A Phase I Archaeological Survey of the Southeast Drainage for the Weldon Spring Site Remedial Action Project, St. Charles County, Missouri

Prepared for
U.S. Department of Energy

by
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Argonne, Illinois

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CONTENTS

1 Abstract

Planned cleanup activities within the Southeast Drainage of the Weldon Spring Site Remedial Action Project, St. Charles County, Missouri, involve the removal of radioactivity contaminated soils along the drainage and minor modifications to the stream channel to provide access to those areas. A Phase I archaeological survey was conducted in April 1997 on portions of the Southeast Drainage to assess whether significant cultural resources could be impacted. The survey consisted of a pedestrian reconnaissance employing systematic troweling of leaf litter to improve surface visibility. Results of the investigation indicate that the planned action, as shown in the attached drawings in Appendix A, will not adversely impact cultural resources. It is recommended, however, that four areas potentially eligible for listing on the *National Register of Historic Places* near planned remedial action areas be avoided. Should it become necessary to encroach on these areas, Phase II testing would be required to evaluate further whether the locations meet National Register eligibility requirements.

2 Background

On April 21-24, 1997, the U.S. Department of Energy (DOE), with assistance of the PMC and Argonne National Laboratory (ANL), conducted a Phase I archaeological survey of areas involving remedial action activities within the Southeast Drainage of the Weldon Spring Site in St. Charles County, Missouri. The survey was completed to identify whether any significant cultural resources could be impacted by the planned action, as required under Section 106 of the National Historic Preservation Act of 1966, as amended.

Within the Southeast Drainage is a first-order intermittent stream located in a steep-sided valley cut into limestone bluffs. The stream runs in a south-southeasterly direction from just northwest of Highway 94 near the Weldon Spring chemical plant to the Missouri River. The elevation of the stream channel gradually drops from approximately 183 to 137 m above mean sea level as the stream approaches the Missouri River. Four springs and a sinkhole have been identified within the drainage (Missouri Department of Natural Resources 1991). The Southeast Drainage was historically used by the Army and the U.S. Atomic Energy Commission (predecessor of DOE) for discharging wastewater to the Missouri River. Effluents were discharged from the Weldon Spring Ordnance Works wastewater treatment plants, the chemical plant, and the sanitary treatment plant at the DOE project office building. As a result of these past operations, surface water and sediment in many areas of the drainage are radioactivity and chemically contaminated. Evaluation presented in the engineering evaluation/cost analysis for the Southeast Drainage (ANL 1996)

The Southeast Drainage is part of the Missouri River watershed (East Missouri Study Unit) located in the Dissected Till Plains, a subdivision of the Central Lowlands Plateau Physiographic Province. More specifically, it is located in Township 45N, Range

3E, in Sections 5 and 6 and part of a Land Grant projected to be in Section 8 (USGS 1954, photorevised 1982) (Figure 1). The entire Southeast Drainage basin comprises an area of approximately 106 hectares. The sedimentary context within the basin consists primarily of silty clays and clayey silts. Nearer the headwaters, the channel is located in a steep and narrow valley with a rocky surface and little sediment, but sedimentary deposits increase as the valley floor flattens and broadens as the stream approaches the Missouri River (ANL 1996). Soils adjacent to the stream channel are predominantly Goss cherty silt loam and, nearer the Missouri River confluence, Hodge loamy fine sand (Tummons 1982).

The Southeast Drainage basin consists of a mature hardwood forest community, with common tree species including oak, maple, hickory, and sycamore. The available habitat is suitable for a variety of wildlife including amphibians, reptiles, birds, and mammals. The intermittent nature of the stream is not suitable for waterfowl, and the limited fish fauna that occurs in the drainage are restricted to the few permanent spring-fed pools and to the lowermost portion of the drainage near its confluence with the Missouri River (ANL 1996).

An overview of the culture history of the East Missouri Study Unit, as proposed by Chapman (1975, 1980) and supplemented by Weston and Weichman (1987), is provided in earlier cultural resource reports for the Weldon Spring Site by Dr. Gary Rex Walters of Triad Research Services (1988, 1989, 1990c, 1992), and will not be addressed here. Paleo-Indian, Archaic, Woodland, and Mississippian period sites have been encountered within the boundaries of the study unit. The temporal affiliation of many of the sites previously recorded at the Weldon Spring Site by Walters is currently unknown, although some Archaic, Woodland, and Late Woodland/Mississippian period sites have been identified (Walters 1988, 1989, 1990c, 1992).

A review of previous cultural resource investigations in the Southeast Drainage was conducted by Walters on July 3, 1990. He reported the area had never been surveyed for cultural resources, and no archaeological material had been previously recorded (Walters 1990a). The principal intermittent stream channel flowing through the Southeast Drainage was subsequently surveyed by Walters and ANL on July 11, 1990. Despite excellent visibility within the channel, only one isolated artifact, a Late Archaic period projectile point redeposited by water transport, was recorded during that survey (Walters 1990a). One historic period site is located near the confluence of the drainage with the Missouri River (Walters 1990b). Structures from this farmstead location were demolished by the U.S. Army when they acquired the property in the 1940s. Neither the isolated projectile point nor the historic site appear likely to meet the eligibility criteria for listing on the *National Register of Historic Places*. No additional cultural resource investigations have taken place within the Southeast Drainage until the present survey.

