- In what ways are an installation's various habitats susceptible to change or damage from different stressors?
- What stressors affect each habitat type?
- To what degree (i.e., high, medium, or low) is the INRMP and its associated actions supporting the installation's ability to sustain the current and potential future military mission?

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COOPERATIVE MANAGEMENT AGREEMENT

Camp Blanding Buffers – SRWMD PROPERTY

THIS COOPERATIVE MANAGEMENT AGREEMENT is made and entered into this 17th day of December, 2015, between the Governing Board of the **SUWANNEE RIVER WATER MANAGEMENT DISTRICT** , a public body ~~existing under Chapter 373, Florida Statutes whose mailing address is 9225~~ County Road 49, Live Oak, Florida 32060 (herein called the "DISTRICT") and the **Florida Department of Military Affairs**, a public agency of the State of Florida, whose mailing address is 189 Marine Street, St. Augustine Florida, 32084(hereinafter called the "DMA").

WITNESSETH

WHEREAS, the DISTRICT is the fee simple owner of certain real property, hereinafter referred to as the "PROPERTY" in eastern Bradford County bordering the western boundary of Camp Blanding Joint Training Center (CBJTC), as depicted in Exhibit "A" and as described in Schedule "A" attached hereto and by reference made a part hereof, and

WHEREAS, the DMA is desirous of managing the PROPERTY for the purpose of meeting guidelines within the Army Compatible Use Buffer (ACUB) Project through ecological multi-use management of natural resources as outlined in CBJTC's guidance document, the Integrated Natural Resource Management Plan (INRMP); and

Whereas, the DISTRICT has purchased the PROPERTY for water resource purposes including water resource development, flood attenuation and aquifer recharge projects and is developing construction plans for facilities to accomplish these purposes; and

WHEREAS, the DISTRICT and the DMA recognize that the PROPERTY has potential for multiple uses if management activities are closely coordinated; and

WHEREAS, the DMA possesses the personnel, ability, interest, and willingness to manage the PROPERTY, consistent with DISTRICT purposes, under the multiple-use concept, based on sound ecological principles as outlined and approved in the CBJTC INRMP; and

WHEREAS, the DISTRICT and the DMA recognize the value of close cooperation and mutual support in providing for the potential public benefits and enjoyment of the PROPERTY.

NOW, THEREFORE, the parties hereto for and in consideration of the premises and mutual covenants, terms and conditions hereinafter contained, hereby covenant and agree as follows:

1. Subject to the terms, conditions and limitations set forth in this Agreement, the DISTRICT hereby conveys certain management responsibilities to the DMA and the DMA hereby accepts management responsibilities from the DISTRICT of the PROPERTY depicted in Exhibit "A" and described in Schedule "A" for the purposes and in the manner hereinafter set forth.

2. The initial term of this Agreement is for a period of twenty five (25) years, commencing on December 17, 2015 and ending on December 17, 2040. Thereafter, this agreement shall be automatically renewed in twenty five year increments, unless terminated as otherwise set forth herein.

3. The purpose of this Agreement shall be to designate the DMA as the lead management entity for day to day management operations on the PROPERTY. The DMA shall manage the habitat on the PROPERTY as set forth in the approved INRMP using a long-term sustained yield harvest of natural resources, in a manner consistent with, and subject to the water resource projects initiated and constructed by DISTRICT.

   These operations include implementing specific management actions including, but not limited to prescribed burning, disking, planting, mowing, silvicultural practices, facility maintenance including roads and firelines and other operations as may be jointly approved. The INRMP and specifically the addendum including and relating to the PROPERTY shall be formally reviewed and approved by the DMA and the DISTRICT not less than every five years and amended as required and agreed by the parties.

4. Notwithstanding any provision contained herein to the contrary, this Agreement is subject to:

   a. The terms, conditions, restrictions and limitations set forth in this Agreement; and

   b. All applicable laws, state statutes, local ordinances and the rules and regulations pertaining thereto which may

be applicable to the operation of the PROPERTY including Chapter 373.1391, Florida Statutes.

c. Pre-existing third party rights and mine reclamation requirements.

5. It is the intent of the DMA and the DISTRICT that the ~~PROPERTY be incorporated into the Camp Blanding Buffers~~ and managed, for land management purposes, as set forth in the CBJTC INRMP. The PROPERTY will be managed for the same goals of wildlife habitat restoration, public access, recreational opportunities and hunting as the CBJTC, so long as these uses do not interfere with or diminish planned or existing water resource projects of DISTRICT. The DMA shall assume primary management responsibilities that are consistent with the CBJTC INRMP, and shall include the following:

a. Reporting of annual activities, revenues, expenses and accomplishments in association with normal DMA reporting procedures, and activities on the PROPERTY will be included in such reports. These reports will be provided to DISTRICT.

b. Providing routine surveillance and security for the PROPERTY.

c. Recreational opportunities and public access will be provided that meet the goals and objectives of the District and CBJTC planned uses of the property. CBJTC is currently included within the Florida Fish and Wildlife Conservation Commission's (FFWCC) Wildlife Management Area (WMA) program that allows for public access and hunting. It is the intent of the DMA to investigate extending that hunting format to the PROPERTY, at the appropriate time, with the agreement of the DISTRICT.

d. Controlling wildfires by employing appropriate management practices.

e. Controlling exotic and invasive plants at maintenance levels.

6. The DISTRICT may partner with available equipment and personnel to advance resource management objectives for the PROPERTY including prescribed burning, exotic species control, natural resource and wildlife monitoring and vegetation management.

7. Nothing contained in this Agreement shall be construed as a waiver of or contract with respect to regulatory or permitting authority of the DISTRICT as it now or hereafter exists under applicable laws, rules and regulations.

8. DMA and DISTRICT shall prepare an annual budget and workplan to implement management activities on the PROPERTY. DMA and DISTRICT shall develop and approve a workplan during the time of budget development each year. DMA shall be responsible to fund Payments in lieu of Taxes as required by Florida statutes. This budget and workplan shall include all anticipated activities. The parties shall jointly determine funds to be paid to the other, if any, for activities pursuant to each annual plan.

9. Revenues generated from the PROPERTY shall be as a result of managing the natural resources or managing public use. Annual revenues shall be used to offset the costs of approved management activities. Any residual funds will be retained by DMA and used by DMA for future management activities on the PROPERTY only. DMA shall maintain detailed records of all revenues and costs associated with the PROPERTY and shall provide DISTRICT an annual financial report. For any revenue generating activity, DMA shall provide DISTRICT with such information as may be needed to ensure adherence to restrictions on the use of lands purchased with bond proceeds. Upon termination of this Agreement all residual funds will be paid over to the DISTRICT.

10. It shall be the responsibility of the DMA for a DMA-initiated Project, and the DISTRICT for a DISTRICT-initiated Project, at its sole cost and expense, to obtain or renew any and all permits which may be required by the Suwannee River Water Management District, the State of Florida Department of Environmental Protection, and other applicable governmental agencies for activities conducted by such initiating party hereunder.

11. The DMA acknowledges that the use authorized herein does not convey to DMA any real property rights or interests in the PROPERTY nor any interests, rights, or privileges other than those specified herein.

12. The DMA shall pay all lawful debts incurred by it with respect to the PROPERTY and shall satisfy all liens of contractors, sub-contractors, mechanics, laborers, and materialmen in respect to any construction, alteration, and repair ordered by it in and on the PROPERTY, and any improvements thereon. Furthermore, the DMA shall not have authority to create any mortgages on the PROPERTY or liens for labor or material on or against the PROPERTY and all persons contracting with the DMA for the construction or removal of any structure, or for the erection, installation or repair of any structure or improvement on the PROPERTY, including materialmen, contractors, mechanics and laborers involved in such work, shall be notified that they must look to the DMA solely to secure the payment of any bill or account for work done, material furnished, or money owed during the term of this Agreement.

13. All structures, improvements or personal property placed upon, or moved in or upon the PROPERTY by the DMA shall be at the sole risk of the DMA and the DISTRICT shall not be liable for any damage to said personal property, structures, or improvements, unless said damage is due to the actions of the DISTRICT.

14. All structures and improvements existing, as of the effective date of the Agreement, on the PROPERTY or placed upon the PROPERTY by the DISTRICT shall remain the property of the DISTRICT. All new structures or improvements placed upon or moved in or upon the PROPERTY by the DMA shall be deemed personal property of the DMA and shall not be considered attached to the land as a fixture unless otherwise agreed upon in writing between the parties.

15. The DMA accepts management responsibility of the PROPERTY with full knowledge of the existing condition of the PROPERTY and accepts the PROPERTY in an "as is" condition. The DISTRICT makes no representation or warranties as to the fitness of the PROPERTY for any particular use.

16. The DMA possesses no knowledge of or expertise in the state of any pollutants, if they exist on the PROPERTY. Therefore, notwithstanding any other provision hereof, the DMA shall in no way be liable for any claims or damages based, in whole or in part on the presence of pollutants or toxins, of any sort, on the PROPERTY as of the first date of this agreement.

17. The DMA shall be solely responsible for and shall hold DISTRICT free and harmless from, and hereby indemnifies DISTRICT against any and all claims, demands, causes of action, loss, cost, damages, and expenses arising out of or in connection with its management of the PROPERTY. The DMA and other governmental agencies or organizations involved in management related activities on the PROPERTY shall, throughout the term of this Agreement, provide, maintain, and keep in force a program of insurance or self-insurance covering its liabilities as prescribed by Section 768.28, Florida Statutes. The DMA agrees to maintain participation in the state insurance program or any similar insurance program enacted during the term of this Agreement for the duration of this Agreement. In addition, nothing contained herein shall be construed as a waiver of limitation of liability which may be enjoyed by the DISTRICT as a landowner providing land to the public for outdoor recreational purposes, as provided in Section 373.1395, Florida Statutes, or any other law providing limitations on claims against the landowner.

18. This Agreement and any and all rights and privileges contained herein are for the sole use of the DISTRICT and the DMA and shall not be assigned or transferred to another party without the written consent of both the DISTRICT and the DMA.

19. The DMA shall not use or permit the PROPERTY to be used in violation on any valid present or future laws, ordinances, rules or regulations of any public or governmental authority at any time applicable thereto relating to sanitation or the public health, safety or welfare, or relating to the DMA's activities in, and use of, the PROPERTY.

20. The DISTRICT reserves the right for itself, its agents, consultants and employees, to enter upon the PROPERTY for the purpose of conducting other water management activities and projects, inspecting the PROPERTY and determining

compliance with the terms of this Agreement, so long as such entry or use is coordinated with the DMA's use of the PROPERTY for the purpose set forth herein.

21. Either party may terminate this Agreement, with or without cause, at any time upon ninety (90) days written notice to the other party.

22. All notices, consents, approvals, waivers and elections which any party shall be required or shall desire to make or give under this Agreement shall be in writing and/or shall be sufficiently made or given only when mailed by Certified Mail, postage prepaid, return receipt requested, addressed as follows to the parties listed below or to such other address as any party hereto shall designate by like notice given to the other parties hereto:

DISTRICT: SUWANNEE RIVER WATER MANAGEMENT DISTRICT
9225 COUNTY ROAD 49
LIVE OAK, FLORIDA 32060
ATTENTION: EXECUTIVE DIRECTOR

DMA: FLORIDA DEPARTMENT OF MILITARY AFFAIRS
189 MARINE STREET
ST. AUGUSTINE, FLORIDA 32084
ATTENTION: STATE QUARTERMASTER

Notices, consents, approvals, waivers and elections given or made as aforesaid shall be deemed to have been given and received on the date of mailing hereof as aforesaid.

23. Wherever used herein, the terms "DISTRICT" and "DMA" include all parties to this instrument, their employees, legal representatives and assigns of individuals, and the successors and assigns of corporations, partnerships, public bodies, and quasi-public bodies.

24. This Agreement constitutes the entire agreement of the parties, and there are no understandings dealing with the

subject matter of this Agreement other than those contained herein. This Agreement may not be modified, changed or amended, except in writing signed by the parties hereto or their authorized representatives.

25. This Agreement shall be construed and interpreted according to the laws of the State of Florida.

26. As a condition of this Agreement the DISTRICT and DMA hereby covenant and agree not to discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring pursuant to this Agreement.

27. The DISTRICT and DMA reserve the right to unilaterally cancel this Agreement for refusal by either to allow public access to all documents, papers, letters, or other material subject to the provisions of Chapter 119, Florida Statutes, and made or received by the DISTRICT and the DMA in conjunction with this Agreement.

28. This Agreement shall not be construed more strictly against one party than against the other merely by virtue of the fact that it may have been prepared by counsel for one of the parties, it being recognized that both the DISTRICT and DMA have contributed substantially and materially to the preparation hereof.

29. Nothing contained in this Agreement or the Plans prepared pursuant to this Agreement shall be construed as a waiver of or contract with respect to the regulatory or permitting authority of the DISTRICT or DMA as it now or hereafter exists under applicable laws, rules and regulations.

30. For all purposes of this Agreement, the Effective Date hereof shall mean the date when the last of the DISTRICT or the DMA has executed the same, and that date shall be inserted at the top of the first page hereof.

[Signature/Acknowledgment pages follow]

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement, on the date and year first above written.

Signed, sealed, and delivered
in the presence of:

A. Keith Rowell
WITNESS
A. Keith Rowell
PRINT/TYPE WITNESS NAME

Robert Heeke
WITNESS
Robert Heeke
PRINT/TYPE WITNESS NAME

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

By: _____
Don Quincey, Jr.
Chairman

Attest: _____
Virginia Johns
Secretary/Treasurer

Approved as to form and legality:

By: _____
Tom Reeves
Legal Counsel

STATE OF FLORIDA
COUNTY OF SUWANNEE

The foregoing agreement was acknowledged before me this 12th day of November, 2015, by Don Quincey, Jr. and Virginia Johns, as Chairman and Secretary/Treasurer, respectively, of the Suwannee River Water Management District, a Florida Statutes Chapter 373 Water Management District, on behalf of said District, ☒ who are personally known to me, or ☐ whom produced Florida Driver's License as identification.

Robin Lamm
Print Name: Robin Lamm
Notary Public, State of Florida
Commission No. FF033862
My Commission Expires: 8/28/2017

Robin Lamm
NOTARY PUBLIC
STATE OF FLORIDA
Comm# FF033862
Expires 8/28/2017

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement, on the date and year first above written.

Signed, sealed, and delivered
in the presence of:

Terry A Roberts
WITNESS

TERRY A. ROBERTS
PRINT/TYPE WITNESS NAME

Jill Haney
WITNESS

Jill Haney
PRINT/TYPE WITNESS NAME

ARMORY BOARD
STATE OF FLORIDA

By: 17 Dec 15
Valeria Gonzalez-Kerr
Brigadier General
State Quartermaster

Approved as to form and legality:

By:
Terrence Gorman, Major
General Counsel

STATE OF FLORIDA
COUNTY OF SUWANNEE

The foregoing agreement was acknowledged before me this 17th day of December, 2015, by Valeria Gonzalez-Kerr, as Brigadier General, State Quartermaster, of the Armory Board State of Florida, ☑ who are personally known to me, or ☐ whom produced Florida Driver's License as identification.

Notary Public State of Florida
Sondra G Vaughan
My Commission EE145213
Expires 02/10/2016

Sondra G. Vaughan

Print Name: SONDRA G. VAUGHAN

Notary Public, State of Florida

Commission No. 02/10/2016
EE145213

My Commission Expires:

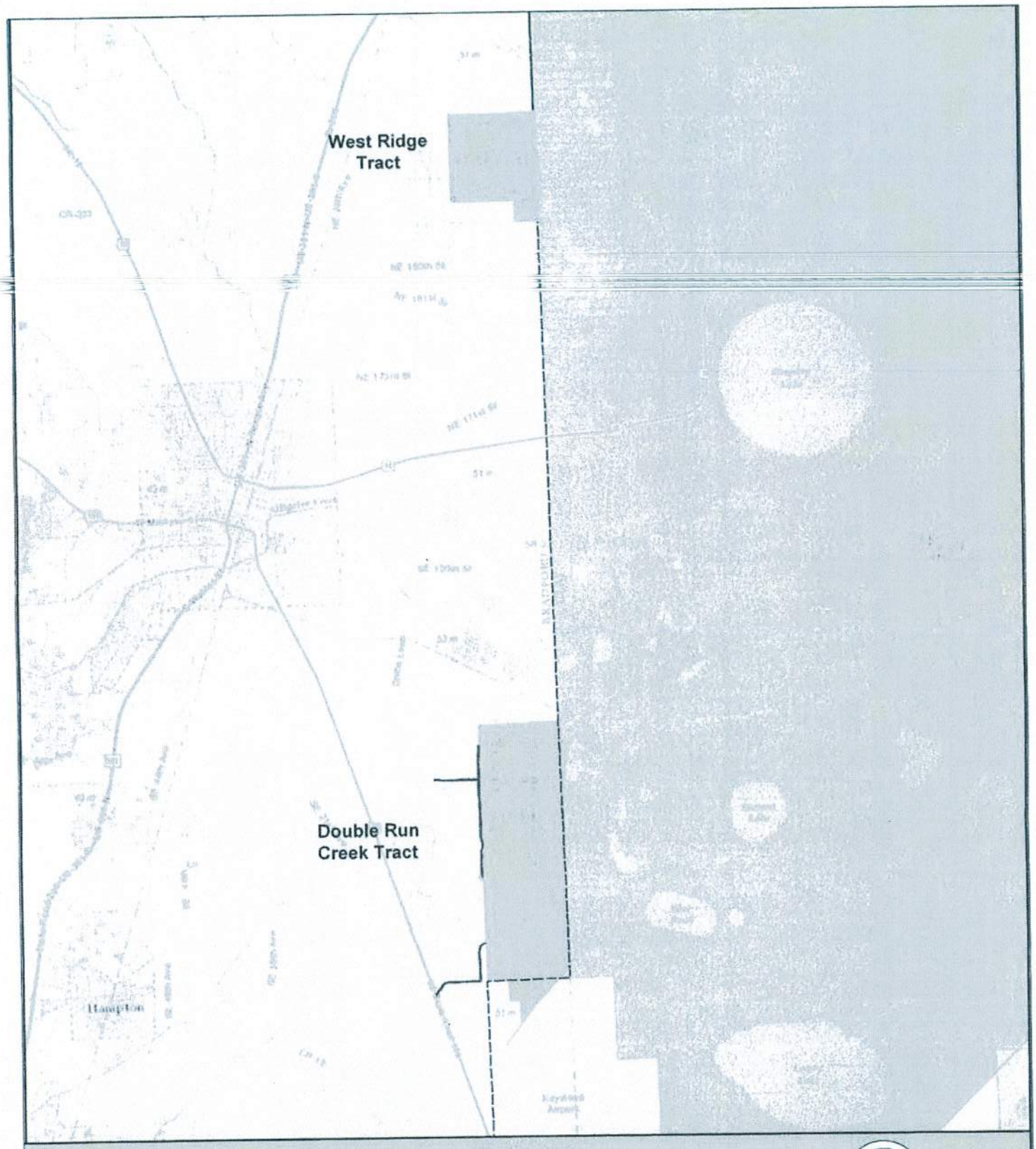


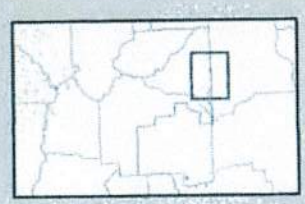
Exhibit A

Camp Blanding Buffers Cooperative Management Agreement

SRWMD Ownership
Access Easement
WMD Boundary

N

0 1 2
Miles



Note: This map was created by the Suwannee River Water Management District (SRWMD) to be used for planning purposes only. SRWMD shall not be held liable for any injury or damage caused by the use of data distributed as a public records request regardless of their use or application. SRWMD does not guarantee the accuracy, or suitability for any use of these data, and no warranty is expressed or implied. For more information please contact the SRWMD at 386-362-1001.
Map Created on 11/6/2015

SCHEDULE "A"

WEST RIDGE TRACT:

The East 1/2 of Section 1; and the Northeast 1/4 of the Northeast 1/4 of Section 12; all in Township 6 South, Range 22 East, Bradford County, Florida.

Less and Except the lands contained in Official Records Book 983, Page 395 of the Public Records of Bradford County, Florida.

Also less and except any portion lying within a public road right of way.

CONTAINING 344.58 ACRES

AND

PART OF SECTION 1, TOWNSHIP 6, SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, SAID LANDS BEING THE WEST 1/2 OF SAID SECTION 1 AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

FOR A POINT OF REFERENCE, BEGIN AT A CONCRETE MONUMENT MARKING THE NE CORNER OF THE WEST 1/2 OF SECTION 1, TOWNSHIP 6, SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA; THENCE ALONG THE EAST LINE OF THE WEST 1/2 OF SAID SECTION 1, S 01°10'24" E, 5313.20 FEET TO AN IRON PIPE MARKING THE SE CORNER OF THE WEST 1/2 OF SAID SECTION 1; THENCE LEAVING THE SAID EAST LINE, RUN ALONG THE SOUTH LINE OF SAID SECTION 1, S 88°53'32" W, 2650.80 FEET TO A CONCRETE MONUMENT MARKING THE SW CORNER OF SAID SECTION 1; THENCE LEAVING THE SAID SOUTH LINE, RUN ALONG THE WEST LINE OF SAID SECTION 1, N 00°55'56" W, 5312.41 FEET TO A REBAR AND CAP MARKING THE NW CORNER OF SAID SECTION 1; THENCE LEAVING THE WEST LINE OF SAID SECTION 1, RUN ALONG THE NORTH LINE OF SAID SECTION 1, N 88°52'28" E, 2628.45 FEET THE POINT OF BEGINNING.

CONTAINING 321.95 ACRES

DOUBLE RUN CREEK TRACT:

PARCEL 1

A PARCEL LAND LYING IN SECTIONS 11, 12, 13, 14 AND 24, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY FLORIDA, SAID LANDS BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

~~COMMENCE AT THE NE CORNER OF SECTION 12, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD~~ COUNTY, FLORIDA, THENCE ALONG THE EAST LINE OF SAID SECTION 12, S 02°34'37" E, 5194.20 FEET TO THE NE CORNER OF SECTION 13, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA; THENCE ALONG THE EAST LINE OF SAID SECTION 13, S 01°06'17" E, 5351.70 FEET TO THE NE CORNER OF SECTION 24, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA; THENCE ALONG THE EAST LINE OF SAID SECTION 24, S 02°34'17" E, 5304.70 FEET TO THE SE CORNER OF SAID SECTION 24, SAID POINT ALSO BEING THE NE CORNER OF SECTION 25, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA; THENCE ALONG THE COMMON LINE BETWEEN SAID SECTIONS 24 AND 25, S 87°54'16" W, 496.31 FEET TO A POINT ON THE SOUTH LINE OF SAID SECTION 24; THENCE CONTINUE ALONG SAID SECTION LINE, S 87°37'39" W, 3469.90 FEET TO THE SE CORNER OF THE SW 1/4 OF THE SW 1/4 OF SAID SECTION 24; THENCE CONTINUE ALONG THE SOUTH LINE OF SAID SECTION 24, S 88°39'41" W, 1320.31 FEET TO THE SW CORNER OF SAID SECTION 24; THENCE ALONG THE WEST LINE OF SAID SECTION 24, N 01°55'05" W, 5327.52 FEET TO THE SW CORNER OF SECTION 13, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, SAID POINT ALSO BEING THE SE CORNER OF SECTION 14, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA; THENCE N 01°40'58" W, 1177.96 FEET TO THE EAST RIGHT OF WAY LINE OF AN EXISTING GRADE ROAD; THENCE ALONG THE EAST RIGHT OF WAY LINE OF SAID EXISTING GRADE ROAD THROUGH THE FOLLOWING COURSES, N 03°03'59" W, 200.56 FEET; N 00°40'03" W, 936.08 FEET; N 03°49'03" E, 54.45 FEET; N 00°05'17" W, 221.25 FEET; N 13°22'19" W, 46.55 FEET; N 07°59'46" W, 65.17 FEET; N 12°44'56" E, 70.18 FEET; N 00°31'08" E, 78.14 FEET; N 19°24'47" E, 52.20 FEET; N 21°10'54" E, 107.39 FEET; N 22°06'15" E, 27.82 FEET; N 00°11'26" E, 304.55 FEET; N 19°55'03" W, 64.96 FEET; N 17°07'39" W, 162.32 FEET; N 11°29'56" W, 113.04 FEET; N 02°14'03" W, 122.39 FEET; N 00°43'36" W, 211.83 FEET; N 00°54'41" W, 1188.59 FEET; N 01°56'39" W, 289.52 FEET; N 02°36'29" W, 196.78 FEET; N 04°27'13" W, 275.55 FEET; N 01°33'56" W, 633.35 FEET; N 00°52'55" W, 502.78 FEET; N 01°33'35" E 109.92 FEET; THENCE CONTINUE N 01°33'35" E, 37.53 FEET; N 00°39'58" W, 1142.26 FEET; N 01°39'57" E, 357.07 FEET; N 02°39'40" E, 357.83 FEET; N 00°02'14" W, 200.41 FEET TO THE END OF SAID EAST RIGHT OF WAY; N 00°02'14" W, 1277.63 FEET TO THE NW CORNER OF THE AFOREMENTIONED SECTION 12; THENCE ALONG THE NORTH LINE OF SAID SECTION 12, N 88°15'16" E, 5045.04 FEET TO THE POINT OF BEGINNING.

LESS THE FOLLOWING DESCRIBED LANDS

Parcel 3

A 60' STRIP OF LAND LYING IN SECTION 24, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, SAID LAND BEING A PART OF THE OLD AND ABANDONED GS&F RAILROAD RIGHT OF WAY AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

COMMENCE AT THE SE CORNER OF SECTION 24, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, THENCE ALONG THE EAST LINE OF SAID SECTION 24, N 02°34'17" W, 448.86 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE ALONG SAID EAST LINE, N 02°34'17" W, 80.57 FEET; THENCE LEAVING SAID EAST LINE, S 45°33'52" W, 786.66 FEET TO THE SOUTH LINE OF SAID SECTION 24; THENCE ALONG THE SAID SOUTH LINE, N 87°37'39" E, 89.56 FEET; THENCE LEAVING THE SAID SOUTH LINE, N 45°33'52" E, 666.41 FEET TO THE AFOREMENTIONED EAST LINE OF SAID SECTION 24 AND THE POINT OF BEGINNING.

CONTAINING 1,900.10 ACRES

AND

PARCEL 2

A parcel land lying in Section 25, Township 7 South, Range 22 East, Bradford County Florida, said lands being more particularly described as follows;

Commence at the NE corner of Section 25, Township 7 South, Range 22 East, Bradford County, Florida, thence along the North line of said Section 25, S 87°54'16" W, 496.31 feet to the POINT OF BEGINNING; thence leaving said Section line, S 45°33'52" W, 2180.59 feet to the beginning of a curve concave to the East having a radius of 2035.87 feet and a chord bearing and distance of S 41°21'41" W, 298.78 feet; thence along the arc of said curve 298.92 feet to the end of said curve; thence S 37°10'34" W, 1299.46 feet; thence S 37°10'43" W, 1834.41 feet to the North right of way line of a county grade road known as SE 94th Street (60' Right of Way); thence along the said right of way line, N 53°15'22" W, 60.00 feet; thence leaving said right of way line, N 37°23'44" E, 1811.04 feet; thence S 88°38'06" W, 127.00 feet; thence N 01°37'01" W, 1338.97 feet; thence S 87°59'32" W, 662.88 feet; thence N 01°52'56" W, 1318.04 feet to the North line of the aforementioned Section 25; thence along the North line of said Section 25, N 87°37'39" E, 3469.90' feet to the POINT OF BEGINNING.

LESS THE FOLLOWING DESCRIBED LANDS:

Parcel 4

A 60' STRIP OF LAND LYING IN SECTION 25, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, SAID LAND BEING A PART OF THE OLD AND ABANDONED GS&F RAILROAD RIGHT OF WAY AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

COMMENCE AT THE NE CORNER OF SECTION 25, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, THENCE ALONG THE NORTH LINE OF SAID SECTION 25, S 87°54'16" W, 496.31 FEET TO THE POINT OF BEGINNING; THENCE S 45°33'52" W, 1111.90 FEET; THENCE N 02°21'23" W, 80.84 FEET; THENCE N 45°33'52" E, 991.24 FEET TO THE AFOREMENTIONED NORTH LINE OF SECTION 25, THENCE ALONG SAID NORTH LINE, N 87°37'39" E, 89.56 FEET TO THE POINT OF BEGINNING.

ALSO LESS

Parcel 5

A 60' STRIP OF LAND LYING IN SECTION 25, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD COUNTY, FLORIDA, SAID LAND BEING A PART OF THE OLD AND ABANDONED GS&F RAILROAD RIGHT OF WAY AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS;

COMMENCE AT THE SW CORNER OF SECTION 25, TOWNSHIP 7 SOUTH, RANGE 22 EAST, BRADFORD ~~COUNTY, FLORIDA; THENCE ALONG THE WEST LINE OF SAID SECTION 25, N 01°36'51" W, 1324.40 FEET~~ TO THE SOUTHERLY RIGHT OF WAY OF A COUNTY MAINTAINED 60 FOOT WIDE ROAD(SE 94TH STREET); THENCE ALONG THE SAID RIGHT OF WAY LINE, N 88°00'36" E, 827.71 FEET; THENCE CONTINUE ALONG THE SAID RIGHT OF WAY LINE, S 32°01'04" E, 140.82 FEET TO THE POINT OF BEGINNING; THENCE S 53°15'22" E, 60.00 FEET; THENCE N 36°44'38" E, 60.00 FEET; THENCE N 53°15'22" W, 60.00 FEET; THENCE S 36°44'38" W, 60.00 FEET TO THE POINT OF BEGINNING.

CONTAINING 107.17 ACRES

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

December 2, 2015

Paul Catlett
Florida Department of Military Affairs
Bldg #4540
5629 SR 16 West
Starke FL 32091

Subject: Cooperative Management Agreement

Dear Mr. Catlett:

Enclosed in duplicate is the cooperative management agreement between the Suwannee River Water Management District and the Florida Department of Military Affiars for management of the Camp Blanding Buffers. Please obtain the appropriate signatures on this document and return one original to my attention. The other may be retained for your files.

Please feel free to contact the project manager Bob Heeke at 386.647.3166 with any questions regarding this agreement.

Sincerely,

Gwen Lord

Gwendolyn A. Lord, CPPB
Contracts and Procurement Coordinator

/gal
cc: Bob Heeke
Enclosures

DEPARTMENT OF THE ARMY
FLORIDA ARMY NATIONAL GUARD
CAMP BLANDING JOINT TRAINING CENTER
5629 SR 16 W BLDG 2300
STARKE, FL 32091-9703

January 6, 2016

Gwendolyn Lord
Suwannee River Water Management District
9225 County Road 49
Live Oak, Florida 32060

Subject: Cooperative Management Agreement

Dear Ms Lord,

Enclosed is the original signed cooperative management agreement between the Suwannee River Water Management District and the Florida Department of Military Affairs for management of the Camp Blanding Buffers.

Sincerely,

Paul Catlett
Forestry Program Administrator

BEST MANAGEMENT PRACTICES PLAN

THE CHEMOURS COMPANY FC LLC
TRAIL RIDGE SOUTH MINE
BRADFORD AND CLAY COUNTIES, FL

JUNE 2020
REVISED MARCH 2021

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

The Best Management Practices (BMP) Plan (the BMP Plan) is adopted for the purpose of establishing and implementing BMPs at the Chemours Trail Ridge South Mine (the Facility) in order to preserve and protect the quality of surface and ground water. The BMP Plan combines the Spill Prevention Control and Countermeasures (SPCC) Plan, Stormwater Pollution Prevention Plan (SWPPP), and additional site specific BMPs into one comprehensive document. A Facility Site Plan showing existing drainage patterns and locations of potential contamination sources is included. The SPCC section of the BMP Plan documents potential spill hazards and procedures for spill prevention, response, and reporting. The SWPPP section of the BMP Plan details practices related to source control, drainage control, and erosion and sediment control. Additional BMPs are presented to address site specific operations for the Facility. Overall implementation of controls, such as inspections, preventative maintenance, training, housekeeping, and record keeping are provided.

REPORT CERTIFICATION

Dated this 26th day of February 2021.

Owner / Operator Certification:

Stuart Forrester

Digitally signed by Stuart Forrester
DN: cn=Stuart Forrester, c=US, o=The Chemours Company, email=stuart.r.forrester@chemours.com
Date: 2021.02.25 13:38:37 -05'00'

Stuart Forrester
Plant Manager
Chemours
Responsible Corporate Officer

Connie Henderson

Digitally signed by Connie Henderson
DN: cn=Connie Henderson, c=US, o=The Chemours Company FC LLC, email=connie.henderson@chemours.com
Date: 2021.02.25 10:14:37 -05'00'

Connie Henderson
Environmental Manager
Chemours

Engineer Certification:

"I certify that this document was prepared under my supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete."

E. Brian Burkhart
This item has been digitally signed and sealed by E. Brian Burkhart on the date provided using a Digital Signature. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.
2021.03.04 10:27:18-05'00'

Brian Burkhart, PE
FL PE #79054
Principal Professional
Kleinfelder

TERMS AND DEFINITIONS

AST - Above Ground Storage Tanks

BMPs – Best Management Practices (BMPs) are used to reduce or eliminate negative impacts to the environments. They are structural, vegetative, or managerial practices used to treat, prevent, or reduce waste and pollution.

BMP Plan – Best Managed Practices Plan (BMP Plan) incorporates the requirements of 40 CFR § 122.44, Subpart K, and plus pollution prevention techniques.

Committee – The BMP Committee is responsible for the development and implementation of the BMP Plan.

Competent Person – An employee who is able to recognize hazards associated with a particular task and has the ability to mitigate those hazards.

Conventional Pollutants – These pollutants, which include biochemical oxygen demand (BOD), suspended solids, fecal coliform bacteria, and oil and grease, can typically be treated by treatment plans.

CWA – Clean Water Act

DEP – Florida Department of Environmental Protection

EPA – Environmental Protection Agency

Facility – The Chemours Company FC, LLC – Trail Ridge South Mine

GPM – Gallons per minute

IWW – Industrial Wastewater. Industrial wastewater treatment describes the processes used for treating wastewater that is produced by industries as an undesirable by-product. After treatment, the treated industrial wastewater may be reused or released to a surface water in the environment.

MSGP – Multi-Sector Generic Permit

Non-conventional pollutants – Pollutants that are not defined as conventional or toxic.

Non-Stormwater Discharge – Any discharge from the facility not composed entirely of rainfall runoff.

Plant – One of the operational units of the Facility.

Pollutants – Conventional, non-conventional, and toxic pollutants.

Pollution prevention – Any practice that eliminates, reduces, or prevents pollution. It is one of the EPA's preferred hazardous waste management strategies.

Waste minimization – Any practice that eliminates, reduces, or prevents chemical waste. It is one of the EPA's preferred hazardous waste management strategies.

Recycle/Reuse – The minimization of waste generation by recovering and reprocessing usable products that might otherwise become waste, or the reuse or reprocessing of usable waste products in place of the original stock, or for other purposes such as material recovery, material regeneration, or energy production.

Source reduction – Any practice which reduces: (a) the amount of any pollutant entering a waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment or disposal; and (b) the hazards to public health and the environment associated with the release of such pollutant. The term includes equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or

inventory control. It does not include any practice which alters the physical, chemical, or biological characteristics or the volume of a pollutant through a process or activity which itself is not integral to, or previously considered necessary for, the production of a product or the providing of a service.

SPCC – Spill Prevention Control and Countermeasures

SWPP – Stormwater Pollution Prevention

Toxic pollutants – (a) any toxic substance listed in Section 304(a)(1) of the Clean Water Act (CWA), any hazardous substance listed in Section 311 of the CWA, or chemical listed in Section 313(c) of the Superfund Amendments and Reauthorization Act of 1986; and/or (b) any substance for which EPA has published an acute or chronic toxicity criteria that is not also a conventional or non-conventional pollutant except ammonia.

1 PLAN DESCRIPTION

The following section describes the Facility, details the BMP Committee, and provides the BMP Plan scope and goals.

1.1 FACILITY OVERVIEW

The Chemours Company FC, LLC Trail Ridge South Mine (Facility) is an active industrial site near Starke, Florida whose operations include the caustic scrubbing, storage of mineral sands from other Chemours facilities and the production of Ilmenite, Zircon, Zircore, and Staurolite from those mineral sands. A detailed report of current Facility operations can be found in Section 2: FACILITY EVALUATION.

Facility Name: The Chemours Company FC, LLC Trail Ridge South Mine
Facility Location: 5222 Treat Road, Starke, FL 32091
Corporate Address: PO Box 753, Starke, FL 32091
Date of Initial Operation: Est. January 1, 2021
Operating Schedule: 24 hours a day, 7 days a week
Number of Employees: 130
NPDES Permit Number: TBD

1.2 SCOPE OF PLAN

BMPs are used as a guide to reduce or eliminate waste and pollutants. The BMP Plan has been created to address all Facility operations and includes a SPCC Plan, SWPPP, and additional site-specific BMPs. The SPCC Plan focuses on spill control, cleanup, reporting, and inspection. The SWPPP focuses on drainage and erosion control practices. Within the Facility, areas of concern for potential waste and pollutants risks include: above ground petroleum and oil storage tanks, water treatment facilities, active mining areas, active reclamation areas, sludge management, dikes and berms, drainage ditches and swales, and temporary storage and stockpile locations. The following information is identified in the BMP Plan:

- Facility Evaluation
- Spill potential, including a description of Facility operations and potential release assessments
- Spill prevention BMPs
- Spill response procedures including emergency response personnel, notification procedures, and reporting procedures
- Stormwater pollution prevention and management controls
- Inspection and maintenance procedures
- Site-specific BMPs

1.3 PLAN GOALS AND OBJECTIVES

The objective of the BMP Plan is help identify, mitigate, reduce, and eliminate waste and pollutants at the Facility. SPCC BMPs aim to minimize the potential for release of toxic or hazardous substances as defined by Section 304(e) of the CWA and petroleum products as defined by 40 CFR 112. SWPPP BMPs aim to minimize stormwater pollution through drainage and erosion control features. The BMP Plan addresses all activities that could or do contribute pollutants to surface water discharges, including process, treatment, and ancillary activities known at the time of distribution. Chemours management is strongly committed to the goals and objectives of the BMP Plan, which is to be implemented as a priority in its Facility operations. The BMP Plan shall be a living document, updated as needed to make sure all the elements of the BMP Plan are current and meaningful. The content of the BMP Plan shall be made known to all Facility employees at annual training programs and whenever changes are made to the BMP Plan. Training of employees and especially of individuals responsible for implementing the BMP Plan will be provided as part of the implementation of the BMP Plan.

1.4 BMP COMMITTEE

The BMP Committee (Committee) shall develop, implement, and manage all Facility BMPs covered in this BMP Plan. The lead Committee member is the Environmental Manager. The Environmental Manager holds primary responsibility for developing and overseeing Facility activities necessary to comply with the BMP Plan. The Environmental Manager shall be on-site

and familiar with the Facility and its operations. The Environmental Manager also holds primary responsibility for inspections and monitoring activities and is the main point of contact for permitting authority inspector visits. For purposes of Facility compliance and the work of the Committee, the Environmental Manager coordinates with the following Committee Members:

- Minerals Operations Director
- Unit Manager – Operations
- Services Manager - EHS
- Area Manager – Mining Operations
- Area Manager – Dry Separations
- EHS Department
- Professional Engineer
- Mining Supervisor
- Processing Supervisor
- Lab Manager
- E&I / Mechanic Operator
- Brown and Root Representative
- Krebs Land Development Representative

The Minerals Operations Director is also an Ex Officio member of the Committee and reviews and ratifies its decisions. Committee member contact information is provided in **Table 1-1**. This table shall be reviewed and updated when any personnel changes occur and no less than annually. The Committee is responsible for the following activities:

- Develop Plan scope and implement Plan objectives
- Review any existing accidental spill control plans to evaluate existing BMPs
- Identify areas with potential for release to the environment
- Conduct assessments to prioritize substances and areas of concern
- Establish procedures for recordkeeping and reporting
- Coordinate Facility environmental release response, cleanup, and notification procedures
- Determine and select appropriate BMPs
- Make recommendations to management in support of BMP policies
- Establish BMP training for Facility and contractor personnel
- Evaluate the BMP Plan effectiveness in preventing and mitigating release of pollutants

- Periodically review the BMP Plan to evaluate need for update and/or modification of the BMP Plan
- Develop all BMP Plan updates

The Committee, under the leadership and direction of the Environmental Manager, is authorized and directed to carry out the provisions of the BMP Plan, including the duties set out above, and to authorize the cleanup of unpermitted releases. Any employee with questions or concerns about the topics discussed in this BMP Plan should contact the Committee. The Committee will strive to maintain a healthy environment of open communication and continual improvement.

1.5 BMP PLAN REVIEW AND MODIFICATION

The BMP Plan shall be reviewed and evaluated annually by the Committee to ensure it fulfills the stated objectives and remains applicable per permit guidelines. Revisions to the BMP Plan may be made by the Committee if Facility conditions change, including but not limited to the following:

- Restructuring of management
- Substantial growth
- Significant changes in the nature or quantity of pollutants discharged
- New permit requirements
- New legislation related to BMPs
- Operational changes

Revisions to the BMP Plan can be made by the Chemours Environmental Department and must be approved by plant manager, unit manager, area manager (mining), site service unit manager, safety manager, environmental manager and contract administrator. Revisions shall be identified in the ETQ Reliance Database, Document Control Module, indicating revision date, individual conducting revision, a brief description of the revision, and the approval process. In the case of the BMP Plan being determined insufficient by FDEP, the Committee will have 30 days after notification to make the appropriate changes. For the SPCC portion, if the Committee identifies a more effective and field-proven prevention and control technology that could be implemented to reduce the likelihood of a spill event, then the BMP Plan will be amended to include this new approach. The BMP Plan has been entered into the Chemours data base as PROC-L-05771 Trail

Ridge South Mine and shall be reviewed annually. Review and revision history will be maintained in the ETQ database.

2 FACILITY EVALUATION

The following section evaluates the Facility operations, pollutant sources, water treatment, sludge management, and security.

2.1 OPERATIONAL AREAS

The Facility location is provided in **Figure 1**. The Facility consists of three operational processing areas: Plant Area, Mobile Mining Unit (MMU) (active mine) and Mobile Concentrator (MC, wet separations). The Plant Area has a separate BMP Plan specific to the construction of the facility. Mining is conducted in the Mobile Concentrator Area via excavators and a mobile mining unit. Reclamation activities are on-going throughout operation of the mine.

The active mining area consists of excavators and two MMUs working in tandem. Excavators remove the material from the pit and feed it to a screen/shredder on the MMU. The MMU removes any hardpan, rock, roots and overburden material and slurries the material to the MC at the Plant Site. Pumps are used in the mining areas for dewatering the active pits, transporting the slurry to the MC and for the tails return line.

2.2 POLLUTANT SOURCES

Potential pollutant sources are summarized as follows:

- Exposed significant materials such as mineral sands, tailings, water treatment agents, etc
- Raw material storage areas
- Fueling stations
- Equipment washing and maintenance areas
- Loading and unloading areas
- Above ground tanks and oil storage
- Portable pumps and tanks
- Recently graded areas

Relevant locations/features, such as temporary storage areas and spill kits, will be provided as they are identified. An inventory of potential chemicals that may be on-site is provided in **Table 2-1**. The potential for pollution related to spills and stormwater for these pollutant sources is detailed in Sections 3.1 and 4.1, respectively.

2.3 WATER TREATMENT

The Industrial Wastewater Treatment system consists of a Process Pond (Pond 1) and 3 Treatment (IWW) Ponds (Ponds 2, 3 and 4). The process water pond is approximately 9.6 acres at the top of bank (TOB) and will collect rainwater and minimal runoff from approximately 11.5 acres (includes capture of contact stormwater from a curbed impervious surface directly under the Mobile Concentrator (MC) and top/interior pond berms). This pond will also receive make-up water from the lowest quality available source, mining rim ditch and return water from the tailing pit and stockpile area (~1,128 gpm for steady state conditions). IWW Ponds 2, 3 and 4 (Lime Neutralization, Treatment, and Final Effluent Ponds, respectively) are each approximately 0.8 acres at the TOB and will collect rainwater and the runoff from approximately 1 acre (includes interior pond berms). Discharges from the site will be made from Pond 4 in compliance with the IWW permit requirements.

The water treatment system operates as follows:
Water will flow through the various spiral stages located on the mill at the plant site. Once the mineral material is separated, prior to the tailings being slurried to the mined cell for reclamation, the water is directed through the thickener. At the thickener, the flocculant or “floc” is added to remove the humate from the water column, the humate is then re-introduced to the sand tailings and slurried to the mined cell as part of reclamation. The tailings water as well as active pit dewatering, is then utilized in association with the mining unit and screener, to slurry the excavated material to the plant. Excess water is diverted to the process pond to add as make up water. Water then continues through this closed loop system, process pond to mill; tailings return water to mill; water from mill to process ponds and tailings return.

Normal dosage of floc at the thickener is approximately a 0.2% solution (about 6 ppm). Excess water from the process ponds would be transferred to the Industrial Wastewater ponds for treatment with ALUM, Ferric Sulfate, or Sulfuric/HCL acid to settle out any solids. Lime will be added to adjust pH to discharge limit established by the Industrial Wastewater permit.

