

# Metals and Controls Corporation SEC Petition Evaluation Report SEC-00236

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**Advisory Board on Radiation and Worker Meeting**

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# SEC petition

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- Received 9/1/2016
- Petitioned class:

All facilities construction & maintenance workers including lubricators-oilers, industrial pipefitters, engineering technicians (mechanical, electrical, structural), maintenance supervisors, electricians, plumbers, millwrights, carpenters, instrumentation technicians, chemical handlers, waste treatment operators, and all production workers including machine operators-helpers, and repair & maintenance (commonly called R&M) workers, who worked in buildings 4, 5, 10 interior areas, and buildings 5, 10, 11, 12, 17 exterior areas at Metals and Controls Corp. in Attleboro, MA, during the period from January 1, 1968 through March 21, 1997



# SEC petition

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- Qualified under 83.13 on 11/14/2016 based on lack of monitoring data
- Petition class evaluated:

All atomic weapons employees who worked as facilities construction & maintenance workers including lubricators-oilers, industrial pipefitters, engineering technicians (mechanical, electrical, structural), maintenance supervisors, electricians, plumbers, millwrights, carpenters, instrumentation technicians, chemical handlers, waste treatment operators, and all production workers including machine operators-helpers, and repair & maintenance (commonly called R&M) workers, who worked in buildings 4, 5, 10 interior areas, and buildings 5, 10, 11, 12, 17 exterior areas at Metals and Controls Corp. in Attleboro, MA, during the period from 1/1/68 through 3/21/97



# Site history and background

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- Located on 100 acres in Attleboro, MA
  - 30 miles south of Boston
- Covered time periods:
  - AWE operations from January 1, 1952 through December 31, 1967
  - Residual radiation from January 1, 1968 through March 21, 1997
- AWE operations period previously added to SEC under petition SEC-00149 (2009) under an 83.14 petition



# Site history and background

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- 1952 – Radiological operations began in bldgs. 3 and 4
  - Included work for Navy, Air Force and other government agencies
- 1957 - All radiological operations moved to building 10
  - Contained a Fuel Manufacturing Area (FMA)
- 1959 - Metals & Controls Corp. (MC) merged with Texas Instruments Corp. (TI)



# Site history and background

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- Operations during the AWE period included:
  - Fabrication of enriched uranium fuel elements and foils for the Navy, Air Force, Government-funded research, and commercial customers
  - Processing of depleted (68,000 kg) and natural uranium (253 kg)
  - Limited R&D and fabrication of thorium fuel, alloys, and foils for Brookhaven and others (244 kg)
  - Production of 5,000 electrical breakers containing radium-bearing luminescent markers for the Navy



