5. CUMULATIVE IMPACTS

This section summarizes the potential cumulative environmental impacts for treating TRU/alpha low-level waste at the Oak Ridge National Laboratory. Cumulative impacts result

> "… from the incremental impact of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 *CFR* 1508.7).

The proposed action is to treat and repackage waste by one of three treatment methods and to ship the waste offsite, or for one alternative to treat and store the waste onsite. The evaluation of cumulative impacts adds the impacts of the proposed action for each resource area with impacts from past and existing operations and reasonably foreseeable future actions. Cumulative impacts are analyzed for the bounding case alternative for each resource area. The general methodology used to determine if a potential cumulative impact might result from implementation of the proposed action was to first determine if either an adverse or beneficial impact was documented (Chapter 4) for a given resource area. If none would occur (which is the case for cultural and archaeological resources for example) then, by definition, a cumulative impact could not exist for this resource area. Next, past, present, and reasonably foreseeable future projects which are affecting, have affected, or could affect the Region of Influence for each resource area were evaluated and their impacts were added to the impacts of the bounding case alternative.

Potential cumulative impacts to resource areas are discussed in Sections 5.1 through 5.7. Table 5-1 presents the past, present, and reasonably foreseeable future actions which have the potential for producing cumulative impacts.

Table 5-1. Past, present, and reasonably foreseeable future actions with potential for cumulative impacts

Past, present, or reasonably foreseeable future actions	Location	Description	Applicable resource area
Construction and Operation of the Spallation Neutron Source[a]	To be located approximately 4 km (2.5 miles) from the proposed TRU Waste Treatment Project site, northeast between ORNL and the Y-12 Plant	This high-energy physics facility would increase employment by 1,700 persons and affect the ORR land use by developing 45 ha (110 acres) of land.	Applicable to land use, socioeconomics, and human health.
Construction and Operation of the Joint Institute for Neutron Science[a]	To be located at ORNL approximately 1.6 km (1 mile) east of the proposed TRU Waste Treatment Project site	This facility, which was originally planned to be open in 2000 but is currently delayed, would provide office space, meeting rooms, and hotel accommodations for visiting scientists. The facility would require about 4 ha (10 acres).	Applicable to land use.
Construction and Operation of the Laboratory for Comparative and Functional Genomics[a]	To be located at ORNL approximately 2.0 km (1.25 miles) east of the TRU Waste Treatment Project site	This would be a genetic research laboratory. About 2 ha (10 acres) would be needed for the buildings and parking lots.	Applicable to land use.
Relocate ORNL Personnel at Y-12 Plant back to ORNL[b]	ORNL	This effort would relocate 300 to 320 ORNL staff currently housed at the Y-12 Plant back to ORNL. Office, laboratory, and parking space would require approximately 10 ha (25 acres).	Applicable to land use and socioeconomics.
Implementation of the White Oak Embayment Project[c]	Located at the mouth of White Oak Creek approximately 2.1 km (1.3 miles) west of the TRU Waste Treatment Project site	A CERCLA project completed in 1992, which resulted in construction of a coffer dam on White Oak Creek. Purpose was to renew and retain sediment in White Oak Lake, covering exposed cesium-137 sediments.	Applicable to water resources.
Old Melton Valley Road Upgrade Construction[d]	Immediately west of the TRU Waste Treatment Project site and Melton Valley Storage Tanks	This 1.8-km (1.1-mile) road upgrade project to be completed in 2000 affects approximately 4 ha (10 acres) along the south side of White Oak Creek.	Applicable to land use and ecological resources.

