APPENDIX A. VARIANCE ANALYSIS

Table A-1 summarizes proposed variances between the current life-cycle baseline plan for the DOE-ORO Environmental Management program for the Oak Ridge Reservation (ORR) and the end state vision for the ORR. Table A-1 provides a brief description of each proposed variance, potential impacts of the variance, barriers to implementation, and recommendations for action. Maps depicting end state conditions for the ORR under the current life-cycle baseline plan and the end state with the variances summarized in Table A-1 are presented in Figures A-1 and A-2, respectively.

Table A-1. Variance Report for the DOE Oak Ridge Reservation End State Vision

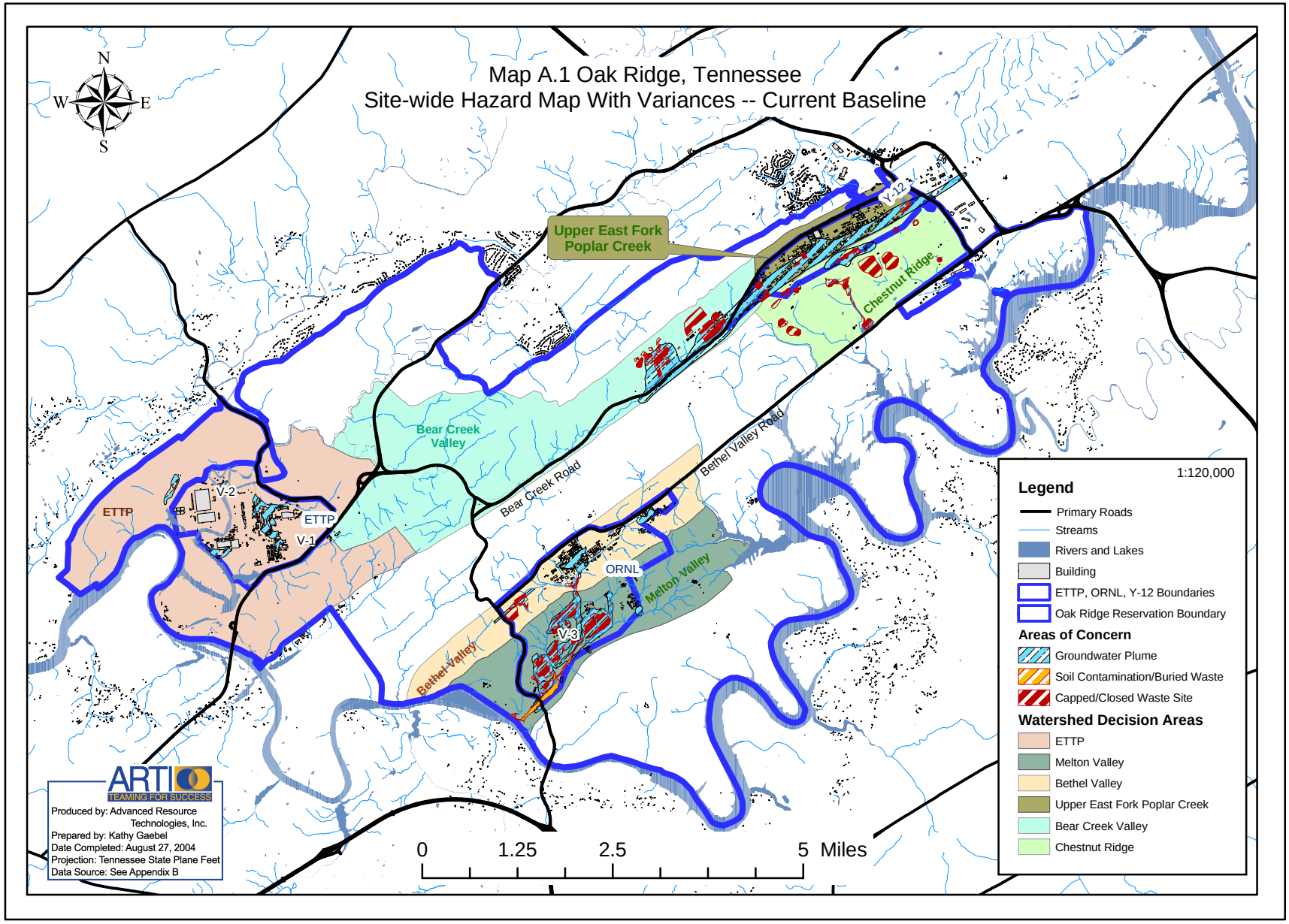
ID No.	Description of Variance	Impacts (in Terms of Scope, Cost, Schedule and Risk)	Barriers to Achieving End State	Recommendations
V-1	ETTP Closure Project, K-1070-C/D Burial Grounds - While a final decision will not be made until the ETTP Zone 2 ROD is completed, the current baseline plan calls for the K-1070-C/D burial grounds to be excavated for disposal at ORR or offsite disposal facilities. This remedy was originally assumed to be most consistent with the desired end use of the ETTP site as an unrestricted commercial industrial park. However, subsequent analysis has indicated that it may be possible to achieve an equally protective remedy, potentially at lower cost, for the K-1070-C/D burial grounds through excavation of wastes and contaminated soil above risk-based remediation criteria for industrial use to a depth of 10 ft and leaving deeper wastes in place beneath a clean soil cover. Since the K-1070-C/D burial grounds contain classified materials, consideration of security requirements required for implementation of all alternatives must be included in the comparative analysis of alternatives.	CERCLA decision documents for ETTP Zone 2 are currently under development. All remedial actions at ETTP are scheduled for completion by FY2008. No unacceptable risk to human health or the environment is expected under either the baseline alternative or the proposed variance. Risks to remediation workers and risks associated with waste transportation would be reduced under the partial excavation alternative, but long-term institutional controls would be required to ensure protectiveness to future workers at ETTP. The implementation time for the full excavation alternative is estimated at 2.5 yr, while that for the proposed partial excavation alternative is 1 yr. Cost estimates in the draft ROD for Zone 2 indicate potential cost savings of $43 million for the proposed variance relative to the baseline alternative.	The partial excavation alternative would require long-term institutional controls for the K-1070-C/D area, both to ensure protectiveness of the remedy and to prevent unauthorized access to classified materials. However, these controls would be similar to those to be required throughout the ETTP site, i.e., to prevent disturbance of soils below 10 ft below ground surface and limit future land use to industrial activities. Public comment on the proposed plan for ETTP Zone 2 has addressed the desire to remediate the ETTP site to a condition that is most conducive to future commercial industrial use. Some comments have indicated that partial excavation of the K-1070-C/D burial ground would be less desirable than full excavation. The SSAB has not formally endorsed either alternative to date. While the Zone 2 ROD is still in draft form, the partial excavation alternative for K-1070-C/D is under active consideration as part of the selected remedy.	Continue to evaluate all alternatives in the focused feasibility study, proposed plan, and record of decision currently under development. The feasibility study and proposed plan have received public comment and the draft record of decision is scheduled for completion in 2005. Coordinate with EPA, TDEC, and other stakeholders through the CERCLA process.

