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DRAFT FOR PUBLIC REVIEW

ATTACHMENT A

Environmental Baseline Survey Report for the Proposed Title Transfer of the Former K-31 Area at the East Tennessee Technology Park, Oak Ridge, Tennessee

This document is approved for public release per review by:

Susan D. Faucher 3/12/15

ETTP Classification and Information Control Office — Date

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Environmental Baseline Survey Report for the Proposed Title Transfer of the Former K-31 Area at the East Tennessee Technology Park, Oak Ridge, Tennessee

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URS | CH2M Oak Ridge LLC
Managing and Safely Delivering the Department of Energy's Vision
for the East Tennessee Technology Park Mission
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This report is intended to be used in its entirety. Excerpts, which are taken out-of-context, run the risk of being misinterpreted and are, therefore, not representative of the findings of this assessment. Opinions and recommendations presented in this report apply only to site conditions and features as they existed at the time of the site visit, and those inferred from information observed or available at that time, and cannot be applied to conditions and features of which Leidos is unaware and has not had the opportunity to evaluate.

The results of this report are based on record reviews, site reconnaissance, interviews, and the radiological report reviewed and approved by UCOR. Leidos has not made, nor has it been asked to make, any independent investigation concerning the accuracy, reliability, or completeness of such information.

All sources of information on which Leidos has relied in making its conclusions are identified in Chap. 8 of this report. Any information, regardless of its source, not listed in Chap. 8 has not been evaluated or relied upon by Leidos in the context of this report.

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ABBREVIATIONS

Avg	average
bgs	below ground surface
CDR	Covenant Deferral Request
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CNF	Central Neutralization Facility
COC	contaminant of concern
COE	U.S. Army Corps of Engineers
D&D	decontamination and decommissioning
DCE	dichloroethene
DOE	U.S. Department of Energy
DQO	data quality objective
DVS	Dynamic Verification Strategy
EA	Environmental Assessment
EBS	Environmental Baseline Survey
ELCR	excess lifetime cancer risk
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
EU	exposure unit
FFA	Federal Facility Agreement
FY	fiscal year
HI	hazard index
IV	independent verification
LLW	low-level waste
Max	maximum
MCL	maximum contaminant level
NCP	National Contingency Plan
NFA	no further action
NFI	no further investigation
ORAU	Oak Ridge Associated Universities
OREIS	Oak Ridge Environmental Information System
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORO	Oak Ridge Office
ORR	Oak Ridge Reservation
PCB	polychlorinated biphenyl
PCCR	Phased Construction Completion Report
pCi/g	picocuries per gram
PCP	pentachlorophenol
PRG	preliminary remediation goal
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act of 1976
RCW	recirculating cooling water
RL	remediation level
ROD	Record of Decision
RSL	risk screening level
SAIC	Science Applications International Corporation
SU	soil unit
SVOC	semivolatile organic compound

Tc	technetium
TCE	trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TVA	Tennessee Valley Authority
TVS	Transportable Vitrification System
UCOR	URS | CH2M Oak Ridge LLC
UF_6	uranium hexafluoride
VOC	volatile organic compound
µg/L	micrograms per liter

EXECUTIVE SUMMARY

This environmental baseline survey (EBS) report documents the baseline environmental conditions at the U.S. Department of Energy's (DOE's) Former K-31 Area, hereafter also referred to as the "Property," consisting of approximately 61 acres located at the East Tennessee Technology Park (ETTP) Heritage Center (Heritage Center). DOE is proposing to transfer the title of this land for mixed (industrial/commercial) use, consistent with the applicable Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Records of Decision (RODs) and the Environmental Assessment completed pursuant to the National Environmental Policy Act. This EBS provides a summary of information to support the transfer of this government-owned property at the Heritage Center to a non-federal entity under the requirements of Sect. 120(h) of CERCLA. More specifically, the goal is to obtain a covenant deferral under CERCLA Sect. 120(h)(3)(C).

This EBS for the Former K-31 Area relies upon documentation in the four relevant Phased Construction Completion Reports (PCCRs) for the environmental data evaluation and human health risk evaluation. It summarizes no further action (NFA) determinations that have been approved by the U.S. Environmental Protection Agency (EPA) Region 4 and Tennessee Department of Environment and Conservation (TDEC) for the soils, slabs, and subsurface structures of the Former K-31 Area. The PCCRs used for source information for the proposed transfer are:

- *Fiscal Year 2006 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2317&D2), December 2006 (approved) [DOE 2006] (addresses Exposure Units [EUs] Z2-02, Z2-07, Z2-09, and Z2-10).

- *Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2723&D2), September 2007 (approved) [DOE 2008] (addresses EUs Z2-01, Z2-03, and Z2-08).

- *Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2590&D1), November 2012 (approved) [DOE 2012].

- *Phased Construction Completion Report for Exposure Unit Z2-06 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-XXXX), 2015 (in-preparation) [DOE 2015] (addresses EU Z2-06) [NFA recommended, D1 version to EPA and TDEC in November 2015 (planned)].

The NFA determinations under an industrial land use risk scenario documented in the referenced PCCRs were reached using the Environmental Management (EM) Program's Dynamic Verification Strategy (DVS) process [*Remedial Design Report/Remedial Action Work Plan for Zone 2 Soils, Slabs, and Subsurface Structures, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2224&D2 (DOE 2007b)], a process designed to facilitate real-time decision-making. This process is in use for remedial action decision-making across the Heritage Center, which has been divided into Zone 1 and Zone 2 and further subdivided into Geographic Areas, then Groups, then EUs. For consistency with the EM nomenclature, this EBS will use the EU as the basis for discussion.

All of the acreage addressed in this EBS (approximately 61 acres) is contained within Zone 2 and includes three Zone 2 EUs in their entirety: Z2-06 (approximately 25.6 acres), Z2-07 (approximately 10.9 acres), and Z2-10 (approximately 20.9 acres). Portions of EUs Z2-03 and Z2-05 were excluded from

the K-33 Area Covenant Deferral Request (CDR) and EBS and are included in this K-31 Area CDR and EBS because these portions were needed, at the time, to support the K-31 Building Decontamination and Decommissioning (D&D) project. The transfer footprint portions included in this proposed transfer are 2.1 acres of EU Z2-03 and 1.6 acres of EU Z2-05. For purposes of the Former K-31 Area EBS, information is presented on the land proposed for transfer in its entirety. However, in order to provide context and a tie-in with the status of the EUs, this EBS provides regulatory details for the relevant EUs or partial EUs in Chap. 3 and the results of the risk evaluation in Chap. 7.

The primary objective of the remediation measures presented in the Zone 2 ROD is to protect industrial workers from exposure to hazardous substances. The institutional controls restricting property use of the Heritage Center to a mixed-use commercial and industrial park, and the limited potential for off-site migration of contaminants, limit the potential for exposure to other individuals. Therefore, remediation criteria were designed for the protection of the future industrial worker. Accordingly, land use controls have been established to control excavations or soil penetrations below 10 feet and to restrict future land use to industrial/commercial activities.

The DVS process included a detailed records search, which included Federal Government records and title documents. That search has been relied upon for this report. The DVS process and the preparation of this report evaluated aerial photographs that may reflect prior uses, visual and physical inspections of the Property and adjacent properties, and interviews with current and former employees involved in the operations on the real Property to identify any areas on the Property where hazardous substances and petroleum products, or their derivatives, and acutely hazardous wastes were stored for one year or more, known to have been released, or disposed of. The following is a summary of the findings of the evaluation that was performed:

- The results of the DVS evaluation for EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10, in which the Former K-31 Area EBS footprint is located, show that the EUs met the requirements specified for an NFA determination for soils under an industrial land use risk scenario.

- EU Z2-03, which is only partially included in the transfer footprint, included five field test kit sample results for polychlorinated biphenyls (PCBs), and one sediment sample from the K-897-M Oil Containment Structure within the K-31 transfer footprint. There were no detections of PCBs in the field test kit results. Evaluation of the field test results against laboratory results during the DVS found that there was good correlation between the field test kit results and laboratory results. The sediment sample from K-897-M contained four semivolatile organic compounds and PCB-1260 at concentrations below remediation levels (RLs) and residential preliminary remediation goals (PRGs). Because the highest chemical and radiological concentrations detected in soils in EU Z2-03 were detected in the portion of the EU that is not included in the K-31 transfer footprint area, the findings of NFA in the PCCR are also appropriate for the portion of the EU included in the Former K-31 Area transfer footprint.

- Because the soil and slab underlying the K-761 Switch House is part of an EU with an approved NFA determination, the land underlying this structure is included in the transfer footprint of this EBS/CDR. The soils beneath K-761 were not sampled under the DVS, due to their inaccessible nature beneath the building, but they were included within the scope of the PCCR for EU Z2-03. However, to ensure that no contamination above established Zone 2 RLs remains, when demolition of K-761 is complete, the subsurface soils and/or exposed remaining structures, if any, will be characterized during confirmatory sampling to ensure that the soils and/or subsurface structures, such as concrete subsurface foundation elements and electrical ducts, meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in Federal

Facility Agreement (FFA) Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the Fiscal Year 2007 PCCR Addendum for Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

- EU Z2-05, which is only partially included in the transfer footprint, included sampling of soil around the outside of the former K-33 building, prior to demolition of the building; sampling of soil through the concrete slab prior to slab removal; and sampling of the underlying soil following removal of the slab. Soil samples collected from EU Z2-05 at the completion of decontamination and decommissioning (D&D) and remediation activities indicated the soils in EU Z2-05 met the requirements of the Zone 2 ROD for NFA. The portion of the EU (~ 1.6 acres) that was not included in the Former K-33 Area transfer footprint contains little exposed soils, as the area is essentially covered by concrete and asphalt. Thus, the findings of NFA for the entire EU Z2-05 are appropriate for the narrow strip of EU Z2-05 included in the Former K-31 Area transfer footprint.

- The K-903 concrete slab is posted as containing fixed radiological contamination. The K-903 slab will be removed prior to transfer of the Former K-31 Area. Because the soil underlying the K-903 Pad is part of an EU with an approved NFA determination, the land underlying this structure is included in the transfer footprint of this EBS/CDR. The soils beneath the K-903 Pad were not sampled under the DVS, due to their inaccessible nature beneath the pad, but they were included within the scope of the PCCR for EU Z2-05. However, to ensure that no contamination above established Zone 2 RLs remains, when removal of the K-903 Pad is complete, the subsurface soils will be characterized during confirmatory sampling to ensure that the soils meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until K-903 Pad removal, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the PCCR Addendum for EUs Z2-04 and Z2-05 in Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

- EU Z2-06: A PCCR is being prepared with an NFA recommendation for this EU. The data used in this EBS are the same data used in the risk evaluation for the PCCR. DVS sampling of EU Z2-06 included a total of 54 samples of the soils underlying the K-31 slab. No contamination above average or maximum RLs was detected in these below-slab soil samples. An NFA determination has been recommended in the draft Technical Memorandum that was provided to EPA in March 2015. As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of K-31 and its slab is completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR in Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA.

- EU Z2-07: This EU is south of the K-31 building and is 10.9 acres in size. EU Z2-07 was the location of the K-897-E and K-897-F oil containment structures. There are 18 sample locations in

EU Z2-07, with 15 of the samples collected at depths of 0 to 3 ft below ground surface (bgs). The remaining three samples were composited over the 0 to 10 ft bgs interval at three locations. There were no maximum or average RL exceedances.

- EU Z2-10: This EU is southeast of the K-31 building and is approximately 20.9 acres in size. The only Federal Facility Agreement site is the K-897-G oil containment structure. There were seven sample locations in EU Z2-10, with all samples collected at depths of 0 to 1 ft bgs. There were no maximum or average RL exceedances.

- An evaluation of the adjacent land did not indicate a risk posed by the adjacent areas.

CONCLUSIONS

Based on the U.S. Department of Energy's (DOE's) review of the existing information, including discussions and interviews referenced herein, and evaluation of the data gathered in preparation of the environmental baseline survey for the Former K-31 Area, DOE recommends the following:

- Because of the uncertainty associated with the nature of the on-site groundwater and the need to evaluate and possibly address groundwater in the future, DOE recommends that the transfer of the Former K-31 Area be achieved by a covenant deferral per the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Sect. 120(h)(3)(C).

- Based on the results of the Dynamic Verification Strategy (DVS) evaluation and the remedial actions completed, soils in the five Exposure Units included in the transfer footprint have been approved by the regulatory agencies (see Appendix C) for industrial use. Therefore, the soils in the Property are safe for industrial use and are suitable for transfer.

- The K-31 building, the K-761 Switch House, and the K-903 Pad (see Fig. 1.2) will be demolished before the underlying land is transferred.

- The soil and slab underlying Bldg. K-761 and the K-903 Pad are part of an exposure unit (EU) with an approved no further action (NFA) determination;, hence, the land underlying these structures is included in the transfer footprint of this Environmental Baseline Survey (EBS)/Covenant Deferral Request (CDR), including the land underlying these structures. The soils beneath K-761 and the K-903 Pad were not sampled under the DVS, due to their inaccessible nature, but they were included within the scope of the Phased Construction Completion Reports (PCCRs) for EUs Z2-03 and Z2-05. However, to ensure that no contamination above established Zone 2 remediation levels (RLs) remains, when removal of these structures is complete, the subsurface soils will be characterized during confirmatory sampling to ensure that the soils meet the Zone 2 Record of Decision (ROD) RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in Federal Facility Agreement (FFA) Appendix E and/or J. The underlying land will not be transferred until K-903 Pad removal, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the PCCR Addendum for EUs Z2-04 and Z2-05 in Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA. Likewise, when demolition of K-761 is complete, the subsurface soils and/or exposed remaining structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and/or subsurface structures, such as concrete subsurface foundation elements and electrical ducts, meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the Fiscal Year 2007 PCCR Addendum for Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

- DVS sampling of EU Z2-06, including 54 samples of the soils underlying the K-31 slab, detected no contamination above average or maximum RLs. An NFA determination has been recommended in the

draft Technical Memorandum that was provided to the U.S. Environmental Protection Agency (EPA) in March 2015; hence, the land underlying the K-31 building is included in the transfer footprint of this EBS. As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of these structures is completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR for Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA.

LAND USE RESTRICTIONS

Land use restrictions are an important component of a CERCLA covenant deferral; they help to ensure that transfer of the Property is protective for the intended use. The restrictions that will apply to the Former K-31 Area are summarized below. Full details are found in Sect. 6.1 of the Covenant Deferral Request.

1. The Property shall not be developed in a manner that is inconsistent with the land use assumptions of "industrial use" contained in the approved applicable ROD for Zone 2 [*Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2 of East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2161&D2 (DOE 2005)].

2. Development of the Property must comply with all applicable federal, state, and local laws and regulations with respect to any present or future development of the Property.

3. All structures, facilities, and improvements requiring a water supply shall be required to be connected to an approved water system for any and all usage. Extraction, consumption, exposure, or use, in any way, of the groundwater underlying the Property is prohibited without the prior written approval of DOE, EPA, and the Tennessee Department of Environment and Conservation (TDEC).

4. Disturbance of any portion of the Property deeper than 10 ft bgs without prior authorization from DOE is prohibited.

5. In order to ensure that the migration of volatile organic compounds (VOCs) in contaminated groundwater does not contribute to an unacceptable risk to human health, DOE will address the potential for vapor intrusion in the East Tennessee Technology Park final Sitewide ROD, which is currently scheduled to be signed in 2022, and will take interim protective measures to ensure protectiveness until the ROD is signed. Any new building or structure built on the Property that is intended to be occupied by workers 8 hours or more per scheduled work day, or by public visitors, must be designed and constructed to minimize potential exposure to VOC vapors, using EPA/625/R-92/016 (June 1994), *Radon Prevention in the Design and Construction of Schools and Other Large Buildings*, as guidance.

6. DOE reserves the right of access to all portions of the Property for environmental investigation, remediation, or other corrective action.

RESPONSE TO REGULATOR COMMENTS

The CDR and EBS were issued in draft form for regulator review on April 23, 2015. Comments were received from EPA Region 4 on May 22, 2015. Comments were received from TDEC on May 20, 2015. EPA requested clarification on the NFA status of EUs where demolition activities have been conducted, clarification that PCCR addenda would be submitted for review and approval, clarification on the history of the K-903 Pad, clarification on the decision to wait until demolition was completed before sampling beneath buildings and pads, and clarification on the actions taken post-demolition of the K-1206 Water Tank. EPA also requested to receive a copy of the deed, and correction of various typographical errors. TDEC also requested clarification on the status of NFA for EUs where demolition activities have been conducted, clarification on the history of the K-903 Pad, clarification on the status of the recirculating cooling water lines, clarification on what actions were taken for the paint chips from demolition of the K-1206 Water Tank, clarification on what subsurface structures will remain at the buildings being demolished, and correction of typographical errors.

Comments received from EPA and TDEC, and DOE's responses, are included in the CDR in Sect. 7.1. Comments received have been incorporated into the CDR and EBS.

RESPONSE TO PUBLIC COMMENTS

This is a placeholder.

1. PROPERTY IDENTIFICATION

This environmental baseline survey (EBS) report documents the baseline environmental conditions for the Former K-31 Area transfer footprint. The U.S. Department of Energy (DOE) is proposing to transfer this property for mixed (industrial/commercial) use, pursuant with the applicable Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Records of Decision (RODs) and the Environmental Assessment (EA) completed pursuant to the National Environmental Policy Act (DOE 2003). The Property is composed of a single contiguous tract of land totaling 61.01 acres. The transfer footprint is located in the far northwestern portion of the East Tennessee Technology Park (ETTP) [formerly the Oak Ridge Gaseous Diffusion Plant (ORGDP) or K-25 Site] Heritage Center on the Oak Ridge Reservation (ORR) in Roane County, Tennessee.

The Former K-31 Area transfer footprint is bounded by the former K-762 Switchyard (Z2-03) and vacant land (Exposure Unit [EU] Z1-46) to the west; the Former K-33 Area to the north (EUs Z2-02, Z2-05, Z2-08, and Z2-09); and Poplar Creek to the east and south. The transfer footprint includes the land on which Bldg. K-31 was located, which includes EU Z2-06 and the southernmost portion of EU Z2-05, which served as a buffer and work area for the decontamination and decommissioning (D&D) of the K-31 building, and was not included in the Former K-33 Area transfer footprint (DOE 2014).

Figure 1.1 shows the location of the study area at the Heritage Center, and Fig. 1.2 shows the proposed transfer footprint. Figure 1.3 provides an aerial photograph of the K-31 area in 1952, and Fig. 1.4 provides an aerial photograph of the study area in 2000.

Figure 1.2 indicates the boundary of the proposed transfer footprint and the boundaries of the EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10 in which the proposed transfer footprint is located. DOE received regulatory concurrence for no further action (NFA) determinations for soil under an industrial land use risk scenario for Z2-03 in 2008; EUs Z2-07 and Z2-10 in 2007; and EU Z2-05 in 2013. NFA concurrence has been recommended for EU Z2-06, which meets the requirements for NFA for soils and subsurface structures as required under the Zone 2 ROD.

Preparation of this report relied on the Phased Construction Completion Reports (PCCRs) that discuss the transfer footprint area and included a detailed search of government records and title documents for the area. Preparation of this report and the relevant PCCRs included reviews of historic aerial photographs that may reflect prior uses; visual and physical inspections of the Property and adjacent properties; and interviews with current and former employees involved in the operations on the real property to identify any areas on the Property where hazardous substances and petroleum products, or their derivatives, were known to have been stored, released, or disposed.