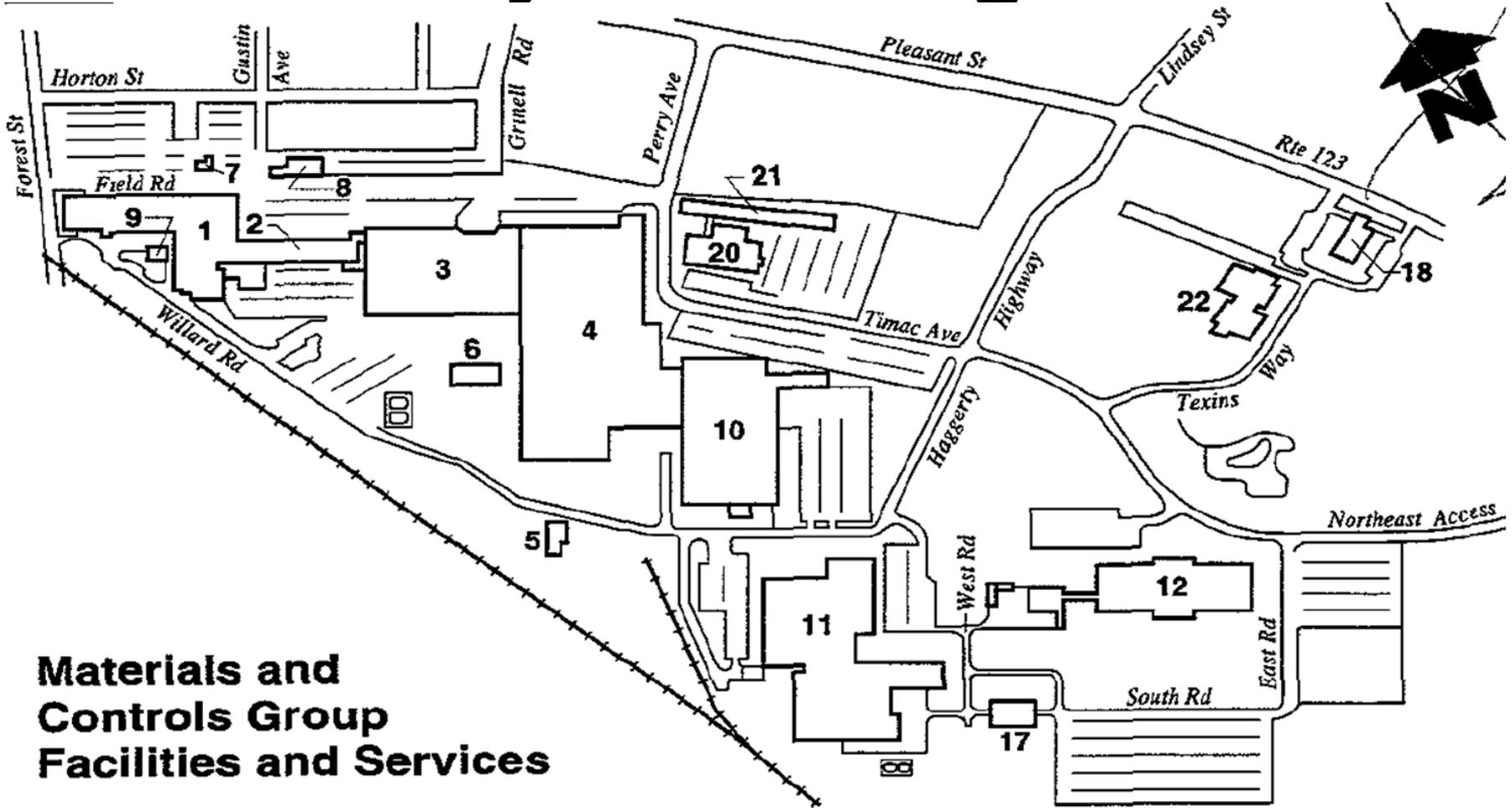
# Site history and background

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- Operations during the Residual period included:
  - Fuel fabrication for High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory and other Government-owned research reactor
  - HIFR operations exposures not covered under EEOICPA during the residual period