Table 5-1. Past, present, and reasonably foreseeable future actions with potential for cumulative impacts (continued)

Past, present, or reasonably foreseeable future actions	Location	Description	Applicable resource area
Waste Area Group 5 Seep C and D Remediation[c]	Seep D is approximately 0.3 km (.19 miles) northeast of the TRU Waste Treatment Project site; Seep C is 0.14 km (0.09 miles) north	These two CERCLA actions, completed in the mid-1990s, significantly reduced strontium-90 releases to the White Oak Creek watershed.	Applicable to soils, water resources, and ecological resources.
Waste Area Group 4 Seeps Remediation[c]	These seeps are approximately 0.75 km (0.5 miles) north of the TRU Waste Treatment Project site	This CERCLA action, completed in 1996, helped reduce strontium-90 releases into the White Oak Creek watershed.	Applicable to soils, water resources, and ecological resources.
Old Hydrofracture Tanks Remediation[c]	Located approximately 0.10 km (0.06 miles) east of the TRU Waste Treatment Project site	This project is an ongoing CERCLA action, but the TRU wastes in these tanks have already been transferred to the Melton Valley Storage Tanks.	Applicable to water resources and waste management.
WAG 13 Cesium Test Plots Remediation[c]	Located approximately 2.1. km (1.32 miles) west of the TRU Waste Treatment Project site on the banks of the Clinch River	This CERCLA action, completed in the mid-1990s, reduced cesium-137 releases into the Clinch River.	Applicable to soils and water resources.
Molten Salt Reactor Remediation[c]	Located approximately 1.6 km (1.0 mile) east of the TRU Waste Treatment Project site	An ongoing CERCLA action intended to reduce the risk of nuclear criticality.	Potentially applicable to waste management.
Transfer of TRU debris waste from Paducah to Oak Ridge	Paducah, Kentucky	Approximately 15 m^3 (20 yd^3) of TRU debris waste could be sent to ORNL in 2005	Waste management.
Operation of the TSCA Incinerator	Located at ETTP (formerly K-25 Site) approximately 7 km (4.4 miles) from TRU Waste Treatment Project Site	Future plans are to phase out entirely the operation of this incinerator, thus eliminating a source of airborne radionuclides.	Applicable to air quality.
Operation of the TVA Steam Plants[e]	Bull Run Steam Plant is a 900 MW plant approximately 8 km (5 miles) east of ORNL; Kingston Steam Plant is a 1,640 MW plant approximately 48 km (30 miles) northwest of ORNL	Both electric-generating plants are coal-fired with emissions typical of such plants. These plants are major air pollutant sources for NO_x, SO_2, CO_2, lead, and particulates.	Applicable to air quality.

Table 5-1. Past, present, and reasonably foreseeable future actions with potential for cumulative impacts (continued)

Past, present, or reasonably foreseeable future actions	Location	Description	Applicable resource area
Construction and Operation of the ETTP Reindustrialization Projects[f]	Located at ETTP	Three reindustrialization projects (ETTP, ED-1, and ED-3) would increase area employment by up to 17,700 direct jobs. The three projects, involving approximately 2,025 ha (5,000 acres) of DOE land leased to the Community Reuse Organization of East Tennessee, are intended to spur economic development as DOE reduces direct employment in the Oak Ridge, Tennessee, area.	Applicable to socioeconomics and land use.
Macedonia Industrial Park in Roane County[f]	A private industrial park in Roane County off the ORR	This 280-ha (700-acre) site is expected to employ approximately 3,500 workers.	Applicable to socioeconomics and land use.

[a]DOE 1999. *Final Environmental Impact Statement, Construction and Operation of the Spallation Neutron Source*, U.S. Department of Energy, Office of Science, DOE/EIS-0247, April 1999.

[b]Personal communication with Tony Medley, ORNL Capital Assets Manager, January 7, 2000.

[c]DOE 1999. *Remedial Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee,* DOE OR/01-1790&D0.

[d]DOE 1998. *Categorical Exclusion for Construction/Relocation of Access Road at Oak Ridge National Laboratory*, CX-TRU-98-007, Oak Ridge, Tennessee.

[e]TVA internet web site.

[f]DOE 1999. *Draft Environmental Assessment, Lease of Parcel ED-3 of the Oak Ridge Reservation to the Community Reuse Organization of East Tennessee*, U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tennessee.

