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Final Environmental Impact Statement

Remedial Actions at the Former Vitro Rare Metals Plant Site,

Canonsburg,
Washington County,
Pennsylvania

United States Department of Energy

July 1983

Volume I

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Cover Sheet
Final Environmental Impact Statement
Remedial Actions at the
Former Vitro Rare Metals Plant Site,
Canonsburg, Washington County,
Pennsylvania

- (a) Lead Agency: U.S. Department of Energy (DOE)
Cooperating Agency: U.S. Nuclear Regulatory Commission (NRC)
- (b) Proposed Action: Long-term stabilization and control of residual radioactive materials at an industrial park in Canonsburg, Pennsylvania designated a processing site for remedial action under the Uranium Mill Tailings Radiation Control Act of 1978 (Public Law 95-604).
- (c) For Further Information Contact: (1) Mr. James A. Morley, Manager, Uranium Mill Tailings Remedial Action Project, U.S. Department of Energy, Albuquerque Operations Office, 5301 Central Avenue, N.E., Suite 1700, Albuquerque, New Mexico 87108, Ph: (505) 844-3941; (2) Dr. Robert J. Stern, Director, Office of Environmental Compliance, U.S. Department of Energy, Office of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness, Room 4G-064, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585, Ph: (202) 252-4600; (3) Mr. Henry Garson, Esq., Assistant General Counsel for Environment, U.S. Department of Energy, Room 6D-033, Forrestal Building, 1000 Independence Avenue, S.W., Washington, DC 20585, Ph: (202) 252-6947.

For Copies of the FEIS, Contact: Mr. Morley at the above address.

- (d) Designation: Final Environmental Impact Statement (FEIS).
- (e) Abstract: This Canonsburg FEIS evaluates the environmental impacts associated with remedial actions in connection with residual radioactive materials remaining at the inactive uranium processing site located in Canonsburg, Washington County, Pennsylvania. The Canonsburg site is an 18.5-acre property that was formerly owned by the Vitro Rare Metals Company. The expanded Canonsburg site would be an approximately 30-acre property that would include the Canonsburg site (the former Vitro Rare Metals plant), seven adjacent private houses, and the former Georges

Pottery property. The processing plant located on the Canonsburg site was owned and operated by the Vitro Rare Metals Company and its successors in interest. During the period 1942 through 1957 the Vitro Manufacturing Company and its successor, the Vitro Corporation of America, processed onsite (contractor-owned) residues and ores, and government-owned ores, concentrates, and scraps to extract uranium and other rare metals. The Canonsburg site is now the Canon Industrial Park. In addition to storing the residual radioactive materials of this process at the Canonsburg site, approximately 12,000 tons of radioactively contaminated materials were transferred to a railroad landfill in Burrell Township, Indiana County, Pennsylvania (the Burrell site). This Canonsburg FEIS evaluates five alternatives for removing the potential public health hazard associated with the radioactively contaminated materials. In addition to "no action," these alternatives involve various combinations of stabilization of the radioactively contaminated materials in place or decontamination of the Canonsburg and Burrell sites by removing the radioactively contaminated materials to another location. In addition to the two sites mentioned, a third site located in Hanover Township, Washington County, Pennsylvania (the Hanover site) has been considered as a disposal site to which the radioactively contaminated materials presently located at either of the other two sites might be moved.

The five alternatives are: (1) no action; (2) decontamination of the Burrell site, transfer of the Burrell site's radioactively contaminated materials to the Canonsburg site, and stabilization of both the Canonsburg and Burrell sites' radioactively contaminated materials at the expanded Canonsburg site; (3) stabilization of the Canonsburg site's radioactively contaminated materials at the expanded Canonsburg site and the Burrell site's radioactively contaminated materials at the Burrell site; (4) decontamination of both the Canonsburg and Burrell sites, and disposal of all of the radioactively contaminated materials at the Hanover site; (5) decontamination of the Canonsburg site, disposal of its radioactively contaminated materials at the Hanover site, and stabilization of the Burrell site's radioactively contaminated materials at the Burrell site.

Alternative 3 is the DOE's preferred alternative.

Impacts associated with the proposed cleanup were assessed in terms of radiation, air quality, surface- and ground-water quality, soils, geology, mineral resources, aquatic and terrestrial ecology, noise, land use, socioeconomics, demography, and transportation networks. Under Alternative 1 the present situation would remain (i.e., the presence of radioactively contaminated materials at the Canonsburg and Burrell sites). The main impact of this alternative is that there would be 0.011 and 0.001 additional lung cancer deaths per year among the 68,488 people living near the Canonsburg and Burrell sites, respectively, due to the radioactively contaminated materials present. After any of the other alternatives are completed, the incremental chance for any individual living near any of the three sites dying from lung cancer arising from the radioactively contaminated materials would be approximately 1 in 20,000,000 per year. This is extremely small when compared with the

normally expected annual lung cancer death rate of 1 in 33. Aside from the radiological impacts, the impacts arising from the transportation of the radioactively contaminated materials and clean fill would be the most significant. If Alternative 3 is selected as the recommended action, the majority of the hauling would be for clean fill. This clean fill material would come from borrow pits located near each site. The use of 20-ton dump trucks to haul this clean fill material would create traffic, noise, and road deterioration problems, particularly on the narrow streets giving access to the Canonsburg site. The timing of the trips would be scheduled so that peak traffic hours and heavily traveled routes would be used as little as possible. Under all of the remedial-action alternatives, excavation of radioactively contaminated materials, addition of clean fill, and grading, would occur in the flood plain of Chartiers Creek. Alternative 2 or 3 would involve filling part of the flood plain to provide a base for the encapsulation cell.

Other potential impacts that could not be avoided include the possible local exceedance of the total suspended-particulate air-quality standard at the Hanover site under Alternatives 4 and 5, the disruption of the terrestrial ecosystems at each site, the disruption of local businesses, the inconvenience of the local residents through noise, travel, and aesthetic impacts, and the potential loss of land for future development. If Alternative 2 or 3 is chosen, at the expanded Canonsburg site there would be the loss of the former Georges Pottery buildings and the seven residences currently located on Wilson Avenue (also called Ward Street) and George Street adjacent to the Canon Industrial Park. The owners of the buildings and residences, and the businesses located on the expanded Canonsburg site would receive relocation assistance from the U.S. Department of Energy.

Local businesses and local government agencies could receive additional revenues from supplying the goods and services needed by the workers conducting the remedial action.

Several mitigation measures have been identified which, if implemented, would reduce or eliminate any remaining impacts. These measures could include emission controls on vehicles, stoppage of work during adverse weather conditions, covering exposed piles at the end of each day, placement of erosion-control berms, use of protective equipment, treatment of all waste water leaving the site, decontamination of all vehicles leaving the site, and personnel radiation protection measures. A monitoring program would be implemented during the remedial action to ensure that no significant releases of radiation, dust, soil, or other pollutants occur. After the project is completed, a long-term surveillance and maintenance program would be implemented to further ensure that the program accomplished its primary goal, i.e., remove the potential public health hazard associated with the radioactively contaminated materials.

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This Canonsburg FEIS contains several changes from the Canonsburg Draft Environmental Impact Statement (DEIS) issued by the DOE in November 1982. These changes include the following:

1. Use of the final U.S. Environmental Protection Agency (EPA) standards (40 CFR 192) in place of the proposed EPA standards (40 CFR 192 (proposed)).
2. Revision of the radiological discussions for the "no action" alternative to more accurately reflect the existing site conditions.
3. Increase of the radiological impact evaluation area at the Canonsburg site from 1.24 miles (2 kilometers) to 6.2 miles (10 kilometers).
4. Revision of the ground-water discussions to include new data and current modeling results.
5. Revision of Appendices A.1 and A.2 to reflect the most recent engineering designs.
6. Addition of a new appendix that assesses potential flood-plain impacts.
7. Addition of a new chapter containing public comments on the Canonsburg DEIS and the DOE's responses to these comments.

These changes are more fully described in Chapters 1 and 5. The changes respond to public comments, and provide the most current information available but do not represent substantial changes in the proposed action or significant new circumstances or information.

Additional information on the remedial-action activities at the three sites will be presented in several future documents as described in Section 1.6.

Final Environmental Impact Statement

Remedial Actions at the Former Vitro Rare Metals Plant Site

**Canonsburg,
Washington County,
Pennsylvania**

United States Department of Energy

July 1983

Volume I

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Abbreviations and acronyms

Glossary

List of preparers

List of agencies, organizations, and persons to whom copies of this statement
are being sent

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1 Summary

In response to public concern over the potential public health hazards associated with uranium mill tailings and associated residual radioactive material left abandoned or otherwise uncontrolled at several inactive processing sites throughout the United States, Congress passed the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), Public Law 95-604, which was enacted into law on November 8, 1978. In UMTRCA, the Congress acknowledged the potential health hazards associated with uranium-mill tailings. Title I of UMTRCA authorizes the U.S. Department of Energy (DOE) to enter into cooperative agreements with affected states and Indian tribes to clean up those inactive sites contaminated with uranium-mill tailings, requires the Secretary of the DOE to designate sites to be cleaned up, and charges the EPA to promulgate standards for these sites. The U.S. Environmental Protection Agency (EPA) has promulgated final standards (40 CFR 192) for remedial actions at inactive uranium-processing sites (40 FR 590-604, January 5, 1983). The EPA published an Environmental Impact Statement (EIS) (U.S. EPA, 1982) on the development and impacts of the standards (40 CFR 192). All remedial actions performed under the UMTRCA must be done in accordance with the EPA standards (40 CFR 192) and with the concurrence of the U.S. Nuclear Regulatory Commission (NRC), which will issue a license for the maintenance and monitoring of the disposal site after the cleanup work is complete.

The Canonsburg, Pennsylvania site is one of the sites identified in the UMTRCA as requiring remedial action. On November 8, 1979 it was designated as a high priority site by the Secretary of the DOE, and on September 5, 1980 the DOE and the Commonwealth of Pennsylvania (Commonwealth) entered into a cooperative agreement to perform remedial work at this site. As required by the National Environmental Policy Act of 1969 (NEPA, Public Law 91-190), this EIS has been prepared to discuss the potential environmental impacts of the proposed and alternative remedial-action strategies that could be performed at this site. The Canonsburg Draft EIS (DEIS) (U.S. DOE, 1982a) was issued in November 1982. Public and government comments on the Canonsburg DEIS (U.S. DOE, 1982a) were solicited through a notice in the Federal Register (47 FR 55305, December 8, 1982) and through a series of local public hearings held in January 1983 (see Chapter 6).

The Canonsburg FEIS includes several changes from the Canonsburg DEIS (U.S. DOE, 1982a). These changes are summarized in the paragraphs that follow, and are discussed in subsequent chapters of the Canonsburg FEIS.

1. The EPA published final standards (40 CFR 192) for remedial actions at inactive uranium processing sites (48 FR 590-606, January 5, 1983; effective March 7, 1983). These final standards contain several less stringent standards compared to the proposed standards (40 CFR 192 (proposed)) (45 FR 27370-27375, April 22, 1980 and 46 FR 2556-2563, January 9, 1981). The promulgation of these standards (40 CFR 192) resulted in design changes for the remedial-action program, such as a reduction in the overall cover thickness at the expanded Canonsburg site. One of the main differences between the proposed EPA standards (40 CFR 192 (proposed)) and the final EPA standards (40 CFR 192) is

that the amount of radon-222 that may be released from the surface of a disposal site has been increased by a factor of 10 (i.e., from 2 to 20 picocuries per square meter per second).

2. The description of the present (no action) radiological conditions was revised to more accurately reflect the existing situation at the Canonsburg site. The Canonsburg DEIS (U.S. DOE, 1982a) took a worst-case approach and considered the radioactively contaminated materials present on the Canonsburg site to be essentially uncovered and directly exposed to the biosphere. The Canonsburg FEIS considers the existing soil cover over these radioactively contaminated materials. This revision results in a reduction by a factor of 15 in the estimated level of radiological impacts resulting from the current condition (no action) of the Canonsburg site compared with that given in the Canonsburg DEIS (U.S. DOE, 1982a). This revision does not change the actual amounts of radioactively contaminated materials present on the Canonsburg site nor the actual radiological impacts either during or after the remedial action. The revision results only in a revised estimate of the present radiological situation on the Canonsburg site against which the potential radiological impacts during and after remedial action are compared. In other words, the physical impacts do not change, but the estimates of these impacts are more accurate.

The Canonsburg DEIS (U.S. DOE, 1982a) estimated that Alternative 2 or 3 would reduce the potential radiological impacts at the Canonsburg site by a factor of 700, compared with the no action alternative. Because of the changes described in these first two items, the Canonsburg FEIS estimates that Alternative 2 or 3 would reduce the potential radiological impacts at the Canonsburg site by a factor of 4, compared with no action.

The Canonsburg DEIS (U.S. DOE, 1982a) estimated a slight increase in the level of potential radiological impacts during the 96-week remedial-action period at the expanded Canonsburg site, compared with no action. Because the estimate of the potential radiological impacts under no action has been reduced, as described in this item, the Canonsburg FEIS estimates that the potential radiological impacts under Alternative 2 or 3 would be about twice those of the no action alternative during the 96-week remedial-action period.

3. The geographical area considered in the radiological impact evaluation for the Canonsburg site was increased from 1.24 miles (2 kilometers) to 6.2 miles (10 kilometers). This change permitted a more extensive assessment of the potential environmental impacts resulting from any of the alternative remedial actions.
4. Additional ground-water data were obtained. These data were collected at both onsite wells on the expanded Canonsburg site and at offsite wells both upgradient and downgradient of the expanded Canonsburg site. These data provide a more complete characterization of the

hydrological and geological conditions of the expanded Canonsburg site. A computer modeling study of the ground-water regime at the expanded Canonsburg site has also been completed. This more current information is included in the Canonsburg FEIS.

5. A new appendix (Appendix J) covering flood-plain impacts has been added. This appendix summarizes the project's potential environmental impacts on the flood plains of both Chartiers Creek and the Conemaugh River. This new appendix constitutes a flood-plain assessment in accordance with the DOE regulations (10 CFR 1022).
6. Appendices A.1 and A.2 (which in the Canonsburg DEIS (U.S. DOE, 1982a) were executive summaries of the engineering feasibility studies for in-situ stabilization of the Canonsburg and Burrell sites' radioactively contaminated materials, respectively) have been replaced in the Canonsburg FEIS by the executive summaries of the conceptual designs for in-situ stabilization of the radioactively contaminated materials at the expanded Canonsburg site and the Burrell site. These appendices provide a more current description of what the expected remedial actions would be at each site if the proposed alternative (Alternative 3) is accomplished.
7. A new chapter (Chapter 6) has been added to this Canonsburg FEIS to accommodate the comments on the Canonsburg DEIS (U.S. DOE, 1982a) received from the public and government agencies both at the public hearings and by letter. Chapter 6 also includes the DOE's response to each comment. Changes, corrections, and new information generated as a result of these comments have also been incorporated into the body of the Canonsburg FEIS.

These changes are more fully described in Chapters 1 and 5. The changes respond to public comments, and provide the most current information available but do not represent substantial changes in the proposed action or significant new circumstances or information.

The remedial actions described and evaluated in this Canonsburg FEIS would be conducted to accomplish one major goal: removing a potential public health hazard, i.e., that potential hazard associated with radioactively contaminated materials. The tasks performed in achieving this goal are as follows:

1. Establish the project background.
2. Collect the baseline data.
3. Identify the engineering alternatives.
4. Characterize the affected environment.
5. Evaluate the environmental impacts.
6. Conduct the remedial action.
7. Perform maintenance and monitoring activities.

1.1 PROJECT BACKGROUND

The Canonsburg site is located within the Borough of Canonsburg, Washington County, in southwestern Pennsylvania. It lies approximately 20 miles southwest of downtown Pittsburgh (Figure 1-1). The former Vitro Rare Metals Plant property (18.5 acres), now the Canon Industrial Park, is the area designated by the UMTRCA as containing the residual radioactive materials and is the area implied in this Canonsburg FEIS when discussing the Canonsburg site. The Canonsburg site is divided by Strabane Avenue and Ward Street into three separate areas: A, B, and C (Figure 1-2). Area A is the only developed area and contains the existing Canon Industrial Park buildings. Areas B and C are open areas along Chartiers Creek. Two other areas adjacent to the Canonsburg site, i.e., the former Georges Pottery property (6.1 acres) and the seven residences situated on Wilson Avenue and George Street (5.4 acres), are needed to complete the remedial-action alternatives involving onsite stabilization (Alternatives 2 and 3). The expanded Canonsburg site is approximately 30 acres in size, bounded by Chartiers Creek to the north, west, and east, and by the ConRail right-of-way to the south (Figure 1-3). The expanded Canonsburg site contains the Canonsburg site, the adjacent residential area, and the former Georges Pottery property. The expanded Canonsburg site is located in an urban area; e.g., across the ConRail tracks to the south, residences are as close as 250 feet to the expanded Canonsburg site.

In the early 1900's, the Standard Chemical Company initiated the development of a method to extract and concentrate radium from carnotite ore. The company established its radium-processing facilities at Canonsburg, Pennsylvania, and produced the first salable quantities of radium in 1913 (Standard Chemical Co., 1919). The company ceased processing operations in the early 1920's (probably around 1922), but continued to act as a marketing agent for some foreign radium producers.

Vitro purchased the Canonsburg facility in 1933 and utilized it for the extraction of uranium, vanadium, and radium from various residues, ores, and concentrates. From 1942 until the facility's closing in 1957, Vitro and its successor, the Vitro Corporation of America, owned and operated the plant on the Canonsburg site. The operations were directed toward the production of uranium concentrates. The only customer from 1942 to 1957 was the United States Government. The uranium, and other rare metals, were extracted from both onsite (contractor-owned) residues and ores and government-owned ores, concentrates, and scrap. During this time various ores, concentrates, and scrap materials were brought from different Atomic Energy Commission (AEC) installations to the Canonsburg site for uranium recovery. The end products of these processes were delivered to the AEC in accordance with terms of government procurement contracts. All solid process wastes were stored temporarily on the Canonsburg site. The liquid wastes were discharged through a drainage system beneath Strabane Avenue into the former swamp in Area C that discharged through a drainage ditch into Chartiers Creek. This swamp has since been filled in.

FIGURE 1-1
MAP OF SOUTHWESTERN PENNSYLVANIA
SHOWING THE LOCATION OF
THE THREE SITES - CANONSBURG,
BURRELL TOWNSHIP AND
HANOVER TOWNSHIP

**FIGURE 1-2
PRESENT CONFIGURATION OF THE
EXPANDED CANONSBURG SITE**

SOURCE
 MAP FROM BOROUGH AND TOWNSHIP MAPS CHECKED
 AGAINST PENNDOT COUNTY MAP (WASHINGTON CO -
 1976) AND USGS 7 1/2 MIN QUADS (PHOTOREVISED TO 1969)

TONED AREA - INCORPORATED
 BOROUGH OF CANONSBURG
 AND HOUSTON

FIGURE 1-3
MAP OF THE AREA AROUND THE
EXPANDED CANONSBURG SITE
BOROUGH OF CANONSBURG,
WASHINGTON COUNTY,
PENNSYLVANIA

On November 1, 1953, the government and Vitro entered into a contract (AT-(30-1)-1683) that required Vitro to process certain government-owned materials. The contract required that Vitro store the residual radioactive materials from this operation at the Canonsburg site until November 1, 1955 because the AEC believed the residual radioactive materials might contain recoverable uranium. After attempts by Vitro to recycle the residual radioactive materials and attempts by the AEC to identify commercial interest in the residual radioactive materials, it was determined that the uranium in the residual radioactive materials was "unrecoverable" and the AEC authorized an inventory write-off pursuant to provisions of AEC Manual Chapter 7401-12. The AEC's Oak Ridge Operations Office approved the transfer of 11,600 tons of wet radioactively contaminated materials from the Canonsburg site to the Burrell site. The radioactively contaminated materials, containing approximately 6 tons of uranium oxide, were transported to the Burrell site from late 1956 to early 1957 (Leggett et al., 1979a).

The Burrell site is situated about 50 miles northeast of the Canonsburg site in Burrell Township, Indiana County, Pennsylvania (Figure 1-1). At the time of the 1956-1957 disposal, it was owned and operated by the Pennsylvania Railroad as a railroad landfill. Currently, it is owned by the George Burrows Company. The Burrell site covers approximately 49 acres; it is currently an undeveloped plateau along a bend of the Conemaugh River at the southern boundary of Indiana County (Figure 1-4). Its only significant surface features are three steep-banked ponds in the western area that are remnants of an old railroad disposal pit (Figure 1-5). Disposal of the 11,600 tons of radioactively contaminated materials removed from the Canonsburg site took place within an approximately 9-acre section in the western portion of the Burrell site. The radioactively contaminated materials were brought in by railcar, dumped into the disposal pit, and covered with an uneven layer of uncontaminated material.

