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Office of
Emergency and
Remedial Response

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August 1985

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Superfund Record of Decision:

Lansdowne Radiation, PA

TECHNICAL REPORT DATA
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16. ABSTRACT

The Lansdowne Radiation site consists of a duplex located at 105/107 East Stratford Avenue Avenue in Lansdowne, Pennsylvania. The building is located on a side street in a residential area, approximately two miles from Philadelphia. The dwellings are contaminated with radium and other radionuclides as the result of work done in one of the houses to refine radium and produce medical devices from 1924 through 1944. Radiation levels in the houses exceed current EPA guidelines and the Center for Disease Control has issued a Public Health Advisory which states that, "..exposure levels are in excess of those considered safe for human habitation."

The selected remedial action includes permanent relocation of the residents in 105 and 107 East Stratford Avenue. This will entail purchasing the property at fair market value under the Uniform Relocation Act.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field Group
Record of Decision Lansdowne Radiation, PA Contaminated Media: wood, soil Key contaminants: radium, radon and other radionuclides		

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RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE: Lansdowne Radiation Site, Lansdowne, Pennsylvania

Documents Reviewed:

I am basing my decision principally on the following documents describing the analysis of cost effectiveness and feasibility of remedial alternatives for the Lansdowne Radiation Site:

- Public Health Advisory, Centers for Disease Control, March 5, 1985
- Radiologic Assessments-Interim Reports, Argonne National Laboratory, February 28, 1985 and March 14, 1985
- Remedial Action Plans and Procedures for the Lansdowne Property, 105-107 East Stratford Avenue, Lansdowne, PA, Argonne National Laboratory, June 1985
- Staff summaries and recommendations
- Recommendations by the Pennsylvania Department of Environmental Resources

Description of the Selected Remedy:

- Permanent relocation of the residents in 105 and 107 East Stratford Ave. This will entail purchasing the property at fair market value under the Uniform Relocation Act.
- There will be no operation and maintenance associated with this action.

Declaration

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (42 U.S.C. §9601-9657), including Section 101(24), and the National Contingency Plan (40 CFR Part 300), I have determined that the remedial action described above, constitutes a cost-effective remedy which mitigates and minimizes damage to public health, welfare, and the environment. The remedial action provides for the permanent relocation of the two families affected at the site and eliminates any further exposure of the occupants to the radiation. The remedial action does not affect any floodplain or wetland areas. The Commonwealth of Pennsylvania has been consulted and agrees with the approved remedy. In addition, the action will require no operation and maintenance activities.

I have determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

August 2, 1985

DATE

James M. Seif
Regional Administrator
EPA Region III

SUMMARY OF REMEDIAL ALTERNATIVES SELECTION
LANSDOWNE RADIATION SITE

Site Description (see figures 1 and 2)

The Lansdowne Radiation Site consists of two attached residences located at 105/107 East Stratford Avenue in Lansdowne, Pennsylvania. The building is located on a side street in a residential area, approximately two miles from Philadelphia. The Borough of Lansdowne is approximately 1.1 square miles and the population is approximately 11,000. The dwellings are contaminated with radium and other radionuclides as the result of work done in one of the houses to refine radium and produce medical devices from 1924 through 1944.

The site in not located in a floodplain and the nearest surface water is the Darby Creek, located approximately three quarters of a mile southeast of the site. The residents in the area are on public water supplied by the Philadelphia Suburban Water Company from surface water reservoirs approximately ten miles north of the site.

Radiation levels in the houses exceed current EPA guidelines and the Centers for Disease Control has issued a Public Health Advisory which states that, "... exposure levels are in excess of those considered safe for human habitation. Occupancy of this building for residential or commercial purposes will constitute a significant health risk."

FEMA has provided temporary housing for one of the residents under a temporary relocation measure. The resident from the other half of the twin was marrying at the time of the relocation and moved to another location nearby with her new husband. Fire and intrusion alarms were installed by EPA during an Immediate Removal action in January, 1985. A one-thousand-gallon water bladder was also installed in the basement and attached to an automatic sprinkler system.