5.1 LAND USE

The proposed action's incremental contributions to land use classification changes or land use practices (Chapter 4, Section 4.1), when combined with past, present, and reasonable foreseeable future classifications and practices, are evaluated. The zoning of reservation land for future use is the same as the current land use pattern, as reflected in the *ORNL Land and Facilities Use Plan* (LMER and LMES 1998). DOE plans to use the land in ways compatible with the current pattern of use. A number of mission-related projects are now planned for the ORR. These projects, with some likelihood of cumulatively affecting land use, would be at or near ORNL. These include the Spallation Neutron Source, the Joint Institute for Neutron Science, the Laboratory for Comparative and Functional Genomics (Hall 2000), and Relocation of ORNL Personnel from the Y-12 Plant (Medley 2000). These projects would require development of 45, 4, 2, and 10 ha, respectively, as described in Table 5-1. Because of the relatively large scale of development, the ETTP Reindustrialization projects and the Macedonia Industrial

Park are also considered (Table 5-1). Two of the ETTP projects (ED-1 and ED-3) would involve developing industrial land zoned as industrial but not currently developed.

The proposed action would be consistent with the existing industrial land use classification in Melton Valley. Construction and operation of a waste treatment and repackaging facility adjacent to the Melton Valley Storage Tanks would help continue the trend of industrial development at ORNL. The bounding alternative would be the Treatment and Waste Storage at ORNL Alternative using vitrification as the treatment process. The proposed facility would require 3.3 ha (8.2 acres) for the treatment facility and additional on-site storage space. The cumulative impact on land use would be small.

5.2 ECOLOGICAL RESOURCES

Forested and other undeveloped lands used by wildlife are rapidly being converted to residential, commercial, and industrial uses throughout the Tennessee Valley. The ORR, and ORNL specifically, by virtue of land use planning and restricted access, provide a refuge where habitat and species of wildlife are especially abundant. The proposed action would slightly reduce wildlife habitat at ORNL. The Melton Valley Access Road upgrade (Table 5-1) resulted in approximately 4 ha (10 acres) of forest habitat being permanently lost to wildlife. This disturbance is immediately adjacent to the proposed treatment site. The bounding alternative would be the Treatment and Waste Storage at ORNL Alternative using vitrification as the treatment process. The proposed facility would require 2.8 ha (7 acres) of forested land for the treatment facility and an additional 0.6 ha (1.5 acres) of cleared and/or forested land for on-site storage space. This wildlife habitat would be lost for a period of at least a decade, thereby resulting in a small incremental increase in the loss of habitat in the lower reaches of Melton Valley.

Waste removal from the SWSA 5 North trenches would, when combined with remediation of the Waste Area Group 5 Seeps C and D and Waste Area Group 4 seeps, result in a beneficial cumulative impact to area biota.

5.3 WATER RESOURCES

Potential cumulative impacts to water resources in the defined Region of Influence, the White Oak Creek Watershed, are evaluated by combining the impacts identified in Section 4.5 with other impacts occurring in that watershed. To the extent known, specific projects such as the five completed projects [the White Oak Creek Embayment Project, Waste Area Group (WAG) 5 Seep C, WAG 5 Seep D, WAG 4 Seeps, and WAG 13 Cesium Test Plots] and two ongoing CERCLA cleanup actions (Old Hydrofracture Tanks and Molten Salt Reactor projects) in the Melton Valley Watershed (Figure 5-1), and other actions or activities, are identified (Table 5-1). The impacts of these projects are then combined with those of the bounding alternative for the proposed action to determine the cumulative impact to water resources that would be expected to result if the proposed action were implemented.