# Site history and background



**Materials and  
Controls Group  
Facilities and Services**



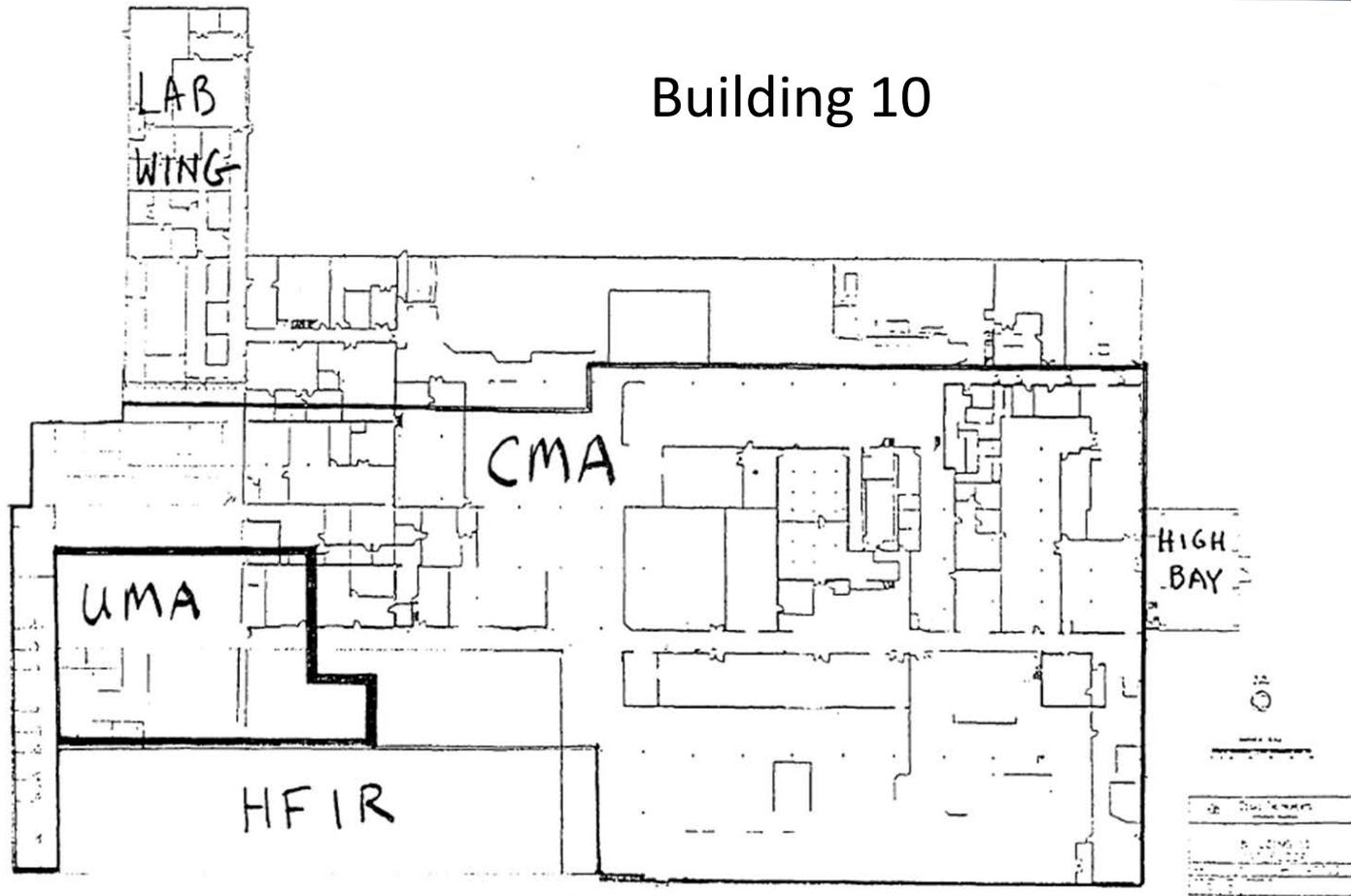
# Site history and background

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- Building 10 separated by floor to ceiling partitions into the following areas:
  - Unclad-fuel Machining Area (UMA) -all material processing performed in dry boxes or hoods with ventilation UMA under negative pressure with respect to surrounding area.
  - Clad-fuel Machining Area (CMA) –No unclad material allowed
  - HFIR –No unclad material allowed



# Site history and background



# Decontamination & Decommissioning

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- AWE areas (Buildings 3, 4 and 10) cleaned at the end of operations
  - No covered radiological work after the AWE operations period
- Rad waste
  - Processed inside and outside of Building 5 then shipped (Metals Recovery Area, Stockade)
  - Limited onsite burial between Buildings 11 and 12