Analysis of the radon and radon progeny on the site, along with a thorough analysis of other radionuclides, was performed by the Department of Energy's Argonne National Laboratory. This analysis shows that the structure of the houses as well as the ground around them is contaminated. Although one of the homes was the subject of an intensive decontamination effort in 1964, the contamination persists in the walls, floors and ceiling. No further decontamination can be performed without removing the structural members, walls and floors. Furniture and appliances that are uncontaminated have been turned over to the residents at their new locations. Furniture that cannot be decontaminated or that the residents did not take to their temporary housing has been left in the house pending later remedial actions.

SITE GEOLOGY

The Lansdowne area lies in the Wissahickon Formation which consists of mica shists and gneiss. Borings on the property showed shists and gneiss at depths between eight and twelve feet. Groundwater in this low-yield aquifer is expected to be 10-20 feet below the surface. Although no known wells are operating in the area, records from previous wells located nearby in the aquifer of concern show water at an average depth of 18 feet below the surface. Soil samples show radium contamination has penetrated at least three feet into the soil.

SITE HISTORY

In 1910, Dr. Dicran Kabakjian, a professor of physics at the University of Pennsylvania, developed a process for the purification of radium. This process was used from 1913 to 1922 by a local company that employed Kabakjian as a consultant.

Two years after the company closed down in 1922, the professor opened what was essentially a family-run business in his house at 105 E. Stratford Avenue. He continued to produce radium implant needles used by physicians in the treatment of cancer. He also repaired broken ones and worked with other medical devices for twenty years.

In 1945, Dr. Kabakjian died at the age of 70. Although he suffered from emphysema and a fibrous tissue buildup in his lungs, these conditions were not linked directly to radium exposure.

In 1949, four years after Dr. Kabakjian's death, 105 E. Stratford (the Kabakjian side of the twin) was sold to the Tallant family, who later sold the house to the Kizirian family in 1961.

In 1963, based on information gathered from private individuals, the State Department of Health inspected the house and found extremely high levels of radiation. State officials began to look for a way to clean up the site. Unable to address the problem and cleanup through state or federal regulations, the Pennsylvania Department of Health ordered the Kizirian family to decontaminate their own home. The Kizirian family was able to enlist the help of a local congressman and eventually the U.S. Public Health Service (USPHS) and the Pennsylvania Department of Health decontaminated the 105 E. Stratford portion of the twin as a demonstration project in 1964. The U.S. Air Force also contributed to the decontamination effort by supplying a mobile radiation laboratory to monitor the cleanup.

The actual decontamination effort consisted of removing as much radium as practical by sanding, scraping, vacuuming, and washing the house walls, floors and ceilings. Some concrete floor and wooden floorboards were also removed. After the cleanup, the house received epoxy-based paint coatings to limit the migration of the radium that remained deeply embedded in the actual structure. It is postulated that the acid fumes from the radium purification procedure used and spills carried the radium contamination deep into the wood and plaster of the home.

The decontamination was completed in the summer of 1964 and the Kizirian family was allowed to move back into 105 E. Stratford on September 6, 1964. Four months later, the Pennsylvania Department of Environmental Resources questioned the level of contamination remaining and was told by the USPHS that based on a 16 hour-per-day exposure, the radiation dose rate received by the occupants was just above the then existing guidelines of 0.5 rem/yr, and that further decontamination of the house would be impractical. The Kizirian family continued to live in the house.

Just on the other side of the common party wall of the twin home, at 107 E. Stratford Avenue, the Bashore family was still in the home they occupied since 1919, the same year the Kabakjians moved into 105. No action was taken at 107 in 1964, when the contamination in 105 was addressed.

CURRENT STATUS

In 1983 the EPA was requesting information from all states concerning radioactive sites that may be eligible for Superfund cleanup monies. The Pennsylvania Department of Environmental Resources (DER) notified EPA of the Lansdowne site and its previous contamination.