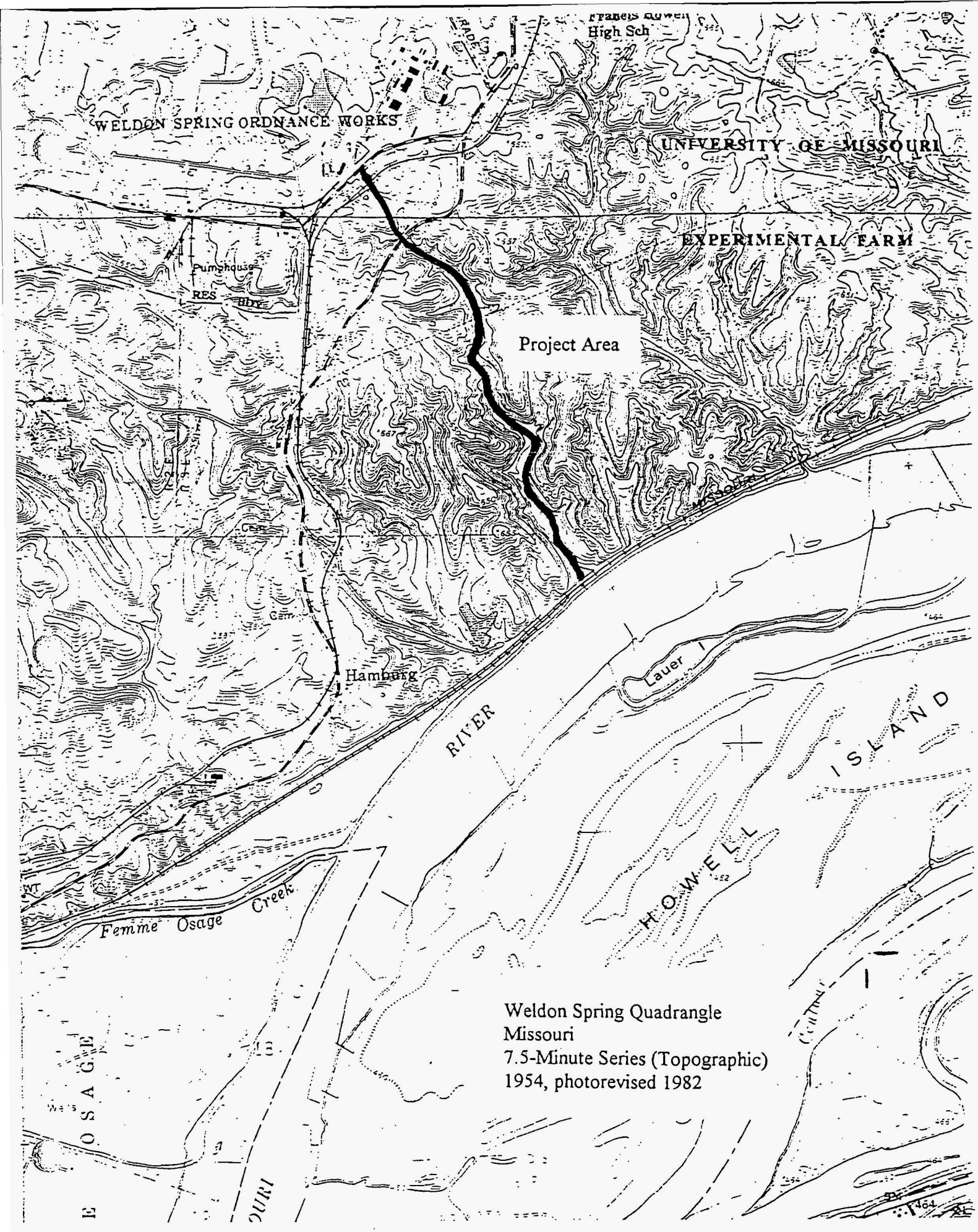

Figure 1: Location of the Weldon Spring Southeast Drainage Project Area

3 Archaeological Field Survey

3.1 Purpose

Cleanup of the drainage is scheduled to begin the winter of 1997-98. The existing channel with some minor modifications will be used as the access route for removing the contaminated sediment. The purpose of the Phase I archaeological survey was to locate archaeological sites within buffer areas around contaminated sites, along previously non-surveyed areas of the access route, and in designated turnout areas. Only those sites that would be impacted by remediation activities would be tested further to evaluate their potential to meet the eligibility requirements for listing on the *National Register of Historic Places*. Any other sites recorded during the survey would be avoided during the cleanup. Health risk was a consideration for the waiver of survey requirements for specific radiologically contaminated areas within the Weldon Spring Ordnance Works by the Missouri Department of Natural Resources, Office of Historic Preservation (MDNR-SHPO) (Weichman 1986).

3.2 Field Conditions

The ground surface visibility was extremely poor in many areas. Although the understory was not very developed beneath the hardwood forest canopy, heavy leaf litter made conditions for a surface survey difficult (see Survey Methodology). Once the leaf litter was removed surface visibility improved to better than 80% on average. The terrain was rather rugged at times, and obstacles, such as large fallen trees, required variations to an otherwise systematic survey transect interval. The areas within the drainage were primarily undisturbed by humans with the exception of the extreme north end (north of Highway 94) and the extreme south end where the drainage meets the publicly accessible Katy Trail and the Missouri River. Additional areas of human disturbance include a transmission line corridor and limited areas used by vehicles forced to leave the primary channel when accessing the remedial action locations. The boundaries of the contaminated areas were delineated using stakes.

Consistent with requirements for the Weldon Spring site, personal protection measures were taken during the survey. Field personnel were required to wear special knee-hi rubber boots, disposable cotton gloves, a hard hat, and safety glasses. Field personnel were accompanied by environmental health and safety personnel who were equipped with a portable monitor for detecting external radiation and a communications radio in case of emergency. No food or beverage was allowed in the survey area. Water was allowed if it was in a sealed container and if the persons hands were scanned using the monitor and washed with disposable wipes before handling the container. Before exiting the survey area, hands, boots and equipment (trowels) were scanned for contamination. Upon return to the main part of the Weldon Spring Site, both for lunch and at the end of the day, a boot wash and full body scan were completed to monitor for potential contamination.

3.3 Survey Methodology

The survey methodology entailed a surface reconnaissance of areas adjacent to contaminated locations designated for remediation. Previous survey results within the drainage (i.e., an isolated projectile point) indicate a relatively low potential for the existence of significant sites adjacent to the cutbanks where the planned remediation will take place. The pedestrian survey consisted of transect intervals spaced 10 m apart. Locations of the transects are highlighted on the figures presented in Appendix A. Transects were limited to relatively flat terrace areas adjacent to the contaminated locations, turnout areas, and areas identified as likely to be modified for the access road. Much of the area within the drainage consists of steep slopes which are not likely to contain archaeological material nor be impacted by remedial action activities.

Within each transect, systematic troweling to remove heavy leaf litter was conducted to improve surface visibility when necessary. This procedure was used every 10 m along the transects whenever possible. An area of approximately 30 cm by 30 cm was cleared. If one piece of cultural material was encountered, the cleared area was expanded to a minimum area of one meter by one meter. If more than three artifacts were encountered, the transect interval was reduced from 10 m to 5 m in four directions to attempt to delineate the extent of the artifact scatter. No artifacts were collected.

3.4 Survey Results

Two areas north of Highway 94 were surveyed. Both areas exhibited evidence of extensive human ground disturbance within which significant cultural resources are unlikely to be encountered. Survey transects of 10 m intervals were completed only for undisturbed and minimally disturbed areas (see Appendix A). In areas of low surface visibility, surface debris was cleared with a trowel. No cultural material was encountered in either of the two areas.

The main portion of the Southeast Drainage survey was conducted within a 1.6 km-long corridor along the stream channel from just north of the transmission line corridor to the Katy Trail along the Missouri River. The transmission line runs perpendicular to the stream channel approximately 0.5 km downstream from Highway 94. Within that corridor eleven areas adjacent to planned activity areas were surveyed (see Appendix A, areas are numbered sequentially from north to south).

No archaeological material was encountered in four of the areas (Areas 3, 4, 6, and 7). In three of the other areas, material was encountered in the form of isolated occurrences of lithic debitage (2 isolated flakes on opposite ends of the area in Area 5 and 1 isolated flake each in Areas 10 and 11). The previously reported historic site is located to the east of Area 10, but is well outside the planned action area and would not be impacted by the remediation. It should also be noted that portions of Areas 10 and 11 have been disturbed by vehicular traffic along the existing Pioneered Path. The isolated chert flake found in Area 10 was found on the road surface. Two isolated stone tools (one uniface and one blade, designated isolated find IF 6 and IF 7, respectively) were

encountered within the stream channel in two different locations in Area 8 (exact locations are provided in Appendix A). The artifacts have more than likely been removed from their primary context and redeposited by stream action. The nearby cutbanks were closely examined for evidence of eroding buried deposits, but none was encountered. It is also possible that these artifacts were redeposited recently, possibly during one of the major Missouri River flooding events that took place after the 1990 survey was conducted. In any event, the lack of contextual integrity and the isolated nature of the artifacts makes it unlikely that they will be considered significant cultural resources. Additional isolated finds were encountered by chance during the survey while in transit from one remedial action location to another. These included a historic bottle (IF 1) located on the east terrace north of Area 1 and a possible lithic tool (IF 5) located in the stream channel (out of primary context), just north of Area 2. In conclusion, these eight areas and the two isolated finds are unlikely to require any further action regarding cultural resources prior to initiation of cleanup activities.

The three remaining areas (Areas 1, 2, and 9) did contain archaeological material which warrant awareness and precaution by the remedial action team even though the locations are not immediately within the planned action areas. Each area will be addressed separately below (refer to Appendix A for detailed locational information).