# Decontamination & Decommissioning

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- 1981 - Formal site-wide D&D begins without DOE involvement
- D&D was performed in either the HFIR area, or by contractors
- Building 10 had the highest pre-D&D contamination levels, comprehensive grid surveys show a vast majority of areas  $<100$  dpm/100 cm<sup>2</sup>, and max values of 1258 dpm/100 cm<sup>2</sup> and 0.15 mr/hr
- 1983 - Initial NRC release of AWE areas



# Decontamination & Decommissioning

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- 1984 – ORISE verification survey of Burial Area finds contamination
- 1992 – Follow-up Burial Area remediation
- 1992 – ORISE verification survey of Burial Area finds contamination
- 1993 – Follow-up Burial Area remediation
- 1993 – ORISE verification survey of Burial Area successful
- 1994 – Metals Recovery Area remediation
- 1995 – ORISE verification survey finds contamination



# Decontamination & Decommissioning

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- 1995 –NRC requests site-wide comprehensive characterization
- 1995 –Contamination found on inaccessible surfaces in previously released AWE areas
- 1996 –Follow-up remediation
- February 1997 –NRC and State verification survey successful
- March 21, 1997 –NRC site-wide release for unrestricted use except for Building 1



# Sources of available information

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- 621 documents found in NIOSH Site Research Database (SRDB)
- Documents and affidavits provided by the petitioner
- Normal data searches also conducted (Internet etc.)
- Guidance from Battelle-TBD-6000, NUREG/CR-5512, and ORAUT-OTIB-0070 to model doses from residual contamination generated from machining operations



# Previous DRs

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- 448 claims submitted for dose reconstruction
- 397 claims for energy employees who worked during the period under evaluation (January 1, 1968 – March 21, 1997)
- 314 dose reconstructions completed for energy employees who started their employment during the period under evaluation
- 1 claims with internal dosimetry records
- 4 claims with external dosimetry records

(NIOSH DCAS Claims Tracking System Information available as of January 2017)



# Potential exposure

1/1/68 – 3/21/97

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- Internal –Inhalation and ingestion of U and Th
- External –Photon / beta exposure small amounts of U and Th surface contamination present after operations ceased



# Internal exposure

## 1/1/68 – 3/21/97

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### Internal monitoring data

- Routine contamination monitoring of personnel and areas
- Survey data from the end of the operational period (1966–1967)
- For comparison, NIOSH reviewed data from surface contamination surveys, air monitoring, urinalysis and lung counts that were performed during the residual period for personnel performing commercial work



# External exposure

1/1/68 – 3/21/97

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## External monitoring data

- Film badge data from the end of the operational period is representative of exposures from operations and residual radioactive material, and are therefore bounding for exposures to only residual radioactive material
- For comparison, NIOSH reviewed data from film badges, and area and item radiation surveys that were obtained during the residual period for personnel performing commercial work



# DR feasibility and approaches

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- NIOSH found that the available monitoring records, process descriptions, and source-term data *are* adequate to estimate exposures and complete dose reconstructions with sufficient accuracy for the evaluated class of employees during the Residual Radiation Period
- January 1, 1968 through March 21, 1997