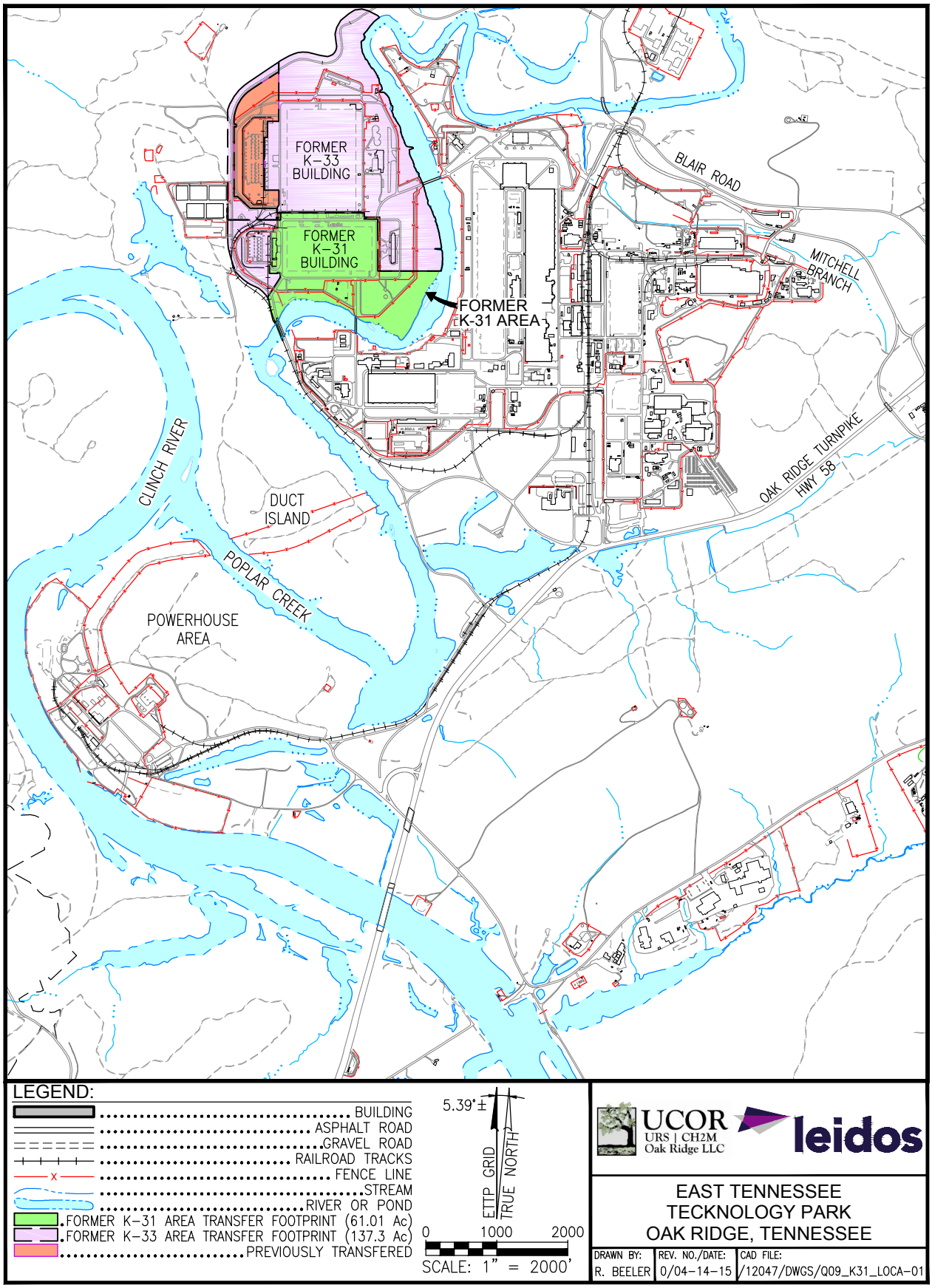

Fig. 1.1. Location of the proposed Former K-31 Area transfer footprint within the Heritage Center.

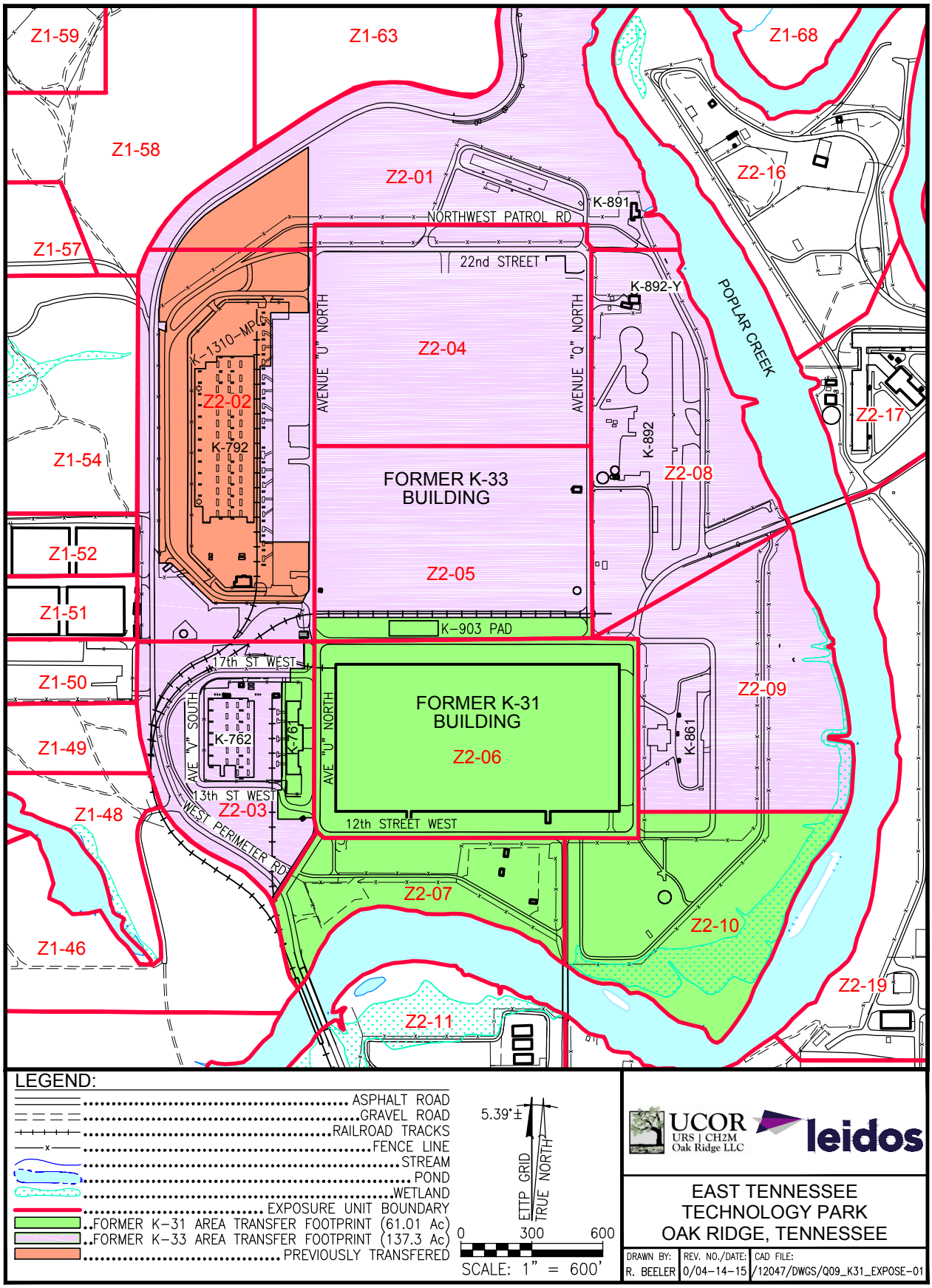

Fig. 1.2. Proposed Former K-31 Area transfer footprint and EU boundaries.

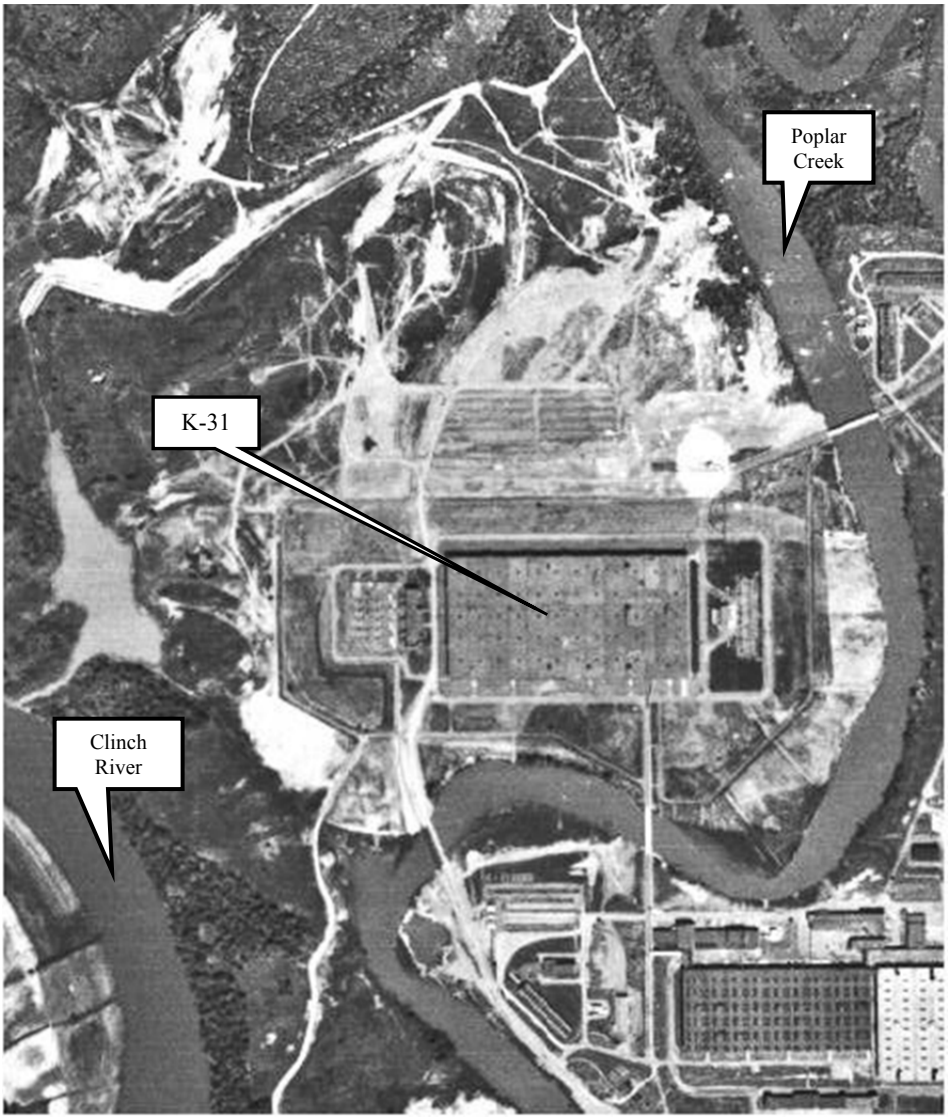

Fig. 1.3. Former K-31 Area, circa 1952.

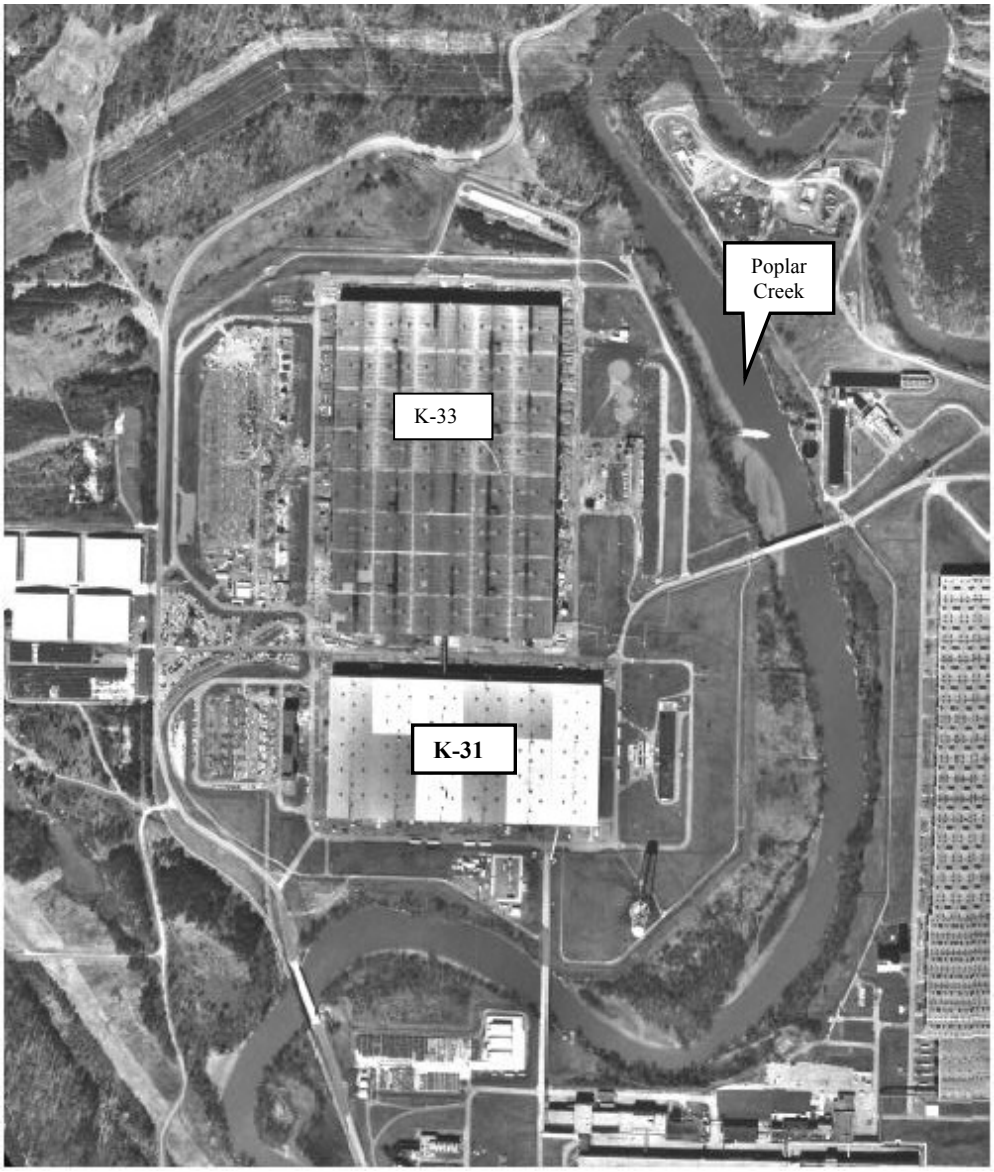

Fig. 1.4. Former K-31 Area, circa 2000.

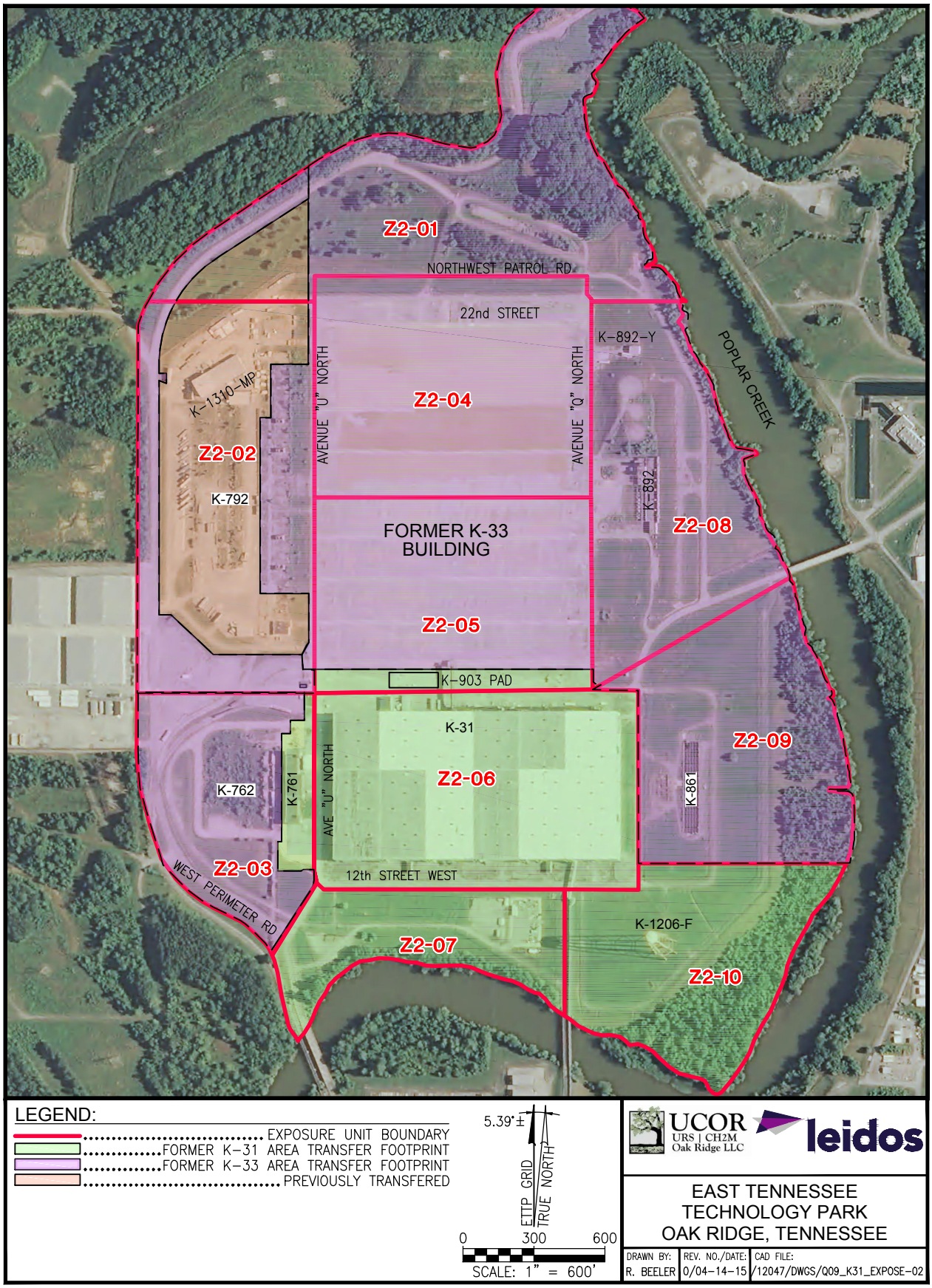

Fig. 1.5. Aerial photograph of the Former K-31 Area footprint and EU boundaries, circa 2013.

2. TITLE SEARCH

On October 16, 1996, the State of Tennessee Roane County Recorder's Office was visited, and a review was conducted of the recorded deeds documenting previous ownership of the land tract where the Former K-31 Area and adjacent areas are located. The deeds contained no information or references to other recorded evidence that, prior to DOE ownership, the Property was utilized for the storage of hazardous substances and/or petroleum products or their derivatives. Additionally, no information contained in the deeds would indicate that hazardous substances and/or petroleum products or their derivatives were released from or disposed of on the Property. Prior to acquisition by the government, the area was farmland and was a combination of cultivated fields and pastures with scattered wooded areas.

Because the Tennessee Valley Authority (TVA) was the previous owner of several large tracts of ORR land, the TVA Real Estate Office was contacted regarding their knowledge of any previous land uses. The U.S. Army Corp of Engineers (COE) was another source of information that has been contacted regarding previous land uses (see Sect. 3.1).

3. FEDERAL RECORDS SEARCH AND COMPLIANCE SUMMARY

3.1 FEDERAL RECORDS SEARCH

In 1997, the TVA in Knoxville, Tennessee (TVA 1997), and the COE District Office in Nashville, Tennessee (COE 1997), were contacted to determine if they maintained any records reflecting past or present land use relative to the land that is now the Heritage Center. Neither TVA nor COE had any information regarding the history of past or present land use that would indicate if hazardous substances or petroleum products or their derivatives were stored or released on the site.

DOE real estate records documenting previous ownership of the land tracts where the Former K-31 Area is located were examined. Page A-3 of Appendix A is a statement from the Realty Officer of the DOE-Oak Ridge Office (ORO) that the real estate records contained no information or references to other recorded evidence that, prior to ownership by DOE and its U.S. Government predecessor agencies, the property had been used for the storage of hazardous substances. Additionally, no information contained in these records indicated that hazardous substances had been released from or disposed of on the property.

Pre-construction aerial photographs and maps reflecting prior use of this land were also reviewed. A copy of these photographs and maps is maintained on file in the DOE-ORO Real Estate Office.

Aerial Photographs:

Photograph Nos. and Date	Flight By	Source
No. 130-3-9, dated 1939	Unknown	DOE-ORO, Real Estate Office
Nos. 820-2-20 through -23 and 820-3-20 through -24, dated September 25, 1942	Aero Service Corp. for Stone and Webster	DOE-ORO, Real Estate Office

These photographs, which were taken in 1939 and 1942, show that the land where the study area is located was predominantly used for agricultural purposes. Approximately 90% of the Property was used in some type of agricultural pursuit, and the remaining acreage was wooded. A map depicting pre-World War II structures, archeological sites, and cemeteries that were present in the area of the Heritage Center is included in Appendix B.

Topographic and real estate maps:

A November 1, 1942, topographic map identified as Section B-1 of ORR that was prepared by Aero Service Corporation for Stone and Webster and a February 19, 1945, real estate map (sheet 9 of 16) prepared by the U.S. Army shows the boundaries of all land tracts upon which facilities at the site are currently located. The area addressed in this EBS is located primarily on a portion of Land Tract K-1007, with the southern border of the study area located on a portion of Land Tract K-1016.

Neither the aforementioned photographs nor maps contained any information regarding the history of the past land usage that would indicate that storage or releases of hazardous substances or petroleum products have occurred on the land where the Former K-31 Area is located. Copies of the 1942 topographic map and real estate map are maintained in the DOE-ORO Real Estate Office.

3.2 REGULATORY SUMMARY

3.2.1 Background

As mentioned previously, for the foundational information about the potential for surface and subsurface soil contamination, this EBS relies upon documentation presented in the following PCCRs:

- *Fiscal Year 2006 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2317&D2), December 2006 (approved) [DOE 2006] (addresses EUs Z2-02, Z2-07, Z2-09, and Z2-10).

- *Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2723&D2), September 2007 (approved) [DOE 2008] (addresses EUs Z2-01, Z2-03, and Z2-08).

- *Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-2590&D1), November 2012 (approved) [DOE 2012].

- *Phased Construction Completion Report for Exposure Unit Z2-06 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee* (DOE/OR/01-XXXX), 2015 (in preparation) [DOE 2015] (addresses EU Z2-06) [NFA recommended, D1 version to the U.S. Environmental Protection Agency (EPA) and Tennessee Department of Environment and Conservation (TDEC) in May 2015 (planned)].