5.3.1 White Oak Creek Embayment Project

Cesium-137 concentrations in the near-surface sediments of White Oak Lake are thought to be a potential human health and ecological risk. Erosion of lake bed sediments from water surging into and out of White Oak Lake was caused by daily releases of water from Melton Hill Dam and storm water flows,

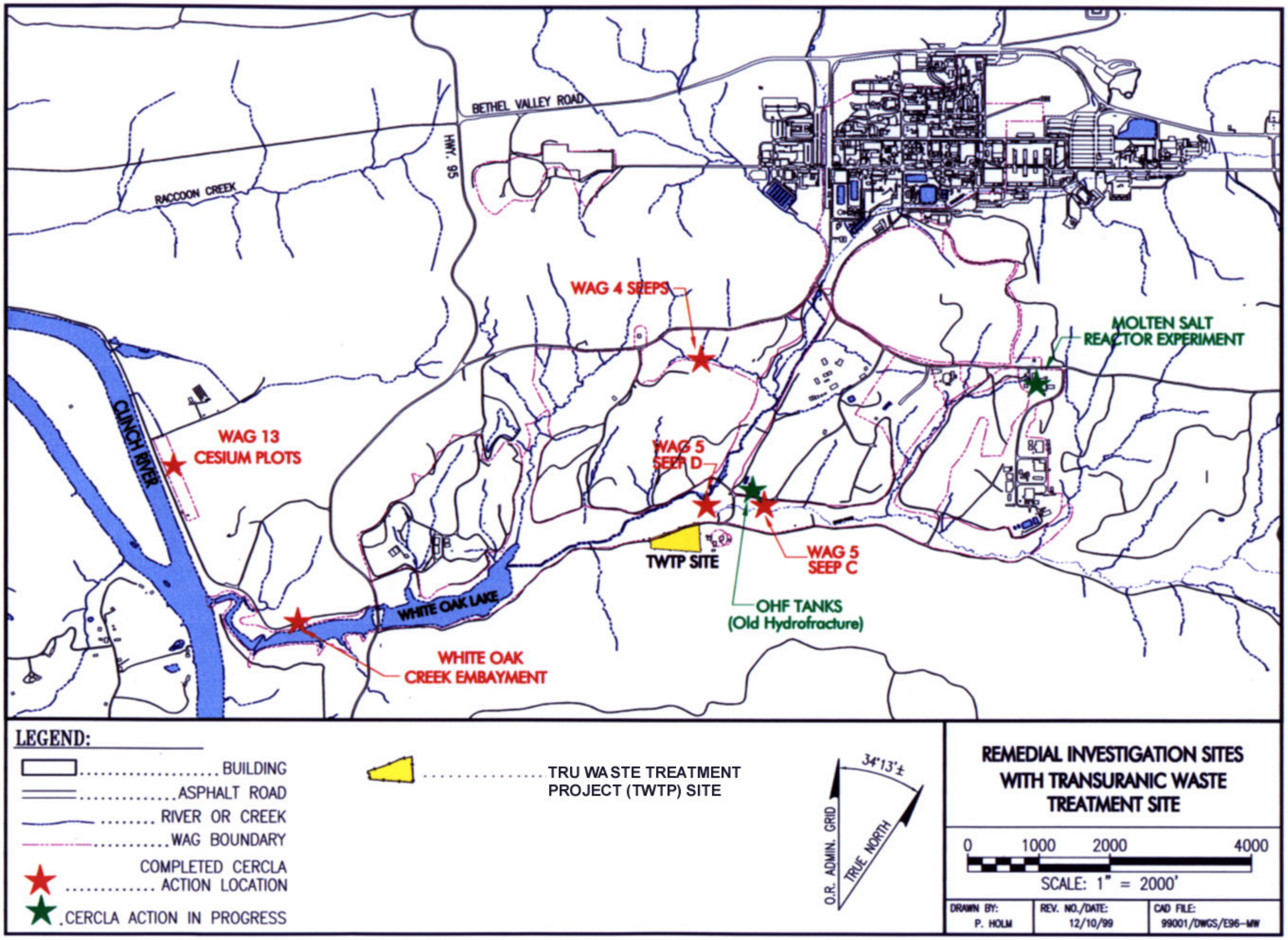

Figure 5-1. Melton Valley Watershed Remedial Investigation site map with proposed Treatment Site Location.

especially during the winter months when the lake was at low-pool elevation. Loss of the surface sediment, which served as a physical barrier for the buried radionuclides, exposed the cesium-137-bearing layers. In 1992, DOE completed a CERCLA action resulting in the construction of a coffer dam at the mouth of White Oak Creek to help retain and renew sediment deposition in White Oak Lake (DOE 1999a).