In early 1984, EPA and DER sampling and monitoring of the structure showed high radon and gamma radiation levels in 105 (the Kizirians) and high radon levels along with lower gamma levels in 107 (the Bashores). Additionally, very high levels of radiation have been measured in the soil around the properties. In March 1984, the Chronic Disease Division of the Centers for Disease Control (CDC) wrote that based on the measured levels, "... the entire duplex structure should be considered to pose a significant health risk to longterm occupants."

The various levels of radiation measured are summarized below:

TYPE	PERMISSIBLE LEVEL	105 E. Stratford	107 E. Stratford
Gamma	0.17 rem/yr	1.6 rem/yr	0.33 rem/yr
Radon	0.03 WL	0.021-0.309 WL	0.023-0.106 WL
Total Soil Activity	5-15 pCi/g	2800 pCi/g	283 pCi/g

NOTES: 1. Permissible gamma level is the accepted limit for exposure to the general public.

2. Radon levels are expressed in Working Levels (WL) originally developed for uranium miners.

3. Soil activity limits are action levels for uranium mill tailing sites.

Although immediate relocation of the occupants was not deemed necessary at that time, additional sampling was conducted to define the nature and the extent of the contamination. Argonne National Laboratory's assistance was requested by EPA for this effort. Argonne took samples in and around the twin home and levels of alpha and gamma radiation were found to exceed the EPA standards in both dwellings.

In September 1984, EPA in coordination with the Federal Emergency Management Agency (FEMA) began a temporary relocation effort for both families in the house. These actions were taken as part of a larger effort to minimize the threat to the local community and the environment. Mrs. Kizirian was moved to an apartment in the area. Mrs Bashore declined the relocation for personal reasons. She was remarried in November and moved in with her new husband not far from the site.

Other actions taken at the time included the installation of a burglar alarm and fire alarm system along with a full sprinkler system throughout the structure. The insides of all the windows were sealed with plastic to minimize the chances of any radioactive particles leaving the house and other security measures were taken to minimize the danger of vandalism.

Some of the furniture in the homes was found to be free of contamination and was removed for the residents' use. Contaminated furniture and household belongings were left in the home. A number of small items like tools were found contaminated in 105 and were placed in drums which have been stored in the basement. Several pieces of wood furniture in 107 had been found to have slight contamination and initial decontamination efforts failed to remove all of the radium. Further work will be done to determine if it is possible to clean and then return the furniture. Mrs Bashore (now Louderback) would like to save pieces of the furniture for their value as heirlooms and antiques. If the decontamination cannot be performed without ruining the pieces, the furniture will be disposed of with the other contaminated material.

At the same time these actions were being taken, Argonne was conducting a detailed laboratory analysis of their samples taken earlier, to determine if other species of radioactive materials were present on the site. These tests confirmed the presence of other nuclides including actinium, thorium and protactinium.

Environmental concerns are minimal at this time. The radon gas levels outside the structure are at background levels. The gamma levels measured do not pose an immediate danger to the residents in the area or to wildlife. Some migration of the contamination is expected off-site and will be addressed in a future operable unit of any remedial action at the site. Further extent-of-contamination studies will be conducted during the design of remedial actions for the structure itself.

Analysis of Alternatives:

Alternative 1 - No Action

This alternative involves no remedial action and leaves the houses in their existing state. The temporary relocation conducted under the Removal program would cease in October 1985. If the residents moved back into the homes they would be exposed to high levels of radiation that present a known health hazard. If the houses remain vacant, vandalism or fire could spread the radium contamination and expose the surrounding population to more risk. House repairs would be dangerous for the persons performing the work. Repairing the walls, porches or doorframes or any similar activity would likely disturb the radium contamination imbedded in the structure and cause it to be released. There are no capital costs associated with this alternative.

Alternative 2 - Decontamination

The 1964 decontamination effort removed what was practical without dismantling the structure and rebuilding it. The contamination that remains is primarily deeply embedded in the actual materials with which the house is constructed. It is also unknown if any radium has worked its way under the house and is contributing to the radon gas levels. Consequently, actual "decontamination" is not technically possible. Only through the actual removal of the contaminated structural material can the decontamination be accomplished. No costs or time estimates were calculated for this alternative since it is not technically feasible.

