



Department of Energy
Office of Legacy Management

Mr. Thomas Schneider, Project Manager
Ohio Environmental Protection Agency
Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402-2911

Mr. Dave DeVault
United States Fish and Wildlife Service
Regional Office – Federal Building
Fort Snelling, Minnesota 55111

Mr. Johnny Reising, Director
U.S. Department of Energy
10995 Hamilton-Cleves Highway
Harrison, OH 45030

Dear Mr. Schneider, Mr. DeVault and Mr. Reising:

**SUBJECT: Transmittal of the 2006 Consolidated Monitoring Report for Restored Areas
at the Fernald Preserve**

This letter transmits the 2006 Consolidated Monitoring Report for Restored Areas at the Fernald Preserve. This document provides the results of implementation monitoring activities completed in restored areas at the Fernald Preserve in 2006.

If you have any questions or require additional information, please call me at 513-648-3418.

Sincerely,

Jane Powell,
Fernald Site Manager
DOE-LM-20.1

Enclosure

3610 Collins Ferry Road, P.O. Box 880, Morgantown, WV 26507	<input type="checkbox"/>	2597 B 3/4 Road, Grand Junction, CO 81503
1000 Independence Ave., S.W., Washington, DC 20585	<input type="checkbox"/>	626 Cochrans Mill Road, P.O. Box 10940, Pittsburgh, PA 15236
10995 Hamilton-Cleves, Hwy., Harrison, OH 45030	<input type="checkbox"/>	11025 Dover St., Suite 1000, Westminster, CO 80021
232 Energy Way, N. Las Vegas, NV 89030	<input type="checkbox"/>	955 Mound Road, Miamisburg, OH

REPLY TO: Fernald Preserve, Harrison, OH

Mr. Thomas Schneider
Mr. Dave DeVault
Mr. Johnny Reising
Page 2

c: w/enclosures:

M. Cullerton, Tetra Tech
S. Helmer, ODH
G. Jablonowski, USEPA-V, SR-6J
M. Murphy, USEPA-V, A-18J
J. Saric, USEPA-V, SRF-51
T. Schneider, OEPA (3 copies of enclosure)
Project Record File 115.02.10(A) (thru W. Sumner)

cc w/o enclosures:

J. Homer, Stoller
F. Johnston, Stoller

ENCLOSURE

**2006 CONSOLIDATED MONITORING REPORT
FOR RESTORED AREAS AT THE FERNALD PRESERVE
NARRATIVE SUMMARY
June 2007**

The attached tables present the data collected in 2006 for Implementation monitoring of restored areas at the Fernald Preserve. Implementation monitoring included vegetation survival and herbaceous cover within Paddys Run West, Paddys Run East, and Sub-Areas 1, 2 and 8 of the Borrow Area. Water quality data were also collected for the Phase II Wetland Mitigation Project and Sub-Area 8 of the Borrow Area.

Site precipitation data for 2006 are presented in Table 1. Monthly precipitation was below average for much of the spring and summer. As a result, restoration personnel used a combination of water tanks, water trucks and water cannons to irrigate planted and seeded areas.

Implementation Monitoring

Vegetation survival for Paddys Run West, Paddys Run East and the Borrow Area is presented in Table 2. All vegetation planted across the project area was surveyed pursuant to the methodology established in the 2002 Consolidated Monitoring Report (DOE 2003). Field survival was over 80 percent overall and for each of the individual areas except for the Aesthetic Barrier. Increased use of deer exclosure fencing continues to prove very beneficial. Most mortality observed was not due to deer, but rather to small mammals that girdled the base of sapling trees. This appears to be the reason for the increased mortality in the vicinity of the Aesthetic Barrier.