The proposed action would contribute some sediment loading into White Oak Creek and White Oak Lake, although best management practices would be followed to minimize soil erosion and sedimentation in surface waters. Potentially beneficial cumulative impacts could result from inadvertent or unpreventable releases of sediments that would incrementally contribute to sediment renewal in White Oak Lake.

5.3.2 Old Melton Valley Access Road Upgrade

Minor erosion-related sediment releases from the Old Melton Valley Access Road upgrade are occurring into the surface waters of White Oak Lake. This road upgrade was evaluated for environmental impacts by DOE, and a categorical exclusion was prepared for it.

Storm water runoff from the proposed TRU Waste Treatment Project would contribute to sediment releases in the White Oak Creek/White Oak Lake watershed. As mentioned above, while best management practices, such as the use of silt fences, would be followed during construction of the treatment facility, some minor additional siltation of White Oak Creek and White Oak Lake is likely from project activities.

5.3.3 Waste Area Group 5 Seep C and D

WAG 5 Seep C and Seep D (Figure 5-1) were determined to be major contributors to strontium-90 releases into White Oak Creek. In 1993-1994, Seep C contributed 30 to 40% of the total strontium-90 monitored at White Oak Dam, and Seep D contributed an additional 7% (DOE 1999a). CERCLA removal actions using ion-exchange technology were implemented to treat the groundwater discharge to Melton Branch. Removal efficiencies ranging from 90 to greater than 99% have been documented for both removal actions.

As part of the proposed action, low-level waste would be removed from the SWSA 5 North trenches, which are a significant source of strontium-90 and cesium-137 releases in the White Oak Creek Watershed presently (6% of the strontium-90 and 3.6% of the cesium-137 releases to the White Oak Creek Watershed in 1995). Approximately 14,000 curies of radiation is estimated to be in the waste in these trenches. To further clarify the improvements made in the watershed, Table 5-2 shows the yearly monitoring results of tritium and strontium-90 flux at White Oak Dam. The Seep C contribution to Melton Branch in 1998 is calculated at 86.4 pCi/L with a flux rate of 17.8 mCi, and Seep D's contribution is 12.1 pCi/L with a flux rate of 3.2 mCi. (DOE 1999a). Cumulatively, the proposed action would contribute to recent efforts to improve the groundwater and surface water quality in this watershed by treating the waste containing strontium-90 and cesium-137 in the SWSA 5 North trenches.

Table 5-2. Changes in tritium and strontium flux at White Oak Dam, 1993–1998[a]

Year[b]	White Oak Dam flux (Ci)	
	^{3}H	^{90}Sr
CY 1993	2,141	2.44
CY 1994	2,783	3.37
CY 1995	2,340	1.55
FY 1996	2,250	2.04
FY 1997	1,860	1.99
FY 1998	937	1.37

[a]DOE 1999. *Remedial Effectiveness Report for the U.S. Department of Energy, Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/OR/01-1790&D0.

[b]In past years estimates have been made for the 12-month calendar year (CY). Since 1996, estimates are provided for the 12-month fiscal year (FY) (October 1997 through September 1998).

5.3.4 Waste Area Group 4 Seeps

The WAG 4 seeps (Figure 5-1) were determined to contribute approximately 25% of the strontium-90 measured at White Oak Dam in 1996. As noted above, the total flux rates at White Oak Dam are presented in Table 5-2. The WAG 4 Seeps contribute to these fluxes. The CERCLA remedy implemented in 1996 was to grout several trenches in WAG 4 to improve their physical stability and reduce hydraulic conductivity. DOE estimates that the trench grouting will reduce strontium-90 releases from these trenches by 75% over 10 years (DOE 1999a). The proposed action would treat wastes that are removed under this CERCLA cleanup action thereby reducing the strontium-90 source.