Recovery operations at Vitro's Canonsburg plant ceased by 1957. The contractor's remaining residues and processing wastes were stored on the Canonsburg site by Vitro. Vitro's final source-material license expired, and in May 1961 Vitro applied to the AEC for another source-material license. On June 21, 1961, the AEC granted Vitro a license, for storage only, of a maximum of 23 tons of uranium contained in 4458 tons of material.

In 1962 Vitro's real property was sold to developers, with Vitro retaining title to the radioactively contaminated materials remaining on the Canonsburg site. In an effort to decontaminate the immediate plant area, in 1964 all of the materials then considered radioactively contaminated were consolidated into one pile in Area A. In 1965, Vitro obtained a permit from the Commonwealth to move this pile to Area C. At Area C it was buried beneath a relatively impermeable layer of steel-mill slag (red dog), and covered by clean fill material. Vitro's source-material license was then terminated, and the Canonsburg site was developed into its present use as the Canon Industrial Park in 1966.

SOURCE

MAP FROM BOROUGH AND TOWNSHIP MAPS CHECKED AGAINST PENNDOT COUNTY MAPS (WESTMORELAND CO & INDIANA CO - 1976) AND USGS 7 1/2 MIN QUADS (PHOTO-REVISED TO 1973)

TONED AREA - INCORPORATED BOROUGH OF BLAIRSVILLE

FIGURE 1-4
MAP OF THE AREA AROUND
THE BURRELL TOWNSHIP SITE,
BURRELL TOWNSHIP,
INDIANA COUNTY, PENNSYLVANIA

**FIGURE 1-5
PRESENT CONFIGURATION OF
THE BURRELL TOWNSHIP SITE**

In 1978, the UMTRCA was enacted into law. On November 8, 1979 the Canonsburg site was designated by the DOE as a processing site eligible for remedial action under the UMTRCA. Effective September 5, 1980, the DOE and the Commonwealth entered into a cooperative agreement under UMTRCA, setting forth the terms and conditions for the DOE and the Commonwealth cooperative remedial-action effort, including 90 percent (DOE), 10 percent (Commonwealth) cost-sharing, the Commonwealth's real estate acquisition responsibilities, the Commonwealth's responsibility for nominating potential disposal sites, and provision for the DOE's development of a remedial-action plan after publication of the Canonsburg FEIS. (The remedial-action plan will be concurred on by the Commonwealth and the NRC.)

In 1980 representatives of the Commonwealth conducted a study (Pennsylvania, 1981) of potential areas where the Canonsburg site's radioactively contaminated materials could be taken if the Canonsburg site were to be decontaminated. This study used a preliminary draft of 10 CFR 61, Licensing Requirements for Land Disposal of Radioactive Waste (46 FR 38081ff; July 24, 1981), and included field investigations and the examination of existing reports, maps, files, data, and aerial photographs. As a result of this study, the Commonwealth identified seven areas in which disposal sites might potentially be located; these areas are numbered 1 through 7 on Figure 1-6. (The Burrell site was not included in the sites that were investigated during this study.)

In providing the results of the disposal site study to the DOE, the Commonwealth's representatives stated that Areas 6 and 7, both located in Hanover Township, Washington County, appeared to be better suited as potential disposal sites than the other five. Further study by the DOE confirmed this evaluation (U.S. DOE, 1981a). Within or near Areas 6 and 7, seven promising sites, identified as Sites A through G on Figure 1-7, were investigated further (U.S. DOE, 1981b). Of these seven sites, only Sites B and C have been judged acceptable. Site B ranks appreciably above Site C. Site C would require extensive excavation and clearing compared to Site B. Slope and subgrade stability of Site C could also present a problem as well as the smaller size of Site C compared to Site B. As a result, Site B (the Hanover site) (Figures 1-8 and 1-9) is considered in detail in the Canonsburg FEIS as the prime alternative disposal site.

1.2 DATA COLLECTION

After establishing the background of the Canonsburg and Burrell sites, and the location of the Hanover site, it was necessary to assemble the data on each of the sites. This included reviewing existing data and collecting new information. Compilation of the existing data was accomplished by researching government, public, and private sources.

NORTH

1000 0 1000

SCALE IN FEET

STRIP MINED AREAS

SOURCE USGS, BURGETTSTOWN QUAD, 7 1/2 MIN, P R 1979

FIGURE 1-7
LOCATION OF POTENTIAL DISPOSAL SITES IN
HANOVER TOWNSHIP, WASHINGTON COUNTY
PENNSYLVANIA

**FIGURE 1-9
PRESENT CONFIGURATION OF
THE HANOVER TOWNSHIP SITE**

The literature review led directly to the planning and initiation of field and laboratory programs to gather the necessary additional data. These programs required personnel to be both on the sites and within the surrounding area to collect information. The types of data collected ranged from the number of people living in nearby houses to the concentrations of radioactively contaminated materials in ground water. The appendices accompanying this Canonsburg FEIS (Volume 2) present the detailed programs used by each of the technical disciplines to conduct these studies: i.e., engineering, air quality, soils, geology, hydrology, ecology, radiology, socioeconomics, noise, and transportation.

1.3 IDENTIFICATION OF ALTERNATIVES

After the information was collected, engineering studies were conducted to determine the feasibility of various solutions to the problem. All of the alternatives were selected to accomplish the same major goal: removing a potential public health hazard, i.e., cleaning up the radioactively contaminated materials at the Canonsburg and Burrell sites (U.S. DOE, 1982b).

Five alternatives have been identified for the remedial-action work at the Canonsburg and Burrell sites. They are as follows:

1. No action.
2. Decontamination of the Burrell site, transfer of the Burrell site's radioactively contaminated materials to the Canonsburg site, and stabilization of both the Canonsburg and Burrell sites' radioactively contaminated materials at the expanded Canonsburg site.
3. Stabilization of the Canonsburg site's radioactively contaminated materials at the expanded Canonsburg site and the Burrell site's radioactively contaminated materials at the Burrell site. Alternative 3 is the DOE's preferred alternative.
4. Decontamination of both the Canonsburg and Burrell sites, and disposal of all of the radioactively contaminated materials at the Hanover site.
5. Decontamination of the Canonsburg site, disposal of its radioactively contaminated materials at the Hanover site, and stabilization of the Burrell site's radioactively contaminated materials at the Burrell site.

The specific actions associated with each alternative are given in Table 1-1. The volumes of material, resource commitments, staffing, and duration of each alternative are given in Table 1-2.

Table 1-1. Summary of remedial-action activities

Project activities	Alternative 1		Alternative 2		Alternative 3		Alternative 4			Alternative 5		
	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Hanover	Canonsburg	Burrell	Hanover
1. Roadway construction	---	---	X	X	X	X	X	X	X	X	X	X
2. Temporary roadway closing	---	---	X	---	X	---	X	---	---	X	---	---
3. Permanent roadway closing	---	---	X	---	X	---	---	---	---	---	---	---
4. Onsite building demolition	---	---	X	---	X	---	X	---	---	X	---	---
5. Temporary interruption of some vicinity property use	---	---	---	---	---	---	X	---	---	X	---	---
6. Permanent elimination of some vicinity property use	---	---	X	---	X	---	---	---	---	---	---	---
7. Excavation of site's radioactively contaminated materials	---	---	X	X	X	---	X	X	---	X	---	---
8. Export of site's radioactively contaminated materials	---	---	---	X	---	---	X	X	---	X	---	---
9. Import of radioactively contaminated materials from other places	---	---	X	---	X ^a	---	X ^a	---	X	X ^a	---	X
10. Encapsulation of radioactively contaminated materials	---	---	X	---	X	---	---	---	X	---	---	X
11. Covering of radioactively contaminated materials areas	---	---	X	---	X	X	---	---	---	---	X	---
12. Temporary lowering of water table	---	---	X	---	X	---	X	---	X	X	---	X
13. Use of truck-wash station	---	---	X	X	X	---	X	X	X	X	---	X
14. Use of onsite waste-water-treatment facilities	---	---	X	X	X	---	X	X	X	X	---	X

^aThe only radioactively contaminated material brought onto the Canonsburg site is the 30,000 cubic yards from the vicinity properties. Under Alternatives 2 and 3 it will remain on the expanded Canonsburg site permanently; under Alternatives 4 and 5 it will remain on the Canonsburg site temporarily until it is transferred to the Hanover site, along with the Canonsburg site's radioactively contaminated materials. The impacts associated with transporting the radioactively contaminated materials to the Canonsburg site are not part of this Canonsburg FEIS; these impacts were considered previously (U.S. DOE, 1982c).

Table 1-2. Approximate volumes of materials, resource commitments, staffing, and project duration required for each alternative

	Alternative 1		Alternative 2		Alternative 3		Alternative 4			Alternative 5		
	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Hanover	Canonsburg	Burrell	Hanover
Volume of contaminated material excavated (cubic yards)	0	0	60,000	80,000	60,000	0	250,000	80,000	N/A	250,000	0	N/A
Volume of contaminated material exported from the site (cubic yards)	0	0	0	80,000	0	0	280,000 ^a	80,000	N/A	280,000 ^a	0	N/A
Volume of contaminated material imported to the site (cubic yards)	0	0	110,000 ^a	0	30,000 ^a	0	30,000 ^a	0	360,000 ^a	30,000 ^a	0	280,000 ^a
Volume of fill and construction materials imported (cubic yards)	0	0	270,000	16,000	270,000	30,000	270,000	16,000	200,000	270,000	30,000	170,000
Electricity requirement (kWh)	0	0	222,000	140,000	222,000	8,500	270,000	140,000	280,000	270,000	8,500	280,000
Engine fuels (gallons)	0	0	232,000	127,000	228,000	82,000	640,000	127,000	503,000	640,000	82,000	383,000
Water (gallons)	0	0	2,120,000	185,000	2,120,000	125,000	5,350,000	185,000	4,000,000	5,350,000	125,000	4,000,000
Average/maximum site staffing (persons)	0	0	28/55	20/35	28/50	15/30	28/50	20/35	30/50	28/50	15/30	30/50
Project duration (weeks)	0	0	96	80	86	32	105	80	120	105	32	120

^aA portion of this value (30,000 cubic yards) is the material brought to the Canonsburg site from the vicinity properties. Under Alternatives 2 and 3 it will remain at the expanded Canonsburg site permanently; under Alternatives 4 and 5 it will remain at the Canonsburg site temporarily until it is transferred to the Hanover site, along with the Canonsburg site material. The impacts associated with transporting this material to the Canonsburg site are not part of this Canonsburg FEIS; they were considered previously (U.S. DOE, 1982c).

The primary difference between decontaminating and stabilizing a radioactively-contaminated site is that a decontaminated site will contain no radioactively-contaminated materials at levels above the EPA standards (40 CFR 192, Subpart B, "Cleanup ...") and may later be available for unrestricted use. A stabilized site will meet the EPA standards (40 CFR 192, Subpart A, "Standards for the Control ..."), but it will still retain its radioactively contaminated materials and therefore must remain undisturbed to protect the containment. Thus, its future use is permanently restricted.

None of the identified alternatives includes reprocessing the residual radioactive materials. Pursuant to Public Law 95-604, the DOE solicited expressions of interest in reprocessing from the current owner of each abandoned uranium-mill-tailings site (by individual letter) and from the general public (by notices in the Federal Register (45 FR 36470-36471, May 30, 1980) and by press releases). For the Canonsburg site there has been no response to these requests, probably because the small amount of reprocessable material and the long distance to established reprocessing plants make this alternative uneconomical. For this reason, reprocessing is not included in any of the five alternatives being considered. A brief description of each alternative follows.

1.3.1 Alternative 1: no action

This alternative consists of performing no remedial action, thereby allowing the present situation at the Canonsburg and Burrell sites to continue.

1.3.2 Alternative 2: decontamination of the Burrell site, transfer of the Burrell site's radioactively contaminated materials to the Canonsburg site, and stabilization of both the Canonsburg and Burrell sites' radioactively contaminated materials at the expanded Canonsburg site

All radioactively contaminated materials at the Burrell and Canonsburg sites would be stabilized at the expanded Canonsburg site. The Canon Industrial Park's buildings would be demolished, and the contaminated portions of them buried with the other radioactively contaminated materials. Seven nearby houses (six on Wilson Avenue and one on George Street) and the Georges Pottery buildings would also be demolished. The EPA standards (40 CFR 192) would be met by moving from the Burrell site all radioactively contaminated materials not meeting the EPA soil contamination standard (40 CFR 192) and encapsulating the radioactively contaminated materials with the more highly contaminated portion of the Canonsburg site's radioactively contaminated materials (radioactively contaminated materials with radium-226 concentrations that are or could become greater than 100 picocuries per gram of soil and at least 300 cubic yards contiguous in size) at the expanded Canonsburg site. This concentration was determined based on limiting radionuclide migration off the expanded Canonsburg site to levels meeting the EPA's National Interim

Primary Drinking Water Standards (40 CFR 141) and reducing radon emissions to below the EPA standards (40 CFR 192). The encapsulation process would consist of placing the radioactively contaminated materials in a disposal area that would be lined -- top, sides, and bottom -- with a relatively impermeable material to control contaminant migration and infiltration of precipitation. The remainder of the Canonsburg site's radioactively contaminated materials, including radioactively contaminated materials with radium-226 concentrations less than 100 picocuries per gram of soil and small quantities of material with radium-226 concentrations greater than 100 picocuries per gram of soil, would be stabilized in place by covering the expanded Canonsburg site (with the exception of the residential areas) with a minimum of 2 feet of uncontaminated fill.

The transport of all the radioactively contaminated materials associated with this and the other alternatives is discussed later in this Canonsburg FEIS. The Commonwealth has acquired the Canonsburg site. The U.S. Army Corps of Engineers is in the process of conducting title searches and property appraisals of the adjacent vicinity properties south of Chartiers Creek necessary to expand the site to approximately 30 acres following the Record of Decision (ROD) if Alternative 2 or 3 is chosen. Following completion of the project, title to the expanded Canonsburg site would be transferred from the Commonwealth to the Federal government. The NRC would issue a license for long-term maintenance and monitoring of the expanded Canonsburg site to the DOE or any other Federal agency charged with custody of the site. The Burrell site would be released for unrestricted use consistent with the Corps of Engineers flood control easement and local land-use controls.

1.3.3 Alternative 3: stabilization of the Canonsburg site's radioactively contaminated materials at the expanded Canonsburg site and the Burrell site's radioactively contaminated materials at the Burrell site
(Alternative 3 is the DOE's preferred alternative.)

This alternative differs from Alternative 2 in that the Burrell site's radioactively contaminated materials would not be removed from the Burrell site. All of the radioactively contaminated materials at the Canonsburg site would be disposed of as under Alternative 2. At the Burrell site, the EPA standards (40 CFR 192) would be met by covering the radioactively contaminated materials with a layer of uncontaminated soil with the physical characteristics and thickness necessary to control radon emission and minimize infiltration and erosion. Recent studies (U.S. DOE, 1982d) have indicated that only small amounts of radioactively contaminated materials remain at the Burrell site, which may make excavation and encapsulation unnecessary. The expanded Canonsburg site and the Burrell site would both be acquired by the Commonwealth and the DOE. Following completion of the project, title to the expanded Canonsburg site and to the Burrell site would be transferred to the Federal government and their future use restricted in accordance with the NRC license.

1.3.4 Alternative 4: decontamination of both the Canonsburg and Burrell sites, and disposal of all of the radioactively contaminated materials at the Hanover site

All radioactively contaminated materials with radium-226 concentrations in excess of the EPA standards (40 CFR 192) would be removed from the Canonsburg and Burrell sites. Work at the Burrell site would be the same as under Alternative 2. At the Canonsburg site, however, a greater amount of radioactively contaminated materials would have to be excavated and handled during decontamination than during in-situ stabilization because in-situ stabilization does not require that all of the radioactively contaminated materials be excavated.

The radioactively contaminated materials would be encapsulated at the Hanover site by methods similar to those described for the Canonsburg site under Alternatives 2 and 3.

The Hanover site would be acquired by the Commonwealth. After project completion, the Canonsburg and Burrell sites would be available for unrestricted use, while title to the Hanover site would be transferred to the Federal government and its future use restricted in accordance with the NRC license.

1.3.5 Alternative 5: decontamination of the Canonsburg site, disposal of its radioactively contaminated materials at the Hanover site, and stabilization of the Burrell site's radioactively contaminated materials at the Burrell site

This alternative would be the same as Alternative 4 for the Canonsburg and Hanover sites, and Alternative 3 for the Burrell site.

Preliminary cleanup activities at those offsite properties contaminated with radioactively contaminated materials from the Canonsburg site that have been designated as vicinity properties have been addressed previously in an environmental assessment (EA) (U.S. DOE, 1982c). The radioactively contaminated materials removed from these properties will be temporarily stored on the Canonsburg site until remedial action on the Canonsburg site begins and then disposed of with the Canonsburg site's radioactively contaminated materials. The DOE made a finding of no significant impact (FONSI) for the cleanup of the vicinity properties on July 16, 1982 (47 FR 31061-31062, July 16, 1982). The Burrell site, the former Georges Pottery property, and the residences adjoining the Canonsburg site are vicinity properties not covered in the FONSI. These vicinity properties are included in the remedial-action alternatives for the Canonsburg site presented in this Canonsburg FEIS.

1.4 CHARACTERIZATION OF THE AFFECTED ENVIRONMENT

In order to predict the potential impacts of the remedial action, the baseline data were analyzed to determine each site's major physical, biological, and sociological characteristics.

The Canonsburg, Burrell, and Hanover sites are within 70 miles of each other in southwestern Pennsylvania. This is an area of rugged topographic features, many forests, and rich coal, oil, and gas resources. The land use and economic character of the area have been strongly influenced by these features. The pattern of land use shows distinct communities set in a region dominated by rural and open spaces. Air quality in the area of the three sites meets all of the National Ambient Air Quality Standards (NAAQS) except for ozone, and all of the Pennsylvania air-quality standards. (The entire Commonwealth has been designated as nonattainment for ozone.) Several major industrial and manufacturing centers, particularly those in the greater Pittsburgh area, are located along the Ohio River system and the interstate highways.

1.4.1 Canonsburg site

The expanded Canonsburg site is a 30-acre parcel consisting of the Canon Industrial Park (18.5 acres), the former Georges Pottery property (6.1 acres), and seven adjacent residences located on Wilson Avenue and George Street (5.4 acres). The expanded Canonsburg site is situated in a populated part of a residential section of the Borough of Canonsburg. The expanded Canonsburg site, which is currently zoned in part for industrial use and in part for residential use, consists of developed areas occupied by buildings and houses, and undeveloped areas covered by weeds and medium-sized trees. Larger trees grow along the banks of Chartiers Creek.

The Canonsburg site's location in the humid continental climate region of southwestern Pennsylvania results in temperatures ranging from a maximum of 95°F in the summer to a minimum of -6°F in the winter. Annual precipitation at the Canonsburg site averages 37 inches. Winds come mainly from the west at moderate speeds.

The topography of the Canonsburg site has been altered by past earth-moving and landfilling activities. The elevation of much of the Canonsburg site has been raised above natural levels, resulting in 30 feet of relief over this area. The lower portions of the expanded Canonsburg site are included in the 100-year and 500-year flood plains of Chartiers Creek (Figure D.1-1).

Chartiers Creek in the vicinity of the Canonsburg site is polluted by acid mine drainage and by nearby industrial and municipal discharges. Public water supplies for Canonsburg come from protected surface waters upstream of the Canonsburg site. Ground water at the Canonsburg site occurs in a water table system (unconsolidated material) and in a semi-confined system (bedrock).

The shallow ground-water system discharges into Chartiers Creek, and the deep ground-water system flows beneath Chartiers Creek. The ground water contains elevated levels of both sulfates, derived from the natural substrate material in the area, and of radium-226 and total uranium (Leggett et al., 1979b). The area has been extensively mined for coal, but the Pittsburgh coal seam does not occur on the Canonsburg site.

In addition to the radiological contamination of the ground water, the Canonsburg site contains a heterogeneous mixture of radioactively contaminated soil material. This includes unprocessed ores, radioactively contaminated soils, waste sludges and fines, and building materials. The radioactively contaminated materials are distributed as deep as 16 feet. Area A contains radioactively contaminated materials in both its top few feet of soil and beneath its buildings, with virtually all of its surface soils exceeding the EPA radium-226 standard (40 CFR 192) of 5 picocuries per gram of soil averaged over the first 15 centimeters of soil and 15 picocuries per gram of soil below that. Area B contains a 2- to 6-foot thick layer of radioactively contaminated materials contaminated with radium above the EPA standard (40 CFR 192) buried beneath 8 to 9 feet of clean fill. Area C contains radioactively contaminated materials with radioactive contamination above the EPA standard (40 CFR 192) from the surface to a depth of 16 feet.