Archaeological material was encountered in three separate locations within Area 1. On the bank slope within a contaminated area just north of the transmission line, a flake and a possible lithic tool were found (designated IF 2). It was unclear whether the materials were eroding out of the cutbank or had been redeposited on the slope. A brief visual inspection of the adjacent cutbank was conducted but no additional material was noted. Further downstream east of the channel at the base of the steep slope where it adjoins the stream terrace, a lithic artifact (blade) and one chert flake were found on the surface. As no additional material was encountered, it is considered an isolated find (IF 3) rather than a site. This area is not adjacent to any contaminated areas and as long as the access road remains in the channel at this location as planned, it is highly unlikely that the area will be impacted. On the opposite side of the stream channel, near Benchmark (BM) 313, where the base of a considerably washed out cutbank slopes to meet a gravel terrace, a battered scraper-like lithic artifact was noted (IF 4). Due to its condition and proximity to the channel, this artifact has questionable contextual integrity and has likely been redeposited. No other definitively cultural material was noted nearby (an extremely battered piece of lithic material remotely resembling an artifact was observed but dismissed as non-cultural).

Area 2 contains two areas in which archaeological material was recorded. The first area consists of a hearth feature (Feature 1) north of two contaminated areas. Evidence of fairly recent historic use of the hearth was present (rusted tin can, Bud Dry can--indicating use within last ten years, and small piece of plastic), but no lithic material was detected to indicate prehistoric use. Although this area is unlikely to be considered a significant cultural resource, the limited nature of the surface survey does not preclude the possibility of finding significant buried remains associated with the hearth. The second

area is located just south of one of the largest contaminated areas in the Southeast Drainage. Designated as Site 1 of the Weldon Spring Site Southeast Drainage (WSS-SD-1), the location consists of a lithic scatter along the base of the hill slope extending for approximately 30 m. The site ends at one of the four springs present within the drainage. Several flakes (approximately 20) of at least two different chert types were observed in the area, as well as one core. This potentially eligible site is just outside the planned remedial action area; should it become necessary to disturb it during remediation, Phase II testing will be required to evaluate the site as to whether it meets the criteria of eligibility for listing on the *National Register of Historic Places.*

The last area in which archaeological material was encountered is just south of Area 9. Similar to Area 2, this location contains one of the four springs present in the drainage. Designated as Feature 2, this area consists of a rock cairn resembling the shape of an arrowhead, pointing to the spring location. Again no evidence to support the age of the cairn was present. Two chert flakes and a number of blocky chert fragments were found in the surrounding troweled areas, but not at a density to warrant a site designation at this time. Due to the proximity to the spring and the presence of at least some lithic material, the possible presence of a site should not be discounted. However, this area is again outside of any imminent danger from remedial action activities and no further testing was completed.

4 Recommendations

Based on the results of the survey it appears that current plans for remediation activities would not affect significant cultural resources. It is therefore recommended that the remediation activities in the Southeast Drainage be allowed to proceed as scheduled, pending concurrence by MDNR-SHPO. It is also recommended that four areas (IF 3, Feature 1, Site WSS-SD-1, and Feature 2) be acknowledged as potentially eligible cultural resources and avoided by the remedial action team during the scheduled activities (i.e., no excavation, equipment storage/parking, or personnel loitering). Completed construction design does not include the aforementioned four areas and therefore, potential impacts to these areas are not expected to occur. However, if unforeseen circumstances arise which will lead to changes of the construction design, Phase II testing would be necessary to determine the extent of the sites identified and to evaluate the sites against the eligibility criteria for listing on the *National Register of Historic Places.* Although the survey allows for some flexibility in the field regarding the clean-up activities, it is also recommended that any change in activity which would involve ground disturbance outside areas delineated in the present survey (Appendix A) undergo a similar cultural resource investigation and clearance by the MDNR-SHPO prior to initiation of that activity.

Because the results of this survey are limited to the identification of surface manifestations of potential archaeological sites, the possibility of encountering additional cultural remains during remediation activities does exist. This is especially true given the number of isolated artifacts redeposited into the stream channel from unknown locations. However, because the planned activities are predominantly confined to contaminated areas

and small areas adjacent to an actively eroding stream channel (in which no artifacts were discovered in the cutbank in the course of two field surveys -- Walters 1990 and the present survey in 1997), the likelihood of encountering a significant archaeological site remains small. In the event that archaeological material is unexpectedly uncovered during remediation activities involving a non-contaminated area, it is recommended that work in that area be stopped immediately and the MDNR-SHPO and a qualified archaeologist be notified so that the significance of the material can be evaluated. Provisions should also be established with the MDNR-SHPO for the appropriate actions should material be unexpectedly discovered in a contaminated area.

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USGS: See U.S. Geological Survey

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Walters, G.R., 1992, *A Phase I Survey and Evaluation of a Proposed Borrow Area fro the Weldon Spring Site Remedial Action Project, St. Charles County, Missouri*, prepared by Triad Research Services, Columbia, Mo., for U.S. Department of Energy and MK-Ferguson Company, St. Charles, Mo., Jan.

Weichman, M.S., 1986, letter from Weichman (Missouri Department of Natural Resources, Division of Parks, Recreation, and Historic Preservation, Jefferson City, Mo.) to R.R. Nelson (Department of Energy, Weldon Spring Site Remedial Action Project, Oak Ridge Operations, Oak Ridge Tenn.), Nov. 3.

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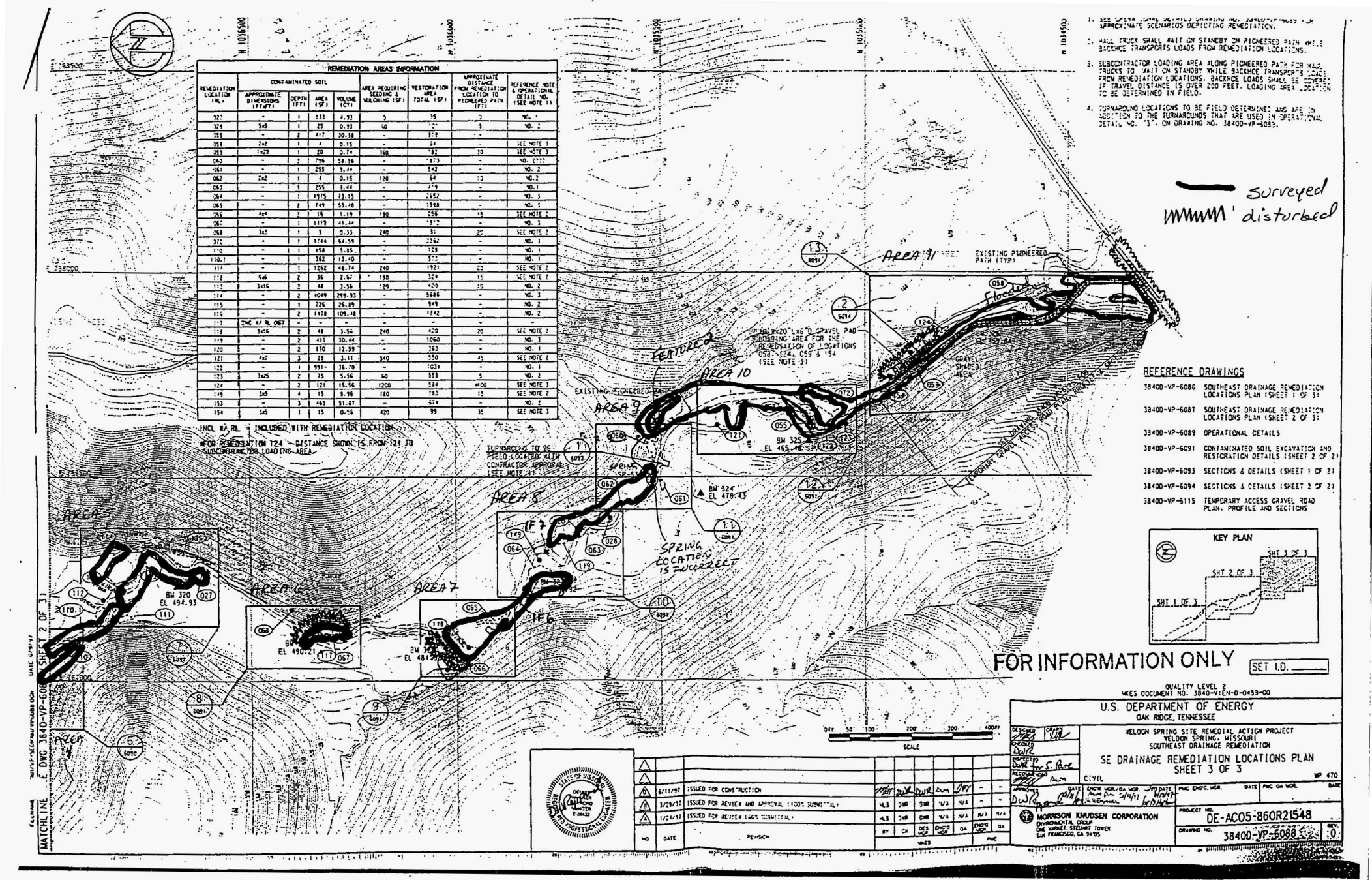
APPENDIX A