The main control measure to prevent water treatment chemical discharge is mechanical in that the flow (water) to pump size ratio has been set so that the system cannot dose above 7ppm. Additionally, there are alarms throughout the system located in the control rooms that if any part of the system (pumps, low tank levels, dosage meters) experience an upset condition, alarms will be activated. Acute/chronic toxicity testing is proposed as part of the Industrial Wastewater permit.

See Appendix F for Safety Data Sheets for the proposed water treatment chemicals.

2.4 SLUDGE MANAGEMENT

The humates and fine solids which settle out in the thickener are removed from the bottom of the thickener and pumped to the final tailings sumps where they are then combined with a small amount of flocculant and the coarse sand tailings and then pumped back to the tailings cells located adjacent to the mining cells for co-disposal during reclamation activities. This process allows for the humates to be mixed with the sand so that they form a more homogenous mixture and settle out together in the tailings cells.

The method of disposal for humate sludge that may accumulate in the thickener or a pond would be dried and then placed on tailings to be disced with the sand tailings prior to topsoiling, Humate sludge or other sludge not suitable for land application is to be tested and disposed of in a solid waste management facility permitted by the Department of Environmental Protection (DEP) in accordance with the requirements of Chapter 62-701, F.A.C. Sludge storage, transportation and disposal shall be in accordance with the requirements of Chapter 62-730, F.A.C.

2.5 FACILITY SECURITY

The Facility is operational 24 hours a day, seven days a week. The Facility is continuously manned by Chemours personnel and Chemours contractors. The facility is located on Camp Blanding property or is being managed by Camp Blanding and will have limited access to authorized personnel only. Main access points are gated, security cameras are installed at various locations and off duty law enforcement patrol areas to ensure facility security upon request. “No Trespassing” signs are posted throughout the Facility to keep unauthorized personnel out. Only authorized Chemours personnel/contractors have keys to access the treatment areas.

Storage areas for chemicals and hydrocarbons are well lit and routinely inspected by Chemours personnel or a contractor.

3 SPILL PREVENTION CONTROL AND COUNTERMEASURES

The following section details the Facility SPCC Plan. It has been written to satisfy the requirements of 40 CFR 112 and Section 304(e) of the CWA. The SPCC Plan addresses releases of oils that have the potential to reach surface waters of the United States, as well as toxic or hazardous substances used in Facility operations which can either discharge into the surface drainage system or Facility septic system.

3.1 POTENTIAL SOURCES OF SPILLS

Types and locations of potential spills are detailed for in the following sections. A summary of potential on-site chemicals is provided in **Table 2-1**.

See **Table 3-1** for a list of of potential fuel tanks proposed for the site.

3.1.1 Oil Storage Buildings

There is the potential for one oil storage building that stores new and used oil as well as oil cleaning products to be located onsite within the Plant Area. 55+ gallon drums or buckets are stored on concrete pads in an enclosed building. Additional uncovered storage may be adjacent to the oil storage building with portable containment used to place drums. Spill controls potentially located in the building include, but are not limited to: absorbent pads, floatation booms, Oil-Dri, and Loose absorbent.

3.1.2 Vehicle and Machinery Fueling and Chemical Unloading

Fuel trucks are utilized for fueling tanks located in the field to serve pumps or equipment. The off-road diesel tanks at the Facility are equipped with secondary containment via a double wall.

In addition to fueling, chemical loading is associated primarily with the water treatment process. At the Facility, chemical storage tanks are located within internal berms or secondary containment areas that would prevent spills from occurring outside the containment area.

3.1.3 Portable Diesel Pumps and Tanks

Although most pumps used on-site are electric, some portable diesel pumps are utilized during power outages; specifically, during severe weather events. The pumps contain an internal tank ranging from 100-300 gallons. The associated diesel tank ranges from 250-500 gallons. Mobile or portable oil storage containers are positioned or located as to prevent a discharge from reaching navigable waters. Portable pumps and ASTs that are utilized onsite are double walled. A release from any of these ASTs would result in the product being released to the ground. The pumps and attached tanks are frequently moved to different locations with the progression of the reclamation activities, necessary fueling locations, or where needed. In the case that a pump is located near wetland areas, a direct release to waters of the United States is possible. Section 3.4 provides procedures to follow in the event of a spill.

3.1.4 Mobile Equipment

Mobile equipment is commonly used Facility-wide, including the mobile mining units, excavators, crawlers, dozers, and forklifts. The equipment utilized on site is documented in **Table 3-2**. Table 3-2 will be updated upon initiation of operations. This equipment may be utilized at other facilities if requested.

3.1.5 Material Storage and Handling Areas

Material storage, handling, and staging is performed at the Oil Storage Building and discussed in Section 3.1.1.

3.2 SPILL CONTROLS

3.2.1 Secondary Containment

Table 2-1 and **Table 3-1** list all potential chemicals and petroleum products, respectively, that may be located on site. Fuel and chemical tanks are primarily characterized by the construction

of a double wall to ensure, in the case of a spill or leak, there is a control of material prior to reaching surface waters. A few non-hazardous coagulants may be placed within an earthen berm where, in the case of a spill, the chemical is contained. Spill pallets for portable drums may be utilized near the oil storage buildings as an alternate method to control spills.

Accumulation of water in secondary containment structures is to be avoided. Secondary containment structures are evaluated on a weekly basis. If the accumulated water is rainwater, the dike will be drained only if the follow criteria are met:

- The bypass valve is closed.
- Run-off rainwater is inspected to ensure compliance with applicable water quality standards and that it will not cause a harmful discharge.
- Records are kept of drainage events.

If the accumulated water in the dike or secondary containment is deemed unsafe per Chapter 62-320, F.A.C., Surface Water Quality Standards, action must be taken to remove the contaminated water. Contaminated stormwater is removed for transport off site by a licensed hazardous waste or waste oil contractor.

3.2.2 Fuel Transfer Procedures

A release can occur during a fuel/oil transfer because the equipment and material are in the most vulnerable state. The appropriate personnel must follow fuel transfer control measures to prevent discharges, which include the following:

- Overseeing major fueling activities
- Using wheel chocks to prevent movement of vehicles
- Inspecting vehicles for leaks before and after fueling
- Monitoring level of product during the transfer process

3.2.3 Proper Location of Portable Tanks

Any portable diesel tanks located on site will be double walled to protect the environment. Facility employees must place portable tanks in area where releases have a limited likelihood of reaching surface waters. This is done by placing the portable tanks inside earthen berms. These fuel and chemical tanks are routinely inspected to eliminate the potential for rupture (See inspection schedule **Appendix A**).

3.2.4 Measures for Immediate Action

In case of a spill, Quick-Dri and other supplies are available to absorb the oil, or spills can be removed by a vacuum truck and recycled with used oil. Instructions for spill cleanup are clearly posted and Facility personnel are made aware of the procedures and the locations of the information and cleanup supplies. Materials and equipment necessary for spill cleanup is kept in the material storage area on-site. Portable Spill kits are located at designated areas (e.g. water operator's truck, manager's trucks, field crew trucks) so spills can quickly be addressed.

3.3 INSPECTION AND MAINTENANCE

Inspections of all units which store hazardous or potentially contaminating materials are completed by qualified personnel to detect and identify any environmental releases. Piping, pumps, storage tanks and bins, pressure vessels, process and material handling equipment, and material bulk storage areas are inspected for any signs of other deterioration or non-containment. These inspections and tests shall be conducted in accordance with written procedures. If repair or maintenance is required, the responsible supervisor makes the assignment of duties. A list of inspection checklists is provided in **Appendix B**. All forms are located in ETQ Reliance as Chemours' documents control system. Each document contains the retention policy and hard copy storage area location. Inspection and maintenance procedures for each area of concern are detailed in the following sections.

3.3.1 Oil Storage Buildings

Oil Storage buildings shall be inspected weekly by a competent person to ensure that all containment is adequate and free of standing water. The competent person shall ensure that oil storage buildings remain in good housekeeping and best management practices are used to avoid a spill. Buckets and drums are to be placed on wood pallets or spill control pallets. Absorbency materials are stored in all oil storage buildings to assist employees with quick response to oil spills.

3.3.2 Vehicle and Machinery Fueling and Chemical Loading

Employees shall utilize ground levels to assess the impact of spills reaching navigable waters. Chemours' environmental policy mandates that no unattended fueling operations be conducted. CFL-SOP- 1404 and CFL-SOP- 1405 are examples of the procedures for chemical unloading. Chemours' conducts frequent environmental and safety inspections of the storage tanks and fuel tanks/equipment. Records of the inventory of all tanks containing vehicular fuel are updated monthly.

3.3.3 Portable Diesel Pumps and Tanks

Close monitoring with daily inspections of pumps and tanks shall be conducted to quickly identify any releases. The inspections are documented on CFL-SOP-1706.

3.3.4 Mobile Equipment

The equipment is checked daily for any issues with leaking oil or fuel.

3.3.5 Material Storage and Handling Areas, Staging Areas

An employee is assigned to each storage and handling area. Inspections are conducted on a weekly basis to ensure proper labelling, storage, and housekeeping.

3.4 SPILL RESPONSE AND REPORTING

The response procedures detailed in this Section apply to the release of oil and toxic/hazardous substances. Following the occurrence of a spill or release that requires implementation of the BMP Plan, the Environmental Manager must immediately notify the proper regulatory agencies and follow-up with a written spill report. Spill response plans shall be retained onsite and made readily available to trained individuals. **Appendix C** includes a list of all reportable quantities in the case of a spill together with specific reporting agency contact information. Should notification be required to the State, Form 62-761.9000(1) would be completed and submitted to the appropriate agency.

3.4.1 General Spill Response Procedures

The following procedures should be used for spills occurring at the Facility together with appropriate notification procedures as set out in Section 3.4.2:

- The extent of the release shall be assessed, along with the type of material, health and environmental hazards, and immediate response actions to other local and regulatory agencies.
- Immediate attempts shall be made to isolate the release with temporary dikes. If already diked, the material will be vacuumed or pumped using compatible equipment.
- If the spill is below the reportable quantity, trained company personnel utilizing spill response equipment shall clean it up.
- If the spill is above the reportable quantity, the spilled material shall be recovered from its area of containment to prevent further contamination.
- Waste material shall be placed into DOT 17-E or 17-H drums which are labeled and in good condition.
- In the case that a drum was punctured, the material remaining in the drum and the drum itself shall be placed in an 85-gallon over pack drum. This material will then be stored in approved area for eventual transfer to an approved disposal facility.
- The area will be thoroughly cleaned up and decontaminated periodically.

- If the recovered material is contaminated beyond reuse, it shall be appropriately labeled and stored in an approved oil storage location for eventual transfer to an approved waste disposal facility.
- If an oil spill is major and is likely to enter the nearest body of water, and Emergency Response Contractor shall be called. Chemours has a corporate contract with two resources to help with such emergency: CHEMTREC and Safety Kleen.
- For portable tanks/pumps there shall be 5-gallon quick spill kits located in high potential spill areas, mobile equipment, and supervisor's trucks.
- If a larger spill is occurring, immediate steps will be made to pump the tank of the hazardous material, salvage the material, repair the tank, re-test the tank and refill. Large spills may require additionally equipment which may include front-end loaders, dump trucks, and booms to restrict the movement of the release and prevent surface water contamination. In the case of an emergency, company contractors such as CHEMTREC or Safety Kleen will be brought to the Facility for appropriate cleaning to reduce the risk of material reaching navigable waters.

In the unlikely event that a significant amount of oil is spilled and has reached area surface waters; the following actions must be taken:

- Employees shall determine the directed travel path to receiving waters.
- The Environmental Manager shall work with staff to contain and remove these pollutants while in the surface water management system by incorporating the use of booms, oil absorbent materials, and neutralizing chemicals. Additionally, the use of private contractors with vacuum equipment may be used if essential in oil and hazardous materials cleanup activities.
- Waste material will be placed into DOT 17-E or 17-H, 55-gallon drums or roll-off type containers with fitted covers. The material will be taken off-site for disposal.
- In the event of a major release, an outside contractor CHEMTREC or Safety Kleen can assist 24/7 with contamination and remediation.

3.4.2 Notification Procedures

If a minor leak, spill, release or fire occurs, the individual discovering the incident should attempt to locate and eliminate the source if they have been properly trained. Untrained individuals should locate a trained individual to conduct elimination. Such actions can include: closing valves, turning drums upright, activating emergency pumps, or using absorbent materials. These measures should only be undertaken if they can be accomplished without any risk to the individual. If the source is not immediately obvious or if these measures are not effective and the situation requires further immediate notification, the discoverer should initiate the following emergency procedures:

i. Notify immediate supervisor and Environmental Department
    a. Environmental Manager
    b. Environmental Specialist
    c. Environmental Technician
ii. Report the following information:
    a. Exact location of the emergency event;
    b. Type and description of the emergency;
    c. Estimate of the amount of material released;
    d. Extent of injury or property damage incurred;
    e. Extent of the actual potential environmental damage; and
    f. Initial remedial actions taken, if any.

3.4.3 Environmental Manager Responsibilities in Case of Spill

After being alerted of an emergency, the Environmental Manager will determine the severity of the situation and instruct the necessary plant personnel to implement appropriate emergency response and cleanup procedures. The Environmental Manager shall undertake the following tasks:

i. Determine if the released material contains hazardous substances or oils. Refer to **Appendix D** to determine whether it is classified as a hazardous substance.
ii. Determine if the quantity of material represents a reportable quantity (**Appendix C**).
iii. Comply with “Immediate Reporting” permit condition.

3.4.4 Immediate Reporting

The Permittee shall report to the FDEP Northeast District any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain the following: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

The following shall be included as information which must be reported within 24 hours under this condition:

i. Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge,
ii. Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,
iii. Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and
iv. Any unauthorized discharge to surface or ground waters.

Oral reports as required by this subsection shall be provided as follows:

i. For unauthorized releases or spills of treated or untreated wastewater reported pursuant to subparagraph (a)4. that are in excess of 1,000 gallons per incident, or where information indicates that public health or the environment will be endangered, oral reports shall be provided to the STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519, as soon as practical, but no later than 24 hours from the time the permittee becomes aware of the discharge. The permittee, to the extent known, shall provide the following information to the State Warning Point:
   a. Name, address, and telephone number of person reporting;

b. Name, address, and telephone number of permittee or responsible person for the discharge;
c. Date and time of the discharge and status of discharge (ongoing or ceased);
d. Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater);
e. Estimated amount of the discharge;
f. Location or address of the discharge;
g. Source and cause of the discharge;
h. Whether the discharge was contained on-site, and cleanup actions taken to date;
i. Description of area affected by the discharge, including name of water body affected, if any; and
j. Other persons or agencies contacted.
k. Oral reports, not otherwise required to be provided pursuant to subparagraph b.1 above, shall be provided to the Department's Northeast District within 24 hours from the time the permittee becomes aware of the circumstances.

3.4.5 Cleanup Procedures

The discoverer and Environmental Manager shall address the spill/leakage immediately and properly. Appropriate spill kits are located strategically in locations for easy access. Also, employees are trained and informed of material that will assist in the cleanup and emergency response.

3.4.6 Follow-up Spill Reporting

As a follow-up to the Immediate Reporting, the Environmental Manager will submit any additional written reports required by Section 3.4.3 that were not completed immediately. The Environmental Manager shall also write and submit a report to the Plant Manager and the Committee. This report shall include an assessment of whether additional measures should be taken to avoid reoccurrence. The Chemours Reliance database maintains logs noting all spills, releases, and cleanup actions taken.

A spill report shall be submitted to the EPA Regional Administrator and FDEP within 60 days from the following events:

- A single spill event of more than 1,000 U.S. gallons of oil into or upon the navigable waters of the United States or adjoin shorelines; or
- Two spill events of discharged oil in harmful quantities, as defined in 40 CFR 110, into or upon the navigable water reportable under Section 311(b)(5) of the FWPCA occurring within any twelve-month period.

3.5 BMP PLAN REVIEW AND REVISION

This section of the BMP Plan shall be thoroughly reviewed by the Committee at least once every three years. Revisions to this section of the BMP Plan shall be amended upon any of the following occurrences:

- Revisions to applicable Federal, State, or local regulations
- Failure of BMP Plan to perform adequately during a spill emergency
- Commissioning or decommissioning of tanks or other oil-containing equipment
- Construction or demolition which alters secondary containment or diversionary structures
- Revision of standard operating, maintenance, or safety procedures affecting oil-containing equipment

Amendments to the BMP Plan shall be implemented within six months of the review.

4 STORMWATER POLLUTION PREVENTION

Operations of the Facility have the potential to impact stormwater runoff from the Trail Ridge South property. It is the goal of this plan to maintain quality standards for stormwater runoff and assure compliance with the terms and conditions listed in the MSGP.

The following section governs Facility stormwater pollution prevention, including management of active mining and reclamation areas and inspection and maintenance of: dikes, ditches, ponds, and equipment storage.

For general site information, including contract information, BMP Plan Team, and descriptions of site activities, see Section 1: PLAN DESCRIPTION, and Section 2: FACILITY EVALUATION.

4.1 POTENTIAL SOURCES OF STORMWATER POLLUTION

Throughout construction, operation and reclamation activities, each permittee, contractor, and/or person(s) responsible for conducting work will need to ensure that sources of pollution are managed to prevent discharge of untreated runoff. Stormwater pollution is possible as a result of runoff from the following facility areas:

- Parking Areas
- Loading and Unloading Areas
- Active Reclamation Areas
- Active Mining Areas
- Unstable / Exposed Soil Areas
- Stockpiles
- Wastewater Treatment Area

The Facility consists of unpaved parking areas, gravel or earthen access roads, process areas, petroleum storage areas, and equipment storage areas with little vegetation. Sediment transported by vehicles, vehicle fluid or spills can be carried by stormwater. Based on topographic mapping, runoff from the above areas is collected and treated in the Facility wastewater system. Waste materials generated during the production processes are stored on-site. These waste

materials include overburden and off-spec materials. Overburden and off-spec materials may be stored in stockpiles or used for facility development. Universal waste that is generated is stored and disposed of in accordance with the federal universal waste regulations as defined in 40 CFR 273.

Operation of the Facility, while constant, may vary in location or scope over time. Should additional sources of pollution be identified, they shall be added to the list by the person(s) with day-to-day operational control on site within 30 days. Those persons shall be responsible for contacting the Environmental Manager to assist in proper management of newly identified pollution sources.
For pollution sources other than those related to stormwater, see Section 3.1: POTENTIAL SOURCES OF SPILLS.

4.2 STORMWATER CONTROL MEASURES

Controls shall be implemented to minimize stormwater pollution from all potential site sources. In general, these controls can be grouped as: source controls, intended to prevent exposure of stormwater to pollution sources; drainage controls, intended to convey, contain, and manage runoff in designated treatment areas; and erosion and sediment controls, intended to minimize erosion and prevent the transfer of sediments from the Facility. This section will be updated once the stormwater permit for the plant site has been obtained.

For control measures specifically addressing spill prevention and response, see Section 3.2: SPILL CONTROLS.

4.2.1 Source Controls

The most direct method to prevent stormwater pollution is to minimize the use of water contaminants in industrial activities. Where water contaminants are necessary in industrial processing, Chemours has focused on stormwater control measures that reduce exposure of stormwater runoff and pollutant sources. The controls and BMPs are utilized and implemented to minimize potential impacts by diverting stormwater away from pollutant sources and directing stormwater run-on/runoff towards control measures. When in effect, source controls help decrease the volume of stormwater requiring treatment, and the resources needed to treat polluted stormwater. Source controls include the following:

- Minimizing exposure of Facility processing areas to stormwater
- Maintaining equipment and performing preventative maintenance
- Good housekeeping, including picking up trash and debris
- Minimizing impervious areas and maximizing areas where stormwater can infiltrate on-site, while simultaneously avoiding groundwater contamination through spill controls and augmenting base flow in local streams
- Recycling water so that it is used within its processes to the greatest extent possible
- Training Facility staff on appropriate spill procedures and proper materials management and storage. For specific spill prevention procedures, see Section 3.2**.**
- Maintaining vegetative cover throughout the Facility, as appropriate.

4.2.2 Drainage Controls

Drainage controls are utilized to manage, convey, contain, and manage water on site, whether it be surface water or ground water. Drainage controls may be implemented to deal with both water that has been exposed to pollutant sources and water that has not been exposed. Surface water is managed using dikes, swales, ditches, depressions, and ponds. Dikes prevent stormwater from draining beyond designated treatment areas. Contact water is recycled within the facility and is either pumped or otherwise conveyed to the water treatment system. Ponds can be used as treatment for non-contact stormwater, detainment for treated or untreated wastewater for re-use, or for treated water to be discharged from the site in compliance with the terms and conditions of the NPDES permit.

The following minimum BMPs shall be utilized as drainage controls:

- Ten-foot buffer from toe of dam where possible to allow adequate room for inspection and maintenance and buffer zone near preservation and restoration areas as practicable. Due to the age of the site, some areas are adjacent to borrow pits that limit buffer widths.
- Ponds operated with a minimum of 1 foot of freeboard.
- Vegetated swales and natural depressions are used to dissipate energy in overland flow, increase infiltration, and promote uptake of nutrients by plants to avoid groundwater contamination

4.2.3 Erosion and Sediment Controls

As the Facility is in continuous operation, there is potential for disturbed soils in some locations. These locations are vulnerable to loss of sediment through stormwater erosion. Erosion and sediment controls are implemented both in these types of locations, and downstream of these locations within the Facility to minimize erosion and prevent the transfer of sediments from off-site. This is accomplished by surface grading and preparation, sediment barriers, water velocity reduction measures, settlement controls and vegetation. Erosion and sediment control best management practices shall be installed immediately prior to, and be maintained during and after construction as needed, to prevent adverse impacts to water resources and adjacent lands. Such practices are in accordance with the State of Florida Erosion and Sediment Control Designer and Reviewer Manual[1] and the Florida Stormwater Erosion and Sedimentation Control Inspector's Manual[2].

Active areas that are susceptible to erosion shall be provided with appropriate erosion controls**.** Controls shall be utilized in any active area susceptible to erosion to prevent sediments from entering drainage features, including but not limited to, areas of material processing, operational facilities and/or stacking of tailings. Sediment barriers such as silt fencing, hay bales, and temporary berms will help to slow or impede water flow and sediment transfer. Existing swales and depressions shall be maintained and regraded to control water flow and velocities to prevent unintended erosion. Existing ponds, traps, check dams and other sediment collection areas are used to detain stormwater and allow sediments to settle.

Erosion and sediment controls will be implemented at the Facility to meet effluent water quality standards by preventing sediments from leaving the Facility. The following measures shall be used to control erosion and sediment:

- Sediment track-out from vehicles shall be minimized through adequate improved roadway surfaces prior to the Facility exit that will allow for dislodging of sediment.
- Vegetated swales and depressions shall be used to reduce erosion through reduction of surface water flow velocities.

- Ditches shall be cleared of sediment buildup as needed based on visual inspections in accordance with inspection schedule.
- Silt fencing shall be installed down gradient from disturbed areas to prevent sediment-laden water from entering wetlands or other receiving waters.
- Areas with processing equipment and/or stockpiles shall be graded when needed based on inspections to control surface runoff and minimize soil erosion and sedimentation.
- Stockpile locations shall be designed and maintained to ensure that the piles are in a stable location prior to placement. Water contacting stockpiles shall be routed into the treatment system.
- Modifications to pH and chemical additions to settle out solids and soil particles via flocculation shall be performed as needed based on monitoring results for the water treatment system.

4.2.4 Non-Stormwater Discharge Controls

All non-stormwater discharges occur from the water treatment system as discussed above and are performed based on the requirements of the IWW permit.

4.3 INSPECTION AND MAINTENANCE

Inspections of all stormwater pollution prevention measures and erosion and sediment control devices shall be completed by area supervisors to ensure adequate operation and/or to detect and identify any deficiencies. Stormwater system inspections shall be conducted weekly and within 24 hours after each rainfall event greater than ½-inch. Erosion and sediment controls shall be maintained on a daily basis and within 24 hours after each rainfall event greater than ½-inch. Inspectors shall have completed stormwater erosion control training, receive annual training updates and be familiar with all BMP plans. Each inspection shall be documented and kept on file at the Environmental Manager's. Each inspection report shall contain, as a minimum, date, name of inspector, as-found condition of system features and nature and extent of maintenance/repair performed.

Facilities to be inspected include areas where industrial materials are exposed to stormwater, pollutant sources identified in this document, and all control measures used to remain in

compliance with the NPDES permit (including but not limited to all stormwater and spill prevention control measures).

If repair or maintenance is required, the responsible supervisor makes the assignment of duties.

4.3.1 Dikes

Dike inspections shall evaluate the following critical conditions:

i. Seepage on the outer face or downstream from the toe in which there are boils, sand cones, or deltas
ii. Cracking of soil surface or crest on either face of the dike
iii. Bulging of the downstream face of the dike
iv. Seepage, damp areas, or boils in the vicinity of or erosion around a conduit through the dike
v. Any subsidence of the crest or faces
vi. Surface erosion, gullying, or wave erosion of the upstream face of the dike
vii. Surface erosion, gullying, or wave erosion of the downstream face of the dike, including the berm and the area downstream from the outside toe
viii. Erosion below any conduit exiting the dike
ix. Wet areas or soggy soil in downstream face of the dike or in natural soil below the dike
x. Visibility problems association with overgrown vegetation that may impede proper inspection and maintenance of dikes

4.3.2 Conveyance Swales

Ditch inspections shall evaluate the following critical conditions:

i. Erosion or scour of ditch banks and bottom
ii. Trash or debris within the ditch
iii. Sufficient vegetative cover or armoring
iv. Evidence of discharges outside the treatment system

4.3.3 Ponds

Daily drive-by inspections and weekly documented inspections of active ponds.

4.3.4 Erosion Control Measures

Inspections shall evaluate the following critical conditions:

Silt Fence

i. Rips or tears in the fabric
ii. Accumulated sediment above the maintenance line
iii. Evidence of sediment opposite of the controlled area
iv. Failing posts or supports

Hay Bales

i. Accumulation of sediment
ii. Breaches in the bales
iii. Loss of straw and integrity

4.3.5 Corrective Actions

The following actions shall be taken if any inspection items are found to be deficient:

i. Document the deficiency found
    - Include written description of deficiency in inspection form and take pictures if possible
ii. Notify the Environmental Manager
iii. For deficiencies noted during dike inspections, review with the Environmental Manager and Reclamation Supervisor
    - If washes or rills are found, the eroded areas shall be repaired and stabilized within 48 hours. Where the possibility of cascading failure exists, up gradient dikes and berms must also meet this requirement.
iv. Initial Actions

- If corrective action is needed, as soon as practicable, the Facility will take reasonable steps necessary to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events.

v. Subsequent Actions
   - If additional actions are necessary beyond those implemented in accordance with the Initial Actions outlined above, the facility must complete the corrective actions before the next storm event, if possible, and within 30 calendar days from the time of discovery of the corrective action condition. If it is infeasible to complete the corrective action within 30 calendar days, the Environmental Manager will document why it is infeasible to complete the corrective action within the 30-day timeframe.
   - The Facility will also identify the schedule for completing the work, which will be done as soon as practicable after the 30-day timeframe but no longer than 90 days after discovery. If the corrective action cannot be completed within the 90-day timeframe, the Facility will notify DEP, document the rationale for an extension, and maintain that documentation with the SWPPP. Where corrective actions result in changes to any of the controls or procedures documented in the SWPPP, the SWPPP must be modified accordingly within 30 calendar days after completing corrective action work.

vi. If the necessary repair is beyond Chemours' skill, the Environmental Manager will contact 3rd Party Engineer for review and follow recommendations from 3rd Party Engineer.

4.4 ADDITIONAL BEST MANAGEMENT PRACTICES

4.4.1 Temporary Stockpile Areas

New temporary stockpile areas are required to be surrounded by silt fence until the stockpile (for example, limerock) has been removed and the ground stabilized by seeding and mulching or other vegetative cover as approved by the Environmental Manager. Off-site drainage from natural or reclaimed areas should be diverted around the stockpile area. Silt fence should be inspected weekly and repaired as necessary until no longer required due to the removal of the stockpile. A 2-foot tall berm shall be provided interior to the silt fence for stockpiles that will remain longer than 6 months.

4.4.2 Temporary Parking and Staging Areas

On occasion, third-party vendors require a staging and parking area for extended periods of time. These areas should be in upland areas and surrounded by silt fence and in areas that are currently within a treatment pond drainage area as approved by Chemours. A 6-inch course of FDOT No. 1 shall be applied over geotextile across the entire parking/staging area during operations. A stabilized construction entrance shall be provided at all connections to paved roads. Once construction has been completed, all stone and geotextile shall be removed, and the area immediately stabilized with grass and mulch.

4.4.3 Temporary Pumps

Operations require the use of multiple water pumps to move water around the Facility. Pumps shall be located on flat ground and surrounded by a grassed berm a minimum of 2 feet high and 3:1 side slopes. Silt fence shall be placed 1 foot beyond the exterior slope. The berm and silt fence shall remain until the pump is moved, then the ground shall be reestablished to existing conditions and seeded and mulched.

4.4.4 Temporary Haul Roads

For the purpose of this document, temporary haul roads are roads that will not have a hard surface. In reclaimed areas that discharge clean water, a diversion shall be placed along the road to collect and convey clean runoff from the haul road. The temporary road shall be sloped a minimum of 1% to one side with another roadside ditch installed to collect the runoff from the haul road. Stone check dams or hale bales shall be installed for every foot of elevation change and the ditch shall be stabilized using either grass or an erosion control blanket installed per manufacturer's instructions. All ditches shall be triangular and a minimum of 18" deep with 3:1 side slope.

4.4.5 Earthen Embankments/Berms

Trees and brush should not be permitted on embankment surfaces. Roots can create pathways for seepage, trees that fall over can create large holes in the embankment surface and brush obscures visual inspection.

Earthen embankments should be inspected for the presence of trees and brush. Stumps of cut trees should be removed so vegetation can be established and the surface mowed. Small stumps may be entirely removed if removal does not require extensive excavation into the embankment which could compromise the structural integrity of the dam. If the stump is of sufficient size where complete removal would require significant excavation into the embankment, then the stump should be ground down to about 6 inches below the surface. All other woody material should also be removed or ground down to about 6 inches below the ground surface.

Stumps of trees in riprap should be cut as close to the rock layer as possible and then chemically treated so they will not form new sprouts. Certain herbicides are effective for this purpose and can even be used at water supply reservoirs if applied by licensed personnel. These products should be applied in strict coherence with local and state herbicide regulations. Other instructions found on the label should be strictly followed when handling and applying these materials. Only a few commercially available chemicals can be used along shorelines or near water.

5 GENERAL REQUIREMENTS

In addition to those controls listed specifically in Sections 3 through 5 of this BMP Plan, this section provides more general requirements applicable to all best management practices and programs. These practices include inspections, preventative maintenance, training, good housekeeping, and record keeping.

5.1 INSPECTIONS

Inspections shall be conducted in accordance with written documentation, on the schedule defined for the specific program, and be well documented. Inspections shall be undertaken with the following guidance in mind:

- Inspectors must follow a consistent process so that all areas are systematically inspected. Follow a schedule of areas to inspect, to include locations of industrial activities exposed to stormwater, stormwater conveyances and discharge points, and any BMPs.
- Evaluate the area where raw materials are delivered. Are these areas contained or is there potential for stormwater to carry spills or pollutants away from the drop area? If so, can these pollutants leave the Facility to an adjoining surface water? If so, make note of additional control measures that should be implemented.
- Are raw materials stored in a contained area with overhead cover, berms, or other secondary containment? If not, do the raw materials have the potential to contribute to stormwater pollution?
- Is equipment maintenance and fueling conducted in appropriately contained areas? Are spill kits present and full in areas where a liquid spill could be expected?
- Do the industrial processes occur in covered and contained areas?
- Where is waste material stored?
- Is the finished product appropriately contained for potential pollutant sources?
- Following the internal evaluation, walk the perimeter of the Facility and look for evidence of stormwater discharges—particularly litter, stains from oil and grease or chemicals. If this is observed, look at the discharge area and consider additional control measures.

- Observe all stormwater outfalls where stormwater leaves the Facility.
- Following each inspection, make note of control measures that require maintenance, or that need to be replaced, and make sure that the BMP Plan and site map are current regarding industrial activities and potential pollutants.
- Where appropriate, repair or replace worn or ineffective control measures as soon as possible but certainly before the next forecasted precipitation.
- Recognizing the massiveness of the Facility, such inspections should focus on the heavy use areas but monthly, the whole system should be visited.

Daily log sheets and work-place inspections are reviewed once per shift by the team leader or supervisor. The Facility inspections must be completed by qualified personnel with at least one member of the stormwater pollution prevention team participating. If the inspection identifies deficiencies, necessary follow up actions must be documented.

5.2 PREVENTATIVE MAINTENANCE

Preventive Maintenance is a normal activity for all machinery and process equipment at the Facility. All items which require routine care such as lubrication, machinery adjustments, cleaning and removal of sludge or solids buildup, stormwater accumulation, and inspection for items for structural integrity will be identified for preventative maintenance. All records and inspection reports are the responsibility of Chemours staff and on-site Contractors. To ensure the Facility is properly maintained, employees are responsible for their individual actions, and the supervisor makes routine checks.

Major equipment items will be investigated and crucial parts identified to be inputted into the software program, SAP, for organized repair/service dates. An inventory of said parts shall be maintained to assure that any downtime of mining or processing equipment is minimized. Backup equipment is made available in the act of equipment failure. Backup equipment includes portable pumps, electrical/diesel generators, and other vital replacement parts that can be utilized until permanent repairs can be made. To ensure proper and timely repairs, PM25's are scheduled in SAP to maintain a database for equipment repair/service. These necessary repairs are scheduled weeks in advance which allow employees to address the appropriate equipment.

5.3 EMPLOYEE TRAINING

All Chemours Employees and Contractors are provided with mandatory safety training specific to the Chemours mine operations. Chemours provides SPCC, SWPPP, and BMP training for all personnel on site. The Site Trainer shall arrange for annual training, which includes the following topics:

- Introduction to pollution control laws
- An overview of what is in the SWPP and SPCC
- Rules and regulations pertaining to the use and storage of petroleum products
- Spill prevention and control best management practices
- Spill response and cleanup
- Spill notification and record keeping
- Good housekeeping and maintenance requirements
- Material management practices
- Record keeping
- Inspections
- Review of BMP Plan and, particularly, any changes thereto

Each briefing shall highlight and describe known spill events, failures, malfunctioning components, and recently developed precautionary measures. If there is a significant change to the BMP Plan, employees will be required to review the changes and report their acceptance of reviewed material. Training schedules appear in **Appendix E.**

In the case of a release or where an immediate response is required, additionally informal training will be provided to inform employees Facility-wide. The training instructions direct personnel to immediately seek their supervisor or a supervisor in a high administrative position and apprise them of the observed situation. The Supervisor on duty is the designated responsible Facility administrator to implement a remediation or emergency response plan.

5.4 GOOD HOUSEKEEPING

Good housekeeping is the maintenance of a clean, orderly work environment. Maintaining an orderly Facility means that materials and equipment are neat and well-kept to prevent releases to the environment. To mitigate for spills and slip/trip/fall hazards personnel are required to conduct routine housekeeping checks. As a result, the Facility shall establish good housekeeping procedures and measures which include the following:

- Place litter in receptacles
- Replace tank hoses inside containment dikes
- Provide regular pickup and disposal of waste materials and scrap equipment
- Maintain clean work spaces
- Inspect for leaks and of the condition of drums, tanks, and containers
- Inspect to make sure that industrial materials are properly stored and labeled
- Maintain a schedule for sweeping paved areas and floors, including who will perform the sweeping
- Assign the individual or position responsible for emptying drip pans placed beneath leaking equipment, valves, and fill lines
- Maintain proper labeling

Any violations of good housekeeping procedures are reported to and addressed by the Site Supervisor.

5.5 RECORD KEEPING

Records that are pertinent to actual or potential environmental releases are maintained by all Chemours supervisors. Per permit requirement, daily shift inspections are kept for one year such as workplace exams and confined space permits. Other inspections are kept for three years which include but are not limited to quarterly reports, Mine ID changes, or secondary containment evaluation.

REFERENCES

1. Florida Department of Environmental Protection and Florida Department of Transportation. 2007. *Florida Erosion and Sediment Control Designer and Reviewer Manual.*

2. Florida Department of Environmental Protection. 2008. *Florida Stormwater Erosion and Sediment Control Inspector's Manual.*

TABLES

TABLE 1-1
BMP COMMITTEE CONTACT INFORMATION

COMMITTEE MEMBER	NAME	Company	PHONE	EMAIL
Environmental Manager	Connie Henderson	Chemours	904-964-1327	connie.henderson@chemours.com
Minerals Operation Manager	Stuart Forrester	Chemours	804-481-6111	stuart.r.forrester@chemours.com
Mining Manager	Rafael Montalvo	Chemours	904-479-3667	rafael.j.montalvo@chemours.com
Services Manager - EHS	Phil Pombier	Chemours	904-479-3065	philop.r.pombier@chemours.com
LC&R Coordinator	Travis Jolley	Chemours	904-964-1213	travis.e.jolley@chemours.com
Processing Manager	Jason Geiger	Chemours	904-539-7060	jason.j.geiger@chemours.com
Professional Engineer	Brian Burkhart	Kleinfelder	919-755-5011	bburkhart@kleinfelder.com
EHS Specialist	Jeremy Horsley	Chemours	904-454-6330	jeremy.horsley@chemours.com
Mining Supervisor	Robert Runyon	Chemours	904-540-9593	robert.e.runyon@chemours.com
Processing Supervisor	Randy Connor	Chemours	904-861-2445	randy.connor@chemours.com
Lab Manager	Jerry Vandergriff	Chemours	912-464-9319	jerry.w.vandergriff@chemours.com
Water Operator	Mike Todd	Chemours	904-759-7912	michael.l.todd@chemours.com
Brown & Root	Eric Scoggins	BR	904-364-3159	eric.scoggins@chemours.com
Krebs Land Development	Josh Sanford	KLD	386-931-3812	josh@krebsld.com

TABLE 2-1

CHEMICAL SUMMARY*

Chemical	Maximum Quantity Stored	Method of Storage	Location
Sulfuric or Hydrochloric Acid	TBD	AST	TRS WWT
Aluminum Sulfate	TBD	AST	TRS WWT
Polytec PT-318	TBD	AST	TRS WWT
Polytec PT-414	TBD	AST	TRS WWT
Ethylene Glycol (Antifreeze)	1.5 gallon/vehicles	Vehicles	Site
Calcium Hydroxide (Lime)	TBD	AST	TRS WWT
Ferric Sulfate	TBD	AST	TRS WWT

**A list of potential chemicals that may be onsite are provided above. This table will be updated to reflect actual chemicals onsite once mining activities are initiated*.

TABLE 3-1

FUEL TANK SUMMARY*

Chemical	Maximum Quantity Stored	Method of Storage	Location
Diesel	TBD	AST	TRS
Diesel	TBD	AST	TRS
Used Oil	TBD	AST	TRS
Lube Oil	500 gallons	AST	TRS

**A list of potential chemicals that may be onsite are provided above. This table will be updated to reflect actual chemicals onsite once mining activities are initiated*.

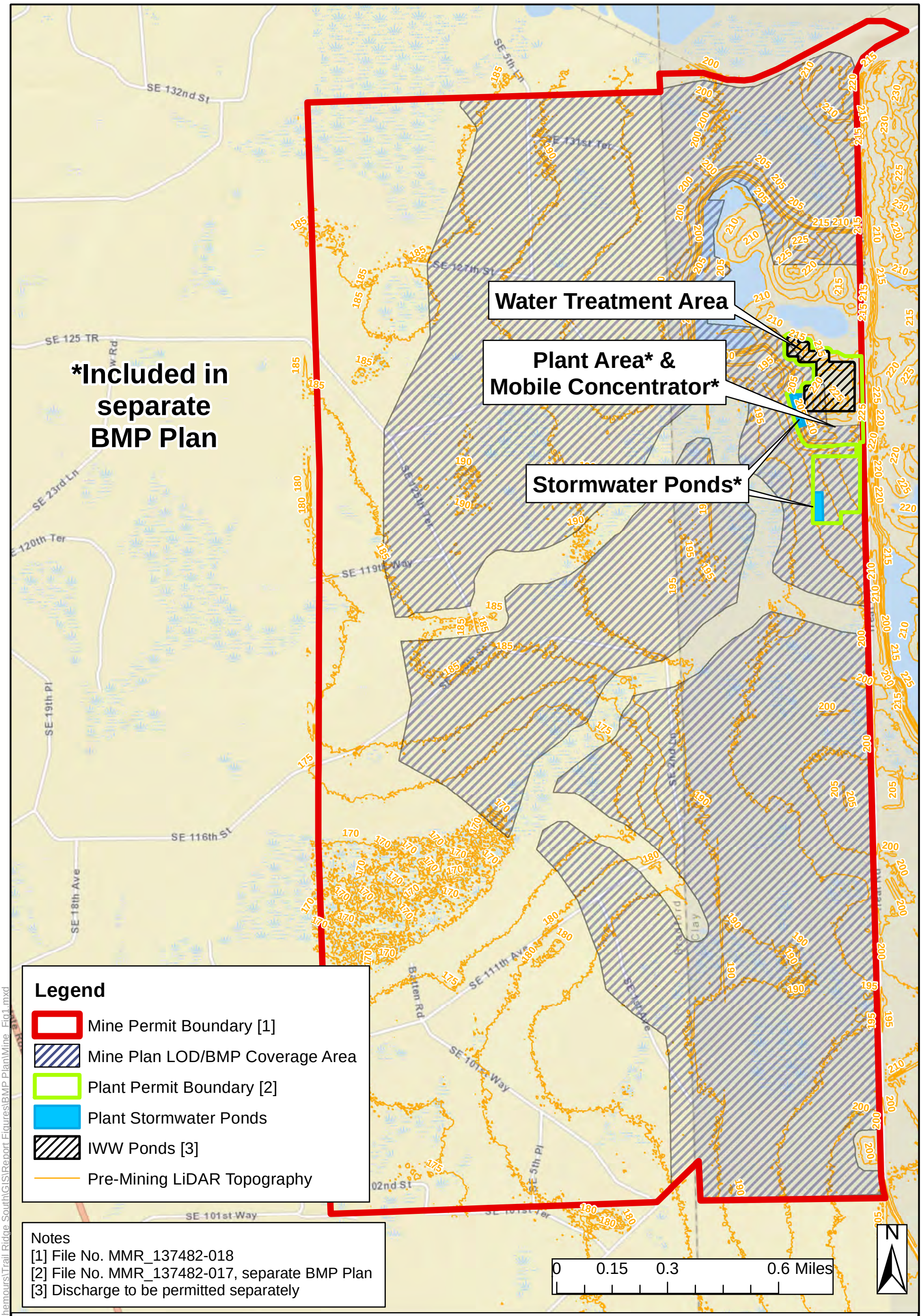
TABLE 3-2

MOBILE EQUIPMENT SUMMARY*

Mobile Equipment	Fuel Capacity (Gallons)	Hydraulic Oil
2 Mobile Mining Units	TBD	TBD
Rough terrain/Carry Deck Cranes	TBD	TBD
Passenger/utility carts	TBD	TBD
Dozers	TBD	TBD
Excavators	TBD	TBD
Challengers	TBD	TBD
Off Road/On Road Haul Trucks	TBD	N/A
Light Duty Trucks	TBD	N/A

**A list of potential chemicals that may be onsite are provided above. This table will be updated to reflect actual chemicals onsite once mining activities are initiated*.

FIGURES



Source: Imagery was obtained from ESRI Basemap.

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PROJECT NO.	00129491.003A
DRAWN:	6/18/2020
DRAWN BY:	KC
CHECKED BY:	BB
FILE NAME:	Mine_Fig1

Facility Overview Map

Trail Ridge South Mine
The Chemours Company
Bradford and Clay Counties, Florida

FIGURE 1

Document Path: W:\Civil\Chemours\Trail Ridge South\GIS\Report Figures\BMP Plan\Mine_Fig1.mxd

Received FDEP MMP Tallahassee 3/5/2021

APPENDIX A – INSPECTION SCHEDULES

Erosion and sediment control devices: shall be inspected and maintained daily and within 24 hours after each rainfall event greater than ½-inch.

Slopes and exterior sides of berms: shall be inspected daily and within 24 hours after each rainfall event greater than ½-inch in a 24-hour period until vegetation has been established. Thereafter, inspections shall occur weekly and within 24 hours after each rainfall event greater than ½-inch in a 24-hour period.

Pumps: shall be inspected daily when running

Stormwater Ponds: shall be inspected and maintained daily and within 24 hours after each rainfall event greater than ½-inch.

Stormwater Conveyances: shall be inspected and maintained daily and within 24 hours after each rainfall greater than ½-inch.

APPENDIX B – REFERENCE DOCUMENTS

Chemours uses ETQ Reliance as our Document Control database. All SOP's and checklists are located in this system. As a document is entered into the system; a workflow is established. This workflow includes designating a document owner, an approval list, a revision log and a review frequency. This reduces manual input and maintains a more efficient document control process. Additionally, this system will allow a field for reference documents. Links can be made to other checklists and documents so the system will prompt the document owner that if changes are made to primary document, the others may need to be reviewed as well.