1.4.2 Burrell site

In contrast to the Canonsburg site, the Burrell site is a 49-acre undeveloped property located in an open, unpopulated area. There are two small housing communities within 1 mile of the Burrell site, and the town of Blairsville is 1 mile to the west. The Burrell site is a low-lying plateau situated along the Conemaugh River with only 10 feet of topographic relief over most of the Burrell site. The Burrell site contains two steep-banked ponds in its western part.

The level of the Conemaugh River at the Burrell site is regulated by a U.S. Army Corps of Engineers dam about 10 miles downstream of the Burrell site. At the maximum flood pool elevation approximately 15 percent of the Burrell site would be inundated; however, recorded river levels have always been below the maximum. The Conemaugh River is polluted by the same types of materials as Chartiers Creek. Similar to the Canonsburg site, public-water supplies near the Burrell site come from protected surface waters.

There are two ground-water systems at the Burrell site, one in the fill and one in the bedrock. The shallow ground-water system does not recharge the bedrock system at the Burrell site. Ground water flows and discharges toward the Conemaugh River. The ground water is high in naturally-derived sulfates, but generally meets the EPA National Secondary Drinking Water guidelines (40 CFR 143).

Radiological analyses at the Burrell site have produced conflicting estimates of the levels of radioactive contamination. In 1977, surveys (Leggett et al., 1979a) revealed that soils as deep as 36 feet contained contamination at levels well above the then proposed EPA standards (40 CFR 192 (proposed)). Surveys (U.S. DOE, 1982d) in 1981 and 1982 indicated that the Burrell site contains much less radioactively contaminated materials and that these radioactively contaminated materials are at shallower depths than seemed to be the case in 1977. The more detailed latter surveys (U.S. DOE, 1982d) are believed to reflect the current status of the Burrell site, and are the basis for remedial action. These surveys are also the basis for the assessment of the impacts presented in this Canonsburg FEIS.

1.4.3 Hanover site

The Hanover site is an undeveloped property situated in an unpopulated area. The Hanover site occupies 50 acres along a ridgetop, within a trench created by strip mining. The Hanover site is characteristically a reclaimed strip mine. Its substrate consists of rocky material with very little natural soil. The Hanover site's vegetation is limited to low-growing weeds.

The Hanover site lies within the watershed of Harmon Creek, a small, severely polluted stream. The only surface water at the Hanover site occurs in two wet areas that are formed by site drainage.

The water table at the Hanover site occurs at the interface between mine rubble and bedrock. The ground water does not meet the EPA National Interim Primary Drinking-Water standards (40 CFR 141), however, it does not contain any detectable amounts of radiation.

The Hanover site is being considered as a new disposal site, and currently contains no radioactively contaminated materials arising from activities at the Canonsburg site or elsewhere.

1.5 EVALUATION OF ENVIRONMENTAL IMPACTS

The impacts of the five alternatives are summarized and compared in Table 1-3 and discussed in detail in Chapter 5. It is helpful to separate these potential impacts into those that would be directly associated with the radioactively contaminated materials and those that would not. Among the nonradiological impacts the most significant would be the transportation impacts associated with moving the radioactively contaminated materials and fill dirt into and out of the sites. The Canonsburg site area would experience the greatest impact from both truck traffic and road closings. Trucks transporting material to and from the Canonsburg site may have to use the poor, narrow residential roads leading to the Canonsburg site. All of the

Table 1-3. Comparison of potential impacts at each site for each remedial-action alternative

	Alternative 1		Alternative 2		Alternative 3		Alternative 4			Alternative 5			Reference
	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Hanover	Canonsburg	Burrell	Hanover	
<u>Radiological</u>													
Excess external whole body dose to population ^a													
During remed. action (man-rem) ^b	---	---	22	0.0934	22	0.0311	18	0.0934	0.00889	18	0.0311	0.00457	Tables 5-4 to 5-6
After remed. action (man-rem/yr) ^c	11	0.0864	0.254	~0	0.254	0.0233	~0	~0	0.000116	~0	0.0233	0.000116	Tables 5-1 to 5-3
Excess bronchial dose to population ^a													
During remed. action (man-rem) ^b	---	---	1,858	29.9	1,860	9.97	1,720	29.9	10.3	1,720	9.97	4.88	Tables 5-4 to 5-6
After remed. action (man-rem/yr) ^c	530	47.8	151	~0	151	11.5	~0	~0	0.152	~0	11.5	0.152	Tables 5-1 to 5-3
Excess lung cancer deaths to population ^a													
During remed. action (total deaths) ^d	---	---	0.0372	0.000598	0.0372	0.000199	0.0344	0.000598	0.000206	0.0344	0.000199	0.0000976	Tables 5-4 to 5-6
After remed. action (per year) ^e	0.0106	0.000956	0.00302	~0	0.00302	0.00023	~0	~0	0.00000304	~0	0.00023	0.00000304	Tables 5-1 to 5-3
<u>Air Quality</u> (incremental)													
Short term													
Annual TSP (g/cu m)	---	---	5.9	2.1	4.4	2.8	8.9	2.1	9.0	8.9	2.8	8.3	Table 5-9
Annual SO ₂ (g/cu m)	---	---	4.9	3.1	4.6	3.3	6.2	3.1	3.2	6.2	3.3	3.2	
8-hour CO (mg/cu m)	---	---	1.86	2.60	1.89	1.80	2.11	2.60	1.81	2.11	1.80	1.87	
Annual NO _x (g/cu m)	---	---	54	32	50	35	66	32	33	66	35	33	
3-hour HC (g/cu m)	---	---	50	44	28	20	48	44	123	48	20	123	
Settleable particulates (tons/sq mi-month)	---	---	0.33	0.11	0.24	0.15	0.50	0.11	3.15	0.50	0.15	2.86	
Long term	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	
<u>Soils</u>													
Short term	Minimal impact	Minimal impact	No removal of soils. Import approximately 270,000 cubic yards of fill material.	Removal of 80,000 cubic yards of radioactively contaminated materials. Import 16,000 cubic yards of fill material.	No removal of soils. Import approximately 270,000 cubic yards of fill material.	No removal of soils. Import 30,000 cubic yards of fill material.	Removal of 280,000 cubic yards of radioactively contaminated materials. Import 270,000 cubic yards of fill material.	Same as Alternative 2.	No soil removal. Import 360,000 cubic yards of radioactively contaminated materials. Import 200,000 cubic yards of fill material.	Same as Alternative 4.	Same as Alternative 3.	No soil removal. Import 280,000 cubic yards of radioactively contaminated materials. Import 170,000 cubic yards of fill material.	Subsections 3.1.1 to 3.1.5, 5.4.2
Long term	Minimal impact	Minimal impact	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Soil stabilization	Subsections 3.1.1 to 3.1.5, 5.4.2
<u>Mineral Resources</u>													
Short and long term	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	Section 5.5
<u>Topography</u>													
Short term	No impact	No impact	Raise elevation of encapsulation area.	Lower elevation of excavated area.	Same as Alternative 2.	Raise elevation of stabilized area.	No new topographic highs or lows.	Same as Alternative 2.	Raise elevation in section of trench.	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.4.1
Long term	No impact	No impact	Overall site grading to even slopes.	Grade surrounding area to slope evenly past excavated area.	Same as Alternative 2.	Grade surrounding area to slope evenly past stabilized area.	Overall site grading to even slopes.	Same as Alternative 2.	Overall site grading to even slopes.	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.4.1

Table 1-3. Comparison of potential impacts at each site for each remedial-action alternative (continued)

	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Hanover	Alternative 5			Reference
	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell		Canonsburg	Burrell	Hanover	
<u>Surface Waters</u>													
Short term	Erosion	No erosion or runoff into river.	Possibility of erosion of sediments and contaminants into creek during project.	Use of erosion and sediment controls during project.	Same as Alternative 2.	Use of erosion and sediment controls.	Same as Alternative 2.	Same as Alternative 2.	Possibility for erosion of sediment and contaminants into Harmon Creek during project controlled by erosion and sedimentation controls.	Same as Alternative 2.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.6.1
	Contaminant discharge	Indirect discharge into river.				Minimal possibility for impact because of no excavation or exposure of contaminated material.							
	Possibility of washing contaminants into Chartiers Creek during flooding.	No major potential for contaminant load during flooding.	Discharge from WWTP controlled under NPDES permit.	Discharge from WWTP controlled under NPDES permit.	No change in water quantity; water supplied from local supply; discharge from WWTP <1 CFS.	No change in water quantity; water supplied from well; discharge from WWTP <1 CFS.				Discharge from WWTP controlled under NPDES permit.			
									No change in water quantity; water supplied from well; discharge from WWTP <1 CFS.				
Long term	Same as short term	Same as short term	Reduced input of contaminants into creek. Improved site drainage.	Reduced potential for contaminants entering river.	Same as Alternative 2.	Minimal possibility of impact.	Same as Alternative 2.	Same as Alternative 2.	No input of radiological contaminants into the creek. Improved site drainage.	Same as Alternative 2.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.6.1
<u>Ground Waters</u>													
Short term	Continued leaching of radiological contaminants into ground water.	Minimal movement of radiological contaminants into ground water.	Reduce leaching of contaminants into ground water. Temporary lowering of water table in Area C.	Stop leaching of contaminants into ground water.	Same as Alternative 2.	Reduce leaching of contaminants into ground water.	Stop leaching of contaminants into ground water.	Same as Alternative 2.	Reduce leaching of contaminants into ground water.	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.6.2
Long term	Same as short term	Same as short term	Reduce leaching of contaminants into ground water.	Same as short term	Same as Alternative 2.	Same as short term	Same as short term	Same as Alternative 2.	Same as short term	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Subsection 5.6.2
<u>Ecology</u>													
<u>Terrestrial</u>													
Short term	No impact	No impact	Temporary disruption and loss of habitat during project.	Temporary disruption and loss of habitat during project.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Temporary disruption and loss of habitat during project.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Subsection 5.7.1
Long term	No impact	No impact	Habitat will be reestablished after project.	Habitat will be reestablished after project.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Habitat will be reestablished after project.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Subsection 5.7.1
<u>Aquatic</u>													
Short term	Minimal impact	Minimal impact	Potential for temporary habitat alteration and biological impact from accidental contaminant discharge.	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Potential for temporary habitat alteration and biological impact from accidental contaminant discharge.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Subsection 5.7.2
Long term	Minimal impact	Minimal impact	Return to pre-project conditions after project.	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Return to pre-project conditions after project.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Subsection 5.7.2
<u>Socioeconomics</u>													
<u>Land use</u>													
Short term	No impact	No impact	Temporary closing of site for several years.	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Section 5.8
Long term	No impact	No impact	Permanent commitment of site as disposal area.	Availability of site for development and use in accordance with land-use controls.	Same as Alternative 2.	Permanent commitment of site.	Availability of site for development and use in accordance with land-use controls.	Same as Alternative 2.	Permanent commitment of site as disposal area.	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Section 5.8

Table 1-3. Comparison of potential impacts at each site for each remedial-action alternative (continued)

	Alternative 1		Alternative 2		Alternative 3		Alternative 4				Alternative 5			Reference
	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Canonsburg	Burrell	Hanover	Canonsburg	Burrell	Hanover		
<u>Socioeconomics (cont.)</u>														
<u>Truck traffic</u>														
Short term	No impact	No impact	<90 trucks per day over 32 weeks for construction materials. ^h	<40 truck trips per day over 4 weeks for construction materials.	<90 trucks per day over 32 weeks for construction materials. ^h	<60 truck trips per day over 15 weeks for construction materials.	<90 truck trips per day over 32 weeks for construction materials. ^h	Same as Alternative 2.	Low rate of import of construction materials over 52 weeks.	Same as Alternative 4.	Same as Alternative 3.	Low rate of import of construction materials over 52 weeks.	Subsections 3.1.1 to 3.1.5 and Table 5-19	
			<40 truck trips per day over 20 weeks for Burrell material.	<40 truck trips per day over 20 weeks for material removal.			<70 truck trips per day over 46 weeks, for material removal. ^h		<70 truck trips per day over 46 weeks for Canonsburg material. ^h			<70 truck trips per day over 46 weeks for Canonsburg material. ^h		
									<40 truck trips per day over 20 weeks for Burrell material.					
Long term	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact		
<u>Population</u>														
Short term	No impact	No impact	Increase in local population of a maximum of 55 remedial-action workers.	Increase in local population of a maximum of 35 remedial-action workers.	Increase in local population of a maximum of 50 remedial-action workers.	Increase in local population of a maximum of 30 remedial-action workers.	Increase in local population of a maximum of 50 remedial-action workers.	Increase in local population of a maximum of 35 remedial-action workers.	Increase in local population of a maximum of 50 remedial-action workers.	Same as Alternative 4.	Same as Alternative 3.	Same as Alternative 4.	Table 5-14	
Long term	No impact	No impact	Decrease in vicinity population by 7 families.	No impact	Decrease in vicinity population by 7 families.	No impact	Temporary relocation of 7 families.	No impact	No impact	Same as Alternative 4.	No impact	No impact	Section 5.8	
<u>Housing requirements</u>														
<u>Short term</u>														
Partial project duration	0	0	48	30	43	30	44	30	19	44	30	19	Table 5-15	
Most of project duration	0	0	7	5	7	0	6	5	31	6	0	31		
Long term	0	0	0	0	0	0	0	0	0	0	0	0		
<u>Noise</u>														
Short term	No impact	No impact	Minimal impact	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Minimal impact	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Section 5.9	
Long term	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact	No impact		
<u>Transportation</u>														
Short term	No impact	No impact	Temporary closing of Strabane and Wilson Aves. and Ward and George Sts.	Impact on local roads	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 2.	Impact on local roads	Same as Alternative 2.	Same as Alternative 2.	Same as Alternative 4.	Section 5.14	
Long term	No impact	No impact	Permanent closing of Wilson Ave., Ward and George Sts.	No impact	Same as Alternative 2.	No impact	No impact	No impact	No impact	No impact	No impact	No impact	Section 5.14	
<u>Project Requirements</u>														
<u>Manpower -- average/maximum</u>														
Short term	0	0	28/55	20/35	28/50	15/30	28/50	20/35	30/50	28/50	15/30	30/50	Subsections 3.1.1 to 3.1.5 and Table 5-14	
Long term	0	0	0	0	0	0	0	0	0	0	0	0		
Financial ¹	No cost		\$21,705,000		\$13,366,000		\$38,965,000				\$31,491,000		Table A.4-1	

^a Population = persons living within 6.2 miles of the Canonsburg site (63,942) and 1.2 miles of the Burrell site (4,546) and Hanover site (114).

^b Total man-rems for the remedial action.

^c Man-rems per year existing for an indefinite time period.

^d For the population in (a) only.

^e Deaths per year existing for an indefinite time period.

^f WWTTP = waste-water treatment plant.

^g NPDES = National Pollutant Discharge Elimination System.

^h The number of trucks required does not include those trucks needed to transport the vicinity property material.

ⁱ Excluding the cost of decontaminating the vicinity properties.

remedial-action alternatives would require closing Strabane Avenue through the Canonsburg site, a major local road, for the project duration. In addition, both Ward Street and Wilson Avenue would be closed through the expanded Canonsburg site; permanently under Alternatives 2 and 3, and temporarily under Alternatives 4 and 5.

In addition to transportation impacts, there would be the direct impacts to several people whose homes or business locations would be acquired. The seven residences located on Wilson Avenue and George Street and the former Georges Pottery buildings would be either acquired and demolished (Alternatives 2 and 3) or closed for approximately 2 years (Alternatives 4 and 5). The Canon Industrial Park has been condemned by the Commonwealth and the remaining businesses are currently in the process of being relocated. The DOE would assist the homeowners in finding temporary housing under Alternatives 4 and 5, and would acquire their properties under Alternatives 2 and 3. The owners of the houses and industries are entitled to relocation assistance.

The remainder of the nonradiological impacts would be small. There would be typical construction noises and dust, temporarily inconveniencing people at certain times, and there could be some localized siltation of Chartiers Creek at the expanded Canonsburg site, but these impacts would be no greater than those experienced from other construction projects such as building a new highway or erecting a new shopping center. All of these impacts would be manageable and appropriate measures such as dust suppression, vehicle mufflers, work scheduling, waste-water treatment, and erosion control would be taken to mitigate their severity.

The remaining potential impacts would be those connected with the radioactively contaminated materials at the Canonsburg and Burrell sites. There are 63,942 people living within 6.2 miles of the Canonsburg site, and 4,546 people living within 1.24 miles of the Burrell site. The normal lung cancer death rate is 1 in 33 (National Academy of Sciences, 1980); this means that the normally-expected lung cancer mortality rate is 63 deaths per year over the remaining lifetime of these 68,488 people. Calculations show that the radioactively contaminated materials at the Canonsburg and Burrell sites may be currently causing an excess lung cancer mortality rate of 0.012 deaths per year among these 68,488 people over their remaining lifetime. An individual in this population has an approximately 1 in 5000 increased chance of dying from lung cancer because of the present condition of the Canonsburg and Burrell sites. With no action, this rate of excess lung cancer deaths will continue into the future.

Preliminary results from two recent studies (Lanes, 1982; and Talbott et al., 1982), show that the cases of lung and thyroid cancer among people living near the Canonsburg site are not statistically different from those for the general public not living near the Canonsburg site. These preliminary results are not considered definitive because the study of lung cancer, the expected consequence of exposure to radon-222 and its daughter products, was based on a very small sample and thyroid cancer is not the expected consequence of exposure to this type of radiation. Recent changes (Haurwitz, 1983; Lash,

1983) in the results of the Talbott et al. (1982) study indicate that the incidence of thyroid abnormalities among the Canonsburg Borough women tested is "marginally significant" compared to the original "not statistically significant."

Each of the alternatives, except for Alternative 1, would reduce the already small increase in lung cancer deaths. Any of the remedial actions would decrease the number of annual excess lung cancer deaths to the 63,942 people living within 6.2 miles of the Canonsburg site to about 0.003 over their remaining lifetime, or any individual in this population would have approximately a 1 in 20,000,000 increased chance of dying from lung cancer in any one year over their remaining lifetime. In reality this means that there would be a very small probability that a lung cancer death would result directly from exposure to the radioactively contaminated materials present at the Canonsburg site after the remedial action is completed. The chances of cancer deaths would be similarly small at the Burrell and Hanover sites. Both of these areas are more isolated than the Canonsburg site and are not subject to the same frequency of human activity as is the Canonsburg site.

1.6 REMEDIAL ACTIONS

The actual work will be done on the sites during this phase of the program. Remedial actions would be performed by the DOE's prime remedial-action contractor (RAC) and its subcontractors. The RAC will competitively award firm, fixed-price subcontracts for the building demolition, earth-moving, construction, and material-handling activities required at each site, which would provide business opportunities for several local firms. The construction would follow a predetermined schedule in which major activities have been planned and a time period for each step developed. Tables 1-1 and 1-2 indicate the remedial-action activities and the basic engineering-related requirements for each alternative.

During the construction period a set of safety and contamination controls would be followed to ensure that no workers are exposed to radiation levels beyond acceptable limits, and that no significant amount of radioactive material escapes into the surrounding area.

Additional information on the remedial-action activities at the three sites will be published as indicated in Table 1-4.

Table 1-4. Document publication schedule -- Canonsburg remedial-action project

Document type	Scheduled publication date
<u>Final site documents</u>	
Remedial action plan (including health and safety plan and radiological support plan)	Late summer 1983
Site conceptual design	Late summer 1983
Site design criteria	Late summer 1983
Site characterization report	Late summer 1983
Final design and specifications	Late fall 1983
Site licensing plan	1984
Site surveillance and maintenance plan	1984
<u>Final UMTRA project documents</u>	
Project licensing plan	Early fall 1983
Project surveillance and maintenance plan	Early fall 1983
Project health and safety plan	Summer 1983

1.7 MAINTENANCE AND MONITORING

After all of the cleanup work is finished, the DOE, or another Federal agency charged with custody of the disposal site, would continue to monitor the final disposal site to ensure that the remedial-action program continues to comply with the EPA standards (40 CFR 192). This could include measurements of parameters such as air and water contaminant levels as specified by the NRC in its license, and maintenance of the site as required. The EPA standards (40 CFR 192) would have to be met before the remedial action is considered officially completed. The proposed monitoring programs that would be implemented during the remedial action are discussed in Appendices F.4 and F.5.

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2 Purpose and Need

The remedial-action alternatives (except no action) presented in this Canonsburg FEIS are possible strategies for reducing the radioactivity levels at the Canonsburg and Burrell sites to meet the EPA standards (40 CFR 192) and other Federal and state laws applicable to the cleanup of inactive processing sites. The purpose of these standards is to protect the public health and safety and the environment from potential radiological and nonradiological hazards associated with radioactively contaminated materials at the sites. The remedial-action project would accomplish one major goal: removing a potential public health hazard, i.e., that potential hazard associated with radioactively contaminated materials.