(Restricted Distribution)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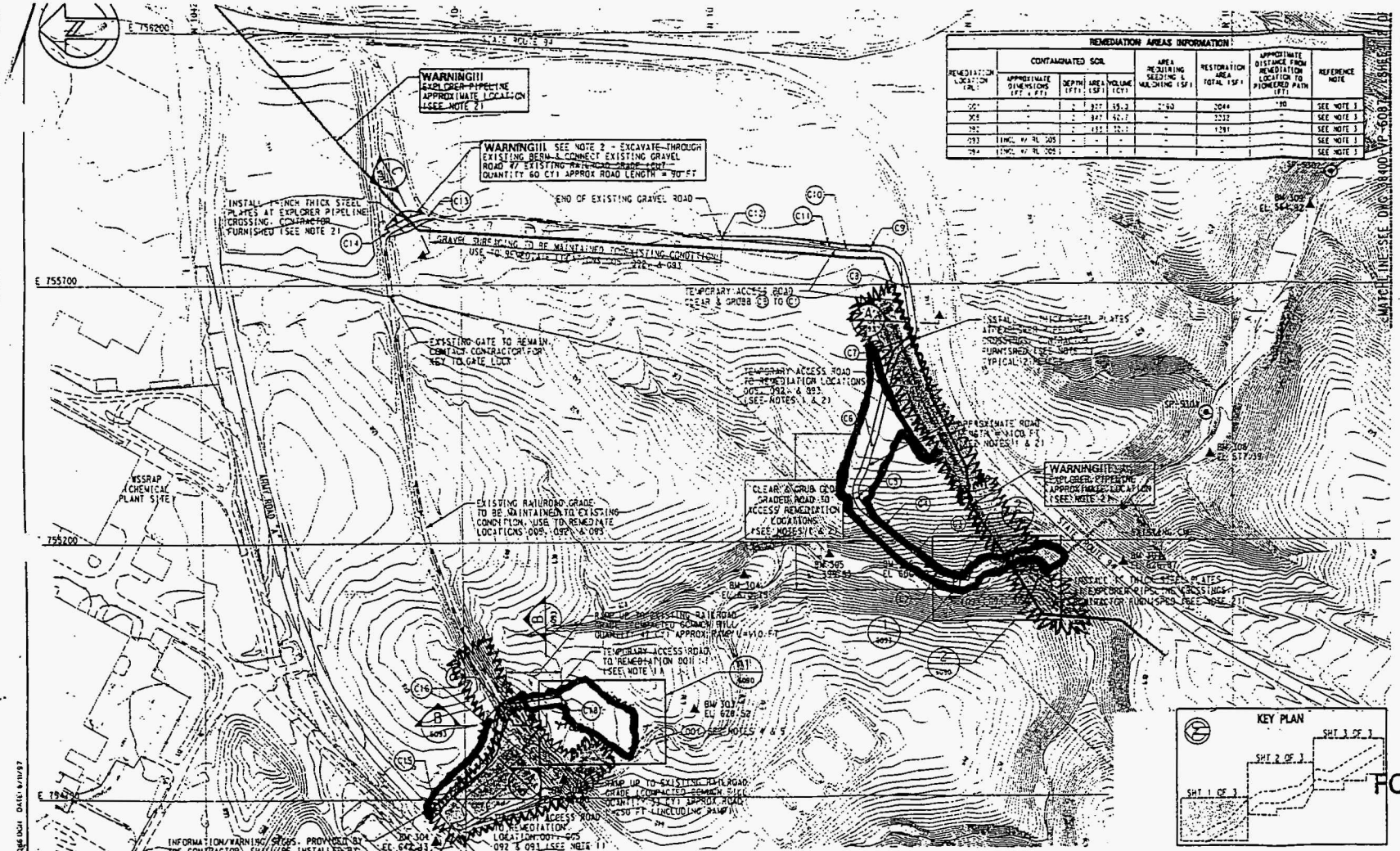
REMEDIATION LOCATION (RL)
APPROXIMATE DIMENSIONS (FT x FT)
DEPTH (FT)
AREA (SF)
VOLUME (CY)
AREA REQUIRING SEEDING & MULCHING (SF)
RESTORATION AREA TOTAL (SF)
APPROXIMATE DISTANCE FROM REMEDIATION LOCATION TO PIONEERED PATH (FT)
REFERENCE NOTE & OPERATIONAL DETAIL NO. (SEE NOTE 1)
INCL W/ RL = INCLUDED WITH REMEDIATION LOCATION
FOR REMEDIATION 124 - DISTANCE SHOWN IS FROM 124 TO SUBCONTRACTOR LOADING AREA
1. SEE SPECIFICATION SECTION 02270 FOR APPROXIMATE SCENARIOS DEPICTING REMEDIATION.
2. HAUL TRUCK SHALL WAIT ON STANDBY ON PIONEERED PATH WHILE BACKHOE TRANSPORTS LOADS FROM REMEDIATION LOCATIONS.
3. SUBCONTRACTOR LOADING AREA ALONG PIONEERED PATH FOR HAUL TRUCKS TO WAIT ON STANDBY WHILE BACKHOE TRANSPORTS LOADS FROM REMEDIATION LOCATIONS. BACKHOE LOADS SHALL BE CARRIED IF TRAVEL DISTANCE IS OVER 200 FEET. LOADING AREA LOCATION TO BE DETERMINED IN FIELD.
4. TURNAROUND LOCATIONS TO BE FIELD DETERMINED AND ARE IN ADDITION TO THE TURNAROUNDS THAT ARE USED IN OPERATIONAL DETAIL NO. "3" ON DRAWING NO. 38400-VP-6093.
surveyed
disturbed
AREA 11
AREA 10
AREA 9
AREA 8
AREA 7
AREA 6
AREA 5
AREA 4
EXISTING PIONEERED PATH (TYP)
FEATURE 2
SPRING LOCATION IS INCORRECT
TURNAROUND TO BE FIELD LOCATED PER CONTRACTOR APPROVAL (SEE NOTE 4)
TEMPORARY GRAVEL ACCESS ROAD PLAN/PROFILE
BM 320 EL 494.93
BM 325 EL 465.46
BM 324 EL 478.43
BM 322 EL 490.21
BM 323 EL 484.75
REFERENCE DRAWINGS
38400-VP-6086 SOUTHEAST DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 1 OF 3)
38400-VP-6087 SOUTHEAST DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 2 OF 3)
38400-VP-6089 OPERATIONAL DETAILS
38400-VP-6091 CONTAMINATED SOIL EXCAVATION AND RESTORATION DETAILS (SHEET 2 OF 2)
38400-VP-6093 SECTIONS & DETAILS (SHEET 1 OF 2)
38400-VP-6094 SECTIONS & DETAILS (SHEET 2 OF 2)
38400-VP-6115 TEMPORARY ACCESS GRAVEL ROAD PLAN, PROFILE AND SECTIONS
KEY PLAN
SHT 1 OF 3
SHT 2 OF 3
SHT 3 OF 3
FOR INFORMATION ONLY
SET I.D.
QUALITY LEVEL 2
WKES DOCUMENT NO. 3840-VIEN-0-0453-00
U.S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE
WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI
SOUTHEAST DRAINAGE REMEDIATION
SE DRAINAGE REMEDIATION LOCATIONS PLAN
SHEET 3 OF 3
WP 470
CIVIL
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL GROUP
ONE MARKET, STEUART TOWER
SAN FRANCISCO, CA 94105
PROJECT NO. DE-AC05-86OR21548
DRAWING NO. 38400-VP-6088
REV. 0
6/11/97 ISSUED FOR CONSTRUCTION
3/28/97 ISSUED FOR REVIEW AND APPROVAL (100% SUBMITTAL)
1/24/97 ISSUED FOR REVIEW (100% SUBMITTAL)
MATCHLINE E DWG 3840-VP-6087 SHEET 2 OF 3