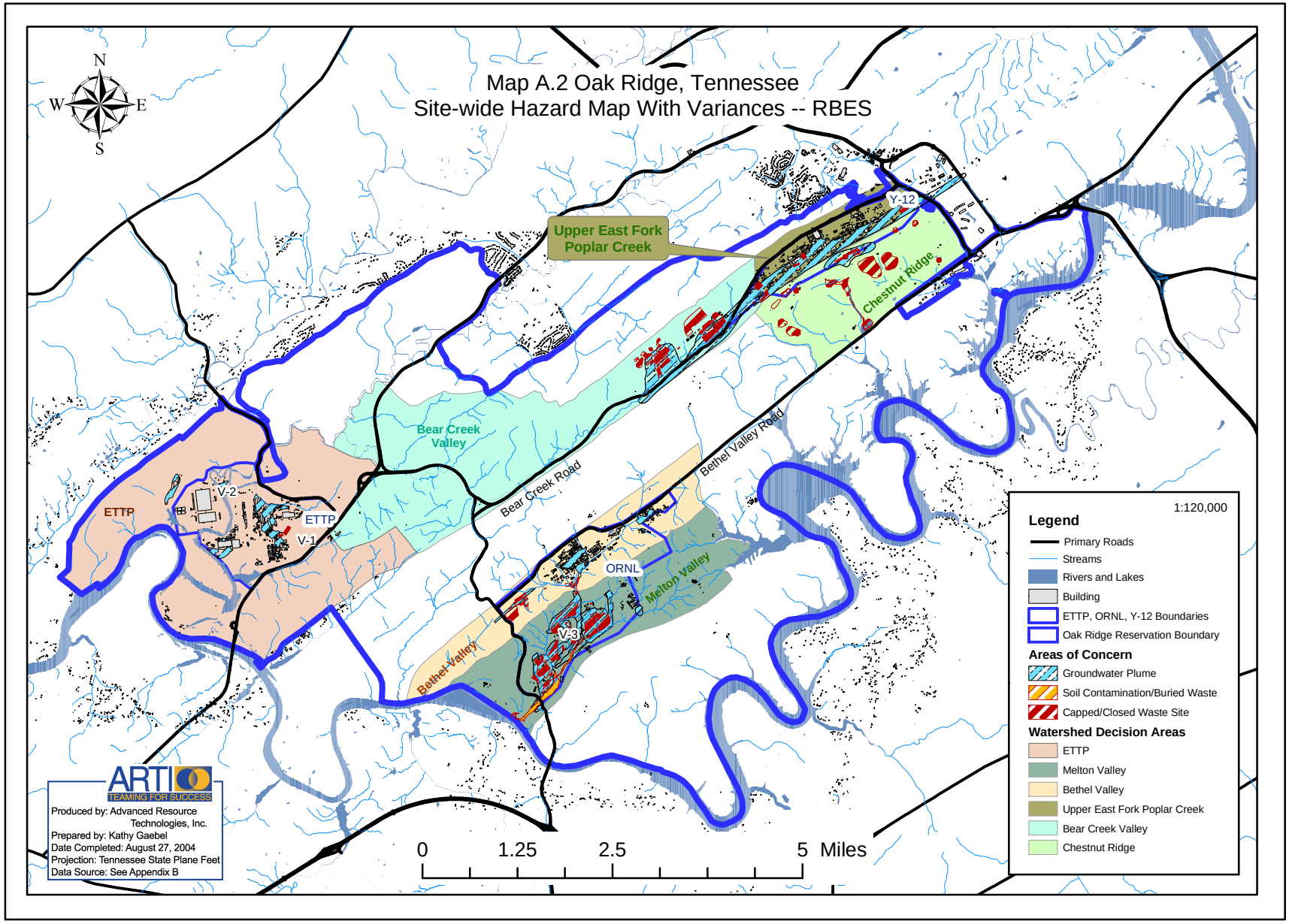
Table A-1. Variance Report for the DOE Oak Ridge Reservation End State Vision