The PCCRs for EUs Z2-03, Z2-05, Z2-07, and Z2-10 (DOE 2006; DOE 2007c; and DOE 2012) have been approved by EPA Region 4 and TDEC (Appendix C). Approval of the PCCR addressing EU Z2-06 (DOE 2015) is currently pending. The PCCRs address the EUs where characterization or remedial actions had to be completed before the Property could meet the requirements of the Zone 2 ROD [*Record of Decision for Soil, Buried Waste, and Subsurface Structure Actions in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2161&D2 (DOE 2005)]. The PCCRs were prepared as part of the Environmental Management (EM) Dynamic Verification Strategy (DVS). The DVS process is in use for remedial action decision-making across the Heritage Center, and decisions are based on hierarchical land unit divisions of Zones, then Geographic Areas, then Groups, then EUs.

All of the acreage in the Former K-31 Area EBS footprint is included in EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10. These EUs are located in Zone 2 of the Heritage Center. The component and surrounding EUs and the Former K-31 Area transfer footprint are shown on Fig. 1.2.

CERCLA decisions for EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10 are indicated in Table 3.1. These EUs were assessed under an approved Work Plan [*Remedial Action Work Plan for Dynamic Verification Strategy for Zone 1, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2182&D4 (DOE 2007)] prepared according to the DVS process. The Work Plan was approved by EPA and TDEC on December 7 and 13, 2007, respectively. It was used for both Zone 1 and Zone 2. All verified and validated data used to make regulatory decisions have been placed in the Oak Ridge Environmental Information System (OREIS) database (see http://www-oreis.ettp.energy.gov/oreis/help/oreishome.html) and are available for review. The sampling results and data evaluation can be found in Appendix A of the PCCRs for EUs Z2-07 and Z2-10 (DOE 2006); EUs Z2-04 and Z2-05 (DOE 2012); and Z2-06 (DOE 2015). Sampling results and data evaluation can be found in Appendix B of the PCCR for EU Z2-03 (DOE 2008). These data were deemed sufficient to

reach NFA decisions for soils under an industrial land use risk scenario for EUs Z2-03, Z2-05, Z2-07, and Z2-10, and an NFA has been recommended for Z2-06.

Table 3.1. Summary of CERCLA decisions for the Zone 2 EUs addressed in this EBS

Geographic area	Group	PCCR	EU (acreage)[a]	Associated FFA sites within the transfer footprint[b]	Decision
K-31/33 Area	K-31/K-33	FY 2007 PCCR for Zone 2 Soils, Slabs, and Subsurface Structures at ETTP	Z2-03 (14.9 acres)	K-762 Valve Vault 2 (known as K-896) K-897-M Oil Containment Structure	NFA for soils approved[c]
K-31/33 Area	K-31/K-33	2012 PCCR for EUs Z2-04 and Z2-05 at ETTP	Z2-05 (22 acres)	None	NFA for soils approved[d]
K-31/33 Area	K-31/K-33	2015 PCCR for EU Z2-06	Z2-06 (25.6 acres)	None	NFA for soils recommended[e]
K-31/33 Area	K-31/K-33	FY 2006 PCCR for Zone 2 Soils, Slabs, and Subsurface Structures at ETTP	Z2-07 (10.9 acres)	K-897-E Oil Containment Structure K-897-F Oil Containment Structure	NFA for soils approved[f]
K-31/33 Area	K-31/K-33	FY 2007 PCCR for Zone 2 Soils, Slabs, and Subsurface Structures at ETTP	Z2-10 (20.9 acres)	K-897-G Oil Containment Structure	NFA for soils approved[f]

[a] Component names and acreages as provided in the PCCRs listed in Sect. 3.2.
[b] No FFA sites are located within the former K-31 building EU.
[c] NFA approved from the *Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2723&D2 (DOE 2008).
[d] NFA approved in the *Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2590&D1 (DOE 2012).
[e] NFA recommended in the *Phased Construction Completion Report for Exposure Unit Z2-06 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-XXXX (DOE 2015) [NFA recommended, D1 version to EPA and TDEC in November 2015 (planned)].
[f] NFA approved from the *Fiscal Year 2006 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2317&D2 (DOE 2006).

EBS = Environmental Baseline Survey Report.
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.
ETTP = East Tennessee Technology Park.
EU = exposure unit.
FFA = Federal Facility Agreement.
NFA = no further action.
PCCR = Phased Construction Completion Report.

Building K-761 is located west of the K-31 building in EU Z2-03, which has an approved NFA for soils, slabs, and subsurface structures. Building K-761 was the Switch House for the former K-762 Switchyard and the building is scheduled for demolition. The building is a three-story structure that was previously associated with switchyard operations and used for offices, a receipt inspection area, and during the Three-Building D&D, a warehouse and passive neutron waste assay system were located there. The warehouse handled miscellaneous office supplies and small metal parts needed for the Three-Building D&D efforts. All equipment was removed from Bldg. K-761, but it was not demolished as the Three-Building D&D project concluded in 2005.

Because the soil and slab underlying Bldg. K-761 and the K-903 Pad are part of an EU with an approved NFA determination, the entire EU is included in the transfer footprint of this EBS/Covenant Deferral Request (CDR), including the land underlying these structures. The soils beneath K-761 and the K-903 Pad were not sampled under the DVS, due to the inaccessible nature of the soils while these structures remained in-place, but they were included within the scope of the PCCR for EUs Z2-03 and Z2-05. Sampling locations for these EUs were established during DQOs workshops with EPA and TDEC approval. However, to ensure that no contamination above established Zone 2 remediation levels (RLs) remains, when removal of the K-903 Pad is complete, the subsurface soils will be characterized during confirmatory sampling to ensure that the soils meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in Federal Facility Agreement (FFA) Appendix E and/or J. The underlying land will not be transferred until K-903 Pad removal, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the PCCR Addendum for EUs Z2-04 and Z2-05 in Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA. Likewise, when demolition of K-761 is complete, the subsurface soils and/or exposed remaining structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and/or subsurface structures, such as concrete subsurface foundation elements and electrical ducts, meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the Fiscal Year (FY) 2007 PCCR Addendum for Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

DVS sampling of EU Z2-06, including 54 samples of the soils underlying the K-31 slab, detected no contamination above average or maximum RLs. An NFA determination has been recommended in the draft Technical Memorandum that was provided to EPA in March 2015; hence, the land underlying the K-31 building is included in the transfer footprint of this EBS. As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of these structures is completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR for Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA.

Ecological Impacts

Potential impacts to ecological receptors can occur from either:

1. impacts that are associated with residual contamination of environmental media that result in risk to ecological receptors; or

2. impacts to ecological receptors from development and/or operational activities occurring after transfer of the property.

Potential impacts to ecological receptors, both within the transfer property and the adjacent property, from the first category will be addressed as ecological risk in the final ETTP Sitewide ROD, which will also evaluate risk from groundwater and surface water to human and ecological receptors. DOE will remain responsible, regardless of property ownership, for providing the necessary response actions to address any residual contamination on the property to ensure protection of human health and the environment.

Potential impacts to ecological receptors, both within the transfer property and the adjacent property, from development and/or operational activities resulting from property transfer were addressed in the *Environmental Assessment for Transfer of Land and Facilities within the East Tennessee Technology Park and Surrounding Area, Oak Ridge, Tennessee*, DOE/EA-1640, October 2011 (DOE 2011), which resulted in a Finding of No Significant Impact. Exhibit B of the Quitclaim Deed, included in Sect. 6.2 of the CDR, restricts development of the property to the industrial, commercial, and recreational uses evaluated in the EA. Additionally, following transfer, the new property owner is still subject to regulatory requirements such as storm water management, wetlands protection, and Clean Air Act compliance. Finally, adverse environmental impacts to existing ecological receptors would be limited because construction activities would primarily occur within previously disturbed areas.

3.2.2 The EM DVS Protocol and Former K-31 Area

Regulatory information for Zone 2, as it relates to the Former K-31 Area, will be discussed below along with a summary of the EM DVS approach. Technical information for EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10 will be presented in Chap. 7.

The EM DVS process was designed to facilitate real-time decision-making and includes five steps:

1. Preparation of Data Quality Objectives (DQOs) scoping packages.
2. Classification of SUs using a graded approach.
3. Determination of additional sampling or surveying needs.
4. Determination of the need for remedial action using decision rules.
5. Use of confirmation sampling to determine if remedial action is complete.

The decision rules mentioned in Step 4 were based on one or more of the following criteria:

- exceedance of a maximum RL (Max RL) at any location,
- exceedance of an average RL (Avg RL) across the EU,

- unacceptable future threat to groundwater, or
- unacceptable cumulative excess lifetime cancer risk (ELCR) of > 1×10^{-4} and hazard index (HI) > 1 across the EU.

The potential threat to groundwater from Zone 2 soils is evaluated by reviewing historical groundwater data and, if necessary, screening soil data against established screening levels. Based on the screening, site-specific modeling may be conducted. Consideration of an action on groundwater is required if any of these steps indicate a site may be a potential source of contamination to groundwater.

3.2.3 Actions Taken Within the Former K-31 Area EBS Study Area Exposure Units

The Former K-31 Area EBS study area footprint is located within EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10. Located within three of these EUs (Z2-03, Z2-07, and Z2-10) are sites designated as requiring special attention because they were listed in the Federal Facility Agreement (FFA) [*Federal Facility Agreement for the Oak Ridge Reservation*, DOE/OR-1014 (DOE 1992)] as having the potential for contamination (see Table 3.1). (The FFA agreement was entered into by DOE, the state of Tennessee, and EPA-Region 4 under the authority of CERCLA.)

There are no FFA sites located within Z2-05 and Z2-06. It should be noted that the DQOs Scoping Package [*Data Quality Objective Scoping Package for the K-31/K-33 Buildings (EUs Z2-04, Z2-05, and Z2-06) at the East Tennessee Technology Park, Oak Ridge, Tennessee*, BJC/OR-3234 (BJC 2009)] identifies the K-33 Recirculating Cooling Water (RCW) Lines Leak Site FFA site as being located in EUs Z2-04 and Z2-05 (DOE 2012). However, the RCW Lines Leak Site listed in the FFA is actually in the adjacent EU Z2-08 and was evaluated as part of that EU (DOE 2008).

Demolition of the K-1206-F Fire Water Tank, located in the central portion of EU Z2-10, was conducted in August of 2013 through a controlled explosive demolition (Fig. 3.1). The 382-ft tall water tank toppled into an empty field (Fig. 3.2), and the metal from the tank was recycled. Paint chips dislodged during size reduction of the metal structure were collected, packaged, and disposed. Approximately 4 ft^3 of lead-containing paint chips were collected following demolition and disposed at an off-site Resource Conservation and Recovery Act of 1976 (RCRA) facility. The distribution of any remaining paint chips on the ground is consistent with historical sand blasting operations on the tank for re-coating performed prior to the DVS evaluation of EU Z2-10.

Characterization, evaluation, and remediation of the FFA sites are used as a metric for completion of the closure of DOE facilities at the Heritage Center. Some EUs contain one or more FFA sites. However, the final action/NFA decisions are made on an EU basis and are not predicated upon the results from any smaller scale subdivision of the EU. If the evaluation of all of the available data for an EU supports an NFA determination at the EU level, then all of the FFA sites within that EU are considered NFA by inclusion. Based on sampling analytical results and an evaluation of the EU-wide contaminant profile, soils in the FFA sites shown in Table 3.1 in EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10 do not pose a potential threat to the future industrial worker or groundwater.

Fig. 3.1. Demolition of the K-1206-F Water Tower, August 2013.

Fig. 3.2. K-1206-F Water Tower after demolition.

4. PAST AND PRESENT ACTIVITIES

4.1 PAST AND PRESENT ACTIVITIES FOR THE REAL PROPERTY PROPOSED FOR TRANSFER

The following describes the past and present activities for the Property proposed for transfer under this EBS on an EU basis.

EU Z2-03

The portion of EU Z2-03 that was included in the Former K-33 Area transfer footprint includes approximately 12.8 acres of the total 14.9 acres contained in the EU, with the remaining 2.1 acres included in the Former K-31 Area transfer footprint. The 12.8 adjacent acres were included in the Former K-33 Area EBS and CDR, and were primarily used for electrical power distribution associated with the former K-31 building. The primary activities conducted within the proposed transfer footprint portion of the EU are described below.

K-761 Switch House

The K-761 Switch House (also known as the K-31 Switch House) is a three-story structure that was constructed in the early 1950s. This facility and the associated K-762 Switchyard served as the power distribution and electrical switching station for the K-31 building. It has two building "galleries" and a control room "gallery." It housed an electrical equipment test area that was relocated to the Elza Facility at the Y-12 National Security Complex. Following shutdown in 1985, maintenance personnel working in the area used the building during the day. During the Three-Building D&D, K-761 was used for offices, as a receipt inspection area, for warehouse space, and was the location of a passive neutron waste assay system. The warehouse handled miscellaneous office supplies and small metal parts needed for the Three-Building D&D efforts. All equipment was removed from K-761 as the Three-Building D&D project concluded in 2005, but it was not demolished. D&D of K-761 is currently planned for the summer of 2016.

A Rubb tent was previously located between the K-761 and K-31 buildings and was used to support D&D operations in the area. The Rubb tent was removed in 2014. There are railroad tracks just outside the western boundary of the transfer footprint.

Z2-05

EU Z2-05 is one of two EUs that the former K-33 building occupied, with Z2-04 containing the northern half of the building, and Z2-05 the southern half of the K-33 building. Only a narrow strip at the southern end EU Z2-05, which is largely paved with asphalt or covered with concrete with an imbedded rail line, is included in the Former K-31 Area transfer footprint. This narrow strip of land, which was not included in the transfer footprint of the Former K-33 Area, was needed to support D&D activities for the K-31 building. The K-33 building, which previously occupied EUs Z2-04 and Z2-05, is described in Sect. 4.2 as part of the adjacent area. This strip of land is the location of the K-903 Supercompactor concrete pad.

K-903 Supercompactor

The Supercompaction Facility (K-903) was built to support D&D activities for the Three-Building D&D project. Facility construction commenced March 2000 and operation began January 2001. The Supercompactor operation was housed in a new, temporary, pre-engineered building attached to the south side of the K-33 building. The building measured approximately 205 ft in length (parallel to south wall of K-33) and extended south toward K-31 approximately 86 ft. It was approximately 62 ft high. A new switch and short rail spur (250 ft) was also constructed to the Supercompactor vehicle loading bay from the existing rail track servicing K-33.

The Supercompactor had a waste unloading station on the east side of the building and a waste loading station on the west side (Fig. 4.1). Each station was serviced with a new 25-ton crane that could lift intermodals or sea-land containers on and off trucks or rail cars. A third crane utilizing a four-claw grapple hook was fitted to run into K-33 to lift waste materials from the compaction waste staging areas on the second floor of K-33, and then transfer the waste materials to the compactor on the first floor of the facility. The compactor was monitored from a control room on the second floor of the facility.

Fig. 4.1. Rail spur leading up to the former Supercompactor vehicle loading bay.

This facility compacted and containerized contaminated metal sections and other low-level waste (LLW) to provide significant waste volume reduction and facilitate more economical off-site waste disposal operations. The process of compaction applied intense pressures, on the order of tons per square inch, to achieve substantial volume reductions. The facility accepted complete components such as coolers, compressor stators, valve bodies, and converter end caps. All waste fed into the compactor was Class A LLW as defined by 10 *Code of Federal Regulations* 61.55. Due to the relatively low intensity of gamma radiation from these materials, no radiological shielding was needed to adequately protect operations personnel. After the waste was compacted, it was placed in intermodal boxes for out-of-state transport by truck or railcar to Envirocare or the Nevada Test Site. Free liquids, asbestos-containing material, soft organic wastes, soil, demolition rubble, and other loose metallic and inorganic materials were not processed in the Supercompactor.

Compactor operations concluded in the fall of 2004, and the building and equipment were decommissioned and removed. The concrete foundation pad remains and was used as a laydown area during removal of the process tie lines conducted in 2013. The presence of contamination was identified in the PCCR for the K-33/K-31 Process Tie Line Demolition Project (DOE 2013).

EU Z2-06

EU Z2-06 occupies the northern portion of the transfer footprint and is the location of the former K-31 building, which is described below.

Building K-31

The K-31 building is located to the south of the study area and is a two-story structure with a total floor area of approximately 32 acres. The building was part of the low-enriched uranium gaseous diffusion cascade at the ORGDP and began operations in 1954. All enrichment operations were discontinued in 1985 and Bldg. K-31 was shut down in 1987. Building K-31 and associated equipment have historical radiological and chemical contamination from past operations and are being addressed under the ORR FFA under CERCLA authority. Between 1997 and 2005, a CERCLA removal action was undertaken by DOE to remove the process equipment and to decontaminate the facilities [*Engineering Evaluation/Cost Analysis for Equipment Removal and Building Decontamination for Buildings K-29, K-31, and K-33, East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/02-1579/D2 (DOE 1997)]. All process and non-process equipment and associated piping, ducting, and electrical services have been removed from the K-31 building. Removal of the exterior transite siding was initiated in May 2014 in preparation for D&D of the building (Fig. 4.2). D&D of Bldg. K-31 is expected to be complete in the summer of 2015.

Fig. 4.2. K-31 building with transite panels removed, September 2014 (EU Z2-06).

The K-33/K-31 tie lines were elevated transfer lines located outside, between the former K-33 building and the K-31 building. A small portion of the tie lines was in and above the proposed transfer footprint prior to their removal in 2013. Figure 4.3 shows the K-33/K-31 tie line structure prior to demolition, but after completion of the K-33 building demolition. The tie lines provided for the distribution of process gas between the enrichment cascades. They were enclosed in thermally insulated housings and provided with hot air or steam heat and temperature control instrumentation. They were composed of multiple uranium hexafluoride (UF_6) distribution pipes of 3- to 42-in. diameter. They operated between 1954 and 1985. When gaseous diffusion operations were stopped in 1985, the volatile UF_6 inventory was evacuated, and the tie lines were purged and isolated from the process system by closing valves in the interconnection buildings.

Fig. 4.3. K-31/K-33 process tie line structure (EU Z2-06).

Fig. 4.4. K-31/K-33 process tie line end state along north side of Bldg. K-31 (EU Z2-06).

K-31 Recirculating Cooling Water Lines

The K-31 RCW lines were located immediately east of the former K-31 building. The system provided RCW for the K-31 Cascade. There were some releases associated with the RCW lines. In 1956, a leak caused by local galvanic action occurred in the south K-862 supply header. Cathodic protection was installed following this release. In 1968, seepage occurred at ground level (K/ER-47/R1 [Energy Systems 1995]). Approximately 10 valve vaults, which were associated with the RCW lines, are located within the transfer footprint. Prior to transfer, the RCW lines will be evaluated to ensure they meet the free release criteria of DOE Order 458.1 for residual radioactive materials or, alternatively, the lines will be isolated through engineered controls to eliminate the potential exposure pathway.

EU Z2-07

EU Z2-07 is adjacent to the southern end of the proposed transfer footprint (see Fig. 1.2). This EU is generally vacant, flat-lying land that has primarily been used for temporary staging of support trailers and facilities during construction and demolition activities at ETTP.

The northeastern corner of this EU was the location of the Transportable Vitrification System (TVS) in 1996 to 1997. TVS was a large-scale vitrification system for the treatment of mixed wastes (Fig. 4.5). The wastes contained both hazardous and radioactive materials in the form of sludge, soil, and ash. The TVS was moved to the site and erected in 1996. The TVS was demonstrated at ETTP during September and October of 1997. During this period, approximately 16,000 pounds of actual mixed waste were processed, producing over 17,000 pounds of glass. After the demonstration was complete, it was determined that it was more expensive to use the TVS unit to treat and dispose of mixed waste than to direct bury this waste in a permitted facility. Thus, the unit was deactivated and a RCRA closure of the facility was conducted and the unit subsequently was dismantled.

Fig. 4.5. Transportable vitrification system located south of the K-31 building.

Mixed waste treated at the TVS consisted of dried K-1407-B and -C Pond Sludge and newly generated waste sludge from the Central Neutralization Facility (CNF). The mixed waste was transported to the site as needed and was not stored at the TVS location. At the end of waste feed operations, all tanks and lines from the inside of the batch module were flushed and the resulting flush water was fed to the melter. The melter was drained of glass to the lowest point without exposing the electrodes. Approximately 3 tons of glass, containing vitrified waste, remained in the melter. All treated and untreated wastes were removed from the area and placed in permitted storage facilities located elsewhere on the ETTP reservation. Aqueous waste remaining in the 20,000-gallon blow-down tank was removed and transported to the CNF for disposal. The TVS unit was successfully closed under RCRA in 2002.

EU Z2-10

EU Z2-10 lies adjacent to the southeastern portion of the transfer footprint. This EU is generally vacant land that was the location of the former K-1206-F fire water storage tank. This water tower was demolished in 2013. The demolition debris was size-reduced prior to disposal. Paint chips dislodged during size reduction of the metal structure were collected, packaged, and disposed at an off-site RCRA facility. The distribution of any remaining paint chips on the ground is consistent with historical sand blasting operations on the tank for re-coating performed prior to the DVS evaluation for EU Z2-10. DOE will document no change to NFA for EU Z2-10 in either a Concurrence Form, an erratum, or an Addendum to the 2007 PCCR (DOE 2008).