The herbaceous cover summary for Paddys Run West, Paddys Run East and a portion of the Borrow Area is presented in Table 3. Area-specific data tables are provided in Tables 3A through 3H. Again, the methodology established in the 2002 Consolidated Monitoring Report was used to collect field data. At least three random quadrats were sampled in each area. Cover in all areas is generally well established, as most quadrats sampled had greater than 90 percent total cover. Also, most native herbaceous species composition and relative frequency of native species calculations were greater than 50 percent. Table 3H demonstrates that native species establishment has been difficult in a portion of the Borrow Area. This area was seeded with a wet prairie mix, and the wetland basins and swales located within this Sub-Area appear to have a diverse assemblage of wetland vegetation. However, the hydrology of this area may be such that wet areas are limited to the constructed basins instead of the Sub-Area footprint. As a result, the seeded wetland vegetation is out-competed by upland weeds. This area will be re-evaluated in 2007 to determine if any additional actions are necessary to increase native species composition and frequency.

Water quality data were collected in each basin of the Phase II Wetland Mitigation Project (Area 6, Phase I) and in Sub-Area 8 of the Borrow Area (Table 4). The water quality findings appeared within normal ranges, with the exception of pH in several basins. Also, increased turbidity was observed in the Borrow Area. Since the sample was collected in the fall, this basin may have been affected by grading activities in adjacent Sub-Areas 5 and 6. Additional water quality sampling will be conducted in 2007 to investigate turbidity and determine whether the pH values are a trend or an outlier.

Activities in 2007

The Final Legacy Management and Institutional Controls Plan (LMICP, DOE 2006) identifies the specific monitoring requirements for restored areas. Projects that will be monitored include the Former Production Area, the Waste Pits Area, and the Silos Area. In addition, wetland mitigation monitoring will continue for the Phase II Wetland Mitigation Project and the Borrow Area. Herbaceous cover of the Onsite Disposal Facility Cell 2 will be collected as well. Per the LMICP, this data will be provided as a separate report.

References:

U.S. Department of Energy, 2006, "Comprehensive Legacy Management and Institutional Controls Plan", Final, June.

U.S. Department of Energy, 2003, "2002 Consolidated Monitoring Report for Restored Areas at the Fernald Closure Project," 20900-RP-0017 Rev. B.

Table 1
2006 Consolidated Monitoring Report
2006 Precipitation Data

Month	Average Site Precipitation (in.)	Actual Site Precipitation (in.)	Monthly Departure from Average (in.)	Cumulative Departure from Average (in.)	Palmer Drought Severity Index
January	3.14	3.43	0.29	0.29	Mid-Range
February	2.80	1.35	-1.45	-1.16	Mid-Range
March	3.90	4.84	0.94	-0.22	Mid-Range
April	3.80	6.54	2.74	2.52	Mid-Range
May	4.23	2.78	-1.45	1.07	Mid-Range
June	4.06	2.29	-1.77	-0.70	Mid-Range
July	4.03	2.86	-1.17	-1.87	Mid-Range
August	3.20	2.28	-0.92	-2.79	Mid-Range
September	2.79	4.77	1.98	-0.81	Mid-Range
October	2.68	3.86	1.18	0.37	Very Moist
November	3.33	4.03	0.70	1.07	Moderately Moist
December	3.12	3.17	0.05	1.12	Moderately Moist

Palmer Drought Severity Index source:

<http://wf.ncdc.noaa.gov/oa/climate/research/prelim/drought/palmer.html>

Table 3
2006 Consolidated Monitoring Report
Herbaceous Cover Summary

Area	Average Cover Class	Native Species Composition	Native Relative Frequency
Paddys Run West - Area 8, Phase III North Prairie	6	56%	69%
Paddys Run West - Sub Station Prairie	6	50%	61%
Paddys Run West - Willey Road Prairie	6	67%	65%
Paddys Run East - South Pines	5.67	57%	64%
Paddys Run East - Area 2, Phase II	5.67	67%	75%
Paddys Run East - Area 2, Phase III	5.67	39%	38%
Borrow Area - Sub Areas 1 and 2	5	43%	50%
Borrow Area - Sub Area 8	6	19%	19%