REMEDIATION AREAS INFORMATION

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005	-	2	947	62.7	-	2332	-	SEE NOTE 3
092	-	2	433	32.1	-	1291	-	SEE NOTE 3
093	INCL W/ RL 005	-	-	-	-	-	-	SEE NOTE 3
094	INCL W/ RL 005	-	-	-	-	-	-	SEE NOTE 3

CLEARING AND GRUBBING OF TREES AND BRUSH.

2. **WARNING!!!** EXPLORER PETROLEUM'S 24 INCH HIGH PRESSURE PETROLEUM PRODUCTS PIPELINE. CONTACT LAYTON WILSON AT 615-251-3250, 48 HOURS PRIOR TO ANY CONSTRUCTION WITHIN 50 FEET OF PIPELINE. HEAVY EQUIPMENT AND HAUL TRUCKS SHALL NOT CROSS PIPELINE WITHOUT STEEL PLATES IN PLACE AS SHOWN.
3. SEE DRAWING 38400-VP-6090 FOR EXCAVATION AND REMEDIATION DETAILS.
4. HAUL TRUCKS SHALL WAIT ON STANDBY ON TEMPORARY ACCESS HAUL ROAD WHILE BACK-HOE TRANSFERS LOADS FROM REMEDIATION LOCATION.
5. TARP HAUL TRUCKS AT THE END OF THE TEMPORARY ACCESS ROAD.

REFERENCE DRAWINGS

38400-VP-6083	CHEMICAL PLANT SITE MAP, VICINITY MAP, LIST OF DRAWINGS AND GENERAL NOTES
38400-VP-6084	SITE PLAN, ABBREVIATIONS AND GENERAL LEGEND
38400-VP-6085	HAUL ROUTES AND HAMBURG QUARRY ROAD IMPROVEMENTS PLANS
38400-VP-6087	SE DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 2 OF 3)
38400-VP-6088	SE DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 3 OF 3)
38400-VP-6090	CONTAMINATED SOIL EXCAVATION AND RESTORATION DETAILS (SHEET 1 OF 2)
38400-VP-6093	SECTIONS AND DETAILS (SHEET 1 OF 2)
38400-VP-6094	SECTIONS AND DETAILS (SHEET 2 OF 2)

ROAD ALIGNMENT TABLE APPROXIMATE COORDINATES

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C15	1041559	754679
C16	1041435	754830
C17	1041421	754979
C18	1041312	754994

KEY PLAN

FOR INFORMATION ONLY

SET I.D. _____

QUALITY LEVEL 2
MKES DOCUMENT NO. 3840-V-ENV-D-01-0457-00

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A	3/24/97	ISSUED FOR REVIEW (90% SUBMITTAL)	MLB	DWR	DWR	MLM	MLM	MLM	MLM

MKES — PMC

U.S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE

WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI
SOUTHEAST DRAINAGE REMEDIATION

SE DRAINAGE REMEDIATION LOCATIONS PLAN SHEET 1 OF 3

DESIGNED DWR | DRAWN MLB | CHECKED DWR | INSPECTION DWR for S. Pare | RECOMMENDED MLM | APPROVED DWR Rogers 6/11/97 | CIVIL | HP 470

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL GROUP
ONE MARKET, STEUART TOWER
SAN FRANCISCO, CA 94105

PMC ENGG VER. | DATE | PMC QA VER. | DATE

PROJECT NO. DE-AC05-86OR21548

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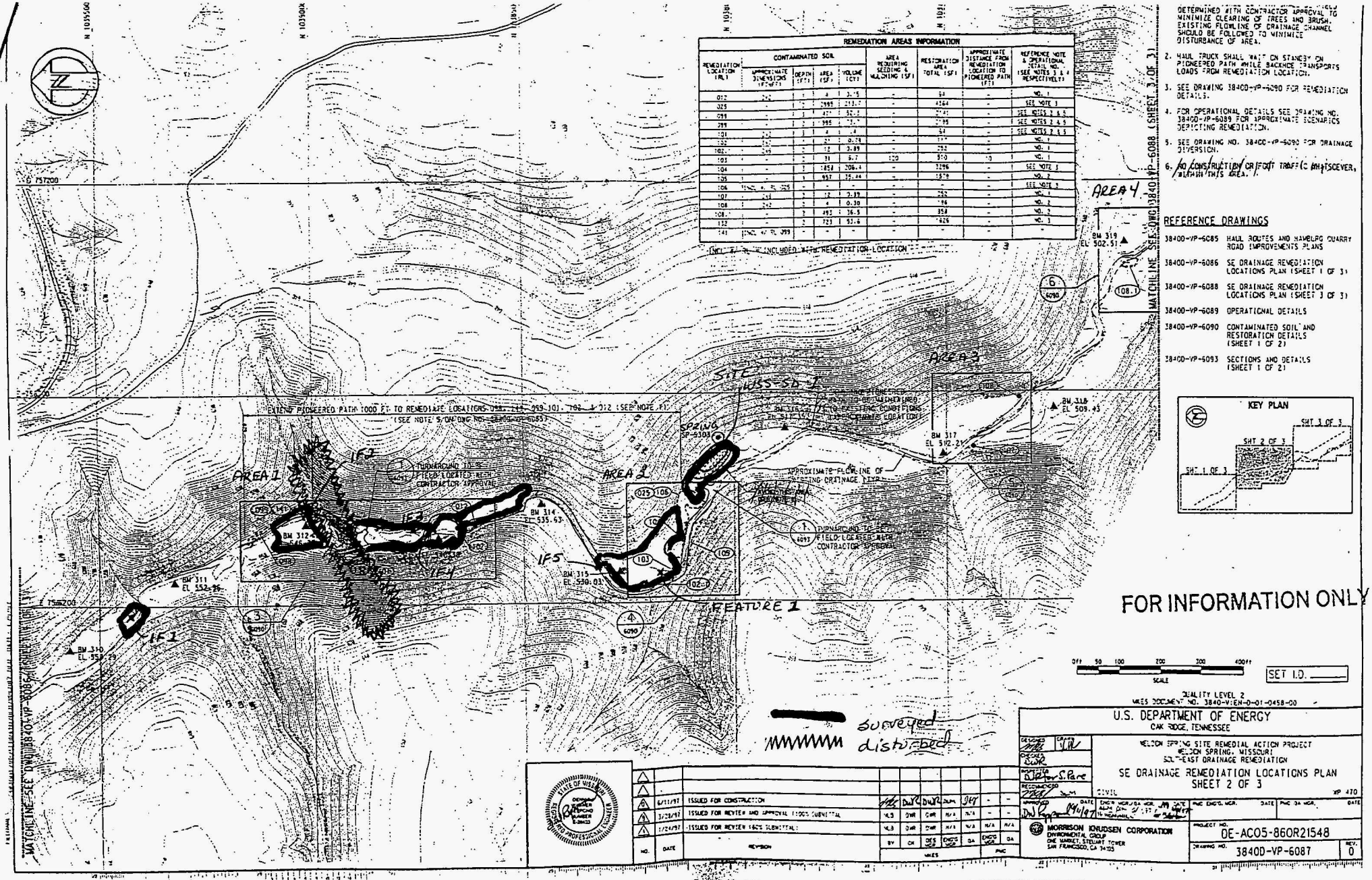
38400/VP/SE/RM/GA/VP6086.DGN DATE: 6/11/97