Alternative 3 - Removal of the Contaminated Structure and Soil; Rebuild the Houses.

This alternative would involve the removal of the contaminated structure and the surrounding contaminated soil to an approved offsite disposal facility.

After the structure and contaminated soil are removed, the site would be backfilled with clean fill and new houses would be constructed for the residents. During the cleanup phase and the construction period, the two families would continue to be provided temporary housing.

The costs of this alternative have been calculated to be: $3,400,000 - $3,800,000 for the dismantling and disposal of the existing structure; $265,000 for the reconstruction, and $15,000 for temporary relocation expenses. The time to accomplish the work has been estimated to be four months for the design, ten months for the clean-up and six months for the construction of the new homes.

Alternative 4 - Removal of the House, Permanent Relocation of the Residents

This alternative is the same as Alternative 3 except the lot will be left vacant. In order to accomplish this alternative, it will be necessary to take a permanent relocation action. This will require an interagency agreement with FEMA to acquire the properties from the two families at fair market value. Once this is accomplished, EPA will be able to proceed with the remedial actions. The capital cost of this alternative has been estimated at $3,400,000 - $3,800,000 for the dismantling and disposal of the existing structure, and $150,000 for the permanent relocation costs. The time to accomplish this work has been estimated at four months to design the remedial action and ten months to perform the clean-up.

RECOMMENDED ACTION

Section 300.68(j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost effective (i.e., the lower cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to, and provides adequate protection of, public health, welfare, or the environment. Based on our evaluation of the cost-effectiveness of each of the proposed alternatives, of the comments received from the public, and of information received from the Pennsylvania Department of Environmental Resources, we recommend:

Alternative 4 - Removal of the House, Permanent Relocation of the Residents

This alternative will consist of at least two operable units. This Record of Decision has been prepared to accomplish the actual purchase of the properties in order that further remedial actions could be undertaken as second or later operational units.

This decision will allow EPA to enter into an interagency agreement with FEMA to purchase the contaminated properties. At the same time, further studies and recommendations will be completed by EPA which will detail the methodology of dismantling the structure and its ultimate disposal.

Based on the information gathered through our investigations and the work done in 1964 to decontaminate 105, it is clear that the existing structure is too contaminated for decontamination procedures to be practical. Remedial actions involving the actual cleanup are expected to be accomplished as the second operable unit following the implementation of this unit.

OPERATION AND MAINTENANCE

There will be no operation and maintenance associated with the actual purchase of the properties. Further Records of Decision will be prepared for later operable units that will deal with the actual removal of the structure. Capital as well as operation and maintenance costs will be addressed in these documents.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The remedial action proposed will be coordinated with the State and the Federal Emergency Management Agency (FEMA) to insure that the provisions of the Comprehensive Relocation Act are followed.

SCHEDULE

Approve First Remedial Action Operable Unit (sign ROD)	8/01/85
Sign Interagency Agreement with FEMA for Relocation	8/09/85
Complete Permanant Relocation Actions (FEMA)	10/15/85
Complete Ongoing Studies and Approve Cleanup Operable Unit (sign second ROD)	9/30/85
Amend Cooperative Agreement with COE for Design	October 1985
Start Design	November 1985
Complete Design	January 1986
Amend Interagency Agreement for Construction	January 1986
Start Contruction	April 1986
Complete Construction	December 1986

EVALUATION OF ALTERNATIVES NOT SELECTED

Alternative 1, which is the "no action" alternative, was not chosen due to the inability of this option to remedy the existing contamination at the site. If the residents moved back into the homes, they would be exposed to high levels of radiation that present a known hazard. If they decided not to return to their homes, the property would be left vacant. Through vandalism, fire, malicious mischief, or even routine maintenance of the property, radium contamination could be spread on the site or throughout the neighborhood. Therefore, this alternative does not adequately mitigate or minimize damage to public health and the environment.