In 1978, Congress passed the UMTRCA, Public Law 95-604, expressly acknowledging that uranium-mill-tailings located at inactive (and active) mill sites may pose a potential health hazard to the public. The UMTRCA charges the EPA with the responsibility for promulgating remedial-action standards for inactive processing sites. Under the UMTRCA the DOE is authorized to enter into cooperative agreements with affected states or Indian tribal governments to perform remedial actions to bring the radiation levels at the sites in their jurisdictions to within the EPA standards (40 CFR 192). The DOE will fund 90 percent of the remedial-action-cleanup costs (except on Indian land where DOE will fund 100 percent); the affected state will provide the remaining 10 percent. All remedial actions performed under the UMTRCA must be done in accordance with the EPA standards (40 CFR 192) and with the concurrence of the NRC, which will issue a license for the long-term maintenance and monitoring of the disposal site after the cleanup work is complete.

Title I to the UMTRCA identified 22 inactive processing sites to be designated by the Secretary of the DOE for remedial action. On November 8, 1979, the Secretary of the DOE designated those 22 sites and an additional three sites; the Canonsburg site was one of the designated sites. The DOE and the Commonwealth entered into a cooperative agreement effective September 5, 1980, for remedial action at the Canonsburg site and its associated vicinity properties, including the Burrell site.

2.1 HISTORY AND PRESENT STATUS

In the early 1900's, the Standard Chemical Company initiated the development of a method to extract and concentrate radium from carnotite ore. The company established its radium-processing facilities at Canonsburg, Pennsylvania, and produced the first salable quantities of radium in 1913 (Standard Chemical Co., 1919). The company ceased processing operations in the early 1920's (probably around 1922), but continued to act as a marketing agent for some foreign radium producers.

Vitro purchased the Canonsburg facility in 1933 and utilized it for the extraction of uranium, vanadium, and radium from various residues, ores, and concentrates. From 1942 until the facility's closing in 1957, Vitro and its successor, the Vitro Corporation of America, owned and operated the plant on the Canonsburg site. The operations were directed toward the production of uranium concentrates. The only customer from 1942 to 1957 was the United States Government. The uranium and other rare metals were extracted from both onsite (contractor-owned) residues and ores, and government-owned ores, concentrates, and scrap. During this time various ores, concentrates, and scrap materials were brought from different Atomic Energy Commission (AEC) installations to the Canonsburg site for uranium recovery. The end products of these processes were delivered to the AEC in accordance with terms of government procurement contracts. All solid process wastes were stored temporarily on the Canonsburg site. The liquid wastes were discharged through a drainage system beneath Strabane Avenue into the former swamp in Area C that discharged through a drainage ditch into Chartiers Creek. This swamp has since been filled in.

On November 1, 1953, the government and Vitro entered into a contract (AT-(30-1)-1683) that required Vitro to process certain government-owned materials. The contract required that Vitro store the residual radioactive materials from this operation at the Canonsburg site until November 1, 1955 because the AEC believed the residual radioactive materials might contain recoverable uranium. After attempts by Vitro to recycle the residual radioactive materials and attempts by the AEC to identify commercial interest in the residual radioactive materials, it was determined that the uranium in the residual radioactive materials was "unrecoverable" and the AEC authorized an inventory write-off pursuant to provisions of AEC Manual Chapter 7401-12. The AEC's Oak Ridge Operations Office approved the transfer of 11,600 tons of wet radioactively contaminated materials from the Canonsburg site to the Burrell site. The radioactively contaminated materials, containing approximately 6 tons of uranium oxide, was transported to the Burrell site from late 1956 to early 1957 (Leggett et al., 1979a).

The Burrell site is situated about 50 miles northeast of the Canonsburg site in Burrell Township, Indiana County, Pennsylvania (Figure 1-1). At the time of the 1956-1957 disposal, it was owned and operated by the Pennsylvania Railroad as a railroad landfill. Currently, it is owned by the George Burrows Company. The Burrell site covers approximately 49 acres; it is currently an undeveloped plateau along a bend of the Conemaugh River at the southern boundary of Indiana County (Figure 1-4). Its only significant surface features are three steep-banked ponds in the western area that are remnants of an old railroad disposal pit (Figure 1-5). Disposal of the 11,600 tons of

radioactively contaminated materials removed from the Canonsburg site took place within an approximate 9-acre section in the western portion of the Burrell site. The radioactively contaminated materials were brought in by railcar, dumped into the disposal pit, and covered with an uneven layer of uncontaminated material.

Recovery operations at Vitro's Canonsburg plant ceased by 1957. The contractor's remaining residues and processing wastes were stored on the Canonsburg site by Vitro. Vitro's final source-material license expired, and in May 1961 Vitro applied to the AEC for another source-material license. On June 21, 1961, the AEC granted Vitro a license, for storage only, of a maximum of 23 tons of uranium contained in 4458 tons of material.

In 1962 Vitro's real property was sold to developers, with Vitro retaining title to the radioactively contaminated materials remaining on the Canonsburg site. In an effort to decontaminate the immediate plant area, in 1964 all of the materials then considered radioactively contaminated were consolidated into one pile in Area A. In 1965, Vitro obtained a permit from the Commonwealth to move this pile to Area C. At Area C it was buried beneath a relatively impermeable layer of steel-mill slag (red dog), and covered by clean fill material. Vitro's source-material license was then terminated, and the Canonsburg site was developed into its present use as the Canon Industrial Park in 1966.

In 1978, the UMTRCA was enacted into law. On November 8, 1979 the Canonsburg site was designated by the DOE as a processing site eligible for remedial action under the UMTRCA. Effective September 5, 1980, the DOE and the Commonwealth entered into a cooperative agreement under UMTRCA, setting forth the terms and conditions for the DOE and the Commonwealth cooperative remedial-action effort, including 90 percent (DOE), 10 percent (Commonwealth) cost-sharing, the Commonwealth's real estate acquisition responsibilities, the Commonwealth's responsibility for nominating potential alternative disposal sites, and provision for the DOE's development of a remedial-action plan after publication of the Canonsburg FEIS. (The remedial-action plan will be concurred on by the Commonwealth and the NRC.)

At various times throughout the years radioactively contaminated soils and building materials were removed from the Canonsburg site and used in local construction projects. It is estimated that over 100 properties in the vicinity of the Canonsburg site have these radioactively contaminated soils and building materials. A separate EA (U.S. DOE, 1982b) addresses the potential environmental impacts of preliminary cleanup activities at these properties.

The Canonsburg site requires cleanup to reduce its radioactivity level to meet the EPA standards (40 CFR 192). Radiological surveys made of the Canonsburg site in 1977 (Leggett et al., 1979b) indicated that significant amounts of radioactively contaminated materials remain on the Canonsburg site and that the radiation levels in the buildings, soils, and ground water exceeded the then-proposed EPA standards (40 CFR 192 (proposed)). The

radioactively contaminated materials at the Canonsburg site are heterogeneously distributed; they consist of unprocessed ores, contaminated soils, waste sludges and fines, and building materials.

The radioactively contaminated materials at the Burrell site (Figure 1-4) are mixed with a large amount of debris, especially railroad ties (Leggett et al., 1979a). The Hanover site (Figure 1-8), proposed as a possible disposal site for the radioactively contaminated materials, currently contains no radioactively contaminated materials. It is located in an abandoned strip-mine area and is in the vicinity of land contaminated with chemical and industrial wastes.

As required by the NEPA (PL 91-190) this Canonsburg FEIS has been prepared to provide environmental information before decisions are made and before action is taken. It predicts and analyzes the effects on the environment from performing each alternative. It also addresses the major areas of public concern expressed during the scoping meetings and the public hearings.

2.2 EPA STANDARDS

Under Public Law 95-604, no remedial action may begin until final cleanup standards have been promulgated. The Canonsburg DEIS (U.S. DOE, 1982a) used the proposed EPA standards (40 CFR 192 (proposed)). The Canonsburg FEIS uses the final EPA standards (40 CFR 192). Subpart A of the EPA standards (40 CFR 192), which pertains to disposal sites, is applicable to the expanded Canonsburg site under Alternatives 2 and 3, to the Burrell site under Alternatives 3 and 5, and to the Hanover site under Alternatives 4 and 5. Subpart B of the EPA standards (40 CFR 192), which pertains to decontaminated sites, is applicable to the Canonsburg site vicinity properties, to the Canonsburg site under Alternatives 4 and 5, and to the Burrell site under Alternatives 2 and 4. Pertinent parts of the final EPA standards (40 CFR 192) are quoted in this subsection. A comparison of the proposed and final EPA standards (40 CFR 192) and a discussion of the reasons for selecting the final EPA standards (40 CFR 192) were presented by the EPA in the Federal Register (48 FR 590-604, January 5, 1983). The EPA published an EIS (U.S. EPA, 1982) on the development and impacts of the standards (40 CFR 192).

Subpart A

"Section 192.02 (Disposal) Standards

Control shall be designed^a to:

- (a) Be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, and,
- (b) Provide reasonable assurance that releases of radon-222 from residual radioactive material to the atmosphere will not:
 - (1) Exceed an average^b release rate of 20 picocuries per square meter per second, or
 - (2) Increase the annual average concentration of radon-222 in air at or above any location outside the disposal site by more than one-half picocurie per liter."

Subpart B

"Section 192.12 (Cleanup) Standards

Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:

- (a) The concentration of radium-226 in land averaged over any area of 100 square meters shall not exceed the background level by more than:
 - (1) 5 pCi/g (picocuries/gram) averaged over the first 15 cm (centimeters) of soil below the surface, and
 - (2) 15 pCi/g, averaged over 15 cm thick layers of soil more than 15 cm below the surface.
- (b) In any occupied or habitable building --
 - (1) The objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL (working level). In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL, and
 - (2) The level of gamma radiation shall not exceed the background level by more than 20 microroentgens per hour."

^aBecause the standard applies to design, monitoring after disposal is not required to demonstrate compliance."

^bThis average shall apply over the entire surface of the disposal site and over at least a one-year period. Radon will come from both residual radioactive materials and from materials covering them. Radon emissions from the covering materials should be estimated as part of developing a remedial action plan for each site. The standard, however, applies only to emissions from residual radioactive materials to the atmosphere."

With respect to water quality, the following statements have been excerpted:

"(2) Protection of water should be considered in the analysis for reasonable assurance of compliance with the provisions of Section 192.02. Protection of water should be considered on a case-specific basis, drawing on hydrological and geochemical surveys and all other relevant data"

"Judgements on the possible need for remedial or protective actions for groundwater aquifers should be guided by relevant considerations described in EPA's hazardous waste management system (47 FR 32274, July 26, 1982) and by relevant State and Federal Water Quality Criteria for anticipated or existing uses of water over the term of the stabilization."

2.3 NRC LICENSING

The NRC has not issued and does not intend to issue regulations that apply to the cleanup and disposal of residual radioactive materials at inactive uranium-processing sites. The DOE will select and execute a plan of remedial action that will satisfy the EPA standards (40 CFR 192). In conformance with Section 104(f) (2) of the UMTRCA, the required NRC concurrence with the proposed remedial actions and the NRC licensing of disposal sites will be for the purpose of ensuring compliance with these EPA standards (40 CFR 192).

Section 104(f) (2) further states that "upon completion of the remedial action program . . . such property and minerals shall be maintained pursuant to a license issued by the Commission (the NRC) in such manner as will protect the public health, safety, and the environment. The Commission may . . . require the Secretary (of the DOE) or other Federal agency having custody of such property and minerals to undertake such monitoring, maintenance, and emergency measures as necessary to protect public health and safety and other actions as the Commission deems necessary"

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3 Alternatives Including the Proposed Action

3.1 DESCRIPTION OF THE ALTERNATIVES

Five alternative actions have been developed for dealing with the radioactively contaminated materials at the Canonsburg and Burrell sites. In all the alternatives except no action, the effort would begin by decontaminating the local vicinity properties now contaminated with radioactively contaminated materials taken from the Canonsburg site. Materials removed from these properties would be consolidated at the Canonsburg site. The remedial-action alternatives for the Canonsburg and Burrell sites, are described in detail in this subsection. Alternatives eliminated from consideration are given in Subsection 3.1.6.

- Alternative 1 -- No action
- Alternative 2 -- Decontamination of the Burrell site, transfer of the Burrell site's radioactively contaminated materials to the Canonsburg site, and stabilization of both the Canonsburg and Burrell sites' radioactively contaminated materials at the expanded Canonsburg site.
- Alternative 3 (proposed action) -- Stabilization of the Canonsburg site's radioactively contaminated materials at the expanded Canonsburg site and the Burrell site's radioactively contaminated materials at the Burrell site.
- Alternative 4 -- Decontamination of both the Canonsburg and Burrell sites, and disposal of all of the radioactively contaminated materials at the Hanover site.
- Alternative 5 -- Decontamination of the Canonsburg site, disposal of its radioactively contaminated materials at the Hanover site, and stabilization of the Burrell site's radioactively contaminated materials at the Burrell site.

The primary difference between decontaminating and stabilizing a radioactively contaminated site is that a decontaminated site will contain no radioactively contaminated materials at levels above the EPA standards (40 CFR 192) and may later be available for unrestricted use. A stabilized site will meet the EPA standards (40 CFR 192), but it will still retain its radioactively contaminated materials and therefore must remain undisturbed to protect the containment. Thus, its future use is permanently restricted. Each of the alternatives (except no action) includes maintenance and monitoring programs to ensure the effectiveness of the remedial actions (see Appendix F.4).

The basic strategies considered for carrying out the remedial actions are to stabilize the radioactively contaminated materials at their present locations or to transport them to a new disposal site (U.S. DOE, 1982b). Tables 3-1 through 3-3 summarize the basic methods that would be used to dispose of the radioactively contaminated materials at each of the three sites under each of the alternatives.

A number of site activities are a part of every alternative except no action. They include the following:

1. Surveying the site and placing benchmarks at specific work locations.
2. Installing site security barriers and developing the road network that is required on the site, including both constructing new roads and closing or rearranging existing roads.
3. Setting up personnel trailers and decontamination facilities and establishing areas for stockpiling materials. This will include implementing strict dust-control measures during any handling of contaminated material.
4. Developing and installing a waste-water collection and treatment system for those alternatives involving handling contaminated materials.
5. Transferring 30,000 cubic yards of radioactively contaminated materials from the vicinity properties near the Canonsburg site onto the Canonsburg site.

As stated in Section 1.1, two areas adjoining the Canon Industrial Park are proposed for incorporation into the expanded Canonsburg site for the Canonsburg site stabilization alternatives (Alternatives 2 and 3). These areas are the former Georges Pottery property and the seven residences on Wilson Avenue and George Street. The reasons for this approach are as follows:

1. There would be a lack of access to the properties both during and after the remedial action unless a separate new road is built.
2. There would be interference between the construction equipment on the site and the vehicles going to the residences.
3. It would be more cost effective and less personally disruptive to permanently relocate the residents.
4. Inclusion of the two areas would allow the entire site to be buffered by two existing barriers -- the creek and the railroad.
5. The most effective way to perform in-situ stabilization would be by using the entire area (see Appendix A.1).

Table 3-1. Summary of possible environmental controls and engineering features for stabilization of the radioactively contaminated materials at the Canonsburg site (Alternatives 2 and 3)^a

Environmental issues and requirements	Engineering features
1. Control of radon-emanation rate	<ul style="list-style-type: none"> a. Encapsulation of highly contaminated materials from Areas A and C and the former Georges Pottery property. b. Demolition of buildings in Area A and the former Georges Pottery property. c. Use of multilayer cover system (clay and soil, and soil layers) for radon-222 attenuation in encapsulation area. d. Drain layer in cover and under capsule. e. Use of soil cover for balance of site.
2. Surface-radiation levels	<ul style="list-style-type: none"> a. Encapsulation of highly-contaminated materials. b. Soil cover over balance of site depending on radiation levels. c. Stabilization and vegetation of site.
3. Subsurface-water quality	<ul style="list-style-type: none"> a. Removal of highly contaminated materials from saturated zone in Area C. b. Dewatering of Area C and treatment of recovered water during construction. c. Encapsulation of highly contaminated material. d. Use of multilayer cover system to minimize the potential for leachate generation in encapsulation cell. e. Use of clay and soil liner for waste containment, and attenuation of leachate contaminants. f. Reduction of infiltration throughout the site using cover, drainage, and stabilization of surface.
4. Surface-water quality	<ul style="list-style-type: none"> a. Removal of highly contaminated materials from flood plain (Areas B and C). b. Construction of temporary flood-control berm around the excavated areas. c. Improving drainage and control of runoff. d. Collection and treatment of contaminated water and waste water during construction period.

^aSee Appendix A.1 and U.S. DOE (1982c) for additional information.

Table 3-1. Summary of possible environmental controls and engineering features for stabilization of the radioactively contaminated materials at the Canonsburg site (Alternatives 2 and 3)^a
(continued)

Environmental issues and requirements	Engineering features
5. Soil-contamination levels	<ul style="list-style-type: none"> a. Removal of highly contaminated materials from Areas A, B, and C and the former Georges Pottery property. b. Encapsulation of highly contaminated material. c. Soil cover over remaining contaminated areas. d. Building demolition in Area A and the former Georges Pottery property. e. Stabilization of site surface using soil cover and revegetation.
6. Long-term stability	<ul style="list-style-type: none"> a. Use of natural material (soil, clay, rock) for liner and cover construction. b. Use of passive control techniques. c. Physical and structural stabilization of highly contaminated material prior to encapsulation.
7. Radiation protection (public and construction personnel)	<ul style="list-style-type: none"> a. Control of site access (fence, gates, signs, etc.) during and after the remedial-action program. b. Establishment of employee health and support facilities (showers, protective clothing, dosimeters, etc.). c. Closing of Wilson Avenue and Ward and George Streets, relocation of the commercial and residential tenants and government acquisition of the contaminated Canon Industrial Park buildings, machinery, and equipment. d. Radiation monitoring and surveillance. e. Quality control and assurance.

^aSee Appendix A.1 and U.S. DOE (1982c) for additional information.

Table 3-2. Summary of possible environmental controls and engineering features for stabilization of the radioactively contaminated materials at the Burrell site (Alternatives 3 and 5)^b

Environmental issues and requirements	Engineering features
1. Control of radon-emanation rate	a. Soil cover over localized high radiation spots.
2. Surface radiation	a. Cover system (soil) over localized high radiation spots. b. Stabilization and revegetation of the contaminated areas of the site.
3. Subsurface-water quality	a. Cover system to reduce excessive infiltration through contaminants.
4. Surface-water quality	a. Covering localized high-radiation spots. b. Improving runoff and drainage patterns. c. Site stabilization and revegetation of areas prone to erosion.
5. Soil-contamination levels	a. Covering localized high-radiation spots. b. Site stabilization and revegetation.
6. Long-term stability	a. Use of natural earth and durable material (e.g., stone, soil, slag, and clay) for site stabilization and cover. b. Design of cover to accommodate projected subsidence of waste material. c. Use of passive control techniques.
7. Radiation protection (public and construction personnel)	a. Control of site access (fence, gates, signs, etc.) during and after the remedial-action program. b. Establishment of employee health and support facilities (showers, protective clothing, dosimeters, etc.) . c. Radiation monitoring and surveillance. d. Quality control and assurance.

^bSee Appendix A.2 and U.S. DOE (1982d) for additional information.

Table 3-3. Summary of possible environmental controls and engineering features for decontamination of the Canonsburg and Burrell sites and disposal of the radioactively contaminated materials at the Hanover site (Alternatives 4 and 5)

Environmental issues and requirements	Engineering features
1. Control of radon-emanation rate	a. Encapsulation of waste and contaminated material and use of multilayer cover consisting of clay cap, stone, and soil layers.
2. Surface radiation	a. Use of adequate cover material and thickness. b. Stabilization and revegetation of the site.
3. Subsurface-water quality	a. Locating encapsulation cells above ground-water table. b. Control of ground-water levels using drainage devices. c. Use of multilayer cover system to minimize the potential for leachate generation in encapsulation cells. d. Use of clay and soil liner for waste containment and attenuation of leachate contaminants.
4. Surface-water quality	a. Construction of runoff, drainage, and erosion-control devices. b. Stabilization and revegetation of site surfaces. c. Collection and treatment of contaminated runoff and leachate during construction and waste placement periods.
5. Soil-contamination levels	a. All waste and contaminated material and soils will be placed in the encapsulation cell between clay liner and multilayer cover system.
6. Long-term stability	a. Use of natural material for liner and cover material. b. Use of passive control techniques. c. Optimum compaction of waste and contaminated material during placement in encapsulation cells. d. Design and construction of cover system that could accommodate some degree of settlement and subsidence.