K-1206-F Fire Water Tank

The K-1206-F Fire Water Tank, located in the central portion of EU Z2-10, was demolished in August 2013 through a controlled explosive demolition. The 382-ft-tall water tank toppled into an empty field. The 400,000-gallon structure was built in 1958 to service the ORGDP's fire protection system. It operated until June 3, 2013, when the valves were turned off, and it was drained, disconnected, and permanently taken out of service on July 15, 2013.

4.2 PAST AND PRESENT ACTIVITIES FOR THE ADJACENT PROPERTY

All of these adjacent areas have NFA determinations and were also included in the previously approved Former K-33 Area CDR and EBS.

EU Z2-02

Approximately 11.7 acres of the total 29.7 acres of EU Z2-02 are located within the Former K-33 Area transfer footprint. The remaining 18 acres of EU Z2-02 were transferred in 2010. The northern portion of EU Z2-02 is currently owned by Environmental Dimensions, Inc. The southern portion of EU Z2-02 was transferred to Energy Solutions LLC. EU Z2-02 was historically used for electrical power distribution associated with the former K-33 building. The primary facilities that previously occupied the transfer footprint portion of the EU are described below.

Former K-792 Switchyard

The K-792 Powerhouse Complex—a three-building complex—consisted of the K-791-N Switch House, K-791 Control House, and K-791-S Switch House that formerly occupied the area of EU Z2-02 proposed for transfer. This complex was originally designed to receive the power from the former K-792 Switchyard and distribute it to the K-33 process facility and K-892 Pump House. The footprints of these former buildings lie to the east of the former K-792 Switchyard, across the railroad spur, and are included in the proposed transfer footprint. In 1998, demolition of the switchyard and switch houses

began as part of the ETTP Three-Building D&D and Recycle Project. Since that time the K-791-N Switch House, K-791 Control House, and K-791-S Switch House have been demolished down to their concrete pads [see Fig. 1.5; *Environmental Baseline Survey Report for the Proposed Transfer of the K-792 Switchyard Complex at the East Tennessee Technology Park, Oak Ridge, Tennessee*, DOE/OR/01-2347 (DOE 2010)]. The activities conducted in the balance of the EU, which has been transferred, are described in Sect. 4.2.

EU Z2-03

The portion of EU Z2-03 that is adjacent to the K-31 transfer footprint includes approximately 12.8 acres of the total 14.9 acres contained in the EU, with the remaining 2.1 acres included in the K-31 transfer footprint. The 12.8 adjacent acres were included in the Former K-33 Area EBS and CDR, and were primarily used for electrical power distribution associated with the former K-31 building. The primary activities conducted within EU Z2-03 that is adjacent to the proposed K-31 transfer footprint are described below.

Former K-762 Switchyard

The K-762 Switchyard Complex was constructed in 1952 to receive TVA power and supply the K-31 Process Facility. In some documents, it is also referred to as the K-31 Switchyard. At the time of construction, a system of French drains was installed immediately below the switchyard's gravel bed. An oil skimmer for runoff was installed in 1980–81. Approximately 20 transformers were located in the switchyard and there were also four vaults/pits. The footprint of the K-762 Switchyard is coincident with the boundaries of the K-762 Switchyard Soils FFA site. In 1951, two related transformer explosions and a subsequent fire resulted in the release of polychlorinated biphenyls (PCBs) [*Site Descriptions of Environmental Restoration Units at the Oak Ridge K-25 Site, Oak Ridge, Tennessee*, K/ER-47/R1 (Energy Systems 1995)]. Railroad tracks are located next to the vaults/pits near the eastern border of the proposed transfer footprint. The switchyard was shut down in 1985 and the 161-kV feeds were disconnected and the transformers were either drained or removed from the switchyard. Following shutdown, surplus electrical equipment was stored in the switchyard. It currently is mostly grass-covered and is partially fenced. It contains 21 transformer vault concrete pits. It also contains four Synchronous Condenser Buildings made of concrete block above grade and poured concrete basements in each. Associated concrete pits for each have been filled in with gravel. Various concrete equipment pedestals, saddles, and slabs also remain in the switchyard. The activities conducted in the balance of the EU that will remain as adjacent property are described in Sect. 4.2.

EUs Z2-05

EU Z2-05 is the EU that the southern half of the former K-33 building occupied, with Z2-04 containing the northern half of the building. A small strip at the southern end of EU Z2-05 is included in the proposed transfer footprint. The K-33 building, which previously occupied EUs Z2-04 and Z2-05 is described below. This portion of EU Z2-05 was included in the Former K-33 Area CDR and EBS.

Former K-33 Building

Construction of Bldg. K-33 began in July 1952, and it was placed in operation in March 1954 as the largest and last of the ORGDP cascades for the isotopic enrichment of uranium. The first floor was the operating floor that contained the process control room, offices, maintenance shops, and auxiliary equipment such as electrical switchgear, ventilation fans and ducts, process control instrument cabinets, lube oil storage tanks, chlorofluorocarbon evaporative coolant storage tanks, and vacuum pumps with chemical solvent traps. The UF_6 enrichment process equipment was located on the second floor, which was called the cell floor. All

enrichment operations were discontinued in 1985 and Bldg. K-33 was shut down in 1987. Portions of the building were then used for hazardous waste storage (*Site Descriptions of Environmental Restoration Units at the Oak Ridge K-25 Site, Oak Ridge, Tennessee*, K/ER-47/R1). From 1998 to 2005, the building was decontaminated and all process equipment was removed. The demolition of the building (Fig. 4.1) began in 2010 and was completed in 2011 (DOE 2012b). During the preparation stages of the demolition, the soil beneath the slab was characterized using DVS. Removal of the slab began immediately following demolition of the building and was completed in 2012. Following slab removal, the area within the building foundation footprint was graded and seeded with grass (DOE 2012a).

EU Z2-08

The activities that have historically been conducted within EU Z2-08 were primarily water pumping, treatment, and cooling associated with the RCW lines. The main facilities that currently, or previously, occupied this EU are described below.

K-892-G and -H Cooling Towers and Basins

The K-892-G and -H cooling towers were located immediately east of the former K-33 building. They were built in 1954 and operated until 1985. They were part of the RCW system for the K-33 cascade. The treated redwood towers and Munters fill superstructure were demolished as part of the Cooling Tower Demolition Project in 1995. However, the aboveground concrete basins were cleaned, demolished, left in place, and covered with soil and vegetation. A portion of the west wall of the center basin between the -G and -H towers remains as it serves as the east wall of the K-892 Pumphouse.

During operation, the lines to the K-892-G basin became corroded. A chromate/zinc/phosphate treatment was used for corrosion control. In 1963 and 1973, a Mar-treat system™[1] was used to control biological attack. That process reportedly produces copper fluoride, copper chromate, zinc arsenate, copper arsenate, and zinc chromate. In the early 1960s, the Steam Chem system™, which contains semivolatile organics, was used to fight biological attack in cooling towers. A pentachlorophenol (PCP) fungicide treatment, which contains or degrades to traces of dioxin, may have been used on this system's cooling towers.

K-892 Pumphouse

The K-892 Pumphouse is located immediately east of the former K-33 building. It was built in 1954 and operated until 1989 to pump treated water for the K-33 RCW system. Auxiliary units include the K-896 Recycle Blowdown Facility; the K-896-A, -B, and -C Clarifier Tanks; K-892-D, -E, -K, -M, -P, -U, and -W valve houses; K-892-V Valve House and Electrical Panels; K-892-N HCl Pump House; K-892-R, -S, and -T tanks; K-892-Q HCl Storage Tank and Basin; K-892-X Sludge Tank; K-894 Acid Unloading Station; K-896-C Pump House; and K-700-A-40 Pump House Transformers. Clarifier tanks have been demolished but the concrete basins for the tanks remain. The K-892 building consists of three sections. The northwest section contains water treatment chemical tanks and feed equipment. The east section contains 11 RCW pumps, piping, and valves. The south section contains electrical transformers, diesel fuel tanks, and chemical storage tanks. Outside the west wall are the seven transformers. Outside the south end of the building is an empty, 500-gal diesel tank for the fire water pump engine. There are two empty, 500-gal sulfuric acid tanks outside the northwest end of the building. Building demolition was

[1] Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

recently completed in March 2015. Demolition of the K-892 Pumphouse will be described in the FY 2015 PCCR for Low Risk/Low Complexity Facilities of the Remaining Facilities Demolition Project.

Approximately 80 lead acid batteries, each containing 1 gal of sulfuric acid, have been used and stored in the building along with flammable materials and lime. Chromates and PCBs have also been possible contaminants. The building is posted as having radiological contamination inside the RCW pipes. The above-ground portion of the RCW lines will be removed as part of the building demolition. The RCW lines remaining in-place have been filled to eliminate any potential exposure pathway and meet the free release criteria.

K-892-Y Recirculating Water Sludge Softener Facility and Maintenance Shop

The K-892-Y Recirculating Water Sludge Softener Facility and Maintenance Shop is located immediately east of the former K-33 building. It was built for handling, thickening, and fixing sludge from RCW treatment. The facility was only operated for testing and evaluation and was later used for storage. The building contains sludge processing equipment. Outside the building is the K-892-X steel thickener tank. The facility has been recently demolished.

EU Z2-09

All of the acreage included in EU Z2-09 was included in the transfer footprint of the Former K-33 Area CDR and EBS. The majority of the EU is primarily vacant land containing a segment of the West Poplar Creek Patrol Road. The historical activities that have been conducted within this EU were primarily water pumping, treatment, and cooling associated with the RCW lines. The main facilities that currently, or previously, occupied this EU are described below.

K-861 and K-861-J Cooling Towers and Basins

The K-861 and K-861-J cooling towers were located immediately east of the K-31 building. K-861 was built in 1951 and operated until 1985. The K-861-J cooling tower was an adjacent, one-cell counterflow tower added at the north end of K-861 in 1979. The towers were part of the RCW system for the K-31 cascade. The treated redwood and Douglas fir and Munters fill towers were demolished as part of the Cooling Tower Demolition Project in 1996. However, all sediment was removed from the in-ground concrete basins, and the internal surfaces were steam cleaned and the basin left in place. The sludge removed from the basins was disposed of at the Envirocare facility in Utah. TDEC recommended NFA for the facilities addressed under the Cooling Tower Demolition Project on March 4, 1998, and EPA concurred with no further investigation (NFI) for the study area addressed under the Cooling Tower Demolition Project on March 23, 1998. The basins have been filled with concrete rubble and gravel.

During operation, a chromate/zinc/phosphate treatment was used for corrosion control. In 1969, a Mar-treat system™ was used to control biological attack. That process reportedly produces copper fluoride, copper chromate, zinc arsenate, copper arsenate, and zinc chromate. A PCP fungicide treatment, which contains or degrades to traces of dioxin, may have been used on this system's cooling towers.

Former K-862 Pumphouse

The former K-862 Pumphouse was located immediately east of the K-31 building. It was built in 1951 and operated until 1985 to pump treated water for the K-31 RCW system. The building was demolished under the Cooling Tower Demolition Project. Auxiliary units associated with the pumphouse included the

K-861-A, and -B valve houses; the K-862-S Sulfuric Acid Tank; and the K-700-A-39 Pump House Transformers, all of which were demolished in 1996.

4.3 HYDROGEOLOGIC ENVIRONMENT

This information is being presented to provide the basis for the evaluation of the potential for vapor intrusion into existing or future buildings within the Former K-31 Area transfer footprint.

The Former K-31 Area is located in the northwestern portion of the Heritage Center. This portion of the ETTP is underlain by bedrock of the lower Chickamauga Supergroup (Lemiszki 1994). The Chickamauga Supergroup formations in this area include the Pond Spring Formation, the Murfreesboro Limestone, the Ridley Limestone, the Lebanon Limestone, the Carters Limestone, and the Hermitage Formation (Fig. 4.6). Structurally, these formations dip to the southeast in the vicinity of the study area. The angle of dip ranges from 20 to 74 degrees to the southeast based on measurements obtained from bedrock exposures along Poplar Creek (see Lemiszki 1994) in the Former K-31 Area.

The bedrock formations underlying the Former K-31 Area consist primarily of interbedded limestone, argillaceous limestone, and calcareous shale of the Chickamauga Supergroup. Calcareous shales and argillaceous limestones are characteristic of the Pond Spring Formation, which is found at the very northwestern corner of the K-31 study area. Thin- to thick-bedded, fine-grained crystalline limestones of the Murfreesboro Limestone overlie the Pond Spring Formation, and underlie northwestern portion of the transfer footprint. Thick to massively bedded, fucoidal-textured limestone is characteristic of the Ridley Limestone, which occupies the middle portion of the transfer footprint. “Fucoidal texture” is a term used to describe the presence of tan-brown, irregularly shaped, fine- to coarse-grained dolomitic patches within the limestone beds of the Ridley. A distinctive characteristic of the Lebanon Limestone, which underlies a narrow area in the southeastern portion of the study area, is the abundance of fossils in this unit. Bedding in the Lebanon Limestone ranges from regular and even, thin to medium beds, to irregular, cobbly beds. Some thick to massive limestone beds also occur. Thick to massive beds of interbedded micritic- and coarse-grained limestone characteristic of the lower part of the overlying Carters Limestone, which underlies the southern portion of the study area. The top of the lower Carters consists of olive-gray, argillaceous limestone that is mud-cracked and devoid of fossils and weathers into thin chips. The middle part of the Carters Limestone consists of medium to thick, regular- and even-bedded, blue-gray limestone. At the top of the middle part are two apple green, sometimes partly maroon, metabentonite beds that range from 1 to 3 ft in thickness. Although exposures of the metabentonites were not found in the Heritage Center area during mapping by Lemiszki (1994), they have been observed along strike toward the southwest and northeast. The upper part of the Carters is poorly exposed but generally consists of micritic, greenish-gray and yellowish-gray, poorly-bedded, mud-cracked limestone. Limestones of the Hermitage Formation, which underlies the southeasternmost corner of the study area, consist of thin to medium, irregular, uneven, cobbly beds that are abundantly fossiliferous. A maroon, olive-tan, calcareous shale has been observed near the base of the unit.

Formations of the Chickamauga Supergroup are subject to karst development due to their carbonate content. Evidence of karst development in the Chickamauga includes cavities encountered in drilling at the Heritage Center. Approximately 30% of the monitoring wells completed in the Chickamauga at the Heritage Center have encountered cavities ranging in size from a few inches up to 7 ft. Pre-construction topographic maps indicate the occurrence of sinkholes in the vicinity of the K-31 study area. A closed depression that appears to be a large sinkhole existed in the area along the western side of the former K-31 building, and additional closed depressions existed in the vicinity of the study area. All of these sinkholes were filled during construction of the K-31/K-33 buildings circa 1950.

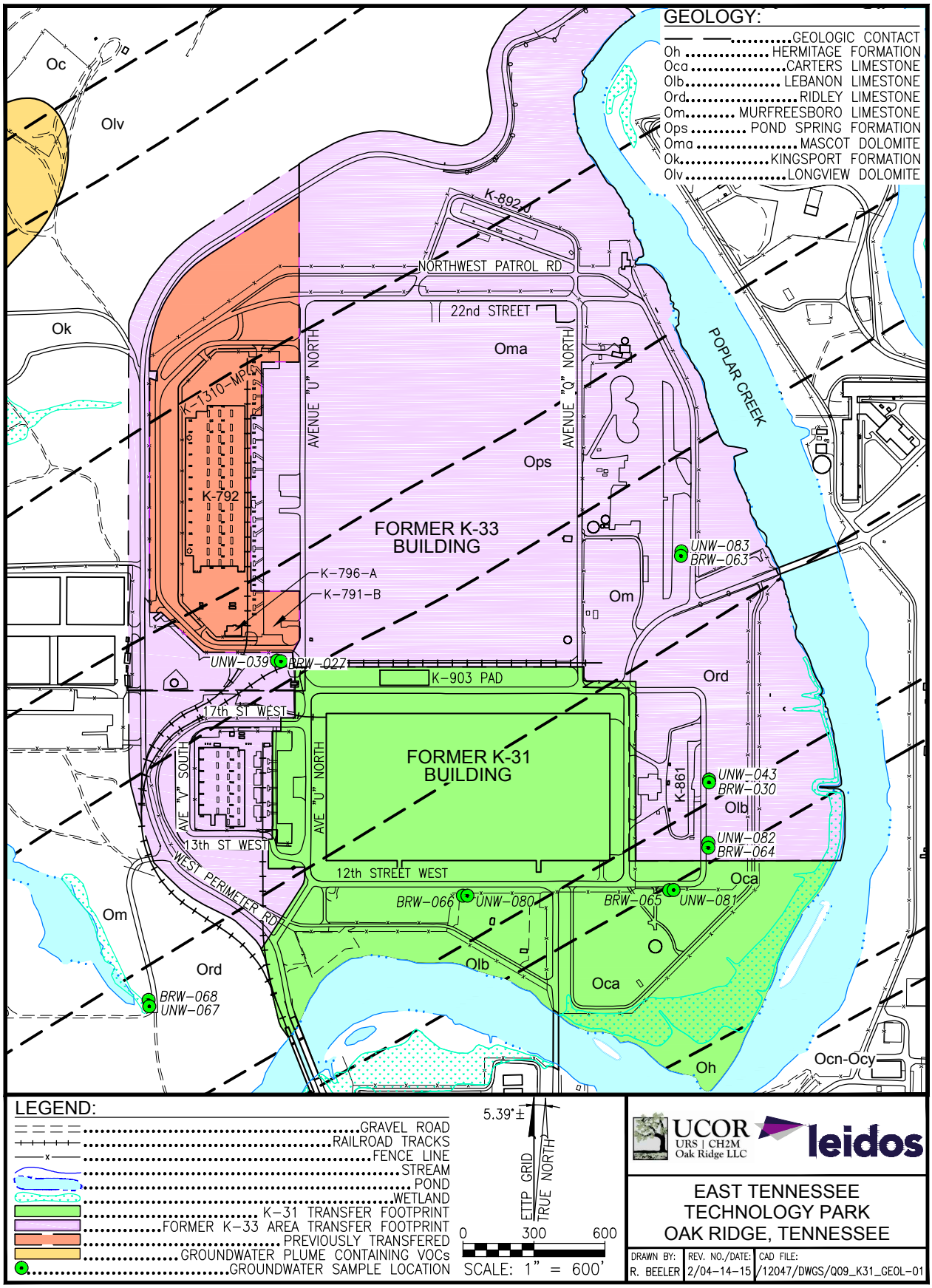

Fig. 4.6. Geologic map of the K-31 and surrounding area EBS study area.

Hydrogeologic characterization data for the Former K-31 Area are provided by 14 monitoring wells located within or adjacent to the study area (see Fig. 4.6). Much of the hydrogeologic characterization data discussed below for the K-31 study area reflect the information available from these wells and from other available Heritage Center site-wide information.

The water table at the Heritage Center generally mimics topography with shallow groundwater flowing from higher topographic areas to the surrounding surface water bodies. Groundwater flow paths in bedrock are a key uncertainty in the conceptual model of the Heritage Center, but fractures, bedding planes, and hydraulic gradient are expected to be the primary controlling factors. Based on the data obtained during installation of monitoring wells in the vicinity of the K-31 study area, it appears likely that bedrock occurs at depths from approximately 20 to greater than 45 ft below ground surface (bgs). Based on pre-construction topographic maps, it appears that as much as 10 ft of fill material was potentially placed beneath the western portion of the former K-31 building during construction.

Water levels obtained from the wells in the vicinity of the Former K-31 Area indicate depths to water ranging from 8 to 25 ft bgs with shallow groundwater movement anticipated to be primarily to the south, southeast, and east toward Poplar Creek. Vertical hydraulic gradients determined from the paired unconsolidated zone and bedrock monitoring wells in the vicinity of the study area indicate generally downward vertical gradients from the unconsolidated zone to the bedrock. Hydraulic conductivity of subsurface materials has been determined from slug tests conducted in numerous monitoring wells throughout the Heritage Center. Based on these tests average values for the Chickamauga bedrock and the overburden materials above bedrock have been determined and are presented in Table 4.1.

Table 4.1. Summary of hydrogeologic conditions at the K-31 study area

Parameter	Site conditions
Is a groundwater plume present beneath the site?	None identified
Distance from site to nearest upgradient plume (ft)	2000 NW
Is karst present?	Yes
Depth to bedrock (ft)	20 to 45
Depth to groundwater (ft)	8 to 25[a]
Are fill materials present at the site?	Yes
Composition of overburden materials present.	Primarily silty clay
Shallow groundwater flow direction	East, southeast, and south
Hydraulic conductivity of overburden materials (cm/sec)	1.25E-03[b]
Hydraulic conductivity of bedrock (cm/sec)	4.28E-03[c]
Hydraulic gradient at the site (ft/ft)	0.008[a]
Is a perched water table present at the site?	None identified

[a] Represents range based on available data.

[b] Represents average hydraulic conductivity of unconsolidated zone at the Heritage Center based on slug test results for wells completed in overburden materials at the Heritage Center.

[c] Represents average hydraulic conductivity of bedrock at the Heritage Center based on slug test results.