Below is a list of reference and related documents and checklists associated with this Plan.

Document Number	Title
CFL-DPF-0002	Equipment Check Sheet
CFL-DPF-0029	Water Treatment Checklist
CFL-DPF-0062	AST Monthly Inspection - Double Walled Tanks
CFL-DPF-0063	AST Monthly Inspection - Stationary Bulk Tanks
CFL-DPF-0069	Severe Weather Checklist
CFL-DPF-0081	Sensitive Area Work Permit
CFL-DPF-0083	Mining Cell Release Form
CFL-DPF-0091	Unloading 50% Caustic from a Tanker Truck
CFL-DPF-0252	Authorization Request for New Chemical
CFL-DPF-0326	Line Break Permit
CFL-DPF-0607	Water Treatment Sampling
CFL-DPF-0609	Weekly Pond Report
CFL-DPF-0610	Workplace Examination
CFL-DPF-0613	Caustic Log Sheet
CFL-DPF-0614	Booster Line Inspection and Frequency Checklist

Document Number	Title
CFL-SOP-0726	Off Loading 50% Sodium Hydroxide (Caustic) Solution into the Caustic Tank
CFL-SOP-0728	Sampling and Analysis
CFL-WFP-0735	Tank Level Meter Calibration
CFL-WFP-0826	pH Meters PM
CFL-WFP-0851	Test Environmental Alarms
CFL-SOP-1079	Land Preparation
CFL-SOP-1080	Land Reclamation
CFL-SOP-1081	Mining Plan
CFL-SOP-1384	Environmental Protection
CFL-SOP-1390	Normal Operation - Flocculation
CFL-SOP-1391	Normal Operation - Neutralization Final Effluent
CFL-SOP-1394	Maxville Long Term Ponds Startup
CFL-SOP-1404	Unloading Ferric Sulfate, Barium Chloride or Aluminum Sulfate
CFL-SOP-1405	Unloading Lime Shipments
CFL-SOP-1415	ABB TB82 pH Meter Calibration
Safety How G	G - Hazard Communication
Safety How P3.6	P3.6 - Emergency Planning and Response
Safety How Q1	Q1 - Waste Water Treatment
CFL-SOP-1572	Inspection of Field Line
CFL-DPF-1623	Pond Inspection Form
CFL-DPF-1624	Spillway Discharge Data Form
CFL-DPF-1649	Wetland Water Quality Sampling

Document Number	Title
CFL-SOP-1652	Material Off-loading
CFL-DPF-1689	Weekly Stormwater Management Report
CFL-DPF-1706	Environmental BMP Inspection Sheet
CFL-DPF-1709	Monthly Discharge Data
PROC-L-01450	Best Management Plan - Highland Facility
PROC-L-01451	Best Management Plan - Trail Ridge Facility
PROC-L-01452	Best Management Plan - Maxville Mine
PROC-L-01453	Best Management Plan - North Maxville Mine
PROC-L-01448	Spiral Test Rig - Environmental Considerations
PROC-L-01499	Spiral Test Rig - Water Consumption Form

APPENDIX C – REPORTABLE SPILL QUANTITIES

Reportable Quantities

Report all unauthorized releases or spills of:

1. Oil or petroleum products in excess of 25 galls per incident
2. Untreated or treated wastewater or stormwater in excess of 1,000 gallons per incident
3. Other hazardous substances where public health or the environment may be endangered

Chemical	Reportable Quantity	Unit
Diesel Fuel[1]	25	gallons
Gasoline[1]	25	gallons
Used Oil[1]	25	gallons
Hydraulic Oil[1]	25	gallons
Motor Oil[1]	25	gallons
Transmission Fluid[1]	25	gallons
Gear Lubricant[1]	25	gallons
Oil/Water[1]	25	gallons
Gear Oil[1]	25	gallons
Grease[1]	25	gallons
50% Caustic Soda[1]	1000	pounds
Aluminum Sulfate	5000	pounds
Sulfuric Acid	1000	pounds
Isopropyl Alcohol	NA[2]	
Tetrabromoethane	NA[2]	
2% Caustic Soda	1000	pounds

Notes:
1 - Reportable quantity for release to pervious surface.
2 - No reportable quantity listed in 40 CFR Part 302, Table 302.4

Spill Report Procedures

Unauthorized releases or spills shall be reported to:

1. The State Watch Office Toll Free Number: (800) 320-0519
2. The Department's Pollution Notice website at https://floridadep.gov/pollutionnotice
3. The Department's Mining and Mitigation Program at mailto:MiningAndMitigation@dep.state.fl.us

Unauthorized releases or spills shall be reported as soon as practical, but no later than 24 hours from the time the Environmental Manager becomes aware of the discharge. The following information shall be provided, to the extent known:

1. Name, mailing and email addresses and telephone number of person reporting
2. Name, mailing and email addresses and telephone number of permitee or responsible person for the discharge
3. Date and time of the discharge and status of discharge (ongoing or ceased)
4. Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater or stormwater)
5. Estimated amount of discharge
6. Location or address of discharge
7. Source and cause of discharge
8. Whether the discharge was contained onsite and cleanup actions take to date
9. Description of area affected by the discharge, including name of water body affected, if any
10. Other persons or agencies contacted

A written submission shall also be provided to the Department at the email address listed above, within five (5) days of the time the permittee becomes aware of the unauthorized release or spill. The written submission shall contain:

1. All the information listed above
2. Description of the unauthorized discharge and cause
3. Period of the unauthorized discharge including exact dates and time
4. If the unauthorized spill has not been corrected, the anticipated time it is expected to continue

5. Steps taken or planned to reduce, eliminate and prevent recurrence of the unauthorized discharge

If the permittee discovers that a reportable pollution release has migrated outside the property boundaries of the installation, the permittee must provide an additional notice to the Department via the Pollution Notice website that the release has migrated outside the property boundaries within 24 hours after discovery.

For unauthorized stormwater releases or spills of 1,000 gallons or less per incident, notification emails shall be provided to the Department at mailto:MiningAndMitigation@dep.state.fl.us within 24 hours from the time the permittee becomes aware of the discharge.

APPENDIX D – HAZARDOUS SUBSTANCE QUALIFICATIONS

APPENDIX D – HAZARDOUS SUBSTANCE QUALIFICATIONS

State, municipality, commission, political subdivision of a State, or any interstate body;

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes:

(1) Any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons;

(2) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

(3) Release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or for the purposes of section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978; and

(4) The normal application of fertilizer;

Reportable quantity ("RQ") means that quantity, as set forth in this part, the release of which requires notification pursuant to this part;

United States include the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction; and

Vessel means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

[50 FR 13474, Apr. 4, 1985, as amended at 67 FR 45321, July 9, 2002]

§ 302.4 Designation of hazardous substances.

(a) *Listed hazardous substances.* The elements and compounds and hazardous wastes appearing in table 302.4 are designated as hazardous substances under section 102(a) of the Act.

(b) *Unlisted hazardous substances.* A solid waste, as defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b), is a hazardous substance under section 101(14) of the Act if it exhibits any of the characteristics identified in 40 CFR 261.20 through 261.24.

NOTE: The numbers under the column headed "CASRN" are the Chemical Abstracts Service Registry Numbers for each hazardous substance. The "Statutory Code" column indicates the statutory source for designating each substance as a CERCLA hazardous substance: "1" indicates that the statutory source is section 311(b)(2) of the Clean Water Act, "2" indicates that the source is section 307(a) of the Clean Water Act, "3" indicates that the source is section 112 of the Clean Air Act, and "4" indicates that the source is section 3001 of the Resource Conservation and Recovery Act (RCRA). The "RCRA Waste Number" column provides the waste identification numbers assigned to various substances by RCRA regulations. The "Pounds (kg)" column provides the reportable quantity adjustment for each hazardous substance in pounds and kilograms. Appendix A to §302.4, which lists CERCLA hazardous substances in sequential order by CASRN, provides a per-substance grouping of regulatory synonyms (i.e., names by which each hazardous substance is identified in other statutes and their implementing regulations).

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Acenaphthene	83-32-9	2		100 (45.4)
Acenaphthylene	208-96-8	2		5000 (2270)
Acetaldehyde	75-07-0	1,3,4	U001	1000 (454)
Acetaldehyde, chloro-	107-20-0	4	P023	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Acetaldehyde, trichloro-	75–87–6	4	U034	5000 (2270)
Acetamide	60–35–5	3		100 (45.4)
Acetamide, N-(aminothioxomethyl)-	591–08–2	4	P002	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	62–44–2	4	U187	100 (45.4)
Acetamide, N-9H-fluoren-2-yl-	53–96–3	3,4	U005	1 (0.454)
Acetamide, 2-fluoro-	640–19–7	4	P057	100 (45.4)
Acetic acid	64–19–7	1		5000 (2270)
Acetic acid, (2,4-dichlorophenoxy)-, salts & esters	94–75–7	1,3,4	U240	100 (45.4)
Acetic acid, ethyl ester	141–78–6	4	U112	5000 (2270)
Acetic acid, fluoro-, sodium salt	62–74–8	4	P058	10 (4.54)
Acetic acid, lead(2+) salt	301–04–2	1,4	U144	10 (4.54)
Acetic acid, thallium(1+) salt	563–68–8	4	U214	100 (45.4)
Acetic acid, (2,4,5-trichlorophenoxy)-	93–76–5	1,4	See F027	1000 (454)
Acetic anhydride	108–24–7	1		5000 (2270)
Acetone	67–64–1	4	U002	5000 (2270)
Acetone cyanohydrin	75–86–5	1,4	P069	10 (4.54)
Acetonitrile	75–05–8	3,4	U003	5000 (2270)
Acetophenone	98–86–2	3,4	U004	5000 (2270)
2-Acetylaminofluorene	53–96–3	3,4	U005	1 (0.454)
Acetyl bromide	506–96–7	1		5000 (2270)
Acetyl chloride	75–36–5	1,4	U006	5000 (2270)
1-Acetyl-2-thiourea	591–08–2	4	P002	1000 (454)
Acrolein	107–02–8	1,2,3,4	P003	1 (0.454)
Acrylamide	79–06–1	3,4	U007	5000 (2270)
Acrylic acid	79–10–7	3,4	U008	5000 (2270)
Acrylonitrile	107–13–1	1,2,3,4	U009	100 (45.4)
Adipic acid	124–04–9	1		5000 (2270)
Aldicarb	116–06–3	4	P070	1 (0.454)
Aldrin	309–00–2	1,2,4	P004	1 (0.454)
Allyl alcohol	107–18–6	1,4	P005	100 (45.4)
Allyl chloride	107–05–1	1,3		1000 (454)
Aluminum phosphide	20859–73–8	4	P006	100 (45.4)
Aluminum sulfate	10043–01–3	1		5000 (2270)
4-Aminobiphenyl	92–67–1	3		1 (0.454)
5-(Aminomethyl)-3-isoxazolol	2763–96–4	4	P007	1000 (454)
4-Aminopyridine	504–24–5	4	P008	1000 (454)
Amitrole	61–82–5	4	U011	10 (4.54)
Ammonia	7664–41–7	1		100 (45.4)
Ammonium acetate	631–61–8	1		5000 (2270)
Ammonium benzoate	1863–63–4	1		5000 (2270)
Ammonium bicarbonate	1066–33–7	1		5000 (2270)
Ammonium bichromate	7789–09–5	1		10 (4.54)
Ammonium bifluoride	1341–49–7	1		100 (45.4)
Ammonium bisulfilte	10192–30–0	1		5000 (2270)
Ammonium carbamate	1111–78–0	1		5000 (2270)
Ammonium carbonate	506–87–6	1		5000 (2270)
Ammonium chloride	12125–02–9	1		5000 (2270)
Ammonium chromate	7788–98–9	1		10 (4.54)
Ammonium citrate, dibasic	3012–65–5	1		5000 (2270)
Ammonium fluoborate	13826–83–0	1		5000 (2270)
Ammonium fluoride	12125–01–8	1		100 (45.4)
Ammonium hydroxide	1336–21–6	1		1000 (454)
Ammonium oxalate	6009–70–7	1		5000 (2270)
	5972–73–6			
	14258–49–2			
Ammonium picrate	131–74–8	4	P009	10 (4.54)
Ammonium silicofluoride	16919–19–0	1		1000 (454)
Ammonium sulfamate	7773–06–0	1		5000 (2270)
Ammonium sulfide	12135–76–1	1		100 (45.4)
Ammonium sulfite	10196–04–0	1		5000 (2270)
Ammonium tartrate	14307–43–8	1		5000 (2270)
	3164–29–2			
Ammonium thiocyanate	1762–95–4	1		5000 (2270)
Ammonium vanadate	7803–55–6	4	P119	1000 (454)
Amyl acetate	628–63–7	1		5000 (2270)
iso-Amyl acetate	123–92–2			
sec-Amyl acetate	626–38–0			
tert-Amyl acetate	625–16–1			
Aniline	62–53–3	1,3,4	U012	5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
o-Anisidine	90–04–0	3		100 (45.4)
Anthracene	120–12–7	2		5000 (2270)
Antimonydagger;dagger;	7440–36–0	2		5000 (2270)
ANTIMONY AND COMPOUNDS	N.A.	2,3		**
Antimony Compounds	N.A.	2,3		**
Antimony pentachloride	7647–18–9	1		1000 (454)
Antimony potassium tartrate	28300–74–5	1		100 (45.4)
Antimony tribromide	7789–61–9	1		1000 (454)
Antimony trichloride	10025–91–9	1		1000 (454)
Antimony trifluoride	7783–56–4	1		1000 (454)
Antimony trioxide	1309–64–4	1		1000 (454)
Argentate(1-), bis(cyano-C)-, potassium	506–61–6	4	P099	1 (0.454)
Aroclor 1016	12674–11–2	1,2,3		1 (0.454)
Aroclor 1221	11104–28–2	1,2,3		1 (0.454)
Aroclor 1232	11141–16–5	1,2,3		1 (0.454)
Aroclor 1242	53469–21–9	1,2,3		1 (0.454)
Aroclor 1248	12672–29–6	1,2,3		1 (0.454)
Aroclor 1254	11097–69–1	1,2,3		1 (0.454)
Aroclor 1260	11096–82–5	1,2,3		1 (0.454)
Aroclors	1336–36–3	1,2,3		1 (0.454)
Arsenicdagger;dagger;	7440–38–2	2,3		1 (0.454)
Arsenic acid H3AsO4	7778–39–4	4	P010	1 (0.454)
ARSENIC AND COMPOUNDS	N.A.	2,3		**
Arsenic Compounds (inorganic including arsine)	N.A.	2,3		**
Arsenic disulfide	1303–32–8	1		1 (0.454)
Arsenic oxide As2O3	1327–53–3	1,4	P012	1 (0.454)
Arsenic oxide As2O5	1303–28–2	1,4	P011	1 (0.454)
Arsenic pentoxide	1303–28–2	1,4	P011	1 (0.454)
Arsenic trichloride	7784–34–1	1		1 (0.454)
Arsenic trioxide	1327–53–3	1,4	P012	1 (0.454)
Arsenic trisulfide	1303–33–9	1		1 (0.454)
Arsine, diethyl-	692–42–2	4	P038	1 (0.454)
Arsinic acid, dimethyl-	75–60–5	4	U136	1 (0.454)
Arsonous dichloride, phenyl-	696–28–6	4	P036	1 (0.454)
Asbestosdagger;dagger;dagger;	1332–21–4	2,3		1 (0.454)
Auramine	492–80–8	4	U014	100 (45.4)
Azaserine	115–02–6	4	U015	1 (0.454)
Aziridine	151–56–4	3,4	P054	1 (0.454)
Aziridine, 2-methyl-	75–55–8	3,4	P067	1 (0.454)
Azirino[2',3':3,4]pyrrolo[1,2–a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b-hexahydro-8a-methoxy-5- methyl-,[1aS-(1aalpha,8beta,8aalpha, 8balpha)]-	50–07–7	4	U010	10 (4.54)
Barium cyanide	542–62–1	1,4	P013	10 (4.54)
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56–49–5	4	U157	10 (4.54)
Benz[c]acridine	225–51–4	4	U016	100 (45.4)
Benzal chloride	98–87–3	4	U017	5000 (2270)
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2propynyl)-	23950–58–5	4	U192	5000 (2270)
Benz[a]anthracene	56–55–3	2,4	U018	10 (4.54)
1,2-Benzanthracene	56–55–3	2,4	U018	10 (4.54)
Benz[a]anthracene, 7,12-dimethyl-	57–97–6	4	U094	1 (0.454)
Benzenamine	62–53–3	1,3,4	U012	5000 (2270)
Benzenamine, 4,4'-carbonimidoylbis (N,N dimethyl-	492–80–8	4	U014	100 (45.4)
Benzenamine, 4-chloro-	106–47–8	4	P024	1000 (454)
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165–93–3	4	U049	100 (45.4)
Benzenamine, N,N-dimethyl-4-(phenylazo)-	60–11–7	3,4	U093	10 (4.54)
Benzenamine, 2-methyl-	95–53–4	3,4	U328	100 (45.4)
Benzenamine, 4-methyl-	106–49–0	4	U353	100 (45.4)
Benzenamine, 4,4'-methylenebis [2-chloro-	101–14–4	3,4	U158	10 (4.54)
Benzenamine, 2-methyl-,hydrochloride	636–21–5	4	U222	100 (45.4)
Benzenamine, 2-methyl-5-nitro-	99–55–8	4	U181	100 (45.4)
Benzenamine, 4-nitro-	100–01–6	4	P077	5000 (2270)
Benzene[a]	71–43–2	1,2,3,4	U019	10 (4.54)
Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)- α-hydroxy-, ethyl ester.	510–15–6	3,4	U038	10 (4.54)
Benzene, 1-bromo-4-phenoxy-	101–55–3	2,4	U030	100 (45.4)
Benzenebutanoic acid, 4-[bis(2- chloroethyl)amino]-	305–03–3	4	U035	10 (4.54)
Benzene, chloro-	108–90–7	1,2,3,4	U037	100 (45.4)
Benzene, (chloromethyl)-	100–44–7	1,3,4	P028	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Benzenediamine, ar-methyl-	95–80–7 496–72–0 823–40–5 25376–45–8	3,4	U221	10 (4.54)
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	117–81–7	2,3,4	U028	100 (45.4)
1,2-Benzenedicarboxylic acid, dibutyl ester	84–74–2	1,2,3,4	U069	10 (4.54)
1,2-Benzenedicarboxylic acid, diethyl ester	84–66–2	2,4	U088	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	131–11–3	2,3,4	U102	5000 (2270)
1,2-Benzenedicarboxylic acid, dioctyl ester	117–84–0	2,4	U107	5000 (2270)
Benzene, 1,2-dichloro-	95–50–1	1,2,4	U070	100 (45.4)
Benzene, 1,3-dichloro-	541–73–1	2,4	U071	100 (45.4)
Benzene, 1,4-dichloro-	106–46–7	1,2,3,4	U072	100 (45.4)
Benzene, 1,1'-(2,2-dichloroethylidene) bis[4-chloro-	72–54–8	1,2,4	U060	1 (0.454)
Benzene, (dichloromethyl)-	98–87–3	4	U017	5000 (2270)
Benzene, 1,3-diisocyanatomethyl-	91–08–7 584–84–9 26471–62–5	3,4	U223	100 (45.4)
Benzene, dimethyl-	1330–20–7	1,3,4	U239	100 (45.4)
1,3-Benzenediol	108–46–3	1,4	U201	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methyl amino)ethyl]-	51–43–4	4	P042	1000 (454)
Benzeneethanamine, alpha,alpha-dimethyl-	122–09–8	4	P046	5000 (2270)
Benzene, hexachloro-	118–74–1	2,3,4	U127	10 (4.54)
Benzene, hexahydro-	110–82–7	1,4	U056	1000 (454)
Benzene, methyl-	108–88–3	1,2,3,4	U220	1000 (454)
Benzene, 1-methyl-2,4-dinitro-	121–14–2	1,2,3,4	U105	10 (4.54)
Benzene, 2-methyl-1,3-dinitro-	606–20–2	1,2,4	U106	100 (45.4)
Benzene, (1-methylethyl)-	98–82–8	3,4	U055	5000 (2270)
Benzene, nitro-	98–95–3	1,2,3,4	U169	1000 (454)
Benzene, pentachloro-	608–93–5	4	U183	10 (4.54)
Benzene, pentachloronitro-	82–68–8	3,4	U185	100 (45.4)
Benzenesulfonic acid chloride	98–09–9	4	U020	100 (45.4)
Benzenesulfonyl chloride	98–09–9	4	U020	100 (45.4)
Benzene,1,2,4,5-tetrachloro-	95–94–3	4	U207	5000 (2270)
Benzenethiol	108–98–5	4	P014	100 (45.4)
Benzene,1,1'-(2,2,2-trichloroethylidene) bis[4-chloro-	50–29–3	1,2,4	U061	1 (0.454)
Benzene,1,1'-(2,2,2-trichloroethylidene) bis[4-methoxy-	72–43–5	1,3,4	U247	1 (0.454)
Benzene, (trichloromethyl)-	98–07–7	3,4	U023	10 (4.54)
Benzene, 1,3,5-trinitro-	99–35–4	4	U234	10 (4.54)
Benzidine	92–87–5	2,3,4	U021	1 (0.454)
1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide, & salts	81–07–2	4	U202	100 (45.4)
Benzo[a]anthracene	56–55–3	2,4	U018	10 (4.54)
1,3-Benzodioxole, 5-(1-propenyl)-1	120–58–1	4	U141	100 (45.4)
1,3-Benzodioxole, 5-(2-propenyl)-	94–59–7	4	U203	100 (45.4)
1,3-Benzodioxole, 5-propyl-	94–58–6	4	U090	10 (4.54)
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol)	22961–82–6	4	U364	##
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).	22781–23–3	4	U278	##
Benzo[b]fluoranthene	205–99–2	2		1 (0.454)
Benzo(k)fluoranthene	207–08–9	2		5000 (2270)
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl- (Carbofuran phenol).	1563–38–8	4	U367	##
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.	1563–66–2	1,4	P127	10 (4.54)
Benzoic acid	65–85–0	1		5000 (2270)
Benzoic acid, 2-hydroxy-, compd. with (3aS- cis)-1,2,3,3a,8,8a- hexahydro-1,3a,8- trimethylpyrrolo [2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).	57–64–7	4	P188	##
Benzonitrile	100–47–0	1		5000 (2270)
Benzo[rst]pentaphene	189–55–9	4	U064	10 (4.54)
Benzo[ghi]perylene	191–24–2	2		5000 (2270)
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo- 1-phenylbutyl)-, & salts.	81–81–2	4	P001 U248	100 (45.4)
Benzo[a]pyrene	50–32–8	2,4	U022	1 (0.454)
3,4-Benzopyrene	50–32–8	2,4	U022	1 (0.454)
p-Benzoquinone	106–51–4	3,4	U197	10 (4.54)
Benzotrichloride	98–07–7	3,4	U023	10 (4.54)
Benzoyl chloride	98–88–4	1		1000 (454)
Benzyl chloride	100–44–7	1,3,4	P028	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Beryllium dagger;dagger;	7440–41–7	2,3,4	P015	10 (4.54)
BERYLLIUM AND COMPOUNDS	N.A.	2,3		**
Beryllium chloride	7787–47–5	1		1 (0.454)
Beryllium compounds	N.A.	2,3		**
Beryllium fluoride	7787–49–7	1		1 (0.454)
Beryllium nitrate	13597–99–4	1		1 (0.454)
	7787–55–5			
Beryllium powder dagger;dagger;	7440–41–7	2,3,4	P015	10 (4.54)
alpha-BHC	319–84–6	2		10 (4.54)
beta-BHC	319–85–7	2		1 (0.454)
delta-BHC	319–86–8	2		1 (0.454)
gamma-BHC	58–89–9	1,2,3,4	U129	1 (0.454)
2,2′-Bioxirane	1464–53–5	4	U085	10 (4.54)
Biphenyl	92–52–4	3		100 (45.4)
[1,1′-Biphenyl]-4,4′-diamine	92–87–5	2,3,4	U021	1 (0.454)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dichloro-	91–94–1	2,3,4	U073	1 (0.454)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethoxy-	119–90–4	3,4	U091	100 (45.4)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethyl-	119–93–7	3,4	U095	10 (4.54)
Bis(2-chloroethoxy) methane	111–91–1	2,4	U024	1000 (454)
Bis(2-chloroethyl) ether	111–44–4	2,3,4	U025	10 (4.54)
Bis(chloromethyl) ether	542–88–1	2,3,4	P016	10 (4.54)
Bis(2-ethylhexyl) phthalate	117–81–7	3,4	U028	100 (45.4)
Bromoacetone	598–31–2	4	P017	1000 (454)
Bromoform	75–25–2	2,3,4	U225	100 (45.4)
Bromomethane	74–83–9	2,3,4	U029	1000 (454)
4-Bromophenyl phenyl ether	101–55–3	2,4	U030	100 (45.4)
Brucine	357–57–3	4	P018	100 (45.4)
1,3-Butadiene	106–99–0	3		10 (4.54)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87–68–3	2,3,4	U128	1 (0.454)
1-Butanamine, N-butyl-N-nitroso-	924–16–3	4	U172	10 (4.54)
1-Butanol	71–36–3	4	U031	5000 (2270)
2-Butanone	78–93–3	3,4	U159	5000 (2270)
2-Butanone, 3,3-dimethyl-1(methylthio)-, O-[(methylamino)carbonyl] oxime.	39196–18–4	4	P045	100 (45.4)
2-Butanone peroxide	1338–23–4	4	U160	10 (4.54)
2-Butenal	123–73–9	1,4	U053	100 (45.4)
	4170–30–3			
2-Butene, 1,4-dichloro-	764–41–0	4	U074	1 (0.454)
2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3- methyl-1-oxobutoxy] methyl]-2,3, 5,7a-tetrahydro- 1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]-.	303–34–4	4	U143	10 (4.54)
Butyl acetate	123–86–4	1		5000 (2270)
iso-Butyl acetate	110–19–0			
sec-Butyl acetate	105–46–4			
tert-Butyl acetate	540–88–5			
n-Butyl alcohol	71–36–3	4	U031	5000 (2270)
Butylamine	109–73–9	1		1000 (454)
iso-Butylamine	78–81–9			
sec-Butylamine	513–49–5			
	13952–84–6			
tert-Butylamine	75–64–9			
Butyl benzyl phthalate	85–68–7	2		100 (45.4)
n-Butyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Butyric acid	107–92–6	1		5000 (2270)
iso-Butyric acid	79–31–2			
Cacodylic acid	75–60–5	4	U136	1 (0.454)
Cadmium dagger;dagger;	7440–43–9	2		10 (4.54)
Cadmium acetate	543–90–8	1		10 (4.54)
CADMIUM AND COMPOUNDS	N.A.	2,3		**
Cadmium bromide	7789–42–6	1		10 (4.54)
Cadmium chloride	10108–64–2	1		10 (4.54)
Cadmium compounds	N.A.	2,3		**
Calcium arsenate	7778–44–1	1		1 (0.454)
Calcium arsenite	52740–16–6	1		1 (0.454)
Calcium carbide	75–20–7	1		10 (4.54)
Calcium chromate	13765–19–0	1,4	U032	10 (4.54)
Calcium cyanamide	156–62–7	3		1000 (454)
Calcium cyanide Ca(CN)2	592–01–8	1,4	P021	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Calcium dodecylbenzenesulfonate	26264–06–2	1		1000 (454)
Calcium hypochlorite	7778–54–3	1		10 (4.54)
Captan	133–06–2	1,3		10 (4.54)
Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).	10605–21–7	4	U372	##
Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester (Benomyl).	17804–35–2	4	U271	##
Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban).	101–27–9	4	U280	##
Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).	55285–14–8	4	P189	##
Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).	644–64–4	4	P191	##
Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).	119–38–0	4	P192	##
Carbamic acid, ethyl ester	51–79–6	3,4	U238	100 (45.4)
Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb)	1129–41–5	4	P190	##
Carbamic acid, methylnitroso-, ethyl ester	615–53–2	4	U178	1 (0.454)
Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)] bis-, dimethyl ester (Thiophanate-methyl).	23564–05–8	4	U409	##
Carbamic acid, phenyl-, 1-methylethyl ester (Propham)	122–42–9	4	U373	##
Carbamic chloride, dimethyl-	79–44–7	3,4	U097	1 (0.454)
Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters	111–54–6	4	U114	5000 (2270)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.	2303–16–4	4	U062	100 (45.4)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2- propenyl) ester (Triallate).	2303–17–5	4	U389	##
Carbamothioic acid, dipropyl-, S - (phenylmethyl) ester (Prosulfocarb).	52888–80–9	4	U387	##
Carbaryl	63–25–2	1,3,4	U279	100 (45.4)
Carbofuran	1563–66–2	1,4	P127	10 (4.54)
Carbon disulfide	75–15–0	1,3,4	P022	100 (45.4)
Carbonic acid, dithallium(1+) salt	6533–73–9	4	U215	100 (45.4)
Carbonic dichloride	75–44–5	1,3,4	P095	10 (4.54)
Carbonic difluoride	353–50–4	4	U033	1000 (454)
Carbonochloridic acid, methyl ester	79–22–1	4	U156	1000 (454)
Carbon oxyfluoride	353–50–4	4	U033	1000 (454)
Carbon tetrachloride	56–23–5	1,2,3,4	U211	10 (4.54)
Carbonyl sulfide	463–58–1	3		100 (45.4)
Catechol	120–80–9	3		100 (45.4)
Chloral	75–87–6	4	U034	5000 (2270)
Chloramben	133–90–4	3		100 (45.4)
Chlorambucil	305–03–3	4	U035	10 (4.54)
Chlordane	57–74–9	1,2,3,4	U036	1 (0.454)
Chlordane, alpha & gamma isomers	57–74–9	1,2,3,4	U036	1 (0.454)
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).	57–74–9	1,2,3,4	U036	1 (0.454)
CHLORINATED BENZENES	N.A.	2		**
Chlorinated camphene	8001–35–2	1,2,3,4	P123	1 (0.454)
CHLORINATED ETHANES	N.A.	2		**
CHLORINATED NAPHTHALENE	N.A.	2		**
CHLORINATED PHENOLS	N.A.	2		**
Chlorine	7782–50–5	1,3		10 (4.54)
Chlornaphazine	494–03–1	4	U026	100 (45.4)
Chloroacetaldehyde	107–20–0	4	P023	1000 (454)
Chloroacetic acid	79–11–8	3		100 (45.4)
2-Chloroacetophenone	532–27–4	3		100 (45.4)
CHLOROALKYL ETHERS	N.A.	2		**
p-Chloroaniline	106–47–8	4	P024	1000 (454)
Chlorobenzene	108–90–7	1,2,3,4	U037	100 (45.4)
Chlorobenzilate	510–15–6	3,4	U038	10 (4.54)
p-Chloro-m-cresol	59–50–7	2,4	U039	5000 (2270)
Chlorodibromomethane	124–48–1	2		100 (45.4)
1-Chloro-2,3-epoxypropane	106–89–8	1,3,4	U041	100 (45.4)
Chloroethane	75–00–3	2,3		100 (45.4)
2-Chloroethyl vinyl ether	110–75–8	2,4	U042	1000 (454)
Chloroform	67–66–3	1,2,3,4	U044	10 (4.54)
Chloromethane	74–87–3	2,3,4	U045	100 (45.4)
Chloromethyl methyl ether	107–30–2	3,4	U046	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
beta-Chloronaphthalene	91–58–7	2,4	U047	5000 (2270)
2-Chloronaphthalene	91–58–7	2,4	U047	5000 (2270)
2-Chlorophenol	95–57–8	2,4	U048	100 (45.4)
o-Chlorophenol	95–57–8	2,4	U048	100 (45.4)
4-Chlorophenyl phenyl ether	7005–72–3	2		5000 (2270)
1-(o-Chlorophenyl)thiourea	5344–82–1	4	P026	100 (45.4)
Chloroprene	126–99–8	3		100 (45.4)
3-Chloropropionitrile	542–76–7	4	P027	1000 (454)
Chlorosulfonic acid	7790–94–5	1		1000 (454)
4-Chloro-o-toluidine, hydrochloride	3165–93–3	4	U049	100 (45.4)
Chlorpyrifos	2921–88–2	1		1 (0.454)
Chromic acetate	1066–30–4	1		1000 (454)
Chromic acid	11115–74–5 7738–94–5	1		10 (4.54)
Chromic acid H2CrO4, calcium salt	13765–19–0	1,4	U032	10 (4.54)
Chromic sulfate	10101–53–8	1		1000 (454)
Chromium dagger;dagger;	7440–47–3	2		5000 (2270)
CHROMIUM AND COMPOUNDS	N.A.	2,3		**
Chromium Compounds	N.A.	2,3		**
Chromous chloride	10049–05–5	1		1000 (454)
Chrysene	218–01–9	2,4	U050	100 (45.4)
Cobalt Compounds	N.A.	3		**
Cobaltous bromide	7789–43–7	1		1000 (454)
Cobaltous formate	544–18–3	1		1000 (454)
Cobaltous sulfamate	14017–41–5	1		1000 (454)
Coke Oven Emissions	N.A.	3		1 (0.454)
Copper dagger;dagger;	7440–50–8	2		5000 (2270)
COPPER AND COMPOUNDS	N.A.	2		**
Copper cyanide Cu(CN)	544–92–3	4	P029	10 (4.54)
Coumaphos	56–72–4	1		10 (4.54)
Creosote	N.A.	4	U051	1 (0.454)
Cresol (cresylic acid)	1319–77–3	1,3,4	U052	100 (45.4)
m-Cresol	108–39–4	3		100 (45.4)
o-Cresol	95–48–7	3		100 (45.4)
p-Cresol	106–44–5	3		100 (45.4)
Cresols (isomers and mixture)	1319–77–3	1,3,4	U052	100 (45.4)
Cresylic acid (isomers and mixture)	1319–77–3	1,3,4	U052	100 (45.4)
Crotonaldehyde	123–73–9 4170–30–3	1,4	U053	100 (45.4)
Cumene	98–82–8	3,4	U055	5000 (2270)
Cupric acetate	142–71–2	1		100 (45.4)
Cupric acetoarsenite	12002–03–8	1		1 (0.454)
Cupric chloride	7447–39–4	1		10 (4.54)
Cupric nitrate	3251–23–8	1		100 (45.4)
Cupric oxalate	5893–66–3	1		100 (45.4)
Cupric sulfate	7758–98–7	1		10 (4.54)
Cupric sulfate, ammoniated	10380–29–7	1		100 (45.4)
Cupric tartrate	815–82–7	1		100 (45.4)
Cyanide Compounds	N.A.	2,3		**
CYANIDES	N.A.	2,3		**
Cyanides (soluble salts and complexes) not otherwise specified.	N.A.	4	P030	10 (4.54)
Cyanogen	460–19–5	4	P031	100 (45.4)
Cyanogen bromide (CN)Br	506–68–3	4	U246	1000 (454)
Cyanogen chloride (CN)Cl	506–77–4	1,4	P033	10 (4.54)
2,5-Cyclohexadiene-1,4-dione	106–51–4	3,4	U197	10 (4.54)
Cyclohexane	110–82–7	1,4	U056	1000 (454)
Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α, 2α, 3β–, 4α, 5α, 6β).	58–89–9	1,2,3,4	U129	1 (0.454)
Cyclohexanone	108–94–1	4	U057	5000 (2270)
2-Cyclohexyl-4,6-dinitrophenol	131–89–5	4	P034	100 (45.4)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77–47–4	1,2,3,4	U130	10 (4.54)
Cyclophosphamide	50–18–0	4	U058	10 (4.54)
2,4-D Acid	94–75–7	1,3,4	U240	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
2,4-D Ester	94–11–1 94–79–1 94–80–4 1320–18–9 1928–38–7 1928–61–6 1929–73–3 2971–38–2 25168–26–7 53467–11–1	1		100 (45.4)
2,4-D, salts and esters	94–75–7	1,3,4	U240	100 (45.4)
Daunomycin	20830–81–3	4	U059	10 (4.54)
DDD	72–54–8	1,2,4	U060	1 (0.454)
4,4′-DDD	72–54–8	1,2,4	U060	1 (0.454)
DDE [b]	72–55–9	2		1 (0.454)
DDE [b]	3547–04–4	3		5000 (2270)
4,4′-DDE	72–55–9	2		1 (0.454)
DDT	50–29–3	1,2,4	U061	1 (0.454)
4,4′-DDT	50–29–3	1,2,4	U061	1 (0.454)
DDT AND METABOLITES	N.A.	2		**
DEHP	117–81–7	2,3,4	U028	100 (45.4)
Diallate	2303–16–4	4	U062	100 (45.4)
Diazinon	333–41–5	1		1 (0.454)
Diazomethane	334–88–3	3		100 (45.4)
Dibenz[a,h]anthracene	53–70–3	2,4	U063	1 (0.454)
1,2:5,6-Dibenzanthracene	53–70–3	2,4	U063	1 (0.454)
Dibenzo[a,h]anthracene	53–70–3	2,4	U063	1 (0.454)
Dibenzofuran	132–64–9	3		100 (45.4)
Dibenzo[a,i]pyrene	189–55–9	4	U064	10 (4.54)
1,2-Dibromo-3-chloropropane	96–12–8	3,4	U066	1 (0.454)
Dibromoethane	106–93–4	1,3,4	U067	1 (0.454)
Dibutyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Di-n-butyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Dicamba	1918–00–9	1		1000 (454)
Dichlobenil	1194–65–6	1		100 (45.4)
Dichlone	117–80–6	1		1 (0.454)
Dichlorobenzene	25321–22–6	1		100 (45.4)
1,2-Dichlorobenzene	95–50–1	1,2,4	U070	100 (45.4)
1,3-Dichlorobenzene	541–73–1	2,4	U071	100 (45.4)
1,4-Dichlorobenzene	106–46–7	1,2,3,4	U072	100 (45.4)
m-Dichlorobenzene	541–73–1	2,4	U071	100 (45.4)
o-Dichlorobenzene	95–50–1	1,2,4	U070	100 (45.4)
p-Dichlorobenzene	106–46–7	1,2,3,4	U072	100 (45.4)
DICHLOROBENZIDINE	N.A.	2		**
3,3′-Dichlorobenzidine	91–94–1	2,3,4	U073	1 (0.454)
Dichlorobromomethane	75–27–4	2		5000 (2270)
1,4-Dichloro-2-butene	764–41–0	4	U074	1 (0.454)
Dichlorodifluoromethane	75–71–8	4	U075	5000 (2270)
1,1-Dichloroethane	75–34–3	2,3,4	U076	1000 (454)
1,2-Dichloroethane	107–06–2	1,2,3,4	U077	100 (45.4)
1,1-Dichloroethylene	75–35–4	1,2,3,4	U078	100 (45.4)
1,2-Dichloroethylene	156–60–5	2,4	U079	1000 (454)
Dichloroethyl ether	111–44–4	2,3,4	U025	10 (4.54)
Dichloroisopropyl ether	108–60–1	2,4	U027	1000 (454)
Dichloromethane	75–09–2	2,3,4	U080	1000 (454)
Dichloromethoxyethane	111–91–1	2,4	U024	1000 (454)
Dichloromethyl ether	542–88–1	2,3,4	P016	10 (4.54)
2,4-Dichlorophenol	120–83–2	2,4	U081	100 (45.4)
2,6-Dichlorophenol	87–65–0	4	U082	100 (45.4)
Dichlorophenylarsine	696–28–6	4	P036	1 (0.454)
Dichloropropane	26638–19–7	1		1000 (454)
1,1-Dichloropropane	78–99–9			
1,3-Dichloropropane	142–28–9			
1,2-Dichloropropane	78–87–5	1,2,3,4	U083	1000 (454)
Dichloropropane—Dichloropropene (mixture)	8003–19–8	1		100 (45.4)
Dichloropropene	26952–23–8	1		100 (45.4)
2,3-Dichloropropene	78–88–6			
1,3-Dichloropropene	542–75–6	1,2,3,4	U084	100 (45.4)
2,2-Dichloropropionic acid	75–99–0	1		5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Dichlorvos	62–73–7	1,3		10 (4.54)
Dicofol	115–32–2	1		10 (4.54)
Dieldrin	60–57–1	1,2,4	P037	1 (0.454)
1,2:3,4-Diepoxybutane	1464–53–5	4	U085	10 (4.54)
Diethanolamine	111–42–2	3		100 (45.4)
Diethylamine	109–89–7	1		100 (45.4)
N,N-Diethylaniline	91–66–7	3		1000 (454)
Diethylarsine	692–42–2	4	P038	1 (0.454)
1,4-Diethyleneoxide	123–91–1	3,4	U108	100 (45.4)
Diethylhexyl phthalate	117–81–7	2,3,4	U028	100 (45.4)
N,N'-Diethylhydrazine	1615–80–1	4	U086	10 (4.54)
O,O-Diethyl S-methyl dithiophosphate	3288–58–2	4	U087	5000 (2270)
Diethyl-p-nitrophenyl phosphate	311–45–5	4	P041	100 (45.4)
Diethyl phthalate	84–66–2	2,4	U088	1000 (454)
O,O-Diethyl O-pyrazinyl phosphorothioate	297–97–2	4	P040	100 (45.4)
Diethylstilbestrol	56–53–1	4	U089	1 (0.454)
Diethyl sulfate	64–67–5	3		10 (4.54)
Dihydrosafrole	94–58–6	4	U090	10 (4.54)
Diisopropylfluorophosphate (DFP)	55–91–4	4	P043	100 (45.4)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)-	309–00–2	1,2,4	P004	1 (0.454)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta, 5beta,8beta,8abeta)-	465–73–6	4	P060	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1aalpha,2beta, 2aalpha,3beta,6beta,6aalpha, 7beta,7aalpha)-	60–57–1	1,2,4	P037	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1aalpha,2beta, 2abeta,3alpha,6alpha, 6abeta,7beta,7aalpha)-, & metabolites.	72–20–8	1,2,4	P051	1 (0.454)
Dimethoate	60–51–5	4	P044	10 (4.54)
3,3'-Dimethoxybenzidine	119–90–4	3,4	U091	100 (45.4)
Dimethylamine	124–40–3	1,4	U092	1000 (454)
Dimethyl aminoazobenzene	60–11–7	3,4	U093	10 (4.54)
p-Dimethylaminoazobenzene	60–11–7	3,4	U093	10 (4.54)
N,N-Dimethylaniline	121–69–7	3		100 (45.4)
7,12-Dimethylbenz[a]anthracene	57–97–6	4	U094	1 (0.454)
3,3'-Dimethylbenzidine	119–93–7	3,4	U095	10 (4.54)
alpha,alpha-Dimethylbenzylhydroperoxide	80–15–9	4	U096	10 (4.54)
Dimethylcarbamoyl chloride	79–44–7	3,4	U097	1 (0.454)
Dimethylformamide	68–12–2	3		100 (45.4)
1,1-Dimethylhydrazine	57–14–7	3,4	U098	10 (4.54)
1,2-Dimethylhydrazine	540–73–8	4	U099	1 (0.454)
alpha,alpha-Dimethylphenethylamine	122–09–8	4	P046	5000 (2270)
2,4-Dimethylphenol	105–67–9	2,4	U101	100 (45.4)
Dimethyl phthalate	131–11–3	2,3,4	U102	5000 (2270)
Dimethyl sulfate	77–78–1	3,4	U103	100 (45.4)
Dinitrobenzene (mixed)	25154–54–5	1		100 (45.4)
m-Dinitrobenzene	99–65–0			
o-Dinitrobenzene	528–29–0			
p-Dinitrobenzene	100–25–4			
4,6-Dinitro-o-cresol, and salts	534–52–1	2,3,4	P047	10 (4.54)
Dinitrophenol	25550–58–7	1		10 (4.54)
2,5-Dinitrophenol	329–71–5			
2,6-Dinitrophenol	573–56–8			
2,4-Dinitrophenol	51–28–5	1,2,3,4	P048	10 (4.54)
Dinitrotoluene	25321–14–6	1,2		10 (4.54)
3,4-Dinitrotoluene	610–39–9			
2,4-Dinitrotoluene	121–14–2	1,2,3,4	U105	10 (4.54)
2,6-Dinitrotoluene	606–20–2	1,2,4	U106	100 (45.4)
Dinoseb	88–85–7	4	P020	1000 (454)
Di-n-octyl phthalate	117–84–0	2,4	U107	5000 (2270)
1,4-Dioxane	123–91–1	3,4	U108	100 (45.4)
DIPHENYLHYDRAZINE	N.A.	2		**
1,2-Diphenylhydrazine	122–66–7	2,3,4	U109	10 (4.54)
Diphosphoramide, octamethyl-	152–16–9	4	P085	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Diphosphoric acid, tetraethyl ester	107–49–3	1,4	P111	10 (4.54)
Dipropylamine	142–84–7	4	U110	5000 (2270)
Di-n-propylnitrosamine	621–64–7	2,4	U111	10 (4.54)
Diquat	85–00–7	1		1000 (454)
	2764–72–9			
Disulfoton	298–04–4	1,4	P039	1 (0.454)
Dithiobiuret	541–53–7	4	P049	100 (45.4)
1,3-Dithiolane-2- carboxaldehyde, 2,4- dimethyl-O-[(methylamino)carbonyl] oxime (Tirpate).	26419–73–8	4	P185	##
Diuron	330–54–1	1		100 (45.4)
Dodecylbenzenesulfonic acid	27176–87–0	1		1000 (454)
Endosulfan	115–29–7	1,2,4	P050	1 (0.454)
alpha-Endosulfan	959–98–8	2		1 (0.454)
beta-Endosulfan	33213–65–9	2		1 (0.454)
ENDOSULFAN AND METABOLITES	N.A.	2		**
Endosulfan sulfate	1031–07–8	2		1 (0.454)
Endothall	145–73–3	4	P088	1000 (454)
Endrin	72–20–8	1,2,4	P051	1 (0.454)
Endrin aldehyde	7421–93–4	2		1 (0.454)
ENDRIN AND METABOLITES	N.A.	2		**
Endrin, & metabolites	72–20–8	1,2,4	P051	1 (0.454)
Epichlorohydrin	106–89–8	1,3,4	U041	100 (45.4)
Epinephrine	51–43–4	4	P042	1000 (454)
1,2-Epoxybutane	106–88–7	3		100 (45.4)
Ethanal	75–07–0	1,3,4	U001	1000 (454)
Ethanamine, N,N-diethyl-	121–44–8	1,3,4	U404	5000 (2270)
Ethanamine, N-ethyl-N-nitroso-	55–18–5	4	U174	1 (0.454)
1,2-Ethanediamine, N,N-dimethyl-N'-2- pyridinyl-N'-(2-thienylmethyl)-.	91–80–5	4	U155	5000 (2270)
Ethane, 1,2-dibromo-	106–93–4	1,3,4	U067	1 (0.454)
Ethane, 1,1-dichloro-	75–34–3	2,3,4	U076	1000 (454)
Ethane, 1,2-dichloro-	107–06–2	1,2,3,4	U077	100 (45.4)
Ethanedinitrile	460–19–5	4	P031	100 (45.4)
Ethane, hexachloro-	67–72–1	2,3,4	U131	100 (45.4)
Ethane, 1,1'-[methylenebis(oxy)]bis[2- chloro-	111–91–1	2,4	U024	1000 (454)
Ethane, 1,1'-oxybis-	60–29–7	4	U117	100 (45.4)
Ethane, 1,1'-oxybis[2-chloro-	111–44–4	2,3,4	U025	10 (4.54)
Ethane, pentachloro-	76–01–7	4	U184	10 (4.54)
Ethane, 1,1,1,2-tetrachloro-	630–20–6	4	U208	100 (45.4)
Ethane, 1,1,2,2-tetrachloro-	79–34–5	2,3,4	U209	100 (45.4)
Ethanethioamide	62–55–5	4	U218	10 (4.54)
Ethane, 1,1,1-trichloro-	71–55–6	2,3,4	U226	1000 (454)
Ethane, 1,1,2-trichloro-	79–00–5	2,3,4	U227	100 (45.4)
Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213).	30558–43–1	4	U394	##
Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).	23135–22–0	4	P194	##
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester.	16752–77–5	4	P066	100 (45.4)
Ethanimidothioic acid, N,N'[thiobis[(methylimino) carbonyloxy]]bis-, dimethyl ester (Thiodicarb).	59669–26–0	4	U410	##
Ethanol, 2-ethoxy-	110–80–5	4	U359	1000 (454)
Ethanol, 2,2'-(nitrosoimino)bis-	1116–54–7	4	U173	1 (0.454)
Ethanol, 2,2'-oxybis-, dicarbamate (Diethylene glycol, dicarbamate).	5952–26–1	4	U395	##
Ethanone, 1-phenyl-	98–86–2	3,4	U004	5000 (2270)
Ethene, chloro-	75–01–4	2,3,4	U043	1 (0.454)
Ethene, (2-chloroethoxy)-	110–75–8	2,4	U042	1000 (454)
Ethene, 1,1-dichloro-	75–35–4	1,2,3,4	U078	100 (45.4)
Ethene, 1,2-dichloro-(E)	156–60–5	2,4	U079	1000 (454)
Ethene, tetrachloro-	127–18–4	2,3,4	U210	100 (45.4)
Ethene, trichloro-	79–01–6	1,2,3,4	U228	100 (45.4)
Ethion	563–12–2	1		10 (4.54)
Ethyl acetate	141–78–6	4	U112	5000 (2270)
Ethyl acrylate	140–88–5	3,4	U113	1000 (454)
Ethylbenzene	100–41–4	1,2,3		1000 (454)
Ethyl carbamate	51–79–6	3,4	U238	100 (45.4)
Ethyl chloride	75–00–3	2,3		100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Ethyl cyanide	107–12–0	4	P101	10 (4.54)
Ethylenebisdithiocarbamic acid, salts & esters	111–54–6	4	U114	5000 (2270)
Ethylenediamine	107–15–3	1		5000 (2270)
Ethylenediamine-tetraacetic acid (EDTA)	60–00–4	1		5000 (2270)
Ethylene dibromide	106–93–4	1,3,4	U067	1 (0.454)
Ethylene dichloride	107–06–2	1,2,3,4	U077	100 (45.4)
Ethylene glycol	107–21–1	3		5000 (2270)
Ethylene glycol monoethyl ether	110–80–5	4	U359	1000 (454)
Ethylene oxide	75–21–8	3,4	U115	10 (4.54)
Ethylenethiourea	96–45–7	3,4	U116	10 (4.54)
Ethylenimine	151–56–4	3,4	P054	1 (0.454)
Ethyl ether	60–29–7	4	U117	100 (45.4)
Ethylidene dichloride	75–34–3	2,3,4	U076	1000 (454)
Ethyl methacrylate	97–63–2	4	U118	1000 (454)
Ethyl methanesulfonate	62–50–0	4	U119	1 (0.454)
Famphur	52–85–7	4	P097	1000 (454)
Ferric ammonium citrate	1185–57–5	1		1000 (454)
Ferric ammonium oxalate	2944–67–4	1		1000 (454)
	55488–87–4			
Ferric chloride	7705–08–0	1		1000 (454)
Ferric fluoride	7783–50–8	1		100 (45.4)
Ferric nitrate	10421–48–4	1		1000 (454)
Ferric sulfate	10028–22–5	1		1000 (454)
Ferrous ammonium sulfate	10045–89–3	1		1000 (454)
Ferrous chloride	7758–94–3	1		100 (45.4)
Ferrous sulfate	7720–78–7	1		1000 (454)
	7782– 63–0			
Fine mineral fibers[c]	N.A.	3		**
Fluoranthene	206–44–0	2,4	U120	100 (45.4)
Fluorene	86–73–7	2		5000 (2270)
Fluorine	7782–41–4	4	P056	10 (4.54)
Fluoroacetamide	640–19–7	4	P057	100 (45.4)
Fluoroacetic acid, sodium salt	62–74–8	4	P058	10 (4.54)
Formaldehyde	50–00–0	1,3,4	U122	100 (45.4)
Formic acid	64–18–6	1,4	U123	5000 (2270)
Fulminic acid, mercury(2+)salt	628–86–4	4	P065	10 (4.54)
Fumaric acid	110–17–8	1		5000 (2270)
Furan	110–00–9	4	U124	100 (45.4)
2-Furancarboxaldehyde	98–01–1	1,4	U125	5000 (2270)
2,5-Furandione	108–31–6	1,3,4	U147	5000 (2270)
Furan, tetrahydro-	109–99–9	4	U213	1000 (454)
Furfural	98–01–1	1,4	U125	5000 (2270)
Furfuran	110–00–9	4	U124	100 (45.4)
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-,D-	18883–66–4	4	U206	1 (0.454)
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-.	18883–66–4	4	U206	1 (0.454)
Glycidylaldehyde	765–34–4	4	U126	10 (4.54)
Glycol ethers[d]	N.A.	3		**
Guanidine, N-methyl-N'-nitro-N-nitroso-	70–25–7	4	U163	10 (4.54)
Guthion	86–50–0	1		1 (0.454)
HALOETHERS	N.A.	2		**
HALOMETHANES	N.A.	2		**
Heptachlor	76–44–8	1,2,3,4	P059	1 (0.454)
HEPTACHLOR AND METABOLITES	N.A.	2		**
Heptachlor epoxide	1024–57–3	2		1 (0.454)
Hexachlorobenzene	118–74–1	2,3,4	U127	10 (4.54)
Hexachlorobutadiene	87–68–3	2,3,4	U128	1 (0.454)
HEXACHLOROCYCLOHEXANE (all isomers)	608–73–1	2		**
Hexachlorocyclopentadiene	77–47–4	1,2,3,4	U130	10 (4.54)
Hexachloroethane	67–72–1	2,3,4	U131	100 (45.4)
Hexachlorophene	70–30–4	4	U132	100 (45.4)
Hexachloropropene	1888–71–7	4	U243	1000 (454)
Hexaethyl tetraphosphate	757–58–4	4	P062	100 (45.4)
Hexamethylene-1,6–diisocyanate	822–06–0	3		100 (45.4)
Hexamethylphosphoramide	680–31–9	3		1 (0.454)
Hexane	110–54–3	3		5000 (2270)
Hexone	108–10–1	3,4	U161	5000 (2270)
Hydrazine	302–01–2	3,4	U133	1 (0.454)
Hydrazinecarbothioamide	79–19–6	4	P116	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Hydrazine, 1,2-diethyl-	1615–80–1	4	U086	10 (4.54)
Hydrazine, 1,1-dimethyl-	57–14–7	3,4	U098	10 (4.54)
Hydrazine, 1,2-dimethyl-	540–73–8	4	U099	1 (0.454)
Hydrazine, 1,2-diphenyl-	122–66–7	2,3,4	U109	10 (4.54)
Hydrazine, methyl-	60–34–4	3,4	P068	10 (4.54)
Hydrochloric acid	7647–01–0	1,3		5000 (2270)
Hydrocyanic acid	74–90–8	1,4	P063	10 (4.54)
Hydrofluoric acid	7664–39–3	1,3,4	U134	100 (45.4)
Hydrogen chloride	7647–01–0	1,3		5000 (2270)
Hydrogen cyanide	74–90–8	1,4	P063	10 (4.54)
Hydrogen fluoride	7664–39–3	1,3,4	U134	100 (45.4)
Hydrogen phosphide	7803–51–2	3,4	P096	100 (45.4)
Hydrogen sulfide H2S	7783–06–4	1,4	U135	100 (45.4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80–15–9	4	U096	10 (4.54)
Hydroquinone	123–31–9	3		100 (45.4)
2-Imidazolidinethione	96–45–7	3,4	U116	10 (4.54)
Indeno(1,2,3-cd)pyrene	193–39–5	2,4	U137	100 (45.4)
Iodomethane	74–88–4	3,4	U138	100 (45.4)
1,3-Isobenzofurandione	85–44–9	3,4	U190	5000 (2270)
Isobutyl alcohol	78–83–1	4	U140	5000 (2270)
Isodrin	465–73–6	4	P060	1 (0.454)
Isophorone	78–59–1	2,3		5000 (2270)
Isoprene	78–79–5	1		100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	42504–46–1	1		1000 (454)
Isosafrole	120–58–1	4	U141	100 (45.4)
3(2H)-Isoxazolone, 5–(aminomethyl)-	2763–96–4	4	P007	1000 (454)
Kepone	143–50–0	1,4	U142	1 (0.454)
Lasiocarpine	303–34–4	4	U143	10 (4.54)
Lead††	7439–92–1	2		10 (4.54)
Lead acetate	301–04–2	1,4	U144	10 (4.54)
LEAD AND COMPOUNDS	N.A.	2,3		**
Lead arsenate	7784–40–9 7645–25–2 10102–48–4	1		1 (0.454)
Lead, bis(acetato-O)tetrahydroxytri-	1335–32–6	4	U146	10 (4.54)
Lead chloride	7758–95–4	1		10 (4.54)
Lead compounds	N.A.	2,3		**
Lead fluoborate	13814–96–5	1		10 (4.54)
Lead fluoride	7783–46–2	1		10 (4.54)
Lead iodide	10101–63–0	1		10 (4.54)
Lead nitrate	10099–74–8	1		10 (4.54)
Lead phosphate	7446–27–7	4	U145	10 (4.54)
Lead stearate	1072–35–1 7428–48–0 52652–59–2 56189–09–4	1		10 (4.54)
Lead subacetate	1335–32–6	4	U146	10 (4.54)
Lead sulfate	7446–14–2 15739–80–7	1		10 (4.54)
Lead sulfide	1314–87–0	1		10 (4.54)
Lead thiocyanate	592–87–0	1		10 (4.54)
Lindane	58–89–9	1,2,3,4	U129	1 (0.454)
Lindane (all isomers)	58–89–9	1,2,3,4	U129	1 (0.454)
Lithium chromate	14307–35–8	1		10 (4.54)
Malathion	121–75–5	1		100 (45.4)
Maleic acid	110–16–7	1		5000 (2270)
Maleic anhydride	108–31–6	1,3,4	U147	5000 (2270)
Maleic hydrazide	123–33–1	4	U148	5000 (2270)
Malononitrile	109–77–3	4	U149	1000 (454)
Manganese, bis(dimethylcarbamodithioato-S,S')-Manganese dimethyldithio- carbamate).	15339–36–3	4	P196	##
Manganese Compounds	N.A.	3		**
MDI	101–68–8	3		5000 (2270)
MEK	78–93–3	3,4	U159	5000 (2270)
Melphalan	148–82–3	4	U150	1 (0.454)
Mercaptodimethur	2032–65–7	1,4	P199	10 (4.54)
Mercuric cyanide	592–04–1	1		1(0.454)
Mercuric nitrate	10045–94–0	1		10 (4.54)
Mercuric sulfate	7783–35–9	1		10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Mercuric thiocyanate	592–85–8	1		10 (4.54)
Mercurous nitrate	10415–75–5	1	10 (4.54)	7782–86–7
Mercury	7439–97–6	2,3,4	U151	1 (0.454)
MERCURY AND COMPOUNDS	N.A.	2,3		**
Mercury, (acetato-O)phenyl-	62–38–4	4	P092	100 (45.4)
Mercury Compounds	N.A.	2,3		**
Mercury fulminate	628–86–4	4	P065	10 (4.54)
Methacrylonitrile	126–98–7	4	U152	1000 (454)
Methanamine, N-methyl-	124–40–3	1,4	U092	1000 (454)
Methanamine, N-methyl-N-nitroso-	62–75–9	2,3,4	P082	10 (4.54)
Methane, bromo-	74–83–9	2,3,4	U029	1000 (454)
Methane, chloro-	74–87–3	2,3,4	U045	100 (45.4)
Methane, chloromethoxy-	107–30–2	3,4	U046	10 (4.54)
Methane, dibromo-	74–95–3	4	U068	1000 (454)
Methane, dichloro-	75–09–2	2,3,4	U080	1000 (454)
Methane, dichlorodifluoro-	75–71–8	4	U075	5000 (2270)
Methane, iodo-	74–88–4	3,4	U138	100 (45.4)
Methane, isocyanato-	624–83–9	3,4	P064	10 (4.54)
Methane, oxybis(chloro-	542–88–1	2,3,4	P016	10 (4.54)
Methanesulfenyl chloride, trichloro-	594–42–3	4	P118	100 (45.4)
Methanesulfonic acid, ethyl ester	62–50–0	4	U119	1 (0.454)
Methane, tetrachloro-	56–23–5	1,2,3,4	U211	10 (4.54)
Methane, tetranitro-	509–14–8	4	P112	10 (4.54)
Methanethiol	74–93–1	1,4	U153	100 (45.4)
Methane, tribromo-	75–25–2	2,3,4	U225	100 (45.4)
Methane, trichloro-	67–66–3	1,2,3,4	U044	10 (4.54)
Methane, trichlorofluoro-	75–69–4	4	U121	5000 (2270)
Methanimidamide, N,N-dimethyl-N′-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).	23422–53–9	4	P198	##
Methanimidamide, N,N-dimethyl-N′-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-(Formparanate).	17702–57–7	4	P197	##
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro- 1,5,5a,6,9,9a-hexahydro-, 3-oxide.	115–29–7	1,2,4	P050	1 (0.454)
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	76–44–8	1,2,3,4	P059	1 (0.454)
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro—.	57–74–9	1,2,3,4	U036	1 (0.454)
Methanol	67–56–1	3,4	U154	5000 (2270)
Methapyrilene	91–80–5	4	U155	5000 (2270)
1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	143–50–0	1,4	U142	1 (0.454)
Methiocarb	2032–65–7	1,4	P199	10 (4.54)
Methomyl	16752–77–5	4	P066	100 (45.4)
Methoxychlor	72–43–5	1,3,4	U247	1 (0.454)
Methyl alcohol	67–56–1	3,4	U154	5000 (2270)
2-Methyl aziridine	75–55–8	3,4	P067	1 (0.454)
Methyl bromide	74–83–9	2,3,4	U029	1000 (454)
1-Methylbutadiene	504–60–9	4	U186	100 (45.4)
Methyl chloride	74–87–3	2,3,4	U045	100 (45.4)
Methyl chlorocarbonate	79–22–1	4	U156	1000 (454)
Methyl chloroform	71–55–6	2,3,4	U226	1000 (454)
3-Methylcholanthrene	56–49–5	4	U157	10 (4.54)
4,4′-Methylenebis(2-chloroaniline)	101–14–4	3,4	U158	10 (4.54)
Methylene bromide	74–95–3	4	U068	1000 (454)
Methylene chloride	75–09–2	2,3,4	U080	1000 (454)
4,4′-Methylenedianiline	101–77–9	3		10 (4.54)
Methylene diphenyl diisocyanate	101–68–8	3		5000 (2270)
Methyl ethyl ketone	78–93–3	3,4	U159	5000 (2270)
Methyl ethyl ketone peroxide	1338–23–4	4	U160	10 (4.54)
Methyl hydrazine	60–34–4	3,4	P068	10 (4.54)
Methyl iodide	74–88–4	3,4	U138	100 (45.4)
Methyl isobutyl ketone	108–10–1	3,4	U161	5000 (2270)
Methyl isocyanate	624–83–9	3,4	P064	10 (4.54)
2-Methyllactonitrile	75–86–5	1,4	P069	10 (4.54)
Methyl mercaptan	74–93–1	1,4	U153	100 (45.4)
Methyl methacrylate	80–62–6	1,3,4	U162	1000 (454)
Methyl parathion	298–00–0	1,4	P071	100 (45.4)
4-Methyl-2-pentanone	108–10–1	3,4	U161	5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Methyl tert-butyl ether	1634–04–4	3		1000 (454)
Methylthiouracil	56–04–2	4	U164	10 (4.54)
Mevinphos	7786–34–7	1		10 (4.54)
Mexacarbate	315–18–4	1,4	P128	1000 (454)
Mitomycin C	50–07–7	4	U010	10 (4.54)
MNNG	70–25–7	4	U163	10 (4.54)
Monoethylamine	75–04–7	1		100 (45.4)
Monomethylamine	74–89–5	1		100 (45.4)
Naled	300–76–5	1		10 (4.54)
5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-.	20830–81–3	4	U059	10 (4.54)
1-Naphthalenamine	134–32–7	4	U167	100 (45.4)
2-Naphthalenamine	91–59–8	4	U168	10 (4.54)
Naphthalenamine, N,N'-bis(2-chloroethyl)-	494–03–1	4	U026	100 (45.4)
Naphthalene	91–20–3	1,2,3,4	U165	100 (45.4)
Naphthalene, 2-chloro-	91–58–7	2,4	U047	5000 (2270)
1,4-Naphthalenedione	130–15–4	4	U166	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	72–57–1	4	U236	10 (4.54)
1-Naphthalenol, methylcarbamate	63–25–2	1,3,4	U279	100 (45.4)
Naphthenic acid	1338–24–5	1		100 (45.4)
1,4-Naphthoquinone	130–15–4	4	U166	5000 (2270)
alpha-Naphthylamine	134–32–7	4	U167	100 (45.4)
beta-Naphthylamine	91–59–8	4	U168	10 (4.54)
alpha-Naphthylthiourea	86–88–4	4	P072	100 (45.4)
Nickel††	7440–02–0	2		100 (45.4)
Nickel ammonium sulfate	15699–18–0	1		100 (45.4)
NICKEL AND COMPOUNDS	N.A.	2,3		**
Nickel carbonyl Ni(CO)4, (T-4)-	13463–39–3	4	P073	10 (4.54)
Nickel chloride	7718–54–9	1		100 (45.4)
	37211–05–5			
Nickel compounds	N.A.	2,3		**
Nickel cyanide Ni(CN)2	557–19–7	4	P074	10 (4.54)
Nickel hydroxide	12054–48–7	1		10 (4.54)
Nickel nitrate	14216–75–2	1		100 (45.4)
Nickel sulfate	7786–81–4	1		100 (45.4)
Nicotine, & salts	54–11–5	4	P075	100 (45.4)
Nitric acid	7697–37–2	1		1000 (454)
Nitric acid, thallium (1+) salt	10102–45–1	4	U217	100 (45.4)
Nitric oxide	10102–43–9	4	P076	10 (4.54)
p-Nitroaniline	100–01–6	4	P077	5000 (2270)
Nitrobenzene	98–95–3	1,2,3,4	U169	1000 (454)
4-Nitrobiphenyl	92–93–3	3		10 (4.54)
Nitrogen dioxide	10102–44–0	1,4	P078	10 (4.54)
	10544–72–6			
Nitrogen oxide NO	10102–43–9	4	P076	10 (4.54)
Nitrogen oxide NO2	10102–44–0	1,4	P078	10 (4.54)
	10544–72–6			
Nitroglycerine	55–63–0	4	P081	10 (4.54)
Nitrophenol (mixed)	25154–55–6	1		100 (45.4)
m-Nitrophenol	554–84–7	.....		.....
o-Nitrophenol	88–75–5	1,2		100 (45.4)
p-Nitrophenol	100–02–7	1,2,3,4	U170	100 (45.4)
2-Nitrophenol	88–75–5	1,2		100 (45.4)
4-Nitrophenol	100–02–7	1,2,3,4	U170	100 (45.4)
NITROPHENOLS	N.A.	2		**
2-Nitropropane	79–46–9	3,4	U171	10 (4.54)
NITROSAMINES	N.A.	2		**
N-Nitrosodi-n-butylamine	924–16–3	4	U172	10 (4.54)
N-Nitrosodiethanolamine	1116–54–7	4	U173	1 (0.454)
N-Nitrosodiethylamine	55–18–5	4	U174	1 (0.454)
N-Nitrosodimethylamine	62–75–9	2,3,4	P082	10 (4.54)
N-Nitrosodiphenylamine	86–30–6	2		100 (45.4)
N-Nitroso-N-ethylurea	759–73–9	4	U176	1 (0.454)
N-Nitroso-N-methylurea	684–93–5	3,4	U177	1 (0.454)
N-Nitroso-N-methylurethane	615–53–2	4	U178	1 (0.454)
N-Nitrosomethylvinylamine	4549–40–0	4	P084	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
N-Nitrosomorpholine	59–89–2	3		1 (0.454)
N-Nitrosopiperidine	100–75–4	4	U179	10 (4.54)
N-Nitrosopyrrolidine	930–55–2	4	U180	1 (0.454)
Nitrotoluene	1321–12–6	1		1000 (454)
m-Nitrotoluene	99–08–1			
o-Nitrotoluene	88–72–2			
p-Nitrotoluene	99–99–0			
5-Nitro-o-toluidine	99–55–8	4	U181	100 (45.4)
Octamethylpyrophosphoramide	152–16–9	4	P085	100 (45.4)
Osmium oxide OsO4, (T–4)–	20816–12–0	4	P087	1000 (454)
Osmium tetroxide	20816–12–0	4	P087	1000 (454)
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145–73–3	4	P088	1000 (454)
1,2-Oxathiolane, 2,2-dioxide	1120–71–4	3,4	U193	10 (4.54)
2H-1,3,2-Oxazaphosphorin-2-amine, N,N- bis(2-chloroethyl)tetrahydro-, 2-oxide.	50–18–0	4	U058	10 (4.54)
Oxirane	75–21–8	3,4	U115	10 (4.54)
Oxiranecarboxyaldehyde	765–34–4	4	U126	10 (4.54)
Oxirane, (chloromethyl)-	106–89–8	1,3,4	U041	100 (45.4)
Paraformaldehyde	30525–89–4	1		1000 (454)
Paraldehyde	123–63–7	4	U182	1000 (454)
Parathion	56–38–2	1,3,4	P089	10 (4.54)
PCBs	1336–36–3	1,2,3		1 (0.454)
PCNB	82–68–8	3,4	U185	100 (45.4)
Pentachlorobenzene	608–93–5	4	U183	10 (4.54)
Pentachloroethane	76–01–7	4	U184	10 (4.54)
Pentachloronitrobenzene	82–68–8	3,4	U185	100 (45.4)
Pentachlorophenol	87–86–5	1,2,3,4	See F027	10 (4.54)
1,3-Pentadiene	504–60–9	4	U186	100 (45.4)
Perchloroethylene	127–18–4	2,3,4	U210	100 (45.4)
Phenacetin	62–44–2	4	U187	100 (45.4)
Phenanthrene	85–01–8	2		5000 (2270)
Phenol	108–95–2	1,2,3,4	U188	1000 (454)
Phenol, 2-chloro-	95–57–8	2,4	U048	100 (45.4)
Phenol, 4-chloro-3-methyl-	59–50–7	2,4	U039	5000 (2270)
Phenol, 2-cyclohexyl-4,6-dinitro-	131–89–5	4	P034	100 (45.4)
Phenol, 2,4-dichloro-	120–83–2	2,4	U081	100 (45.4)
Phenol, 2,6-dichloro-	87–65–0	4	U082	100 (45.4)
Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56–53–1	4	U089	1 (0.454)
Phenol, 2,4-dimethyl-	105–67–9	2,4	U101	100 (45.4)
Phenol, 4-(dimethylamino)-3,5-dimethyl-, 4 methylcarbamate (ester).	315–18–4	1,4	P128	1000 (454)
Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	2032–65–7	1,4	P199	10 (4.54)
Phenol, 2,4-dinitro-	51–28–5	1,2,3,4	P048	10 (4.54)
Phenol, methyl-	1319–77–3	1,3,4	U052	100 (45.4)
Phenol, 2-methyl-4,6-dinitro-, & salts	534–52–1	2,3,4	P047	10 (4.54)
Phenol, 2,2′-methylenebis[3,4,6- trichloro-	70–30–4	4	U132	100 (45.4)
Phenol, 2-(1-methylethoxy)-, methylcarbamate	114–26–1	3,4	U411	100 (45.4)
Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate).	64–00–6	4	P202	##
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).	2631-37-0	4	P201	##
Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88–85–7	4	P020	1000 (454)
Phenol, 4-nitro-	100–02–7	1,2,3,4	U170	100 (45.4)
Phenol, pentachloro-	87–86–5	1,2,3,4	See F027	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	58–90–2	4	See F027	10 (4.54)
Phenol, 2,4,5-trichloro-	95–95–4	1,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trichloro-	88–06–2	1,2,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	131–74–8	4	P009	10 (4.54)
L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	148–82–3	4	U150	1 (0.454)
p-Phenylenediamine	106–50–3	3		5000 (2270)
Phenylmercury acetate	62–38–4	4	P092	100 (45.4)
Phenylthiourea	103–85–5	4	P093	100 (45.4)
Phorate	298–02–2	4	P094	10 (4.54)
Phosgene	75–44–5	1,3,4	P095	10 (4.54)
Phosphine	7803–51–2	3,4	P096	100 (45.4)
Phosphoric acid	7664–38–2	1		5000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	311–45–5	4	P041	100 (45.4)
Phosphoric acid, lead(2+) salt (2:3)	7446–27–7	4	U145	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester.	298–04–4	1,4	P039	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester.	298–02–2	4	P094	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288-58-2	4	U087	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.	60–51–5	4	P044	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	55–91–4	4	P043	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56–38–2	1,3,4	P089	10 (4.54)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297–97–2	4	P040	100 (45.4)
Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester.	52–85–7	4	P097	1000 (454)
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.	298–00–0	1,4	P071	100 (45.4)
Phosphorus	7723–14–0	1,3		1 (0.454)
Phosphorus oxychloride	10025–87–3	1		1000 (454)
Phosphorus pentasulfide	1314–80–3	1,4	U189	100 (45.4)
Phosphorus sulfide	1314–80–3	1,4	U189	100 (45.4)
Phosphorus trichloride	7719–12–2	1		1000 (454)
PHTHALATE ESTERS	N.A.	2		**
Phthalic anhydride	85–44–9	3,4	U190	5000 (2270)
2-Picoline	109–06–8	4	U191	5000 (2270)
Piperidine, 1-nitroso-	100–75–4	4	U179	10 (4.54)
Plumbane, tetraethyl-	78–00–2	1,4	P110	10 (4.54)
POLYCHLORINATED BIPHENYLS	1336–36–3	1,2,3		1 (0.454)
Polycyclic Organic Matter[c]	N.A.	3		**
POLYNUCLEAR AROMATIC HYDROCARBONS	N.A.	2		**
Potassium arsenate	7784–41–0	1		1 (0.454)
Potassium arsenite	10124–50–2	1		1 (0.454)
Potassium bichromate	7778–50–9	1		10 (4.54)
Potassium chromate	7789–00–6	1		10 (4.54)
Potassium cyanide K(CN)	151–50–8	1,4	P098	10 (4.54)
Potassium hydroxide	1310–58–3	1		1000 (454)
Potassium permanganate	7722–64–7	1		100 (45.4)
Potassium silver cyanide	506–61–6	4	P099	1 (0.454)
Pronamide	23950–58–5	4	U192	5000 (2270)
Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).	1646–88–4	4	P203	##
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.	116–06–3	4	P070	1 (0.454)
1-Propanamine	107–10–8	4	U194	5000 (2270)
1-Propanamine, N-propyl-	142–84–7	4	U110	5000 (2270)
1-Propanamine, N-nitroso-N-propyl-	621–64–7	2,4	U111	10 (4.54)
Propane, 1,2-dibromo-3-chloro-	96–12–8	3,4	U066	1 (0.454)
Propane, 1,2-dichloro-	78–87–5	1,2,3,4	U083	1000 (454)
Propanedinitrile	109–77–3	4	U149	1000 (454)
Propanenitrile	107–12–0	4	P101	10 (4.54)
Propanenitrile, 3-chloro-	542–76–7	4	P027	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	75–86–5	1,4	P069	10 (4.54)
Propane, 2-nitro-	79–46–9	3,4	U171	10 (4.54)
Propane, 2,2'-oxybis[2-chloro-	108–60–1	2,4	U027	1000 (454)
1,3-Propane sultone	1120–71–4	3,4	U193	10 (4.54)
1,2,3-Propanetriol, trinitrate	55–63–0	4	P081	10 (4.54)
Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	93–72–1	1,4	See F027	100 (45.4)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126–72–7	4	U235	10 (4.54)
1-Propanol, 2-methyl-	78–83–1	4	U140	5000 (2270)
2-Propanone	67–64–1	4	U002	5000 (2270)
2-Propanone, 1-bromo-	598–31–2	4	P017	1000 (454)
Propargite	2312–35–8	1		10 (4.54)
Propargyl alcohol	107–19–7	4	P102	1000 (454)
2-Propenal	107–02–8	1,2,3,4	P003	1 (0.454)
2-Propenamide	79–06–1	3,4	U007	5000 (2270)
1-Propene, 1,3-dichloro-	542–75–6	1,2,3,4	U084	100 (45.4)
1-Propene, 1,1,2,3,3,3-hexachloro-	1888–71–7	4	U243	1000 (454)
2-Propenenitrile	107–13–1	1,2,3,4	U009	100 (45.4)
2-Propenenitrile, 2-methyl-	126–98–7	4	U152	1000 (454)
2-Propenoic acid	79–10–7	3,4	U008	5000 (2270)
2-Propenoic acid, ethyl ester	140–88–5	3,4	U113	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	97–63–2	4	U118	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	80–62–6	1,3,4	U162	1000 (454)
2-Propen-1-ol	107–18–6	1,4	P005	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
beta-Propiolactone	57–57–8	3		10 (4.54)
Propionaldehyde	123–38–6	3	1000 (454)	
Propionic acid	79–09–4	1		5000 (2270)
Propionic anhydride	123–62–6	1		5000 (2270)
Propoxur (Baygon)	114–26–1	3,4	U411	100 (45.4)
n-Propylamine	107–10–8	4	U194	5000 (2270)
Propylene dichloride	78–87–5	1,2,3,4	U083	1000 (454)
Propylene oxide	75–56–9	1,3		100 (45.4)
1,2-Propylenimine	75–55–8	3,4	P067	1 (0.454)
2-Propyn-1-ol	107–19–7	4	P102	1000 (454)
Pyrene	129–00–0	2		5000 (2270)
Pyrethrins	121–29–9	1		1 (0.454)
	121–21–1			
	8003–34–7			
3,6-Pyridazinedione, 1,2-dihydro-	123–33–1	4	U148	5000 (2270)
4-Pyridinamine	504–24–5	4	P008	1000 (454)
Pyridine	110–86–1	4	U196	1000 (454)
Pyridine, 2-methyl-	109–06–8	4	U191	5000 (2270)
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts	54–11–5	4	P075	100 (45.4)
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-	66–75–1	4	U237	10 (4.54)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56–04–2	4	U164	10 (4.54)
Pyrrolidine, 1-nitroso-	930–55–2	4	U180	1 (0.454)
Pyrrolo[2,3-b] indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-(Physostigmine).	57–47–6	4	P204	##
Quinoline	91–22–5	1,3		5000 (2270)
Quinone	106–51–4	3,4	U197	10 (4.54)
Quintobenzene	82–68–8	3,4	U185	100 (45.4)
Radionuclides (including radon)	N.A.	3		§
Reserpine	50–55–5	4	U200	5000 (2270)
Resorcinol	108–46–3	1,4	U201	5000 (2270)
Saccharin, & salts	81–07–2	4	U202	100 (45.4)
Safrole	94–59–7	4	U203	100 (45.4)
Selenious acid	7783–00–8	4	U204	10 (4.54)
Selenious acid, dithallium (1+) salt	12039–52–0	4	P114	1000 (454)
Seleniumdagger;dagger;	7782–49–2	2		100 (45.4)
SELENIUM AND COMPOUNDS	N.A.	2,3		**
Selenium Compounds	N.A.	2,3		**
Selenium dioxide	7446–08–4	1,4	U204	10 (4.54)
Selenium oxide	7446–08–4	1,4	U204	10 (4.54)
Selenium sulfide SeS2	7488–56–4	4	U205	10 (4.54)
Selenourea	630–10–4	4	P103	1000 (454)
L-Serine, diazoacetate (ester)	115–02–6	4	U015	1 (0.454)
Silver dagger;dagger;	7440–22–4	2		1000 (454)
SILVER AND COMPOUNDS	N.A.	2		**
Silver cyanide Ag(CN)	506–64–9	4	P104	1 (0.454)
Silver nitrate	7761–88–8	1		1 (0.454)
Silvex (2,4,5-TP)	93–72–1	1,4	See F027	100 (45.4)
Sodium	7440–23–5	1		10 (4.54)
Sodium arsenate	7631–89–2	1		1 (0.454)
Sodium arsenite	7784–46–5	1		1 (0.454)
Sodium azide	26628–22–8	4	P105	1000 (454)
Sodium bichromate	10588–01–9	1		10 (4.54)
Sodium bifluoride	1333–83–1	1		100 (45.4)
Sodium bisulfite	7631–90–5	1		5000 (2270)
Sodium chromate	7775–11–3	1		10 (4.54)
Sodium cyanide Na(CN)	143–33–9	1,4	P106	10 (4.54)
Sodium dodecylbenzenesulfonate	25155–30–0	1		1000 (454)
Sodium fluoride	7681–49–4	1		1000 (454)
Sodium hydrosulfide	16721–80–5	1		5000 (2270)
Sodium hydroxide	1310–73–2	1		1000 (454)
Sodium hypochlorite	7681–52–9	1		100 (45.4)
	10022–70–5			
Sodium methylate	124–41–4	1		1000 (454)
Sodium nitrite	7632–00–0	1		100 (45.4)
Sodium phosphate, dibasic	7558–79–4	1		5000 (2270)
	10039–32–4			
	10140–65–5			