Table 3-3. Summary of possible environmental controls and engineering features for decontamination of the Canonsburg and Burrell sites and disposal of the radioactively contaminated materials at the Hanover site (Alternatives 4 and 5) (continued)

Environmental issues and requirements	Engineering features
7. Radiation protection (public and construction personnel)	<ul style="list-style-type: none"> a. Control of site access (fence, gates, signs, etc.) during remedial-action program. b. Establishing employee health and support facilities (showers, protective clothing, dosimeters, etc.). c. Radiation monitoring and surveillance. d. Quality control and assurance.

6. Inclusion of the two areas would eliminate the possibility of damage to private structures from heavy equipment operation.
7. Inclusion of the two areas would eliminate the possibility of private vehicle contamination.
8. Inclusion of the two areas would allow sufficient room for temporary storage of clean fill.

A preliminary evaluation has been made of the feasibility and cost of transporting the radioactively contaminated materials by rail (Appendix I). Rail haul of these radioactively contaminated materials may be physically possible, assuming the use of unit trains, sufficient upgrading of rights-of-way, new spur construction, and the construction of bulk loading and unloading facilities. However, the costs associated with rail transportation would be significantly higher than those costs for truck transportation. The DOE has determined that rail transportation does not represent a reasonable alternative for transporting the radioactively contaminated materials or the clean fill materials.

3.1.1 Alternative 1 -- no action

This alternative entails leaving the Canonsburg and Burrell sites in their present condition.

3.1.2 Alternative 2

In this alternative all radioactively contaminated materials, including those at the Burrell site and at the local vicinity properties, would be placed at the expanded Canonsburg site.

The Burrell site would be decontaminated and the Canonsburg and Burrell sites' radioactively contaminated materials stabilized at the expanded Canonsburg site. The major stabilization activities at the expanded Canonsburg site would fall into three categories: structure demolition, excavation, and burial of the radioactively contaminated materials. The decontamination activities at the Burrell site would include excavating and removing the radioactively contaminated materials, and filling and grading the Burrell site.

Structures that would be demolished at the expanded Canonsburg site include the industrial park buildings, the railroad spur, the former Georges Pottery buildings, and the seven Wilson Avenue and the George Street residences. (These are shown on Figure 1-2.) The residences would be treated either under the vicinity property program or the Canonsburg remedial-action plan. The industrial park buildings are radioactively contaminated and would

be cleaned and painted to fix surface contamination before demolition. Uncontaminated rubble would be buried without prior cleaning or treatment. The rubble would be stockpiled until it could be buried on the expanded Canonsburg site. Steel could be salvaged from the Canon Industrial Park and the former Georges Pottery buildings and transported off the expanded Canonsburg site after being decontaminated, if necessary, to the levels specified in NRC Regulatory Guide 1.86 (U.S. NRC, 1976). The railroad spur material is also contaminated and would eventually be buried on the expanded Canonsburg site.

The excavation activities at the expanded Canonsburg site would occur in stages. The initial stage would include excavating the boundaries of an encapsulation cell for laying the drain and gravel layers.

The second stage of construction at the expanded Canonsburg site would entail excavating the radioactively contaminated materials in Areas A and C and the former Georges Pottery property for encapsulation. Areas to be excavated would be delineated using a survey grid. The survey would maximize the probability of identifying for encapsulation a contiguous volume of soil greater than 300 cubic yards and contaminated with radium-226 at concentrations greater than 100 picocuries per gram of soil. Smaller contiguous volumes of greater than 15 cubic yards that could have an average concentration of radium-226 greater than the 100 picocuries per gram of soil throughout the facility's design life would be excavated and encapsulated if detected by the grid survey or excavation. This would result in spot removals in Area A and the former Georges Pottery property, and excavation of a major portion of Area C.

The water table in Area C is relatively high, often within 4 feet of the surface. Therefore, this area would have to be dewatered during the entire excavation period. It has been estimated that a maximum of 300,000 gallons per day would have to be pumped out initially to depress the water table and a maximum of 20,000 gallons per day thereafter to maintain a depressed level. These estimates are based on assumed aquifer characteristics. The rate of delivery of this water to the treatment plant could be controlled in order to match the rate of treatment capacity. This water would be routed through a sedimentation basin and an onsite waste-water-treatment plant before discharge into Chartiers Creek. Discharged water would meet the National Pollutant Discharge Elimination System (NPDES) standards (40 CFR 124). Since most of the radioactively contaminated materials in Area B with radium-226 concentrations greater than 100 picocuries per gram of soil are deeply buried, and the total radium-226 activity is considered small relative to that on the entire Canonsburg site, very little excavation would take place in this area.

The encapsulation cell that would be used at the expanded Canonsburg site includes a multilayer cover and a low-permeability liner. The cover is designed to limit the radon-222 emanation from the encapsulated radioactively contaminated materials to below 20 picocuries per square meter per second and to limit the water infiltration as much as possible. The liner serves the dual purpose of minimizing water movement and passively treating any water that does move through. The cover and liner would be constructed of natural

materials brought onto the expanded Canonsburg site from local sources, possibly augmented by admixing with bentonite clay imported from outside the local area to meet permeability criteria. The liner would consist of a layer of compacted clay. The liner must be placed on a stable prepared base and adequate separation must be maintained between the seasonal high water table and the bottom of the liner. Vegetation would be established to reduce erosion and thus to enhance the longevity of the cover. A gravel layer would be placed between the clay cap and the vegetation layer to control root and animal penetration into the encapsulation cell.

Historically, cover failure of poorly designed systems often resulted in the "bathtub" effect. This effect occurs when the rate of infiltration into the cell exceeds the rate of exfiltration out of the cell and results in seeps (plumes) of contaminants. Based on studies of failed systems and laboratory research, it is now known that this phenomenon may happen through flaws in the design (e.g., permeabilities are less for the liner than cover), or systems failure (e.g., cover failure).

To prevent these problems from occurring, the design and specifications for material selection will consider, at a minimum, the following:

1. Types and characteristics (e.g., permeabilities, ion exchange potential) of available native materials.
2. Need for imported natural materials (e.g., bentonite).
3. Cell configuration (e.g., slopes, topography).
4. Water balance analysis (e.g., rates of infiltration and exfiltration).
5. Others (e.g., compaction, construction sequencing).

To reduce the potential for encapsulation cell failure because of differential settlement, erosion, and adverse weathering, the concept calls for a thick (several feet) clay cap covered by a soil cover layer. In addition, a drain layer comprised of gravel or cobble could be placed between the clay and soil layers. The soil and pit run rock layers over the cap would provide adequate protection from freeze-thaw (frost depth in this area is 2 to 3 feet) and surface drying-cracking damage. The capillary break (coarse sand) layer would break capillary action, thereby preventing continuous saturation and further minimize the effects of freeze-thaw. Proper placement and compaction of the radioactively contaminated materials in the cell should minimize the potential for differential settlement.

Burial of the radioactively contaminated materials at the expanded Canonsburg site would be planned to minimize stockpiling. As soon as a portion of the encapsulation cell is complete, the initial radioactively contaminated materials excavated from Area A would be emplaced. If rail transportation is not used to bring in the radioactively contaminated materials from the Burrell site, the radioactively contaminated materials

resulting from dismantling the railroad spur coming into Area A would also be emplaced in the encapsulation cell as soon as possible. If rail transportation were used, the spur would be revitalized. As an alternative to revitalization of the rail spur, the imported radioactively contaminated materials could be off-loaded alongside the main railroad line and moved by conveyor onto the site. The Burrell site's radioactively contaminated materials would be brought onto the expanded Canonsburg site and deposited directly into the encapsulation cell. Similarly, the radioactively contaminated materials from Areas A and C would be deposited in the encapsulation cell as they are excavated. The radioactively contaminated materials from Area C would be wet and would be mixed with the dry radioactively contaminated materials from Area A. At the close of each working day the exposed radioactively contaminated materials in the encapsulation cell would either be sprayed with water or would be covered with a tarpaulin to prevent wind erosion. If radioactively contaminated organic materials were found, they would be shredded and spread over the expanded Canonsburg site outside the encapsulation cell and covered with soil.

Strict dust-control measures would be implemented during any handling of the radioactively contaminated materials. Pending Commonwealth approval, it is proposed that dust be controlled through the use of Best Available Technology (BAT). This could include the use of water sprays with surfactants at emission sources (e.g., stockpiles, excavated areas, haul roads, etc.). Special control emphasis would be placed on building decontamination and demolition at the expanded Canonsburg site, transfer points (construction vehicles), and stockpiles. Additional controls could include the use of cover over excavation areas, road maintenance, or the use of other types of dust suppressors.

Depending on its radioactive contamination levels, the radioactively contaminated materials previously brought onto the Canonsburg site from cleaning the vicinity properties and stored on Area A would either be encapsulated or spread over the expanded Canonsburg site and covered with soil.

All of the excavated holes would be backfilled and graded to natural contours. The entire expanded Canonsburg site, other than the present residential area and the low areas along Chartiers Creek, would be covered with cover soil, topsoil, and seeded. There would be both excavation and fill activities occurring in the 100-year flood plain to remove radioactively contaminated materials (Areas B and C), and to construct the base for the encapsulation cell (Area B).

The excavation work at the Burrell site would entail removing all radioactively contaminated materials not meeting EPA standards (40 CFR 192) and transporting them to the expanded Canonsburg site. This work would include the original residual radioactive materials, as well as other material that has become radioactively contaminated. Miscellaneous radioactively contaminated organic materials (e.g., wood) would be segregated for shredding and disposal on the expanded Canonsburg site. Following radioactively contaminated-materials excavation, the Burrell site would be filled, regraded, and reseeded.

The major material-handling activities at the expanded Canonsburg site during Alternative 2 would be importing and burying the radioactively contaminated Burrell site materials, excavating and burying the Canonsburg site's radioactively contaminated materials, spreading or burying the vicinity properties' radioactively contaminated materials, and importing approximately 270,000 cubic yards of fill and construction materials. The 270,000 cubic yards of imported fill and construction materials could be brought onto the expanded Canonsburg site by 20-ton dump trucks at a rate of 90 trips per day over a 32-week period. The Burrell site's radioactively contaminated materials (up to 80,000 cubic yards) could be brought onto the expanded Canonsburg site by 20-ton dump trucks at a rate of 40 trips per day over a 20-week period or by rail in 70-ton side-dumping railroad cars in two or three trains per week in approximately the same time.

The radioactively contaminated materials to be moved on the expanded Canonsburg site consist of the following:

Former Georges Pottery property	3,000 cubic yards
Area A preliminary excavation	4,000 cubic yards
Railroad spur material	3,000 cubic yards
Major Area A excavation	10,000 cubic yards
Area C excavation	40,000 cubic yards
Vicinity property material	<u>30,000</u> cubic yards
Total	90,000 cubic yards

Material handling at the Burrell site would consist of exporting the radioactively contaminated materials and importing clean fill. It is estimated that 16,000 cubic yards of clean fill would be required. This would be brought to the Burrell site at a rate of 40 truck trips per day over a 4-week period and stockpiled until needed. If trains were used to haul the clean fill, the delivery period would be about the same.

The decontamination of the Burrell site would occur over an estimated 80-week period, while the stabilization of the expanded Canonsburg site would require an estimated 95 to 100 weeks. (The duration of the four alternatives discussed in this section represents all activity from the first day of site mobilization through the last day of site demobilization. Radioactively contaminated materials handling would not occur over this entire span.) The stabilization of the expanded Canonsburg site and the decontamination of the Burrell site would not be scheduled to start at the same time. The Canonsburg site's staffing levels would average an estimated 25 to 30 site workers, with approximately 55 persons during the peak activity. Staffing levels at the Burrell site would average approximately 20 persons on the Burrell site at any one time, with a maximum of 35. Typical construction and earth-moving equipment would be used at both sites. After all remedial actions were completed, the stabilized Canonsburg site would be fenced and both sites monitored to ensure the integrity of the work.

This schedule assumes year-round activity performed during a normal workday. It includes some provisions for bad weather delays.

3.1.3 Alternative 3 -- the proposed action

This alternative would result in onsite stabilization of the radioactively contaminated materials at the expanded Canonsburg site and the Burrell site separately. The activity at the expanded Canonsburg site would be identical to that described for Alternative 2, except that there would be no inflow of radioactively contaminated materials from the Burrell site. This would result in a much smaller encapsulation cell at the expanded Canonsburg site.

The Burrell site's radioactively contaminated materials would be stabilized in place without excavation. The conceptual design for this process is detailed in Appendix A.2, based in part on information presented in U.S. DOE (1982e). The principal feature of the design concept is the capping of the surface to control radon exhalation and to inhibit water infiltration. The completed stabilized area would encompass approximately 4 acres in the northwest portion of the Burrell site. Cover material would be brought from other locations on the Burrell site or from the immediate area to form a low permeability cover. The surface would be graded to maximize runoff and vegetated to minimize erosion.

While the Burrell site has been designated a vicinity property, it is the DOE's intent to redesignate the Burrell site as a disposal site under this alternative. Therefore, it would be necessary for the government to acquire and maintain title to the radioactively contaminated portion of the Burrell site.

Material handling at the expanded Canonsburg site during Alternative 3 would entail excavating and burying the radioactively contaminated materials on the expanded Canonsburg site, spreading or burying the vicinity properties' radioactively contaminated materials, and importing 270,000 cubic yards of fill and construction materials. These activities would be performed in the same way as described for Alternative 2.

Material handling at the Burrell site would be limited to importing the 30,000 cubic yards of construction and fill materials. These construction and fill materials would be brought to the Burrell site in 20-ton trucks over a 15-week period at a rate of less than 60 truck trips per day. If rail transportation were used, the material could be delivered in 70-ton freight cars in about the same time period. The construction and fill materials would be stockpiled on the Burrell site and used as needed.

The stabilization of the expanded Canonsburg site would require an estimated 85 to 90 weeks, approximately 10 fewer than for Alternative 2. The staffing levels would average an estimated 25 to 30 onsite workers, peaking to a maximum of approximately 50.

The stabilization of the Burrell site would occur over an estimated 30- to 35-week period, less than half the time required for Alternative 2. The staffing levels would average approximately 15 persons on the Burrell site with a maximum of 30.

3.1.4 Alternative 4

Under this alternative all radioactively contaminated materials with radium-226 concentrations greater than those permitted under the EPA standards (40 CFR 192) would be excavated from the Canonsburg and Burrell sites and disposed of at the Hanover site.

The activities at the Canonsburg site would consist primarily of demolishing buildings, excavating and removing radioactively contaminated materials, and filling the excavated holes. The demolition of the buildings and the railroad spur would be performed as discussed for Alternative 2, with the exception of the former Georges Pottery property and the Wilson Avenue and George Street residences. These would remain standing, and Ward Street would be returned to public use following the remedial work. The radioactively contaminated rubble from the industrial park buildings and the railroad spur (totaling approximately 7000 cubic yards) would also be transported to the Hanover site for disposal.

Significantly greater amounts of radioactively contaminated materials would be excavated from the Canonsburg site during this alternative than in Alternative 2, because of the requirement for removing radium contamination rather than simply reducing surface radon flux. Approximately 250,000 cubic yards of radioactively contaminated materials would have to be excavated at the Canonsburg site. This amounts to 140,000, 34,000, and 76,000 cubic yards from Areas A, B, and C, respectively. (The stockpiled vicinity-property radioactively contaminated materials would add approximately 30,000 cubic yards.)

The excavation of Area A would cover a larger general area in comparison to the spot removals during Alternative 2. The excavation of Area C, although involving a greater volume, would be performed as described for Alternative 2, complete with lowering the water table and mixing wet radioactively contaminated materials with dry Area A radioactively contaminated materials. Unlike the stabilization alternatives, radioactively contaminated materials would also be excavated and removed from Area B.

The radioactively contaminated materials would be exported from the Canonsburg site as soon as they were excavated, with very little stockpiling, over a 46-week period using 20-ton trucks at a rate of less than 70 truck trips per day. If rail transportation were used, it would be necessary to rehabilitate a considerable length of abandoned spur in the Hanover site area.

The fill and construction materials to be used at the Canonsburg site for this alternative would consist of 32,000 cubic yards of road and berm materials, 220,000 cubic yards of clean fill, and 18,000 cubic yards of topsoil. These materials would be brought on the Canonsburg site over an estimated 30- to 35-week period at a daily rate of less than 90 truck trips; an alternative transportation method could again be rail. The materials would be stockpiled on the Canonsburg site until used.

The decontamination of the Burrell site would be performed as described for Alternative 2, with the same volume of material, and number of trips. The only difference would be the transportation route for the radioactively contaminated materials, i.e., from the Burrell site to the Hanover site instead of to the Canonsburg site.

The decontamination of the Canonsburg site would take place over approximately 105 weeks. There would be an average of 25 to 30 persons working on the site at any time. The maximum staff would be approximately 50 persons during the height of the excavation and transporting activities.

The decontamination of the Burrell site would occur over approximately 80 weeks. The staff levels would average 20 persons and peak to an estimated 35.

The Canonsburg and Burrell sites' radioactively contaminated materials would be stabilized at the Hanover site in an encapsulation cell. This encapsulation cell would be constructed in the same design as that constructed at the Canonsburg site under Alternatives 2 and 3. Once a portion of the liner was completed at the Hanover site, the contaminated Burrell and Canonsburg sites' radioactively contaminated materials would be placed in the encapsulation cell as they arrive.

A leachate-collection system would be installed at the Hanover site at the low point in the encapsulation-cell excavation. This system would be in operation during project activities to collect storm water and to transport it to the wastewater treatment plant. Once burial was completed, the collection system would be abandoned. A temporary water-supply well and pond would be constructed on the Hanover site to provide a source of wash water for equipment decontamination.

The construction and fill materials (approximately 200,000 cubic yards total of crushed stone, fill, clay, and topsoil) would be brought to the Hanover site by 20-ton dump trucks over an estimated 50- to 55-week period or they could be delivered by rail if the spur is rehabilitated, and stockpiled. The radioactively contaminated materials would arrive at the Hanover site at the same rate as they were removed from the Canonsburg and Burrell sites.

The stabilization activities at the Hanover site would require approximately 120 weeks to complete. The onsite staff would average an estimated 30 persons, with a maximum of up to 50.

3.1.5 Alternative 5

This alternative would entail decontaminating the Canonsburg site and disposing of its radioactively contaminated materials at the Hanover site, while the Burrell site's radioactively contaminated materials would be stabilized in place.

The activities that would be performed at the Canonsburg site are identical to those presented for Alternative 4. Excavating and removing the radioactively contaminated materials to the Hanover site would be conducted in the same way as for Alternative 4. This alternative would require the same length of time and staffing levels.

The Burrell site would be stabilized as discussed for Alternative 3. The activities, radioactively contaminated materials-handling volumes, transporting rates, staffing, and scheduling would be the same as for Alternative 3.

The stabilization activities at the Hanover site would be generally the same as presented for Alternative 4. The primary difference between these alternatives would be in the project duration and the volume of disposed radioactively contaminated materials. The Burrell site's radioactively contaminated materials would not be brought to the Hanover site. Approximately 170,000 cubic yards of construction and fill materials would be brought to the Hanover site. The activity at the Hanover site would take place over an estimated 120 weeks. The manpower requirements would average approximately 30 people, with a maximum of 50.

3.1.6 Alternatives eliminated from further consideration

Additional remedial-action alternatives were identified but eliminated from further consideration because they do not represent reasonable alternatives. These alternatives and the reasons for their elimination are discussed in the subsections that follow.

Use of rail instead of truck transportation is reviewed in Appendix I. Based on this analysis, the DOE has concluded that rail transportation is not a reasonable alternative. The study process conducted in cooperation with the Commonwealth that led to the selection of the Hanover site as the reasonable alternative offsite disposal site is outlined in Section 1.1.

3.1.6.1 Decontaminate the Canonsburg site and stabilize the Canonsburg and Burrell sites' radioactively contaminated materials at the Burrell site

This alternative would involve transporting the greater bulk of radioactively contaminated materials over 50 miles from Washington County to Indiana County. This violates one of the guidelines for disposal-site selection suggested by the Commonwealth (Pennsylvania, 1981); the one that calls for keeping the majority of the radioactively contaminated materials within the county where they are now. Most importantly, this alternative would require the construction of a disposal facility that would probably be larger than the Burrell site could handle.

3.1.6.2 Stabilize the Canonsburg site, decontaminate the Burrell site, and dispose of the Burrell site's radioactively contaminated materials at the Hanover site

This alternative would also require transporting large quantities of radioactively contaminated materials across county borders and through metropolitan Pittsburgh. The costs of this alternative in terms of finances, level of effort, and risks significantly outweigh the benefits; in effect, it would require the same magnitude of costs as Alternatives 2 and 4.

3.1.6.3 Decontaminate the Canonsburg and Burrell sites and dispose of the radioactively contaminated materials in above-ground containment structures

There is no historical experience that demonstrates the ability of any type of above-ground structure to provide long-term isolation with minimal maintenance. The use of natural materials for the underground containment structure should provide a more lasting structure than a rigid metal container. The climate of Pennsylvania complicates the problem because it would subject the containment structure to seasonal temperature extremes.