A groundwater plume has not been identified beneath or within the vicinity of the K-31 study area. The nearest identified plume, sourced from the K-1070-A Burial Ground, is located upgradient and approximately 2000 ft northwest of the study area. Although available potentiometric maps indicate that this plume may be considered to be upgradient of the Former K-31 Area, groundwater data and dye tracer

studies indicate that flow from the K-1070-A Burial Ground is primarily to the southwest toward the K-901-A Pond and not southeastward toward the K-31 study area. Analytical data for the well pair of BRW-027 and UNW-039 indicate the general absence of volatile organic compounds (VOCs) in both the bedrock and unconsolidated zone materials. Only low estimated concentrations of 2-butanone (3 micrograms per liter [µg/L]) and trichloroethene (TCE) [1 µg/L] were reported in one of five sampling events (August 1998) at the bedrock well BRW-027. August 1998 is the last sampling event of record for this well, and these compounds had not been detected in the previous six sampling events at this well dating back to 1990. Only a single detection of acetone (16 µg/L) in 1994 has been reported at well UNW-039 in five sampling events since 1990. The sporadic detection of low estimated concentrations of VOCs also occurs in the wells located south and east of K-31. Several VOCs including 2-butanone, 1,1-dichloroethene (DCE), 1,2-DCE, 1,2-dimethylbenzene, acetone, carbon disulfide, chloroform, chloromethane, methylene chloride, tetrachloroethene, toluene, and TCE have been detected in bedrock wells and unconsolidated zone wells south and east of K-31. However, of these detections, only TCE at wells BRW-064 and BRW-066 has exceeded its respective maximum contaminant level (MCL) of 5 µg/L in all samples collected since 1994. A concentration of 10 µg/L was reported in March 1995 at well BRW-064 and 54 µg/L in June 1998 at well BRW-066; however, TCE concentrations during subsequent sampling events at well BRW-064 have not exceeded the MCL, and TCE has been detected in only 5 of 25 samples collected at well BRW-066 since the June 1998 sampling event. The detected concentrations of TCE at BRW-066 since 1998 have all been below the MCL with concentrations ranging from 0.2 µg/L to 4 µg/L.

Metals that have been detected in at least one sampling event at concentrations above MCLs include antimony, arsenic, cadmium, chromium, lead, selenium, and thallium. Total chromium is the metal detected the most frequently at concentrations above the MCL of 0.1 mg/L with the exceedances primarily limited to wells located east and northeast (BRW-030, BRW-063, UNW-043, and UNW-083) of the former K-31 building. With the exception of total chromium, the other metals that have historically exceeded MCLs have not been detected above MCLs in the most recent sampling events for these wells.

Well UNW-039 located immediately northwest of the Former K-31 Area has exhibited gross alpha activity above the MCL of 15 pCi/L during one sampling event in September 1994 with a concentration of 58 picocuries per liter (pCi/L). However, the duplicate sample had no detectable alpha activity. Five of the six samples analyzed for gross alpha activity from this well were either nondetects for alpha activity or the detected concentration was well below the MCL. The gross beta activity has not exceeded the guidance level of 50 pCi/L at any of the Former K-31 Area wells since 1990. Technetium-99 (^{99}Tc) has exceeded the derived MCL of 900 pCi/L at two unconsolidated zone wells (UNW-081 and UNW-082) and three bedrock wells (BRW-027, BRW-065, and BRW-068) with concentrations ranging from 947 to 1300 pCi/L in 1992 and 1993 samples. However, the limit of error for these results ranges from 320 to 1400 pCi/L indicating the uncertainty associated with these results is relatively high, and ^{99}Tc was not detected in subsequent groundwater samples from these wells.

VOCs have been detected sporadically in soil samples from the Former K-31 Area at low concentrations. Although the available data suggest the general absence of elevated levels of VOCs in the groundwater beneath the study area, there is uncertainty concerning groundwater flow paths due to the karst conditions in the bedrock underlying the Former K-31 Area. Since the remedial investigation for groundwater and soil gas is incomplete, and since there are uncertainties associated with the available data, further evaluation is necessary to confirm that a vapor intrusion threat does not exist in the area.

5. RESULTS OF VISUAL AND PHYSICAL INSPECTIONS

5.1 VISUAL AND PHYSICAL INSPECTIONS OF THE PROPERTY TO BE TRANSFERRED

Visual and physical inspections of portions of the Former K-31 Area were initially conducted on October 25, 2012, and March 7, 2014, as part of the adjacent area inspections for the Former K-33 Area. A follow-up visual and physical inspection of the K-31 Area footprint was conducted on December 16, 2014. The study area is generally flat with low relief and is primarily occupied by the remaining structure of the partially demolished K-31 building (Fig. 5.1) with paved roads crisscrossing the area. Areas not occupied by the K-31 building and paved roads and concrete pads are grass-covered for the most part (Fig. 5.2) with trees and other vegetation occupying a buffer zone adjacent to Poplar Creek.

At the time of the December 2014 inspection, demolition of the K-31 building was in an advanced stage of completion with primarily only the structural framework remaining (Fig. 5.1). Several excavators using grappling claws and shears were actively removing the K-31 building structure. Piles of scrap metal and debris from demolition were being staged on the east side of the former building footprint for sorting prior to disposal. A steady flow of dump trucks was providing concrete rubble for use as fill in the K-861 Cooling Tower Basin (Fig. 5.3). Several valve vaults and oil containment structures exist throughout the property. These are also in the process of being filled with gravel.

Fig. 5.1. Demolition of K-31 building, December 2014 (EUs Z2-05 and Z2-06).

5.2 VISUAL AND PHYSICAL INSPECTION OF ADJACENT PROPERTY

The adjacent areas include the location of the former K-33 building to the north, the former K-762 Switchyard and the portion of the K-792 Switchyard area that has been transferred to the Community Reuse Organization

of East Tennessee (CROET) to the west, and Poplar Creek to the east and south. With the exception of the portion of the K-792 Switchyard area that has been transferred to CROET, the adjacent areas are owned by DOE and have been assessed to determine actual or potential releases of hazardous substances or petroleum products. Information about each of the adjacent areas that may contain contamination is documented in Sect. 4.2.

The former K-33 building footprint is covered with grass (Fig. 5.2) and was surrounded by the remaining building foundation wall, a truck alley with imbedded rail line on the northern side, gravel or grassy areas and paved roadways on all sides, and a truck alley on the southern side.

The K-762 and K-791 Switchyard areas contained concrete slabs and concrete transformer pedestals, and the four Synchronous Condenser superstructure housings in K-791, but were otherwise grass-covered with small shrubs.

Fig. 5.2. Former K-33 building footprint condition looking south (former K-31 building in background) [EUs Z2-04 and Z2-05].

Fig. 5.3. K-861 Cooling Tower Basin before fill (EU Z2-09).

Fig. 5.4. K-861 Cooling Tower Basin after fill (EU Z2-09).

6. SAMPLING RESULTS

All five of the EUs (EUs Z2-03, Z2-05, Z2-06, Z2-07, and Z2-10) associated with this Former K-31 Area EBS were assessed under an approved Work Plan (DOE/OR/01-2182&D4 [DOE 2007b]) prepared according to the DVS process. The Work Plan was approved by EPA and TDEC on December 7 and 13, 2007, respectively. All verified and validated data used to make regulatory decisions have been placed in the OREIS database (http://www-oreis.ettp.energy.gov/oreis/help/oreishome.html) and are available for review. The sampling results and data evaluation can be found in the Appendices of the PCCRs. These data were deemed sufficient to reach NFA decisions under an industrial land use risk scenario for soil and subsurface structures in the five EUs, which are included, either partially or completely, in the Former K-31 Area transfer footprint. EUs Z2-06, Z2-07, and Z2-10 are completely contained in the transfer footprint, and EUs Z2-03 and Z2-05 are partially included in the transfer footprint. The portions of EUs Z2-03 and Z2-05, which are not included in the Former K-31 Area transfer footprint, have previously been included in the transfer footprint for the Former K-33 Area. The locations of soil samples collected under the DVS within the EUs included in the K-31 Area transfer footprint are indicated in Fig. 6.1.

In support of the transfer of the K-792 Switchyard Complex, soil vapor samples were collected through the sub-slab of Bldgs. K-791-B and K-796-A, located approximately 200 ft northwest of the Former K-31 Area transfer footprint (see Fig. 4.15), to evaluate the potential vapor intrusion pathway. Sub-slab soil vapor was collected in these buildings during September (dry season) 2006 and February (wet season) 2007 to determine if a potential source for VOCs exists under the buildings. The results were validated, and the average concentration for each VOC was calculated and compared to its respective ETTP soil vapor trigger level (TL); TLs are EPA-approved concentrations calculated to be health protective. In addition, to ensure that the VOCs did not cumulatively exceed TLs, the average concentration for each VOC was divided by its respective TL to determine what fraction the concentration represented. The resulting fractions were then added for all VOCs that had at least one detection. If, collectively, the VOC concentrations had exceeded the TLs, the resulting value would be above 1.0 (i.e., the fractions would add up to over 1.0).

The soil vapor sampling results for Bldgs. K-791-B and K-796-A indicated that none of the VOCs detected in the sampling events exceeded individual TLs, and the sum of TL fractions was below 1.0. Therefore, based on the soil vapor sampling results for these two nearby buildings, the vapor intrusion pathway is not considered complete beneath these buildings. The complete soil vapor results and evaluation are presented in the EBS for the K-792 Switchyard Complex (DOE 2010).

6.1 DATA FOR EU Z2-03

Following is a summary of the sampling results for EU Z2-03. Soil sample locations are indicated in Fig. 6.1. A total of 34 samples were collected under DVS for this EU, and 6 of the 34 sample locations were within the K-31 transfer footprint. Based on DVS and historical sampling analytical results and results of the Class 3 walkover assessment, and evaluation of the data, the following was determined:

- There were no maximum RL exceedances in EU Z2-03.
- No average contaminant of concern (COC) concentration across EU Z2-03 exceeded its average RL.
- There are no sources for groundwater contamination in EU Z2-03.

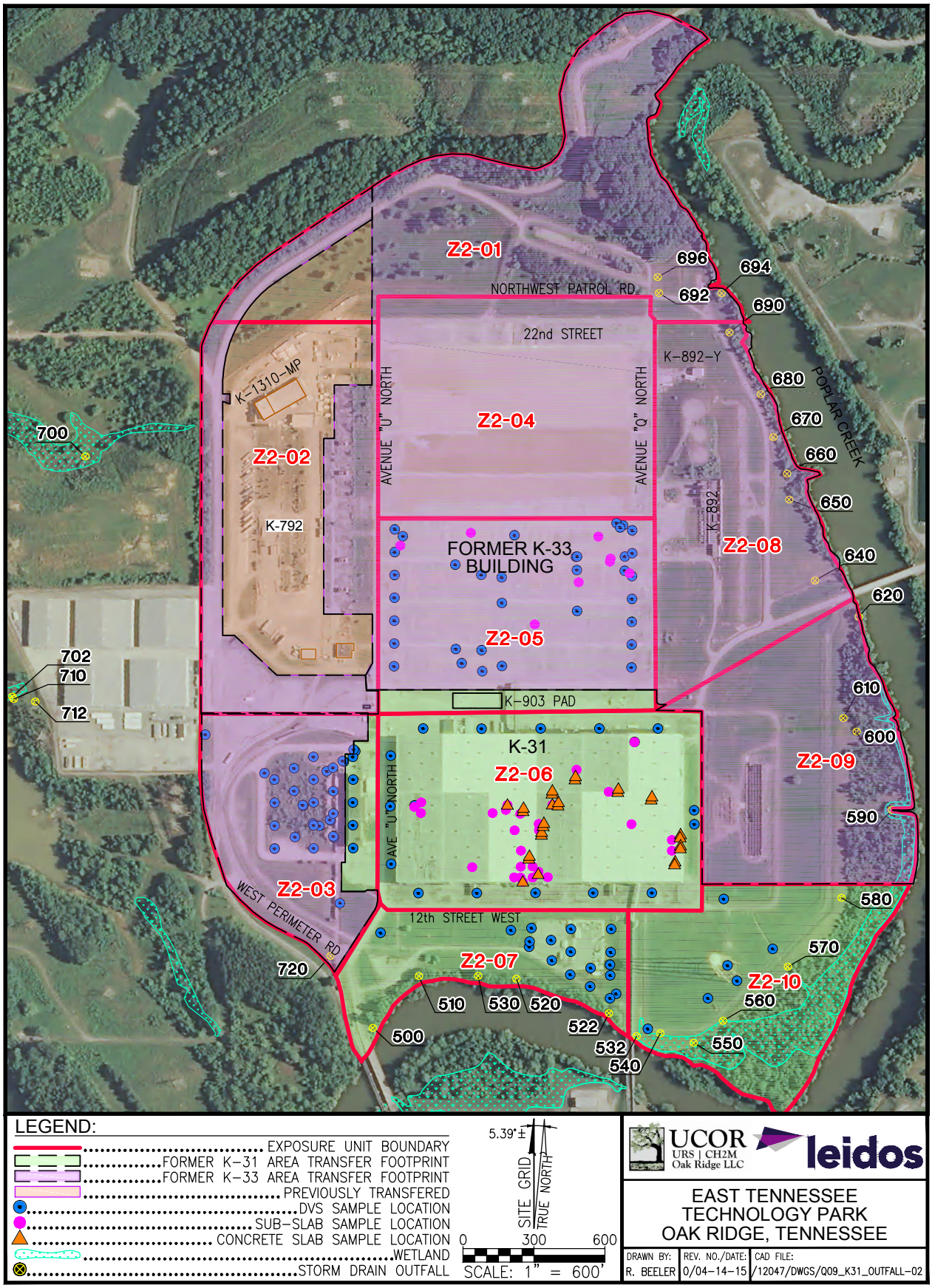

Fig. 6.1. DVS sample locations in the Former K-31 Area transfer footprint.

Although only a portion of the EU is proposed for transfer (the western portion of the EU was previously included in the K-33 transfer footprint), six samples were collected from within the Former K-31 Area transfer footprint portion of the EU. Five of these samples were collected for field test analysis for PCBs. The results indicated that no PCBs were detected in the field test results for these samples. The remaining sample from the proposed transfer footprint was collected from the K-897-M Oil Containment Structure. This sediment sample was analyzed for semivolatile organic compounds (SVOCs), PCBs, and VOCs. The sediment sample from K-897-M contained four SVOCs and PCB-1260 at concentrations below both RLs and residential preliminary remediation goals (PRGs). Because the highest chemical and radiological concentrations detected in soils in EU Z2-03 were detected in the portion of the EU that is not included in the Former K-31 Area transfer footprint, and less than 10% of the 2.1 acres of EU Z2-03 included in the Former K-31 Area transfer footprint contains exposed soils (the remaining acreage is paved, graveled, or concrete), the findings of NFA as described in the approved PCCR are appropriate for the portion of the EU included in the Former K-31 Area transfer footprint.

Because the soil and slab underlying Bldg. K-761 is part of an EU with an approved NFA determination, the land underlying this structure is included in the transfer footprint of this EBS/CDR. The soils beneath K-761 were not sampled under the DVS, but they were included within the scope of the PCCR for EU Z2-03. Sampling locations for this EU were established during DQOs workshops with EPA and TDEC approval, which did not identify a need for samples beneath these facilities. However, as an additional measure for ensuring that no contamination above established Zone 2 RLs remains, when demolition of K-761 is complete, the subsurface soils and/or exposed remaining structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and/or subsurface structures, such as concrete subsurface foundation elements and electrical ducts, meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the FY 2007 PCCR Addendum for Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

As documented in the approved PCCR (DOE 2008), NFA is necessary to meet industrial land use in this EU.

6.2 DATA FOR EU Z2-05

Sampling of soil around the outside of the K-33 building was conducted in 2006, prior to demolition of the building (Fig. 6.1). The soil under the building was characterized for DVS by drilling through the slab prior to slab removal but after demolition of the building. DQOs planning assumed the slab would remain in place. With removal of the slab during remedial action, concrete characterization data were no longer necessary. The underlying soil (now exposed) was sampled at statistical and biased locations and a radiological walkover survey of the soil in the former slab footprint was conducted following the slab removal remedial action.

No soil is exposed in the narrow strip of property that is included in EU Z2-05 and addressed in this EBS for the transfer of the Former K-31 Area. This area of EU Z2-05 is completely paved with asphalt, or covered by concrete or gravel. The details of the sampling and analysis conducted under the DVS in EU Z2-05 are presented in Appendix A of the PCCR (DOE 2012). Based on the results of the sampling conducted, and evaluation of the data, the following was determined:

- There were no maximum RL exceedances in EU Z2-05.
- No average COC concentration across EU Z2-05 exceeded its average RL.
- There are no sources for groundwater contamination in EU Z2-05.

As documented in the approved PCCR (DOE 2012), NFA is necessary to meet industrial land use in this EU.

As discussed in the EBS for the Former K-33 Area (DOE 2014), gamma walkover surveys were conducted as the K-33 building slab was being removed and confirmation soil samples were collected following slab removal. The sample locations are shown in Fig. 7 of the Z2-04 and Z2-05 PCCR (DOE 2012) and illustrated in Fig. 6.1. These samples showed no results greater than the average RLs.

At DOE's request, Oak Ridge Associated Universities, under the ORISE contract, performed independent verification (IV) of the gamma survey results and reviewed, to the extent possible, preliminary radiological results from the aforementioned soil samples. Judgmental soil samples were collected as a result of gamma walkover survey results. Only one surface soil sample was collected from a judgmental location in EU Z2-05 where elevated direct gamma radiation levels suggested the potential presence of contamination. This sample is representative of current residual concentrations. The results for this sample showed no average or maximum RL exceedances. Additional information on the IV sampling can be found in DOE (2014).

The K-903 concrete slab, located within the strip of EU Z2-05 that is included in the K-31 transfer footprint, is currently posted as containing fixed radioactive contamination. Although not identified in the PCCR for EUs Z2-04 and Z2-05 (DOE 2012), this slab was used as a laydown area during removal of the process tie lines, and it is suspected that contamination was transferred to the slab from the process tie line removal activities. EPA identified the presence of the contaminated pad and requested additional information on the monitoring activities for the pad following review of the PCCR for the K-33/K-31 Process Tie Line Demolition Project (DOE 2014b) in their letter of December 31, 2013 (DOE 2013). This concrete slab will be removed prior to transfer of the property. Because the soil underlying the K-903 Pad is part of an EU with an approved NFA determination, the land underlying this structure is included in the transfer footprint of this EBS/CDR. The soils beneath the K-903 Pad were not sampled under the DVS, due to the inaccessible nature of the soils. However, to ensure that no contamination above established Zone 2 RLs remains, when removal of the K-903 Pad is complete, the subsurface soils will be characterized during confirmatory sampling to ensure that the soils meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until K-903 Pad removal, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the PCCR Addendum for EUs Z2-04 and Z2-05 in Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

6.3 DATA FOR EU Z2-06

Sampling of soil around the outside of the K-31 building was conducted in 2006 prior to demolition of the building (see Fig. 6.1). Additional sampling was performed in 2014 during building demolition. The results of these sampling efforts are discussed in the PCCR for EU Z2-06 (DOE 2015), and summarized below.

Sub-slab soil samples were collected at 27 locations beneath the operating floor of the former K-31 building in EU Z2-06. Multiple samples were collected at most locations resulting in a total of 54 soil samples being collected from the top of the soil below the slab to a depth of 10 ft. A summary of the evaluation of EU Z2-06 soil data against Zone 2 ROD criteria is presented in Table 6.1. The analytical data for the sub-slab soil samples were compared to the Zone 2 ROD evaluation criteria. In summary, there is only one Zone 2 ROD evaluation criterion exceedance: technetium-99 (Tc-99) exceeds its groundwater (GW) soil screening level (SSL) in one (313 picocuries per gram [pCi/g]) out of 54 samples. Potassium-40 (K-40) shows up as exceeding its risk screening level (RSL), but because the K-40 background concentration is so high relative to the RSL, K-40 is not considered as a potential risk problem. PCBs, SVOCs, and VOCs were all detected with PCBs being the most prevalent, but no RLs, nor RSLs, were exceeded. Based on DVS sampling analytical results, the following was determined:

- There were no maximum RL exceedances in sub-slab soils in EU Z2-06.
- No average contaminant of concern (COC) sub-slab soil concentration exceeded its average RL.
- Although one sub-slab soil Tc-99 result, and the average detected Tc-99 concentration (166 pCi/g), exceeds the GW SSL, given that there are only 2 detects out 54 analyses and that only one of those detects exceeds the Tc-99 groundwater soil screening level (GW SSL), there is insufficient mass of Tc-99 in the EU Z2-06 sub-slab soils to pose a threat to groundwater.

In addition to the sub-slab soil samples, samples were collected from the concrete slab at 30 locations on the operating floor of Bldg. K-31 in EU Z2-06. Twenty-four of these sample locations are paired and consist of a center point sample location plus a composite of four step-out locations, which are sample locations spaced 12.5 ft from the center point location. Twenty-three of the paired sample locations occur at locations where British Nuclear Group (BNG) identified elevated PCBs and one of these locations occurs at a location of elevated radioactivity also identified by BNG. Samples from all center point locations were analyzed for metals, PCBs, radionuclides, and SVOCs. Samples from 22 step-out locations at the historical elevated PCB locations were analyzed for PCBs only and the sample from the other of these locations was analyzed for PCBs and SVOCs. The step-out sample from the historical elevated radioactivity location was analyzed for radionuclides only. The remaining concrete samples from EU Z2-06 were analyzed for metals, PCBs, radionuclides, and SVOCs.