Cover Class: 0 = 0% 1 = 2-4% 2 = 5-24% 3 = 25-49% 4 = 50-74% 5 = 75-89% 6 = 90-100%

Table 3A
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run West - Area 8, Phase III North Prairie

Native Spp.: 15
 Non-Native Spp.: 12
 Percent Native: 56%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Andropogon gerardii</i>	big blue stem	grass	5	1.00	10%	
<i>Asclepias tuberosa</i>	butterfly weed	forb	4	0.60	6%	
<i>Aster pilosus</i>	old field aster	forb	1	0.20	2%	
<i>Bidens cernua</i>	nodding beggar's tick	forb	3	0.20	2%	
<i>Bouteloua curtipendula</i>	side oats grama	grass	8	0.60	6%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.20	2%	
<i>Echinacea purpurea</i>	purple coneflower	forb	6	0.80	8%	
<i>Heliopsis helianthoides</i>	false sunflower	forb	5	0.60	6%	
<i>Juncus tenuis</i>	poverty rush	rush	1	0.20	2%	
<i>Monarda fistulosa</i>	bergamot	forb	3	0.20	2%	
<i>Panicum virgatum</i>	switchgrass	grass	4	0.60	6%	
<i>Rudbeckia hirta</i>	black eyed Susan	forb	1	0.80	8%	
<i>Schizachyrium scoparium</i>	little bluestem	grass	5	0.20	2%	
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.40	4%	
<i>Vernonia gigantea</i>	tall iron weed	forb	2	0.20	2%	
<i>Cirsium arvense</i>	Canada thistle	forb	0	0.20	2%	
<i>Echinochloa crusgalli</i>	barnyard grass	grass	0	0.20	2%	
<i>Glechoma hederacea</i>	ground ivy	forb	0	0.20	2%	
<i>Medicago lupulina</i>	black medick	forb	0	0.20	2%	
<i>na</i>	Re-green	grass	0	0.20	2%	
<i>Plantago lanceolata</i>	English plantain	forb	0	0.40	4%	
<i>Polygynum persicaria</i>	spotted ladies thumb	forb	0	0.20	2%	
<i>Setaria glauca</i>	yellow foxtail	grass	0	0.20	2%	
<i>Solanum carolinense</i>	horsenettle	forb	0	0.20	2%	
<i>Taraxacum officinale</i>	dandelion	forb	0	0.20	2%	
<i>Trifolium pratense</i>	red clover	forb	0	0.20	2%	
<i>Trifolium repens</i>	white clover	forb	0	0.60	6%	
				Native Species:	6.8	69%
				Non-Native Species:	3	31%

CC = Coefficient of Conservatism

Table 3B
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run West - Sub Station Prairie

Native Spp.: 6
 Non-Native Spp.: 6
 Percent Native: 50%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Acer negundo</i>	box elder seedling	tree	3	0.67	11%
<i>Acer rubrum</i>	red maple seedling	tree	2	0.33	6%
<i>Achillia millefolium</i>	yarrow	forb	1	0.33	6%
<i>Elymus canadensis</i>	Canada wild rye	grass	6	1.00	17%
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.67	11%
<i>Vernonia gigantea</i>	tall iron weed	forb	2	0.67	11%
<i>Chicorium intybus</i>	chickory	forb	0	0.33	6%
<i>Fescue sp.</i>	fescue sp.	grass	0	0.33	6%
<i>Glechoma hederacea</i>	ground ivy	forb	0	0.67	11%
<i>Plantago major</i>	common plantain	forb	0	0.33	6%
<i>Solanum carolinense</i>	horsenettle	forb	0	0.33	6%
<i>Stellaria media</i>	common chickweed	forb	0	0.33	6%
Native Species:				3.67	61%
Non-Native Species:				2.33	39%