The isolation of at least 330,000 cubic yards of radioactively contaminated materials would require an extremely large structure. In addition to the engineering difficulties associated with this endeavor, serious aesthetic and social problems could occur. One example is a structure 10 yards high and 200 yards in diameter (two football fields in diameter).

3.1.6.4 Decontaminate the Canonsburg and Burrell sites and dispose of all of the radioactively contaminated materials in a central Federal repository for all UMTRAP sites

At present no such Federal repositories exist, nor have any been planned. This alternative would entail extensive financial and time costs and is not justifiable. The effort required to implement such an action would preclude the performance of any remedial action at the Canonsburg site during the foreseeable future. In addition, the risk of transportation-related accidents would be greatly increased under this alternative compared to onsite stabilization. Therefore, this action does not comply with the intent of the UMTRCA to provide for effective and swift removal of the potential public health hazard caused by the radioactively contaminated materials at all UMTRAP sites.

3.1.6.5 Decontaminate the Canonsburg and Burrell sites and dispose of all of the radioactively contaminated materials in a deep underground (geological) disposal area

Disposal in a deep underground (geological) disposal area (e.g., a specially selected stable area or an existing worked-out mine) would be extremely expensive vis-a-vis the five alternatives considered, and is not warranted considering the extremely low radiation level of the radioactively contaminated materials located at the Canonsburg and Burrell sites. Deep geological disposal is considered applicable to spent nuclear fuel, high level waste, and transuranic waste.

3.1.6.6 Decontaminate the Canonsburg and Burrell sites and reprocess the radioactively contaminated materials

None of these alternatives includes the reprocessing of the tailings. Pursuant to Public Law 95-604, the DOE solicited expressions of interest in reprocessing from the owners of each uranium-mill-tailings pile (by individual letter) and from the general public (by notices in the Federal Register (45 FR 36470-36471, May 30, 1980) and press releases). For the Canonsburg site there has been no response to these requests, probably because the small amount of reprocessible material and the long distance to established reprocessing plants make reprocessing uneconomical. For this reason, reprocessing is not included as a viable alternative.

3.2 ENVIRONMENTAL IMPACTS

3.2.1 Comparison of impacts

The major differences among the remedial-action alternatives (2 through 5) are discussed in this section. Chapter 5 contains a complete description of all of the environmental impacts associated with the remedial-action alternatives, and Table 1-3 summarizes these impacts. Chapter 1 explains the changes that were made in the document between the Canonsburg DEIS (U.S. DOE, 1982a) and the FEIS.

One of the major areas of environmental concern in comparing the alternatives is their radiological impacts. Under the no-action alternative, people living near the Canonsburg and Burrell sites would continue to be exposed to uncontrolled radioactively-contaminated materials contained at the Canonsburg and Burrell sites. The 63,942 people living within 6.2 miles (10 kilometers) of the Canonsburg site would receive an excess bronchial dose of 530 man-rems per year; the 4,546 people living within 1.24 miles of the Burrell site would receive an excess bronchial dose of 48 man-rems per year. These doses could cause 0.011 excess lung cancer deaths per year over the

remaining lifetime of the 63,942 people living within 6.2 miles of the Canonsburg site, and 0.001 excess lung cancer deaths per year over the remaining lifetime of the 4,546 people living within 1.24 miles of the Burrell site. Under the no action alternative these rates of excess lung cancer deaths would continue into the future. Each of the remedial-action alternatives would meet the EPA standards (40 CFR 192) for radioactively contaminated materials disposal. Each alternative would have similar short- and long-term effects on population exposure. Exposure during project implementation would be approximately twice the present (no action) level, while after project completion, the exposure would be reduced by a factor of approximately 4 from the present level. This reduction in exposure after completion of the remedial actions would result in an expected 0.003 additional lung cancer deaths per year among the 63,942 people living within 6.2 miles of the Canonsburg site over their remaining lifetime over those lung cancer deaths expected naturally; deaths would continue at this rate into the future.

The main difference between the remedial-action alternatives with respect to radiological conditions is that Alternatives 2 and 3 would involve potential disposal sites presently contaminated with radioactively contaminated materials, and Alternatives 4 and 5 would involve a potential disposal site presently not contaminated with radioactively contaminated materials.

A major nonradiological concern for Alternatives 2 through 5 pertains to transportation impacts. Each of the remedial-action alternatives would require extensive handling of both radioactively contaminated and uncontaminated materials. The feasibility of rail transport for some or all of these materials was assessed in terms of site and borrow pit locations, and existing rail line conditions (Appendix I). Because of the distance of the borrow pits from rail lines and the necessity for revitalizing several track sections between the sites, rail transport has been determined not to be economically viable. However, the trucks would have to access each site by minor roads. The Canonsburg site area would be the most sensitive area because the trucks would have to use narrow, congested roads through residential areas. Based on the lesser amounts of material movement during these alternatives, Alternatives 2 and 3 would entail the least amount of truck traffic into the expanded Canonsburg site (16,500 and 12,500 total truck trips, respectively). Alternatives 4 and 5 would each require 25,000 total truck trips to the Canonsburg site. Each remedial action would also affect traffic patterns in the vicinity of the Canonsburg site during project implementation. The temporary closing of Strabane Avenue through the Canonsburg site, a major connecting route between the Borough of Canonsburg and the Village of Strabane, would require motorists to travel over one-half mile to the east or west to cross Chartiers Creek. This could lead to traffic congestion in these two areas.

The remedial-action alternatives would differ in their short-term air-quality impacts. Alternatives 2 and 3 would not result in any air-quality impacts that would exceed the NAAQS (40 CFR 50) at either the Canonsburg or Burrell site. For both Alternatives 4 and 5 the 24-hour total-suspended-particulate concentration is predicted to be greater than the secondary

standard (40 CFR 50), and the annual concentration, when added to the background for the Hanover site, is predicted to marginally exceed the primary standard (40 CFR 50). All other pollutants at all sites for Alternatives 4 and 5 are predicted to be below the NAAQS (40 CFR 50).

Socioeconomic impacts at the sites would differ among the alternatives. Stabilized sites (the expanded Canonsburg site under Alternatives 2 and 3, the Burrell site under Alternatives 3 and 5, and the Hanover site under Alternatives 4 and 5) would be permanently committed as disposal sites and would not be available for future commercial or residential development. All alternatives would create offsite land-use impacts at the expanded Canonsburg site. Under Alternatives 2 and 3, seven houses adjacent to the Canon Industrial Park and their access roads (Ward Street, Wilson Avenue, and George Street) would be permanently closed. Under Alternatives 4 and 5 these houses and their access roads would be closed for two or three years.

None of the alternatives would cause large-scale population changes. At the expanded Canonsburg site, there would be a permanent relocation of the persons occupying the seven houses on Wilson Avenue and George Street under Alternatives 2 and 3, and a temporary relocation of these people under Alternatives 4 and 5. Each of the remedial-action alternatives would create an influx of workers during project activities. Because most of these workers would be from the greater Pittsburgh area and would have periods of employment less than the entire project duration, this short-term population shift would not have a serious effect on local housing or community services in the site areas. Also, the slight difference in staffing requirements between the alternatives would not be enough to create significant differences in housing or community services impacts.

Each of the alternatives would have a small economic impact in the project areas. Over the short term, there would be an inflow of some project funds at each site area. Material and supply purchases would be the major input of funds into the local economies. Only a small portion of wage monies would enter the local economies because of the workers' nonpermanent status. Closing the Canon Industrial Park (Alternatives 2 through 5), and closing the former Georges Pottery property and the seven houses at the Canonsburg site (temporarily during Alternatives 4 and 5, and permanently during Alternatives 2 and 3) would eliminate the tax revenues collected from these land uses.

3.2.2 Mitigating measures

Each remedial-action alternative (2 through 5) would include the same types of mitigation controls to prevent or lessen potential environmental impacts during project implementation.

Radiation releases and human exposure would be controlled by a combination of physical and management techniques to reduce wind and water erosion and to minimize direct human contact with the radioactively contaminated materials.

Radioactively contaminated materials would be covered each evening with tarps or sprinkled with water, if needed. Under high-wind conditions no radioactively contaminated materials would be handled. The offsite transport of dust would be controlled by washing trucks when necessary and by containing their loads with tight-fitting covers and tailgates. Other controls such as spraying unimproved roads with water or surfactants could also be used.

Water erosion of radioactively contaminated materials would be controlled by installing erosion-control berms at each site around all areas where radioactively contaminated materials would be exposed. There would also be a berm built along Chartiers Creek at the expanded Canonsburg site for all remedial-action alternatives. This structure would keep water from flowing into the radioactively contaminated areas, and would collect all precipitation that falls onto these areas. All collected water would be routed to the onsite waste-water treatment plant where it would be treated to NPDES standards (40 CFR 124) before being disposed of in Chartiers Creek. In addition to precipitation and runoff, the waste-water-treatment plant would treat process waste water, and ground water pumped during dewatering.

Direct human contact with radioactively contaminated materials would be minimized by restricting access to the project sites. Protective equipment would be provided to the remedial-action workers, as needed. At the expanded Canonsburg site those persons living in the seven residences on Wilson Avenue and George Street would be either temporarily (Alternatives 4 and 5) or permanently (Alternatives 2 and 3) relocated.

Nonradiological air-quality impacts would be reduced by the use of exhaust controls on equipment and vehicles, and by dust control in work areas. Fugitive dust would be controlled by the same measures used to prevent wind erosion of the radioactive dust, i.e., spraying unimproved roads and covering stockpiled materials.

The noise generated by equipment and vehicles would be reduced by the use of mufflers. In addition, noise levels experienced off the site would be made less annoying by scheduling project activities for daylight hours only.

Mitigation of transportation-related impacts would rely largely on route selection and scheduling. Traffic routes would be selected and hauling activities scheduled to avoid the most sensitive areas and times, i.e., school zones during school hours. Road repairs and maintenance would be evaluated during all transportation actions. Alternative routes, crosswalks, etc. will be considered in the remedial action plan.

Following project completion, a monitoring and maintenance program would be conducted for the final stabilized disposal site as required under the terms of the license issued by the NRC. This program would include measures for protecting structure integrity, such as restricting tree growth over the stabilized area and establishing a complete site security system.

3.2.3 Summary of impacts

Three major issues have been identified in the impact analysis. These pertain to radiation, transportation, and costs.

Alternatives 2 through 5 would all meet the EPA standards (40 CFR 192) for cleanup of inactive uranium-mill-tailings sites and disposal of uranium-mill tailings. Alternative 1 does not, and is therefore unacceptable. All of the remedial-action alternatives (2 through 5) would reduce the residual radiation-population doses from the radioactively contaminated materials nearly to background levels. However, there would be minor differences in levels of population exposure during the remedial action, as well as differences in the number of persons who would be affected; i.e., people near the Canonsburg and Burrell sites would be affected under all of the alternatives, while Alternatives 4 and 5 would also involve people near the Hanover site.

Based on the considerations detailed in Appendix I, the DOE is proposing the use of trucks rather than rail transportation to bring in fill dirt and to move out radioactively contaminated materials for each site under all remedial-action alternatives. The DOE has determined that rail transportation is not a reasonable alternative. Fill dirt would be needed at the Canonsburg and Burrell sites in all of the remedial-action alternatives, and at the Hanover site under Alternatives 4 and 5. No radioactively contaminated materials would be moved from the Canonsburg site under Alternatives 2 and 3, or from the Burrell site under Alternatives 3 and 5. Radioactively contaminated materials would be taken to the Hanover site under Alternatives 4 and 5. The material transport required for each alternative would involve not only the use of large trucks on minor roads, but also public concern about radiation exposure.

Since each alternative would require some degree of truck transport of material, differences among the transportation-related impacts of each alternative would be in the number of trucks used, the number of sites involved, and the roads used. Alternative 3 would require the least amount of truck traffic because there would be no offsite movement of radioactively contaminated materials and only two sites would be involved. Alternative 4 would entail greater transportation impacts because it would involve three sites, and would require the transport of radioactively contaminated materials from both the Canonsburg and Burrell sites to the Hanover site.

The costs that would be associated with the alternatives are summarized in subsection 5.13.2. They range over a factor of three, in the following order: Alternative 3 (\$13.4 million), Alternative 2 (\$21.7 million), Alternative 5 (\$31.5 million), and Alternative 4 (\$39.0 million).

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4 Affected Environment

4.1 A BRIEF DESCRIPTION OF THE REGION AND THE AFFECTED AREA

4.1.1 Regional characteristics

The Canonsburg, Burrell, and Hanover sites are located within 70 miles of each other in southwestern Pennsylvania (see Figure 1-1). They are situated south, east, and west, respectively, of the city of Pittsburgh, which is the major industrial and population center of the region. Secondary economic centers include the city of Johnstown to the east and the cities of Steubenville, Ohio, and Weirton, West Virginia to the west.

Economic growth and development in southwestern Pennsylvania is heavily influenced by its geologic features. This region lies within the Appalachian Mountain system and contains rich coal seams and numerous natural gas and oil deposits, which represent the major natural resources of the region. Washington County, which includes the Canonsburg and Hanover sites, and Indiana County, which includes the Burrell site, are the leading coal-producing counties in Pennsylvania, ranking first and second, respectively.

These geologic resources are also responsible for shaping the industrial character of this area. Electricity-generating facilities are primarily coal-fired. Industrial activities are dominated by steel and primary-metals production, while the major manufacturing activities are centered around machinery production, including mining equipment, glass products, and electrical equipment.

The major renewable resource in southwestern Pennsylvania is forest land. In several counties, forests account for the greatest land use, making this area a leading producer of forest products. In addition, the forests in southwestern Pennsylvania support a significant wildlife population, making hunting an important secondary use of this resource. Agricultural production is the second largest land use in this region. Much of the farmland is dedicated to dairy and livestock production because the rugged topography often limits field-crop production.

The overall pattern of land-use development in southwestern Pennsylvania is one of distinct communities set in a region dominated by rural areas and open space. Coal mines and oil and gas fields occur throughout the region, while manufacturing activities generally occur in association with the larger communities.

Southwestern Pennsylvania is connected to the greater regional area by a well-developed transportation network. The Greater Pittsburgh International Airport, the Ohio River, and various rail lines and interstate highways, such as I-79 running north and south and I-70 running east and west, provide interstate service. Population and industrial centers within the region are

interconnected by numerous highways and rail lines. The layout of the local highway system is typically influenced by the topography. Local roads are often narrow with steep slopes, abrupt curves, and poor surfaces.

The region contains an extensive surface-water network that eventually drains into the Ohio River system. The most notable surface-water feature of this area is the confluence of the Allegheny and Monongahela Rivers forming the Ohio River in Pittsburgh. The headwaters of the area's streams generally have good water quality and support healthy fisheries. However, much of the downstream water quality is adversely affected by acid drainage from mining activities. As a result, many streams are characterized by a low pH and are high in iron, sulfates, and total dissolved solids.

The air quality in the area of southwestern Pennsylvania near the Canonsburg, Burrell, and Hanover sites is classified as attainment for the National Ambient Air Quality Standards (NAAQS) (40 CFR 50) for all criteria pollutants except photochemical oxidants. (The entire Commonwealth is classified as nonattainment for ozone.) However, the potential exists for temporary poor air-quality conditions in localized areas. The rugged terrain tends to decrease wind speeds, which increases the potential for a buildup of high concentrations of airborne pollutants. Manufacturing activity is mainly concentrated in valley areas such as the Ohio, Allegheny, and Monongahela River valleys and, in conjunction with coal-mining operations and coal-fired power plants, is often responsible for generating significant air impacts. During temperature inversions, when air masses remain in a confined area, contaminants can reach unhealthy levels.

4.1.2 Canonsburg site

The Canonsburg site is located within the Borough of Canonsburg, Washington County, in southwestern Pennsylvania. It lies approximately 20 miles southwest of downtown Pittsburgh (Figure 1-1). The former Vitro Rare Metals Plant property (18.5 acres), now the Canon Industrial Park, is the area designated by the UMTRCA as containing the residual radioactive materials and is the area implied in this FEIS when discussing the Canonsburg site. The Canonsburg site property is divided by Strabane Avenue and Ward Street into three separate areas: A, B, and C (Figure 1-2). Area A covers 11 acres and is bounded by Ward Street, Strabane Avenue, George Street, and the former W. S. Georges Pottery Company. All of the buildings of the Canon Industrial Park are situated in Area A. Area B covers approximately 4.5 acres and is vacant. It is bounded by Chartiers Creek, Strabane Avenue, Ward Street, and the no-longer-operating Washington-Canonsburg Street Railway right-of-way. Area C covers 3 acres and is also vacant. It is bounded by Chartiers Creek, Strabane Avenue, and the ConRail right-of-way. The expanded Canonsburg site includes two other areas adjacent to the Canonsburg site that are needed to complete two of the remedial-action alternatives (Alternatives 2 and 3) involving onsite stabilization; these areas are the former Georges Pottery property (6.1 acres), and the seven residences situated on Wilson Avenue and George Street

(5.4 acres). The expanded Canonsburg site is an approximate 30-acre area bounded by Chartiers Creek to the north, west, and east, and by the ConRail right-of-way to the south (Figure 1-3). The expanded Canonsburg site is located in an urban area. There are residences across the ConRail tracks to the south as close as 250 feet to the expanded Canonsburg site.

The Canonsburg site was owned by the Canon Development Company which had operated it as the Canon Industrial Park from 1966 to 1982, but it has been acquired by the Commonwealth in accordance with the provisions of the DOE-Pennsylvania cooperative agreement, entered into under PL 95-604, Section 104. As of April 1983 there were two firms, employing a maximum of 11 persons, located on the Canonsburg site (Yusko, 1983). These two firms will vacate the premises prior to October 1, 1983.

4.1.3 Burrell site

The Burrell site is located in Burrell Township along the southern border of Indiana County (Figure 1-1). It lies approximately 40 miles east of Pittsburgh, and 1 mile east of the Town of Blairsville. It is situated about 50 miles in a straight line northeast of the Canonsburg site. The Burrell site lies within a bend of the Conemaugh River along its northern bank (Figure 1-4). The ConRail main line passes along the northern boundary of the Burrell site (Figure 1-5). The Burrell site consists of 49 acres, which is a portion of a larger tract presently owned by the James Burrows Company. There are no structures on the property, and except for the ConRail right-of-way along the northern boundary, there are no public thoroughfares. The most outstanding surface features of the Burrell site are two steep-banked ponds (three at low water) located within the western sector. These correspond to ponds B, C, and D on Figure 1-5. (Pond A, located north of the railline, is included on the figure only for completeness; it is not contained on the Burrell site.) The general area of the Burrell site is sparsely developed; the nearest residence is 500 feet away.

4.1.4 Hanover site

The Hanover site is located in southwestern Pennsylvania in Hanover Township, Washington County (Figure 1-1). It is approximately 25 miles from downtown Pittsburgh and 16 miles from the Canonsburg site. The nearest community is Burgettstown, which lies 3 miles to the east of the Hanover site. Steubenville, Ohio and Weirton, West Virginia are 10 and 6 miles to the west of the Hanover site, respectively. The area considered for the Hanover site in Hanover Township covers about 50 acres of a much larger parcel of land owned by Starvaggi Industries (Figure 1-8). The Hanover site consists of a long trench that was formed as a result of strip-mining activities (Figure 1-9). There are no structures on the Hanover site, and the only access is by unimproved gravel-access roads along its eastern and western boundaries. The

Hanover site is surrounded by a large amount of uninhabited land. There are only a few residences within the general area; and the nearest home is over 2000 feet away from the Hanover site.

4.2 DESCRIPTION OF THE CANONSBURG AND BURRELL SITE RESIDUES

4.2.1 Canonsburg site

In the early 1900's, the Standard Chemical Company initiated the development of a method to extract and concentrate radium from carnotite ore. The company established its radium-processing facilities at Canonsburg, Pennsylvania, and produced the first salable quantities of radium in 1913 (Standard Chemical Co., 1919). The company ceased processing operations in the early 1920's (probably around 1922), but continued to act as a marketing agent for some foreign radium producers.

Vitro purchased the Canonsburg facility in 1933 and utilized it for the extraction of uranium, vanadium, and radium from various residues, ores, and concentrates. From 1942 until the facility's closing in 1957, Vitro and its successor, the Vitro Corporation of America, owned and operated the plant on the Canonsburg site. The operations were directed toward the production of uranium concentrates. The only customer from 1942 to 1957 was the United States Government. The uranium, and other rare metals, was extracted from both onsite (contractor-owned) residues and ores and government-owned ores, concentrates, and scrap. During this time various ores, concentrates, and scrap materials were brought from different Atomic Energy Commission (AEC) installations to the Canonsburg site for uranium recovery. The end products of these processes were delivered to the AEC in accordance with terms of government procurement contracts. All solid process wastes were stored temporarily on the Canonsburg site. The liquid wastes were discharged through a drainage system beneath Strabane Avenue into the former swamp in Area C that discharged through a drainage ditch into Chartiers Creek. This swamp has since been filled in.