ID No.	Description of Variance	Impacts (in Terms of Scope, Cost, Schedule and Risk)	Barriers to Achieving End State	Recommendations
V-2	ETTP Closure Project, Dose-Base Criteria for Building Surface Contamination – The great majority of buildings currently standing at ETTP will be demolished during the site closure process. Only those buildings which have a specific identified future use by private industry will remain, with titles transferred to CROET. These remaining buildings may contain residual radiological contamination on building surfaces (walls, floors, structural beams, etc) that may require decontamination to levels sufficiently protective for future occupants. Current cleanup operations at ETTP are based on surface radioactivity limits specified in DOE Order 5400.5, Table IV-1. Under the proposed variance, dose-based criteria will be derived specifically for the radionuclides of concern at each building and the designated future use scenarios for that building. These criteria will be derived to limit the potential radiation dose and health risk to future building occupants to levels that are determined to be protective and consistent with DOE policy to reduce exposures as low as reasonably achievable (ALARA). The use of dose-based criteria currently is being proposed only for decontamination of elevated surfaces within the K-31 and K-33 gaseous diffusion process buildings by BNFL Inc, due to the specific characteristics of these buildings. However, similar criteria also could be considered for use at other ETTP buildings in the future.	No unacceptable risks to human health or the environment would exist under either alternative. Risks to future building occupants (workers) from exposure to residual radioactive material would be slightly higher under the dose-based surface criteria, but the radiological and industrial risks to remediation workers performing the D&D operations would be reduced under this alternative. Use of dose-based criteria, derived for the specific radionuclides of concern and site conditions, would be expected to support more rapid completion of building decontamination and decommissioning (D&D) operations; the estimated schedule acceleration for decontamination of Buildings K-31 and K-33 only is approximately 1 year. As noted in V-1, all actions at ETTP are scheduled for completion by FY2008 in either case. Cost estimates for the use of dose-based surface criteria indicate potential savings of approximately $95 M for the decontamination of Buildings K-31 and K-33 alone. Application of these dose-based criteria for other buildings at ETTP could yield additional savings.	Dose-based limits must be derived and approved consistent with DOE directives and guidance (DOE 5400.5 and associated guidance, and draft DOE G 441.1-XX). Remedial actions for the ETTP site also must be evaluated and approved under the CERCLA process described under V-1 above. Use of dose-based surface activity limits is entirely consistent with current EPA, NRC, and DOE guidance, so no significant barriers are anticipated.	Develop appropriate technical documentation for dose-based surface activity criteria for ETTP buildings; BNFL has currently submitted such documentation for the K31 and K33 Buildings for DOE approval. Pursue approval of such documentation both within DOE (through the authorized limits or supplemental limits process specified in DOE Order 5400.5 and DOE G 441.1-XX) and also through the CERCLA decision process.