CC = Coefficient of Conservatism

Table 3C
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run West - Willey Road Prairie

Native Spp.: 10
 Non-Native Spp.: 5
 Percent Native: 67%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Achillia millefolium</i>	yarrow	forb	1	0.33	5%
<i>Asclepias tuberosa</i>	butterfly weed	forb	4	0.33	5%
<i>Erigeron annuus</i>	daisy fleabane	forb	0	0.67	10%
<i>Monarda fistulosa</i>	bergamot	forb	3	0.33	5%
<i>Muhlenbergia schreberi</i>	nimblewill	grass	0	0.33	5%
<i>Prunella vulgaris</i>	heal-all	forb	0	0.33	5%
<i>Rudbeckia hirta</i>	black eyed susan	forb	1	0.33	5%
<i>Solidago canadensis</i>	Canada goldenrod	forb	1	0.67	10%
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.33	5%
<i>Vernonia gigantea</i>	tall iron weed	forb	2	0.67	10%
<i>Cichorium intybus</i>	chickory	forb	0	0.33	5%
<i>Daucus carota</i>	Queen Anne's lace	forb	0	1.00	15%
<i>Fescue sp.</i>	fescue sp.	grass	0	0.67	10%
<i>Plantago lanceolata</i>	english plantain	forb	0	0.33	5%
<i>Poa sp.</i>	bluegrass sp.	grass	0	0.33	5%
Native Species:				4.33	65%
Non-Native Species:				2.67	40%

CC = Coefficient of Conservatism

Table 3D
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run East - South Pines

Native Spp.: 12
 Non-Native Spp.: 9
 Percent Native: 57%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisifolia</i>	common ragweed	forb	0	1.00	11%
<i>Andropogon gerardii</i>	big blue stem	grass	5	0.67	7%
<i>Aster novae-angliae</i>	New England aster	forb	2	0.33	4%
<i>Aster pilosus</i>	old field aster	forb	1	0.33	4%
<i>Bidens frondosa</i>	devil's beggar's-tick	forb	2	0.67	7%
<i>Calystegia sepium</i>	hedge bindweed	forb	1	0.33	4%
<i>Euthamia graminifolia</i>	flat-topped goldenrod	forb	2	0.33	4%
<i>Panicum virgatum</i>	switchgrass	grass	4	0.67	7%
<i>Platanus occidentalis</i>	sycamore seedling	tree	7	0.33	4%
<i>Polygynum hydropiper</i>	water pepper	forb	1	0.33	4%
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.67	7%
<i>Ulmus sp.</i>	elm seedling	tree	2	0.33	4%
<i>Cirsium arvense</i>	Canada thistle	forb	0	0.33	4%
<i>Daucus carota</i>	Queen Anne's lace	forb	0	0.67	7%
<i>Echinochloa crusgalli</i>	barnyard grass	grass	0	0.33	4%
<i>Medicago lupulina</i>	black medick	forb	0	0.33	4%
<i>na</i>	Re-green	grass	0	0.33	4%
<i>Polygynum aviculare</i>	common knotweed	forb	0	0.33	4%
<i>Setaria glauca</i>	yellow foxtail	grass	0	0.33	4%
<i>Sorghum halepense</i>	Johnson grass	grass	0	0.33	4%
<i>Trifolium repens</i>	white clover	forb	0	0.33	4%
Native Species:				6.00	64%
Non-Native Species:				3.33	36%

CC = Coefficient of Conservatism

Table 3E
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run East - Area 2, Phase II