On November 1, 1953, the government and Vitro entered into a contract (AT-(30-1)-1683) that required Vitro to process certain government-owned materials. The contract required that Vitro store the residual radioactive materials from this operation at the Canonsburg site until November 1, 1955 because the AEC believed the residual radioactive materials might contain recoverable uranium. After attempts by Vitro to recycle the residual radioactive materials and attempts by the AEC to identify commercial interest in the residual radioactive materials, it was determined that the uranium in the residual radioactive materials was "unrecoverable" and the AEC authorized an inventory write-off pursuant to provisions of AEC Manual Chapter 7401-12. The AEC's Oak Ridge Operations Office approved the transfer of 11,600 tons of wet radioactively contaminated materials from the Canonsburg site to the Burrell site. The radioactively contaminated materials, containing approximately 6 tons of uranium oxide, were transported to the Burrell site from late 1956 to early 1957 (Leggett et al., 1979a).

The Burrell site is situated about 50 miles northeast of the Canonsburg site in Burrell Township, Indiana County, Pennsylvania (Figure 1-1). At the time of the 1956-1957 disposal, it was owned and operated by the Pennsylvania Railroad as a railroad landfill. Currently, it is owned by the George Burrows Company. The Burrell site covers approximately 49 acres; it is currently an undeveloped plateau along a bend of the Conemaugh River at the southern boundary of Indiana County (Figure 1-4). Its only significant surface features are three steep-banked ponds in the western area that are remnants of an old railroad disposal pit (Figure 1-5). Disposal of the 11,600 tons of radioactively contaminated materials removed from the Canonsburg site took place within an approximately 9-acre section in the western portion of the Burrell site. The radioactively contaminated materials were brought in by railcar, dumped into the disposal pit, and covered with an uneven layer of uncontaminated material.

Recovery operations at Vitro's Canonsburg plant ceased by 1957. The contractor's remaining residues and processing wastes were stored on the Canonsburg site by Vitro. Vitro's final source-material license expired, and in May 1961 Vitro applied to the AEC for another source-material license. On June 21, 1961, the AEC granted Vitro a license, for storage only, of a maximum of 23 tons of uranium contained in 4458 tons of material.

In 1962 Vitro's real property was sold to developers, with Vitro retaining title to the radioactively contaminated materials remaining on the Canonsburg site. In an effort to decontaminate the immediate plant area, in 1964 all of the materials then considered radioactively contaminated were consolidated into one pile in Area A. In 1965, Vitro obtained a permit from the Commonwealth to move this pile to Area C. At Area C it was buried beneath a relatively impermeable layer of steel-mill slag (red dog), and covered by clean fill material. Vitro's source-material license was then terminated, and the Canonsburg site was developed into its present use as the Canon Industrial Park in 1966.

In 1978, the UMTRCA was enacted into law. On November 8, 1979 the Canonsburg site was designated by the DOE as a processing site eligible for remedial action under the UMTRCA. Effective September 5, 1980, the DOE and the Commonwealth entered into a cooperative agreement under UMTRCA, setting forth the terms and conditions for the DOE and the Commonwealth cooperative remedial-action effort, including 90 percent (DOE), 10 percent (Commonwealth) cost-sharing, the Commonwealth's real estate acquisition responsibilities, the Commonwealth's responsibility for nominating potential disposal sites, and provision for the DOE's development of a remedial-action plan after publication of the Canonsburg FEIS. (The remedial-action plan will be concurred on by the Commonwealth and the NRC.)

Radiological surveys were made of the Canonsburg site in 1977 under the Atomic Energy Commission's 1974 "Formerly Utilized MED/AEC Sites Remedial Action Program" (Leggett et al., 1979b). It was determined that significant amounts of radioactively contaminated materials remained on the Canonsburg site and that the radiation levels measured in the buildings, soils, and ground water in certain areas exceeded existing standards, proposed standards, or guidelines.

The Canonsburg site exhibits a widely distributed, heterogeneous pattern of radioactive contamination in each of its three areas: A, B, and C. The radioactively contaminated materials consist of unprocessed ores, contaminated soils, waste sludges and fines, and building materials. These radioactively contaminated materials are distributed from the surface to a depth of 16 feet. Decontamination of the Canonsburg site to a radium-226 concentration of 15 picocuries per gram would require removing approximately 250,000 cubic yards of radioactively contaminated materials.

Surveys of Area A indicate that radioactively contaminated materials are present in soil beneath, and adjacent to, many of the buildings as well as in the top few feet of soil over much of the area. Virtually all of the surface soil samples taken in this area indicate radium-226 concentrations above EPA standards (40 CFR 192). Radon-222 and radon-daughter concentrations measured in the buildings in Area A exceed EPA standards (40 CFR 192) and NRC standards (10 CFR 20). Airborne concentrations of thorium-230 measured in air of two of the buildings exceed NRC standards (10 CFR 20). Alpha-contamination levels, beta-gamma dose rates, and external gamma-radiation levels in some areas of the buildings and outdoors in Area A are above NRC surface-contamination guidelines (U.S. NRC, 1976) or NRC standards (10 CFR 20), as applicable. The ground water in Area A contains concentrations of radium-226 above NRC standards (10 CFR 20). Subsurface contamination in this area occurs within 8 feet of the surface, mostly at depths of 0 to 4 feet.

Surveys of Area B indicate that contamination on the surface is above NRC standards (10 CFR 20), but at lower levels than found in Area A. Radioactive contamination is concentrated in the northeastern and southeastern portions of the area. Beta-gamma dose rates, external gamma radiation levels, radium-226 in ground water, and radium-226 in soil are, in some samples or measurements, above the applicable NRC standards (10 CFR 20), and EPA standards (40 CFR 192), respectively. The 2- to 6-foot layer of contaminated soil on this area appears to be under approximately 8 to 9 feet of clean fill, which has held surface radiation levels in this area below those of Area A.

Area C, a former lagoon area, was used as a depository for liquid wastes during uranium- and radium-recovery operations, as well as for disposal of solid wastes during the transfer of the stockpiled radioactively contaminated materials from Area A to Area C in 1965. The subsurface contamination in Area C contains radionuclides in higher concentrations at greater depths than in Areas A and B. A mucky radioactively contaminated material remains beneath the surface, with elevated concentrations of uranium-238 and radium-226. Radium-226 concentrations in soil and ground water exceed EPA standards (40 CFR 192) and NRC standards (10 CFR 20), respectively. Beta-gamma dose rates and potential doses from external gamma radiation levels measured over a large portion of this area exceed NRC standards (10 CFR 20). Surveys indicate that Area C is contaminated to a depth of approximately 16 feet.

4.2.2 Burrell site

The Burrell site was never operated under an AEC license. The radiological contamination at the Burrell site is the result of a one-time disposal operation. From October 1956 through January 1957, Vitro, with the approval of the AEC and the Pennsylvania Railroad, disposed of approximately 11,600 wet tons of radioactively contaminated materials from its Canonsburg facility at the Burrell site. The radioactively contaminated materials reportedly contained carbonate cake, pitchblende, calcium fluoride, and magnesium fluoride (Leggett et al., 1979a).

These radioactively contaminated materials were further described as containing an average of 0.097 percent uranium oxide by weight (or about 6 tons of uranium oxide), which corresponds to approximately 1.5 curies of uranium-238. The Canonsburg site's radioactively contaminated materials were transported by rail to the Burrell site and stockpiled in a relatively small section between a railroad spur and the railroad disposal area in the western portion of the Burrell site. From there they were pushed by bulldozer into the railroad disposal area. This type of disposal did not allow the radioactively contaminated materials to mix uniformly with uncontaminated material and resulted in virtually all of the radioactively contaminated materials being located in a small section of the railroad disposal area. The radioactively contaminated materials were covered with an uneven layer of uncontaminated material.

The radioactively contaminated materials are located between the ConRail tracks and the ponds in the western portion of the Burrell site (Leggett et al., 1979a). Field surveys by Oak Ridge National Laboratory (ORNL) (Leggett et al., 1979a) indicated that more than 75 percent of the radioactively contaminated materials were located between 10 and 36 feet below the surface. It was estimated that the total radium-226 and uranium-238 activity in the radioactively contaminated materials were 4 curies and 1.3 curies, respectively. This included the Vitro residual radioactive materials and any other materials that had become radioactively contaminated.

In late 1981, WESTON drilled additional wells at the Burrell site to assess its water quality and stratigraphy, and to obtain additional radiological information. This data (U.S. DOE, 1982c) indicated that the concentrations of the more deeply buried radioactively-contaminated material had been reduced since 1977. As a confirmation of these results, Bendix Field Engineering Corporation drilled more wells and performed additional well drilling and data collection in early 1982. The results of the Bendix survey (U.S. DOE, 1982c) agreed with the WESTON data and are considered to be the conditions that currently exist on the Burrell site. The results of these surveys are discussed in more detail in subsection 4.8.2. Based on these more recent and more extensive data it is believed that only one-third to one-tenth of the radiological activity originally placed on the Burrell site in 1956-1957 remains there, and that most of this radiological activity occurs at depths of less than 12 feet. Therefore, the Burrell site currently meets the EPA standards (40 CFR 192), except in a few small areas. This, in turn, could imply that a much smaller remedial-action plan is necessary than originally envisioned (viz, acquiring the Burrell site, covering the radioactively contaminated portion of the Burrell site with a minimum soil cover, and designating that portion as a disposal site as described in Appendix A.2). The Burrell site is currently classified as a vicinity property, but the DOE is proposing to redesignate the Burrell site as a disposal site. The Burrell site's use is currently restricted by the U.S. Army Corps of Engineers flood-control easement for the Conemaugh Dam.

4.3 WEATHER

Weather data for the Canonsburg site were collected from a meteorological monitoring station operated at the Canonsburg site (Figure 1-2) (Appendix B.1), which measured wind speed, wind direction, and temperature from 1979 through 1981. An identical system was installed at the Burrell site; however, within a month it was vandalized. Based on the one month's worth of simultaneous monitoring (Appendix B.1), wind estimates for the Burrell site for 1979 through 1981 were derived by altering the Canonsburg site's values to reflect the Burrell site's topographic conditions. This was done by making a 30-degree clockwise shift in the recorded Canonsburg site wind directions. Average temperature and precipitation information for the Burrell site were obtained from the Indiana Airport, approximately 15 miles to the north.

The Hanover site meteorological data were obtained from measurements made at the Pittsburgh International Airport for the 1979 through 1981 period. The airport is located 13 miles east of the Hanover site and has a similar topographic setting. Although meteorological data for the Pittsburgh Airport are available for a longer time period, these two years were used to be consistent with the information available for the Canonsburg and Burrell sites. All meteorological data are presented as hourly averages.

4.3.1 Weather patterns

The Canonsburg, Burrell, and Hanover sites are located in the humid continental climatic region. This region experiences distinct seasons with seasonal variations slightly moderated by the nearness of the Great Lakes and the Atlantic seaboard.

The regional climate is dominated by a succession of low- and high-pressure centers and fronts that migrate through the area during the year. The constant movement of these weather systems from west to east and the sites' proximity to moisture sources (i.e., the Great Lakes) provide a generally uniform distribution of precipitation and winds in the areas of relatively flat, open terrain.

The summer season is generally mild but frequently humid because of invasions of tropical air from the Gulf of Mexico. The winter months are brisk with occasional periods of extreme cold. Cloud cover is persistent during the winter because of the frequent passage of moisture-laden air masses from the Great Lakes and the region's location in the path of west-to-east migratory storms. Spring and fall are transitional seasons with moderate-to-cool temperatures. Rapid and wide variations in day-to-day weather conditions are common during the spring and fall.

4.3.2 Temperature

Temperatures for this region from 1979 through 1981 ranged from 99°F in the summer to -18°F in the winter (Table B.1-2). July and August are typically the warmest months of the year, while December, January, and February are the coldest. During the winter it is not uncommon for subfreezing temperatures to persist for 1 to 2 weeks.

The average annual temperature in the region is approximately 50°F as reported for all three sites. Average winter temperatures range between 28°F at the Canonsburg site to 32°F at the Hanover site, while summer temperatures average between 68°F at the Burrell site to 73°F at the Hanover site.

4.3.3 Precipitation and floods

Precipitation in this climatic region primarily results from cyclonic storms in winter, spring, and fall; from thunderstorms in the summer; and infrequently, from remnants of hurricanes and tropical storms in late summer and fall. The annual precipitation in this area is fairly evenly distributed throughout the year.

Precipitation in the Canonsburg-Hanover sites' vicinity averages 37.0 inches per year. March and June are the wettest months, averaging 3.8 inches each, while February and November are the driest, averaging 2.4 inches each. The average annual snowfall in the Canonsburg-Hanover sites area is 45.3 inches, and has varied from 16.6 inches to 82.0 inches. The snow season typically occurs from October to May with the heaviest fall in January.

The average annual precipitation in the Burrell site vicinity is 44.4 inches. The highest monthly precipitation occurs in June and July, and the lowest occurs in December. The snowfall values for the Canonsburg-Hanover sites vicinity are also representative of the Burrell site.

The Canonsburg and Hanover sites precipitation events are based on data from the Pittsburgh International Airport for the period from 1941 to 1980. Precipitation information for the Burrell site is from the Indiana Airport for the period 1960 to 1972. No data are available on extreme events for the Burrell site; however, information for extreme events from Pittsburgh are representative because these events generally occur as a result of large-scale systems affecting the entire three-site area.

Although thunderstorms are common in the vicinity of the Canonsburg, Burrell, and Hanover sites during the spring and summer months, hurricanes or low-pressure-tropical systems rarely affect the region. Approximately 36 thunderstorms occur annually, most frequently in summer (June, July, and August). Tornadoes are rare, but can occur during the summer.

Since 1931 an average of only two hurricanes reach the United States coast each year. Significantly fewer storms will actually affect the study area. Based on data collected since 1953 only 1.2 tornadoes occur in Pennsylvania each year. Only 8 tornadoes were reported in the three-site area between 1916 and 1950, which translates into an average of 0.25 tornadoes per year.

A portion of the Canonsburg site is located in the flood plain of Chartiers Creek (Figure D.1-1), which has a history of flooding. The most significant flooding occurred in 1912. Other major floods occurred in August 1956, April 1961, March 1963, and February 1966 (FEMA, 1979).

Although the Burrell site is within the maximum flood pool of the Conemaugh River (Figure D.1-3), the potential for flooding at the Burrell site is believed to be minimal since even Hurricane Agnes in 1972, considered to be a 1000-year storm, did not create a flood pool high enough to inundate the site. During that storm the onsite ponds did not completely fill.

The Hanover site is located on a plateau and therefore is not subject to flooding.

Preliminary conversations have been held with the U.S. Army Corps of Engineers (COE), which has jurisdiction over Federal projects in flood plains and wetlands, pursuant to Executive Orders 11988 and 11990. The COE has indicated that probably no permit will be required to do the work needed at

the Canonsburg site under any of the proposed alternatives. The Burrell site is subject to a perpetual easement for flood control, and the terms of that easement will have to be modified to be consistent with whatever remedial action is carried out there. The flood-plain assessment required under the DOE regulations (10 CFR 1022) is integrated into this Canonsburg FEIS and summarized in Appendix J. The DOE will issue the required flood-plain findings when a remedial-action alternative is chosen in the Record of Decision.

4.3.4 Winds

The Canonsburg site is situated in the east-to-west-oriented Chartiers Creek valley, which channels wind flows. As a result, the predominant wind direction (occurring over 50 percent of the time) is from the west-to-northwest sector (Figure B.1-1). Cross-valley flows (north and south) are limited to periods of relatively high wind speeds. These typically occur in the winter as northerly winds. The average annual wind speed as measured from 1979 to 1980 at the Canonsburg site was 4.7 miles per hour. Over 90 percent of the recorded one-hour average wind speeds were less than 11.2 miles per hour, and none exceeded 22.4 miles per hour. Calm periods (wind speeds less than 0.7 miles per hour) occurred less than 2 percent of the time.

The Canonsburg site is strongly affected by the topography of the surrounding area. The relatively high hills south and north of the Canonsburg site tend to shield the area from high-speed winds in these quadrants. The elevated terrain induces a drag on the wind causing a decrease in speed and a corresponding change in direction. The lower wind-speed conditions, which are generally associated with either very stable or very unstable conditions, reduce the potential for significant transport of pollutants from the site and increase the potential for relatively high localized-pollutant concentrations. The low wind-speed conditions, in conjunction with the high frequency of up-valley winds, further enhance the potential for high localized pollutant concentrations.

The predominant wind direction at the Burrell site is from the west and northwest sectors (Figure B.1-2). The wind distribution reflects the strong topographic influence on local wind conditions. The wind-speed distribution at the Burrell site is very similar to that at the Canonsburg site.

The Burrell site is also strongly influenced by local topography. High hills to the north and east of the Burrell site tend to shield this area from the winds in these quadrants. Similar reductions in speed and corresponding changes in direction will occur at the Burrell site because of the effects of the hills. The reduction in wind speed will reduce the potential for transport of pollutants off the Burrell site, but will increase the potential for locally high pollutant concentrations. Stability, dispersion, and mixing are likely to be similar at the Burrell and Canonsburg sites.

The wind distribution at the Hanover site is generally uniform, indicating that winds here are not strongly influenced by the topography (Figure B.1-3). Although the predominant wind direction is westerly, a southerly flow is common during the warmer months. The average-annual-recorded one-hour average wind speed at Hanover is 9.4 miles per hour, with more than 80 percent less than 11.2 miles per hour. Calm periods exist only 9 percent of the time, while wind speeds greater than 22.4 miles per hour occur less than 2 percent of the time.

The strong similarity between the two-year (1979 to 1981) average wind-direction data and the ten-year (1967 to 1976) average wind-flow data for the Hanover site suggest that the two-year data used at the Canonsburg and Burrell sites are also representative of longer-term wind conditions.

The Hanover site is located on a plateau that is at least as high as the surrounding hills, making it unlikely that winds would be affected by the terrain. The potential for offsite transport and dispersion of pollutants at Hanover is greater than for the Canonsburg and Burrell sites, resulting in a lower potential for a local buildup of pollutants.

4.4 AIR QUALITY

The Canonsburg, Burrell, and Hanover sites are all located in the southwest Pennsylvania Interstate Air Quality Control Region (AQCR). None of the sites are located in a Pennsylvania Department of Environmental Resources (PA DER)-designated air basin. Air-quality standards adopted by the PA DER include the EPA National Ambient Air Quality Standards (NAAQS) (40 CFR 50) and Pennsylvania standards (Table B.2-1). These standards cover the following pollutants:

1. National Ambient Air Quality Standards (40 CFR 50).
 - a. Carbon monoxide (CO).
 - b. Hydrocarbons (HC) (Although the EPA has revoked the primary and secondary NAAQS (40 CFR 50) for hydrocarbons (48 FR 628-629, January 5, 1983), the revoked standard is still included for completeness.)
 - c. Nitrogen dioxide (NO₂).
 - d. Ozone (O₃).
 - e. Total suspended particulates (TSP).
 - f. Sulfur dioxide (SO₂).
 - g. Lead (Pb).
2. Pennsylvania standards (25 PA Code 131).
 - a. Settleable particulates.
 - b. Beryllium.
 - c. Sulfates.
 - d. Fluorides.
 - e. Hydrogen sulfides.

The part of the southwest Pennsylvania Interstate AQCR containing the three sites is classified as attainment for all criteria pollutants except photochemical oxidants (ozone). The entire state of Pennsylvania has been designated as nonattainment for ozone. Based on measurements at Johnstown, Pennsylvania and for the Lower Beaver Valley Air Basin, the average annual ozone concentration is approximately 0.020 parts per million. However, during the summer months the area probably experiences excursions greater than the 0.12 parts per million ozone limit allowed under the EPA NAAQS (40 CFR 50). The only air-quality data that are collected in this area that are representative of conditions at the Canonsburg, Burrell, and Hanover sites are total suspended particulates and sulfur dioxide (Osmon, 1982). Total suspended particulates are routinely measured in the city of Washington, in central Washington County, approximately 8 miles southwest of Canonsburg. Sulfur dioxide is measured in the City of Florence, in northern Washington County at the intersection of Routes 22 and 18, about 18 miles northeast of Canonsburg. The monitors at Washington and Florence are the only ones near the sites that are not significantly impacted by nearby sources. The Pennsylvania DER confirmed that these two measurement locations are the most representative for the Canonsburg-Burrell-Hanover sites area (Osmon, 1982).