A summary of the screening of EU Z2-06 concrete slab data against the Zone 2 ROD criteria is presented in Table 6.2. In summary, PCBs were detected in every sample and the PCB average RL was exceeded in three samples. However, the average detected PCB concentration (5745 µg/kg) in the EU Z2-06 concrete samples does not exceed the PCB Avg RL (10,000 µg/kg). Other than K-40 concentrations which occur within permissible limits, there are no other Zone 2 ROD criteria exceedances in the EU Z2-06 concrete slab sample results. Based on the DVS concrete sampling results, the following was determined:

- There were no maximum RL exceedances in the EU Z2-06 concrete samples.
- No average COC concentration across EU Z2-06 exceeded its average RL.
- There are no sources for groundwater contamination in the K-31 concrete slab in EU Z2-06.

As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of K-31 and its slab is completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated

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Table 6.1. Data summary for EU Z2-06 (K-31) sub-slab soil samples[a] (0 to 10 ft)

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Inorganics (mg/kg)													
Aluminum	54/54	3200J	18800	Z2-EU06BM-326	9590		NA		NA	1100000	0/54		NA
Antimony	0/54	ND	ND		ND		NA		NA	470	0/54	144	0/54
Arsenic	54/54	2.6J	13.5	Z2-EU06B-216	6.2	900	0/54	300	0/54	300	0/54	66.3	0/54
Barium	54/54	13.2	133	Z2-EU06B-202	30.4		NA		NA	220000	0/54	9150	0/54
Beryllium	32/54	0.302J	2.41	Z2-EU06B-324	0.572		NA		NA	2300	0/54		NA
Boron	32/54	1.12J	5.94	Z2-EU06B-203	2.76		NA		NA	230000	0/54		NA
Cadmium	50/54	0.0218J	0.439	Z2-EU06B-324	0.073		NA		NA	980	0/54		NA
Calcium	54/54	1480	270000	Z2-EU06B-203	90169		NA		NA		NA		NA
Chromium	54/54	7.42	28.6	Z2-EU06B-342	15.3		NA		NA	1800000	0/54	172	0/54
Cobalt	54/54	1.86	16.4	Z2-EU06BM-326	4.62		NA		NA	350	0/54		NA
Copper	54/54	5.39	26.7J	Z2-EU06B-316	10		NA		NA	47000	0/54		NA
Iron	54/54	8100J	32900	Z2-EU06BM-326	20376		NA		NA	820000	0/54		NA
Lead	40/54	0.536J	22.9	Z2-EU06B-342	9.04		NA		NA	8000	0/54	3370	0/54
Lithium	54/54	7.47	26.9	Z2-EU06B-204	13.8		NA		NA	2300	0/54		NA
Magnesium	54/54	438	13300	Z2-EU06B-202	4471		NA		NA		NA		NA
Manganese	54/54	80.5	2180	Z2-EU06B-342	341		NA		NA	26000	0/54		NA
Mercury	54/54	0.0148J	0.169	Z2-EU06BM-326	0.06	1800	0/54	600	0/54	600	0/54		NA
Molybdenum	35/54	0.223J	3.03	Z2-EU06B-216	0.686		NA		NA	5800	0/54		NA
Nickel	54/54	3.48	25.8	Z2-EU06BM-326	7.64		NA		NA	22000	0/54		NA
Potassium	54/54	298	1260	Z2-EU06BM-326	592		NA		NA		NA		NA
Selenium	36/54	0.54J	3.92	Z2-EU06B-342	1.14		NA		NA	5800	0/54		NA
Silver	23/54	0.123J	9.05J	Z2-EU06B-316	0.951		NA		NA	5800	0/54		NA
Sodium	54/54	14.6J	211	Z2-EU06B-316	101		NA		NA		NA		NA
Thallium	54/54	0.0699J	0.337J	Z2-EU06B-342	0.171		NA		NA	12	0/54	10.8	0/54
Uranium	54/54	0.549	1.71	Z2-EU06B-206	0.961		NA		NA	3500	0/54		NA
Vanadium	54/54	6.57J	41	Z2-EU06B-342	22.5		NA		NA	5800	0/54		NA
Zinc	54/54	10.5	79	Z2-EU06BM-326	26		NA		NA	350000	0/54		NA
Organics, pesticides, and PCBs (µg/kg)													
PCB-1016	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1221	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1232	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1242	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1248	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1254	35/54	1.91J	2240	Z2-EU06B-325	133	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1260	26/54	1.39J	730	Z2-EU06B-325	67.7	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1262	0/54	ND	ND		ND	100000	0/54	10000	0/54	10000	0/54		NA
PCB-1268	1/54	4.29	4.29	Z2-EU06B-207	4.29	100000	0/54	10000	0/54	10000	0/54		NA
Polychlorinated biphenyl	36/54	1.91J	2970	Z2-EU06B-325	178	100000	0/54	10000	0/54	10000	0/54		NA
Radionuclides (pCi/g)													
Alpha activity	54/54	7.15	30.3	Z2-EU06B-207	17.3		NA		NA		NA		NA
Beta activity	54/54	13.1J	38.8J	Z2-EU06B-207	20.3		NA		NA		NA		NA
Cesium-137	0/54	ND	ND		ND	20	0/54	2	0/54	2	0/54		NA
Cobalt-60	0/54	ND	ND		ND		NA		NA	0.582	0/54		NA
Neptunium-237	0/54	ND	ND		ND	50	0/54	5	0/54	5	0/54		NA
Plutonium-238	0/54	ND	ND		ND		NA		NA	157	0/54		NA
Plutonium-239	0/54	ND	ND		ND		NA		NA	136	0/54		NA

Table 6.1. Data summary for EU Z2-06 (K-31) sub-slab soil samples[a] (0 to 10 ft) – cont.

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Potassium-40	54/54	7.27	29.7	Z2-EU06BM-326	11.1		NA		NA	2.67	54/54		NA
Ra/Th decay series[d]	54/54	0.00001	1.47	Z2-EU06B-332	0.376	15	0/54	5	0/54		NA		NA
Radium-226	54/54	0.735	2.18	Z2-EU06B-325	1.43		NA		NA		NA		NA
Technetium-99	2/54	18.8	313	Z2-EU06BM-210	166		NA		NA	8520	0/54	85.6	1/54
Thorium-228[e]	54/54	0.636	1.78J	Z2-EU06B-217	1.3		NA		NA		NA		NA
Thorium-230[e]	41/54	0.87	2.67J	Z2-EU06B-332	1.4		NA		NA		NA		NA
Thorium-232[e]	54/54	0.748	1.9J	Z2-EU06B-217	1.26		NA		NA		NA		NA
Thorium-234	24/54	0.841	3.42	Z2-EU06B-318	1.92		NA		NA	4750	0/54		NA
Uranium-234	48/54	0.656	1.6	Z2-EU06B-201 Z2-EU06B-207	1.07	7000	0/54	700	0/54	700	0/54	61.1	0/54
Uranium-235	0/54	ND	ND		ND	80	0/54	8	0/54	8	0/54	61.1	0/54
Uranium-238	53/54	0.56	1.6	Z2-EU06B-207	0.987	500	0/54	50	0/54	50	0/54	61.1	0/54
Semivolatile organics (µg/kg)													
1,2,4-Trichlorobenzene	0/54	ND	ND		ND		NA		NA	260000	0/54		NA
1,2-Dichlorobenzene	0/54	ND	ND		ND		NA		NA	9300000	0/54		NA
1,3-Dichlorobenzene	0/54	ND	ND		ND		NA		NA		NA		NA
1,4-Dichlorobenzene	0/54	ND	ND		ND		NA		NA	110000	0/54		NA
2,3,4,6-Tetrachlorophenol	0/54	ND	ND		ND		NA		NA	25000000	0/54		NA
2,4,5-Trichlorophenol	0/54	ND	ND		ND		NA		NA	82000000	0/54		NA
2,4,6-Trichlorophenol	0/54	ND	ND		ND		NA		NA	820000	0/54		NA
2,4-Dichlorophenol	0/54	ND	ND		ND		NA		NA	2500000	0/54		NA
2,4-Dimethylphenol	0/54	ND	ND		ND		NA		NA	16000000	0/54		NA
2,4-Dinitrophenol	0/54	ND	ND		ND		NA		NA	1600000	0/54		NA
2,4-Dinitrotoluene	0/54	ND	ND		ND		NA		NA	74000	0/54		NA
2,6-Dinitrotoluene	0/54	ND	ND		ND		NA		NA	15000	0/54		NA
2-Chloronaphthalene	0/54	ND	ND		ND		NA		NA	93000000	0/54		NA
2-Chlorophenol	0/54	ND	ND		ND		NA		NA	5800000	0/54		NA
2-Methyl-4,6-dinitrophenol	0/54	ND	ND		ND		NA		NA	66000	0/54		NA
2-Methylnaphthalene	1/54	37.8J	37.8J	Z2-EU06B-342	37.8		NA		NA	3000000	0/54		NA
2-Methylphenol	0/54	ND	ND		ND		NA		NA	41000000	0/54		NA
2-Nitrobenzenamine	0/54	ND	ND		ND		NA		NA	8000000	0/54		NA
2-Nitrophenol	0/54	ND	ND		ND		NA		NA		NA		NA
3,3'-Dichlorobenzidine	0/54	ND	ND		ND		NA		NA	51000	0/54		NA
3-Nitrobenzenamine	0/54	ND	ND		ND		NA		NA		NA		NA
4-Bromophenyl phenyl ether	0/54	ND	ND		ND		NA		NA		NA		NA
4-Chloro-3-methylphenol	0/54	ND	ND		ND		NA		NA	82000000	0/54		NA
4-Chlorobenzenamine	0/54	ND	ND		ND		NA		NA	120000	0/54		NA
4-Chlorophenyl phenyl ether	0/54	ND	ND		ND		NA		NA		NA		NA
4-Nitrobenzenamine	0/54	ND	ND		ND		NA		NA	1200000	0/54		NA
4-Nitrophenol	0/54	ND	ND		ND		NA		NA		NA		NA
Acenaphthene	1/54	190J	190J	Z2-EU06B-342	190		NA		NA	45000000	0/54		NA
Acenaphthylene	0/54	ND	ND		ND		NA		NA		NA		NA
Aniline	0/54	ND	ND		ND		NA		NA	4100000	0/54		NA
Anthracene	1/54	352	352	Z2-EU06B-342	352		NA		NA	230000000	0/54		NA
Benz(*a*)anthracene	2/54	96.1J	866	Z2-EU06B-342	481		NA		NA	29000	0/54		NA
Benzenemethanol	0/54	ND	ND		ND		NA		NA	82000000	0/54		NA
Benzo(*a*)pyrene	1/54	774	774	Z2-EU06B-342	774		NA		NA	2900	0/54		NA
Benzo(*b*)fluoranthene	1/54	721	721	Z2-EU06B-342	721		NA		NA	29000	0/54		NA

Table 6.1. Data summary for EU Z2-06 (K-31) sub-slab soil samples[a] (0 to 10 ft) – cont.

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Benzo(*g*,*h*,*i*)perylene	3/54	13J	278J	Z2-EU06B-342	180		NA		NA		NA		NA
Benzo(*k*)fluoranthene	1/54	344	344	Z2-EU06B-342	344		NA		NA	290000	0/54		NA
Benzoic acid	1/54	598J	598J	Z2-EU06B-317	598		NA		NA	3300000000	0/54		NA
Bis(2-chloroethoxy)methane	0/54	ND	ND		ND		NA		NA	2500000	0/54		NA
Bis(2-chloroethyl) ether	0/54	ND	ND		ND		NA		NA	10000	0/54		NA
Bis(2-chloroisopropyl) ether	0/54	ND	ND		ND		NA		NA	220000	0/54		NA
Bis(2-ethylhexyl)phthalate	1/54	795J	795J	Z2-EU06B-320	795		NA		NA	1600000	0/54	2350000	0/54
Butyl benzyl phthalate	0/54	ND	ND		ND		NA		NA	12000000	0/54		NA
Carbazole	1/54	372	372	Z2-EU06B-342	372		NA		NA		NA		NA
Chrysene	2/54	236J	709	Z2-EU06B-342	472		NA		NA	2900000	0/54		NA
Dibenz(*a*,*h*)anthracene	1/54	101J	101J	Z2-EU06B-342	101		NA		NA	2900	0/54		NA
Dibenzofuran	1/54	136J	136J	Z2-EU06B-342	136		NA		NA	1000000	0/54		NA
Diethyl phthalate	0/54	ND	ND		ND		NA		NA	660000000	0/54		NA
Dimethyl phthalate	0/54	ND	ND		ND		NA		NA		NA		NA
Di-n-octylphthalate	0/54	ND	ND		ND		NA		NA	8200000	0/54		NA
Diphenylamine	0/54	ND	ND		ND		NA		NA	21000000	0/54		NA
Fluoranthene	2/54	18.9J	2140	Z2-EU06B-342	1079		NA		NA	30000000	0/54		NA
Fluorene	1/54	192J	192J	Z2-EU06B-342	192		NA		NA	30000000	0/54		NA
Hexachlorobenzene	0/54	ND	ND		ND		NA		NA	14000	0/54		NA
Hexachlorobutadiene	0/54	ND	ND		ND		NA		NA	320000	0/54		NA
Hexachlorocyclopentadiene	0/54	ND	ND		ND		NA		NA	4900000	0/54		NA
Hexachloroethane	0/54	ND	ND		ND		NA		NA	580000	0/54		NA
Indeno(*1,2,3-cd*)pyrene	1/54	361	361	Z2-EU06B-342	361		NA		NA	29000	0/54		NA
Isophorone	0/54	ND	ND		ND		NA		NA	24000000	0/54		NA
m+p Methylphenol	0/54	ND	ND		ND		NA		NA		NA		NA
Naphthalene	1/54	94.4J	94.4J	Z2-EU06B-342	94.4		NA		NA	170000	0/54		NA
Nitrobenzene	0/54	ND	ND		ND		NA		NA	220000	0/54		NA
N-Nitroso-di-n-propylamine	0/54	ND	ND		ND		NA		NA	3300	0/54		NA
N-Nitrosomethylethylamine	0/54	ND	ND		ND		NA		NA		NA		NA
Pentachlorophenol	0/54	ND	ND		ND		NA		NA	40000	0/54		NA
Phenanthrene	3/54	13.6J	1890	Z2-EU06B-342	647		NA		NA		NA		NA
Phenol	0/54	ND	ND		ND		NA		NA	250000000	0/54		NA
Pyrene	2/54	316J	1500	Z2-EU06B-342	908		NA		NA	23000000	0/54		NA
Pyridine	0/54	ND	ND		ND		NA		NA	1200000	0/54		NA
Volatile Organics (µg/kg)													
1,1,1-Trichloroethane	0/6	ND	ND		ND		NA		NA	36000000	0/6	97900	0/6
1,1,2,2-Tetrachloroethane	0/6	ND	ND		ND		NA		NA	27000	0/6		NA
1,1,2-Trichloroethane	0/6	ND	ND		ND		NA		NA	6300	0/6	1370	0/6
1,1-Dichloroethane	0/6	ND	ND		ND		NA		NA	160000	0/6		NA
1,1-Dichloroethene	0/6	ND	ND		ND		NA		NA	1000000	0/6	1750	0/6
1,2-Dichloroethane	0/6	ND	ND		ND		NA		NA	20000	0/6		NA
1,2-Dichloropropane	0/6	ND	ND		ND		NA		NA	44000	0/6		NA
2-Butanone	1/6	772	772	Z2-EU06B-204	772		NA		NA	190000000	0/6		NA
2-Hexanone	0/6	ND	ND		ND		NA		NA	1300000	0/6		NA
4-Methyl-2-pentanone	1/6	1510	1510	Z2-EU06B-204	1510		NA		NA	56000000	0/6		NA
Acetone	1/6	119	119	Z2-EU06B-204	119		NA		NA	67000000	0/6		NA
Benzene	1/6	0.456J	0.456J	Z2-EU06B-323	0.456		NA		NA	51000	0/6	1150	0/6
Bromodichloromethane	0/6	ND	ND		ND		NA		NA	13000	0/6		NA

Table 6.1. Data summary for EU Z2-06 (K-31) sub-slab soil samples[a] (0 to 10 ft) – cont.

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Bromoform	0/6	ND	ND		ND		NA		NA	2900000	0/6		NA
Bromomethane	0/6	ND	ND		ND		NA		NA	30000	0/6		NA
Carbon disulfide	0/6	ND	ND		ND		NA		NA	3500000	0/6		NA
Carbon tetrachloride	1/6	3.07J	3.07J	Z2-EU06B-204	3.07		NA		NA	29000	0/6	2770	0/6
Chlorobenzene	0/6	ND	ND		ND		NA		NA	1300000	0/6		NA
Chloroethane	0/6	ND	ND		ND		NA		NA	57000000	0/6		NA
Chloroform	0/6	ND	ND		ND		NA		NA	14000	0/6	1230	0/6
Chloromethane	1/6	0.968J	0.968J	Z2-EU06B-318	0.968		NA		NA	460000	0/6		NA
cis-1,2-Dichloroethene	0/6	ND	ND		ND		NA		NA	2300000	0/6		NA
cis-1,3-Dichloropropene	0/6	ND	ND		ND		NA		NA		NA		NA
Dibromochloromethane	0/6	ND	ND		ND		NA		NA	32000	0/6		NA
Ethylbenzene	0/6	ND	ND		ND		NA		NA	250000	0/6		NA
Methylene chloride	0/6	ND	ND		ND		NA		NA	3200000	0/6	241	0/6
Styrene	4/6	0.994J	1.11J	Z2-EU06B-318	1.06		NA		NA	35000000	0/6		NA
Tetrachloroethene	0/6	ND	ND		ND		NA		NA	390000	0/6	4720	0/6
Toluene	2/6	0.446J	0.504J	Z2-EU06B-204	0.475		NA		NA	47000000	0/6	502000	0/6
Total Xylene	0/6	ND	ND		ND		NA		NA	2500000	0/6		NA
trans-1,2-Dichloroethene	0/6	ND	ND		ND		NA		NA	23000000	0/6		NA
trans-1,3-Dichloropropene	0/6	ND	ND		ND		NA		NA		NA		NA
Trichloroethene	0/6	ND	ND		ND		NA		NA	19000	0/6	1720	0/6
Vinyl chloride	0/6	ND	ND		ND		NA		NA	17000	0/6	176	0/6

[a]Stations in summary include Z2-EU06B-201, Z2-EU06B-202, Z2-EU06B-203, Z2-EU06B-204, Z2-EU06B-205, Z2-EU06B-206, Z2-EU06B-207, Z2-EU06B-211, Z2-EU06B-216, Z2-EU06B-217, Z2-EU06B-316, Z2-EU06B-317, Z2-EU06B-318, Z2-EU06B-319, Z2-EU06B-320, Z2-EU06B-321, Z2-EU06B-322, Z2-EU06B-323, Z2-EU06B-324, Z2-EU06B-325, Z2-EU06B-330, Z2-EU06B-331, Z2-EU06B-332, Z2-EU06B-342, Z2-EU06BM-210, Z2-EU06BM-215, and Z2-EU06BM-326.
[b]The values in these columns are for detected results. Non-detects are not included.
[c]The "J" validation qualifier means that the analyte was positively identified and the result is the approximate concentration in the sample; "XV" signifies that the result was not validated.
[d]The Ra/Th (radium/thorium) decay series results are calculated values for each sample based on detections of radium-226, thorium-230, and thorium-232 as discussed in the Zone 2 ROD. Because the calculation involves subtraction of background from analytical results and negative numbers are not allowed, 0 (zero) is a legitimate result.
[e]These radionuclides are not included in aggregate risk calculations for the EU. Instead, human health risk effects of these radionuclides (thorium-228 is included in the thorium-232 decay series) are evaluated with the Ra/Th decay series RLs as discussed in the Zone 2 ROD.

EU = exposure unit.
GW = groundwater.
HI = hazard index.
mg/kg = milligram per kilogram.
NA = not applicable.
ND = not detected.
PCB = polychlorinated biphenyl.
pCi/g = picocuries per gram.
RL = remediation level.
ROD = Record of Decision.
RSL = risk screening level.
SSL = soil screening level.
µg/kg = microgram per kilogram.