Table A-1. Variance Report for the DOE Oak Ridge Reservation End State Vision

ID No.	Description of Variance	Impacts (in Terms of Scope, Cost, Schedule and Risk)	Barriers to Achieving End State	Recommendations
V-3	Melton Valley Remedial Action Project, Alternative Stabilization Technologies for In-Situ Vitrification - The current baseline plan calls for use of in-situ vitrification (ISV) technology for remediation of buried waste at Trenches 5 and 7 located in the Seepage Pits and Trenches Area of Melton Valley, as specified in the *Record of Decision for Interim Actions for the Melton Valley Watershed at ORNL*. ISV was selected for use in these areas because these trenches hold a large inventory of radionuclides in a relatively small volume of waste within a small contaminated area. ISV was not proposed for use at other locations within Melton Valley because of the difficulty in using this technology in heterogeneous waste, the potential hazard of using ISV in saturated waste, and the overall high cost of ISV relative to other remediation technologies. Previous demonstration projects using ISV technology at Melton Valley sites near the Trench 5 and 7 area proved unsuccessful. Pre-design activities conducted since the signing of the ROD have identified the presence of standing (perched) water in Trenches 5 and 7, which may further complicate the use of ISV at these sites. Given the extremely aggressive schedule for Melton Valley remedial actions to be completed by FY2006, other remedial alternatives would achieve an equally protective remedy with less schedule risk and lower cost. Selected remediation measures for adjacent areas already include use of in-situ grouting and capping using a multi-layer cover system. Use of in-situ grouting as an alternative treatment technology for the Trench 5 and 7 sites will be protective to human health and the environment under the selected end-state land use for this area (i.e., protection of the worker in this dedicated waste management area).	No unacceptable long-term risk would be expected under either alternative. Short-term risks would be significantly lower for in-situ grouting versus ISV. Long-term institutional controls will be required under either alternative. Construction logic for Melton Valley remedial actions is very difficult due to the highly accelerated schedule for completion of all actions by FY2006. Implementation of in-situ grouting is expected to involve significantly lower schedule risk that ISV, as ISV has not been successfully implemented for conditions of standing water with high activity wastes. Costs for the ISV alternative are estimated at $55M, based on actual subcontract bids received, approximately double the ROD cost estimate of $27.3M. The cost estimate for the in-situ grouting alternative is $14M, for an estimated cost savings of $41M.	The current CERCLA ROD specifically calls for the use of the ISV technology at Trenches 5 and 7. Deviation from this planned action (i.e., substitution of in-situ grouting for in-situ vitrification as the selected treatment technology) would require additional CERCLA documentation, such as an Explanation of Significant Differences or ROD Amendment. The *Amendment to the Record of Decision for Interim Actions for the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee – Revised Remedial Action for Seepage Trenches 5 & 7* has been developed and approved for this purpose. Therefore, no barriers to achieving the end state alternative have been identified.	Continue to coordinate Melton Valley remedial actions with EPA, TDEC, and other stakeholders through the CERCLA process. As noted in the previous column, a ROD Amendment has been approved to modify the selected remedy for Seepage Trenches 5 & 7, and remedial design work is underway to implement this remedy.