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Sodium phosphate, tribasic	7601–54–9 7758–29–4 7785–84–4 10101–89–0 10124–56–8 10361–89–4	1		5000 (2270)
Sodium selenite	7782–82–3 10102–18–8	1		100 (45.4)
Streptozotocin	18883–66–4	4	U206	1 (0.454)
Strontium chromate	7789–06–2	1		10 (4.54)
Strychnidin-10-one, & salts	57–24–9	1,4	P108	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	357–57–3	4	P018	100 (45.4)
Strychnine, & salts	57–24–9	1,4	P108	10 (4.54)
Styrene	100–42–5	1,3		1000 (454)
Styrene oxide	96–09–3	3		100 (45.4)
Sulfuric acid	7664–93–9 8014–95–7	1		1000 (454)
Sulfuric acid, dimethyl ester	77–78–1	3,4	U103	100 (45.4)
Sulfuric acid, dithallium (1+) salt	7446–18–6 10031–59–1	1,4	P115	100 (45.4)
Sulfur monochloride	12771–08–3	1		1000 (454)
Sulfur phosphide	1314–80–3	1,4	U189	100 (45.4)
2,4,5-T	93–76–5	1,4	See F027	1000 (454)
2,4,5-T acid	93–76–5	1,4	See F027	1000 (454)
2,4,5-T amines	2008–46–0 1319–72–8 3813–14–7 6369–96–6 6369–97–7	1		5000 (2270)
2,4,5-T esters	93–79–8 1928–47–8 2545–59–7 25168–15–4 61792–07–2	1		1000 (454)
2,4,5-T salts	13560–99–1	1		1000 (454)
TCDD	1746–01–6	2,3		1 (0.454)
TDE	72–54–8	1,2,4	U060	1 (0.454)
1,2,4,5-Tetrachlorobenzene	95–94–3	4	U207	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746–01–6	2,3		1 (0.454)
1,1,1,2-Tetrachloroethane	630–20–6	4	U208	100 (45.4)
1,1,2,2-Tetrachloroethane	79–34–5	2,3,4	U209	100 (45.4)
Tetrachloroethylene	127–18–4	2,3,4	U210	100 (45.4)
2,3,4,6-Tetrachlorophenol	58–90–2	4	See F027	10 (4.54)
Tetraethyl pyrophosphate	107–49–3	1,4	P111	10 (4.54)
Tetraethyl lead	78–00–2	1,4	P110	10 (4.54)
Tetraethyldithiopyrophosphate	3689–24–5	4	P109	100 (45.4)
Tetrahydrofuran	109–99–9	4	U213	1000 (454)
Tetranitromelhane	509–14–8	4	P112	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	757–58–4	4	P062	100 (45.4)
Thallic oxide	1314–32–5	4	P113	100 (45.4)
Thallium dagger;dagger;	7440–28–0	2		1000 (454)
THALLIUM AND COMPOUNDS	N.A.	2		**
Thallium (I) acetate	563–68–8	4	U214	100 (45.4)
Thallium (I) carbonate	6533–73–9	4	U215	100 (45.4)
Thallium chloride TlCl	7791–12–0	4	U216	100 (45.4)
Thallium (I) nitrate	10102–45–1	4	U217	100 (45.4)
Thallium oxide Tl2O3	1314–32–5	4	P113	100 (45.4)
Thallium (I) selenite	12039–52–0	4	P114	1000 (454)
Thallium (I) sulfate	7446–18–6 10031–59–1	1,4	P115	100 (45.4)
Thioacetamide	62–55–5	4	U218	10 (4.54)
Thiodiphosphoric acid, tetraethyl ester	3689–24–5	4	P109	100 (45.4)
Thiofanox	39196–18–4	4	P045	100 (45.4)
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541–53–7	4	P049	100 (45.4)
Thiomethanol	74–93–1	1,4	U153	100 (45.4)
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-	137–26–8	4	U244	10 (4.54)
Thiophenol	108–98–5	4	P014	100 (45.4)
Thiosemicarbazide	79–19–6	4	P116	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Thiourea	62–56–6	4	U219	10 (4.54)
Thiourea, (2-chlorophenyl)-	5344–82–1	4	P026	100 (45.4)
Thiourea, 1-naphthalenyl-	86–88–4	4	P072	100 (45.4)
Thiourea, phenyl-	103–85–5	4	P093	100 (45.4)
Thiram	137–26–8	4	U244	10 (4.54)
Titanium tetrachloride	7550–45–0	3		1,2,41000 (454)
Toluene	108–88–3	1,2,3,4	U220	1000 (454)
Toluenediamine	95–80–7	3,4	U221	10 (4.54)
	496–72–0			
	823–40–5			
	25376–45–8			
2,4-Toluene diamine	95–80–7	3,4	U221	10 (4.54)
	496–72–0			
	823–40–5			
	25376–45–8			
Toluene diisocyanate	91–08–7	3,4	U223	100 (45.4)
	584–84–9			
	26471–62–5			
2,4-Toluene diisocyanate	91–08–7	3,4	U223	100 (45.4)
	584–84–9			
	26471–62–5			
o-Toluidine	95–53–4	3,4	U328	100 (45.4)
p-Toluidine	106–49–0	4	U353	100 (45.4)
o-Toluidine hydrochloride	636–21–5	4	U222	100 (45.4)
Toxaphene	8001–35–2	1,2,3,4	P123	1 (0.454)
2,4,5-TP acid	93–72–1	1,4	See F027	100 (45.4)
2,4,5-TP esters	32534–95–5	1		100 (45.4)
1H-1,2,4-Triazol-3-amine	61–82–5	4	U011	10 (4.54)
Trichlorfon	52–68–6	1		100 (45.4)
1,2,4-Trichlorobenzene	120–82–1	2,3		100 (45.4)
1,1,1-Trichloroethane	71–55–6	2,3,4	U226	1000 (454)
1,1,2-Trichloroethane	79–00–5	2,3,4	U227	100 (45.4)
Trichloroethylene	79–01–6	1,2,3,4	U228	100 (45.4)
Trichloromethanesulfenyl chloride	594–42–3	4	P118	100 (45.4)
Trichloromonofluoromethane	75–69–4	4	U121	5000 (2270)
Trichlorophenol	25167–82–2	1		10 (4.54)
2,3,4-Trichlorophenol	15950–66–0			
2,3,5-Trichlorophenol	933–78–8			
2,3,6-Trichlorophenol	933–75–5			
3,4,5-Trichlorophenol	609–19–8			
2,4,5-Trichlorophenol	95–95–4	1,3,4	See F027	10 (4.54)
2,4,6-Trichlorophenol	88–06–2	1,2,3,4	See F027	10 (4.54)
Triethanolamine dodecylbenzenesulfonate	27323–41–7	1		1000 (454)
Triethylamine	121–44–8	1,3,4	U404	5000 (2270)
Trifluralin	1582–09–8	3		10 (4.54)
Trimethylamine	75–50–3	1		100 (45.4)
2,2,4-Trimethylpentane	540–84–1	3		1000 (454)
1,3,5-Trinitrobenzene	99–35–4	4	U234	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	123–63–7	4	U182	1000 (454)
Tris(2,3-dibromopropyl) phosphate	126–72–7	4	U235	10 (4.54)
Trypan blue	72–57–1	4	U236	10 (4.54)
Unlisted Hazardous Wastes Characteristic of Corrosivity	N.A.	4	D002	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Ignitability	N.A.	4	D001	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity	N.A.	4	D003	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Toxicity:				
Arsenic (D004)	N.A.	4	D004	1 (0.454)
Barium (D005)	N.A.	4	D005	1000 (454)
Benzene (D018)	N.A.	1,2,3,4	D018	10 (4.54)
Cadmium (D006)	N.A.	4	D006	10 (4.54)
Carbon tetrachloride (D019)	N.A.	1,2,4	D019	10 (4.54)
Chlordane (D020)	N.A.	1,2,4	D020	1 (0.454)
Chlorobenzene (D021)	N.A.	1,2,4	D021	100 (45.4)
Chloroform (D022)	N.A.	1,2,4	D022	10 (4.54)
Chromium (D007)	N.A.	4	D007	10 (4.54)
o-Cresol (D023)	N.A.	4	D023	100 (45.4)
m-Cresol (D024)	N.A.	4	D024	100 (45.4)
p-Cresol (D025)	N.A.	4	D025	100 (45.4)
Cresol (D026)	N.A.	4	D026	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
2,4-D (D016)	N.A.	1,4	D016	100 (45.4)
1,4-Dichlorobenzene (D027)	N.A.	1,2,4	D027	100 (45.4)
1,2-Dichloroethane (D028)	N.A.	1,2,4	D028	100 (45.4)
1,1-Dichloroethylene (D029)	N.A.	1,2,4	D029	100 (45.4)
2,4-Dinitrotoluene (D030)	N.A.	1,2,4	D030	10 (4.54)
Endrin (D012)	N.A.	1,4	D012	1 (0.454)
Heptachlor (and epoxide) (D031)	N.A.	1,2,4	D031	1 (0.454)
Hexachlorobenzene (D032)	N.A.	2,4	D032	10 (4.54)
Hexachlorobutadiene (D033)	N.A.	2,4	D033	1 (0.454)
Hexachloroethane (D034)	N.A.	2,4	D034	100 (45.4)
Lead (D008)	N.A.	4	D008	10 (4.54)
Lindane (D013)	N.A.	1,4	D013	1 (0.454)
Mercury (D009)	N.A.	4	D009	1 (0.454)
Methoxychlor (D014)	N.A.	1,4	D014	1 (0.454)
Methyl ethyl ketone (D035)	N.A.	4	D035	5000 (2270)
Nitrobenzene (D036)	N.A.	1,2,4	D036	1000 (454)
Pentachlorophenol (D037)	N.A.	1,2,4	D037	10 (4.54)
Pyridine (D038)	N.A.	4	D038	1000 (454)
Selenium (D010)	N.A.	4	D010	10 (4.54)
Silver (D011)	N.A.	4	D011	1 (0.454)
Tetrachloroethylene (D039)	N.A.	2,4	D039	100 (45.4)
Toxaphene (D015)	N.A.	1,4	D015	1 (0.454)
Trichloroethylene (D040)	N.A.	1,2,4	D040	100 (45.4)
2,4,5-Trichlorophenol (D041)	N.A.	1,4	D041	10 (4.54)
2,4,6-Trichlorophenol (D042)	N.A.	1,2,4	D042	10 (4.54)
2,4,5-TP (D017)	N.A.	1,4	D017	100 (45.4)
Vinyl chloride (D043)	N.A.	2,3,4	D043	1 (0.454)
Uracil mustard	66–75–1	4	U237	10 (4.54)
Uranyl acetate	541–09–3	1		100 (45.4)
Uranyl nitrate	10102–06–4	1		100 (45.4)
	36478–76–9			
Urea, N-ethyl-N-nitroso-	759–73–9	4	U176	1 (0.454)
Urea, N-methyl-N-nitroso-	684–93–5	3,4	U177	1 (0.454)
Urethane	51–79–6	3,4	U238	100 (45.4)
Vanadic acid, ammonium salt	7803–55–6	4	P119	1000 (454)
Vanadium oxide V2O5	1314–62–1	1,4	P120	1000 (454)
Vanadium pentoxide	1314–62–1	1,4	P120	1000 (454)
Vanadyl sulfate	27774–13–6	1		1000 (454)
Vinyl acetate	108–05–4	1,3		5000 (2270)
Vinyl acetate monomer	108–05–4	1,3		5000 (2270)
Vinylamine, N-methyl-N-nitroso-	4549–40–0	4	P084	10 (4.54)
Vinyl bromide	593–60–2	3		100 (45.4)
Vinyl chloride	75–01–4	2,3,4	U043	1 (0.454)
Vinylidene chloride	75–35–4	1,2,3,4	U078	100 (45.4)
Warfarin, & salts	81–81–2	4	P001, U248	100 (45.4)
Xylene	1330–20–7	1,3,4	U239	100 (45.4)
m-Xylene	108–38–3	3		1000 (454)
o-Xylene	95–47–6	3		1000 (454)
p-Xylene	106–42–3	3		100 (45.4)
Xylene (mixed)	1330–20–7	1,3,4	U239	100 (45.4)
Xylenes (isomers and mixture)	1330–20–7	1,3,4	U239	100 (45.4)
Xylenol	1300–71–6	1		1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta,16beta,17alpha, 18beta,20alpha).	50–55–54	4	U200	5000 (2270)
Zinc dagger;dagger;	7440–66–6	2		1000 (454)
ZINC AND COMPOUNDS	N.A.	2		**
Zinc acetate	557–34–6	1		1000 (454)
Zinc ammonium chloride	52628–25–8	1		1000 (454)
	14639–97–5			
	14639–98–6			
Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram)	137–30–4	4	P205	##
Zinc borate	1332–07–6	1		1000 (454)
Zinc bromide	7699–45–8	1		1000 (454)
Zinc carbonate	3486–35–9	1		1000 (454)
Zinc chloride	7646–85–7	1		1000 (454)
Zinc cyanide Zn(CN)2	557–21–1	1,4	P121	10 (4.54)
Zinc fluoride	7783–49–5	1		1000 (454)
Zinc formate	557–41–5	1		1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Zinc hydrosulfite	7779-86-4	1		1000 (454)
Zinc nitrate	7779-88-6	1		1000 (454)
Zinc phenolsulfonate	127-82-2	1		5000 (2270)
Zinc phosphide Zn3P2	1314-84-7	1,4	P122, U249	100 (45.4)
Zinc silicofluoride	16871-71-9	1		5000 (2270)
Zinc sulfate	7733-02-0	1		1000 (454)
Zirconium nitrate	13746-89-9	1		5000 (2270)
Zirconium potassium fluoride	16923-95-8	1		1000 (454)
Zirconium sulfate	14644-61-2	1		5000 (2270)
Zirconium tetrachloride	10026-11-6	1		5000 (2270)
F001	.....	4	F001	10 (4.54)
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127-18-4	2,3,4	U210	100 (45.4)
(b) Trichloroethylene	79-01-6	1,2,3,4	U228	100 (45.4)
(c) Methylene chloride	75-09-2	2,3,4	U080	1000 (454)
(d) 1,1,1-Trichloroethane	71-55-6	2,3,4	U226	1000 (454)
(e) Carbon tetrachloride	56-23-5	1,2,3,4	U211	10 (4.54)
(f) Chlorinated fluorocarbons	N.A.	.....		5000 (2270)
F002	.....	4	F002	10 (4.54)
The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127-18-4	2,3,4	U210	100 (45.4)
(b) Methylene chloride	75-09-2	2,3,4	U080	1000 (454)
(c) Trichloroethylene	79-01-6	1,2,3,4	U228	100 (45.4)
(d) 1,1,1-Trichloroethane	71-55-6	2,3,4	U226	1000 (454)
(e) Chlorobenzene	108-90-7	1,2,3,4	U037	100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	.....		5000 (2270)
(g) o-Dichlorobenzene	95-50-1	1,2,4	U070	100 (45.4)
(h) Trichlorofluoromethane	75-69-4	4	U121	5000 (2270)
(i) 1,1,2-Trichloroethane	79-00-5	2,3,4	U227	100 (45.4)
F003	.....	4	F003	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents.				
(a) Xylene	1330-20-7	.....		1000 (454)
(b) Acetone	67-64-1	.....		5000 (2270)
(c) Ethyl acetate	141-78-6	.....		5000 (2270)
(d) Ethylbenzene	100-41-4	.....		1000 (454)
(e) Ethyl ether	60-29-7	.....		100 (45.4)
(f) Methyl isobutyl ketone	108-10-1	.....		5000 (2270)
(g) n-Butyl alcohol	71-36-3	.....		5000 (2270)
(h) Cyclohexanone	108-94-1	.....		5000 (2270)
(i) Methanol	67-56-1	.....		5000 (2270)
F004	.....	4	F004	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319-77-3	1,3,4	U052	100 (45.4)
(b) Nitrobenzene	98-95-3	1,2,3,4	U169	1000 (454)
F005	.....	4	F005	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Toluene	108-88-3	1,2,3,4	U220	1000 (454)
(b) Methyl ethyl ketone	78-93-3	3,4	U159	5000 (2270)
(c) Carbon disulfide	75-15-0	1,3,4	P022	100 (45.4)
(d) Isobutanol	78-83-1	4	U140	5000 (2270)
(e) Pyridine	110-86-1	4	U196	1000 (454)
F006	.....	4	F006	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.				
F007	.....	4	F007	10 (4.54)
Spent cyanide plating bath solutions from electroplating operations.				
F008	.....	4	F008	10 (4.54)
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.				
F009	.....	4	F009	10 (4.54)
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.				
F010	.....	4	F010	10 (4.54)
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.				
F011	.....	4	F011	10 (4.54)
Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.				
F012	.....	4	F012	10 (4.54)
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.				
F019	.....	4	F019	10 (4.54)
Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process.				
F020	.....	4	F020	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)				
F021	.....	4	F021	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol or of intermediates used to produce its derivatives.				
F022	.....	4	F022	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.				
F023	.....	4	F023	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or a component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.)				
F024	.....	4	F024	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.31 or 261.32.) F025		4	F025	1 (0.454)
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. F026		4	F026	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions. F027		4	F027	1 (0.454)
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component.) F028		4	F028	1 (0.454)
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027. F032		4	F032	1 (0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. F034		4	F034	1 (0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol. F035		4	F035	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F037	.....	4	F037	1 (0.454)
Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under §261.4(a)(12)(i), if those residuals are to be disposed of.				
F038	.....	4	F038	1 (0.454)
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge-Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.				
F039	.....	4	F039	1 (0.454)
Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of 40 CFR part 261. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other hazardous wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)				
K001	.....	4	K001	1 (0.454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.				
K002	.....	4	K002	10 (4.54)
Wastewater treatment sludge from the production of chrome yellow and orange pigments.				
K003	.....	4	K003	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Wastewater treatment sludge from the production of molybdate orange pigments. K004		4	K004	10 (4.54)
Wastewater treatment sludge from the production of zinc yellow pigments. K005		4	K005	10 (4.54)
Wastewater treatment sludge from the production of chrome green pigments. K006		4	K006	10 (4.54)
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated). K007		4	K007	10 (4.54)
Wastewater treatment sludge from the production of iron blue pigments. K008		4	K008	10 (4.54)
Oven residue from the production of chrome oxide green pigments. K009		4	K009	10 (4.54)
Distillation bottoms from the production of acetaldehyde from ethylene. K010		4	K010	10 (4.54)
Distillation side cuts from the production of acetaldehyde from ethylene. K011		4	K011	10 (4.54)
Bottom stream from the wastewater stripper in the production of acrylonitrile. K013		4	K013	10 (4.54)
Bottom stream from the acetonitrile column in the production of acrylonitrile. K014		4	K014	5000 (2270)
Bottoms from the acetonitrile purification column in the production of acrylonitrile. K015		4	K015	10 (4.54)
Still bottoms from the distillation of benzyl chloride. K016		4	K016	1 (0.454)
Heavy ends or distillation residues from the production of carbon tetrachloride. K017		4	K017	10 (4.54)
Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin. K018		4	K018	1 (0.454)
Heavy ends from the fractionation column in ethyl chloride production. K019		4	K019	1 (0.454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production. K020		4	K020	1 (0.454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production. K021		4	K021	10 (4.54)
Aqueous spent antimony catalyst waste from fluoromethanes production. K022		4	K022	1 (0.454)
Distillation bottom tars from the production of phenol/acetone from cumene. K023		4	K023	5000 (2270)
Distillation light ends from the production of phthalic anhydride from naphthalene. K024		4	K024	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from naphthalene. K025		4	K025	10 (4.54)
Distillation bottoms from the production of nitrobenzene by the nitration of benzene. K026		4	K026	1000 (454)
Stripping still tails from the production of methyl ethyl pyridines. K027		4	K027	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Centrifuge and distillation residues from toluene diisocyanate production.				
K028		4	K028	1 (0.454)
Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane.				
K029		4	K029	1 (0.454)
Waste from the product steam stripper in the production of 1,1,1- trichloroethane.				
K030		4	K030	1 (0.454)
Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene.				
K031		4	K031	1 (0.454)
By-product salts generated in the production of MSMA and cacodylic acid.				
K032		4	K032	10 (4.54)
Wastewater treatment sludge from the production of chlordane.				
K033		4	K033	10 (4.54)
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane.				
K034		4	K034	10 (4.54)
Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane.				
K035		4	K035	1 (0.454)
Wastewater treatment sludges generated in the production of creosote.				
K036		4	K036	1 (0.454)
Still bottoms from toluene reclamation distillation in the production of disulfoton.				
K037		4	K037	1 (0.454)
Wastewater treatment sludges from the production of disulfoton.				
K038		4	K038	10 (4.54)
Wastewater from the washing and stripping of phorate production.				
K039		4	K039	10 (4.54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.				
K040		4	K040	10 (4.54)
Wastewater treatment sludge from the production of phorate.				
K041		4	K041	1 (0.454)
Wastewater treatment sludge from the production of toxaphene.				
K042		4	K042	10 (4.54)
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.				
K043		4	K043	10 (4.54)
2,6-Dichlorophenol waste from the production of 2,4-D.				
K044		4	K044	10 (4.54)
Wastewater treatment sludges from the manufacturing and processing of explosives.				
K045		4	K045	10 (4.54)
Spent carbon from the treatment of wastewater containing explosives.				
K046		4	K046	10 (4.54)
Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.				
K047		4	K047	10 (4.54)
Pink/red water from TNT operations.				
K048		4	K048	10 (4.54)
Dissolved air flotation (DAF) float from the petroleum refining industry.				
K049		4	K049	10 (4.54)
Slop oil emulsion solids from the petroleum refining industry.				
K050		4	K050	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Heat exchanger bundle cleaning sludge from the petroleum refining industry.				
K051		4	K051	10 (4.54)
API separator sludge from the petroleum refining industry.				
K052		4	K052	10 (4.54)
Tank bottoms (leaded) from the petroleum refining industry.				
K060		4	K060	1 (0.454)
Ammonia still lime sludge from coking operations.				
K061		4	K061	10 (4.54)
Emission control dust/sludge from the primary production of steel in electric furnaces.				
K062		4	K062	10 (4.54)
Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).				
K064		4	K064	10 (4.54)
Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production.				
K065		4	K065	10 (4.54)
Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.				
K066		4	K066	10 (4.54)
Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.				
K069		4	K069	10 (4.54)
Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting the stay, EPA will publish a notice of the action in the **Federal Register.**)				
K071	.....	4	K071	1 (0.454)
Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.				
K073	.....	4	K073	10 (4.54)
Chlorinated hydrocarbon waste from the purification step of the diaphragm cellprocess using graphite anodes in chlorine production.				
K083	.....	4	K083	100 (45.4)
Distillation bottoms from aniline production.				
K084	.....	4	K084	1 (0.454)
Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.				
K085	.....	4	K085	10 (4.54)
Distillation or fractionation column bottoms from the production of chlorobenzenes.				
K086	.....	4	K086	10 (4.54)
Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.				
K087	.....	4	K087	100 (45.4)
Decanter tank tar sludge from coking operations.				
K088	.....	4	K088	10 (4.54)
Spent potliners from primary aluminum reduction.				
K090	.....	4	K090	10 (4.54)
Emission control dust or sludge from ferrochromiumsilicon production.				
K091	.....	4	K091	10 (4.54)
Emission control dust or sludge from ferrochromium production.				
K093	.....	4	K093	5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Distillation light ends from the production of phthalic anhydride from ortho-xylene. K094	.....	4	K094	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from ortho-xylene. K095	.....	4	K095	100 (45.4)
Distillation bottoms from the production of 1,1,1-trichloroethane. K096	.....	4	K096	100 (45.4)
Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane. K097	.....	4	K097	1 (0.454)
Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane. K098	.....	4	K098	1 (0.454)
Untreated process wastewater from the production of toxaphene. K099	.....	4	K099	10 (4.54)
Untreated wastewater from the production of 2,4-D. K100	.....	4	K100	10 (4.54)
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting. K101	.....	4	K101	1 (0.454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. K102	.....	4	K102	1 (0.454)
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds. K103	.....	4	K103	100 (45.4)
Process residues from aniline extraction from the production of aniline. K104	.....	4	K104	10 (4.54)
Combined wastewater streams generated from nitrobenzene/aniline production. K105	.....	4	K105	10 (4.54)
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes. K106	.....	4	K106	1 (0.454)
Wastewater treatment sludge from the mercury cell process in chlorine production. K107	.....	4	K107	10 (4.54)
Column bottoms from product separation from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazines. K108	.....	4	K108	10 (4.54)
Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K109	.....	4	K109	10 (4.54)
Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K110	.....	4	K110	10 (4.54)
Condensed column overheads from intermediate separation from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides. K111	.....	4	K111	10 (4.54)
Product washwaters from the production of dinitrotoluene via nitration of toluene. K112	.....	4	K112	10 (4.54)
Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene. K113	.....	4	K113	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. K114		4	K114	10 (4.54)
Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. K115		4	K115	10 (4.54)
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene. K116		4	K116	10 (4.54)
Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine. K117		4	K117	1 (0.454)
Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene. K118		4	K118	1 (0.454)
Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. K123		4	K123	10 (4.54)
Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts. K124		4	K124	10 (4.54)
Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts. K125		4	K125	10 (4.54)
Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts. K126		4	K126	10 (4.54)
Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts. K131		4	K131	100 (45.4)
Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide. K132		4	K132	1000 (454)
Spent absorbent and wastewater separator solids from the production of methyl bromide. K136		4	K136	1 (0.454)
Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene. K141		4	K141	1 (0.454)
Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations). K142		4	K142	1 (0.454)
Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal. K143		4	K143	1 (0.454)
Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by- products produced from coal. K144		4	K144	1 (0.454)
Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.				