Table 6.2. Data summary for EU Z2-06 (K-31) concrete samples[a]

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Inorganics (mg/kg)													
Aluminum	18/18	2330	8130	Z2-EU06B-331	6328		NA		NA	1100000	0/18		NA
Antimony	2/18	0.359J	0.428J	Z2-EU06B-332	0.393		NA		NA	470	0/18	144	0/18
Arsenic	18/18	1.25J	4.84	Z2-EU06B-330	2.28	900	0/18	300	0/18	300	0/18	66.3	0/18
Barium	18/18	17.1	68	Z2-EU06B-228	51.5		NA		NA	220000	0/18	9150	0/18
Beryllium	11/18	0.158J	0.539J	Z2-EU06B-224	0.376		NA		NA	2300	0/18		NA
Boron	18/18	1.92J	20.9	Z2-EU06B-219	5.81		NA		NA	230000	0/18		NA
Cadmium	16/18	0.0215J	0.127J	Z2-EU06B-219	0.064		NA		NA	980	0/18		NA
Calcium	18/18	32500	113000	Z2-EU06B-331	84983		NA		NA		NA		NA
Chromium	18/18	3.69	18.6	Z2-EU06B-330	12.4		NA		NA	1800000	0/18	172	0/18
Cobalt	18/18	1.23	105J	Z2-EU06B-219	10.2		NA		NA	350	0/18		NA
Copper	18/18	12.3	43.6	Z2-EU06B-226	31.5		NA		NA	47000	0/18		NA
Iron	18/18	4380J	16000J	Z2-EU06B-330	10836		NA		NA	820000	0/18		NA
Lead	9/18	0.447J	6.96	Z2-EU06B-224	2.87		NA		NA	8000	0/18	3370	0/18
Lithium	18/18	4.89	8.85	Z2-EU06B-332	6.88		NA		NA	2300	0/18		NA
Magnesium	18/18	1430	4860	Z2-EU06B-211	3631		NA		NA		NA		NA
Manganese	18/18	62.3	416	Z2-EU06B-330	235		NA		NA	26000	0/18		NA
Mercury	7/18	0.00436J	0.0211	Z2-EU06B-210	0.009	1800	0/18	600	0/18	600	0/18		NA
Molybdenum	18/18	0.253J	0.956J	Z2-EU06B-224	0.643		NA		NA	5800	0/18		NA
Nickel	18/18	1.87	8.26J	Z2-EU06B-219	6.2		NA		NA	22000	0/18		NA
Potassium	18/18	329	1430J	Z2-EU06B-223	719		NA		NA		NA		NA
Selenium	16/18	0.541J	7.72	Z2-EU06B-219	1.46		NA		NA	5800	0/18		NA
Silver	14/18	0.402J	15.6	Z2-EU06B-225	4.98		NA		NA	5800	0/18		NA
Sodium	18/18	49.8	894J	Z2-EU06B-223	337		NA		NA		NA		NA
Thallium	0/18	ND	ND		ND		NA		NA	12	0/18	10.8	0/18
Uranium	18/18	0.763	2.84	Z2-EU06B-210	1.11		NA		NA	3500	0/18		NA
Vanadium	18/18	4.03	19.6	Z2-EU06B-330	11.9		NA		NA	5800	0/18		NA
Zinc	18/18	25	103	Z2-EU06B-226	64.6		NA		NA	350000	0/18		NA
Organics, pesticides, and PCBs (µg/kg)													
PCB-1016	0/29	ND	ND		ND	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1221	0/29	ND	ND		ND	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1232	0/29	ND	ND		ND	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1242	0/29	ND	ND		ND	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1248	0/29	ND	ND		ND	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1254	29/29	1.94J	70000	Z2-EU06B-219A	4442	100000	0/29	10000	3/29	10000	3/29		NA
PCB-1260	24/29	1.41J	18900	Z2-EU06B-219A	1557	100000	0/29	10000	2/29	10000	2/29		NA
PCB-1262	3/29	48.2	67.6	Z2-EU06B-225	54.7	100000	0/29	10000	0/29	10000	0/29		NA
PCB-1268	6/29	2.67J	88J	Z2-EU06B-227	39.7	100000	0/29	10000	0/29	10000	0/29		NA
Polychlorinated biphenyl	29/29	3.35J	88900	Z2-EU06B-219A	5745	100000	0/29	10000	3/29	10000	3/29		NA
Radionuclides (pCi/g)													
Alpha activity	19/19	4.32	17.8	Z2-EU06B-331	9.6		NA		NA		NA		NA
Beta activity	19/19	5.34J	22.2J	Z2-EU06B-220	11.8		NA		NA		NA		NA
Cesium-137	0/19	ND	ND		ND	20	0/19	2	0/19	2	0/19		NA
Cobalt-60	0/19	ND	ND		ND		NA		NA	0.582	0/19		NA
Neptunium-237	0/19	ND	ND		ND	50	0/19	5	0/19	5	0/19		NA
Plutonium-238	0/19	ND	ND		ND		NA		NA	157	0/19		NA
Plutonium-239	0/19	ND	ND		ND		NA		NA	136	0/19		NA

Table 6.2. Data summary for EU Z2-06 (K-31) concrete samples[a] – cont.

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Potassium-40	19/19	5.36	8.72	Z2-EU06B-220	7.08		NA		NA	2.67	19/19		NA
Ra/Th decay series[d]	19/19	0	1.19	Z2-EU06B-224	0.081	15	0/19	5	0/19		NA		NA
Radium-226	19/19	0.485	2.44	Z2-EU06B-224	1.12		NA		NA		NA		NA
Technetium-99	1/19	10.2	10.2	Z2-EU06B-210	10.2		NA		NA	8520	0/19	85.6	0/19
Thorium-228[e]	17/19	0.298	1.2	Z2-EU06B-210	0.679		NA		NA		NA		NA
Thorium-230[e]	8/19	0.648	1.17	Z2-EU06B-224	0.855		NA		NA		NA		NA
Thorium-232[e]	19/19	0.391	1.45	Z2-EU06B-227	0.648		NA		NA		NA		NA
Thorium-234	4/19	0.756	0.96	Z2-EU06B-224	0.836		NA		NA	4750	0/19		NA
Uranium-234	10/19	0.506	2.22	Z2-EU06B-210	0.844	7000	0/19	700	0/19	700	0/19	61.1	0/19
Uranium-235	0/19	ND	ND		ND	80	0/19	8	0/19	8	0/19	61.1	0/19
Uranium-238	7/19	0.448	1.88	Z2-EU06B-210	0.796	500	0/19	50	0/19	50	0/19	61.1	0/19
Semivolatile organics (µg/kg)													
1,2,4-Trichlorobenzene	0/19	ND	ND		ND		NA		NA	260000	0/19		NA
1,2-Dichlorobenzene	0/19	ND	ND		ND		NA		NA	9300000	0/19		NA
1,3-Dichlorobenzene	0/19	ND	ND		ND		NA		NA		NA		NA
1,4-Dichlorobenzene	0/19	ND	ND		ND		NA		NA	110000	0/19		NA
2,3,4,6-Tetrachlorophenol	0/19	ND	ND		ND		NA		NA	25000000	0/19		NA
2,4,5-Trichlorophenol	0/19	ND	ND		ND		NA		NA	82000000	0/19		NA
2,4,6-Trichlorophenol	0/19	ND	ND		ND		NA		NA	820000	0/19		NA
2,4-Dichlorophenol	0/19	ND	ND		ND		NA		NA	2500000	0/19		NA
2,4-Dimethylphenol	0/19	ND	ND		ND		NA		NA	16000000	0/19		NA
2,4-Dinitrophenol	0/19	ND	ND		ND		NA		NA	1600000	0/19		NA
2,4-Dinitrotoluene	0/19	ND	ND		ND		NA		NA	74000	0/19		NA
2,6-Dinitrotoluene	0/19	ND	ND		ND		NA		NA	15000	0/19		NA
2-Chloronaphthalene	0/19	ND	ND		ND		NA		NA	93000000	0/19		NA
2-Chlorophenol	0/19	ND	ND		ND		NA		NA	5800000	0/19		NA
2-Methyl-4,6-dinitrophenol	0/19	ND	ND		ND		NA		NA	66000	0/19		NA
2-Methylnaphthalene	0/19	ND	ND		ND		NA		NA	3000000	0/19		NA
2-Methylphenol	0/19	ND	ND		ND		NA		NA	41000000	0/19		NA
2-Nitrobenzenamine	0/19	ND	ND		ND		NA		NA	8000000	0/19		NA
2-Nitrophenol	0/19	ND	ND		ND		NA		NA		NA		NA
3,3'-Dichlorobenzidine	0/19	ND	ND		ND		NA		NA	51000	0/19		NA
3-Nitrobenzenamine	0/19	ND	ND		ND		NA		NA		NA		NA
4-Bromophenyl phenyl ether	0/19	ND	ND		ND		NA		NA		NA		NA
4-Chloro-3-methylphenol	0/19	ND	ND		ND		NA		NA	82000000	0/19		NA
4-Chlorobenzenamine	0/19	ND	ND		ND		NA		NA	120000	0/19		NA
4-Chlorophenyl phenyl ether	0/19	ND	ND		ND		NA		NA		NA		NA
4-Nitrobenzenamine	0/19	ND	ND		ND		NA		NA	1200000	0/19		NA
4-Nitrophenol	0/19	ND	ND		ND		NA		NA		NA		NA
Acenaphthene	0/19	ND	ND		ND		NA		NA	45000000	0/19		NA
Acenaphthylene	0/19	ND	ND		ND		NA		NA		NA		NA
Aniline	0/19	ND	ND		ND		NA		NA	4100000	0/19		NA
Anthracene	0/19	ND	ND		ND		NA		NA	230000000	0/19		NA
Benz(*a*)anthracene	0/19	ND	ND		ND		NA		NA	29000	0/19		NA
Benzenemethanol	0/19	ND	ND		ND		NA		NA	82000000	0/19		NA
Benzo(*a*)pyrene	0/19	ND	ND		ND		NA		NA	2900	0/19		NA
Benzo(*b*)fluoranthene	0/19	ND	ND		ND		NA		NA	29000	0/19		NA

Table 6.2. Data summary for EU Z2-06 (K-31) concrete samples[a] – cont.

Analyte	Frequency of detect	Minimum detect[b,c]	Maximum detect[b,c]	Location(s) of maximum detected result	Average detected result	Maximum RL	Frequency of detects exceeding maximum RL	Average RL	Frequency of detects exceeding average RL	RSL (10^{-5} or HI = 1)	Frequency of detects exceeding RSL	GW SSL	Frequency of detects exceeding GW SSL
Benzo(*g*,*h*,*i*)perylene	0/19	ND	ND		ND		NA		NA		NA		NA
Benzo(*k*)fluoranthene	0/19	ND	ND		ND		NA		NA	290000	0/19		NA
Benzoic acid	0/19	ND	ND		ND		NA		NA	3300000000	0/19		NA
Bis(2-chloroethoxy)methane	0/19	ND	ND		ND		NA		NA	2500000	0/19		NA
Bis(2-chloroethyl) ether	0/19	ND	ND		ND		NA		NA	10000	0/19		NA
Bis(2-chloroisopropyl) ether	0/19	ND	ND		ND		NA		NA	220000	0/19		NA
Bis(2-ethylhexyl)phthalate	0/19	ND	ND		ND		NA		NA	1600000	0/19	2350000	0/19
Butyl benzyl phthalate	0/19	ND	ND		ND		NA		NA	12000000	0/19		NA
Carbazole	0/19	ND	ND		ND		NA		NA		NA		NA
Chrysene	0/19	ND	ND		ND		NA		NA	2900000	0/19		NA
Dibenz(*a*,*h*)anthracene	0/19	ND	ND		ND		NA		NA	2900	0/19		NA
Dibenzofuran	0/19	ND	ND		ND		NA		NA	1000000	0/19		NA
Diethyl phthalate	0/19	ND	ND		ND		NA		NA	660000000	0/19		NA
Dimethyl phthalate	0/19	ND	ND		ND		NA		NA		NA		NA
Di-n-octylphthalate	0/19	ND	ND		ND		NA		NA	8200000	0/19		NA
Diphenylamine	0/19	ND	ND		ND		NA		NA	21000000	0/19		NA
Fluoranthene	0/19	ND	ND		ND		NA		NA	30000000	0/19		NA
Fluorene	0/19	ND	ND		ND		NA		NA	30000000	0/19		NA
Hexachlorobenzene	0/19	ND	ND		ND		NA		NA	14000	0/19		NA
Hexachlorobutadiene	0/19	ND	ND		ND		NA		NA	320000	0/19		NA
Hexachlorocyclopentadiene	0/19	ND	ND		ND		NA		NA	4900000	0/19		NA
Hexachloroethane	0/19	ND	ND		ND		NA		NA	580000	0/19		NA
Indeno(*1*,*2*,*3*-*cd*)pyrene	0/19	ND	ND		ND		NA		NA	29000	0/19		NA
Isophorone	2/19	921J	1980	Z2-EU06B-228A	1450		NA		NA	24000000	0/19		NA
m+p Methylphenol	0/19	ND	ND		ND		NA		NA		NA		NA
Naphthalene	0/19	ND	ND		ND		NA		NA	170000	0/19		NA
Nitrobenzene	0/19	ND	ND		ND		NA		NA	220000	0/19		NA
N-Nitroso-di-n-propylamine	0/19	ND	ND		ND		NA		NA	3300	0/19		NA
N-Nitrosomethylethylamine	0/19	ND	ND		ND		NA		NA		NA		NA
Pentachlorophenol	0/19	ND	ND		ND		NA		NA	40000	0/19		NA
Phenanthrene	0/19	ND	ND		ND		NA		NA		NA		NA
Phenol	0/19	ND	ND		ND		NA		NA	250000000	0/19		NA
Pyrene	0/19	ND	ND		ND		NA		NA	23000000	0/19		NA
Pyridine	0/19	ND	ND		ND		NA		NA	1200000	0/19		NA

[a]Stations in summary include Z2-EU06-210, Z2-EU06-211, Z2-EU06-215, Z2-EU06-218, Z2-EU06-218A, Z2-EU06-219, Z2-EU06-219A, Z2-EU06-220, Z2-EU06-220A, Z2-EU06-221, Z2-EU06-221A, Z2-EU06-222, Z2-EU06-222A, Z2-EU06-223, Z2-EU06-223A, Z2-EU06-224, Z2-EU06-224A, Z2-EU06-225, Z2-EU06-225A, Z2-EU06-226, Z2-EU06-226A, Z2-EU06-227, Z2-EU06-227A, Z2-EU06-228, Z2-EU06-228A, Z2-EU06-229, Z2-EU06-229A, Z2-EU06-330, Z2-EU06-331, and Z2-EU06-332.
[b]The values in these columns are for detected results. Non-detects are not included.
[c]The "J" validation qualifier means that the analyte was positively identified and the result is the approximate concentration in the sample; "XV" signifies that the result was not validated.
[d]The Ra/Th (radium/thorium) decay series results are calculated values for each sample based on detections of radium-226, thorium-230, and thorium-232 as discussed in the Zone 2 ROD. Because the calculation involves subtraction of background from analytical results and negative numbers are not allowed, 0 (zero) is a legitimate result.
[e]These radionuclides are not included in aggregate risk calculations for the EU. Instead, human health risk effects of these radionuclides (thorium-228 is included in the thorium-232 decay series) are evaluated with the Ra/Th decay series RLs as discussed in the Zone 2 ROD.

EU = exposure unit.
GW = groundwater.
HI = hazard index.
mg/kg = milligram per kilogram.
NA = not applicable.
ND = not detected.
PCB = polychlorinated biphenyl.
pCi/g = picocuries per gram.
RL = remediation level.
ROD = Record of Decision.
RSL = risk screening level.
SSL = soil screening level.
µg/kg = microgram per kilogram.

immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR in Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

6.4 DATA FOR EU Z2-07

Following is a summary of the sampling results for EU Z2-07, which is included in its entirety in the proposed transfer footprint. Soil samples collected under the DVS are shown in Fig. 6.1. There were 13 systematic grid samples and 5 biased samples collected under the DVS within this EU. Two sediment samples were collected from the K-897-E and K-897-F Oil Containment structures. Samples were analyzed for metals, PCBs, radionuclides, SVOCs, and VOCs. Based on both historical and DVS sampling results, the results of the Class 3 walkover assessment, and evaluation of the data as documented in the PCCR (DOE 2006), the following was determined:

- There were no maximum RL exceedances in EU Z2-07.
- No average COC concentration across EU Z2-07 exceeded its average RL.
- There are no sources for groundwater contamination in EU Z2-07.

Thus, as documented in the approved PCCR (DOE 2006), NFA is necessary to meet industrial land use in this EU.

6.5 DATA FOR EU Z2-10

Following is a summary of the sampling results for EU Z2-10, which is included in its entirety in the proposed transfer footprint. Soil samples collected under the DVS are shown in Fig. 6.1. There were six biased samples collected under the DVS within this EU. These locations included one sample from the sediment in the K-897-G Oil Containment structure. Samples were analyzed for metals, PCBs, radionuclides, SVOCs, and VOCs. Based on both historical and DVS sampling results, the results of the Class 3 walkover assessment, and the evaluation of the data documented in the PCCR (DOE 2006), the following was determined:

- There were no maximum RL exceedances in EU Z2-10.
- No average COC concentration across EU Z2-10 exceeded its average RL.
- There are no sources for groundwater contamination in EU Z2-10.

Thus, as documented in the approved PCCR (DOE 2006), NFA is necessary to meet industrial land use in this EU.

7. RISK EVALUATION

The Zone 2 remedial action objectives (RAOs) were developed by the DVS process to support the future use of the Heritage Center as a mixed-use commercial and industrial park. Therefore, remediation criteria were designed for the protection of the future industrial worker.

Within that constraint, the decision rules established in the DVS were based on one or more of the following criteria:

- exceedance of a Max RL at any location,
- exceedance of an Avg RL across the EU,
- unacceptable future threat to groundwater, or
- unacceptable cumulative ELCR of $> 1 \times 10^{-4}$ and HI > 1 across the EU.

The National Contingency Plan (NCP) preamble (55 *Federal Register* 8716, March 8, 1990) describes the process used to establish the remediation goal for environmental media as consisting of a two-step approach. First, an individual lifetime excess cancer risk of 10^{-6} is used as a starting point for establishing remediation goals for the risks from contaminants at specific sites. The second step involves consideration of a variety of site-specific or remedy-specific factors, which enter into the determination of where, within the risk range, the cleanup standard for a given contaminant will be established. The factors considered in the development of the Zone 1 and Zone 2 RODs and subsequent steps in the implementation of the RODs, such as the DVS, included an acceptable *cumulative* risk level of 10^{-4}, which is the upper bound of the EPA acceptable risk range. From the Zone 2 ROD (Sect. 1.4): "The remedial action objective (RAO) for Zone 2 is to '*Protect human health under an industrial land use to an excess cancer risk at or below* 10^{-4}.'" A comparable statement is included in the Zone 1 ROD. Zone 1 and 2 RAOs were developed by the DVS to support the future use of 10^{-4} cumulative ELCR across the EU as one of the decision criteria. To achieve the RAO, constituent-specific cleanup goals were developed. Per the NCP preamble, these cleanup goals are to be based on a risk level of 10^{-6} for individual constituents unless site-specific or remedy-specific factors exist to suggest modifications are appropriate. For the Zone 1 and Zone 2 RODs, these factors include the following:

- Site-Specific Exposure Factors

  — Exposure of the industrial worker is limited to soil-related pathways only (multiple media exposures are not applicable to this scenario).

  — The limited COC list indicates that the potential for a large number of remedial goal exceedances was considered unlikely in the ROD, allowing for a higher risk level for each COC considered, while still achieving a cumulative risk $<10^{-4}$. However, the ROD indicates that additional COCs were identified in four EUs within Zone 2, and additional COCs may be identified from the characterization sampling to be conducted for a wide range of potential contaminants.

- Remedy-Specific Technical Factors

  — Remedial goals for particular COCs were generated at a risk level $>10^{-5}$ due to cost prohibitiveness and impracticality of remediation to a lower concentration.

— Remedial goals for particular COCs were revised to reflect consideration of elevated background levels.

Incorporation of these factors provided RLs that reflect the RAO of achieving a cumulative human health risk that will not exceed 10^{-4} for a given EU or FFA site. A summary of the risk evaluation results for the Zone 2 EUs addressed in this EBS is provided in Table 7.1.

Table 7.1. Risk evaluation results for the Former K-31 Area

EU	Associated FFA sites within the transfer footprint	Decision rule evaluation[a]				Risk evaluation	Final status decision[a]
		Max RL	Avg RL	Risk	GW		
Z2-03	K-762 Valve Vault (also identified as K-869) K-879-M Oil Containment Structure	NFA	NFA	NFA	NFA	Passes	NFA for soils
Z2-05	None	NFA	NFA	NFA	NFA	Passes	NFA for soils
Z2-06	None	NFA recommended	NFA recommended	NFA recommended	NFA recommended	Passes	NFA for soils recommended
Z2-07	K-897-E Oil Containment Structure K-897-F Oil Containment Structure	NFA	NFA	NFA	NFA	Passes	NFA for soils
Z2-10	K-897-G Oil Containment Structure	NFA	NFA	NFA	NFA	Passes	NFA for soils

[a] Decision rule, risk evaluation, and final status information are from:

Fiscal Year 2006 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at East Tennessee Technology Park, Oak Ridge, Tennessee, DOE/OR/01-2317&D2 (DOE 2006).

Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at East Tennessee Technology Park, Oak Ridge, Tennessee, DOE/OR/01-2723&D2 (DOE 2008).

Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee, DOE/OR/01-2590&D1 (DOE 2012).

Phased Construction Completion Report for Exposure Unit Z2-06 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee, DOE/OR/01-XXXX (DOE 2015) [NFA recommended, D1 version to EPA and TDEC in November 2015 (planned)].

Avg = average.
EU = exposure unit.
FFA = Federal Facilities Agreement.
GW = groundwater.
Max = maximum.
NFA = No Further Action.
RL = remediation level.