FILENAME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CONTAMINATED SOIL
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APPROXIMATE DIMENSIONS (FT x FT)
DEPTH (FT)
AREA (SF)
VOLUME (CY)
AREA REQUIRING SEEDING & MULCHING (SF)
RESTORATION AREA TOTAL (SF)
APPROXIMATE DISTANCE FROM REMEDIATION LOCATION TO PIONEERED PATH (FT)
REFERENCE NOTE & OPERATIONAL DETAIL NO. (SEE NOTES 3 & 4 RESPECTIVELY)
012
025
099
099
101
102
102.1
103
104
105
106
107
108
108.1
132
141
SEE NOTE 3
SEE NOTES 2 & 5
SEE NOTES 2 & 5
SEE NOTES 2 & 5
NO. 1
NO. 1
NO. 1
SEE NOTE 3
NO. 2
SEE NOTE 3
NO. 1
NO. 2
NO. 2
NO. 1
(INCL. W/ EL 099 INCLUDED WITH REMEDIATION LOCATION
AREA 1
AREA 2
AREA 3
AREA 4
SITE WSS-SD 1
FEATURE 1
EXTEND PIONEERED PATH 1000 FT TO REMEDIATE LOCATIONS 099, 141, 099, 101, 102, & 012 (SEE NOTE 5, DWG NO. 38400-VP-6085)
TURNAROUND TYP. IF FIELD LOCATED WITH CONTRACTOR APPROVAL
APPROXIMATE FLOWLINE OF EXISTING DRAINAGE TYP.
SPRING SP-6103
BM 310 EL 558.29
BM 311 EL 552.26
BM 312 EL 546
BM 314 EL 535.63
BM 315 EL 530.03
BM 317 EL 502.21
BM 318 EL 509.45
BM 319 EL 502.51
IF1
IF2
IF3
IF4
IF5
MATCHLINE SEE DWG 38400-VP-6088 (SHEET 3 OF 3)
MATCHLINE SEE DWG 38400-VP-6088 (SHEET 3 OF 3)
N 1035500
N 1035000
N 1034500
N 1034000
E 757200
E 756700
E 756200
DETERMINED WITH CONTRACTOR APPROVAL TO MINIMIZE CLEARING OF TREES AND BRUSH. EXISTING FLOWLINE OF DRAINAGE CHANNEL SHOULD BE FOLLOWED TO MINIMIZE DISTURBANCE OF AREA.
2. HAUL TRUCK SHALL WAIT ON STANDBY ON PIONEERED PATH WHILE BACKHOE TRANSPORTS LOADS FROM REMEDIATION LOCATION.
3. SEE DRAWING 38400-VP-6090 FOR REMEDIATION DETAILS.
4. FOR OPERATIONAL DETAILS SEE DRAWING NO. 38400-VP-6089 FOR APPROXIMATE SCENARIOS DEPICTING REMEDIATION.
5. SEE DRAWING NO. 38400-VP-6090 FOR DRAINAGE DIVERSION.
6. NO CONSTRUCTION OR FOOT TRAFFIC WITHIN THIS AREA.
REFERENCE DRAWINGS
38400-VP-6085 HAUL ROUTES AND HAMBURG QUARRY ROAD IMPROVEMENTS PLANS
38400-VP-6086 SE DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 1 OF 3)
38400-VP-6088 SE DRAINAGE REMEDIATION LOCATIONS PLAN (SHEET 3 OF 3)
38400-VP-6089 OPERATIONAL DETAILS
38400-VP-6090 CONTAMINATED SOIL AND RESTORATION DETAILS (SHEET 1 OF 2)
38400-VP-6093 SECTIONS AND DETAILS (SHEET 1 OF 2)
KEY PLAN
SHT 1 OF 3
SHT 2 OF 3
SHT 3 OF 3
FOR INFORMATION ONLY
surveyed
disturbed
0ft 50 100 200 300 400ft
SCALE
SET I.D.
QUALITY LEVEL 2
WRES DOCUMENT NO. 3840-V1EN-0-01-0458-00
U.S. DEPARTMENT OF ENERGY
OAK RIDGE, TENNESSEE
WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI
SOUTHEAST DRAINAGE REMEDIATION
SE DRAINAGE REMEDIATION LOCATIONS PLAN
SHEET 2 OF 3
CIVIL
WP 470
MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL GROUP
ONE MARKET, STEUART TOWER
SAN FRANCISCO, CA 94105
PROJECT NO. DE-AC05-86OR21548
DRAWING NO. 38400-VP-6087
REV. 0
6/11/97 ISSUED FOR CONSTRUCTION
3/28/97 ISSUED FOR REVIEW AND APPROVAL (100% SUBMITTAL)
1/24/97 ISSUED FOR REVIEW (60% SUBMITTAL)
REVISION
WRES

Curriculum Vitae

KONSTANCE LYNN (MOELLER) WESCOTT

Archaeologist, Social Sciences Section
Environmental Assessment Division
Argonne National Laboratory

Educational Background

M.A.	Anthropology, Northern Illinois University, 1991
B.A.	Mathematics, North Central College, 1988
B.A.	Sociology/Anthropology, North Central College, 1988

Professional Experience

12/92-present	Assistant Scientist -- Cultural Resources Environmental Assessment Division Argonne National Laboratory

Prepare cultural resource sections of environmental assessments (EA's) and environmental impact statements (EIS's) for the U.S. Department of Energy (DOE) and the U.S. Department of Defense (DoD). These sections support DOE and DoD compliance with local, state, regional, and federal laws and regulations pertaining to the National Environmental Policy Act (NEPA) and the protection of cultural resources (the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act (ARPA), Native American Graves Protection and Repatriation Act (NAGPRA), the American Indian Religious Freedom Act (AIRFA), the Antiquities Act, and others). Duties include reviewing and synthesizing existing reports; collecting, analyzing, and interpreting data; developing approaches to investigate potential effects, as well as developing possible mitigative measures; consulting with the proper agencies (e.g., State Historic Preservation Office (SHPO)); and preparing written reports.

Currently providing technical support to some DOE and DoD facilities in cultural resources management, including writing cultural resource management plans, consulting with SHPO's, and reviewing contractor reports. Recently prepared proposals for and conducted archaeological surveys for the U.S. Air Force (USAF). Supervise ANL archaeology staff during field work and in the preparation of written reports.

