



## ORAU TEAM Dose Reconstruction Project for NIOSH

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## **ACRONYMS AND ABBREVIATIONS**

DOE	U.S. Department of Energy
EEOICPA	Energy Employees Occupational Illness Compensation Program Act
ETEC	Energy Technology Engineering Center
LAT	lateral
NIOSH	National Institute for Occupational Safety and Health
PA	posterior–anterior
SSFL	Santa Susana Field Laboratory
TBD	Technical Basis Document
U.S.C.	United States Code
§	section

## 1.0 INTRODUCTION

Technical basis documents (TBDs) and site profile documents are general working documents that provide guidance concerning the preparation of dose reconstructions at particular sites or categories of sites. They will be revised in the event additional relevant information is obtained about the affected site(s). These documents may be used to assist the National Institute for Occupational Safety and Health (NIOSH) in the completion of the individual work required for each dose reconstruction.

In this document the word “facility” is used as a general term for an area, building, or group of buildings that served a specific purpose at a site. It does not necessarily connote an “atomic weapons employer facility” or a “Department of Energy [DOE] facility” as defined in the Energy Employees Occupational Illness Compensation Program Act [EEOICPA; 42 U.S.C. § 7384l(5) and (12)]. EEOICPA defines a DOE facility as “any building, structure, or premise, including the grounds upon which such building, structure, or premise is located ... in which operations are, or have been, conducted by, or on behalf of, the Department of Energy (except for buildings, structures, premises, grounds, or operations ... pertaining to the Naval Nuclear Propulsion Program)” [42 U.S.C. § 7384l(12)]. Accordingly, except for the exclusion for the Naval Nuclear Propulsion Program noted above, any facility that performs or performed DOE operations of any nature whatsoever is a DOE facility encompassed by EEOICPA.

For employees of DOE or its contractors with cancer, the DOE facility definition only determines eligibility for a dose reconstruction, which is a prerequisite to a compensation decision (except for members of the Special Exposure Cohort). The compensation decision for cancer claimants is based on a section of the statute entitled “Exposure in the Performance of Duty.” That provision [42 U.S.C. § 7384n(b)] says that an individual with cancer “shall be determined to have sustained that cancer in the performance of duty for purposes of the compensation program if, and only if, the cancer ... was at least as likely as not related to employment at the facility [where the employee worked], as determined in accordance with the [probability of causation] guidelines established under subsection (c) ....” [42 U.S.C. § 7384n(b)]. Neither the statute nor the probability of causation guidelines (nor the dose reconstruction regulation) define “performance of duty” for DOE employees with a covered cancer or restrict the “duty” to nuclear weapons work.

As noted above, the statute includes a definition of a DOE facility that excludes “buildings, structures, premises, grounds, or operations covered by Executive Order No. 12344, dated February 1, 1982 (42 U.S.C. 7158 note), pertaining to the Naval Nuclear Propulsion Program” [42 U.S.C. § 7384l(12)]. While this definition contains an exclusion with respect to the Naval Nuclear Propulsion Program, the section of EEOICPA that deals with the compensation decision for covered employees with cancer [i.e., 42 U.S.C. § 7384n(b), entitled “Exposure in the Performance of Duty”] does not contain such an exclusion. Therefore, the statute requires NIOSH to include all radiation exposures in its dose reconstructions for employees at DOE facilities, including radiation exposures related to the Naval Nuclear Propulsion Program. As a result, all internal and external dosimetry results are considered valid for use in dose reconstruction. No efforts are made to determine the eligibility of any fraction of total measured exposure for inclusion in dose reconstruction.

## 1.1 **PURPOSE**

The purpose of this document is to provide a site profile that contains technical basis information for evaluation of the total occupational dose for EEOICPA claimants who were employed at the Energy Technology Engineering Center (ETEC).

## **1.2 SCOPE**

This site profile consists of six TBDs: Introduction, Site Description, Occupational Medical Dose, Occupational Environmental Dose, Occupational Internal Dose, and Occupational External Dosimetry.

### **1.2.1 Site Description**

The Site Description TBD (ORAUT 2005a) describes ETEC since its establishment by the U.S. Atomic Energy Commission in 1966 to provide management, engineering, testing, consultation, and project monitoring services for a wide range of DOE programs. The ETEC consists of government-owned buildings within Area IV of the Santa Susana Field Laboratory (SSFL) in the Simi Hills of Ventura County, California, about 30 miles northwest of downtown Los Angeles. This TBD describes the site including the site areas or buildings, site processes, periods of operation, radionuclides of concern, and other information pertinent to dose reconstruction. In addition, the TBD describes ETEC-related activities at the Downey, Canoga Park, and De Soto facilities.