An evaluation of risk from exposure to soils and subsurface structures is documented in the approved PCCRs for the EUs included in the proposed transfer footprint. The results of the risk evaluations for all five EUs included in the Former K-31 Area transfer footprint indicate that the risk to an industrial worker is less than 1×10^{-4} ELCR, and the target organ HI is less than, or equal to, 1. Thus, all five EUs meet the RAOs of the Zone 2 ROD, and no further action is necessary.

An evaluation of the potential impact on the DVS decisions was conducted for the two EUs that are only partially included in the transfer footprint due to the difference in transfer footprint and EU boundaries. This evaluation is summarized in Chap. 6, and the results of the evaluation indicated the following:

- EUs Z2-06, Z2-07, and Z2-10 are fully contained within the transfer footprint, and the results of the risk evaluation documented in the PCCRs, which indicated that no average concentration of chemicals or radionuclides exceeded the industrial PRGs, are valid for these three EUs. (Only K-40 exceeded its RSL [2.67 pCi/g] in the EU Z2-06 sub-slab soil data. Since neither the K-40 maximum detected concentration [29.7 pCi/g] nor its average detected concentration [11.1 pCi/g] exceeded the K-40 background concentration [32.12 pCi/g], K-40 is not considered as a contributor to risk.) As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of K-31 and its slab are completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR in Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA.

- Although there were PCB and K-40 RSL exceedances in the EU Z2-06 concrete slab data (see Table 6.2), the K-31 building slab will be removed; thus, there will be no risk/hazard associated with the pad.

- The portion EU Z2-03 that has not been included in the K-33 transfer footprint contains six sample locations collected under the DVS. These samples were analyzed for PCBs using field test kits. There were no detections of PCBs indicated by the test kit results. The K-761 building occupies a significant portion of the transfer footprint. Because the soil and slab underlying Bldg. K-761 are part of an EU with an approved NFA determination, the land underlying this structure is included in the transfer footprint of this EBS/CDR. The soils beneath K-761 were not sampled under the DVS, due to their inaccessible nature beneath the building, but they were included within the scope of the PCCR for EU Z2-03. However, to ensure that no contamination above established Zone 2 RLs remains, when demolition of K-761 is complete, the subsurface soils and/or exposed remaining structures, if any, will be characterized during confirmatory sampling to ensure that the soils and/or subsurface structures, such as concrete subsurface foundation elements and electrical ducts, meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the FY 2007 PCCR Addendum for Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

- A small portion of EU Z2-05, which was not included in the K-33 transfer footprint, is included in the transfer footprint for K-31. This area located immediately north of the former K-31 building was needed as a buffer for the K-31 building demolition. There are essentially no soils exposed in this narrow strip of property, as can be seen in Fig. 7.1. The area is completely paved with asphalt or covered with concrete; thus, no DVS samples were collected from this portion of the EU. The results of the risk evaluation described in the PCCR (DOE 2012) indicated that EU Z2-05 meets the Zone 2 ROD requirements for industrial use. Although the K-903 Pad currently remains in this strip of land, the pad will be addressed prior to transfer of the property. The soils beneath the K-903 Pad were not sampled under the DVS, but they were included within the scope of the PCCR for EUs Z2-03 and Z2-05. Sampling locations for this EU were established during DQOs workshops with EPA and TDEC approval, which did not identify a need for samples beneath these facilities. However, as an additional measure for ensuring that no contamination above established Zone 2 RLs remains, when removal of the K-903 Pad is complete, the subsurface soils will be further characterized during confirmatory sampling to ensure that the soils meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until K-903 Pad removal, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the PCCR Addendum for EUs Z2-04 and Z2-05 in Zone 2. The PCCR Addendum will be submitted as a modification for formal review and approval in accordance with Sect. XXI of the FFA.

Fig. 7.1. Aerial view of north side of K-31 building prior to demolition.

- DVS sampling of EU Z2-06, including 54 samples of the soils underlying the K-31 slab, detected no contamination above average or maximum RLs. An NFA determination has been recommended in the draft Technical Memorandum that was provided to EPA in March 2015; hence, the land underlying the K-31 building is included in the transfer footprint of this EBS. As an additional measure for ensuring that no contamination above established Zone 2 RLs remains when demolition of these structures is completed, the subsurface soils and structures, if any, will be further characterized during confirmatory sampling to ensure that the soils and subsurface structures meet the Zone 2 ROD RLs. If contamination above ROD RLs were discovered, it would be remediated

immediately, if possible. If the contamination were significant enough to require planning then it would be milestoned in FFA Appendix E and/or J. The underlying land will not be transferred until building demolition, confirmatory soil sampling, and soil remedial actions, if any, are completed. The results of the confirmatory sampling and any necessary remediation will be documented in the EU Z2-06 PCCR for Zone 2. The PCCR will be submitted for formal review and approval in accordance with Sect. XXI of the FFA.

In addition to the individual EU evaluations, a roving worker scenario was also evaluated in the risk assessment to evaluate exposure to a worker from adjacent property. The roving worker evaluation was based on certain assumptions, including: (1) the worker will not be exposed to areas that are inaccessible due to radiological or other controls, such as fences or other barriers, or postings that prevent casual entry by a worker at a nearby building; and (2) there are no "hotspots" of contamination at the Heritage Center that are accessible to these workers. The results of the roving worker risk screen, which used all available data, show that risk was 1.8×10^{-5}, which is within the EPA acceptable risk range of 10^{-4} to 10^{-6}. The calculated hazard for the roving worker was 0.33, which is below the EPA acceptable level of 1.0.

As a part of the ongoing Heritage Center cleanup, soil data and confirmatory sampling continue to be collected and have been used to support numerous NFA decisions in Zone 1 and Zone 2 under an industrial land use risk scenario. All of the EU components within which the Former K-31 Area proposed transfer footprint is located have either obtained NFA concurrence from the regulators or have met the requirements for NFA and regulator concurrence is pending. Based on these NFA determinations, which address soil and subsurface structures under an industrial worker exposure scenario, and based on consideration of potential impacts to surface water, groundwater, and ecological receptors, the proposed transfer footprint is suitable for the intended industrial use.

8. REFERENCES

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APPENDIX A

REAL ESTATE ACQUISITION LETTER

PROPOSED REAL ESTATE ACTION
OAK RIDGE RESERVATION, TN
FILES RESEARCH FOR HAZARDOUS SUBSTANCE ACTIVITY

The following statement is provided in support of guidance promulgated under Section 120(h) of the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA) 42 U.S.C 9620(h) and in support of regulations issued by the Environmental Protection Agency at 40 CFR part 373.

The undersigned has made a complete search of existing and available Department of Energy (DOE) records, documentation, and data within the real estate files relating to the property that is subject to the proposed fee transfer action of the former K-31 area at the East Tennessee Technology Park (ETTP) within the Oak Ridge Reservation, Tennessee. The proposed action would result in transfer to the Heritage Center, LLC, under a 10 CFR 770 Proposal. The search conducted was considered reasonable with a good faith effort expended to identify whether any hazardous substances were known to have been released or disposed of on the property prior to ownership by the United States. The available real estate records of this office do not reflect any determinable reference that hazardous substance activity took place on or in the property prior to the time the property was owned by the United States of America.

Lands affected by this action are identified as portions of the following original acquisition tracts in which the United States of America acquired title, (having been acquired for the Atomic Energy Commission as a forerunner of the Department of Energy) by Civil Action No. 429 filed in the United States District Court for the Eastern District of Tennessee, Northern Division:

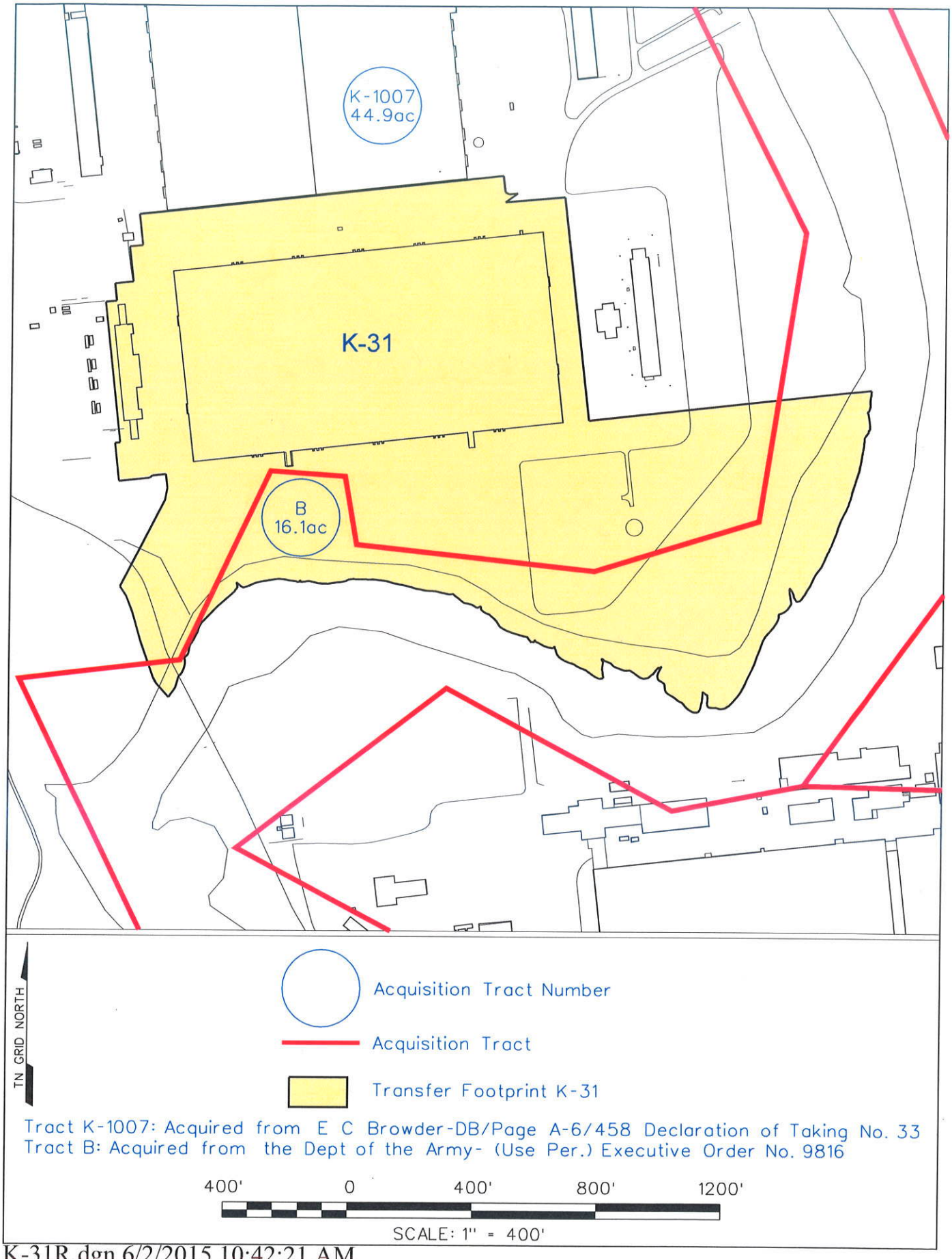
> The former K-31 area is located on a portion of Tract K-1007, title to this land was vested in the United States of America by Declaration of Taking No. 33. Judgement on Declaration of Taking for the Tract K-1007 was filed for public record on December 27, 1943; in Vol. A-6, page 458 in the Roane County Register's Office, Tennessee. The former K-33 area is also located on a portion of Tract B, title to this land was acquired for the Department of the Army under Executive Order No. 9816.

This record shall be made a part of the CERCLA report currently being prepared.

Cindy B. Finn

Cindy B. Finn
Real Estate Contracting Officer
U. S. Department of Energy
Oak Ridge Office

Attachment
Plat Exhibit



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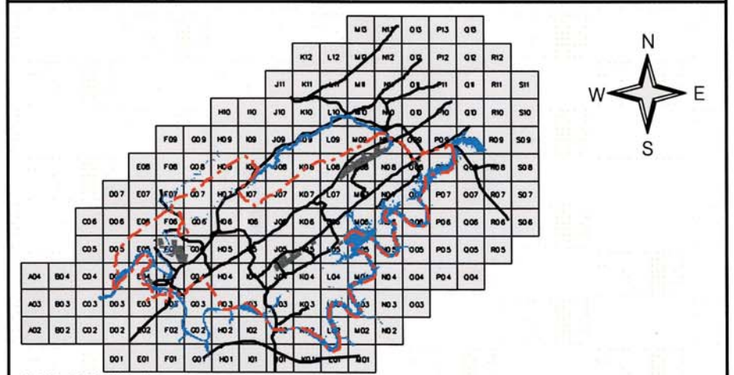
APPENDIX B

STUDY AREA MAP FROM RECORDS SEARCH

Location of Pre–World War II Structures
and Cemeteries in or near the
East Tennessee Technology Park

LEGEND

- Pre–World War II Structures
- Cemeteries
- Buildings
- Roads
- Water Bodies
- Streams



DATA COMPLIED BY GRID IS NAD 83 FEET
ER REMOTE SENSING PROGRAM
ENVIRONMENTAL INFORMATION MANAGEMENT PROGRAM
GEOGRAPHIC INFORMATION SCIENCES AND TECHNOLOGY GROUP
ORIGINAL BY: BARGE, WAGGONER, SUMNER AND CANNON, INC.
REVISED BY: TETRA TECH, INC. 2/1001

KMAPS ORO HISTORIC MAP GSL

APPENDIX C

PCCR APPROVAL LETTERS

E. 0521.059.0100

DOE-07-0114

Dy & 523253

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

I-10033-0278

FEB 8 2007

Certified Mail
Return Receipt Requested

4WD-FFB

Mr. David G. Adler, Project Manager
Federal Facilities Agreement
Oak Ridge Reservation Management Group
Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831

SUBJ: EPA Approval of the Fiscal Year 2006 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2317&D2)

Dear Mr. Adler:

The Environmental Protection Agency (EPA) has reviewed the above-referenced document which was submitted on January 29, 2007. The Phased Construction Completion Report (PCCR) for the Zone 2 Soils, Slabs, and Substructures serves to:

- document the characterization results of the Dynamic Verification Strategy (DVS) for the accessible Exposure Units (EU) in Zone 2;
- describe and document the risk evaluation for each EU evaluated under the DVS and the determination of whether the EU met the Zone 2 Record of Decision (ROD) requirements for unrestricted industrial use to 10 feet below ground surface;
- identify additional areas not defined in the Zone 2 ROD that require remediation based on the DVS evaluation results;
- evaluates 20 Federal Facility Agreement (FFA) sites and recommends no further action (NFA) for 11 of these sites;
- deferring NFA determination on the remaining nine FFA sites located in EU Z2-42 until the remedial action (removing approximately 30 cubic feet of soil) is complete in that EU;
- recommends 108.8 acres for unrestricted industrial use to 10 feet below ground surface; and

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- provided a qualitative assessment that the 108.8 acres had a low probability of being released for unrestricted industrial land use throughout the soil zone.

The EPA has no further comments on this document and is approving the PCCR as submitted. Although this interim remedial action document is approved, the Department of Energy should ensure that the Zone 2 Remedial Action Report (RAR) clearly specifies all land use controls implemented for all acreage within Zone 2, including all changes to the dig restrictions below 10 feet. Revising the industrial land use restrictions may require further specification of the remaining land use controls (e.g., restrictions on digging into contaminated aquifers). The current discussions to remove these controls need to conclude with an agreement between the FFA Parties regarding the specific conditions to apply prior to submitting the D1 RAR.

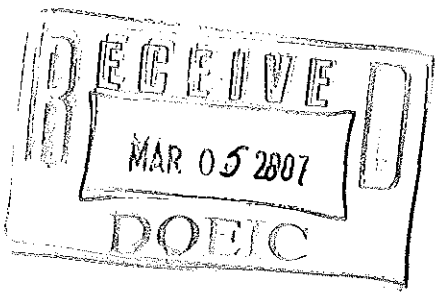
The EPA commends the efforts of the Remedial Action Core Team to achieve this major milestone for Zone 2. If you have any questions regarding this matter, please feel free to contact Constance Jones of my staff at (404) 562-8551.

Sincerely,

David W Taylor for

Arthur L. Collins, Acting Chief
Federal Facilities Branch
Superfund Division

cc: R. Doug McCoy, TDEC
Patricia Halsey, DOE
James Kopotic, DOE
Thomas Gebhart, TDEC
SSAB
LOC



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

June 9, 2008

Certified Mail
Return Receipt Requested

4SF-FFB

Mr. David G. Adler, Project Manager
Federal Facilities Agreement
Oak Ridge Reservation Management Group
Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831

SUBJ: EPA Approval of the Fiscal Year 2007 Phased Construction Completion Report for the Zone 2 Soils, Slabs, and Subsurface Structures at East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2723&D2)

Dear Mr. Adler:

The Environmental Protection Agency (EPA) reviewed the D2 of the Fiscal Year 2007 Phased Construction Completion Report (PCCR) for the Zone 2 Soils, Slabs, and Substructures at East Tennessee Technology Park, which was submitted March 2008. The Department of Energy has addressed all comments submitted by the EPA.

Based on the information provided, the PCCR serves to:

- provide information on the execution of the Dynamic Verification Strategy (DVS) for 11 Exposure Units (EU) in Zone 2 completed in FY 2007;
- describe and document the risk evaluation for each EU evaluated under the DVS and the determination of whether the EU met the Zone 2 Record of Decision (ROD) requirements for unrestricted industrial use to 10 feet below ground surface;
- describe remedial actions performed in EUs Z2-33, Z2-35, and Z2-36;
- identify two additional areas not defined in the Zone 2 ROD that require remediation based on the DVS evaluation results;
- describe the Remedial Actions performed in Zone 2;
- evaluate approximately 195.5 acres and recommends 143 acres for unrestricted industrial use to 10 feet below ground surface;

- evaluate 16 Federal Facility Agreement sites and recommend No Further Action for 14;
- describe remaining remedial action in EU Z2-28 and EU Z2-41; and
- provide a qualitative assessment that 5 of the 11 EUs that have a probability of being released for unrestricted industrial land use throughout the soil zone.

The EPA has no further comments on this document and is approving the PCCR as submitted, which includes the erratum on that corrects Figures C.2 through C.5 in Appendix C and updates to Figures F.2 and F.4 through F.6 in Appendix F. Although this interim remedial action document is approved, the Department of Energy should ensure that the Zone 2 Remedial Action Report (RAR) clearly specifies all land use controls implemented for all acreage within Zone 2, including all changes to the dig restrictions below 10 feet. Revising the industrial land use restrictions may require further specification of the remaining land use controls (e.g., restrictions on digging into contaminated aquifers). The current discussions to remove these controls need to conclude with an agreement between the FFA Parties regarding the specific conditions to apply prior to submitting the D1 RAR.

If you have any questions regarding this matter, please feel free to contact Constance Jones of my staff at (404) 562-8551.

Sincerely,

Arthur L. Collins, Chief
Federal Facilities Branch
Superfund Division

cc: Roger Petrie, TDEC
Patricia Halsey, DOE
James Kopotic, DOE
Michael Travaglini, DOE
Greg Eidam, Bechtel-Jacobs
Thomas Gebhart, TDEC
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LOC

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DOE-13-0075

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

February 6, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. John Michael Japp, Project Manager
Federal Facilities Agreement
Oak Ridge Reservation Management Group
Department of Energy
P.O. Box 2001
Oak Ridge, TN 37831

Dear Mr. Japp:

The U.S. Environmental Protection Agency has received and reviewed the document titled "Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05, at the East Tennessee Technology Park, Oak Ridge, Tennessee (DOE/OR/01-2590&D1)," which was transmitted by the Department of Energy on December 19, 2012.

The review of this document did not identify any factual omissions or discrepancies which warranted revision. Therefore, the EPA is approving the document as submitted.

If you have questions regarding this matter, please contact me at (404) 562-8551.

Sincerely,

Constance Allison Jones

Constance Allison Jones, Senior RPM
AL/FL/MS/TN Federal Oversight Section
Federal Facilities Branch
Superfund Division

cc: Roger Petrie, TDEC
Patricia Halsey, DOE
James Kopotic, DOE
Michael Travaglini, DOE
Thomas Gebhart, TDEC
ORSSAB

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DOE-13-0115

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STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DOE OVERSIGHT DIVISION
761 EMORY VALLEY ROAD
OAK RIDGE, TENNESSEE 37830-7072

February 8, 2013

John Michael Japp
DOE FFA Project Manager
PO Box 2001
Oak Ridge, TN 37831

Dear Mr. Japp

TDEC Approval Letter
Phased Construction Completion Report for Exposure Units Z2-04 and Z2-05 in Zone 2, East Tennessee Technology Park, Oak Ridge, Tennessee
DOE/OR/01-2590&D1
November, 2012

The Tennessee Department of Environment and Conservation, DOE Oversight Division has reviewed the above referenced document pursuant to the Federal Facility Agreement for the Oak Ridge Reservation.

This PCCR is well organized, concise, and literate. No comments were generated during the review of this PCCR and therefore the State approves the document as presented.

Questions or comments concerning the contents of this letter should be directed to Thomas Gebhart at the above address or by phone at (865) 481-0995.

Sincerely

Roger Petrie
FFA Project Manager

xc: Jeff Crane – EPA
Pat Halsey – DOE
Jim Kopotic – DOE
David Adler – DOE

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