Native Spp.: 6
 Non-Native Spp.: 3
 Percent Native: 67%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Acer negundo</i>	Box elder seedling	tree	3	0.33	8%
<i>Andropogon gerardii</i>	big blue stem	grass	5	0.67	17%
<i>Desmodium canadense</i>	Canada tick trefoil	forb	4	0.67	17%
<i>Panicum virgatum</i>	switchgrass	grass	4	0.67	17%
<i>Sorghastrum nutans</i>	Indian grass	grass	5	0.33	8%
<i>Ulmus sp.</i>	elm seedling	tree	2	0.33	8%
<i>Cirsium arvense</i>	Canada thistle	forb	0	0.33	8%
<i>Plantago lanceolata</i>	English plantain	forb	0	0.33	8%
<i>Trifolium repens</i>	white clover	forb	0	0.33	8%
Native Species:				3.00	75%
Non-Native Species:				1.00	25%

CC = Coefficient of Conservatism

Table 3F
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Paddys Run East - Area 2, Phase III

Native Spp.: 11
 Non-Native Spp.: 17
 Percent Native: 39%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisifolia</i>	common ragweed	forb	0	1.00	8%	
<i>Asclepias tuberosa</i>	butterfly weed	forb	4	0.33	3%	
<i>Aster pilosus</i>	old field aster	forb	1	0.67	5%	
<i>Erigeron annuus</i>	daisy fleabane	forb	0	0.33	3%	
<i>Monarda fistulosa</i>	bergamot	forb	3	0.33	3%	
<i>Oxalis stricta</i>	yellow wood sorrel	forb	0	0.33	3%	
<i>Panicum virgatum</i>	switchgrass	grass	4	0.33	3%	
<i>Plantago rugelli</i>	Rugell's plantain	forb	0	0.67	5%	
<i>Polygynum hydropiper</i>	water pepper	forb	1	0.33	3%	
<i>Rudbeckia hirta</i>	black eyed susan	forb	1	0.33	3%	
<i>Vernonia gigantea</i>	tall iron weed	forb	2	0.33	3%	
<i>Cirsium arvense</i>	Canada thistle	forb	0	0.33	3%	
<i>Cirsium vulgare</i>	bull thistle	forb	0	0.33	3%	
<i>Daucus carota</i>	Queen Anne's lace	forb	0	1.00	8%	
<i>Echinochloa crusgalli</i>	barnyard grass	grass	0	0.67	5%	
<i>Fescue sp.</i>	fescue sp.	grass	0	0.33	3%	
<i>Glechoma hederacea</i>	ground ivy	forb	0	0.33	3%	
<i>Medicago lupulina</i>	black medick	forb	0	0.33	3%	
<i>Plantago lanceolata</i>	English plantain	forb	0	0.67	5%	
<i>Ploygynum cespitosum</i>	long-bristled smartweed	forb	0	0.33	3%	
<i>Polygynum persicaria</i>	spotted lady's thumb	forb	0	0.33	3%	
<i>Senecio glabellus</i>	butterweed	forb	0	0.67	5%	
<i>Setaria glauca</i>	yellow foxtail	grass	0	0.33	3%	
<i>Solanum carolinense</i>	horsenettle	forb	0	0.33	3%	
<i>Sorghum halepense</i>	Johnson grass	grass	0	0.33	3%	
<i>Taraxacum officinale</i>	dandelion	forb	0	0.33	3%	
<i>Trifolium pratense</i>	red clover	forb	0	0.67	5%	
<i>Trifolium repens</i>	white clover	forb	0	0.67	5%	
				Native Species:	5.00	38%
				Non-Native Species:	8.00	62%

CC = Coefficient of Conservatism

Table 3G
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Borrow Area - Sub Areas 1 and 2