### **1.2.2 Occupational Medical Dose**

The Occupational Medical Dose TBD (ORAUT 2005b) provides information about the dose that individual workers received from X-ray examinations required as a condition of employment. X-ray examinations were included in pre-employment physical examinations, and chest X-rays were included as part of periodic physicals. The review of records suggests that about half of the pre-employment examinations included both posterior–anterior (PA) and lateral (LAT) chest views and one or two views (PA and LAT) of the lumbar spine. The remainder included only one PA chest view. It was rare for an employee to have annual chest X-rays; most individuals were not subject to periodic radiographic reexamination. Of those who were, the typical frequency was 3 to 5 years. There was no evidence of collimation on the X-rays, and there was no evidence of the use of photofluorography. There was no evidence of the use of gonadal shielding in the lumbar spine views.

### **1.2.3 Occupational Environmental Dose**

The Occupational Environmental Dose TBD (ORAUT 2005c) discusses the doses received by workers on the grounds but outside the facilities at ETEC. The doses were from facility discharges to the atmosphere, from ambient external radiation originating in the facilities, and from inadvertent ingestion of radionuclides. The TBD describes the estimated annual intakes for inhalation exposure, the estimated radiation dose from ambient external exposures, and inadvertent ingestion at the ETEC. Because environmental measurements do not distinguish the source of emissions, they reflect air concentrations from nearby as well as distant sources. The receptors addressed in the TBD are ETEC employees who did not wear external dosimetry or who were not monitored for internal exposures. The TBD provides annual intakes and ambient external dose from 1959 to 1999.

### **1.2.4 Occupational Internal Dose**

The Internal Dose TBD (ORAUT 2005d) discusses the internal dosimetry program at ETEC. It provides supporting technical data to evaluate the internal occupational doses that can reasonably be associated with the radiation exposures of the ETEC worker. The internal occupational doses are from exposures in ETEC facilities and from onsite exposures to ETEC environmental releases. The document discusses the technical basis for methods used to prepare ETEC worker dose information for input to the NIOSH Interactive RadioEpidemiological Program. Information on measurement uncertainties is an integral component of the approach. The document describes the evaluation of

uncertainty for ETEC exposure and dose records. The TBD addresses missed doses as well as the evaluation of exposure to unmonitored and monitored workers.

### **1.2.5 Occupational External Dosimetry**

The External Dosimetry TBD (ORAUT 2005e) discusses historical and current practices in relation to the evaluation of external exposure data for monitored and unmonitored workers at ETEC. In the beginning ETEC had its own dosimeter in addition to pencil dosimeters. ETEC started using commercial vendors in the early 1960s and continued that practice to the end of its operating life. This TBD describes the external dosimetry systems and practices at the facility. Missed doses result from the minimum detectable levels of the dosimeters and the exchange periods. In cases of lost or destroyed dosimeters, estimates are based on past results or similar work, coworker results, or the product of instrument measurements and time spent in the radiation zone. Neutron doses were measured with nuclear track emulsion, Type A film for the start of reactor operations. Both fast and thermal neutrons were measured and recorded as whole-body dose. Missed doses for unmonitored employees could be as much as 500 millirem or 10% of whatever standard was in effect at the time of employment.

## REFERENCES

- ORAUT (Oak Ridge Associated Universities Team), 2005a, *Technical Basis Document for the Energy Technology Engineering Center – Site Description*, ORAUT-TKBS-0038-2, Rev. 00, Oak Ridge, Tennessee, November.
- ORAUT (Oak Ridge Associated Universities Team), 2005b, *Technical Basis Document for the Energy Technology Engineering Center – Occupational Medical Dose*, ORAUT-TKBS-0038-3, Rev. 00, Oak Ridge, Tennessee, November.
- ORAUT (Oak Ridge Associated Universities Team), 2005c, *Technical Basis Document for the Energy Technology Engineering Center – Occupational Environmental Dose*, ORAUT-TKBS-0038-4, Rev. 00, Oak Ridge, Tennessee, November.
- ORAUT (Oak Ridge Associated Universities Team), 2005d, *Technical Basis Document for the Energy Technology Engineering Center – Occupational Internal Dose*, ORAUT-TKBS-0038-5, Rev. 00, Oak Ridge, Tennessee, November.
- ORAUT (Oak Ridge Associated Universities Team), 2005e, *Technical Basis Document for the Energy Technology Engineering Center – Occupational External Dosimetry*, ORAUT-TKBS-0038-6, Rev. 00, Oak Ridge, Tennessee, November.