Alternative 2, which is the decontamination alternative, was not chosen because the action in 1964 showed that surface decontamination of the property was inadequate to address all the radium contamination within the structure. Only through dismantling and removal of the actual structural portions of the house could significant decontamination be accomplished. Therefore, this alternative was not selected because it is not technically feasible.

Alternative 3, which is the removal of the structure and contaminated soil followed by reconstruction of similar houses on the site, was not chosen for two reasons. First, neither property owner wants to move back to the site, even into a new home. Second, it would cost more than the fair market value of the properties to construct new, equivalent homes. This alternative would also include the cost of temporary housing for the period of dismantling and reconstruction. Therefore, based on the difficulty anticipated in moving the residents back onto the site, as well as the additional costs incurred in implementing this alternative, it was determined not to be cost effective or institutionally feasible.

SUMMARY EVALUATION OF RECOMMENDED ACTION

The chosen alternative meets the major objective of mitigating and/or eliminating exposure to radiation at the site. Purchase of the properties and later removal would eliminate the exposure of the occupants to radiation resulting from the contamination of the house structure with radium, radon, radon progeny and other radionuclides. A permanent relocation would compensate the property owners for the fair market value of their properties and would allow them to find permanent living quarters of their own choosing. This operable unit is consistent with the further remedial actions contemplated, including the dismantling of the structure and removal of the contaminated soil around it.

Lansdowne Responsiveness Summary

June, 1985

The history of radiation contamination at 105 East Stratford Avenue in Lansdowne, Pennsylvania (Delaware County) dates back to 1924. The residence was the site of a physics professor's basement laboratory, used for processing radium sources for hospitals, doctors and institutions for radiation therapy. In the early 1960's, the home was the subject of an intensive decontamination project conducted by the State and the U.S. Public Health Service that used state-of-the-art methods for that time, including sanding, scraping, vacuuming and washing. The walls, ceilings and floors were painted with epoxy paint to prevent further release of the remaining radium particles which were deeply entrained in the structure itself.

In late 1983, EPA began a survey of states to determine the existence of any radiation problems which might be addressed by the Superfund Program. As a result of the survey, the State of Pennsylvania's Radiation Program brought the site to EPA's attention. The state and EPA took measurements in June and July which revealed levels of gamma radiation and radon decay products above the recommended general population exposure levels in the 105 East Stratford Avenue home. The attached home at 107 East Stratford Avenue was determined to contain lower levels of radon decay products but these also exceed the levels recommended for general population exposure. The Centers for Disease Control (CDC) recommended that action be taken to remove the residents of both homes from exposure to the contamination.

The residents of 105 East Stratford Avenue were temporarily relocated in September, 1984. The residents of 107 East Stratford Avenue were temporarily relocated in November, 1984. Currently, the health threat exists only for long term continuous residents of the house.

On September 12, 1984 EPA met with the Lansdowne Borough Council to discuss the results of the testing. One week later, EPA attended a public Borough Council meeting. Five residents asked questions about the Lansdowne house. Their concerns were primarily health-related; they questioned the effect that radiation from the house might have on families that live in the same neighborhood. Concerns about property values were also discussed. Some of the former owners of the house attended the meeting and they asked to have their furniture tested. EPA's Region III radiation representative tested the furniture in the weeks that followed the meeting. Any furniture that showed radiation contamination was either decontaminated, or stored at the now vacant Stratford Avenue property. At the requests of several residents who owned and lived in homes close to 105-107 East Stratford Avenue, EPA's radiation representative tested their properties. A followup letter was sent to each property owner. Results of the radiation testing showed no levels of concern at those properties. EPA and Argonne National Laboratory began an intensive radiological assessment of the 105-107 East Stratford properties in September, 1984. Although the assessment report

is not yet complete, interim data has been used to take actions at the site. A fire alarm and sprinkler system were installed in the vacant houses by April, 1985, to eliminate the threat of vandals entering the building and to prevent a potential fire from occurring at the site. Fire could cause a release of radioactive material throughout the neighborhood around the properties.

