

## Exposure Investigation American Chain and Cable Reading, Pennsylvania

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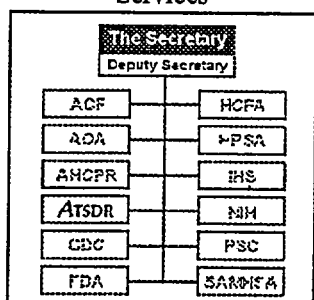
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## U.S. Department of Health and Human Services



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## ATSDR Involvement

### ➤ CERCLA process

➤ Agency can be requested to investigate  
contaminants released to the environment

### ➤ Requested by local resident

➤ Evaluate the impact on the public's health  
resulting from the potential exposure to  
radiological material known to have been  
disposed of at the ACC location

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## Exposure Investigation

- "The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances."

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## EI Criteria

- Can an exposed population be identified?
- Does a data gap exist that affects your ability to interpret whether a public health hazard exists?
- Can the data gap be addressed by an Exposure Investigation?
- How would the Exposure Investigation results impact public health decision making?

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## Data Analysis

- Standard statistical analysis of electronically stored data
- Monte Carlo simulations using commercial software package
  - All information available upon request

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### Participants and instrumentation

- PADEP, NRC Region I, ATSDR Region III, and EPA Region III
- Survey instruments used
  - Ludlum 19 (2)
  - Exploranium G130 minispectrophometer

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### On site survey

- Readings collected outside fence
- Inside fence
  - Top of pile
  - Slope
  - Foot
- Railway and footpath
- Surrounding neighborhood

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### Results of Exposure Investigation

- developed 2 exposure scenarios
- performed a simulation of potential exposures for individuals living around the site.
- the most plausible scenario suggested that the potential annual exposure was less than 35 mrem/y

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## Recommendations

- A more detailed dose assessment be performed by the state and federal regulatory agencies using realistic exposure scenarios for this site;
- Consideration be given to further characterization of the pile; and
- Public meetings should be held in the city of Reading to educate the public to the hazards and risks associated with radiation exposure.

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## Cabot Comments

- Did not consider existing studies and reports
- Report contains a number of errors
  - ATSDR does not understand a number of factual considerations
    - Led to erroneous and inappropriate conclusions in its evaluation of the potential public health concerns

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## Cabot Comments (cont)

- Insufficient detail to allow for third party critical review and evaluation
- Screening assessment did not consult extensive body of previous assessments at the site, especially as it pertains to the "average member of critical group" methodology
- ATSDR conclusions and recommendations are erroneous based on these comments

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Cabot Concern: ATSDR did not consider a number of existing studies and reports

- The purpose was to evaluate potential exposures present at that time, not retrospective exposures
  - Then attempt to project future exposures based on the current exposure parameters
- ATSDR was aware that previous dose assessments had been performed
  - Based on correspondence in our possession as well as discussions with representatives of the EPA, NRC and PADEP.

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Cabot Concern: Report contains a number of errors

- ATSDR appreciates Cabot calling attention to the unclarified statements in the HC
- In our reference number 3, Figure 1 in that report shows areas on the slag pile that were measured for residual radioactivity in the 1985 surveys

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Cabot Concern: Report contains insufficient detail to allow for critical review and evaluation

- All information is available upon request
  - Locations
  - Collected data
  - Spectra from handheld instruments
  - Spreadsheets used for analysis

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**Cabot Concern: No consulting of previous assessments; no use of average member of critical group"**

- The EI was not to derive a critical group exposure and effective dose
  - determine if additional dose characterizations would be necessary to ensure protection of the public
- The doses are below the ATSDR MRL of 100 mrem/y
  - no further public health issues as it pertains to the American Chain and Cable site
- Any additional activities will be determined by the regulatory agencies.

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**Cabot Concern: ATSDR conclusions and recommendations are erroneous**

- The HC specifically states "ATSDR is concerned, in the case of additional site characterization and/or remediation, that activities resulting in soil disturbances could lead to potential public health issues. This is especially true since one of the radiological contaminants, thorium, if present in the air, is very restrictive with respect to public exposure (Code of Federal Regulations, Title 10, Chapter 20, 10CFR20, Table II). This regulation limits the thorium concentration in air to 4 pCi/L, an amount if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 30 mrem, one half of the ATSDR MRL" (emphasis added).

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**ATSDR Review of Cabot Characterization Report**

- Contains technical errors
  - no accounting for radon loss as this can affect secular equilibrium, especially during sample preparation
  - Th 232 decay chain not understood
    - Use of Th 228 for Th 232 and Tl 208 for Th 232
    - Rn 220 loss/ Tl 208 branching ratio
  - Gamma spec analysis
    - Use of single peak for identification
    - Ra 226 (186 keV) interference with U 234 analysis

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## ATSDR Methodology

- Use of ICRP dose coefficients
  - FGR 13 CD-ROM
- Use of site specific exposure factors when available
  - Use of EPA exposure factors as alternate

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## ATSDR Minimal Risk Level Non-Cancerous Effects

- A screening level for chronic exposure
  - ATSDR believes protective of human health
  - The MRL is set at one-third the average background level of radiation in the United States

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## MRL Examples for Uranium

| Exposure           | Dose         | MRL                   | Dose                     | Source                       |
|--------------------|--------------|-----------------------|--------------------------|------------------------------|
| Inhalation (S)     | Intermediate | 0.4 ug/m <sup>3</sup> | 0.15 mg/m <sup>3</sup>   | LOAEL, Richardson 1996       |
| Inhalation (I)     | Intermediate | 8 ug/m <sup>3</sup>   | 1.1 mg/m <sup>3</sup>    | NOAEL, Richardson 1996       |
| Inhalation (S)     | Chronic      | 0.1 ug/m <sup>3</sup> | 0.05 mg/m <sup>3</sup>   | NOAEL, Steingard et al. 1977 |
| Oral               | Intermediate | 2 mg/kg/d             | 0.05 mg/kg/day           | LOAEL, Green et al. 1998b    |
| External Radiation | Acute        | 400 mrem              | 10 <sup>4</sup> rad/year | NOAEL, Dost 1966             |
| External Radiation | Chronic      | 100 mrem/yr           | 250 mrem/year            | NOAEL, BEIR V 1990           |

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## 50 mSv Committed Dose for 70 year Exposure

- Used for long term health effects
  - Based on cancer induction
  - Peer reviewed literature
- Historical data
  - Bomb survivors
  - Accidents
  - Radium dial painters
  - others

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