5.3.5 Other CERCLA Actions

Other CERCLA actions in the general vicinity of Melton Valley area that may impact water resources include the Old Hydrofracture Facility Tanks and the WAG 13 Cesium Test Plots. The Old Hydrofracture Facility Tanks Removal Action (Figure 5-1) is not complete, but the TRU waste in these tanks has already been transferred to the Melton Valley Storage Tanks and is part of the waste inventory to be treated under the proposed action. The completed WAG 13 Cesium Test Plots Project resulted in the reduction of cesium releases near the Clinch River (DOE 1999a). The WAG 13 area is substantially downstream from the proposed TRU Waste Treatment Project site. Both of the actions are expected to have beneficial impacts on ground and surface water resources. There would be little cumulative impact from the proposed action.

5.3.6 Summary of Water Resource Impacts

Cumulatively, impacts to water resources in the White Oak Creek watershed are expected to be mostly beneficial. By implementing the proposed action waste in the SWSA 5 North trenches would be treated and the strontium-90 and cesium-137 releases would be reduced. Sedimentation, while expected to be small because of use of best management practices, would tend to be greatest for the Treatment and Waste Storage at ORNL Alternative using vitrification as the treatment process. Sedimentation would help renew the depleted sediment in the White Oak Embayment.

5.4 WASTE MANAGEMENT

Melton Valley has several waste storage facilities including the Melton Valley Storage Tanks, the Melton Valley Capacity Increase Project Tanks, and eight Waste Area Groupings located along an east-west axis in Melton Valley. The Record of Decision for the Melton Valley Watershed (DOE 1997a) at ORNL addresses the cleanup of the Melton Valley Watershed under CERCLA. The actions conducted as part of the Melton Valley Watershed Record of Decision, in conjunction with the TRU waste treatment and disposal conducted as part of the proposed action would have beneficial impacts on the Melton Valley Watershed, by the cleanup of the majority of contamination in this valley. In addition to the cleanup actions implemented under the Record of Decision for the Melton Valley Watershed, the Molten Salt Reactor Experiment Project remediation is ongoing, and efforts are being directed at reducing the risk of nuclear criticality (DOE 1999a).

Approximately 15 m^3 (20 yd^3) of TRU debris waste may be transferred from DOE's Paducah Plant to ORNL in 2005. Thus, a small amount of off-site waste would be added to the local inventory for treatment and disposal. If the DOE Paducah site, or any other DOE site, ships any TRU waste to ORNL for treatment, DOE would need to conduct further NEPA review as appropriate. This additional waste would add 0.6% to the 2,450 m^3 of TRU/alpha low-level waste inventory at ORNL, a minimal impact to waste management operations.

For the Treatment and Waste Storage at ORNL Alternative and using the cementation process would produce 34,128 m3 of waste. An additional on-site storage space of 0.8 hectares (2 acres) would be required. There are 65 ha (160 acres) of area in Melton Valley devoted to waste storage and operation (DOE 1997c). Given the extensive space already devoted to waste storage in Melton Valley, this would not be cumulatively significant.

5.5 AIR QUALITY

ORNL is an attainment area for all criteria pollutants including particulates. In 1997, the maximum 24-hour particulate concentration was 69.0 $\mu g/m^3$ which is 46% of the 150 $\mu g/m^3$ National Ambient Air Quality Standard. The annual concentration of 33 $\mu g/m^3$ was 66% of the 50 $\mu g/m^3$ standard. Ongoing and future projects involving ground disturbance activities that would likely result in fugitive dust emissions include the Old Melton Valley Access Road upgrade and the proposed Spallation Neutron Source. These emissions would be negligible. The Treatment and Waste Storage at ORNL Alternative using the vitrification treatment process would result in the greatest impacts because vitrification would require the most land for construction of the treatment facility (2.8 ha or 7 acres) and onsite storage (0.6 ha or 1.5 acres) would also result in construction-related fugitive dust emissions. Construction would result in short-term, elevated levels of particulate matter in the localized area around the construction site. There would also be temporary, elevated levels of air pollutant emissions from worker and construction vehicles. However, emissions are estimated to be negligible. Since the access road is complete, construction schedules would not overlap. The distance between the Spallation Neutron Source and the TRU Waste Treatment Project would minimize any cumulative effects, even assuming that construction periods of the projects overlapped. Cumulatively, deposition of particulates from the proposed action combined with emissions from the Old Melton Valley Road upgrade and other large construction projects, such as the Spallation Neutron Source, could indirectly affect vegetation by coating leaves with dust. Such impacts would be very localized and relatively minor.