Assisting in the establishment of a Geographic Information System (GIS) for a DOE facility and currently co-managing that project. Responsible for scheduling, budget, and staff coordination. Developed approaches for applying GIS and remote sensing to archaeology, such as the predictive modeling of archaeological site locations.

Professional Experience (continued)

3/91-12/92 Scientific Assistant – Cultural Resources
Environmental Assessment and Information Systems Division
Argonne National Laboratory

Prepared cultural resource sections of EA's and EIS's for DOE and USAF. Duties included reviewing and synthesizing existing reports; collecting, analyzing, and interpreting data; developing approaches to investigate potential effects, as well as developing possible mitigative measures; consulting with the appropriate agencies; and preparing written reports.

6/91-8/91 Instructor
Department of Sociology and Anthropology
North Central College

Prepared lectures, exams, and other activities for the course "Introduction to Cultural Anthropology" (S&A 105). The course was designed to introduce undergraduate and continuing education students to the basic principles of cultural anthropology and to help them develop an awareness of cultures other than their own.

5/89-2/91 Archaeologist (Special Term Appointment)
Environmental Assessment and Information Systems Division
Argonne National Laboratory

Assisted in the preparation of cultural resource sections of EA's and EIS's for DOE and USAF. Developed a familiarity with the procedures, laws, and regulations regarding cultural resources and NEPA compliance.

8/89-8/90 Head Graduate Teaching Assistant
Department of Anthropology
Northern Illinois University

Assisted anthropology professors in teaching core anthropology courses to undergraduate students (Introduction to Linguistics - ANTH 230 and Language and Culture - ANTH 331); involved in exhibition preparation, collection management, and administrative duties in the Museum of Anthropology; coordinated activities of the other graduate teaching assistants; served on the Graduate Colloquium Committee representing the Department of Anthropology; supervised archaeological field school in Copan, Honduras (6/90-8/90).

Professional Experience (continued)

8/88-5/89 Graduate Teaching Assistant
Department of Anthropology
Northern Illinois University

Assisted anthropology professors in teaching core anthropology courses to undergraduate students (Human Origins - ANTH 101, Prehistoric Civilizations - ANTH 102, and Introduction to Cultural Anthropology - ANTH 120); involved in exhibition preparation in the Museum of Anthropology.

4/87-8/88 Cooperative Education Assignment
Energy and Environmental Systems Division
Argonne National Laboratory

Involved in research to determine the optimization of FORTRAN code and its portability on various computer systems (Sequent, Alliant, and Sun workstations) for the U.S. Department of Defense; designed and coordinated a computerized artifacts catalog using dBase III+, performed statistical analysis with SAS, digitized topographic maps using AUTOCAD, plotted artifact distributions on Surfer, and performed archaeological field work, including surveys, walkovers, shovel tests, and trench and feature excavations, for the Argonne cultural resources program; involved in additional computer-related activities (installations, maintenance, and AUTOCAD) for Systems Ecology.

Honors and Awards

Outstanding Graduate Major in Anthropology, Northern Illinois University, 1989-1990
Outstanding Students of College Achievement, 1988
Presidential Scholarship, North Central College, 1984-1988
Award for Excellence in Language Study (Spanish), 1984

Professional Affiliations

American Anthropological Association
American Association of Museums
Archaeological Institute of America
Council for Museum Anthropology
Midwest Museums Conference
Society for American Archaeology

Other Professional Activities

-- 8-Hour Annual Refresher Training for Hazardous Waste Site Operations Personnel (May 1996).
-- Co-organizer for symposium "GIS: Applications for Modeling in Archaeology," at the 61st Annual Meeting of the Society for American Archaeology, New Orleans, Louisiana (April 1996).
-- Geographic Information Systems Course at Northern Illinois University (1995).
-- 40-Hour Hazardous Waste Site Operations Training Course (August 1994).
-- Workshop, "Presenting the Past to the Public," University of Nevada at Reno, Cultural Resources Management Program (June 1994).
-- Fourth Annual International GPS/GIS Conference and Training Program (May 1994).
-- The Center for Archaeological Investigation's 10th Annual Visiting Scholar's Conference on "Geographic Information Systems and the Advancement of Archaeological Method and Theory" (March 1993).
-- Illinois Historic Preservation Agency Workshop on Cultural Resource Management (October 1992).
-- Department of Energy Affiliated Archaeologists Roundtable at the 55th Annual Meeting of the Society for American Archaeology, Las Vegas, Nevada (April 1990).
-- Maya Hieroglyphic Workshop and Seminar, University of Texas at Austin (March 1990).
-- Member of the Graduate Colloquium Committee, Northern Illinois University (1989-1990).
-- Archaeological field school in Copan, Honduras (Summer 1989); returned as Teaching Assistant (Summer 1990).

Publications

Book Chapter:

Moeller, K. "Change and Diversity in the Southeastern Periphery." In *Testimony of Images: Pre-Columbian Art* (McVicker, D. and M.F. McVicker, eds.) (December 1992).

Technical Memorandum:

Moeller, K.L., L.M. Malinowski, and J.F. Hoffecker. *Green River Archaeological Field Study in Little Hole and Browns Park for the Western Area Power Administration's Salt Lake City Power Marketing Environmental Impact Statement* ANL/EAD/TM-8 (December 1995).

Moeller, K.L., L.M. Malinowski, J.F. Hoffecker, D.A. Walitschek, L. Shogren, J.E. Mathews, and B.T. Verhaaren. *Class I Overview of Cultural Resources for the Western Area Power Administration's Salt Lake City Power Marketing Environmental Impact Statement* ANL/EAD/TM-1 (November 1993).

Sponsor Reports:

Moeller, K.L., B.T. Verhaaren, and D.A. Walitschek. *An Archaeological and Historic Resources Survey and Inventory of Travis Air Force Base, Solano and Contra Costa Counties, California.* Environmental Assessment Division, Argonne National Laboratory, prepared for U.S Air Force, Air Mobility Command, Scott Air Force Base, Illinois (March 1996).

Moeller, K.L., D.A. Walitschek, M. Greby, and J.F. Hoffecker. *An Archaeological and Historic Resources Inventory at McGuire Air Force Base, New Jersey.* Environmental Assessment Division, Argonne National Laboratory, prepared for U.S Air Force, Air Mobility Command, Scott Air Force Base, Illinois (April 1995).

Moeller, K.L., D.A. Walitschek, M. Greby, and J.F. Hoffecker. *An Archaeological and Historic Resources Inventory at Andrews Air Force Base, Maryland.* Environmental Assessment Division, Argonne National Laboratory, prepared for U.S Air Force, Air Mobility Command, Scott Air Force Base, Illinois (March 1995).

Moeller, K.L., D.A. Walitschek, M. Greby, and J.F. Hoffecker. *An Archaeological and Historic Resources Inventory at Andrews Air Force Base, Maryland: Field Survey Design.* Environmental Assessment Division, Argonne National Laboratory, prepared for U.S Air Force, Air Mobility Command, Scott Air Force Base, Illinois (April 1994).

Moeller, K.L., D.A. Walitschek, and J.F. Hoffecker. *An Archaeological and Historic Resources Inventory at McGuire Air Force Base, New Jersey: Field Survey Design.* Environmental Assessment Division, Argonne National Laboratory, prepared for U.S Air Force, Air Mobility Command, Scott Air Force Base, Illinois (January 1994).