# DR feasibility and approaches

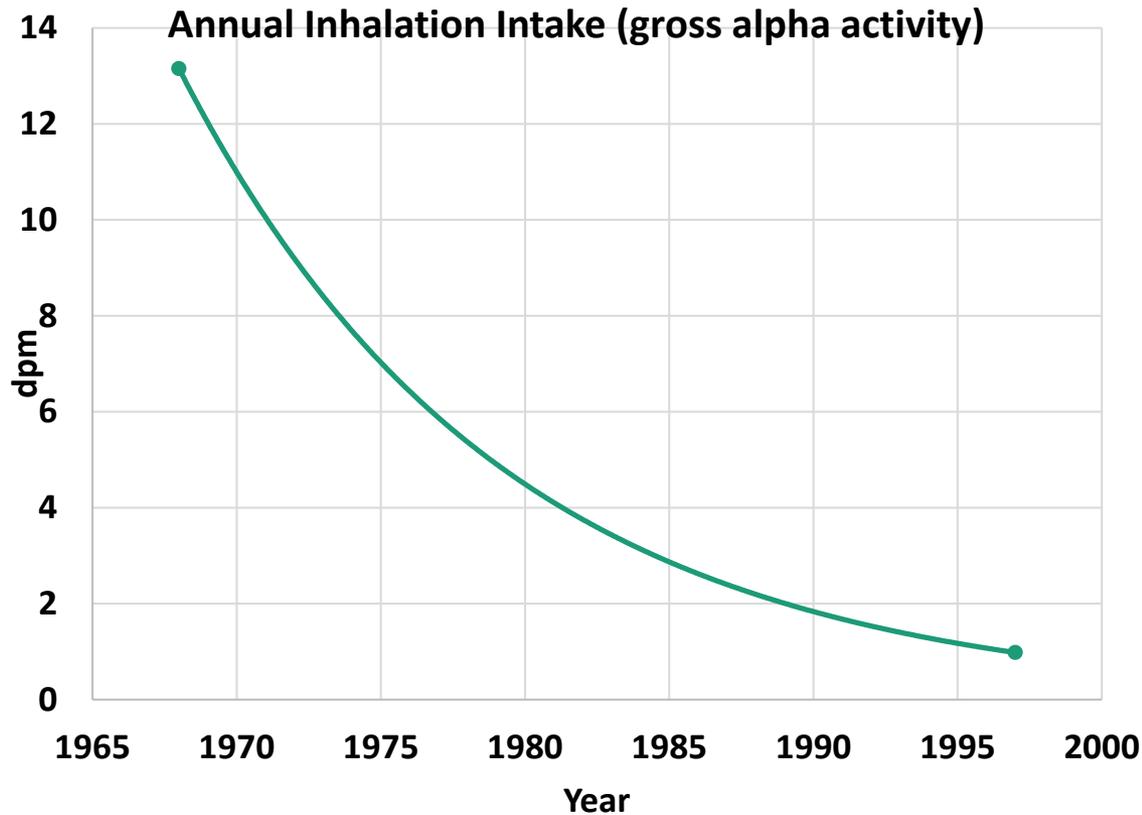
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## Internal Dose Estimate

- Jan. 1, 1968 through March 21, 1997
- 200+ survey data entries taken before D&D were compiled and a 95<sup>th</sup> percentile value calculated
- 7,000+ survey data entries from the end of the Operational period were compiled and a 95<sup>th</sup> percentile value calculated
- A source term depletion rate was calculated and a resuspension factor ( $10^{-6} \text{ m}^{-1}$ ) was applied to estimate air concentration



# DR feasibility and approaches



# DR feasibility and approaches

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- All of the contamination surveys used to create these bounding methods analyzed for gross alpha content
- The most claimant-favorable intake of thorium or uranium will be used
- The amount of activity ingested is evaluated using methodologies provided in NUREG/CR-5512



# DR feasibility and approaches

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## External Dose

- 162 film badge results from the end of the operational period used to determine the 95<sup>th</sup> percentile dose
- Included missed dose (LOD/2) for a total of 165 mrem/year
- Film badge data from non-covered work performed during the residual period was 193 mrem/year
- Will use a claimant favorable constant distribution of 200 mrem/year, with no source term depletion
- Medical x-ray exposure is not covered in the residual period



# DR feasibility and approaches

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- The intakes and external doses for the residual radiation period will apply to all personnel with primary responsibilities in the Rad production areas
- For administrative or non-production area personnel, NIOSH will assume that a worker's external and internal doses are 10% of those associated with those of the production workers (TBD-6000)



# Residual Period

(1/1/1968 - 3/21/1997)

Exposure Source

Feasible

Not Feasible

**Internal**

**Yes**

**External**

**Yes**



# Proposed class

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NIOSH has determined that there is sufficient information to estimate with sufficient accuracy both internal and external radiation doses for members of the evaluated class.