The background offsite (public maximally exposed individual) airborne radionuclide dose from the ORR is 0.41 mrem/year. The radionuclide dose of 0.23 mrem/year to the public maximally exposed individual from the Low-Temperature Drying Alternative is the bounding case. Cumulatively, the total public maximally exposed individual dose would be 0.64 mrem/year.

The Toxic Substances Control Act (TSCA) Incinerator at the ETTP, the Bull Run Steam Plant 8 km (5 miles) east of ORNL, and the Kingston Steam Plant [approximately 48 km (30 miles) northwest of ORNL] near Kingston, Tennessee, are major emission sources in the region which affect the air quality at ORNL. The TSCA Incinerator is a source of radionuclide emissions at the ETTP. The Incinerator emits several non-radionuclides (metals, chlorine, and particulates) but actual emissions in 1998 ranged from <1% to 7% of the emissions allowed by permit (ORNL 1999). The various alternatives considered under the proposed action would contribute a small amount to the overall emissions in the airshed.

5.6 TRANSPORTATION

DOE estimates the transport of waste by truck, from DOE facilities nationwide, to result in a combined total of between 12 and 69 fatalities for the shipment of low-level mixed wastes, low-level wastes, transuranic wastes, high-level wastes, and hazardous wastes. The majority of these fatalities would result from physical trauma directly related to potential accidents and truck fuel emissions. These fatalities from physical trauma are independent of the shipment contents (WM PEIS, DOE 1997b). The Oak Ridge contribution to these accidents and fatalities would be 8.1E-04 accidents per shipment and 1.1E-04 fatalities per shipment. Comparatively, from 1971 through 1993, over one million persons were killed in vehicular accidents in the United States (WM PEIS, DOE 1997b).

Cumulatively, the non-DOE transport of radioactive material accounts for approximately 80% of the collective dose to workers and the public. At ORR, DOE has estimated the effects of waste transportation over a 10-year period to be a radiation dose to the off-site maximally exposed individual of 3.2E-07 to 1.4E-03 rem (WM PEIS, DOE 1997b). Because off-site waste shipment is not part of either the No Action or the Treatment and Waste Storage at ORNL Alternatives, no cumulative off-site transportation impacts would occur for these alternatives.

5.7 HUMAN HEALTH

The reservation has a number of radiological sources including the Melton Valley Storage Tanks. These DOE sources, combined with natural background, help constitute the radiological baseline for the area. As noted in Section 5.3, DOE has an active cleanup program under way under CERCLA. This program is designed to reduce radiological and other contaminant sources and releases in Melton Valley. Using 1998 effective dose equivalent data for the ORR (ORNL 1999), the latent cancer fatalities risk computed for population within 90 km (50 miles) of the ORR is 6.6E-03. The Treatment and Waste Storage at ORNL Alternative using the vitrification process would result in 6.8E-01 person-rem to the affected public population and a corresponding 3E-04 latent cancer fatalities risk to that population. The latent cancer fatalities risk attributed to the Spallation Neutron Source project is 3.0E-01 (DOE 1999b). Cumulatively, the latent cancer fatalities risk from all these sources would be 3.1E-01.