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
K145		4	K145	1 (0.454)
Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.				
K147		4	K147	1 (0.454)
Tar storage tank residues from coal tar refining.				
K148		4	K148	1 (0.454)
Residues from coal tar distillation, including, but not limited to, still bottoms.				
K149		4	K149	10 (4.54)
Distillation bottoms from the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]				
K150		4	K150	10 (4.54)
Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K151		4	K151	10 (4.54)
Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of waste-waters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K156		4	K156	##
Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K157		4	K157	##
Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K158		4	K158	##
Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K159		4	K159	##
Organics from the treatment of thiocarbamate wastes.				
K161		4	K161	##
Purification solids (including filtration, evaporation, and centrifugation solids), baghouse dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This does not include K125 or K126.)				
K169[c]		4	K169	10 (4.54)
Crude oil storage tank sediment from petroleum refining operations.				
K170[c]		4	K170	1 (0.454)
Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.				
K171[c]		4	K171	1 (0.454)
Spent hydrotreating catalyst from petroleum refining operations. (This listing does not include inert support media.)				
K172[c]		4	K172	1 (0.454)
Spent hydrorefining catalyst from petroleum refining operations. (This listing does not include inert support media.)				
K174[c]		4	K174	1 (0.454)
K175[c]		4	K175	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory codedagger;	RCRA waste No.	Final RQ pounds (Kg)
K176				
Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)		4	K176	1 (0.454)
K177				
Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from the production of intermediates (e.g., antimony metal or crude antimony oxide)		4	K177	5,000 (2270)
K178				
Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride ilmenite process		4	K178	1 (0.454)

dagger; Indicates the statutory source defined by 1,2,3, and 4, as described in the note preceding Table 302.4.

dagger;dagger; No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers (0.004 inches).

dagger;dagger;dagger; The RQ for asbestos is limited to friable forms only.

The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory one-pound RQ applies.

§ The adjusted RQs for radionuclides may be found in Appendix B to this table.

** Indicates that no RQ is being assigned to the generic or broad class.

[a] Benzene was already a CERCLA hazardous substance prior to the CAA Amendments of 1990 and received an adjusted 10-pound RQ based on potential carcinogenicity in an August 14, 1989, final rule (54 FR 33418). The CAA Amendments specify that "benzene (including benzene from gasoline)" is a hazardous air pollutant and, thus, a CERCLA hazardous substance.

[b] The CAA Amendments of 1990 list DDE (3547–04–4) as a CAA hazardous air pollutant. The CAS number, 3547–04–4, is for the chemical, p,p'dichlorodiphenylethane. DDE or p,p'-dichlorodiphenyldichloroethylene, CAS number 72–55–9, is already listed in Table 302.4 with a final RQ of 1 pound. The substance identified by the CAS number 3547–04–4 has been evaluated and listed as DDE to be consistent with the CAA section 112 listing, as amended.

[c] Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.

[d] Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR' where:
n = 1, 2, or 3;
R = alkyl C7 or less; or
R = phenyl or alkyl substituted phenyl;
R' = H or alkyl C7 or less; or
OR' consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.

[e] Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 °C.

[f] See 40 CFR 302.6(b)(1) for application of the mixture rule to this hazardous waste.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES

CASRN	Hazardous substance
50000	Formaldehyde.
50077	Azirino[2',3':3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a, 8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
	Mitomycin C.
50180	Cyclophosphamide.
	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide.
50293	Benzene, 1,1'-(2,2,2- trichloroethylidene)bis[4-chloro-.
	DDT.
	4,4'-DDT.
50328	Benzo[a]pyrene.
	3,4-Benzopyrene.
50555	Reserpine.
	Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3 ,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta, 16beta,17alpha,18beta,20alpha)- .
51285	Phenol, 2,4-dinitro-.
	2,4-Dinitrophenol.
51434	Epinephrine.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino) ethyl]-.
51796	Carbamic acid, ethyl ester.
	Ethyl carbamate.
	Urethane.
52686	Trichlorfon.
52857	Famphur.
	[(dimethylamino)sulfonyl]phenyl] O,O-dimethyl ester.
Phosphoric acid, O-[4-	Dibenz[a,h]anthracene.
	Dibenzo[a,h]anthracene.
	1,2:5,6-Dibenzanthracene.
53963	Acetamide, N-9H-fluoren-2-yl-.
	2-Acetylaminofluorene.
54115	Nicotine, & salts.
	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts.
55185	Ethanamine, N-ethyl-N-nitroso-.
	N-Nitrosodiethylamine.
55630	Nitroglycerine.
	1,2,3-Propanetriol, trinitrate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
55914	Diisopropylfluorophosphate (DFP).
	Phosphorofluoridic acid, bis(1-methylethyl) ester.
56042	Methylthiouracil.
	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-.
56235	Carbon tetrachloride.
	Methane, tetrachloro-.
56382	Parathion.
	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester.
56495	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-.
	3-Methylcholanthrene.
56531	Diethylstilbestrol.
	Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E).
56553	Benz[a]anthracene.
	Benzo[a]anthracene.
	1,2-Benzanthracene.
56724	Coumaphos.
57147	Hydrazine, 1,1-dimethyl-.
	1,1-Dimethylhydrazine.
57249	Strychnidin-10-one, & salts.
	Strychnine, & salts.
57476	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)- (Physostigmine).
57578	beta-Propiolactone.
57647	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1) (Physostigmine salicylate).
57749	Chlordane.
	Chlordane, alpha & gamma isomers.
	CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).
	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.
57976	Benz[a]anthracene, 7,12-dimethyl-.
	7,12-Dimethylbenz[a]anthracene.
58899	γ-BHC.
	Cyclohexane, 1,2,3,4,5,6-hexachloro-(1α,2α,3β,4α,5α,6β)-.
	Lindane.
	Lindane (all isomers).
58902	Phenol, 2,3,4,6-tetrachloro-.
	2,3,4,6-Tetrachlorophenol.
59507	p-Chloro-m-cresol.
	Phenol, 4-chloro-3-methyl-.
59892	N-Nitrosomorpholine.
60004	Ethylenediamine-tetraacetic acid (EDTA).
60117	Benzenamine, N,N-dimethyl-4-(phenylazo)-.
	Dimethyl aminoazobenzene.
	p-Dimethylaminoazobenzene.
60297	Ethane, 1,1′-oxybis-.
	Ethyl ether.
60344	Hydrazine, methyl-.
	Methyl hydrazine.
60355	Acetamide.
60515	Dimethoate.
	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.
60571	Dieldrin.
	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2, 2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta, 6aalpha,7beta, 7aalpha)-.
61825	Amitrole.
	1H-1,2,4-Triazol-3-amine.
62384	Mercury, (acetato-O)phenyl-.
	Phenylmercury acetate.
62442	Acetamide, N-(4-ethoxyphenyl)-.
	Phenacetin.
62500	Ethyl methanesulfonate.
	Methanesulfonic acid, ethyl ester.
62533	Aniline.
	Benzenamine.
62555	Ethanethioamide.
	Thioacetamide.
62566	Thiourea.
62737	Dichlorvos.
62748	Acetic acid, fluoro-, sodium salt.
	Fluoroacetic acid, sodium salt.
62759	Methanamine, N-methyl-N-nitroso-.
	N-Nitrosodimethylamine.
63252	Carbaryl.
	1-Naphthalenol, methylcarbamate.
64006	Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate).
64186	Formic acid.
64197	Acetic acid.
64675	Diethyl sulfate.
65850	Benzoic acid.
66751	Uracil mustard.
	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl) amino]-.
67561	Methanol.
	Methyl alcohol.
67641	Acetone.
	2-Propanone.
67663	Chloroform.
	Methane, trichloro-.
67721	Ethane, hexachloro-.
	Hexachloroethane.
68122	Dimethylformamide.
70257	Guanidine, N-methyl-N′-nitro-N-nitroso-.
	MNNG.
70304	Hexachlorophene.
	Phenol, 2,2′-methylenebis[3,4,6-tri- chloro-.
71363	n-Butyl alcohol.
	1-Butanol.
71432	Benzene.
71556	Ethane, 1,1,1-trichloro-.
	Methyl chloroform.
	1,1,1-Trichloroethane.
72208	Endrin.
	Endrin, & metabolites.
	2,7:3.6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha, 6alpha,6abeta,7beta,7aalpha)-, & metabolites.
72435	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-methoxy-.
	Methoxychlor.
72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-.
	DDD.
	TDE.
	4,4′-DDD.
72559	DDE
	4,4′-DDE.
72571	Trypan blue.
	2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl-(l,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.
74839	Bromomethane.
	Methane, bromo-.
	Methyl bromide.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
74873	Chloromethane.
	Methane, chloro-.
	Methyl chloride.
74884	Iodomethane
	Methane, iodo-.
	Methyl iodide.
74895	Monomethylamine.
74908	Hydrocyanic acid.
	Hydrogen cyanide.
74931	Methanethiol.
	Methyl mercaptan.
	Thiomethanol.
74953	Methane, dibromo-.
	Methylene bromide.
75003	Chloroethane.
	Ethyl chloride.
75014	Ethene, chloro-.
	Vinyl chloride.
75047	Monoethylamine.
75058	Acetonitrile.
75070	Acetaldehyde.
	Ethanal.
75092	Dichloromethane.
	Methane, dichloro-.
	Methylene chloride.
75150	Carbon disulfide.
75207	Calcium carbide.
75218	Ethylene oxide.
	Oxirane.
75252	Bromoform.
	Methane, tribromo-.
75274	Dichlorobromomethane.
75343	Ethane, 1,1-dichloro-.
	Ethylidene dichloride.
	1,1-Dichloroethane.
75354	Ethene, 1,1-dichloro-.
	Vinylidene chloride.
	1,1-Dichloroethylene.
75365	Acetyl chloride.
75445	Carbonic dichloride.
	Phosgene.
75503	Trimethylamine.
75558	Aziridine, 2-methyl-.
	2-Methyl aziridine.
	1,2-Propylenimine.
75569	Propylene oxide.
75605	Arsinic acid, dimethyl-.
	Cacodylic acid.
75649	tert-Butylamine.
75694	Methane, trichlorofluoro-.
	Trichloromonofluoromethane.
75718	Dichlorodifluoromethane.
	Methane, dichlorodifluoro-.
75865	Acetone cyanohydrin.
	Propanenitrile, 2-hydroxy-2-methyl-.
	2-Methyllactonitrile.
75876	Acetaldehyde, trichloro-.
	Chloral.
75990	2,2-Dichloropropionic acid.
76017	Ethane, pentachloro-.
	Pentachloroethane.
76448	Heptachlor.
	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.
77474	Hexachlorocyclopentadiene.
	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexa- chloro-.
77781	Dimethyl sulfate.
	Sulfuric acid, dimethyl ester.
78002	Plumbane, tetraethyl-.
	Tetraethyl lead.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
78591	Isophorone.
78795	Isoprene.
78819	iso-Butylamine.
78831	Isobutyl alcohol.
	1-Propanol, 2-methyl-.
78875	Propane, 1,2-dichloro-.
	Propylene dichloride.
	1,2-Dichloropropane.
78886	2,3-Dichloropropene.
78933	2-Butanone.
	MEK.
	Methyl ethyl ketone.
78999	1,1-Dichloropropane.
79005	Ethane, 1,1,2-trichloro-.
	1,1,2-Trichloroethane.
79016	Ethene, trichloro-.
	Trichloroethylene.
79061	Acrylamide.
	2-Propenamide.
79094	Propionic acid.
79107	Acrylic acid.
	2-Propenoic acid.
79118	Chloroacetic acid.
79196	Hydrazinecarbothioamide.
	Thiosemicarbazide.
79221	Carbonochloridic acid, methyl ester.
	Methyl chlorocarbonate.
79312	iso-Butyric acid.
79345	Ethane, 1,1,2,2-tetrachloro-.
	1,1,2,2-Tetrachloroethane.
79447	Carbamic chloride, dimethyl-.
	Dimethylcarbamoyl chloride.
79469	Propane, 2-nitro-.
	2-Nitropropane.
80159	alpha,alpha-Dimethylbenzylhydroperoxide.
	Hydroperoxide, 1-methyl-1-phenylethyl-.
80626	Methyl methacrylate.
	2-Propenoic acid, 2-methyl-, methyl ester.
81072	Saccharin, & salts.
	1,2-Benzisothiazol-3(2H)-one, 1,1-dioxide, & salts.
81812	Warfarin, & salts.
	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts.
82688	Benzene, pentachloronitro-.
	PCNB.
	Pentachloronitrobenzene.
	Quintobenzene.
83329	Acenaphthene.
84662	Diethyl phthalate.
	1,2-Benzenedicarboxylic acid, diethyl ester.
84742	Di-n-butyl phthalate.
	Dibutyl phthalate.
	n-Butyl phthalate.
	1,2-Benzenedicarboxylic acid, dibutyl ester.
85007	Diquat.
85018	Phenanthrene.
85449	Phthalic anhydride.
	1,3-Isobenzofurandione.
85687	Butyl benzyl phthalate.
86306	N-Nitrosodiphenylamine.
86500	Guthion.
86737	Fluorene.
86884	alpha-Naphthylthiourea.
	Thiourea, 1-naphthalenyl-.
87650	Phenol, 2,6-dichloro-.
	2,6-Dichlorophenol.
87683	Hexachlorobutadiene.
	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-.
87865	Pentachlorophenol.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Phenol, pentachloro-.
88062	Phenol, 2,4,6-trichloro-.
	2,4,6-Trichlorophenol.
88722	o-Nitrotoluene.
88755	o-Nitrophenol.
	2-Nitrophenol.
88857	Dinoseb.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-.
90040	o-Anisidine.
91087	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
91203	Naphthalene.
91225	Quinoline.
91587	beta-Chloronaphthalene.
	Naphthalene, 2-chloro-.
	2-Chloronaphthalene.
91598	beta-Naphthylamine.
	2-Naphthalenamine.
91667	N,N-Diethylaniline.
91805	Methapyrilene.
	1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′- (2-thienylmethyl)-.
91941	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dichloro-.
	3,3′-Dichlorobenzidine.
92524	Biphenyl.
92671	4-Aminobiphenyl.
92875	Benzidine.
	[1,1′-Biphenyl]-4,4′-diamine.
92933	4-Nitrobiphenyl.
	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-.
	Silvex (2,4,5-TP).
	2,4,5-TP acid.
93765	Acetic acid, (2,4,5-trichlorophenoxy)-.
93721	2,4,5-T.
	2,4,5-T acid.
93798	2,4,5-T esters.
94111	2,4-D Ester.
94586	Dihydrosafrole.
	1,3-Benzodioxole, 5-propyl-.
94597	Safrole.
	1,3-Benzodioxole, 5-(2-propenyl)-.
94791	2,4-D Ester.
94804	2,4-D Ester.
95476	o-Xylene.
95487	o-Cresol.
95501	Benzene, 1,2-dichloro-.
	o-Dichlorobenzene.
	1,2-Dichlorobenzene.
95534	Benzenamine, 2-methyl-.
	o-Toluidine.
95578	o-Chlorophenol.
	Phenol, 2-chloro-.
	2-Chlorophenol.
95807	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
95943	Benzene, 1,2,4,5-tetrachloro-.
	1,2,4,5-Tetrachlorobenzene.
95954	Phenol, 2,4,5-trichloro-.
	2,4,5-Trichlorophenol.
96093	Styrene oxide.
96128	Propane, 1,2-dibromo-3-chloro-.
	1,2-Dibromo-3-chloropropane.
96457	Ethylenethiourea.
	2-Imidazolidinethione.
97632	Ethyl methacrylate.
	2-Propenoic acid, 2-methyl-, ethyl ester.
98011	Furfural.
	2-Furancarboxaldehyde.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
98077	Benzene, (trichloromethyl)-.
	Benzotrichloride.
98099	Benzenesulfonic acid chloride.
	Benzenesulfonyl chloride.
98828	Benzene, (1-methylethyl)-.
	Cumene.
98862	Acetophenone.
	Ethanone, 1-phenyl-.
98873	Benzal chloride.
	Benzene, (dichloromethyl)-.
98884	Benzoyl chloride.
98953	Benzene, nitro-.
	Nitrobenzene.
99081	m-Nitrotoluene.
99354	Benzene, 1,3,5-trinitro-.
	1,3,5-Trinitrobenzene.
99558	Benzenamine, 2-methyl-5-nitro-.
	5-Nitro-o-toluidine.
99650	m-Dinitrobenzene.
99990	p-Nitrotoluene.
100016	Benzenamine, 4-nitro-.
	p-Nitroaniline.
100027	p-Nitrophenol.
	Phenol, 4-nitro-.
	4-Nitrophenol.
100254	p-Dinitrobenzene.
100414	Ethylbenzene.
100425	Styrene.
100447	Benzene, (chloromethyl)-.
	Benzyl chloride.
100470	Benzonitrile.
100754	N-Nitrosopiperidine.
	Piperidine, 1-nitroso-.
101144	Benzenamine, 4,4′-methylenebis[2-chloro-.
	4,4′-Methylenebis(2-chloroaniline).
101279	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester (Barban).
101553	Benzene, 1-bromo-4-phenoxy-.
	4-Bromophenyl phenyl ether.
101688	MDI.
	Methylene diphenyl diisocyanate.
101779	4,4′-Methylenedianiline.
103855	Phenylthiourea.
	Thiourea, phenyl-.
105464	sec-Butyl acetate.
105679	Phenol, 2,4-dimethyl-.
	2,4-Dimethylphenol.
106423	p-Xylene.
106445	p-Cresol.
106467	Benzene, 1,4-dichloro-.
	p-Dichlorobenzene.
	1,4-Dichlorobenzene.
106478	Benzenamine, 4-chloro-.
	p-Chloroaniline.
106490	Benzenamine, 4-methyl-.
	p-Toluidine.
106503	p-Phenylenediamine.
106514	p-Benzoquinone.
	2,5-Cyclohexadiene-1,4-dione.
	Quinone.
106887	1,2-Epoxybutane.
106898	1-Chloro-2,3-epoxypropane.
	Epichlorohydrin.
	Oxirane, (chloromethyl)-.
106934	Dibromoethane.
	Ethane, 1,2-dibromo-.
	Ethylene dibromide.
106990	1,3-Butadiene.
107028	Acrolein.
	2-Propenal.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
107051	Allyl chloride.
107062	Ethane, 1,2-dichloro-.
	Ethylene dichloride.
	1,2-Dichloroethane.
107108	n-Propylamine.
	1-Propanamine.
107120	Ethyl cyanide.
	Propanenitrile.
107131	Acrylonitrile.
	2-Propenenitrile.
107153	Ethylenediamine.
107186	Allyl alcohol.
	2-Propen-1-ol.
107197	Propargyl alcohol.
	2-Propyn-1-ol.
107200	Acetaldehyde, chloro-.
	Chloroacetaldehyde.
107211	Ethylene glycol.
107302	Chloromethyl methyl ether.
	Methane, chloromethoxy-.
107493	Diphosphoric acid, tetraethyl ester.
	Tetraethyl pyrophosphate.
107926	Butyric acid.
108054	Vinyl acetate.
	Vinyl acetate monomer.
108101	Hexone.
	Methyl isobutyl ketone.
	4-Methyl-2-pentanone.
108247	Acetic anhydride.
108316	Maleic anhydride.
	2,5-Furandione.
108383	m-Xylene.
108394	m-Cresol.
108463	Resorcinol.
	1,3-Benzenediol.
108601	Dichloroisopropyl ether.
	Propane, 2,2′-oxybis[2-chloro-.
108883	Benzene, methyl-.
	Toluene.
108907	Benzene, chloro-.
	Chlorobenzene.
108941	Cyclohexanone.
108952	Phenol.
108985	Benzenethiol.
	Thiophenol.
109068	Pyridine, 2-methyl-.
	2-Picoline.
109739	Butylamine.
109773	Malononitrile.
	Propanedinitrile.
109897	Diethylamine.
109999	Furan, tetrahydro-.
	Tetrahydrofuran.
110009	Furan.
	Furfuran.
110167	Maleic acid.
110178	Fumaric acid.
110190	iso-Butyl acetate.
110543	Hexane.
110758	Ethene, (2-chloroethoxy)-.
	2-Chloroethyl vinyl ether.
110805	Ethanol, 2-ethoxy-.
	Ethylene glycol monoethyl ether.
110827	Benzene, hexahydro-.
	Cyclohexane.
110861	Pyridine.
111422	Diethanolamine.
111444	Bis(2-chloroethyl) ether.
	Dichloroethyl ether.
	Ethane, 1,1′-oxybis[2-chloro-.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
111546	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters.
	Ethylenebisdithiocarbamic acid, salts & esters.
111911	Bis(2-chloroethoxy) methane.
	Dichloromethoxyethane.
	Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-.
114261	Phenol, 2-(1-methylethoxy)-, methylcarbamate.
	Propoxur (Baygon).
115026	Azaserine.
	L-Serine, diazoacetate (ester).
115297	Endosulfan.
	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide.
115322	Dicofol.
116063	Aldicarb.
	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.
117806	Dichlone.
117817	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.
	Bis(2-ethylhexyl)phthalate.
	DEHP.
	Diethylhexyl phthalate.
117840	Di-n-octyl phthalate.
	1,2-Benzenedicarboxylic acid, dioctyl ester.
118741	Benzene, hexachloro-.
	Hexachlorobenzene.
119380	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester (Isolan).
119904	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethoxy-.
	3,3′-Dimethoxybenzidine.
119937	[1,1′-Biphenyl]-4,4′-diamine,3,3′- dimethyl-.
	3,3′-Dimethylbenzidine.
120127	Anthracene.
120581	Isosafrole.
	1,3-Benzodioxole, 5-(1-propenyl)-.
120809	Catechol.
120821	1,2,4-Trichlorobenzene.
120832	Phenol, 2,4-dichloro-.
	2,4-Dichlorophenol.
121142	Benzene, 1-methyl-2,4-dinitro-.
	2,4-Dinitrotoluene.
121211	Pyrethrins.
121299	Pyrethrins.
121448	Ethanamine, N,N-diethyl-.
	Triethylamine.
121697	N,N-Dimethylaniline.
121755	Malathion.
122098	alpha,alpha-Dimethylphenethylamine.
	Benzeneethanamine, alpha,alpha-dimethyl-.
122429	Carbamic acid, phenyl-, 1-methylethyl ester (Propham).
122667	Hydrazine, 1,2-diphenyl-.
	1,2-Diphenylhydrazine.
123319	Hydroquinone.
123331	Maleic hydrazide.
	3,6-Pyridazinedione, 1,2-dihydro-.
123386	Propionaldehyde.
123626	Propionic anhydride.
123637	Paraldehyde.
	1,3,5-Trioxane, 2,4,6-trimethyl-.
123739	Crotonaldehyde.
	2-Butenal.
123864	Butyl acetate.
123911	1,4-Diethyleneoxide.
	1,4-Dioxane.
123922	iso-Amyl acetate.
124049	Adipic acid.
124403	Dimethylamine.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Methanamine, N-methyl-.
124414	Sodium methylate.
124481	Chlorodibromomethane.
126727	Tris(2,3-dibromopropyl) phosphate.
	1-Propanol, 2,3-dibromo-, phosphate (3:1).
126987	Methacrylonitrile.
	2-Propenenitrile, 2-methyl-.
126998	Chloroprene.
127184	Ethene, tertrachloro-.
	Perchloroethylene.
	Tetrachloroethylene.
127822	Zinc phenolsulfonate.
129000	Pyrene.
130154	1,4-Naphthalenedione.
	1,4-Naphthoquinone.
131113	Dimethyl phthalate.
	1,2-Benzenedicarboxylic acid, dimethyl ester.
131748	Ammonium picrate.
	Phenol, 2,4,6-trinitro-, ammonium salt.
131895	Phenol, 2-cyclohexyl-4,6-dinitro-.
	2-Cyclohexyl-4,6-dinitrophenol.
132649	Dibenzofuran.
133062	Captan.
133904	Chloramben.
134327	alpha-Naphthylamine.
	1-Naphthalenamine.
137268	Thioperoxydicarbonic diamide ([H2N)C(S)]2S2, tetramethyl-.
	Thiram.
137304	Zinc, bis(dimethylcarbamodithioato-S,S')-, (Ziram).
140885	Ethyl acrylate.
	2-Propenoic acid, ethyl ester.
141786	Acetic acid, ethyl ester.
	Ethyl acetate.
142289	1,3-Dichloropropane.
142712	Cupric acetate.
142847	Dipropylamine.
	1-Propanamine, N-propyl-.
143339	Sodium cyanide Na(CN).
143500	Kepone.
	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.
145733	Endothall.
	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid.
148823	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-.
	Melphalan.
151508	Potassium cyanide K(CN).
151564	Aziridine.
	Ethylenimine.
152169	Diphosphoramide, octamethyl-.
	Octamethylpyrophosphoramide.
156605	Ethene, 1,2-dichloro- (E).
	1,2-Dichloroethylene.
156627	Calcium cyanamide.
189559	Benzo[rst]pentaphene.
	Dibenzo[a,i]pyrene.
191242	Benzo[ghi]perylene.
193395	Indeno(1,2,3-cd)pyrene.
205992	Benzo[b]fluoranthene.
206440	Fluoranthene.
207089	Benzo(k)fluoranthene.
208968	Acenaphthylene.
218019	Chrysene.
225514	Benz[c]acridine.
297972	O,O-Diethyl O-pyrazinyl phosphorothioate.
	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.
298000	Methyl parathion.
	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.
298022	Phorate.
	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio) methyl] ester.
298044	Disulfoton.
	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester.
300765	Naled.
301042	Acetic acid, lead(2+) salt.
	Lead acetate.
302012	Hydrazine.
303344	Lasiocarpine.
	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S*,3R*), 7aalpha]]-.
305033	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-.
	Chlorambucil.
309002	Aldrin.
	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha, 8abeta)-.
311455	Diethyl-p-nitrophenyl phosphate.
	Phosphoric acid, diethyl 4-nitrophenyl ester.
315184	Mexacarbate.
	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester).
319846	alpha—BHC.
319857	beta—BHC.
319868	delta—BHC.
329715	2,5-Dinitrophenol.
330541	Diuron.
333415	Diazinon.
334883	Diazomethane.
353504	Carbon oxyfluoride.
	Carbonic difluoride.
357573	Brucine.
	Strychnidin-10-one, 2,3-dimethoxy-.
460195	Cyanogen.
	Ethanedinitrile.
463581	Carbonyl sulfide.
465736	Isodrin.
	1,4:5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta, 8abeta)-.
492808	Auramine.
	Benzenamine, 4,4'-carbonimidoylbis[N,N-dimethyl-.
494031	Chlornaphazine.
	Naphthalenamine, N,N'-bis(2-chloroethyl)-.
496720	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
504245	4-Aminopyridine.
	4-Pyridinamine.
504609	1-Methylbutadiene.
	1,3-Pentadiene.
506616	Argentate(1-), bis(cyano-C)-, potassium.
	Potassium silver cyanide.
506649	Silver cyanide Ag(CN).
506683	Cyanogen bromide (CN)Br.
506774	Cyanogen chloride (CN)Cl.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
506876	Ammonium carbonate.
506967	Acetyl bromide.
509148	Methane, tetranitro-.
	Tetranitromethane.
510156	Benzeneacetic acid, 4-chloro-α- (4-chlorophenyl)-α-hydroxy-, ethyl ester.
	Chlorobenzilate.
513495	sec-Butylamine.
528290	o-Dinitrobenzene.
532274	2-Chloroacetophenone.
534521	4,6-Dinitro-o-cresol, and salts.
	Phenol, 2-methyl-4,6-dinitro-, & salts.
540738	Hydrazine, 1,2-dimethyl-.
	1,2-Dimethylhydrazine.
540841	2,2,4-Trimethylpentane.
540885	tert-Butyl acetate.
541093	Uranyl acetate.
541537	Dithiobiuret.
	Thioimidodicarbonic diamide [(H2N)C(S)]2NH.
541731	Benzene, 1,3-dichloro-.
	m-Dichlorobenzene.
	1,3-Dichlorobenzene.
542621	Barium cyanide.
542756	1-Propene, 1,3-dichloro-.
	1,3-Dichloropropene.
542767	Propanenitrile, 3-chloro-.
	3-Chloropropionitrile.
542881	Bis(chloromethyl)ether.
	Dichloromethyl ether.
	Methane, oxybis(chloro-.
543908	Cadmium acetate.
544183	Cobaltous formate.
544923	Copper cyanide Cu(CN).
554847	m-Nitrophenol.
557197	Nickel cyanide $Ni(CN)_2$.
557211	Zinc cyanide $Zn(CN)_2$.
	Zinc cyanide Zn(CN)2.
557346	Zinc acetate.
557415	Zinc formate.
563122	Ethion.
563688	Acetic acid, thallium(1+) salt.
	Thallium(I) acetate.
573568	2,6-Dinitrophenol.
584849	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
591082	Acetamide, N-(aminothioxomethyl)-.
	1-Acetyl-2-thiourea.
592018	Calcium cyanide $Ca(CN)_2$.
592041	Mercuric cyanide.
592858	Mercuric thiocyanate.
592870	Lead thiocyanate.
593602	Vinyl bromide.
594423	Methanesulfenyl chloride, trichloro-.
	Trichloromethanesulfenyl chloride.
598312	Bromoacetone.
	2-Propanone, 1-bromo-.
606202	Benzene, 2-methyl-1,3-dinitro-.
	2,6-Dinitrotoluene.
608731	HEXACHLOROCYCLOHEXANE (all isomers).
608935	Benzene, pentachloro-.
	Pentachlorobenzene.
609198	3,4,5-Trichlorophenol.
610399	3,4-Dinitrotoluene.
615532	Carbamic acid, methylnitroso-, ethyl ester.
	N-Nitroso-N-methylurethane.
621647	Di-n-propylnitrosamine.
	1-Propanamine, N-nitroso-N-propyl-.
624839	Methane, isocyanato-.
	Methyl isocyanate.
625161	tert-Amyl acetate.
626380	sec-Amyl acetate.
628637	Amyl acetate.
628864	Fulminic acid, mercury(2+)salt.
	Mercury fulminate.
630104	Selenourea.
630206	Ethane, 1,1,1,2-tetrachloro-.
	1,1,1,2-Tetrachloroethane.
631618	Ammonium acetate.
636215	Benzenamine, 2-methyl-, hydrochloride.
	o-Toluidine hydrochloride.
640197	Acetamide, 2-fluoro-.
	Fluoroacetamide.
644644	Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester (Dimetilan).
680319	Hexamethylphosphoramide.
684935	N-Nitroso-N-methylurea.
	Urea, N-methyl-N-nitroso-.
692422	Arsine, diethyl-.
	Diethylarsine.
696286	Arsonous dichloride, phenyl-.
	Dichlorophenylarsine.
757584	Hexaethyl tetraphosphate.
	Tetraphosphoric acid, hexaethyl ester.
759739	N-Nitroso-N-ethylurea.
	Urea, N-ethyl-N-nitroso-.
764410	1,4-Dichloro-2-butene.
	2-Butene, 1,4-dichloro-.
765344	Glycidylaldehyde.
	Oxiranecarboxyaldehyde.
815827	Cupric tartrate.
822060	Hexamethylene-1,6-diisocyanate.
823405	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
924163	N-Nitrosodi-n-butylamine.
	1-Butanamine, N-butyl-N-nitroso-.
930552	N-Nitrosopyrrolidine.
	Pyrrolidine, 1-nitroso-.
933755	2,3,6-Trichlorophenol.
933788	2,3,5-Trichlorophenol.
959988	alpha-Endosulfan.
1024573	Heptachlor epoxide.
1031078	Endosulfan sulfate.
1066304	Chromic acetate.
1066337	Ammonium bicarbonate.
1072351	Lead stearate.
1111780	Ammonium carbamate.
1116547	Ethanol, 2,2'-(nitrosoimino)bis-.
	N-Nitrosodiethanolamine.
1120714	1,2-Oxathiolane, 2,2-dioxide.
	1,3-Propane sultone.
1129415	Carbamic acid, methyl-, 3-methylphenyl ester (Metolcarb).
1185575	Ferric ammonium citrate.
1194656	Dichlobenil.
1300716	Xylenol.
1303282	Arsenic oxide As2O5.
	Arsenic pentoxide.
1303328	Arsenic disulfide.
1303339	Arsenic trisulfide.
1309644	Antimony trioxide.
1310583	Potassium hydroxide.
1310732	Sodium hydroxide.
1314325	Thallic oxide.
	Thallium oxide Tl2O3.
1314621	Vanadium oxide V2O5.
	Vanadium pentoxide.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
1314803	Phosphorus pentasulfide.
	Phosphorus sulfide.
	Sulfur phosphide.
1314847	Zinc phosphide Zn_3P_2.
1314870	Lead sulfide.
1319728	2,4,5-T amines.
1319773	Cresol (cresylic acid).
	Cresols (isomers and mixture).
	Cresylic acid (isomers and mixture).
	Phenol, methyl-.
1320189	2,4-D Ester.
1321126	Nitrotoluene.
1327533	Arsenic oxide As2O3.
	Arsenic trioxide.
1330207	Benzene, dimethyl-.
	Xylene.
	Xylene (mixed).
	Xylenes (isomers and mixture).
1332076	Zinc borate.
1332214	Asbestos.
1333831	Sodium bifluoride.
1335326	Lead subacetate.
	Lead, bis(acetato-O)tetrahydroxytri.
1336216	Ammonium hydroxide.
1336363	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
1338234	Methyl ethyl ketone peroxide.
	2-Butanone peroxide.
1338245	Naphthenic acid.
1341497	Ammonium bifluoride.
1464535	1,2:3,4-Diepoxybutane.
	2,2′-Bioxirane.
1563388	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-(Carbofuran phenol).
1563662	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.
	Carbofuran.
1582098	Trifluralin.
1615801	Hydrazine, 1,2-diethyl-.
	N,N′-Diethylhydrazine.
1634044	Methyl tert-butyl ether.
1646884	Propanal, 2-methyl-2-(methylsulfonyl)-, O-[(methylamino)carbonyl] oxime (Aldicarb sulfone).
1746016	TCDD.
	2,3,7,8-Tetrachlorodibenzo-p-dioxin.
1762954	Ammonium thiocyanate.
1863634	Ammonium benzoate.
1888717	Hexachloropropene.
	1-Propene, 1,1,2,3,3,3-hexachloro-.
1918009	Dicamba.
1928387	2,4-D Ester.
1928478	2,4,5-T esters.
1928616	2,4-D Ester.
1929733	2,4-D Ester.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
2008460	2,4,5-T amines.
2032657	Mercaptodimethur.
	Methiocarb.
	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate.
2303164	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.
	Diallate.
2303175	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester (Triallate).
2312358	Propargite.
2545597	2,4,5-T esters.
2631370	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate (Promecarb).
2763964	3(2H)-Isoxazolone, 5-(aminomethyl)-.
	5-(Aminomethyl)-3-isoxazolol.
2764729	Diquat
2921882	Chlorpyrifos.
2944674	Ferric ammonium oxalate.
2971382	2,4-D Ester.
3012655	Ammonium citrate, dibasic.
3164292	Ammonium tartrate.
3165933	Benzenamine, 4-chloro-2-methyl-, hydrochloride.
	4-Chloro-o-toluidine, hydrochloride.
3251238	Cupric nitrate.
3288582	O,O-Diethyl S-methyl dithiophosphate.
	Phosphorodithioic acid, O,O-diethyl S-methyl ester.
3486359	Zinc carbonate.
3547044	DDE.
3689245	Tetraethyldithiopyrophosphate.
	Thiodiphosphoric acid, tetraethyl ester.
3813147	2,4,5-T amines.
4170303	Crotonaldehyde.
	2-Butenal.
4549400	N-Nitrosomethylvinylamine.
	Vinylamine, N-methyl-N-nitroso-.
5344821	Thiourea, (2-chlorophenyl)-.
	1-(o-Chlorophenyl)thiourea.
5893663	Cupric oxalate.
5952261	Ethanol, 2,2′-oxybis-, dicarbamate (Diethylene glycol, dicarbamate).
5972736	Ammonium oxalate.
6009707	Ammonium oxalate.
6369966	2,4,5-T amines.
6369977	2,4,5-T amines.
6533739	Carbonic acid, dithallium(1+) salt.
	Thallium(I) carbonate.
7005723	4-Chlorophenyl phenyl ether.
7421934	Endrin aldehyde.
7428480	Lead stearate.
7439921	Lead.
7439976	Mercury.
7440020	Nickel.
7440224	Silver.
7440235	Sodium.
7440280	Thallium.
7440360	Antimony.
7440382	Arsenic.
7440417	Beryllium.
	Beryllium powder.
7440439	Cadmium.
7440473	Chromium.
7440508	Copper.
7440666	Zinc.
7446084	Selenium dioxide.
	Selenium oxide.
7446142	Lead sulfate.
7446186	Sulfuric acid, dithallium(1+) salt.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Thallium(I) sulfate.
7446277	Lead phosphate.
	Phosphoric acid, lead(2+) salt (2:3).
7447394	Cupric chloride.
7488564	Selenium sulfide SeS_2.
7550450	Titanium tetrachloride.
7558794	Sodium phosphate, dibasic.
7601549	Sodium phosphate, tribasic.
7631892	Sodium arsenate.
7631905	Sodium bisulfite.
7632000	Sodium nitrite.
7645252	Lead arsenate.
7646857	Zinc chloride.
7647010	Hydrochloric acid.
	Hydrogen chloride.
7647189	Antimony pentachloride.
7664382	Phosphoric acid.
7664393	Hydrofluoric acid.
	Hydrogen fluoride.
7664417	Ammonia.
7664939	Sulfuric acid.
7681494	Sodium fluoride.
7681529	Sodium hypochlorite.
7697372	Nitric acid.
7699458	Zinc bromide.
7705080	Ferric chloride.
7718549	Nickel chloride.
7719122	Phosphorus trichloride.
7720787	Ferrous sulfate.
7722647	Potassium permanganate.
7723140	Phosphorus.
7733020	Zinc sulfate.
7738945	Chromic acid.
7758294	Sodium phosphate, tribasic.
7758943	Ferrous chloride.
7758954	Lead chloride.
7758987	Cupric sulfate.
7761888	Silver nitrate.
7773060	Ammonium sulfamate.
7775113	Sodium chromate.
7778394	Arsenic acid H_3AsO_4.
7778441	Calcium arsenate.
7778509	Potassium bichromate.
7778543	Calcium hypochlorite.
7779864	Zinc hydrosulfite.
7779886	Zinc nitrate.
7782414	Fluorine.
7782492	Selenium.
7782505	Chlorine.
7782630	Ferrous sulfate.
7782823	Sodium selenite.
7782867	Mercurous nitrate.
7783008	Selenious acid.
7783064	Hydrogen sulfide H_2S.
7783359	Mercuric sulfate.
7783462	Lead fluoride.
7783495	Zinc fluoride.
7783508	Ferric fluoride.
7783564	Antimony trifluoride.
7784341	Arsenic trichloride.
7784409	Lead arsenate.
7784410	Potassium arsenate.
7784465	Sodium arsenite.
7785844	Sodium phosphate, tribasic.
7786347	Mevinphos.
7786814	Nickel sulfate.
7787475	Beryllium chloride.
7787497	Beryllium fluoride.
7787555	Beryllium nitrate.
7788989	Ammonium chromate.
7789006	Potassium chromate.
7789062	Strontium chromate.
7789095	Ammonium bichromate.
7789426	Cadmium bromide.
7789437	Cobaltous bromide.
7789619	Antimony tribromide.
7790945	Chlorosulfonic acid.
7791120	Thallium chloride TlCl.
7803512	Hydrogen phosphide.
	Phosphine.
7803556	Ammonium vanadate.
	Vanadic acid, ammonium salt.
8001352	Chlorinated camphene.
Toxaphene.	
8003198	Dichloropropane—Dichloropropene (mixture).
8003347	Pyrethrins.
8014957	Sulfuric acid.
10022705	Sodium hypochlorite.
10025873	Phosphorus oxychloride.
10025919	Antimony trichloride.
10026116	Zirconium tetrachloride.
10028225	Ferric sulfate.
10031591	Sulfuric acid, dithallium(1+) salt.
	Thallium(I) sulfate.
10039324	Sodium phosphate, dibasic.
10043013	Aluminum sulfate.
10045893	Ferrous ammonium sulfate.
10045940	Mercuric nitrate.
10049055	Chromous chloride.
10099748	Lead nitrate.
10101538	Chromic sulfate.
10101630	Lead iodide.
10101890	Sodium phosphate, tribasic.
10102064	Uranyl nitrate.
10102188	Sodium selenite.
10102439	Nitric oxide.
	Nitrogen oxide NO.
10102440	Nitrogen dioxide.
	Nitrogen oxide NO2.
10102451	Nitric acid, thallium(1+) salt.
	Thallium(I) nitrate.
10102484	Lead arsenate.
10108642	Cadmium chloride.
10124502	Potassium arsenite.
10124568	Sodium phosphate, tribasic.
10140655	Sodium phosphate, dibasic.
10192300	Ammonium bisulfite.
10196040	Ammonium sulfite.
10361894	Sodium phosphate, tribasic.
10380297	Cupric sulfate, ammoniated.
10415755	Mercurous nitrate.
10421484	Ferric nitrate.
10544726	Nitrogen dioxide.
	Nitrogen oxide NO2.
10588019	Sodium bichromate.
10605217	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester (Carbendazim).
11096825	Aroclor 1260.
11097691	Aroclor 1254.
11104282	Aroclor 1221.
11115745	Chromic acid.
11141165	Aroclor 1232.
12002038	Cupric acetoarsenite.
12039520	Selenious acid, dithallium(1+) salt.
Thallium (I) selenite.	
12054487	Nickel hydroxide.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
12125018	Ammonium fluoride.
12125029	Ammonium chloride.
12135761	Ammonium sulfide.
12672296	Aroclor 1248.
12674112	Aroclor 1016.
12771083	Sulfur monochloride.
13463393	Nickel carbonyl $Ni(CO)_4$, (T–4)-.
13560991	2,4,5-T salts.
13597994	Beryllium nitrate.
13746899	Zirconium nitrate.
13765190	Calcium chromate.
	Chromic acid H2CrO4, calcium salt.
13814965	Lead fluoborate.
13826830	Ammonium fluoborate.
13952846	sec-Butylamine.
14017415	Cobaltous sulfamate.
14216752	Nickel nitrate.
14258492	Ammonium oxalate.
14307358	Lithium chromate.
14307438	Ammonium tartrate.
14639975	Zinc ammonium chloride.
14639986	Zinc ammonium chloride.
14644612	Zirconium sulfate.
15339363	Manganese, bis(dimethylcarbamodithioato-S,S')- (Manganese dimethyldithiocarbamate).
15699180	Nickel ammonium sulfate.
15739807	Lead sulfate.
15950660	2,3,4-Trichlorophenol.
16721805	Sodium hydrosulfide.
16752775	Ethanimidothioic acid, N-[[(methylamino)carbonyl] oxy]-, methyl ester.
Methomyl.	
16871719	Zinc silicofluoride.
16919190	Ammonium silicofluoride.
16923958	Zirconium potassium fluoride.
17702577	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]- (Formparanate).
17804352	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester (Benomyl).
18883664	D-Glucose, 2-deoxy-2[[(methylnitrosoamino)-carbonyl]amino]-.
Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-, D-.	
Streptozotocin.	
20816120	Osmium oxide OsO_4, (T–4)-.
Osmium tetroxide.	
20830813	Daunomycin.
	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-.
20859738	Aluminum phosphide.
22781233	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate (Bendiocarb).
22961826	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, (Bendiocarb phenol).

