



**ORAU TEAM  
Dose Reconstruction  
Project for NIOSH**

Oak Ridge Associated Universities | Dade Moeller & Associates | MJW Corporation

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**PUBLICATION RECORD**

<b>EFFECTIVE DATE</b>	<b>REVISION NUMBER</b>	<b>DESCRIPTION</b>
02/21/2006	00	New technical basis document for the Energy Technology Engineering Center – Introduction. First approved issue. Initiated by Melton H. Chew.
08/30/2006	01	Revision to change site name to Atomics International throughout document in keeping with revised DOE site naming conventions. Approved issue of Revision 01. Added information to Site Description in Section 1.2.1 on page 6. No further changes occurred as a result of formal internal review. Incorporates NIOSH formal review comments. This revision results in no change to the assigned dose and no PER is required. Training required: As determined by the Task Manager. Initiated by Melton H. Chew.

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## ACRONYMS AND ABBREVIATIONS

AI	Atomics International
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 1.0 INTRODUCTION

2 Technical basis documents and site profile documents are not official determinations made by the  
3 National Institute for Occupational Safety and Health (NIOSH) but are rather general working  
4 documents that provide historic background information and guidance to assist in the preparation of  
5 dose reconstructions at particular sites or categories of sites. They will be revised in the event  
6 additional relevant information is obtained about the affected site(s). These documents may be used  
7 to assist the NIOSH staff in the completion of the individual work required for each dose  
8 reconstruction.

9 In this document the word “facility” is used as a general term for an area, building, or group of  
10 buildings that served a specific purpose at a site. It does not necessarily connote an “atomic weapons  
11 employer facility” or a “Department of Energy [DOE] facility” as defined in the Energy Employees  
12 Occupational Illness Compensation Program Act [EEOICPA; 42 U.S.C. § 7384l(5) and (12)].  
13 EEOICPA defines a DOE facility as “any building, structure, or premise, including the grounds upon  
14 which such building, structure, or premise is located ... in which operations are, or have been,  
15 conducted by, or on behalf of, the Department of Energy (except for buildings, structures, premises,  
16 grounds, or operations ... pertaining to the Naval Nuclear Propulsion Program)” [42 U.S.C. §  
17 7384l(12)]. Accordingly, except for the exclusion for the Naval Nuclear Propulsion Program noted  
18 above, any facility that performs or performed DOE operations of any nature whatsoever is a DOE  
19 facility encompassed by EEOICPA.

20 For employees of DOE or its contractors with cancer, the DOE facility definition only determines  
21 eligibility for a dose reconstruction, which is a prerequisite to a compensation decision (except for  
22 members of the Special Exposure Cohort). The compensation decision for cancer claimants is based  
23 on a section of the statute entitled “Exposure in the Performance of Duty.” That provision [42 U.S.C. §  
24 7384n(b)] says that an individual with cancer “shall be determined to have sustained that cancer in the  
25 performance of duty for purposes of the compensation program if, and only if, the cancer ... was at  
26 least as likely as not related to employment at the facility [where the employee worked], as  
27 determined in accordance with the POC [probability of causation<sup>1</sup>] guidelines established under  
28 subsection (c) ...” [42 U.S.C. § 7384n(b)]. Neither the statute nor the probability of causation  
29 guidelines (nor the dose reconstruction regulation) define “performance of duty” for DOE employees  
30 with a covered cancer or restrict the “duty” to nuclear weapons work.

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

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<sup>1</sup> The U.S. Department of Labor is ultimately responsible under the EEOICPA for determining the POC.

- 1 • Radiation from naturally occurring radon present in conventional structures
- 2 • Radiation from diagnostic X-rays received in the treatment of work-related injuries

3 The facility, which includes four locations, has been identified in various ways over time. The name  
4 Atomics International (AI) is used to represent all of them unless more specific location information is  
5 warranted. In that context, AI includes Area IV of the Santa Susana Field Laboratory which has also  
6 been known as Nuclear Development Field Laboratory, Liquid Metal Engineering Center, and Energy  
7 Technology Engineering Center (ETEC), portions of the Downey facility, the Vanowen Building at the  
8 Canoga facility and the De Soto facility.

## 9 **1.1 PURPOSE**

10 The purpose of this document is to provide a site profile that contains technical basis information for  
11 evaluation of the total occupational dose for EEOICPA claimants who were employed at the Atomics  
12 International (AI) facility, as described above.

13 U. S. Atomic Energy omission-funded work at the AI facility began in 1948. North American Aviation  
14 (NAA) entered into a contract with AEC to conduct nuclear research operations at Area IV and the  
15 Downey, Canoga and De Soto sites. At that time, Atomics International, an internal division of NAA,  
16 was the company's designated nuclear research and development division. In addition to the  
17 employees of the AI division, other employees of NAA who worked at any of the above sites during  
18 the AEC contract period are potentially eligible for EEOICPA benefits.

## 19 **1.2 SCOPE**

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

### 22 **1.2.1 Site Description**

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

### 31 **1.2.2 Occupational Medical Dose**

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

1     **1.2.3     Occupational Environmental Dose**

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

11    **1.2.4     Occupational Internal Dose**

12    The Internal Dose TBD (ORAUT 2005d) discusses the internal dosimetry program at AI. It provides  
13    supporting technical data to evaluate the internal occupational doses that can reasonably be  
14    associated with the radiation exposures of the AI worker. The internal occupational doses are from  
15    exposures in AI facilities and from onsite exposures to AI environmental releases. The document  
16    discusses the technical basis for methods used to prepare AI worker dose information for input to the  
17    NIOSH Interactive RadioEpidemiological Program. Information on measurement uncertainties is an  
18    integral component of the approach. The document describes the evaluation of uncertainty for AI  
19    exposure and dose records. The TBD addresses missed doses as well as the evaluation of exposure  
20    to unmonitored and monitored workers.

21    **1.2.5     Occupational External Dosimetry**

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

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1   **REFERENCES**

- 2   ORAUT (Oak Ridge Associated Universities Team), 2005a, *Technical Basis Document for the Energy*  
3         *Technology Engineering Center – Site Description*, ORAUT-TKBS-0038-2, Rev. 00, Oak  
4         Ridge, Tennessee, November.
- 5   ORAUT (Oak Ridge Associated Universities Team), 2005b, *Technical Basis Document for the Energy*  
6         *Technology Engineering Center – Occupational Medical Dose*, ORAUT-TKBS-0038-3, Rev.  
7         00, Oak Ridge, Tennessee, November.
- 8   ORAUT (Oak Ridge Associated Universities Team), 2005c, *Technical Basis Document for the Energy*  
9         *Technology Engineering Center – Occupational Environmental Dose*, ORAUT-TKBS-0038-4,  
10         Rev. 00, Oak Ridge, Tennessee, November.
- 11   ORAUT (Oak Ridge Associated Universities Team), 2005d, *Technical Basis Document for the Energy*  
12         *Technology Engineering Center – Occupational Internal Dose*, ORAUT-TKBS-0038-5, Rev.  
13         00, Oak Ridge, Tennessee, November.
- 14   ORAUT (Oak Ridge Associated Universities Team), 2005e, *Technical Basis Document for the Energy*  
15         *Technology Engineering Center – Occupational External Dosimetry*, ORAUT-TKBS-0038-6,  
16         Rev. 00, Oak Ridge, Tennessee, November.