

460066

SUPERFUND SITE CLOSE OUT REPORT

Lansdowne Radiation Site
Lansdowne, Pennsylvania

I. SUMMARY OF SITE CONDITIONS

Background

The Lansdowne Radiation Site consisted of a three-story duplex dwelling at 105-107 East Stratford Avenue, Lansdowne, Pennsylvania, the grounds surrounding the dwelling and the municipal sewer line on East Stratford Avenue.

During the period 1924-1944, Dr. Dicran Kabakjian, a physics professor at the University of Pennsylvania, processed radium ore in the basement of 105 East Stratford Avenue and used that radium in the manufacture of medical devices including radium implant needles for cancer therapy. Apparently, no precautions were taken to prevent contamination of people or surroundings, and process effluent from the refining operations permeated all parts of the dwelling, including the adjacent 107 side of the duplex. Dr. Kabakjian apparently disposed of liquid waste products down sinks and toilets. Broken laboratory apparatus, empty chemical bottles and "tailings" from the operation were disposed of on the grounds of the 105-107 properties and on adjoining parcels. Tracking of the wastes on shoe soles and other mechanical movements resulted in extensive contamination of the house and grounds.

In 1963, the Pennsylvania Department of Health inspected the house and found extremely high levels of radioactivity. In 1964, the U.S. Public Health Service and the Pennsylvania Department of Health made a joint attempt to decontaminate or stabilize the existing contamination in the 105 residence. They sanded, vacuumed, scraped off or otherwise physically removed the exceptionally "hot spots", sealed the contaminated fireplaces, and stabilized areas of lesser contamination under several layers of paint or stucco. These activities largely eliminated the dangers from alpha emitters and reduced the dose level of gamma radiation in the 105 side of the house from approximately 15 rem/year to about 1.5 rem/year for persons spending 16 hours/day in the house. The 1964 cleanup did not address contamination in the 107 residence, the neighboring garages, the soil or the sewer.

In 1983 the Pennsylvania Department of Environmental Resources informed EPA of the existence of the site. EPA visited the site, discovered elevated radiation levels, and

contacted the Argonne National Laboratories for assistance. As a result of the determination of elevated radiation levels, an "Action Memorandum" was developed by the EPA, Region 3 Emergency Response Section and was subsequently signed by the Regional 3 Regional Administrator. The Removal Action which resulted served to temporarily relocate residents of the dwellings, seal the house, establish security, and remove non-contaminated portable items from the dwellings. It also allowed the Argonne National Laboratory to conduct extensive radiation surveys and to produce documents pertinent to the radiological assessment and the site remediation.

Remedial Planning Activities

The Centers for Disease Control (CDC) advised EPA in July 1984 that long-term residents of the dwellings were endangered due to the elevated gamma radiation and radon daughter levels.

During October through December 1984, the Argonne National Laboratory investigated the property under an Interagency Agreement (IAG) between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE).

The Argonne investigation found elevated levels of radiation in the house, in the soils near the house, and in the sewer line on East Stratford Avenue. Radiation levels found in the house during the investigation ranged as high as 900,000 disintegrations per minute per 100 square centimeters beta-gamma and 200,000 disintegrations per minute per 100 square centimeters alpha as determined by PAC-4G-3 instrument measurements. Ambient radiation levels were as high as 183 micro-Roentgens per hour (uR/h) in the 105 residence. Air samples revealed radon daughter Working Levels (WL) ranging from 21 milli-Working Levels (mWL) to 309 mWL inside the structure. These levels were well above the 20 mWL limit recommended in 40 CFR 192 (Radiation Protection Programs) and the 20 uR/h above-background standard also set in 40 CFR 192 for occupied buildings.

Soil samples obtained on the site showed that radium concentrations were as high as 700 pico-Curies per gram (pCi/g) and that the contamination penetrated into the soil to a depth of eight feet.

On March 7, 1985, the Acting Regional Administrator nominated the Lansdowne Radiation Site for inclusion on the National Priorities List (NPL) under the mechanism provided in Section 300.66(b)(4) of the National Contingency Plan (40 C.F.R. 300.66(b)(4)). The site was promulgated on the NPL on September 1, 1985.