In March, 1985, the CDC issued a public health advisory for the long-term residents of the homes, and later that same month the twin house at 105-107 East Stratford Avenue was placed on the proposed National Priorities List. This is the first such residential dwelling nationwide that has been proposed for inclusion on the NPL. The comment period following the proposal was shortened from 60 days to 30 days in an effort to expedite the process of finalizing the list and beginning the subsequent remedial actions. A public meeting was held on May 7, 1985, to inform the public of the actions which were already taken at the house, and to answer any questions that they had regarding EPA's future work at the site. Notice of the public meeting was made through a press release and an advisory on the UPI and AP newswires. The release was sent to all Philadelphia and Lansdowne newspapers, radio stations and television stations. UPI and AP carried the advisory on its daybook for the Philadelphia media. EPA staff at the meeting included the site On-Scene Coordinator, Remedial Project Manager, and Community Relations Coordinator. Before the meeting, the EPA officials met with both owners of the houses individually.

The first meeting was with the owner of 107 East Stratford Avenue and her attorney. She wanted some of her furniture sent to relatives after it was decontaminated, and she requested that she be reimbursed for the items if they could not be decontaminated. EPA explained that the cost-effectiveness of decontamination over replacement will be considered for each item. The property owner also informed EPA that she will be obtaining a private appraisal of her house. EPA explained that the house should be assessed at fair market value, as if the house were not contaminated. Her primary concern, however, was that she does not want to have a new structure built on the land, and that she would not feel comfortable living on that property. She wants to be reimbursed for her house, and not have another one built on the same lot.

Later that same day, EPA met with the son of the owner of 105 East Stratford Avenue. He informed EPA that he feels the house should have been dismantled in 1964, and he would like to go through the court system to find out if there are any responsible parties. He also wanted to know if his mother will be reimbursed for her home before the dismantling begins. EPA explained the procedure for appraising the home, and the process for reimbursement. The owners will be reimbursed before the dismantling begins. He was also interested in future use, such as who will own the land after the work is complete, and whether a house could be rebuilt on the lot. He was told that EPA works through the Federal Emergency Management Agency (FEMA) to relocate and/or to buy homes. EPA also explained that the lot could possibly be repurchased through FEMA and the State after the cleanup is complete.

The public meeting was held that evening at the Borough Council Building. About 100 residents attended. Due to the limited space at the Hall, future meetings will be held at a larger facility. The concerns of the residents centered on health issues and property values. They asked if an evacuation plan was available during the cleanup. EPA told the residents that staying indoors with the windows closed would be the safest action in the event of a problem arising during the dismantling but that continuous monitoring and security would be provided during the cleanup. A site specific safety plan would be coordinated with local officials as cleanup begins.

The biggest concern was from the local firemen, who said they would not fight a fire at the house, should one occur. They said they were never trained in firefighting at a radiation contaminated structure, and they felt that specific training was necessary. In response to their concern, EPA set up a training program for the firemen. On Sunday, June 9, 1985, the OSC, Remedial Project Manager, Community Relations Coordinator, and Region III's Radiation Representative spent the day with the firemen teaching them basics of radiation safety and decontamination procedures, and answering their questions about radiation contamination. EPA officials walked the firemen through the house, showed them the sprinkler system, and monitored each one of them as they left the property. The Radiation Representative displayed instruments to measure contamination and he explained how each one is used. The firemen told EPA that the workshop was helpful and very informative, and it alleviated many of their fears about the house. Most importantly, they said they would now fight any fire at the house and understood the hazards better.

All of the residents of Lansdowne, local officials, and the media are very interested in seeing the final Radiological Assessment Report being prepared by Argonne National Laboratory. When EPA receives and reviews the report, it will be placed in the repositories at Lansdowne Public Library, and Lansdowne Borough Hall, for all interested citizens to review. This report will detail the contamination found and procedures for dismantling and removing the house. Also, when the site appears on the NPL, and EPA knows what methods will be used to dismantle the structure, another public meeting will be held to discuss the reports and answer questions. The residents of Lansdowne are very interested in knowing how and when the house will be dismantled, and what the property will be used for once EPA's work is complete.