Map A.1 Oak Ridge, Tennessee
Site-wide Hazard Map With Variances -- Current Baseline
N
W
E
S
Upper East Fork Poplar Creek
Y-12
Chestnut Ridge
Bear Creek Valley
Bear Creek Road
Bethel Valley Road
ETTP
V-2
V-1
ETTP
ORNL
Melton Valley
V-3
Bethel Valley
1:120,000
Legend
Primary Roads
Streams
Rivers and Lakes
Building
ETTP, ORNL, Y-12 Boundaries
Oak Ridge Reservation Boundary
Areas of Concern
Groundwater Plume
Soil Contamination/Buried Waste
Capped/Closed Waste Site
Watershed Decision Areas
ETTP
Melton Valley
Bethel Valley
Upper East Fork Poplar Creek
Bear Creek Valley
Chestnut Ridge
ARTI
TEAMING FOR SUCCESS
Produced by: Advanced Resource Technologies, Inc.
Prepared by: Kathy Gaebel
Date Completed: August 27, 2004
Projection: Tennessee State Plane Feet
Data Source: See Appendix B
0
1.25
2.5
5 Miles


Map A.2 Oak Ridge, Tennessee
Site-wide Hazard Map With Variances -- RBES
N
W
E
S
Upper East Fork Poplar Creek
Y-12
Chestnut Ridge
Bear Creek Valley
Bear Creek Road
Bethel Valley Road
ETTP
V-2
V-1
ETTP
ORNL
Melton Valley
V-3
Bethel Valley
1:120,000
Legend
Primary Roads
Streams
Rivers and Lakes
Building
ETTP, ORNL, Y-12 Boundaries
Oak Ridge Reservation Boundary
Areas of Concern
Groundwater Plume
Soil Contamination/Buried Waste
Capped/Closed Waste Site
Watershed Decision Areas
ETTP
Melton Valley
Bethel Valley
Upper East Fork Poplar Creek
Bear Creek Valley
Chestnut Ridge
ARTI
TEAMING FOR SUCCESS
Produced by: Advanced Resource Technologies, Inc.
Prepared by: Kathy Gaebel
Date Completed: August 27, 2004
Projection: Tennessee State Plane Feet
Data Source: See Appendix B
0
1.25
2.5
5 Miles

APPENDIX B. DATA SOURCES FOR MAPPING

Sources of data used for generation of maps presented in this document (Figures 2.1 through A.2) are summarized below.

Data for End State Vision Effort
Map Layers and Sources

Layer	Source
City Boundaries	TN Spatial Data Server
Land Ownership	TN Spatial Data Server, National Atlas
County Boundaries	TN Spatial Data Server, National Transportation Atlas Databases (NTAD)
DOE Boundary	Oak Ridge Environmental Information System (OREIS)
Plant Boundaries	OREIS
Railroads	National Transportation Atlas Databases (NTAD)
Roads	OREIS
Dams	National Atlas
Lakes	OREIS
Streams	TN Spatial Data Server
Rivers	National Transportation Atlas Databases (NTAD), OREIS
Hazard Areas of Concern	Scanned from electronic map in draft vision document
Land Use & Land Cover	NLCD turned to vector data
Watershed	TN Spatial Data Server
Wetlands	TN Spatial Data Server
Fence Lines	OREIS
Utilities	Scanned from electronic map in draft vision document
Buildings	OREIS
Water Treatment Plants	EMMA
Water Supply	EMMA and RBES report
Population Density	TN Spatial Data Server