Documents generated by Argonne National Laboratory as a result of the assessments made during the Immediate Removal Action of 1984-1985 were utilized as the Remedial Investigation/Feasibility Study for the purposes of remedial activities. These documents were: (1) Radiological Assessment Report For The Lansdowne Property, September 1985; (2) Remedial Action Plans and Procedures For the Lansdowne Property, June 1985; (3) Safety Plan For the Decontamination and Dismantling Of The Lansdowne Property, June 1985. These documents were placed in a repository for public review.

On August 2, 1985, the Regional Administrator approved a Record of Decision (ROD) which called for the permanent relocation of the residents of 105 and 107 East Stratford Avenue and the purchase of these properties under the Uniform Relocation Act. However, implementation of these actions became unnecessary. The sole occupant and owner of 105 East Stratford Avenue died and the sole occupant of 107 moved to a new residence without government assistance. The Commonwealth of Pennsylvania awarded the owners of the two properties monetary compensation equal to the fair market value of those properties. The owners retained their respective ownerships of the lots.

On September 22, 1986, the Regional Administrator approved a second Record of Decision (ROD) which selected dismantlement of the contaminated structures, excavation of contaminated soil, removal of the contaminated sewer line, and offsite disposal of the radium-contaminated materials as the remedial action alternative.

On March 25, 1987, an Interagency Agreement between EPA and the U.S. Army Corps of Engineers (USACE) was completed. Under the IAG, USACE would develop a Request For Proposal (RFP) which interested contractors would utilize to develop proposals for the completion of the site remediation. One of the provisions of the USACE RFP was that all soil contamination was to be remediated to a level not to exceed 5 pCi/g above background.

A Superfund State Contract (SSC) dated September 14, 1987 was developed between Commonwealth of Pennsylvania, Department of Environmental Resources and EPA. This SSC

provided that the state would pay 10% of the remedial action costs as required by CERCLA. The SSC does not provide for the costs of any operation and maintenance activities.

The RFP was advertised in the Commerce Business Daily (CBD) and resulted in the submission of several proposals by interested contractors. USACE evaluated the proposals and awarded the remedial action contract to Chem-Nuclear Systems, Inc. on April 26, 1988.

Remedial Construction Activities

On June 1, 1988, USACE issued the Notice to Proceed to Chem-Nuclear Systems, Inc., so that remedial action activities could commence. A public meeting was held July 13, 1988 in the Borough of Lansdowne and a presentation was given to all interested citizens and government officials on the cleanup activities. USACE reviewed the various plans submitted by the contractor, revisions were made, and actual onsite work began August 1, 1988.

Onsite remedial activities included the set up of response trailers on E. Stratford Avenue, fencing of the 105-107 E. Stratford Avenue properties, placement of radiation monitoring devices around the perimeter of the property, removal of trees and brush, dismantlement of the 105-107 E. Stratford Avenue houses and dismantlement of four garages. Approximately 4109 tons of radium-contaminated soil was excavated and 1430 tons of contaminated rubble was generated. The contaminated rubble included 243 feet of sewer line which was removed from E. Stratford Avenue. All radium-contaminated materials were shipped to Envirocare of Utah, Incorporated for land disposal. No portion of the site contained radium contamination in the soil in excess of 5 pCi/g above the background levels of 1.5 pCi/g at the end of the remedial action.

Site restoration activities included replacement of the sewer line on East Stratford Avenue, backfill of excavated areas with clean soil, establishment of grass soil cover, rebuilding of two of the garages, planting of trees and shrubs, re-surfacing of E. Stratford Avenue, and replacement of damaged sidewalks and curbing.

Onsite Remedial Construction activities were virtually complete in July, 1989 and the Remedial Action contractor completed demobilization on July 25, 1989. A pre-final inspection was conducted on July 13, 1989 resulting in a list of 21 items which required some degree of completion. These items were completed by October 31, 1989.

On November 8, 1990, USACE submitted the final Post Remedial Action Report in four volumes dated June 1990. That Report consists of: Volume One, Government Operations; Volume 2, Contractor Operations; Volume 3, Radiological Closeout Documentation; and Volume 4, Radiological Oversight and Certification. The EPA Remedial Project Manager approved the report as "Final" on November 16, 1990.

Community Relations Activities

Since this site posed a threat to the residents of the Borough of Lansdowne and was the object of considerable public interest, the Region 3 Community Relations and Remedial Response staffs conducted a very active campaign to ensure that the local residents, the local governments and PADER were well informed about the activities relative to the site. Community Relations activities included public meetings, neighborhood meetings, meetings with Borough of Lansdowne and Delaware County officials, press conferences, routine publication of progress fact sheets and a tour of the site response trailer facilities by Borough officials. A ceremony was held at the site to commemorate the completion of the remedial response at which Borough, State and federal officials made presentations.