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
23135220	Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester (Oxamyl).
23422539	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)carbonyl]oxy]phenyl]-, monohydrochloride (Formetanate hydrochloride).
23564058	Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester (Thiophanate-methyl).
23950585	Benzamide, 3,5-dichloro-N-(1,1- dimethyl-2-propynyl)-.
	Pronamide.
25154545	Dinitrobenzene (mixed).
25154556	Nitrophenol (mixed).
25155300	Sodium dodecylbenzenesulfonate.
25167822	Trichlorophenol.
25168154	2,4,5-T esters.
25168267	2,4-D Ester.
25321146	Dinitrotoluene.
25321226	Dichlorobenzene.
25376458	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
25550587	Dinitrophenol.
26264062	Calcium dodecylbenzenesulfonate.
26419738	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)carbonyl]oxime (Tirpate).
26471625	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
26628228	Sodium azide.
26638197	Dichloropropane.
26952238	Dichloropropene.
27176870	Dodecylbenzenesulfonic acid.
27323417	Triethanolamine dodecylbenzene sulfonate.
27774136	Vanadyl sulfate.
28300745	Antimony potassium tartrate.
30525894	Paraformaldehyde.
30558431	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester (A2213).
32534955	2,4,5-TP esters.
33213659	beta - Endosulfan.
36478769	Uranyl nitrate.
37211055	Nickel chloride.
39196184	Thiofanox.
	2-Butanone, 3,3-dimethyl-1-(methylthio)-,O-[(methylamino)carbonyl] oxime.
42504461	Isopropanolamine dodecylbenzenesulfonate.
52628258	Zinc ammonium chloride.
52652592	Lead stearate.
52740166	Calcium arsenite.
52888809	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester (Prosulfocarb).
53467111	2,4-D Ester.
53469219	Aroclor 1242.
55285148	Carbamic acid, [(dibutylamino)thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester (Carbosulfan).
55488874	Ferric ammonium oxalate.
56189094	Lead stearate.
59669260	Ethanimidothioic acid, N,N'-[thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester (Thiodicarb).
61792072	2,4,5-T esters.

APPENDIX B TO § 302.4—RADIONUCLIDES

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Radionuclides@		1&(3.7E 10)
Actinium-224	89	100 (3.7E 12)
Actinium-225	89	1 (3.7E 10)
Actinium-226	89	10 (3.7E 11)
Actinium-227	89	0.001 (3.7E 7)
Actinium-228	89	10 (3.7E 11)
Aluminum-26	13	10 (3.7E 11)
Americium-237	95	1000 (3.7E 13)
Americium-238	95	100 (3.7E 12)
Americium-239	95	100 (3.7E 12)
Americium-240	95	10 (3.7E 11)
Americium-241	95	0.01 (3.7E 8)
Americium-242m	95	0.01 (3.7E 8)
Americium-242	95	100 (3.7E 12)
Americium-243	95	0.01 (3.7E 8)
Americium-244m	95	1000 (3.7E 13)
Americium-244	95	10 (3.7E 11)
Americium-245	95	1000 (3.7E 13)
Americium-246m	95	1000 (3.7E 13)
Americium-246	95	1000 (3.7E 13)
Antimony-115	51	1000 (3.7E 13)
Antimony-116m	51	100 (3.7E 12)
Antimony-116	51	1000 (3.7E 13)
Antimony-117	51	1000 (3.7E 13)
Antimony-118m	51	10 (3.7E 11)
Antimony-119	51	1000 (3.7E 13)
Antimony-120 (16 min)	51	1000 (3.7E 13)
Antimony-120 (5.76 day)	51	10 (3.7E 11)
Antimony-122	51	10 (3.7E 11)
Antimony-124m	51	1000 (3.7E 13)
Antimony-124	51	10 (3.7E 11)
Antimony-125	51	10 (3.7E 11)
Antimony-126m	51	1000 (3.7E 13)
Antimony-126	51	10 (3.7E 11)
Antimony-127	51	10 (3.7E 11)
Antimony-128 (10.4 min)	51	1000 (3.7E 13)
Antimony-128 (9.01 hr)	51	10 (3.7E 11)
Antimony-129	51	100 (3.7E 12)
Antimony-130	51	100 (3.7E 12)
Antimony-131	51	1000 (3.7E 13)
Argon-39	18	1000 (3.7E 13)
Argon-41	18	10 (3.7E 11)
Arsenic-69	33	1000 (3.7E 13)
Arsenic-70	33	100 (3.7E 12)
Arsenic-71	33	100 (3.7E 12)
Arsenic-72	33	10 (3.7E 11)
Arsenic-73	33	100 (3.7E 12)
Arsenic-74	33	10 (3.7E 11)
Arsenic-76	33	100 (3.7E 12)
Arsenic-77	33	1000 (3.7E 13)
Arsenic-78	33	100 (3.7E 12)
Astatine-207	85	100 (3.7E 12)
Astatine-211	85	100 (3.7E 12)
Barium-126	56	1000 (3.7E 13)
Barium-128	56	10 (3.7E 11)
Barium-131m	56	1000 (3.7E 13)
Barium-131	56	10 (3.7E 11)
Barium-133m	56	100 (3.7E 12)
Barium-133	56	10 (3.7E 11)
Barium-135m	56	1000 (3.7E 13)
Barium-139	56	1000 (3.7E 13)
Barium-140	56	10 (3.7E 11)
Barium-141	56	1000 (3.7E 13)
Barium-142	56	1000 (3.7E 13)
Berkelium-245	97	100 (3.7E 12)
Berkelium-246	97	10 (3.7E 11)
Berkelium-247	97	0.01 (3.7E 8)
Berkelium-249	97	1 (3.7E 10)
Berkelium-250	97	100 (3.7E 12)
Beryllium-7	4	100 (3.7E 12)
Beryllium-10	4	1 (3.7E 10)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Bismuth-200	83	100 (3.7E 12)
Bismuth-201	83	100 (3.7E 12)
Bismuth-202	83	1000 (3.7E 13)
Bismuth-203	83	10 (3.7E 11)
Bismuth-205	83	10 (3.7E 11)
Bismuth-206	83	10 (3.7E 11)
Bismuth-207	83	10 (3.7E 11)
Bismuth-210m	83	0.1 (3.7E 9)
Bismuth-210	83	10 (3.7E 11)
Bismuth-212	83	100 (3.7E 12)
Bismuth-213	83	100 (3.7E 12)
Bismuth-214	83	100 (3.7E 12)
Bromine-74m	35	100 (3.7E 12)
Bromine-74	35	100 (3.7E 12)
Bromine-75	35	100 (3.7E 12)
Bromine-76	35	10 (3.7E 11)
Bromine-77	35	100 (3.7E 12)
Bromine-80m	35	1000 (3.7E 13)
Bromine-80	35	1000 (3.7E 13)
Bromine-82	35	10 (3.7E 11)
Bromine-83	35	1000 (3.7E 13)
Bromine-84	35	100 (3.7E 12)
Cadmium-104	48	1000 (3.7E 13)
Cadmium-107	48	1000 (3.7E 13)
Cadmium-109	48	1 (3.7E 10)
Cadmium-113m	48	0.1 (3.7E 9)
Cadmium-113	48	0.1 (3.7E 9)
Cadmium-115m	48	10 (3.7E 11)
Cadmium-115	48	100 (3.7E 12)
Cadmium-117m	48	10 (3.7E 11)
Cadmium-117	48	100 (3.7E 12)
Calcium-41	20	10 (3.7E 11)
Calcium-45	20	10 (3.7E 11)
Calcium-47	20	10 (3.7E 11)
Californium-244	98	1000 (3.7E 13)
Californium-246	98	10 (3.7E 11)
Californium-248	98	0.1 (3.7E 9)
Californium-249	98	0.01 (3.7E 8)
Californium-250	98	0.01 (3.7E 8)
Californium-251	98	0.01 (3.7E 8)
Californium-252	98	0.1 (3.7E 9)
Californium-253	98	10 (3.7E 11)
Californium-254	98	0.1 (3.7E 9)
Carbon-11	6	1000 (3.7E 13)
Carbon-14	6	10 (3.7E 11)
Cerium-134	58	10 (3.7E 11)
Cerium-135	58	10 (3.7E 11)
Cerium-137m	58	100 (3.7E 12)
Cerium-137	58	1000 (3.7E 13)
Cerium-139	58	100 (3.7E 12)
Cerium-141	58	10 (3.7E 11)
Cerium-143	58	100 (3.7E 12)
Cerium-144	58	1 (3.7E 10)
Cesium-125	55	1000 (3.7E 13)
Cesium-127	55	100 (3.7E 12)
Cesium-129	55	100 (3.7E 12)
Cesium-130	55	1000 (3.7E 13)
Cesium-131	55	1000 (3.7E 13)
Cesium-132	55	10 (3.7E 11)
Cesium-134m	55	1000 (3.7E 13)
Cesium-134	55	1 (3.7E 10)
Cesium-135m	55	100 (3.7E 12)
Cesium-135	55	10 (3.7E 11)
Cesium-136	55	10 (3.7E 11)
Cesium-137	55	1 (3.7E 10)
Cesium-138	55	100 (3.7E 12)
Chlorine-36	17	10 (3.7E 11)
Chlorine-38	17	100 (3.7E 12)
Chlorine-39	17	100 (3.7E 12)
Chromium-48	24	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Chromium-49	24	1000 (3.7E 13)
Chromium-51	24	1000 (3.7E 13)
Cobalt-55	27	10 (3.7E 11)
Cobalt-56	27	10 (3.7E 11)
Cobalt-57	27	100 (3.7E 12)
Cobalt-58m	27	1000 (3.7E 13)
Cobalt-58	27	10 (3.7E 11)
Cobalt-60m	27	1000 (3.7E 13)
Cobalt-60	27	10 (3.7E 11)
Cobalt-61	27	1000 (3.7E 13)
Cobalt-62m	27	1000 (3.7E 13)
Copper-60	29	100 (3.7E 12)
Copper-61	29	100 (3.7E 12)
Copper-64	29	1000 (3.7E 13)
Copper-67	29	100 (3.7E 12)
Curium-238	96	1000 (3.7E 13)
Curium-240	96	1 (3.7E 10)
Curium-241	96	10 (3.7E 11)
Curium-242	96	1 (3.7E 10)
Curium-243	96	0.01 (3.7E 8)
Curium-244	96	0.01 (3.7E 8)
Curium-245	96	0.01 (3.7E 8)
Curium-246	96	0.01 (3.7E 8)
Curium-247	96	0.01 (3.7E 8)
Curium-248	96	0.001 (3.7E 7)
Curium-249	96	1000 (3.7E 13)
Dysprosium-155	66	100 (3.7E 12)
Dysprosium-157	66	100 (3.7E 12)
Dysprosium-159	66	100 (3.7E 12)
Dysprosium-165	66	1000 (3.7E 13)
Dysprosium-166	66	10 (3.7E 11)
Einsteinium-250	99	10 (3.7E 11)
Einsteinium-251	99	1000 (3.7E 13)
Einsteinium-253	99	10 (3.7E 11)
Einsteinium-254m	99	1 (3.7E 10)
Einsteinium-254	99	0.1 (3.7E 9)
Erbium-161	68	100 (3.7E 12)
Erbium-165	68	1000 (3.7E 13)
Erbium-169	68	100 (3.7E 12)
Erbium-171	68	100 (3.7E 12)
Erbium-172	68	10 (3.7E 11)
Europium-145	63	10 (3.7E 11)
Europium-146	63	10 (3.7E 11)
Europium-147	63	10 (3.7E 11)
Europium-148	63	10 (3.7E 11)
Europium-149	63	100 (3.7E 12)
Europium-150 (12.6 hr)	63	1000 (3.7E 13)
Europium-150 (34.2 yr)	63	10 (3.7E 11)
Europium-152m	63	100 (3.7E 12)
Europium-152	63	10 (3.7E 11)
Europium-154	63	10 (3.7E 11)
Europium-155	63	10 (3.7E 11)
Europium-156	63	10 (3.7E 11)
Europium-157	63	10 (3.7E 11)
Europium-158	63	1000 (3.7E 13)
Fermium-252	100	10 (3.7E 11)
Fermium-253	100	10 (3.7E 11)
Fermium-254	100	100 (3.7E 12)
Fermium-255	100	100 (3.7E 12)
Fermium-257	100	1 (3.7E 10)
Fluorine-18	9	1000 (3.7E 13)
Francium-222	87	100 (3.7E 12)
Francium-223	87	100 (3.7E 12)
Gadolinium-145	64	100 (3.7E 12)
Gadolinium-146	64	10 (3.7E 11)
Gadolinium-147	64	10 (3.7E 11)
Gadolinium-148	64	0.001 (3.7E7)
Gadolinium-149	64	100 (3.7E 12)
Gadolinium-151	64	100 (3.7E 12)
Gadolinium-152	64	0.001 (3.7E 7)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Gadolinium-153	64	10 (3.7E 11)
Gadolinium-159	64	1000 (3.7E 13)
Gallium-65	31	1000 (3.7E 13)
Gallium-66	31	10 (3.7E 11)
Gallium-67	31	100 (3.7E 12)
Gallium-68	31	1000 (3.7E 13)
Gallium-70	31	1000 (3.7E 13)
Gallium-72	31	10 (3.7E 11)
Gallium-73	31	100 (3.7E 12)
Germanium-66	32	100 (3.7E 12)
Germanium-67	32	1000 (3.7E 13)
Germanium-68	32	10 (3.7E 11)
Germanium-69	32	10 (3.7E 11)
Germanium-71	32	1000 (3.7E 13)
Germanium-75	32	1000 (3.7E 13)
Germanium-77	32	10 (3.7E 11)
Germanium-78	32	1000 (3.7E 13)
Gold-193	79	100 (3.7E 12)
Gold-194	79	10 (3.7E 11)
Gold-195	79	100 (3.7E 12)
Gold-198m	79	10 (3.7E 11)
Gold-198	79	100 (3.7E 12)
Gold-199	79	100 (3.7E 12)
Gold-200m	79	10 (3.7E 11)
Gold-200	79	1000 (3.7E 13)
Gold-201	79	1000 (3.7E 13)
Hafnium-170	72	100 (3.7E 12)
Hafnium-172	72	1 (3.7E 10)
Hafnium-173	72	100 (3.7E 12)
Hafnium-175	72	100 (3.7E 12)
Hafnium-177m	72	1000 (3.7E 13)
Hafnium-178m	72	0.1 (3.7E 9)
Hafnium-179m	72	100 (3.7E 12)
Hafnium-180m	72	100 (3.7E 12)
Hafnium-181	72	10 (3.7E 11)
Hafnium-182m	72	100 (3.7E 12)
Hafnium-182	72	0.1 (3.7E 9)
Hafnium-183	72	100 (3.7E 12)
Hafnium-184	72	100 (3.7E 12)
Holmium-155	67	1000 (3.7E 13)
Holmium-157	67	1000 (3.7E 13)
Holmium-159	67	1000 (3.7E 13)
Holmium-161	67	1000 (3.7E 13)
Holmium-162m	67	1000 (3.7E 13)
Holmium-162	67	1000 (3.7E 13)
Holmium-164m	67	1000 (3.7E 13)
Holmium-164	67	1000 (3.7E 13)
Holmium-166m	67	1 (3.7E 10)
Holmium-166	67	100 (3.7E 12)
Holmium-167	67	100 (3.7E 12)
Hydrogen-3	1	100 (3.7E 12)
Indium-109	49	100 (3.7E 12)
Indium-110 (69.1 min)	49	100 (3.7E 12)
Indium-110 (4.9 hr)	49	10 (3.7E 11)
Indium-111	49	100 (3.7E 12)
Indium-112	49	1000 (3.7E 13)
Indium-113m	49	1000 (3.7E 13)
Indium-114m	49	10 (3.7E 11)
Indium-115m	49	100 (3.7E 12)
Indium-115	49	0.1 (3.7E 9)
Indium-116m	49	100 (3.7E 12)
Indium-117m	49	100 (3.7E 12)
Indium-117	49	1000 (3.7E 13)
Indium-119m	49	1000 (3.7E 13)
Iodine-120m	53	100 (3.7E 12)
Iodine-120	53	10 (3.7E 11)
Iodine-121	53	100 (3.7E 12)
Iodine-123	53	10 (3.7E 11)
Iodine-124	53	0.1 (3.7E 9)
Iodine-125	53	0.01 (3.7E 8)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Iodine-126	53	0.01 (3.7E 8)
Iodine-128	53	1000 (3.7E 13)
Iodine-129	53	0.001 (3.7E 7)
Iodine-130	53	1 (3.7E 10)
Iodine-131	53	0.01 (3.7E 8)
Iodine-132m	53	10 (3.7E 11)
Iodine-132	53	10 (3.7E 11)
Iodine-133	53	0.1 (3.7E 9)
Iodine-134	53	100 (3.7E 12)
Iodine-135	53	10 (3.7E 11)
Iridium-182	77	1000 (3.7E 13)
Iridium-184	77	100 (3.7E 12)
Iridium-185	77	100 (3.7E 12)
Iridium-186	77	10 (3.7E 11)
Iridium-187	77	100 (3.7E 12)
Iridium-188	77	10 (3.7E 11)
Iridium-189	77	100 (3.7E 12)
Iridium-190m	77	1000 (3.7E 13)
Iridium-190	77	10 (3.7E 11)
Iridium-192m	77	100 (3.7E 12)
Iridium-192	77	10 (3.7E 11)
Iridium-194m	77	10 (3.7E 11)
Iridium-194	77	100 (3.7E 12)
Iridium-195m	77	100 (3.7E 12)
Iridium-195	77	1000 (3.7E 13)
Iron-52	26	100 (3.7E 12)
Iron-55	26	100 (3.7E 12)
Iron-59	26	10 (3.7E 11)
Iron-60	26	0.1 (3.7E 9)
Krypton-74	36	10 (3.7E 11)
Krypton-76	36	10 (3.7E 11)
Krypton-77	36	10 (3.7E 11)
Krypton-79	36	100 (3.7E 12)
Krypton-81	36	1000 (3.7E 13)
Krypton-83m	36	1000 (3.7E 13)
Krypton-85m	36	100 (3.7E 12)
Krypton-85	36	1000 (3.7E 13)
Krypton-87	36	10 (3.7E 11)
Krypton-88	36	10 (3.7E 11)
Lanthanum-131	57	1000 (3.7E 13)
Lanthanum-132	57	100 (3.7E 12)
Lanthanum-135	57	1000 (3.7E 13)
Lanthanum-137	57	10 (3.7E 11)
Lanthanum-138	57	1 (3.7E 10)
Lanthanum-140	57	10 (3.7E 11)
Lanthanum-141	57	1000 (3.7E 13)
Lanthanum-142	57	100 (3.7E 12)
Lanthanum-143	57	1000 (3.7E 13)
Lead-195m	82	1000 (3.7E 13)
Lead-198	82	100 (3.7E 12)
Lead-199	82	100 (3.7E 12)
Lead-200	82	100 (3.7E 12)
Lead-201	82	100 (3.7E 12)
Lead-202m	82	10 (3.7E 11)
Lead-202	82	1 (3.7E 10)
Lead-203	82	100 (3.7E 12)
Lead-205	82	100 (3.7E 12)
Lead-209	82	1000 (3.7E 13)
Lead-210	82	0.01 (3.7E 8)
Lead-211	82	100 (3.7E 12)
Lead-212	82	10 (3.7E 11)
Lead-214	82	100 (3.7E 12)
Lutetium-169	71	10 (3.7E 11)
Lutetium-170	71	10 (3.7E 11)
Lutetium-171	71	10 (3.7E 11)
Lutetium-172	71	10 (3.7E 11)
Lutetium-173	71	100 (3.7E 12)
Lutetium-174m	71	10 (3.7E 11)
Lutetium-174	71	10 (3.7E 11)
Lutetium-176m	71	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Lutetium-176	71	1 (3.7E 10)
Lutetium-177m	71	10 (3.7E 11)
Lutetium-177	71	100 (3.7E 12)
Lutetium-178m	71	1000 (3.7E 13)
Lutetium-178	71	1000 (3.7E 13)
Lutetium-179	71	1000 (3.7E 13)
Magnesium-28	12	10 (3.7E 11)
Manganese-51	25	1000 (3.7E 13)
Manganese-52m	25	1000 (3.7E 13)
Manganese-52	25	10 (3.7E 11)
Manganese-53	25	1000 (3.7E 13)
Manganese-54	25	10 (3.7E 11)
Manganese-56	25	100 (3.7E 12)
Mendelevium-257	101	100 (3.7E 12)
Mendelevium-258	101	1 (3.7E 10)
Mercury-193m	80	10 (3.7E 11)
Mercury-193	80	100 (3.7E 12)
Mercury-194	80	0.1 (3.7E 9)
Mercury-195m	80	100 (3.7E 12)
Mercury-195	80	100 (3.7E 12)
Mercury-197m	80	1000 (3.7E 13)
Mercury-197	80	1000 (3.7E 13)
Mercury-199m	80	1000 (3.7E 13)
Mercury-203	80	10 (3.7E 11)
Molybdenum-90	42	100 (3.7E 12)
Molybdenum-93m	42	10 (3.7E 11)
Molybdenum-93	42	100 (3.7E 12)
Molybdenum-99	42	100 (3.7E 12)
Molybdenum-101	42	1000 (3.7E 13)
Neodymium-136	60	1000 (3.7E 13)
Neodymium-138	60	1000 (3.7E 13)
Neodymium-139m	60	100 (3.7E 12)
Neodymium-139	60	1000 (3.7E 13)
Neodymium-141	60	1000 (3.7E 13)
Neodymium-147	60	10 (3.7E 11)
Neodymium-149	60	100 (3.7E 12)
Neodymium-151	60	1000 (3.7E 13)
Neptunium-232	93	1000 (3.7E 13)
Neptunium-233	93	1000 (3.7E 13)
Neptunium-234	93	10 (3.7E 11)
Neptunium-235	93	1000 (3.7E 13)
Neptunium-236 (1.2 E 5 yr)	93	0.1 (3.7E 9)
Neptunium-236 (22.5 hr)	93	100 (3.7E 12)
Neptunium-237	93	0.01 (3.7E 8)
Neptunium-238	93	10 (3.7E 11)
Neptunium-239	93	100 (3.7E 12)
Neptunium-240	93	100 (3.7E 12)
Nickel-56	28	10 (3.7E 11)
Nickel-57	28	10 (3.7E 11)
Nickel-59	28	100 (3.7E 12)
Nickel-63	28	100 (3.7E 12)
Nickel-65	28	100 (3.7E 12)
Nickel-66	28	10 (3.7E 11)
Niobium-88	41	100 (3.7E 12)
Niobium-89 (66 min)	41	100 (3.7E 12)
Niobium-89 (122 min)	41	100 (3.7E 12)
Niobium-90	41	10 (3.7E 11)
Niobium-93m	41	100 (3.7E 12)
Niobium-94	41	10 (3.7E 11)
Niobium-95m	41	100 (3.7E 12)
Niobium-95	41	10 (3.7E 11)
Niobium-96	41	10 (3.7E 11)
Niobium-97	41	100 (3.7E 12)
Niobium-98	41	1000 (3.7E 13)
Osmium-180	76	1000 (3.7E 13)
Osmium-181	76	100 (3.7E 12)
Osmium-182	76	100 (3.7E 12)
Osmium-185	76	10 (3.7E 11)
Osmium-189m	76	1000 (3.7E 13)
Osmium-191m	76	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Osmium-191	76	100 (3.7E 12)
Osmium-193	76	100 (3.7E 12)
Osmium-194	76	1 (3.7E 10)
Palladium-100	46	100 (3.7E 12)
Palladium-101	46	100 (3.7E 12)
Palladium-103	46	100 (3.7E 12)
Palladium-107	46	100 (3.7E 12)
Palladium-109	46	1000 (3.7E 13)
Phosphorus-32	15	0.1 (3.7E 9)
Phosphorus-33	15	1 (3.7E 10)
Platinum-186	78	100 (3.7E 12)
Platinum-188	78	100 (3.7E 12)
Platinum-189	78	100 (3.7E 12)
Platinum-191	78	100 (3.7E 12)
Platinum-193m	78	100 (3.7E 12)
Platinum-193	78	1000 (3.7E 13)
Platinum-195m	78	100 (3.7E 12)
Platinum-197m	78	1000 (3.7E 13)
Platinum-197	78	1000 (3.7E 13)
Platinum-199	78	1000 (3.7E 13)
Platinum-200	78	100 (3.7E 12)
Plutonium-234	94	1000 (3.7E 13)
Plutonium-235	94	1000 (3.7E 13)
Plutonium-236	94	0.1 (3.7E 9)
Plutonium-237	94	1000 (3.7E 13)
Plutonium-238	94	0.01 (3.7E 8)
Plutonium-239	94	0.01 (3.7E 8)
Plutonium-240	94	0.01 (3.7E 8)
Plutonium-241	94	1 (3.7E 10)
Plutonium-242	94	0.01 (3.7E 8)
Plutonium-243	94	1000 (3.7E 13)
Plutonium-244	94	0.01 (3.7E 8)
Plutonium-245	94	100 (3.7E 12)
Polonium-203	84	100 (3.7E 12)
Polonium-205	84	100 (3.7E 12)
Polonium-207	84	10 (3.7E 11)
Polonium-210	84	0.01 (3.7E 8)
Potassium-40	19	1 (3.7E 10)
Potassium-42	19	100 (3.7E 12)
Potassium-43	19	10 (3.7E 11)
Potassium-44	19	100 (3.7E 12)
Potassium-45	19	1000 (3.7E 13)
Praseodymium-136	59	1000 (3.7E 13)
Praseodymium-137	59	1000 (3.7E 13)
Praseodymium-138m	59	100 (3.7E 12)
Praseodymium-139	59	1000 (3.7E 13)
Praseodymium-142m	59	1000 (3.7E 13)
Praseodymium-142	59	100 (3.7E 12)
Praseodymium-143	59	10 (3.7E 11)
Praseodymium-144	59	1000 (3.7E 13)
Praseodymium-145	59	1000 (3.7E 13)
Praseodymium-147	59	1000 (3.7E 13)
Promethium-141	61	1000 (3.7E 13)
Promethium-143	61	100 (3.7E 12)
Promethium-144	61	10 (3.7E 11)
Promethium-145	61	100 (3.7E 12)
Promethium-146	61	10 (3.7E 11)
Promethium-147	61	10 (3.7E 11)
Promethium-148m	61	10 (3.7E 11)
Promethium-148	61	10 (3.7E 11)
Promethium-149	61	100 (3.7E 12)
Promethium-150	61	100 (3.7E 12)
Promethium-151	61	100 (3.7E 12)
Protactinium-227	91	100 (3.7E 12)
Protactinium-228	91	10 (3.7E 11)
Protactinium-230	91	10 (3.7E 11)
Protactinium-231	91	0.01 (3.7E 8)
Protactinium-232	91	10 (3.7E 11)
Protactinium-233	91	100 (3.7E 12)
Protactinium-234	91	10 (3.7E 11)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Radium-223	88	1 (3.7E 10)
Radium-224	88	10 (3.7E 11)
Radium-225	88	1 (3.7E 10)
Radium-226Φ	88	0.1 (3.7E 9)
Radium-227	88	1000 (3.7E 13)
Radium-228	88	0.1 (3.7E 9)
Radon-220	86	0.1 (3.7E 9)
Radon-222	86	0.1 (3.7E 9)
Rhenium-177	75	1000 (3.7E 13)
Rhenium-178	75	1000 (3.7E 13)
Rhenium-181	75	100 (3.7E 12)
Rhenium-182 (12.7 hr)	75	10 (3.7E 11)
Rhenium-182 (64.0 hr)	75	10 (3.7E 11)
Rhenium-184m	75	10 (3.7E 11)
Rhenium-184	75	10 (3.7E 11)
Rhenium-186m	75	10 (3.7E 11)
Rhenium-186	75	100 (3.7E 12)
Rhenium-187	75	1000 (3.7E 13)
Rhenium-188m	75	1000 (3.7E 13)
Rhenium-188	75	1000 (3.7E 13)
Rhenium-189	75	1000 (3.7E 13)
Rhodium-99m	45	100 (3.7E 12)
Rhodium-99	45	10 (3.7E 11)
Rhodium-100	45	10 (3.7E 11)
Rhodium-101m	45	100 (3.7E 12)
Rhodium-101	45	10 (3.7E 11)
Rhodium-102m	45	10 (3.7E 11)
Rhodium-102	45	10 (3.7E 11)
Rhodium-103m	45	1000 (3.7E 13)
Rhodium-105	45	100 (3.7E 12)
Rhodium-106m	45	10 (3.7E 11)
Rhodium-107	45	1000 (3.7E 13)
Rubidium-79	37	1000 (3.7E 13)
Rubidium-81m	37	1000 (3.7E 13)
Rubidium-81	37	100 (3.7E 12)
Rubidium-82m	37	10 (3.7E 11)
Rubidium-83	37	10 (3.7E 11)
Rubidium-84	37	10 (3.7E 11)
Rubidium-86	37	10 (3.7E 11)
Rubidium-88	37	1000 (3.7E 13)
Rubidium-89	37	1000 (3.7E 13)
Rubidium-87	37	10 (3.7E 11)
Ruthenium-94	44	1000 (3.7E 13)
Ruthenium-97	44	100 (3.7E 12)
Ruthenium-103	44	10 (3.7E 11)
Ruthenium-105	44	100 (3.7E 12)
Ruthenium-106	44	1 (3.7E 10)
Samarium-141m	62	1000 (3.7E 13)
Samarium-141	62	1000 (3.7E 13)
Samarium-142	62	1000 (3.7E 13)
Samarium-145	62	100 (3.7E 12)
Samarium-146	62	0.01 (3.7E 8)
Samarium-147	62	0.01 (3.7E 8)
Samarium-151	62	10 (3.7E 11)
Samarium-153	62	100 (3.7E 12)
Samarium-155	62	1000 (3.7E 13)
Samarium-156	62	100 (3.7E 12)
Scandium-43	21	1000 (3.7E 13)
Scandium-44m	21	10 (3.7E 11)
Scandium-44	21	100 (3.7E 12)
Scandium-46	21	10 (3.7E 11)
Scandium-47	21	100 (3.7E 12)
Scandium-48	21	10 (3.7E 11)
Scandium-49	21	1000 (3.7E 13)
Selenium-70	34	1000 (3.7E 13)
Selenium-73m	34	100 (3.7E 12)
Selenium-73	34	10 (3.7E 11)
Selenium-75	34	10 (3.7E 11)
Selenium-79	34	10 (3.7E 11)
Selenium-81m	34	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Selenium-81	34	1000 (3.7E 13)
Selenium-83	34	1000 (3.7E 13)
Silicon-31	14	1000 (3.7E 13)
Silicon-32	14	1 (3.7E 10)
Silver-102	47	100 (3.7E 12)
Silver-103	47	1000 (3.7E 13)
Silver-104m	47	1000 (3.7E 13)
Silver-104	47	1000 (3.7E 13)
Silver-105	47	10 (3.7E 11)
Silver-106m	47	10 (3.7E 11)
Silver-106	47	1000 (3.7E 13)
Silver-108m	47	10 (3.7E 11)
Silver-110m	47	10 (3.7E 11)
Silver-111	47	10 (3.7E 11)
Silver-112	47	100 (3.7E 12)
Silver-115	47	1000 (3.7E 13)
Sodium-22	11	10 (3.7E 11)
Sodium-24	11	10 (3.7E 11)
Strontium-80	38	100 (3.7E 12)
Strontium-81	38	1000 (3.7E 13)
Strontium-83	38	100 (3.7E 12)
Strontium-85m	38	1000 (3.7E 13)
Strontium-85	38	10 (3.7E 11)
Strontium-87m	38	100 (3.7E 12)
Strontium-89	38	10 (3.7E 11)
Strontium-90	38	0.1 (3.7E 9)
Strontium-91	38	10 (3.7E 11)
Strontium-92	38	100 (3.7E 12)
Sulfur-35	16	1 (3.7E 10)
Tantalum-172	73	100 (3.7E 12)
Tantalum-173	73	100 (3.7E 12)
Tantalum-174	73	100 (3.7E 12)
Tantalum-175	73	100 (3.7E 12)
Tantalum-176	73	10 (3.7E 11)
Tantalum-177	73	1000 (3.7E 13)
Tantalum-178	73	1000 (3.7E 13)
Tantalum-179	73	1000 (3.7E 13)
Tantalum-180m	73	1000 (3.7E 13)
Tantalum-180	73	100 (3.7E 12)
Tantalum-182m	73	1000 (3.7E 13)
Tantalum-182	73	10 (3.7E 11)
Tantalum-183	73	100 (3.7E 12)
Tantalum-184	73	10 (3.7E 11)
Tantalum-185	73	1000 (3.7E 13)
Tantalum-186	73	1000 (3.7E 13)
Technetium-93m	43	1000 (3.7E 13)
Technetium-93	43	100 (3.7E 12)
Technetium-94m	43	100 (3.7E 12)
Technetium-94	43	10 (3.7E 11)
Technetium-96m	43	1000 (3.7E 13)
Technetium-96	43	10 (3.7E 11)
Technetium-97m	43	100 (3.7E 12)
Technetium-97	43	100 (3.7E 12)
Technetium-98	43	10 (3.7E 11)
Technetium-99m	43	100 (3.7E 12)
Technetium-99	43	10 (3.7E 11)
Technetium-101	43	1000 (3.7E 13)
Technetium-104	43	1000 (3.7E 13)
Tellurium-116	52	1000 (3.7E 13)
Tellurium-121m	52	10 (3.7E 11)
Tellurium-121	52	10 (3.7E 11)
Tellurium-123m	52	10 (3.7E 11)
Tellurium-123	52	10 (3.7E 11)
Tellurium-125m	52	10 (3.7E 11)
Tellurium-127m	52	10 (3.7E 11)
Tellurium-127	52	1000 (3.7E 13)
Tellurium-129m	52	10 (3.7E 11)
Tellurium-129	52	1000 (3.7E 13)
Tellurium-131m	52	10 (3.7E 11)
Tellurium-131	52	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Tellurium-132	52	10 (3.7E 11)
Tellurium-133m	52	1000 (3.7E 13)
Tellurium-133	52	1000 (3.7E 13)
Tellurium-134	52	1000 (3.7E 13)
Terbium-147	65	100 (3.7E 12)
Terbium-149	65	100 (3.7E 12)
Terbium-150	65	100 (3.7E 12)
Terbium-151	65	10 (3.7E 11)
Terbium-153	65	100 (3.7E 12)
Terbium-154	65	10 (3.7E 11)
Terbium-155	65	100 (3.7E 12)
Terbium-156m (5.0 hr)	65	1000 (3.7E 13)
Terbium-156m (24.4 hr)	65	1000 (3.7E 13)
Terbium-156	65	10 (3.7E 11)
Terbium-157	65	100 (3.7E 12)
Terbium-158	65	10 (3.7E 11)
Terbium-160	65	10 (3.7E 11)
Terbium-161	65	100 (3.7E 12)
Thallium-194m	81	100 (3.7E 12)
Thallium-194	81	1000 (3.7E 13)
Thallium-195	81	100 (3.7E 12)
Thallium-197	81	100 (3.7E 12)
Thallium-198m	81	100 (3.7E 12)
Thallium-198	81	10 (3.7E 11)
Thallium-199	81	100 (3.7E 12)
Thallium-200	81	10 (3.7E 11)
Thallium-201	81	1000 (3.7E 13)
Thallium-202	81	10 (3.7E 11)
Thallium-204	81	10 (3.7E 11)
Thorium-226	90	100 (3.7E 12)
Thorium-227	90	1 (3.7E 10)
Thorium-228	90	0.01 (3.7E 8)
Thorium-229	90	0.001 (3.7E 7)
Thorium-230	90	0.01 (3.7E 8)
Thorium-231	90	100 (3.7E 12)
Thorium-232Φ	90	0.001 (3.7E 7)
Thorium-234	90	100 (3.7E 12)
Thulium-162	69	1000 (3.7E 13)
Thulium-166	69	10 (3.7E 11)
Thulium-167	69	100 (3.7E 12)
Thulium-170	69	10 (3.7E 11)
Thulium-171	69	100 (3.7E 12)
Thulium-172	69	100 (3.7E 12)
Thulium-173	69	100 (3.7E 12)
Thulium-175	69	1000 (3.7E 13)
Tin-110	50	100 (3.7E 12)
Tin-111	50	1000 (3.7E 13)
Tin-113	50	10 (3.7E 11)
Tin-117m	50	100 (3.7E 12)
Tin-119m	50	10 (3.7E 11)
Tin-121m	50	10 (3.7E 11)
Tin-121	50	1000 (3.7E 13)
Tin-123m	50	1000 (3.7E 13)
Tin-123	50	10 (3.7E 11)
Tin-125	50	10 (3.7E 11)
Tin-126	50	1 (3.7E 10)
Tin-127	50	100 (3.7E 12)
Tin-128	50	1000 (3.7E 13)
Titanium-44	22	1 (3.7E 10)
Titanium-45	22	1000 (3.7E 13)
Tungsten-176	74	1000 (3.7E 13)
Tungsten-177	74	100 (3.7E 12)
Tungsten-178	74	100 (3.7E 12)
Tungsten-179	74	1000 (3.7E 13)
Tungsten-181	74	100 (3.7E 12)
Tungsten-185	74	10 (3.7E 11)
Tungsten-187	74	100 (3.7E 12)
Tungsten-188	74	10 (3.7E 11)
Uranium-230	92	1 (3.7E 10)
Uranium-231	92	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Uranium-232	92	0.01 (3.7E 8)
Uranium-233	92	0.1 (3.7E 9)
Uranium-234φ	92	0.1 (3.7E 9)
Uranium-235φ	92	0.1 (3.7E 9)
Uranium-236	92	0.1 (3.7E 9)
Uranium-237	92	100 (3.7E 12)
Uranium-238φ	92	0.1& (3.7E 9)
Uranium-239	92	1000 (3.7E 13)
Uranium-240	92	1000 (3.7E 13)
Vanadium-47	23	1000 (3.7E 13)
Vanadium-48	23	10 (3.7E 11)
Vanadium-49	23	1000 (3.7E 13)
Xenon-120	54	100 (3.7E 12)
Xenon-121	54	10 (3.7E 11)
Xenon-122	54	100 (3.7E 12)
Xenon-123	54	10 (3.7E 11)
Xenon-125	54	100 (3.7E 12)
Xenon-127	54	100 (3.7E 12)
Xenon-129m	54	1000 (3.7E 13)
Xenon-131m	54	1000 (3.7E 13)
Xenon-133m	54	1000 (3.7E 13)
Xenon-133	54	1000 (3.7E 13)
Xenon-135m	54	10 (3.7E 11)
Xenon-135	54	100 (3.7E 12)
Xenon-138	54	10 (3.7E 11)
Ytterbium-162	70	1000 (3.7E 13)
Ytterbium-166	70	10 (3.7E 11)
Ytterbium-167	70	1000 (3.7E 13)
Ytterbium-169	70	10 (3.7E 11)
Ytterbium-175	70	100 (3.7E 12)
Ytterbium-177	70	1000 (3.7E 13)
Ytterbium-178	70	1000 (3.7E 13)
Yttrium-86m	39	1000 (3.7E 13)
Yttrium-86	39	10 (3.7E 11)
Yttrium-87	39	10 (3.7E 11)
Yttrium-88	39	10 (3.7E 11)
Yttrium-90m	39	100 (3.7E 12)
Yttrium-90	39	10 (3.7E 11)
Yttrium-91m	39	1000 (3.7E 13)
Yttrium-91	39	10 (3.7E 11)
Yttrium-92	39	100 (3.7E 12)
Yttrium-93	39	100 (3.7E 12)
Yttrium-94	39	1000 (3.7E 13)
Yttrium-95	39	1000 (3.7E 13)
Zinc-62	30	100 (3.7E 12)
Zinc-63	30	1000 (3.7E 13)
Zinc-65	30	10 (3.7E 11)
Zinc-69m	30	100 (3.7E 12)
Zinc-69	30	1000 (3.7E 13)
Zinc-71m	30	100 (3.7E 12)
Zinc-72	30	100 (3.7E 12)
Zirconium-86	40	100 (3.7E 12)
Zirconium-88	40	10 (3.7E 11)
Zirconium-89	40	100 (3.7E 12)
Zirconium-93	40	1 (3.7E 10)
Zirconium-95	40	10 (3.7E 11)
Zirconium-97	40	10 (3.7E 11)