Moeller, K., S. Nash, J. Elias, C. Bebrich, and S.A. Curtis. *Cultural Resources at Argonne's Advanced Photon Source Project Area, Volume II: Sites ANL-4, ANL-6, ANL-23* (Draft Report). U.S. Department of Energy, Office of Energy Research (June 1988).

Conference Proceedings:

Moeller, K. "A GIS Approach to Cultural Resources Management and NEPA Compliance." In *Practical Environmental Directions: A Changing Agenda.* Proceedings of the National Association of Environmental Professionals 21st Annual Conference, Houston, Texas (June 1996).

Conference Papers:

Wescott, K., "New Techniques for Managing Cultural Resources." Paper presented at the U.S. Army Materiel Command Lessons Learned Workshop, Bettendorf, Iowa (August 1996).

Moeller, K., and J. Kuiper. "Using GIS to Model Prehistoric Site Distributions in the Upper Chesapeake Bay." Paper presented at the 61st Annual Meeting of the Society for American Archaeology, New Orleans, Louisiana (April 1996).

Malinowski, L., and K. Moeller. "The Archaeology of the Intermountain West: A Regional Perspective from Browns Park in Utah and Colorado." Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota (May 1995).

Moeller, K., and J. Hoffecker. "Historical Geomorphology and Archaeological Survey Design: Applications in Cultural Resource Management." Paper presented at the 60th Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota (May 1995).

Moeller, K. and J.F. Hoffecker. "Cultural Resources and a GIS Approach to Land Management and Environmental Compliance." Paper presented at the 59th Annual Meeting of the Society for American Archaeology, Anaheim, California (April 1994).

Moeller, K. and J.F. Hoffecker. "A Geoarchaeological Analysis of Hydropower Operation Effects on the Green River in Utah and Colorado." Paper presented at the 58th Annual Meeting of the Society for American Archaeology, St. Louis, Missouri (April 1993).

Moeller, K. "Northern Illinois University Projects at Copan." Paper presented at the Midwest Mesoamericanist's 14th Annual Conference on Mesoamerican Archaeology and Ethnohistory, North Central College, Naperville, Illinois (March 1991).

Museum Exhibitions

Deemer, M. and K. Moeller. *Copan: Puzzles Within Puzzles.* Museum of Anthropology, Northern Illinois University. November 17, 1991 - present.

Moeller, K., R. Casey, C. Dubree, and J. Sassanoff. *More than Meets the Eye: Ways to Look at Art.* Swen Parson Gallery, Northern Illinois University. May 4, 1989 - June 2, 1989.

ARGONNE NATIONAL LABORATORY
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9700 SOUTH CASS AVENUE, BUILDING 900, ARGONNE, ILLINOIS 6043-4832

TELEPHONE 630/252-7669
FAX 630/252-4336

August 22, 1997

Karen Reed
U.S. Department of Energy
Weldon Spring Site
Remedial Action Project
7295 Highway 94 South
St. Charles, MO 63304

Dear Karen,

Please find enclosed a copy of the archaeological survey report for the Southeast Drainage, dated August 1997. Also enclosed is a copy of the responses to comments received from the PMC on the working draft of the same report. Please feel free to call me if you have any questions or if we could be of further assistance.

Sincerely,

Mary Picel
Environmental Assessment Division

MP/bb

Enclosures

cc: w/o enclosures
S. McCracken, DOE
T. Pauling, DOE

Y. Deyo, PAI

J. Ditmars, ANL
R. Van Lonkhuyzen, ANL
K. Wescott, ANL
D. Blunt, ANL
I. Hlohowskyj, ANL

ANL Responses to Comments on the Archaeological Survey of the Southeast Drainage
August 22, 1997

Table of Contents:

- Report was revised to include a table of contents.

Abstract:

- The text was revised to incorporate additional text, as requested.
- The text was revised to address the potential eligibility of the four areas found that contained cultural material.
- The last sentence of this section was retained, as it is an important provision of the survey.

Recommendations:

- Reference to chemical contamination in the drainage was retained in the background section consistent with information presented in the EE/CA. Clarification was made that human health risk is primarily from radioactive contamination and that the decision for cleanup is based on radioactive contamination.
- Existing text on flora and fauna was retained because Missouri guidelines require a discussion of the environmental setting of the survey area. This information provides context as to the suitability of the study area for human settlement.
- Any implication that past surveys were poorly done was not intended. It is important to note the findings and field conditions of previous surveys. The finding of only one artifact along the length of the drainage is significant and had an impact on the design of the survey by indicating a rather low potential for sites immediately along the banks where most of the remediation activities will be taking place Finding a few more artifacts in the drainage during this survey may indicate that the area has a greater potential for cultural remains than previously thought, but the area surveyed was much larger than the previous survey. It also indicates a possible increase in cutbank erosion over the last five years which has washed more material into the channel. Given the amount of time that has passed between surveys and the dynamic environment, it is not unusual that the surveys have yielded different results. Text was revised to omit "reportedly". The survey methodology text was revised to incorporate findings of previous survey.

Field Conditions:

- Text was revised to clarify that the stakes bounded the contaminated area.
- The paragraph on environmental health and safety procedures was retained because it is applicable to the overall description of field conditions as these are not typical procedures for archaeological surveys. Text was revised to incorporate changes provided by commentor.

Survey Methodology:

- The text regarding survey methodology was revised as per comment.
- The survey was limited to relatively flat areas because the steep slopes in much of the area are unlikely to contain archaeological material, and they are also less likely to be impacted by the proposed action. This rational is provided in the text.
- The text was revised to clarify that an area of 30 cm x 30 cm was cleared of leaf litter.

Survey Results:

- The text was revised to state that only undisturbed and minimally disturbed areas were surveyed because heavily disturbed areas are unlikely to yield significant archaeological deposits of sufficient integrity to be considered eligible for the *National Register of Historic Places.*
- Per your suggestion, the text was revised to state that eleven areas adjacent to contaminated locations were surveyed.
- The correspondence for the identified historic site (i.e., Walters 1990b) does not provide a state number. Text was revised to state "reported" instead of "recorded". If the PMC has correspondence that does include a state number, we will incorporate this information in the document.
- Diagrams of isolated finds are not a Phase I survey report requirement and are therefore not provided in the report. A no collection policy for surface artifacts is typical for a Phase I survey and artifact sketches are rarely done in the field. Locations of these artifacts are provided on the maps in Appendix A.
- The sentence "No further action...area" was deleted.
- Comment regarding state number from any subsurface digs is unclear. No subsurface testing has taken place within the Southeast Drainage. There was also not enough material present on the surface at this location to warrant subsurface testing. The area is recommended as potentially eligible and should undergo Phase II testing to see if it is an eligible site, but only if avoidance is not possible. Any subsurface testing for buried deposits would take place during Phase II investigations.
- Although only recent historic material was found at Feature 1, visibility was not adequate to discount the possibility of the feature originating in prehistoric times. Instead of spending a significant amount of time investigating the area further, such as by subsurface testing for buried deposits, it was more feasible to suggest avoidance. As is stated in the report, if it is not possible to avoid the area, a more extensive investigation to evaluate the feature should be completed during Phase II testing. Text was revised to specify the possibility of buried remains associated with the hearth.
- Test was revised to indicate that the site is potentially eligible and further investigation (Phase II testing) is required to evaluate whether it meets eligibility requirements.

Recommendations:

- Text was revised throughout the report to read MDNR-SHPO.
- Text was revised to omit discussion of survey methodology restrictions.
- Text was revised to reflect the potential eligibility of the four areas and recommend Phase II testing, if necessary.

References:

- Heading was changed to "References Cited". The reference list was not intended to be an exhaustive account of all Weldon surveys, but some the previous Weldon reports were used for background information. Only the reports used are cited in this list.