II. DEMONSTRATION OF QA/QC FROM CLEANUP ACTIVITIES

The remedial action contractor's plans and the contractor's actual cleanup activities were carefully scrutinized by EPA, USACE, and Argonne National Laboratory personnel for compliance with relevant quality assurance/quality control (QA/QC) procedures and protocol.

Since all radium-contaminated materials were removed from the site for land disposal in Utah, the soils remaining onsite were carefully evaluated to assure compliance with the 5 pCi/g above background cleanup standard for radium. Verification that this cleanup standard was met is documented in Volume IV, "Radiological Oversight and Certification" of the Post Remedial Action Report.

The QA/QC program utilized throughout the remedial action was sufficiently rigorous and was adequately complied with to enable the determination by EPA, USACE, and the Argonne National Laboratory that all analytical results reported are accurate to the degree needed to assure satisfactory execution of the remedial action consistent with the remedial design specifications.

III. MONITORING RESULTS

The Specifications (for Service Contract), Request For Proposal No. DACW4588R0002 dated December 1987 required that the contaminated materials were to be disposed of offsite in an approved radioactive waste land disposal facility and that all soils remaining onsite were not to exceed radium concentrations of 5 pCi/g above background.

Volume IV, "Radiological Oversight and Certification" of the Post Remedial Action Report presents the results of the verification soil sample analyses. The measured radium 226 (^{226}Ra) soil concentrations in all of the final verification samples analyzed were less than the clean-up criterion of 5 pCi/g above the natural background level of 1.5 pCi/g. The quantity of ^{226}Ra in each sample was determined from the bismuth 214 (^{214}Bi) 609 KeV gamma-ray after a minimum of 20 days for daughter product ingrowth in a sealed Marinelli beaker. The ^{226}Ra activity concentration from the analysis of 393 soil verification samples was 5.49 pCi/g, including the natural presence of ^{226}Ra in the soil.

IV. SUMMARY OF OPERATION AND MAINTENANCE

Operation and maintenance activities, i.e. maintenance of sidewalks and grass mowing, have been assumed by the property owners.

V. SUMMARY OF FIVE YEAR REVIEW STATUS

It is EPA's general policy not to delete sites from the NPL which involve remedial actions which result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow unlimited use and unrestricted exposure, until at least one five-year review has been conducted following completion of all remedial actions at a site (except operation and maintenance), any appropriate actions have been taken to ensure that the site remains protective of public health and the environment, and the site meets EPA's deletion criteria. The remedial action implemented at the Lansdowne Radiation Site involved removal of all radium-contaminated debris and the excavation of soils to a maximum of 5 pCi/g above background levels. As a result of implementing this remedy, hazardous substances, pollutants, and contaminants were removed from the site allowing for unlimited use and unrestricted exposure. Consistent with NCP section 300.430(f)(4)(ii), five year reviews are not necessary for this site (40 C.F.R. 300.430(f)(4)(ii)).

VI. PROTECTIVENESS


All of the completion requirements for this site have been met as delineated in OSWER Directive 9320.2-3A. Specifically, confirmatory sampling has verified that the cleanup objectives, removal of all contaminated rubble to an offsite disposal facility and excavation of all soil exceeding 5 pCi/g above natural background have been accomplished.

The total annual radiation effective dose equivalent received by a member of the population in the United States from various sources of natural radiation exposure is estimated to be 300 milli-rem (mrem). The Argonne National Laboratory personnel calculated the annual dose equivalent on the site after backfilling to be about 75 mrem.

A bibliography of the documents relevant to this Close Out Report is attached. These documents can be made available by calling the Region 3 office at (215) 597-8996.

Approved By:

Disapproved by:

 **FEB 28 1991**
Regional Administrator Date

Regional Administrator Date

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4. Remedial Action Plans and Procedures For The Lansdowne Property; Argonne National Laboratory; June, 1985.
5. Safety Plan For The Decontamination Of The Lansdowne Property; Argonne National Laboratory; June 1985.
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12. Record of Decision/Remedial Alternative Selection; U.S. EPA, Region 3; September 22, 1986.
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