Ci—Curie. The curie represents a rate of radioactive decay. One curie is the quantity of any radioactive nuclide which undergoes 3.7E 10 disintegrations per second.

Bq—Becquerel. The becquerel represents a rate of radioactive decay. One becquerel is the quantity of any radioactive nuclide which undergoes one disintegration per second. One curie is equal to 3.7E 10 becquerel.

@—Final RQs for all radionuclides apply to chemical compounds containing the radionuclides and elemental forms regardless of the diameter of pieces of solid material.

&—The adjusted RQ of one curie applies to all radionuclides not otherwise listed. Whenever the RQs in table 302.4 and this appendix to the table are in conflict, the lowest RQ shall apply. For example, uranyl acetate and uranyl nitrate have adjusted RQs shown in table 302.4 of 100 pounds, equivalent to about one-tenth the RQ level for uranium-238 listed in this appendix.

E—Exponent to the base 10. For example, 1.3E 2 is equal to 130 while 1.3E 3 is equal to 1300.

m—Signifies a nuclear isomer which is a radionuclide in a higher energy metastable state relative to the parent isotope.

φ—Notification requirements for releases of mixtures or solutions of radionuclides can be found in § 302.6(b) of this rule. Final RQs for the following four common radionuclide mixtures are provided: radium-226 in secular equilibrium with its daughters (0.053 curie); natural uranium (0.1 curie); natural uranium in secular equilibrium with its daughters (0.052 curie); and natural thorium in secular equilibrium with its daughters (0.011 curie).

[54 FR 33449, Aug. 14, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 302.4, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO Access.

§ 302.5 Determination of reportable quantities.

(a) *Listed hazardous substances.* The quantity listed in the column "Final RQ" for each substance in table 302.4, or in appendix B to table 302.4, is the reportable quantity (RQ) for that substance. The RQs in table 302.4 are in units of pounds based on chemical toxicity, while the RQs in appendix B to table 302.4 are in units of curies based on radiation hazard. Whenever the RQs in table 302.4 and appendix B to the table are in conflict, the lowest RQ shall apply.

(b) *Unlisted hazardous substances.* Unlisted hazardous substances designated by 40 CFR 302.4(b) have the reportable quantity of 100 pounds, except for those unlisted hazardous wastes which exhibit toxicity identified in 40 CFR 261.24. Unlisted hazardous wastes which exhibit toxicity have the reportable quantities listed in Table 302.4 for the contaminant on which the characteristic of toxicity is based. The reportable quantity applies to the waste itself, not merely to the toxic contaminant. If an unlisted hazardous waste exhibits toxicity on the basis of more than one contaminant, the reportable quantity for that waste shall be the lowest of the reportable quantities listed in Table 302.4 for those contaminants. If an unlisted hazardous waste exhibits the characteristic of toxicity and one or more of the other characteristics referenced in 40 CFR 302.4(b), the reportable quantity for that waste

APPENDIX E – TRAINING SCHEDULES

Training	Frequency	Required
Annual Dam Refresher Training	Annually	Those who supervise, construct or inspect ponds/Structures
Florida Stormwater Erosion & Sedimentation Control Inspector Training	One Time	Those who inspect site BMP's
Annual BMP Refresher Training	Annually	Those who inspect Site BMP’s
Hazard Communication	Annually	All Site Employees
General Communication - BMP	Annually	All Site Employees

APPENDIX F – SAFETY DATA SHEETS

Aluminum Sulfate Solution
SAFETY DATA SHEET

Section 1 – Product and Company Identification

Material Name: Aluminum Sulfate Solution

Manufacturer Information:
Affinity Chemical, LLC
PO Box 601298
Dallas, TX 75360
973-908-8053 (M-F, 8:00 AM -5:00 PM Eastern Time)

24 Hour Emergency Telephone:
Chemtrec 1-800-424-9300

Other Name(s): Alum

Product Usage:
Water treatment coagulant/flocculant, pH control, phosphate control, paper sizing aid, pitch control

Section 2 – Hazard(s) Identification

Classification: Skin Irritant 2, Eye Irritant 2A , Corrosion 1
Signal Word: **Warning**
Hazard Statements: May cause skin irritation ; Causes serious eye irritation; May be corrosive to metals
Symbol(s): Exclamation Mark, Corrosion
Precautionary Statements:

Prevention:
Wash hands, along with any other body parts that may have been exposed, thoroughly after handling.
Wear protective gear to prevent contact with skin (Rubber gloves, aprons, slicker suit)
Wear eye protection/face protection (clear goggles and face shield)
Keep only in original container.

Response:
If on skin: Wash with plenty of water.
If skin irritation occurs: Get medical advice/attention.
Refer to first-aid measures (section 4) for any specific treatment
Take off contaminated clothing and wash it before reuse.
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: get medical attention
Absorb spillage to prevent material damage.

Storage: Store in compatible containers such as polypropylene , polyethylene, PVC, or 316 SS

Other Hazards: Ingestion or inhalation not recommended and could present hazards not otherwise classified.

Section 3 – Composition/Information on Ingredients

Common Name(s): Alum
Chemical family: inorganic, salt

Hazardous Components	CAS#	Weight %
Aluminum Sulfate tetradecahydrate	16828-12-9	48.5

Section 4 – First-Aid Measures

Skin/Eye Contact: For skin, immediately remove contaminated clothes under safety shower. Flush skin with running water for at least 15 minutes. Launder clothes before reuse. For eyes, flush carefully in eye wash for several minutes;remove contact lenses if present and easy to do;cautiously flush person's eyes with running water for at least 15 minutes. Seek Medical attention if irritation persists.

Ingestion: Rinse mouth. Immediately dilute swallowed material by orally administrating large amounts of water or milk. DO NOT INDUCE VOMITING. NEVER administer liquids orally to an unconscious person. Call physician or poison control center if person feels unwell or more than a few drops are ingested.

Inhalation: Seek medical assistance if irritation is noted ,person is having difficulty breathing, or the possibility exists of fluid in the lungs. Remove victim from the contaminated atmosphere. If breathing stopped, give artificial respiration. Weak breathing may be supplemented with a bag-mask or manually operated air supply that delivers at least 1 liter/second.

Aluminum Sulfate Solution
SAFETY DATA SHEET

Section 5 – Fire-Fighting Measures

Suitable Extinguishing Media: Not combustible. Use extinguishing agents appropriate for surrounding fire

Special Fire Fighting: Move container from fire area if it can be done without risk. Avoid inhalation of material or combustion byproducts by wearing a self contained breathing apparatus. Dike area to prevent runoff and contamination of water source. Stay upwind and keep out of low areas.

Unusual Fire/Explosion: Under fire conditions at temperatures greater than 650°C or 1202°F, decomposes to give off sulfur trioxide, an oxidizing agent which will support combustion. Sulfur trioxide will react to form sulfuric acid.

Section 6 – Accidental Release Measures

Spill or Leak: Wear PPE appropriate for handling the material. No smoking or eating in spill areas. Absorb small spills with sand or vermiculite. Place contaminated material in appropriate container for disposal. If spilled on ground, the affected area should be removed to a depth of 1 to 2 inches and placed in an appropriate container for disposal Large spills should be handled according to a predetermined plan. Do not flush material to public sewer systems or any waterways. Wear appropriate protective clothing and equipment during cleanup activities. Ensure adequate decontamination of tools and equipment following cleanup. Adequate ventilation is required when neutralizing spills / leaks.

Section 7– Handling and Storage

Smoking and/or eating is not recommended in storage areas. Stainless steel or fiberglass tanks are recommended. Keep product away from heat sources and direct sunlight. Do not reuse storage containers unless properly reconditioned.
Isolate appropriately from chemicals where low pH could create a hazardous byproduct; for example a combination with hypochlorite could lead to the evolution of chlorine gas.

Section 8– Exposure Controls/Personal Protection

Component	CAS#	OSHA PEL	ACGIH TLV
Aluminum Sulfate tetradecahydrate	16828-12-9	2.0 mg/m^3 (as Al)	2.0 mg/m^3 (as Al)

If airborne exposures exceed 1.0 mg/m^3, a negative pressure air-purifying respirator is recommended. Cartridges must be NIOSH / MSHA approved against dusts and mists having TWA than 0.05 mg/m^3
Eye wash and safety shower should be available near storage and usage points
Exposed skin and eyes should be protected and contact with skin and clothing avoided. Minimal PPE would be closed goggles and/or face shield and gloves (rubber,neoprene,PVC) with work clothing covering other exposed skin.
Arriving material may be hot; personnel performing unload operations should have additional PPE such as a rainsuit/slicker suit, goggles with faceshield, and appropriate footwear and gloves.

Section 9– Physical and Chemical Properties

Appearance	Clear, water white to amber	**Upper/lower flammability or explosive Limits**	N/A
Odor	N/A	**Vapor pressure**	Similar to water
Odor threshold	N/A	**Vapor density**	Similar to water
pH	3.5 (1% soln)	**Relative density (15.6°C)**	1.315-1.345
Melting point/freezing point	-15°C	**Solubility**	high in water
Initial boiling point	100°C	**Partition coef n-octanol/water**	N/A
Flash point	N/A	**Auto-ignition temp**	N/A
Evaporation rate	N/A	**Decomposition Temp**	650°C
Flammability	N/A	**Viscosity**	5-25 cP

Aluminum Sulfate Solution
SAFETY DATA SHEET

Section 10- Stability and Reactivity

Reactivity:	Stable at normal temperatures and pressures
Chemical stability:	Stable; water component can evaporate
Possibility of hazardous reactions:	May produce hazardous decomposition products if mixed with pH sensitive materials (e.g. chlorine gas when mixed with sodium hypochlorite).
Conditions to avoid:	Temperatures at or near to crystallization, -15°C or 4°F. At temperatures greater than 650°C or 1202°F, it decomposes to form aluminum oxide and sulfur trioxide
Incompatible materials:	Corrosive to carbon steel
Hazardous decomposition products:	This may include aluminum oxide and sulfur oxides.

Section 11- Toxicological Information

Acute Toxicity Estimate:	The acute oral LD50 is greater than 5,000 mg/kg.
Chronic Toxicity Estimate:	The acute oral LD50 is greater than 5,000 mg/kg.
Symptoms of Overexposure:	May cause skin and eye irritation. If inhaled, may cause headaches, nausea, and respiratory irritations.
Carcinogenicity:	Not listed as a carcinogen by NTP, IARC, or OSHA.
Other Possible Health Hazards:	The common recognized injury from Aluminum Sulfate is local tissue irritation. The irritating action is often from hydrolysis to form sulfuric acid and may occur from ingestion, skin or eye contact, or inhalation of dusts and mists. Remove victim from contaminated area. SKIN / EYES: May cause corneal burns or severe irritation in eyes. Fumes or mists may cause irritation or burns to skin. INGESTION: Oral and gastrointestinal irritation. Local tissue damage. Nausea, vomiting, diarrhea, and gastrointestinal bleeding may follow. Can be fatal if swallowed in sufficient quantities. INHALATION:Irritation of the respiratory system. Long term exposure may cause bronchial irritation, coughing, and bronchial pneumonia. Medical conditions generally aggravated are acute and chronic respiratory diseases.
Routes of Entry:	Ingestion, skin or eye contact, or inhalation of dusts and mists.

Section 12- Ecological Information

(For CAS 10043-01-3)	
Toxicity LC50 :	96h Mosquitofish: 235 mg/l (ECOTOX Database Ref 508, result 2063538)
Persistence and Degradability:	Can be eliminated from water by precipitation or flocculation

Section 13- Disposal Considerations

Disposal: Contact site environmental personnel and/or state and federal agencies for disposal procedures that are in accordance with environmental regulations.

Section 14- Transport Information

U.S. DOT

PROPER SHIPPING NAME: Environmentally hazardous substance,liquid, N.O.S. (Contains Aluminum Sulfate)

HAZARD CLASS	UN ID NUMBER	PACKING GROUP	RQ (lbs)
9	UN3082	PG III	10,300

Aluminum Sulfate Solution
SAFETY DATA SHEET

Section 15 – Regulatory Information

SARA Title III information:

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES: Not listed
SECTION 313 TOXIC CHEMICAL: Not listed
RCRA HAZARD WASTE: Not listed

311/312 HEALTH & PHYSICAL HAZARDS:

Immediate	Delayed	Fire	Pressure	Reactivity
YES	NO	NO	NO	NO

NFPA RATING

Health	Fire	Reactivity
1	0	1

MAXIMUM USE LEVEL (water treatment): 150 mg/l

Section 16– Other Information

Date of preparation: 6/1/15 Version SDS 1.0

Disclaimer of Warranty:

The information provided in the Safety Data Sheet has been obtained from sources believed to be reliable. Affinity Chemical LLC. provides no warranties; either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration, and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Affinity Chemical LLC. knows of no medical condition, other than those noted on this safety data sheet, which are generally recognized as being aggravated by exposure to this product.

SAFETY DATA SHEET

KEMIRA PIX-312

Ref. /US/EN

Revision Date: 11/03/2016 Previous date: 12/04/2015 Print Date:08/23/2018

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product information

Product name
KEMIRA PIX-312 Chemical name: ferric sulfate

Recommended use of the chemical and restrictions on use

Use of the Substance/Mixture

Water treatment chemical
Recommended restrictions on use
There are no uses advised against.

Supplier's details

Kemira Water Solutions, Inc.
1000 Parkwood Circle, Suite 500
30339 Atlanta USA
Telephone+17704361542, Telefax. +17704363432

HEAD OFFICE
Kemira Oyj
P.O. Box 330
00101 HELSINKI
FINLAND
Telephone +358108611 Telefax +358108621124

Emergency telephone number

Carechem 24 International: +44 (0) 1235 239 670
CHEMTREC: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Corrosive to metals; Category 1; May be corrosive to metals.;
Acute toxicity (Oral); Category 4; Harmful if swallowed.;
Skin corrosion/irritation; Category 2; Causes skin irritation.;
Serious eye damage; Category 1; Causes serious eye damage.;

GHS-Labelling

Hazard pictograms :

Signal word : Danger

Hazard statements : **Hazard statements:**

H290	May be corrosive to metals.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.

Precautionary statements : **Prevention:**

P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash face, hands and any exposed skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P390	Absorb spillage to prevent material damage.
P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P330	Rinse mouth.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P321	Specific treatment (see supplemental first aid instructions on this label).
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P310	Immediately call a POISON CENTER or doctor/ physician.
Storage:	
P405	Store locked up.
P406	Store in corrosive resistant container with a resistant inner liner.
Disposal:	
P501	Dispose of contents/container as special waste in compliance with local and national regulations.

Hazardous components which must be listed on the label:

- 10028-22-5 Diiron tris(sulphate)

Other hazards which do not result in classification

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances /Mixtures

Hazardous components

Chemical Name	CAS-No.	Concentration[%]
Diiron tris(sulphate)	10028-22-5	30 - 50 %

Further information

This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Diiron tris(sulphate) CAS #10028-22-5 is Ferric Sulphate - Fe2(SO4)3

4. FIRST AID MEASURES

Description of first aid measures

Inhalation

If breathing is difficult, remove to fresh air and provide oxygen. If not breathing, give artificial respiration. Seek medical attention if cough or other symptoms develop.

Skin contact

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Get medical attention if irritation develops and persists.

Eye contact

Flush eyes with water at least 15 minutes. Get medical attention if eye irritation develops or persists.

Ingestion

Never give anything by mouth to an unconscious person. Do NOT induce vomiting. Drink 1 or 2 glasses of water. Obtain medical attention.

Most important symptoms and effects, both acute and delayed

5. FIREFIGHTING MEASURES

Suitable extinguishing media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special hazards arising from the substance or mixture

Not combustible. Thermal decomposition products:
Sulphur oxides, hydrogen sulfide

Special protective actions for fire-fighters

Use NIOSH/MSHA approved respiratory protection.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Wear personal protective equipment.

Environmental precautions

Should not be released into the soil, surface water or ground water system. Must be disposed of in accordance with local and national regulations.

Methods and materials for containment and cleaning up

Small amounts:

Absorb with materials such as; Clay. Neutralize with lime or soda.

Large amounts:

In case of large spillage, contain by damming up. Absorb with materials such as; Clay. Dilute residues with water and then neutralize with lime or limestone powder.

7. HANDLING AND STORAGE

Precautions for safe handling

Wear personal protective equipment. Wash contact areas after handling. Prevent eye and skin contact.

Conditions for safe storage, including any incompatibilities

Keep at temperatures between 10 - 30 °C.
Keep containers tightly closed in a cool, well-ventilated place.

Materials for packaging
Suitable material: butyl-rubber, plastic, Stainless steel
Unsuitable material: Metals

Materials to avoid:
Carbon steel, brass, mineral acids, Bases

Storage stability:

Storage period 12 Months

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Form of exposure	Control parameters	Update	Basis
Sulphuric acid	7664-93-9	TWA	Thoracic fraction	0.2 mg/m³	2007-01-01	ACGIH
		TWA		1 mg/m³	2013-10-08	NIOSH REL
Diiron tris(sulphate)	10028-22-5			1 mg/m³		
				1 mg/m³		
		TWA		0.1 mg/m³		

Appropriate engineering controls

Ensure adequate ventilation. Ensure that eyewash stations and safety showers are close to the workstation location.
Handle in accordance with good industrial hygiene and safety practice.

When using do not eat, drink or smoke.

Individual protection measures, such as personal protective equipment
Respiratory protection

Where exposures are below the established exposure limit, no respiratory protection is required. Where exposures exceed the established exposure limits, use respiratory protection recommended for the material and level of exposure. Under conditions of misting or contact with head gases, respiratory protection may be needed. Consider respirator warning properties before use.
With limited contact use an appropriate chemical cartridge respirator with acid gas cartridges. When cleaning, decontaminating or preforming maintenance on tanks, containers, piping systems and accessories, and in any other situations where airborne contaminants and/or dust could be generated, use protective equipment to protect against ingestion or inhalation. HEPA or air supplied respirator, full protective coveralls with head cover, gloves, and boots or chemical suits, and boots are suggested.

Hand protection

Glove material: Neoprene, Wear protective gloves.

Skin and body protection

Wear as appropriate: Protective clothing. Boots. Lab coat

Eye protection

Tightly fitting safety goggles or face-shield.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	, liquid
Colour	red, brown
Odour	acidic
Odour Threshold	not determined
pH	< 2
Freezing point :	> -38 °C

Initial boiling point and boiling range	
Flash point	No data available
Evaporation rate	No data available
Explosive properties:	
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapour pressure	No data available
Relative vapour density	No data available
Density	No data available
Relative density	No data available
Bulk density	No data available
Solubility(ies):	
Water solubility	soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity:	
Viscosity, dynamic	No data available
Viscosity, kinematic	No data available
Volatile organic content (VOC)	Not applicable

10. STABILITY AND REACTIVITY

Reactivity

Chemical stability

Possibility of hazardous reactions

Hazardous reactions: Hazardous polymerisation does not occur.

Stable under recommended storage conditions.

Conditions to avoid

Conditions to avoid: Avoid freezing.

Avoid storage at high temperatures.

Incompatible materials

Materials to avoid: Carbon steel
brass
mineral acids
Bases

Hazardous decomposition products

Hazardous decomposition products: Thermal decomposition products:
Sulphur oxides

Thermal decomposition: Note: No data available

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

Acute oral toxicity

Diiron tris(sulphate):
/OECD Test Guideline 423Remarks: Calculated as Fe
/Rat/220 mg/kg/LD50

Acute inhalation toxicity

Diiron tris(sulphate):
LC50
Remarks: No data available, Not applicable

Acute dermal toxicity

Diiron tris(sulphate):
LD50/Rat/>
/3,154 mg/kg/OECD Test Guideline 402
Remarks: Read-across (Analogy), CAS-No., 7758-94-3

Diiron tris(sulphate):
LD50/Rat/>
/881 mg/kg/OECD Test Guideline 402
Remarks: Calculated as Fe

Skin corrosion/irritation	**Diiron tris(sulphate):** Rabbit Result: No skin irritation /OECD Test Guideline 404 Conclusion: Moistened solid is expected to be irritant as a consequence of low pH.
Serious eye damage/eye irritation	**Diiron tris(sulphate):** Rabbit Result: Causes serious eye damage. /OECD Test Guideline 405 Remarks: Read-across (Analogy), 7758-94-3, dry substance

Respiratory or skin sensitisation

Skin sensitisation	**Diiron tris(sulphate):** Conclusion: According to experience sensitization is not expected.

Germ cell mutagenicity

Genotoxicity in vivo	**Diiron tris(sulphate):** Result: negative

Carcinogenicity

Carcinogenicity	**Diiron tris(sulphate):** /Rat/Oral/2 years Remarks:Information given is based on data obtained from similar substances. Not believed to be a carcinogen. Long-term test

Reproductive toxicity

Toxicity for reproduction	**Diiron tris(sulphate):** Reproductive effects/Rat/>/500 mg/kg Remarks: Read-across (Analogy) **Diiron tris(sulphate):** Developmental toxicity test/Rat/>/1,000 mg/kg Remarks: Read-across (Analogy) Conclusion: In animal studies, did not interfere with reproduction.
Teratogenicity	**Diiron tris(sulphate):** Rat/Oral/>/1,000 mg/kg Conclusion: Did not show teratogenic effects in animal experiments., Information given is based on data obtained from similar substances.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity
LC50/24 h/Gambusia affinis (Mosquito fish): 37.2 mg/l
LC50/96 h/Gambusia affinis (Mosquito fish): 37.2 mg/l
/7 d/Green algae (Selenastrum capricornutum): 10 mg/l

Diiron tris(sulphate):
LC50/96 h/Oncorhynchus mykiss (rainbow trout): > 100 mg/l
NOEC/90 d/Oncorhynchus kisutch (Coho salmon): > 1 mg/l
EC50/48 h/Daphnia (water flea): 82.8 mg/l
NOEC/21 d/Daphnia magna (Water flea): > 1 mg/l

The compound is considered to have no long term effects in aquatic systems due to the rapid formation of insoluble hydroxides.

Toxicity to other organisms

Persistence and degradability

Biological degradability:
Diiron tris(sulphate):
The methods for determining the biological degradability are not applicable to inorganic substances.

Bioaccumulative potential

Partition coefficient: n-octanol/water: No data available

Diiron tris(sulphate):

Does not bioaccumulate.
Partition coefficient: n-octanol/water: Not applicable, inorganic compound

Mobility in soil

Water solubility: soluble

Other adverse effects

May lower the pH of water and thus be harmful to aquatic organisms.

13. DISPOSAL CONSIDERATIONS

Product	Must be disposed of as hazardous waste.
Contaminated packaging	Must be disposed of in accordance with local and national regulations.

14. TRANSPORT INFORMATION

UN number	3264
Land transport	
DOT:	
Description of the goods:	UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Ferric sulfate)
Proper shipping name	
Class:	8
Packaging group:	III
DOT-Labels	8
Reportable quantity	Ferric sulfate
Sea transport	
IMDG:	
Description of the goods:	
UN proper shipping name	UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (FERRIC SULFATE)
Class:	8
Packaging group:	III
IMDG-Labels:	8
Air transport	
ICAO/IATA:	
Description of the goods:	
UN proper shipping name	UN3264, Corrosive liquid, acidic, inorganic, n.o.s. (Ferric sulfate)
Class:	8
Packaging group:	III
ICAO-Labels:	8
Special precautions for user	

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Title III Section 311 Categories

Immediate (Acute) Health Effects: Yes;

Delayed (Chronic) Health Effects: No;
Fire Hazard: No;
Sudden Release Of Pressure Hazard: No;
Reactivity Hazard: No;

SARA 313 - Specific Toxic Chemical Listings

Sulfuric acid (7664-93-9)
OSHA a. United States Occupational Safety and Health Administration substances, 29 CFR 1910.1000, Sub Part Z.

CERCLA Hazardous substance (Reportable Quantities)

CERCLA Hazardous substance (Reportable Quantities)

Diiron tris(sulphate) (10028-22-5)
1,000 lb

Sulfuric acid (7664-93-9)
1,000 lb

Diiron tris(sulphate) (10028-22-5)

California Proposition 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
None Present ()
Remarks: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Other regulations : No restrictions identified other than those already covered in regulations.

: None

Notification status

: All components of this product are included in the United States TSCA Chemical Inventory or are not required to be listed on the United States TSCA Chemical Inventory.
: All components of this product are included in the Canada Domestic Substance List (DSL) or are not required to be listed on the Canada Domestic Substance List (DSL).

: All components of this product are included in the Australian Inventory of Chemical Substances (AICS) or are not required to be listed on the Australian Inventory of Chemical Substances (AICS).
: All components of this product are included on the Chinese inventory or are not required to be listed on the Chinese inventory.
: All components of this product are included in the Korean (ECL) inventory or are not required to be listed on the Korean (ECL) inventory.
: All components of this product are included on the Philippine (PICCS) inventory or are not required to be listed on the Philippine (PICCS) inventory.
: All components of this product are included on the Japanese (ENCS) inventory or are not required to be listed on the Japanese (ENCS) inventory.
: All components of this product are included in the European Inventory of Existing Chemical Substances (EINECS) or are not required to be listed on EINECS.
: All components of this product are included in the New Zealand inventory (NZIoC) or are not required to be listed on the New Zealand inventory(NZIoC).

16. OTHER INFORMATION

HMIS Rating

Health: 3
Flammability: 0
Reactivity: 0

NFPA Rating

Health: 3
Fire: 0
Reactivity: 0

Training advice

Read the safety data sheet before using the product.

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to

the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Sources of key data used to compile the Safety Data Sheet

Regulations, databases, literature, own tests.

Additions, Deletions, Revisions

Relevant changes have been marked with vertical lines.

SAFETY DATA SHEET

HYDRATED LIME

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: **Hydrated Lime**
Synonym/s: HY, High Calcium Hydrated Lime, Hydrate, Slaked Lime, HL
Chemical Name: Calcium Hydroxide
Chemical Formula: $Ca(OH)_2$
Product Use/s: Water Treatment, pH Adjustment, FGD, Construction, Pulp/Paper

Manufacturer: Cheney Lime and Cement Company
478 Graystone Road
Allgood, Alabama 35013
205-625-3031

Emergency Phone: 205-625-3031

SECTION 2: HAZARDS IDENTIFICATION

Emergency Overview: Hydrated Lime is an odorless white powder. Contact can cause irritation to eyes, skin, respiratory system, and gastrointestinal tract.

Hazard Pictograms:

Signal Word:

Danger

Potential Health Effects:

Eyes: Contact can cause severe irritation or burning of eyes, including permanent damage.
Skin: Contact can cause severe irritation or burning of skin, especially in the presence of moisture.
Ingestion: This product can cause severe irritation or burning of gastrointestinal tract if swallowed.
Inhalation: This product can cause severe irritation of the respiratory system. Long-term exposure may cause permanent damage. Hydrated lime is not listed by MSHA, OSHA, or IARC as a carcinogen. However, this product may contain trace amounts of crystalline silica in the form of quartz or crystobalite, which has been classified by IARC as a Group I carcinogen to humans when inhaled. Inhalation of silica can also cause a chronic lung disorder, silicosis.

Potential Environmental Effects:

This material is alkaline and if released into water or moist soil will cause an increase in pH.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient	Chemical Formula	Common Name	Conc. (%)
Calcium Hydroxide	$Ca(OH)_2$	Hydrated Lime	> 90
Magnesium Oxide	MgO	Periclase	< 2.5
Calcium Carbonate	$CaCO_3$	Limestone	< 3.0
Crystalline Silica	SiO_2	Quartz	< 1.0

SECTION 4: FIRST AID MEASURES

Eyes: Immediately flush eyes with generous amounts of water or eye wash solution if water is unavailable. Pull back eyelid while flushing to ensure that all hydrated lime dust has been washed out. Seek medical attention promptly if the initial flushing of the eyes does not remove the irritant. Do not rub eyes.
Skin: Brush off or remove as much dry lime as possible. Wash exposed area with large amounts of water. If burned seriously or if irritation persists, seek medical attention promptly.
Inhalation: Move victim to fresh air. Seek medical attention. If breathing has stopped, give artificial respiration.
Ingestion: Do not induce vomiting. Seek medical attention immediately. Never give anything by mouth unless instructed to do so by medical personnel.
Medical Conditions Aggravated by Exposure: Hydrated lime is an odorless white powder. Contact can cause irritation to eyes, skin, respiratory system, and gastrointestinal tract.

SECTION 5: FIREFIGHTING MEASURES

Fire Hazards:

Suitable Extinguishing Media: Use dry chemical or CO_2 fire extinguisher to extinguish the surrounding fire.
Fire Fighting Instructions: Keep personnel away from and upwind of fire. Avoid skin contact or inhalation of dust. Wear full fire-fighting turn-out gear (full Bulk gear), and respiratory protection (SCBA)
Hazardous Combustion Products: Not applicable

SECTION 6: ACCIDENTAL RELEASE MEASURES

Spill / Leak Procedures: Do Not use water on bulk material spills. Use proper personal protective equipment.
Small Spills: Use dry methods to collect spilled materials. Avoid generating dust. Do not clean up with compressed air. Store collected materials in dry, sealed plastic or non-aluminum metal containers. Residue on surfaces may be water washed.
Large Spills: Use dry methods to collect spilled materials. Evacuate area downwind of clean-up operations to minimize dust exposure. Store spilled materials in dry, sealed plastic or non-aluminum metal containers.
Containment: Minimize dust generation and prevent bulk release to sewers or waterways.
Clean-up: Residual amounts of material can be flushed with large amounts of water. Equipment can be washed with either a mild vinegar and water solution, or detergent and water.

SECTION 7: HANDLING AND STORAGE

Handling: Keep in tightly closed plastic or non-aluminum metal containers. Protect containers from physical damage. Avoid direct skin contact with the material. Avoid breathing any dust.
Storage: Store in a cool, dry, well-ventilated location. Do not store near acids or other incompatible materials. Keep away from moisture. Do not store or ship in aluminum containers. Hydrated lime is not combustible or flammable. However, it reacts vigorously with acids, and may release heat sufficient to ignite combustible materials in specific instances. Hydrated lime is not considered to be an explosion hazard, although reaction with acids or other incompatible materials may rupture containers.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Ingredient	OSHA PEL, TWA 8/40h (mg/m3)	ACGIH TLV, TWA 8/40h (mg/m3)	NIOSH REL,TWA 8/40h (mg/m3)	NIOSH IDLH (mg/m3)
Calcium Hydroxide	15 (total dust) 5 (respirable)	5	5	N/A
Magnesium Oxide	10	10	N/A	N/A
Calcium Carbonate	15 (total dust) 5 (respirable)	10	10(total dust) 5 (total dust)	N/A
Crystalline Silica	10/(SiO_2% + 2) (respirable)	0.025 (respirable)	0.05 (respirable)	50

Engineering Controls: Provide ventilation adequate to maintain PELs.
Respiratory Protection: Use NIOSH/MSHA approved respirators if airborne concentration exceeds PELs.
Skin Protection: Use appropriate gloves and footwear to prevent skin contact and the potential for burns. Clothing should fully cover arms and legs. Should lime get inside clothing or gloves, remove the clothing and the lime promptly.
Eye Protection: Use safety glasses with side shields or safety goggles. Contact lenses should not be worn when working with lime products.
Other: Eye wash fountain/stations and emergency showers should be available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White free flowing powder
Odor:	Odorless
Physical State:	Solid
Melting Point (°C/°F):	decomposes at 580/1076
Boiling Point (°C/°F):	N/A
Bulk Density:	25-35 lbs. /cu. Ft.
Specific Gravity:	2.3 – 2.4
Vapor Pressure (mm Hg):	N/A
Vapor Density:	N/A
Evaporation Rate:	N/A
pH (25°C/77°F):	12.4
Solubility in Water:	0.159 grams per 100 grams sat. sol. at 25**°C**

SECTION 10: STABILITY AND REACTIVITY

Stability: Chemically stable, but slowly reacts with CO_2 to form calcium carbonate.
(See also Incompatibility below.)
Hazardous Decomposition/Products: Does not occur
Hazardous Polymerization: Does not occur
Incompatibility/Conditions to Avoid:
Hydrated lime should not be mixed or stored with the following materials, due to the potential for vigorous reaction and release of heat:
Acids (unless in a controlled process), Organic Acid Anhydrides, Reactive Fluoridated Compounds, Nitro-Reactive Brominated Compounds, Reactive Phosphorous Compounds, Reactive Powdered Metals, Interhalogenated Compounds

SECTION 11: TOXICOLOGICAL INFORMATION

ORL-RAT LD50: 7,340 mg/kg ORL-MUS LD50: 7,300 mg/kg

Hydrated lime is not listed by MSHA, OSHA, or IARC as a carcinogen, but this product may contain trace amounts of crystalline silica, which has been classified by IARC as carcinogenic to humans when inhaled in the form of quartz or crystobalite. Inhalation, skin and eye contact are the most likely routes of exposure. This material is irritating to the skin and severely irritating to the eyes.

SECTION 12: ECOLOGICAL INFORMATION

Eco-toxicity: Because of the high pH of this product, it would be expected to produce significant Eco-toxicity upon exposure to aquatic organisms and aquatic systems in high concentrations (> 1 g/L).
Environmental Fate: This material shows no bioaccumulation effect or food chain concentration toxicity. High pH values will rapidly decrease over time as a result of recarbonation. This material may be used in soil stabilization or remediation and will show very little mobility in soils.

SECTION 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable federal, state, and local environmental regulations. If this product as supplied, and unmixed, becomes a waste, it will not meet the criteria of a hazardous waste as defined under the U.S. Resource Conservation and Recovery Act (RCRA).

SECTION 14: TRANSPORTATION INFORMATION

Hydrated lime is not classified as a hazardous material by US DOT and is not regulated by the Transportation of Dangerous Goods (TDG) when shipped by any mode of transport.

SECTION 15: REGULATORY INFORMATION

U.S. EPA Regulations:

RCRA Hazardous Waste Number (40 CFR 261.33): **not listed**
RCRA Hazardous Waste Classification (40 CFR 261): **not classified**
CERCLA Hazardous Substance (40 CFR 302.4) **unlisted specific per RCRA**, Sec. 3001;
CWA, Sec. 311(b)(4); CWA, Sec. 307(a), CAA, Sec. 112
CERCLA Reportable Quantity (RQ), **not listed**
SARA 311/312 Codes: **not listed**
SARA Toxic Chemical (40 CFR 372.65): **not listed**
SARA EHS (Extremely Hazardous Substance) (40 CFR 355): **not listed**
Threshold Planning Quantity (TPQ): **not listed**
All chemical ingredients are listed on the US EPA TSCA Inventory List.

OSHA/MSHA Regulations:

Air Contaminant (29 CFR 1910.1000, Table Z-1, Z-1-A): 5mg/M3 TWA-8
MSHA: **not listed**
OSHA Specifically Regulated Substance (29 CFR 1910): **not listed**
State Regulations: Consult state and local authorities for guidance. Components found in this product may contain trace amounts of inherent naturally occurring elements (such as, but not limited to arsenic and cadmium) that may be regulated under California Proposition 65 and other states regulations.

Canada:
WHMIS Classification: "D2A" Materials Causing Other Toxic Effects
WHMIS Classification: "E" Corrosive Materials (listed due to corrosive effect on aluminum)
Canada DSL: **Listed**

SECTION 16: OTHER INFORMATION

Prepared By:	Cheney Lime and Cement Company
Date Prepared:	June 1, 2015
NFPA Hazard Class:	Health: 2 Flammability: 0 Instability: 0
HMIS Hazard Class:	Health: 2* Flammability: 0

Physical Hazard: 0
Personal Protection: E
Abbreviations: N/A - Not Applicable, IARC - International Agency for Research on Cancer, IATA - International Air Transport Association, ACGIH - American Conference of Governmental Industrial Hygienists, TWA - Time Weighted Average, PEL - Permissible Exposure Limit, TLV - Threshold Limit Value REL Recommended Exposure Limit.

Cheney lime and Cement Company provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must consult their own technical and legal advisors and/ or exercise their own judgment in determining its appropriateness for a particular purpose.