When the wastes associated with the proposed action are treated and shipped offsite, the total expected fatalities (public population), the maximally exposed individual (public) probability of cancer fatality and non-involved worker probability of cancer fatality associated with potential accidental releases from a breach of the Melton Valley Storage Tanks would be eliminated. The projected risk to the affected public population from both inhalation and ingestion from a release of untreated wastes from a tank breach would be 1.1 total expected fatalities; the maximally exposed individual (public) probability of cancer fatality would be 1.1E-05 and the non-involved worker probability of cancer fatality would be

9.2E-04. These risks would be eliminated by adopting any of the treatment options under the proposed action. The most significant accident associated with waste treatment would be the breach of the Melton Valley Storage Tank transfer line during treatment operations for the Cementation Alternative. Risks from this type of accident would be 0.31 total expected fatalities. Risks from this type of accident would vary by treatment process for the Treatment and Waste Storage at ORNL Alternative but would be greatest if the cementation process were used.

5.8 SOCIOECONOMICS

The cumulative socioeconomic impacts from this project are determined by adding the impacts identified in Section 4.13 with expected future development project effects on employment and wages. Projected changes over the next 10 years in the future DOE and contractor workforce in Oak Ridge are factored into the analysis. As noted in Chapter 4, the TRU Waste Treatment Project would contribute very little to the regional economy and the overall employment picture regardless of the alternative selected. However, the Treatment and Waste Storage at ORNL Alternative would be the bounding case. These impacts must be viewed in context. Several planned re-industrialization projects at ETTP (Table 5-1) would, under full realization, produce up to 14,700 direct and indirect jobs, or 5% of 1996 Region of Influence employment. In addition, Roane County is working on plans for the Macedonia Industrial Park (Table 5-1) near the ETTP site, which would be located off the ORR.

The potential gains in employment from these regional projects are likely to be offset by the large cuts in DOE-related jobs during the same time period. An estimated 4,000 direct and indirect jobs were lost between 1996 and 1998, and more jobs could be lost in the next 10 years. If we assume that 5,000 direct jobs are lost during this period, the cumulative total direct and indirect jobs lost from 1996 to 2010 would total 10,950. This exceeds the lower-bound estimate of total jobs created by the ETTP initiatives. When we subtract this from the upper bound, the net new jobs created would represent roughly 1% of the 1996 region of influence employment. Even if other DOE employment (such as construction-related employment for the Spallation Neutron Source and Y-12 Modernization) is considered, the incremental increase in employment from the proposed action would be minor. The proposed action would contribute very little additional employment, and the project's contribution to cumulative socioeconomics impacts regardless of the treatment process would be very small.

5.9 REFERENCES

DOE (U.S. Department of Energy) 1997a. *Record of Decision for the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1826&D1.

DOE 1997b. *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, U.S. Department of Energy, Washington, D.C., May 1997.

DOE 1997c. *Remedial Investigation Report on the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1, Evaluation, Interpretation, and Data Summary*. DOE/OR/01-1546 V1&D2.

DOE 1998. *Categorical Exclusion for Construction/Relocation of Access Road at Oak Ridge National Laboratory*, CX-TRU-98-007, Oak Ridge, Tennessee.

DOE 1999a. *Remedial Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee*, DOE/OR/01-1790&D0.

DOE 1999b. *Final Environmental Impact Statement—Construction and Operation of the Spallation Neutron Source*, DOE/EIS-0247, U.S. Department of Energy, Office of Science, April 1999.

Hall, J. 2000. Personal communication with Wayne Tolbert, Science Applications International Corporation, January 7, 2000, from James Hall, Oak Ridge National Laboratory National Environmental Policy Act Coordinator.

LMER and LMES (Lockheed Martin Energy Research Corp. and Lockheed Martin Energy Systems, Inc.) 1998. *Comprehensive Integrated Planning: A Process for the Oak Ridge Reservation, Oak Ridge, Tennessee*, ES/ENSFP-49, Oak Ridge, Tennessee, January 1998.

Medley, T. 2000. Personal communication with Wayne Tolbert, Science Applications International Corporation, January 7, 2000, from Tony Medley, Oak Ridge National Laboratory Capital Assets Manager.

ORNL (Oak Ridge National Laboratory) 1999. *Oak Ridge Reservation Annual Site Environmental Report for 1998*, DOE/ORO/2091.