Native Spp.: 9
 Non-Native Spp.: 12
 Percent Native: 43%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency
<i>Ambrosia artemisifolia</i>	common ragweed	forb	0	0.67	7%
<i>Aster pilosus</i>	old field aster	forb	1	0.33	3%
<i>Conyza canadensis</i>	horseweed	forb	0	0.33	3%
<i>Eupatorium serotinum</i>	late-flowering boneset	forb	2	0.33	3%
<i>Euphorbia maculata</i>	spotted spurge	forb	0	0.67	7%
<i>Fragaria virginiana</i>	wild strawberry	forb	1	0.67	7%
<i>Panicum virgatum</i>	switchgrass	grass	4	1.00	10%
<i>Spartina pectinata</i>	prairie cordgrass	grass	5	0.67	7%
<i>Verbena hastata</i>	blue vervain	forb	4	0.33	3%
<i>Chenopodium album</i>	lambs quarters	forb	0	0.33	3%
<i>Medicago lupulina</i>	black medick	forb	0	0.33	3%
<i>Plantago lanceolata</i>	English plantain	forb	0	0.67	7%
<i>Polygynum persicaria</i>	spotted ladies thumb	forb	0	0.33	3%
<i>Rumex crispus</i>	curly dock	forb	0	0.67	7%
<i>Senecio glabellus</i>	butterweed	forb	0	0.33	3%
<i>Setaria glauca</i>	yellow foxtail	grass	0	0.33	3%
<i>Sida spinosa</i>	prickly mallow	forb	0	0.67	7%
<i>Solanum carolinense</i>	horsenettle	forb	0	0.33	3%
<i>Trifolium pratense</i>	red clover	forb	0	0.33	3%
<i>Trifolium repens</i>	white clover	forb	0	0.33	3%
<i>Xanthium strumarium</i>	cocklebur	forb	0	0.33	3%
Native Species:				5.00	50%
Non-Native Species:				5.00	50%

CC = Coefficient of Conservatism

Table 3H
 2006 Consolidated Monitoring Report
 Herbaceous Cover Data Summary
 Borrow Area - Sub Area 8

Native Spp.: 3
 Non-Native Spp.: 13
 Percent Native: 19%

(non native species are in bold)

Species	Common Name	Type	CC	Frequency (species/quadrat)	Relative Frequency	
<i>Ambrosia artemisiifolia</i>	common ragweed	forb	0	0.33	4%	
<i>Conyza canadensis</i>	horseweed	forb	0	0.67	8%	
<i>Elymus virginicus</i>	Virginia wild rye	grass	3	0.67	8%	
<i>Acalypha rhomboidea</i>	three-seeded mercury	forb	0	1.00	12%	
<i>Chenopodium album</i>	lambs quarters	forb	0	0.67	8%	
<i>Daucus carota</i>	Queen Anne's lace	forb	0	1.00	12%	
<i>Echinochloa crusgalli</i>	barnyard grass	grass	0	0.67	8%	
<i>Medicago lupulina</i>	black medick	forb	0	0.33	4%	
<i>Phleum pratense</i>	Timothy	grass	0	0.67	8%	
<i>Plantago major</i>	common plantain	forb	0	0.67	8%	
<i>Polygynum persicaria</i>	spotted lady's thumb	forb	0	0.33	4%	
<i>Rumex crispus</i>	curly dock	forb	0	0.33	4%	
<i>Senecio glabellus</i>	butterweed	forb	0	0.33	4%	
<i>Trifolium pratense</i>	red clover	forb	0	0.33	4%	
<i>Trifolium repens</i>	white clover	forb	0	0.33	4%	
<i>Verbascum thapsus</i>	common mullein	forb	0	0.33	4%	
				Native Species:	1.67	19%
				Non-Native Species:	7.00	81%

CC = Coefficient of Conservatism

Table 4
2006 Consolidated Monitoring Report
Wetland Mitigation Water Quality Summary

Area	Temperature (celsius)	pH	Specific Conductivity (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Color
Area 6, Phase I - Basin 1	26.5	8.52	0.373	40	10.3	clear
Area 6, Phase I - Basin 2	26.3	8.44	0.391	6	9.4	clear
Area 6, Phase I - Basin 3	30.6	9.28	0.337	15	14.17	clear
Borrow Area - Sub Area 8	27.7	9.43	0.378	100	15.51	slightly cloudy