Cheney Lime and Cement Company makes no representations or warranties, either express or implied, including without limitation and warranties of merchantability or fitness for a particular purpose with respect to the information set forth herein or the product(s) to which the information refers. Accordingly, Cheney Lime And Cement Company will not be responsible or liable for any claims, losses or damages resulting from the use of or reliance upon or failure to use this information.

Revision: 02
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SAFETY DATA SHEET

Hydrochloric Acid

Version	Revision Date:	SDS Number:	Date of last issue: 04/14/2020
8.1	10/10/2020	1332004-00039	Date of first issue: 02/27/2017

SECTION 1. IDENTIFICATION

Product name : Hydrochloric Acid

SDS-Identcode : 130000030952

Manufacturer or supplier's details

Company name of supplier : The Chemours Company FC, LLC

Address : 1007 Market Street
Wilmington, DE 19801 United States of America (USA)

Telephone : 1-844-773-CHEM (outside the U.S. 1-302-773-1000)

Emergency telephone : Medical emergency: 1-866-595-1473 (outside the U.S. 1-302-773-2000) ; Transport emergency: +1-800-424-9300 (outside the U.S. +1-703-527-3887)

Recommended use of the chemical and restrictions on use

Recommended use : Industrial use

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Corrosive to Metals : Category 1

Skin corrosion : Category 1A

Serious eye damage : Category 1

Specific target organ toxicity - single exposure : Category 3

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.
H335 May cause respiratory irritation.

Precautionary Statements : **Prevention:**

P234 Keep only in original container.
P261 Avoid breathing mist or vapors.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves, protective clothing, eye protection and face protection.

Response:

P301 + P330 + P331 + P310 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER.
P303 + P361 + P353 + P310 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water. Immediately call a POISON CENTER.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER.
P363 Wash contaminated clothing before reuse.
P390 Absorb spillage to prevent material damage.

Storage:

P405 Store locked up.
P406 Store in corrosive resistant container with a resistant inner liner.

Disposal:

P501 Dispose of contents and container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Chemical name	CAS-No.	Concentration (% w/w)
Hydrochloric acid	7647-01-0	17 - <= 34

SECTION 4. FIRST AID MEASURES

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

If inhaled : If inhaled, remove to fresh air.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.

		Get medical attention immediately.
In case of skin contact	:	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.
In case of eye contact	:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lens, if worn. Get medical attention immediately.
If swallowed	:	If swallowed, DO NOT induce vomiting. If vomiting occurs have person lean forward. Call a physician or poison control center immediately. Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed	:	corrosive effects Causes serious eye damage. May cause respiratory irritation. Causes severe burns. Causes digestive tract burns.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).
Notes to physician	:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire fighting	:	Exposure to combustion products may be a hazard to health.
Hazardous combustion products	:	Chlorine compounds
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.

Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).
Environmental precautions	:	Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Soak up with inert absorbent material. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	If sufficient ventilation is unavailable, use with local exhaust ventilation.
Advice on safe handling	:	Do not get on skin or clothing. Avoid breathing mist or vapors. Do not swallow. Do not get in eyes. Wash skin thoroughly after handling. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Keep container tightly closed. Already sensitized individuals should consult their physician regarding working with respiratory irritants or sensitizers. Keep away from metals. Store in original container or corrosive resistant and/or lined container. Keep only in original packaging.

Take care to prevent spills, waste and minimize release to the environment.

Conditions for safe storage : Keep in properly labeled containers.
Store in original container.
Store locked up.
Keep tightly closed.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.
Reacts with many metals to liberate hydrogen gas which can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage.

Materials to avoid : Do not store with the following product types:
Strong oxidizing agents
Organic peroxides
Explosives

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrochloric acid	7647-01-0	C	2 ppm	ACGIH
		C	5 ppm 7 mg/m³	NIOSH REL
		C	5 ppm 7 mg/m³	OSHA Z-1

Engineering measures : Minimize workplace exposure concentrations.
If sufficient ventilation is unavailable, use with local exhaust ventilation.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection
Material : Neoprene

Remarks	:	Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!
Eye protection	:	Wear the following personal protective equipment: Chemical resistant goggles must be worn. If splashes are likely to occur, wear: Face-shield
Skin and body protection	:	Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential. Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).
Hygiene measures	:	If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Color	:	Colorless to pale yellow
Odor	:	pungent
Odor Threshold	:	No data available
pH	:	0.75
Melting point/freezing point	:	-67 °F / -55 °C
Initial boiling point and boiling range	:	226 °F / 108 °C
Flash point	:	does not flash
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable
Flammability (liquids)	:	No data available

Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	20 hPa
Relative vapor density	:	1.3
Relative density	:	1.1
Solubility(ies)		
Water solubility	:	completely soluble
Partition coefficient: n-octanol/water	:	Not applicable
Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity		
Viscosity, kinematic	:	No data available
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Metal corrosion rate	:	Corrosive to metals
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Can react with strong oxidizing agents. May be corrosive to metals.
Conditions to avoid	:	None known.
Incompatible materials	:	Oxidizing agents Bases
Hazardous decomposition products	:	No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Components:

Hydrochloric acid:

Acute inhalation toxicity	:	LC50 (Rat): 8.3 mg/l Exposure time: 30 min Test atmosphere: dust/mist

Skin corrosion/irritation

Causes severe burns.

Components:

Hydrochloric acid:

Species	:	reconstructed human epidermis (RhE)
Method	:	OECD Test Guideline 431
Result	:	Corrosive after 3 minutes or less of exposure

Serious eye damage/eye irritation

Causes serious eye damage.

Components:

Hydrochloric acid:

Species	:	Bovine cornea
Method	:	OECD Test Guideline 437
Result	:	Irreversible effects on the eye

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Components:

Hydrochloric acid:

Test Type	:	Maximization Test
Routes of exposure	:	Skin contact
Species	:	Guinea pig

Method	:	OECD Test Guideline 406
Result	:	negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Hydrochloric acid:

Genotoxicity in vitro	:	Test Type: Saacharomyces cerevisiae, miotic recombination assay (in vitro) Result: negative

Carcinogenicity

Not classified based on available information.

Components:

Hydrochloric acid:

Species	:	Rat
Application Route	:	Inhalation
Exposure time	:	128 weeks
Result	:	negative

IARC No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

STOT-single exposure

May cause respiratory irritation.

Components:

Hydrochloric acid:

Assessment	:	May cause respiratory irritation.

STOT-repeated exposure

Not classified based on available information.

Aspiration toxicity

Not classified based on available information.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with local regulations.
Contaminated packaging	:	Empty containers should be taken to an approved waste handling site for recycling or disposal. If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 1789
Proper shipping name	:	HYDROCHLORIC ACID SOLUTION
Class	:	8
Packing group	:	II
Labels	:	8

IATA-DGR

UN/ID No.	:	UN 1789
Proper shipping name	:	Hydrochloric acid solution
Class	:	8
Packing group	:	II
Labels	:	Corrosive
Packing instruction (cargo aircraft)	:	855
Packing instruction (passenger aircraft)	:	851

IMDG-Code

UN number	:	UN 1789
Proper shipping name	:	HYDROCHLORIC ACID SOLUTION
Class	:	8
Packing group	:	II

Labels : 8
EmS Code : F-A, S-B
Marine pollutant : no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number : UN 1789
Proper shipping name : Hydrochloric acid SOLUTION

Class : 8
Packing group : II
Labels : CORROSIVE
ERG Code : 157
Marine pollutant : no

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Hydrochloric acid	7647-01-0	5000	14705

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards : Corrosive to Metals
Skin corrosion or irritation
Serious eye damage or eye irritation
Specific target organ toxicity (single or repeated exposure)

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

US State Regulations

Pennsylvania Right To Know

Water	7732-18-5
Hydrochloric acid	7647-01-0

California List of Hazardous Substances

Hydrochloric acid	7647-01-0

California Permissible Exposure Limits for Chemical Contaminants

Hydrochloric acid 7647-01-0

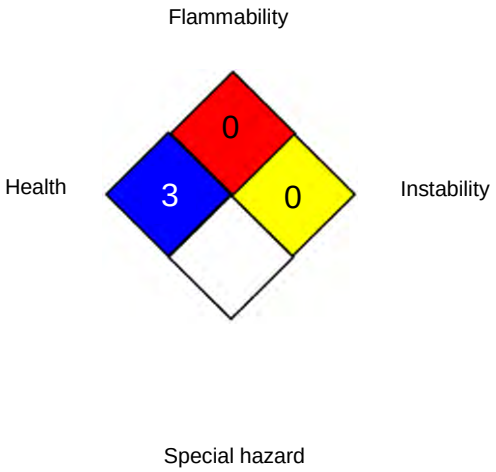
California List of Acutely Hazardous Chemicals, Toxics and Reactives

Hydrochloric acid 7647-01-0

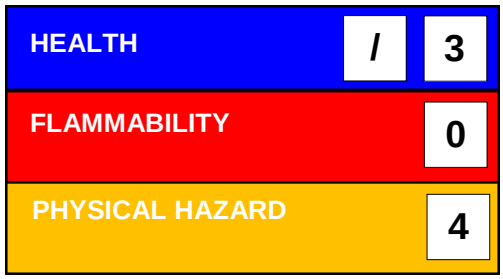
SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



HMIS® IV:



HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

Before use read Chemours safety information.
For further information contact the local Chemours office or nominated distributors.
Do not use or resell Chemours™ materials in medical applications involving implantation in the human body or contact with internal body fluids or tissues unless agreed to by Seller in a written agreement covering such use. For further information, please contact your Chemours representative.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / C	:	Ceiling limit
NIOSH REL / C	:	Ceiling value not be exceeded at any time.
OSHA Z-1 / C	:	Ceiling

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule;

ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	10/10/2020

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY

Product name: **Polytec PT-318**

Company:
Polytec, Inc.
191 Barley Park Lane
Mooresville, NC 28115

Telephone: 704-660-5195
Telefax: 704-662-3498
E-mail: customerservice@polytecinc.net

Emergency telephone number: 800-424-9300 CHEMTREC (CCN 17585), Outside U.S. 703-527-3887

Product Use: Processing aid for industrial applications.

2. HAZARDS IDENTIFICATION

Appearance and Odor:

Form: Liquid

Color: Clear to Amber

Odor: None

Potential Health Effects:
See Section 11 for more information.

Eye: May cause slight temporary eye irritation with susceptible persons.

Skin: May cause skin irritation with susceptible persons.

Potential Physical/Chemical Effects:
Spills produce extremely slippery surfaces.

OSHA Regulatory Status:
This material is not considered hazardous in accordance with OSHA 29 CFR 1910.1200.

Potential Environmental Effects:
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment See Section 12 for more information.

Other information No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification:
Cationic polymer in solution.

Regulated Components:

Chemical Name	CAS Number:	Concentration/ -range:
Dimethylamine, epichlorohydrin, ethylenediamine polymer	42751-79-1	49-50 %

4. FIRST AID MEASURES

Inhalation: Move to fresh air. No hazards which require special first aid measures.

Skin contact: Wash with water and soap as a precaution. Get medical attention if irritation develops and persists.

Eye contact: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion: Rinse mouth. Do not induce vomiting. Get medical attention if symptoms occur.

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.

Unsuitable extinguishing media: None.

Precautions: Spills produce extremely slippery surfaces.

Special protective equipment for firefighters: Wear self-contained breathing apparatus and protective suit.

Specific methods: Keep personnel removed and upwind of fire.

Specific hazards: In the event of fire the following can be released: Carbon Oxides. Nitrogen Oxides.

Flash point (°C): Does not flash.

Autoignition temperature (°C): Does not ignite.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Keep people away from spill/leak. Do not touch or walk through spilled material. Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Environmental precautions: Do not contaminate water. As with all chemical products, do not flush into surface water.

Methods for cleaning up: Do not flush with water. Dam up. Soak up with inert absorbent material. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Storage: Keep in a dry cool place (0 - 30 °C). Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material.

Technical measures/Precautions: No special precautions required.

Incompatible products: None.

Technical measures/Storage conditions: No special storage conditions required.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:
None.

Engineering measures: Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Personal protective equipment:

Respiratory protection: No personal respiratory protective equipment normally required.

Hand protection: PVC or other plastic material gloves.

Eye protection: Safety glasses with side-shields.

Skin and body protection: Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur.

Hygiene measures: Wash hands before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Liquid
Color:	Clear to Amber
Odor:	None
pH:	4 - 7
Specific Gravity:	1.15
Melting point/range (°C):	< 0°C
Flash point (°C):	Does not flash.
Boiling point (°C):	> 100°C
Autoignition temperature (°C):	Does not ignite.
Vapor pressure (mm Hg):	2.3 kPa @ 20°C
Viscosity (mPa.s):	See Technical Bulletin
Water solubility:	Completely miscible
LogPow:	< 0

10. STABILITY AND REACTIVITY

Conditions to avoid: Avoid extremes of temperature. Protect from light, moisture and damage.

Stability: Stable. Hazardous polymerisation does not occur.

Materials to avoid: None.

Hazardous decomposition products: Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NOx), carbon oxides (COx). Hydrogen cyanide (hydrocyanic acid).

11. TOXICOLOGICAL INFORMATION

Product Information

Acute toxicity:

Oral: LD50/oral/rat > 5000 mg/kg

Dermal: LD50/dermal/rat > 5000 mg/kg

Inhalation: The product is not expected to be toxic by inhalation.

Irritation:

Skin: May cause skin irritation with susceptible persons.

Eyes: May cause slight temporary eye irritation with suceptible persons.

Sensitization: Not sensitizing.

Mutagenicity: Not mutagenic.

Carcinogenicity: Not carcinogenic.

Reproductive effects: Not toxic for reproduction.

Chronic toxicity: NOEL/oral/rat/90 days = 2000 mg/kg/day

Other information: Not mutagenic in Ames Test. Not mutagenic in micronucleus test on mice.

Component Information

Dimethylamine, epichlorohydrin, ethylenediamine polymer

Acute toxicity:

Oral: LD50/oral/rat > 2000 mg/kg

Dermal: LD50/dermal/rat > 2000 mg/kg

Inhalation: The product is not expected to be toxic by inhalation.

Irritation:

Skin: No skin irritation

Eyes: Not irritating.

Sensitization: The product is not expected to be sensitizing.

Mutagenicity: By analogy with similar products, this product is not expected to to be mutagenic.

Carcinogenicity: By analogy with similar substances, this substance is not expected to be carcinogenic.

Reproductive effects: By analogy with similar substances, this substance is not expected to be toxic for reproduction.

Chronic toxicity: No chronic effects.

12. ECOLOGICAL INFORMATION

Product Information

Aquatic toxicity:

Toxicity to fish: LC50/Danio rerio/96 hours = 10 - 100 mg/L

Toxicity to daphnia: EC50/Daphnia magna/48 hours = 10 - 100 mg/L

Toxicity to algae: Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogenous distribution which invalidates the test.

Environmental fate:

Persistence and degradability: Not readily biodegradable.

Hydrolysis: Does not hydrolyse.

Bioaccumulation: Does not bioaccumulate.

LogPow: < 0

LogKow: Not determined.

Component Information

Dimethylamine, epichlorohydrin, ethylenediamine polymer

Aquatic toxicity:

Toxicity to fish: LC50/Danio rerio/96 hours = 10 - 100 mg/L

Toxicity to daphnia: EC50/Daphnia magna/48 hours = 10 - 100 mg/L

Toxicity to algae: Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogenous distribution which invalidates the test.

Environmental fate:

Persistence and degradability: Not readily biodegradable.

Hydrolysis: Does not hydrolyse.

Bioaccumulation: The product is not expected to bioaccumulate.

LogPow: < 0

LogKow: Not determined.

13. DISPOSAL CONSIDERATIONS

Disposal: Dispose of in accordance with local, state and federal regulations.

Container: Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT:
Not classified as dangerous in the meaning of DOT regulations.

IMDG/IMO:
Not classified as dangerous in the meaning of IMO/IMDG regulations.

ICAO/IATA:
Not classified as dangerous in the meaning of ICAO/IATA regulations.

15. REGULATORY INFORMATION

Product Information

US SARA Reporting Requirements: None.

RCRA status : Not RCRA hazardous.

SARA (Section 311/312) hazard class: Not concerned.

International Inventories:

USA (TSCA): All components of this product are either listed on the inventory or are exempt from listing.

Canada (DSL): All components of this product are either listed on the inventory or are exempt from listing.

China (IECSC): All components of this product are either listed on the inventory or are exempt from listing.

European Union (REACH): All components of this product have been registered or pre-registered with the European Chemicals Agency or are exempt from registration.

Australia (AICS): All components of this product are either listed on the inventory or are exempt from listing.

Japan (ENCS): All components of this product are either listed on the inventory or are exempt from listing.

Korea (ECL): All components of this product are either listed on the inventory or are exempt from listing.

Philippines (PICCS): All components of this product are either listed on the inventory or are exempt from listing.

Taiwan (CSNN): All components of this product are either listed on the inventory or are exempt from listing.

New Zealand (NZIoC): All components of this product are either listed on the inventory or are exempt from listing.

16. OTHER INFORMATION

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0

HMIS:

Health:	0
Flammability:	0
Physical Hazard:	0
PPE Code:	B

This MSDS was prepared in accordance with the following:
ISO 11014-1: Material Safety Data Sheet for Chemical Products
ANSI Z400.1-2004; Material Safety Data Sheets - Preparation

Revision Number: 15.01.a LDCC002

SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY

Product name: **Polytec PT-414**

Company:
Polytec, Inc.
191 Barley Park Lane
Mooresville, NC 28115

Telephone: 704-660-5195
Telefax: 704-662-3498
E-mail: customerservice@polytecinc.net

Emergency telephone number: 800-424-9300 CHEMTREC (CCN 17585), Outside U.S. 703-527-3887

Product Use: Processing aid for industrial applications.

2. HAZARDS IDENTIFICATION

Appearance and Odor:

Form: Granular solid

Color: White

Odor: None

Potential Health Effects:
None. See Section 11 for more information.

Potential Physical/Chemical Effects:
Aqueous solutions or powders that become wet render surfaces extremely slippery.

OSHA Regulatory Status:
This material is not considered hazardous in accordance with OSHA 29 CFR 1910.1200.

Potential Environmental Effects:
None. See Section 12 for more information.

Other information No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification:
Anionic water-soluble polymer.

Regulated Components:
None.

4. FIRST AID MEASURES

Inhalation: Move to fresh air.

Skin contact: Wash with water and soap as a precaution. Get medical attention if irritation develops and persists.

Eye contact: Rinse thoroughly with plenty of water, also under the eyelids. Get medical attention.

Ingestion: Rinse mouth with water. Do not induce vomiting. Get medical attention

5. FIRE FIGHTING MEASURES

Suitable extinguishing media: Water. Water spray. Foam. Dry powder. Carbon dioxide (CO2).

Unsuitable extinguishing media: None.

Precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.

Special protective equipment for firefighters: In case of fire, wear a self contained breathing apparatus

Specific methods: Keep personnel removed and upwind of fire.

Specific hazards: In the event of fire the following can be released: Nitrogen Oxides. Carbon Oxides. Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

Flash point (°C): Not applicable.

Autoignition temperature (°C): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection). The product when wet renders surfaces extremely slippery

Environmental precautions: As with all chemical products, do not flush into surface water.

Methods for cleaning up: Do not flush with water. Clean up promptly by sweeping or vacuum Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.

Storage: Keep in a dry, cool and well-ventilated place. The recommended storage temperature is 5-30 °C.

Technical measures/Precautions: No special precautions required.

Incompatible products: Oxidising agents.

Technical measures/Storage conditions: No special storage conditions required.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits:
None.

Engineering measures: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal protective equipment:

Respiratory protection: Dust safety masks are recommended where concentration of total dust is more than 10 mg/m^3.

Hand protection: PVC or other plastic material gloves.

Eye protection: Safety glasses with side-shields. Do not wear contact lenses where this product is used.

Skin and body protection: Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene measures: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form:	Granular solid
Color:	White
Odor:	None
pH:	5 - 9 @ 5 g/L
Melting point/range (°C):	> 150°C
Flash point (°C):	Not applicable.
Boiling point (°C):	Not applicable
Autoignition temperature (°C):	Not applicable.
Vapor pressure (mm Hg):	Not applicable
Approx. bulk density:	0.6 - 0.9
Viscosity (mPa.s):	See Technical Bulletin
Water solubility:	Completely soluble
LogPow:	-2

10. STABILITY AND REACTIVITY

Stability: Stable. Hazardous polymerisation does not occur.

Materials to avoid: Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products: Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx), hydrogen cyanide (hydrocyanic acid).

11. TOXICOLOGICAL INFORMATION

Product Information

Acute toxicity:

Oral: LD50/oral/rat > 5000 mg/kg

Dermal: LD50/dermal/rat > 5000 mg/kg

Inhalation: The product is not expected to be toxic by inhalation.

Irritation:

Skin: Not irritating.

Eyes: Not irritating.

Sensitization: Not sensitizing.

Mutagenicity: Not mutagenic.

Carcinogenicity: Not carcinogenic.

Reproductive effects: Not toxic for reproduction.

Chronic toxicity: No chronic effects.

12. ECOLOGICAL INFORMATION

Product Information

Aquatic toxicity:

Toxicity to fish: LC50/Danio rerio/96 hours > 100 mg/L (OECD 203)

Toxicity to daphnia: EC50/Daphnia magna/48 hours > 100 mg/L (OECD 202)

Toxicity to algae: IC50/Scenedesmus subspicatus/72 hours > 100 mg/L (OECD 201)

Environmental fate:

Persistence and degradability: Not readily biodegradable.

Hydrolysis: Does not hydrolyse.

Bioaccumulation: Does not bioaccumulate.

LogPow: -2

LogKow: Not determined.

13. DISPOSAL CONSIDERATIONS

Disposal: Dispose of in accordance with local, state and federal regulations.

Container: Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT:
Not classified as dangerous in the meaning of DOT regulations.

IMDG/IMO:
Not classified as dangerous in the meaning of IMO/IMDG regulations.

ICAO/IATA:
Not classified as dangerous in the meaning of ICAO/IATA regulations.

15. REGULATORY INFORMATION

Product Information

US SARA Reporting Requirements: None.

SARA (Section 311/312) hazard class: Not concerned.

RCRA status : Not RCRA hazardous.

California Proposition 65 Information: WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide.

International Inventories:

USA (TSCA): All components of this product are either listed on the inventory or are exempt from listing.

Canada (DSL): All components of this product are either listed on the inventory or are exempt from listing.

China (IECSC): All components of this product are either listed on the inventory or are exempt from listing.

European Union (REACH): All components of this product have been registered or pre-registered with the European Chemicals Agency or are exempt from registration.

Australia (AICS): All components of this product are either listed on the inventory or are exempt from listing.

Japan (ENCS): All components of this product are either listed on the inventory or are exempt from listing.

Korea (ECL): All components of this product are either listed on the inventory or are exempt from listing.

Philippines (PICCS): All components of this product are either listed on the inventory or are exempt from listing.

Taiwan (CSNN): All components of this product are either listed on the inventory or are exempt from listing.

New Zealand (NZIoC): All components of this product are either listed on the inventory or are exempt from listing.

16. OTHER INFORMATION

NFPA and HMIS Ratings:

NFPA:

Health:	0
Flammability:	0
Instability:	0

HMIS:

Health:	0
Flammability:	0
Physical Hazard:	0
PPE Code:	B

This MSDS was prepared in accordance with the following:
ISO 11014-1: Material Safety Data Sheet for Chemical Products
ANSI Z400.1-2004; Material Safety Data Sheets - Preparation

Revision Number: 15.01.a PRAC001

We undertake to immediately inform and update this certificate whenever a modification of a raw material and/or additive is done or when changes have occured in the regulations, which are referred to in the certificates.

Sulfuric Acid, 70-100%

Safety Data Sheet

According to U.S. Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules And Regulations and according to Canada's Hazardous Products Regulation, February 11, 2015.

Revision Date: 05/07/2018 Date of Issue: 05/31/2016 Version: 4.0

SECTION 1: IDENTIFICATION

Product Identifier

Product Form: Mixture

Product Name: Sulfuric Acid, 70-100%

Formula: H_2-O_4-S

Intended Use of the Product

Use Of The Substance/Mixture: Industrial use.

Name, Address, and Telephone of the Responsible Party

Manufacturer

CHEMTRADE LOGISTICS INC.
155 Gordon Baker Road
Suite 300
Toronto, Ontario M2H 3N5
For SDS Info: (416) 496-5856
www.chemtradelogistics.com

Emergency Telephone Number

Emergency Number : Canada: CANUTEC +1-613-996-6666 / US: CHEMTREC +1-800-424-9300
INTERNATIONAL: +1-703-741-5970
Chemtrade Emergency Contact: (866) 416-4404
For Chemical Emergency, Spill, Leak, Fire, Exposure, or Accident, call CHEMTREC – Day or Night

SECTION 2: HAZARDS IDENTIFICATION

Classification of the Substance or Mixture

GHS Classification

Met. Corr. 1	H290
Skin Corr. 1A	H314
Eye Dam. 1	H318
Carc. 1A	H350
Aquatic Acute 3	H402

Full text of hazard classes and H-statements : see section 16

Label Elements

GHS Labeling

Hazard Pictograms :


GHS05


GHS08

Signal Word : Danger

Hazard Statements : H290 - May be corrosive to metals.
H314 - Causes severe skin burns and eye damage.
H318 - Causes serious eye damage.
H350 - May cause cancer (Inhalation).
H402 - Harmful to aquatic life.

Precautionary Statements : P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P234 - Keep only in original container.
P260 - Do not breathe vapors, mist, or spray.
P264 - Wash hands, forearms, and other exposed areas thoroughly after handling.
P273 - Avoid release to the environment.
P280 - Wear protective gloves, protective clothing, and eye protection.
P301+P330+P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303+P361+P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304+P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 - If exposed or concerned: Get medical advice/attention.
P310 - Immediately call a POISON CENTER or doctor.
P321 - Specific treatment (see section 4 on this SDS).
P363 - Wash contaminated clothing before reuse.
P390 - Absorb spillage to prevent material damage.
P405 - Store locked up.
P406 - Store in corrosive resistant container with a resistant inner liner.
P501 - Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Other Hazards

Exposure may aggravate pre-existing eye, skin, or respiratory conditions.

Unknown acute toxicity

No data available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Name	Product Identifier	%*	GHS Ingredient Classification
Sulfuric acid**	(CAS-No.) 7664-93-9	70 - 100	Met. Corr. 1, H290 Skin Corr. 1A, H314 Eye Dam. 1, H318 Carc. 1A, H350 Aquatic Acute 3, H402
Water	(CAS-No.) 7732-18-5	0.1 - 30	Not classified

Full text of H-phrases: see section 16

*Percentages are listed in weight by weight percentage (w/w%) for liquid and solid ingredients. Gas ingredients are listed in volume by volume percentage (v/v%).

**Strong inorganic acid aerosols/mists containing this substance are carcinogenic to humans via inhalation. Under normal conditions of use this route of exposure is not expected.

SECTION 4: FIRST AID MEASURES

Description of First-aid Measures

General: Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).

Inhalation: When symptoms occur: go into open air and ventilate suspected area. Obtain medical attention if breathing difficulty persists.

Skin Contact: Remove contaminated clothing. Immediately flush skin with plenty of water for at least 30 minutes. Get immediate medical advice/attention. Wash contaminated clothing before reuse.

Eye Contact: Rinse cautiously with water for at least 30 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get immediate medical advice/attention.

Ingestion: Rinse mouth. Do NOT induce vomiting. Obtain medical attention.

Most Important Symptoms and Effects Both Acute and Delayed

General: Corrosive to eyes, respiratory system and skin. May cause cancer.

Inhalation: May be corrosive to the respiratory tract.

Skin Contact: Causes severe irritation which will progress to chemical burns.

Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Ingestion: May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans. Prolonged inhalation of fumes or mists may cause erosion of the teeth.

Indication of Any Immediate Medical Attention and Special Treatment Needed

If exposed or concerned, get medical advice and attention. If medical advice is needed, have product container or label at hand.

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing Media

Suitable Extinguishing Media: Foam, carbon dioxide, dry chemical.

Unsuitable Extinguishing Media: Do not use water. Do not get water inside containers. Do not apply water stream directly at source of leak.

Special Hazards Arising From the Substance or Mixture

Fire Hazard: Not flammable.

Explosion Hazard: Product is not explosive.

Reactivity: May be corrosive to metals. Contact with metals may evolve flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction. This product may act as an oxidizer.

Advice for Firefighters

Precautionary Measures Fire: Exercise caution when fighting any chemical fire.

Firefighting Instructions: Use water spray or fog for cooling exposed containers.

Protection During Firefighting: Do not enter fire area without proper protective equipment, including respiratory protection.

Hazardous Combustion Products: Toxic fumes are released.

Other Information: Do not allow run-off from fire fighting to enter drains or water courses.

Reference to Other Sections

Refer to Section 9 for flammability properties.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment and Emergency Procedures

General Measures: Do not get in eyes, on skin, or on clothing. Do not breathe vapor, mist or spray. Do not handle until all safety precautions have been read and understood.

For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protective equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

For Emergency Personnel

Protective Equipment: Equip cleanup crew with proper protection.

Emergency Procedures: Upon arrival at the scene, a first responder is expected to recognize the presence of dangerous goods, protect oneself and the public, secure the area, and call for the assistance of trained personnel as soon as conditions permit. Ventilate area.

Environmental Precautions

Prevent entry to sewers and public waters. Avoid release to the environment.

Methods and Materials for Containment and Cleaning Up

For Containment: Contain any spills with dikes or absorbents to prevent migration and entry into sewers or streams. As an immediate precautionary measure, isolate spill or leak area in all directions.

Methods for Cleaning Up: Clean up spills immediately and dispose of waste safely. Absorb spillage to prevent material damage. Cautiously neutralize spilled liquid. Transfer spilled material to a suitable container for disposal. Contact competent authorities after a spill.

Reference to Other Sections

See Section 8 for exposure controls and personal protection and Section 13 for disposal considerations.

SECTION 7: HANDLING AND STORAGE

Precautions for Safe Handling

Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Handle empty containers with care because they may still present a hazard. Do not get in eyes, on skin, or on clothing. Do not breathe vapors, mist, spray. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Additional Hazards When Processed: May be corrosive to metals. May release corrosive vapors. NEVER pour water into this substance; when dissolving or diluting always add it slowly to the water.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures.

Conditions for Safe Storage, Including Any Incompatibilities

Technical Measures: Comply with applicable regulations.

Storage Conditions: Keep container closed when not in use. Store in a dry, cool place. Keep/Store away from extremely high or low temperatures and incompatible materials. Store in original container or corrosive resistant and/or lined container.

Incompatible Materials: Combustible materials. Reducing agents. Strong oxidizers. Strong bases. Metals. Water.

Specific End Use(s)

Industrial use.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

For substances listed in section 3 that are not listed here, there are no established Exposure limits from the manufacturer, supplier, importer, or the appropriate advisory agency including: ACGIH (TLV), AIHA (WEEL), NIOSH (REL), OSHA (PEL), Canadian provincial governments, or the Mexican government.

Sulfuric acid (7664-93-9)		
Mexico	OEL TWA (mg/m³)	1 mg/m³
USA ACGIH	ACGIH TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
USA ACGIH	ACGIH chemical category	Suspected Human Carcinogen contained in strong inorganic acid mists
USA OSHA	OSHA PEL (TWA) (mg/m³)	1 mg/m³
USA NIOSH	NIOSH REL (TWA) (mg/m³)	1 mg/m³
USA IDLH	US IDLH (mg/m³)	15 mg/m³
Alberta	OEL STEL (mg/m³)	3 mg/m³
Alberta	OEL TWA (mg/m³)	1 mg/m³
British Columbia	OEL TWA (mg/m³)	0.2 mg/m³ (Thoracic, contained in strong inorganic acid mists)
Manitoba	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
New Brunswick	OEL STEL (mg/m³)	3 mg/m³
New Brunswick	OEL TWA (mg/m³)	1 mg/m³
Newfoundland & Labrador	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Nova Scotia	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Nunavut	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction)
Nunavut	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction)
Northwest Territories	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction, strong acid mists only)
Northwest Territories	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction, strong acid mists only)
Ontario	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic)
Prince Edward Island	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic particulate matter)
Québec	VECD (mg/m³)	3 mg/m³
Québec	VEMP (mg/m³)	1 mg/m³
Saskatchewan	OEL STEL (mg/m³)	0.6 mg/m³ (thoracic fraction)
Saskatchewan	OEL TWA (mg/m³)	0.2 mg/m³ (thoracic fraction)
Yukon	OEL STEL (mg/m³)	1 mg/m³
Yukon	OEL TWA (mg/m³)	1 mg/m³

Exposure Controls

Appropriate Engineering Controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Ensure adequate ventilation, especially in confined areas. Ensure all national/local regulations are observed.

Personal Protective Equipment: Gloves. Protective clothing. Protective goggles. Face shield. Insufficient ventilation: wear respiratory protection.

Materials for Protective Clothing: Acid-resistant clothing.

Hand Protection: Wear protective gloves.

Eye Protection: Chemical safety goggles and face shield.

Skin and Body Protection: Wear suitable protective clothing.

Respiratory Protection: If exposure limits are exceeded or irritation is experienced, approved respiratory protection should be worn. In case of inadequate ventilation, oxygen deficient atmosphere, or where exposure levels are not known wear approved respiratory protection.

Other Information: When using, do not eat, drink or smoke.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Physical State	:	Liquid
Appearance	:	Clear, Colorless to Amber, Oily
Odor	:	Pungent
Odor Threshold	:	Not available
pH	:	0.3
Evaporation Rate	:	Not available
Melting Point	:	10.56 °C (51.01 °F)
Freezing Point	:	Not available
Boiling Point	:	290 °C (554 °F)
Flash Point	:	Not applicable
Auto-ignition Temperature	:	Not applicable
Decomposition Temperature	:	Not available
Flammability (solid, gas)	:	Not applicable
Lower Flammable Limit	:	Not applicable
Upper Flammable Limit	:	Not applicable
Vapor Pressure	:	0.00027 - 0.16 kPa at 25 °C (77 °F)
Relative Vapor Density at 20°C	:	3.4 (air = 1)
Relative Density	:	Not available
Specific Gravity	:	1.84 g/l
Solubility	:	Water: Miscible
Partition Coefficient: N-Octanol/Water	:	Not available
Viscosity	:	Not available

SECTION 10: STABILITY AND REACTIVITY

Reactivity: May be corrosive to metals. Contact with metals may evolve flammable hydrogen gas. May react exothermically with water releasing heat. Adding an acid to a base or base to an acid may cause a violent reaction. This product may act as an oxidizer.

Chemical Stability: Stable under recommended handling and storage conditions (see section 7).

Possibility of Hazardous Reactions: Hazardous polymerization will not occur.

Conditions to Avoid: Extremely high or low temperatures and incompatible materials.

Incompatible Materials: Combustible materials. Reducing agents. Strong bases. Strong oxidizers. Metals. Water.

Hazardous Decomposition Products: Thermal decomposition generates: Corrosive vapors.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on Toxicological Effects - Product

Acute Toxicity (Oral): Not classified

Acute Toxicity (Dermal): Not classified

Acute Toxicity (Inhalation): Not classified

LD50 and LC50 Data: Not available

Skin Corrosion/Irritation: Causes severe skin burns and eye damage.

pH: 0.3

Eye Damage/Irritation: Causes serious eye damage.

pH: 0.3

Respiratory or Skin Sensitization: Not classified

Germ Cell Mutagenicity: Not classified

Carcinogenicity: May cause cancer (Inhalation).

Specific Target Organ Toxicity (Repeated Exposure): Not classified

Reproductive Toxicity: Not classified

Specific Target Organ Toxicity (Single Exposure): Not classified

Aspiration Hazard: Not classified

Symptoms/Effects After Inhalation: May be corrosive to the respiratory tract.

Symptoms/Effects After Skin Contact: Causes severe irritation which will progress to chemical burns.

Symptoms/Effects After Eye Contact: Causes permanent damage to the cornea, iris, or conjunctiva.

Symptoms/Effects After Ingestion: May cause burns or irritation of the linings of the mouth, throat, and gastrointestinal tract.

Chronic Symptoms: Strong inorganic acid mists containing sulfuric acid are carcinogenic to humans. Prolonged inhalation of fumes or mists may cause erosion of the teeth.

Information on Toxicological Effects - Ingredient(s)

LD50 and LC50 Data:

Water (7732-18-5)	
LD50 Oral Rat	> 90000 mg/kg

Sulfuric acid (7664-93-9)	
LD50 Oral Rat	2140 mg/kg
LC50 Inhalation Rat	510 mg/m³ (Exposure time: 2 h)

Sulfuric acid (7664-93-9)	
IARC Group	1
OSHA Hazard Communication Carcinogen List	In OSHA Hazard Communication Carcinogen list.

Strong inorganic acid mists containing sulfuric acid	
National Toxicology Program (NTP) Status	Known Human Carcinogens.

SECTION 12: ECOLOGICAL INFORMATION

Toxicity

Ecology - General: Harmful to aquatic life.

Sulfuric acid (7664-93-9)	
LC50 Fish 1	500 mg/l (Exposure time: 96 h - Species: Brachydanio rerio [static])
LC50 Fish 2	42 mg/l (Exposure time: 96 h - Species: Gambusia affinis [static])

Persistence and Degradability

Sulfuric Acid, 70-100%	
Persistence and Degradability	Not established.

Bioaccumulative Potential

Sulfuric Acid, 70-100%	
Bioaccumulative Potential	Not established.

Sulfuric acid (7664-93-9)	
BCF Fish 1	(no bioaccumulation)

Mobility in Soil Not available

Other Adverse Effects

Other Information: Avoid release to the environment.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Recommendations: Dispose of contents/container in accordance with local, regional, national, territorial, provincial, and international regulations.

Additional Information: Container may remain hazardous when empty. Continue to observe all precautions.

Ecology - Waste Materials: Avoid release to the environment. This material is hazardous to the aquatic environment. Keep out of sewers and waterways.

SECTION 14: TRANSPORT INFORMATION

The shipping description(s) stated herein were prepared in accordance with certain assumptions at the time the SDS was authored, and can vary based on a number of variables that may or may not have been known at the time the SDS was issued.

TRANSPORTATION CLASSIFICATION	DOT	TDG	IMDG	IATA
Identification Number	UN1830	UN1830	UN1830	UN1830
Proper Shipping Name	SULFURIC ACID	SULFURIC ACID	SULPHURIC ACID	SULPHURIC ACID
Transport Hazard Class(es)	8	8	8	8
				
Packing Group	II	II	II	II
Environmental Hazards	**Marine Pollutant :** No	**Marine Pollutant** : No	**Marine Pollutant** : No	**Marine Pollutant**: N/A
Emergency Response	**ERG Number :** 137	**ERAP Index:** 3 000	**EMS:** F-A, S-B	**ERG code (IATA):** 8L
Additional Information	Not applicable	Not applicable	Not applicable	Not applicable

SECTION 15: REGULATORY INFORMATION

US Federal Regulations

Chemical Name (CAS No.)	CERCLA RQ	EPCRA 304 RQ	SARA 302 TPQ	SARA 313
Sulfuric acid (7664-93-9)	1000 lb	1000 lb	1000 lb	Yes

SARA 311/312

Sulfuric Acid, 70-100%
Immediate (acute) health hazard. Delayed (chronic) health hazard. Reactive hazard

US TSCA Flags Not present

US State Regulations

California Proposition 65

Chemical Name (CAS No.)	Carcinogenicity	Developmental Toxicity	Female Reproductive Toxicity	Male Reproductive Toxicity
Sulfuric acid (7664-93-9)	Yes	No	No	No
Strong inorganic acid mists containing sulfuric acid	Yes	No	No	No

State Right-To-Know Lists

Sulfuric acid (7664-93-9)
U.S. - Massachusetts - Right To Know List - Yes U.S. - New Jersey - Right to Know Hazardous Substance List - Yes U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List - Yes U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances - No U.S. - Pennsylvania - RTK (Right to Know) List - Yes

Canadian Regulations

Sulfuric acid (7664-93-9)
Listed on the Canadian DSL (Domestic Substances List) Not listed on the Canadian NDSL (Non-Domestic Substances List)

International Inventories/Lists

Chemical Name (CAS No.)	Australia AICS	Turkey CICR	Korea ECL	EU EINECS	EU ELINCS	EU SVHC	EU NLP	Mexico INSQ
Sulfuric acid (7664-93-9)	Yes	No	Yes	Yes	No	No	No	No

Chemical Name (CAS No.)	China IECSC	Japan ENCS	Japan ISHL	Japan PDSCL	Japan PRTR	Philippines PICCS	New Zealand NZIOC	US TSCA
Sulfuric acid (7664-93-9)	Yes	Yes	No	Yes	No	Yes	Yes	Yes

SECTION 16: OTHER INFORMATION, INCLUDING DATE OF PREPARATION OR LAST REVISION

Date of Preparation or Latest Revision : 05/07/2018

Revision Summary

Section	Change	Date Changed
16	Data modified	05/07/2018

Other Information : This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200 and Canada's Hazardous Products Regulations (HPR).

GHS Full Text Phrases:

Aquatic Acute 3	Hazardous to the aquatic environment - Acute Hazard Category 3
Carc. 1A	Carcinogenicity Category 1A
Eye Dam. 1	Serious eye damage/eye irritation Category 1
Met. Corr. 1	Corrosive to metals Category 1
Skin Corr. 1A	Skin corrosion/irritation Category 1A
H290	May be corrosive to metals
H314	Causes severe skin burns and eye damage
H318	Causes serious eye damage
H350	May cause cancer
H402	Harmful to aquatic life

NFPA 704

NFPA Health Hazard : 3
NFPA Fire Hazard : 0
NFPA Reactivity Hazard : 2
NFPA Specific Hazards : W

HMIS Rating

Health : 3
Flammability : 0
Physical : 2
PPE See Section 8

Abbreviations and Acronyms

AICS – Australian Inventory of Chemical Substances
ACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
ATE - Acute Toxicity Estimate
BCF - Bioconcentration factor
BEI - Biological Exposure Indices (BEI)
CAS No. - Chemical Abstracts Service number
CERCLA RQ - Comprehensive Environmental Response, Compensation, and Liability Act - Reportable Quantity
CICR - Turkish Inventory and Control of Chemicals
DOT – 49 CFR – US Department of Transportation – Code of Federal Regulations Title 49 – Transportation.
EC50 - Median effective concentration
ECL - Korea Existing Chemicals List
EINECS - European Inventory of Existing Commercial Chemical Substances
ELINCS - European List of Notified Chemical Substances
EmS - IMDG Emergency Schedule Fire & Spillage
ENCS - Japanese Existing and New Chemical Substances Inventory
LC50 - Median Lethal Concentration
LD50 - Median Lethal Dose
LOAEL - Lowest Observed Adverse Effect Level
LOEC - Lowest-observed-effect Concentration
Log Pow - Octanol/water Partition Coefficient
NFPA 704 – National Fire Protection Association - Standard System for the Identification of the Hazards of Materials for Emergency Response
NIOSH - National Institute for Occupational Safety and Health
NLP - Europe No Longer Polymers List
NOAEL - No-Observed Adverse Effect Level
NOEC - No-Observed Effect Concentration
NZIOC - New Zealand Inventory of Chemicals
OEL - Occupational Exposure Limits
OSHA – Occupational Safety and Health Administration
PEL - Permissible Exposure Limits
PICCS - Philippine Inventory of Chemicals and Chemical Substances
PDSCL - Japan Poisonous and Deleterious Substances Control Law
PPE – Personal Protective Equipment

EPA – Environmental Protection Agency
EPCRA 304 RQ – EPCRA 304 Extremely Hazardous Substance Emergency Planning and Community Right-to-Know-Act – Reportable Quantity
ERAP Index – Emergency Response Assistance Plan Quantity Limit
ErC50 - EC50 in Terms of Reduction Growth Rate
ERG code (IATA) - Emergency Response Drill Code as found in the International Civil Aviation Organization (ICAO)
ERG No. - Emergency Response Guide Number
HCCL - Hazard Communication Carcinogen List
HMIS – Hazardous Materials Information System
IARC - International Agency for Research on Cancer
IATA - International Air Transport Association – Dangerous Goods Regulations
IDLH - Immediately Dangerous to Life or Health
IECSC - Inventory of Existing Chemical Substances Produced or Imported in China
IMDG - International Maritime Dangerous Goods Code
INSQ - Mexican National Inventory of Chemical Substances
ISHL - Japan Industrial Safety and Health Law
PRTR - Japan Pollutant Release and Transfer Register
REL - Recommended Exposure Limit
SADT - Self Accelerating Decomposition Temperature
SARA - Superfund Amendments and Reauthorization Act
SARA 302 - Section 302, 40 CFR Part 355
SARA 311/312 - Sections 311 and 312, 40 CFR Part 370 Hazard Categories
SARA 313 - Section 313, 40 CFR Part 372
SRCL - Specifically Regulated Carcinogen List
STEL - Short Term Exposure Limit
SVHC – European Candidate List of Substance of Very High Concern
TDG – Transport Canada Transport of Dangerous Goods Regulations
TLM - Median Tolerance Limit
TLV - Threshold Limit Value
TPQ - Threshold Planning Quantity
TSCA – United StatesToxic Substances Control Act
TWA - Time Weighted Average
WEEL - Workplace Environmental Exposure Levels

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