The total suspended-particulate data collected in 1981 indicate that the annual geometric-mean concentration was 67 micrograms per cubic meter, which is 89 percent of the EPA primary NAAQS (40 CFR 50), and 112 percent of the EPA secondary NAAQS (40 CFR 50). The maximum 24-hour concentration measured during 1981 was 194 micrograms per cubic meter, and the second highest value was 119 micrograms per cubic meter. The second highest value was 46 percent of the EPA primary NAAQS (40 CFR 50) and 79 percent of the EPA secondary NAAQS (40 CFR 50). It should be noted that for purposes of determining secondary attainment, the Pennsylvania DER uses the 24-hour total suspended-particulate values (25 PA Code 131). Hence, the area of the three sites is classified as both primary and secondary attainment for total suspended-particulates based on the monitoring data alone.

Sulfur-dioxide data collected in 1981 indicated a mean annual concentration of 47 micrograms per cubic meter (59 percent of the EPA primary NAAQS (40 CFR 50)). The maximum 3-hour concentration measured was 532 micrograms per cubic meter (41 percent of the EPA secondary NAAQS (40 CFR 50)), and the maximum 24-hour concentration was 170 micrograms per cubic meter (46 percent of the EPA primary NAAQS (40 CFR 50)).

4.5 SURFACE AND SUBSURFACE FEATURES

4.5.1 Topography and soils

4.5.1.1 Canonsburg site

The topography of the Canonsburg site, originally a low-lying flood plain, has been altered through filling and earth-moving activities (Figure C.1-1). The Canonsburg site's general slope is from the southwest corner of Area A toward Chartiers Creek, with a total relief of 30 feet. Area A, which contains buildings and a railroad spur, exhibits the greatest relief. Area B is a plateau that is elevated 7.5 feet above its perimeter; it was created through the disposal of dredged material from Chartiers Creek. Area C is the lowest portion of the Canonsburg site and is relatively flat. The former Georges Pottery property and the Wilson Avenue residences also exhibit minimal relief except where they drop off sharply to Chartiers Creek along the northern and western sides.

The natural soil structure of the Canonsburg site has been disturbed by site use. The soils range from sandy loams to silty clay loams (Tables C.1-1 and C.1-2). The soil materials exhibit a wide variation in characteristics (Tables C.1-3 and C.1-4). Coarser materials (sandy loams) are found in Area B as a result of the disposal of dredged materials. The finer materials represent the Canonsburg site's natural flood-plain soils. The soil pH ranges from a low of 2.8 in Area C where the steel-mill waste (red dog) was placed, to a high of 7.5 in association with the natural alluvium along Chartiers Creek.

The organic content of the soils ranges from 0.10 percent in the natural soil to 11.09 percent in the dredge fill. The cation-exchange capacity follows a similar trend of 9.4 milliequivalent per 100 grams in the natural soils to 31.7 milliequivalent per 100 grams in the dredged material (due to the high organic content).

Soil-infiltration rates (the rate at which water enters the soil surface), range from 5.5×10^{-6} to 3.9×10^{-3} inches per second (Table C.1-5). The slowest rates are found in the undisturbed soil profile in Area A, while the rate for the dredged material and flood-plain soils ranges from 7.0×10^{-4} to 3.9×10^{-3} inches per second.

Soil-percolation rates (the rate at which water moves through the soil in all directions) range from 1.7×10^{-4} to 1.6×10^{-3} inches per second in the natural soils and from 1.1×10^{-5} to 2.2×10^{-4} inches per second in the disturbed and dredged soils.

The laboratory permeability test results range from 3.58×10^{-8} to 3.98×10^{-8} inches per second (Table C.1-6). Detailed soil data are presented in Appendix C.1.

The total amount of soil currently lost via the erosional process from the expanded Canonsburg site annually is estimated at 84.2 tons, or 2.8 tons per acre (Table A.5-1).

4.5.1.2 Burrell site

The Burrell site is a plateau formed by landfilling. Its major topographic feature is an east-to-west trending valley about 40 feet deep that occupies approximately 25 percent of the Burrell site area (Figure C.1-2). This valley remains from the previous site-filling operations. The valley contains two ponds (three ponds at low water). The remainder of the Burrell site varies in elevation between 970 and 980 feet from the north to the south across a 1300-foot horizontal distance. There is a 50-foot drop from the edge of the plateau to the Conemaugh River.

Soils at the Burrell site have also been disturbed by excavating and landfilling operations. No original soils were encountered in the study area; instead, fill material was found to depths of 50 to 60 feet. The fill consists of gravelly loam and sandy loam mixed with ashes, cinders, gravel, railroad ties, bricks, boards, and sandstone fragments (Table C.1-7). There are numerous voids throughout the fill due to its random placement and settling. Soil percolation rates range from 6.7×10^{-4} to 2.8×10^{-3} inches per second. Soil infiltration rates range from 1.7×10^{-4} to 9.7×10^{-3} inches per second (Table C.1-8).

The fill material at the Burrell site, which includes railroad ties and bulky debris with very little natural soil, is not conducive to determining soil characteristics such as percent organic matter and cation-exchange capacity. This material could not be sampled or analyzed as soil. The site is presently fully covered with herbaceous and woody plants, and its soil-like material is well stabilized. The present annual soil loss from the entire Burrell site has been calculated as 64.5 tons, or 1.3 tons per acre (Table A.5-1).

4.5.1.3 Hanover site

The Hanover site is located on a ridge top in a broad trench that was formed during strip-mining (Figure C.1-3). The trench walls are composed of mine rubble and reach elevations of 1250 feet. The trench floor slopes gently from north to south, from elevations of 1180 to 1170 feet.

Soils at the Hanover site have been disturbed during strip-mining operations; therefore, at present they do not exist as a stratified unit. The soil material at the Hanover site is a composite of medium-textured loams, sandy loams, and silty loams. The soil is mixed with numerous sandstone, shale, and coal fragments ranging in size from small gravel to boulders over 2

feet in diameter (Table C.1-9). Soil percolation rates ranged from 5.5×10^{-5} to 1.2×10^{-3} inches per second (Table C.1-10). This range indicates that once precipitation enters the unsaturated fill, it moves through the material at a moderately rapid rate. Like the Burrell site, the Hanover site is composed of disturbed and fill material; therefore, it is extremely difficult to determine the soil characteristics. The steep slopes (7 to 8 percent) over most of the site and the shale-sandstone composition of the overburden contribute to soil loss. The annual amount of soil loss from the Hanover site has been determined to be 240.8 tons, or 4.8 tons per acre (Table A.5-1). However, because of the unevenness of the terrain, the runoff is detained during a rainfall, providing time for solids to settle out of solution. The total suspended solids in runoff recorded during a sampling program were low, averaging 1.1×10^{-4} pounds per gallon (Table D.1-12).

4.5.2 Geology

The structural pattern in Washington County is that of subparallel folds with northeast axis orientation. In the northwestern corner of the county there are several dome structures; the Candor Dome, the Westland Dome, and the Gillespie Dome.

4.5.2.1 Canonsburg site

The Canonsburg site is underlain by four types of material: soil, fill, alluvium, and bedrock. The onsite soils are discussed in subsection 4.5.1.1, which also includes descriptions of the fill and alluvium as they relate to soil development. Data were collected on the distribution and character of the onsite materials during drilling programs conducted from 1978 to 1983. Wells were drilled in Areas A, B, and C on the Canonsburg site, and on other areas both on and off the expanded Canonsburg site to provide an in-depth profile of the subsurface stratigraphy (Figure D.2-2 shows the well locations).

Cross-sections of the soils and bedrock underlying the Canonsburg site were prepared for three section lines across the area. Their locations are shown on Figure C.2-1. The cross sections (Figures C.2-1 and C.2-2) were composed using information from well logs and soil borings. Based on the well logs and cross-sections, a detailed description of the subsurface strata was made.

Fill covers the entire Canonsburg site, ranging in thickness from 9 feet to less than 1 foot. The most common component of the fill is cinders. In Area A, along Ward Street, halfway between the northern property line and George Street, there is a pocket of almost pure cinders roughly 9 feet thick, while over the remainder of the site, cinders are mixed with soil, stones, and building rubble.

Area B contains dredge material from Chartiers Creek. This material ranges in thickness from 4 feet to 20 feet, and is described as gray sandy fine-grained silt. The dredged material was deposited in the center of Area B and formed a flat-topped mound of higher elevation than the surrounding landscape. It is difficult to distinguish the bottom limit of the fill from the original materials. On the eastern margins of Area B and Area C, along Chartiers Creek, alluvial material that was deposited during flood stages of the creek is exposed. Portions of Area C had been a swamp, but these parts were filled with radioactively contaminated materials from site operations.

The predominant bedrock types encountered beneath the Canonsburg site were interbedded gray and black carbonaceous shales and sandy shales, along with several thin coal seams and limey shales. A marker bed of red shale was found beginning at a depth of 70 to 108 feet below ground surface (at approximately 375 feet above mean sea level). These features indicate that the bedrock underlying the Canonsburg site belongs to the Casselman Formation of the Pennsylvanian Age Conemaugh Group. This formation consists of cyclical sequences of red and gray shale and silt stones with thin limestones and coals (Pennsylvania DER, 1960). There is a 10- to 20-foot thick red-bed unit in the Casselman Formation about 100 feet above the base (Pennsylvania DER, 1960).

Shale near the bedrock surface is broken and weathered to thin brittle plates 0.3 to 0.5 inch in size. Exposure of the Conemaugh Formation at the surface is apparently the result of erosion by Chartiers Creek since these rocks are exposed only in the vicinity of the confluence of Chartiers Run, Plum Run, and Chartiers Creek. The rock type exposed at the surface in the surrounding area is the Monongahela Formation, which can be seen in road cuts in Canonsburg and Strabane. The Monongahela Formation overlies the Conemaugh Formation; it is described as cyclical sequences of sandstone, shale, limestone, and coal (Pennsylvania DER, 1960). The local significance of the formation is that its lowest member is Pittsburgh coal, which is mined extensively in the area. The Pittsburgh coal was never mined under the Canonsburg site; it was eroded away in past geologic time. Table 4-1 presents the generalized local stratigraphic sequence and the onsite sequence.

The Canonsburg site is located between the Washington anticline and the Nineveh syncline. Based on the contours of the Pittsburgh coal present in the immediate vicinity, there is a bedrock ridge along the axis of the Washington anticline that slopes east to a bedrock valley along the axis of the Nineveh syncline. The bedrock relief between the top of the anticline and the bottom of the syncline is approximately 400 feet. The Canonsburg site is located east of the axis of the Washington anticline. At the Canonsburg site, bedrock elevations for a particular marker bed would be approximately 72 feet below the maximum elevation for that marker bed along the anticlinal axis (Figure C.2-7)

Additional regional and local structural elements have been defined by satellite imagery on the basis of linear topography, drainage patterns, and tonal changes in vegetation (Briggs and Kohle, 1976). Most of the lineaments in the Canonsburg site area are based on topography and vegetation. As shown on Figure C.2-8, the lineaments cross the fold axis and therefore postdate the folding. The nature of these lineaments has not been identified.

Table 4-1. Stratigraphic sequence

Age	Formation or unit		Description
	<u>Canonsburg vicinity^a</u>	<u>Canonsburg site</u>	
Recent	--	"Red dog"	Steel-mill slag, found only in Area C near the surface.
		Fill	Cinders, building rubble, mixed soil, and cobbles. Occurs over the entire site.
		Fluvial material	Sandy silt dredged from Chartiers Creek and used for fill on Area B.
		Alluvium	Chartiers Creek flood-plain sediments found on the margins of Area B and Area C.
Quaternary, Holocene, Pleistocene	Alluvium	Alluvium	Regional thickness is 0 to 19 meters. Well to poorly sorted deposits of clay, sand, gravel, and cobbles. Some fill material on the site resembles this material.
Permian	Greene Formation	--	Regional thickness is 19 to 79 meters shale and shaley sandstone, a few thin limestone beds, and thin coal beds; red shale lenses.
Permian Pennsylvanian	Washington Formation	--	Regional thickness is 11 to 39 meters. Alternating layers of shale and fine-grained sandstone, thin-bedded limestone, and several coalbeds.
Pennsylvanian	Monongahela Formation	--	Regional thickness of 15 to 121 meters. Limestone beds of variable thickness, discontinuous sandstone, and coal.
	Conemaugh Formation	Conemaugh Formation	Regional thickness of 13 to 134 meters. Grey-green and red shale with discontinuous sandstone, limestone, and coal.

^aNewport, 1973.

The results of the onsite-drilling programs show the relief in the bedrock surface at the Canonsburg site as 35 feet. The general trend of bedrock topography, as shown in the contours on Figure C.2-9, is toward the northeast and Chartiers Creek. The highest point of the bedrock surface is on the southwestern corner of Area A. The lowest point is in Area C. The bedrock depression in Area C (Figures C.2-1 and C.2-9) is apparently an erosional feature related to the migration of Chartiers Creek. There are no bedrock exposures on or near the Canonsburg site that are available to identify orientations of local geologic structures.

Fracturing was observed in bedrock core samples as a result of the analysis of recovery and rock quality values measured for the 300R and 500 series wells. Rock quality data (RQD₅₀) values ranged from 0 to over 90, indicating highly friable fractures in the upper 5 to 20 feet of bedrock beneath the Canonsburg site. Recovery and rock quality generally increased with increasing depth in each well. Fracture density was greatest near the surface (in the upper 5 to 20 feet of bedrock). At greater depths, the fractures are separated by larger vertical intervals, but are significant for ground-water transmissivities, as discussed in subsection 4.6.2.1.

The red shale marker bed in the Conemaugh Formation was used to determine strike and dip for the bedrock beneath the Canonsburg site. Based on the orientation of that bed, dip is less than 1 degree, and strike is northeast.

4.5.2.2 Burrell site

Subsurface conditions at the Burrell site are the result of former site uses (Figure C.2-3). The Burrell site is underlain by three separate materials: fill, unconsolidated sediments, and sedimentary rocks (Figure C.2-4). The fill material consists of railroad ties, ashes, rubble, coal, and scrap metal. The thickness of the fill varies; the maximum thickness is approximately 56 feet. Unconsolidated sediments underlie the fill and include both colluvium (or talus) and alluvium. The colluvium is composed of unweathered, broken rocks that vary widely in size. These rocks have been eroded from the steep bluff face north of the Burrell site. The maximum thickness of the colluvium at the Burrell site is approximately 20 feet near the bluff. The alluvium is fine- to coarse-grained silty sand deposited by the Conemaugh River; its maximum thickness on the site is approximately 11.5 feet. The bedrock at the Burrell site is composed of alternating layers of shale, limestone, sandstone, siltstone, coal, coal underclays, and claystone. These rocks belong to the Casselman Formation of Pennsylvanian age, a member of the Conemaugh Group of coal-bearing formations. The bedrock is well defined, with most units ranging from 1 foot to 5.7 feet thick. Structurally, the local bedrock lies in a gently-folded northeast-trending anticline.

4.5.2.3 Hanover site

The near-surface geology at the Hanover site has been disturbed by strip mining the Pittsburgh coal. Before mining operations were started, the area was overlain by shale and sandstone of the Monongahela Formation. When the Hanover site was strip mined beginning in 1917-1918, the shales and sandstones were removed to expose the underlying coal. After the coal was removed, the overburden was replaced as the Hanover site was reclaimed. The Hanover site is now underlain by mine rubble that is composed of shale and sandstone boulders, pebbles, and soil (Figure C.2-5). The fill material is 5 to 10 feet thick on the trench floor. On the upland portions of the Hanover site, mine rubble is approximately 85 to 98 feet thick. Below the mine rubble is an undisturbed underclay layer that was directly beneath the Pittsburgh coal. Where the underclay is present it is 5.7 feet thick. The clay was not encountered in all borings in the center of the valley floor (presumably portions of the clay were removed during strip-mining operations). The underclay is the lowest unit of the Monongahela Formation. Below the underclay is the Casselman Formation, the upper unit of the Conemaugh Group. At the Hanover site this unit is fractured shale with minor interbedded sandstone. It was common practice in the area to blast the bottoms of mine pits to increase drainage. It is possible that there was fracturing at the Hanover site caused by this type of blasting during the strip-mining operations; however, there are no records of this practice at the Hanover site.

4.5.3 Mineral resources

If significant mineral resources are found under a disposal site following remedial action, the Secretary of the Interior, with NRC concurrence, could sell or lease the subsurface mineral rights (as specified in PL 95-604, Section 104(h)). The DOE will acquire the mineral rights under the disposal site(s).

4.5.3.1 Canonsburg site

The primary mineral resources in Washington County are coal, oil, and gas. The most significant source of coal in the Canonsburg area is the Pittsburgh coal seam. Recent production rates in Washington County have been approximately 20 million tons per year. However, the U.S. Geological Survey (Cortis et al., 1975) has indicated that, as of 1971, most of the coal in the Canonsburg, Houston, and Strabane areas had been mined. Pittsburgh coal does not occur on the Canonsburg site. It was not mined from the Canonsburg site; instead, it has been eroded away in past geologic time.

Although oil-producing zones do occur in the Conemaugh Group that underlies the Canonsburg site, there are no available records that indicate that there is a potential producing zone beneath the Canonsburg site. In the oil field closest to the Canonsburg site, the shallowest producing zone is the Gordon sand, which is approximately 2510 feet below the surface. The Canonsburg site has not been included on any maps of oil or gas fields in Washington County.

4.5.3.2 Burrell site

The only mineable coal resources in the vicinity of the Burrell site occur in the Lower Freeport unit that subcrops approximately 2 miles from the Burrell site. No major gas or oil fields have been mapped for this area (Lytle and Balogh, 1977).

4.5.3.3 Hanover site

The Hanover site has been strip mined to remove the Pittsburgh coal seam; the strip pits were 41 to 115 feet deep, depending on the location. In 1970-1971 the Hanover site was reclaimed by backfilling with overburden (sandstone, slate, and shale). The coal seam below the Pittsburgh coal is the Upper Freeport unit that is approximately 1000 feet below the surface. The seam is not currently mineable in the area of the Hanover site.

Within 1.24 miles of the Hanover site are two shallow gas fields, several small, shallow oil fields, and a gas-storage field (Lytle and Balogh, 1977). There are also numerous abandoned gas wells in the Hanover site area. It is not known if these gas wells were properly plugged when abandoned (Chnupa, 1983).

4.5.4 Seismicity

The Canonsburg, Burrell, and Hanover sites are located in seismic risk zone 1, according to the seismic risk map of the United States. This map is based on the known distribution of damaging earthquakes and the intensities associated with them, as well as evidence of strain release, and consideration of major geologic structures and provinces believed to be associated with earthquake activity. The probable frequency of damaging earthquakes was not considered in assigning ratings to the various zones. Four zones were developed by Algermissen (Coffman and von Hake, 1973), as follows:

Zone 0 -- no damage.

Zone 1 -- minor damage.

Zone 2 -- moderate damage.

Zone 3 -- major damage.

In zone 1, during distant earthquakes some buildings may be damaged to a degree that corresponds to intensities V and VI on the Modified Mercalli Scale of 1931 (Figure C.2-6).

The maximum potential ground acceleration for the Canonsburg site has been determined to be 0.05 gravity (U.S. DOE, 1983).

4.6 WATER

4.6.1 Surface water

Nonradiological surface-water quality data are presented in this section. Radiological surface-water quality data are presented in Section 4.8.

4.6.1.1 Canonsburg site

The Canonsburg site lies in the Chartiers Creek basin along the creek's southern bank, approximately 15 miles upstream of its confluence with the Ohio River. In the Canonsburg area Chartiers Creek is a meandering stream with a channel width varying from 75 to 100 feet and a channel depth of about 5 feet. The actual creek dimensions at the Canonsburg site are usually much less than these values. Chartiers Creek drains approximately 265 square miles, of which about 80 square miles are upstream of the Canonsburg site. The average flow past the Canonsburg site ranges from 90 to 130 cubic feet per second. Although a portion of the Canonsburg site is located in the flood plain of Chartiers Creek (Figure D.1-1), which includes the area between the 500-year flood contour and Chartiers Creek, past floods from the creek have had no serious impacts on the Canonsburg site (Table D.1-1), and the 500-year flood would probably also not have a serious impact on the Canonsburg site. All of the remedial-action alternatives would involve activity within the flood plain. Encapsulation of radioactively contaminated materials on the Canonsburg site under Alternative 2 or 3 would take place outside the 500-year flood plain. Excavation and grading activities occurring within the flood plain would be necessary under all of the remedial-action alternatives because the radioactively contaminated materials are currently located in the flood plain.

Extreme flood events, e.g., either a 1000-year flood or a probable maximum flood, would result in increased flooding and minor streambed realignments at the Canonsburg site. Chartiers Creek, in the vicinity of the expanded Canonsburg site, encircles the expanded Canonsburg site such that stream realignment is likely to shift outward because the maximum velocity distribution is radially outward.

The surface topography divides the Canonsburg site into six distinct subbasins (Figure D.1-2). Runoff from four of the basins flows directly into Chartiers Creek. An area in the middle of the Canonsburg site collects runoff along George Street and Strabane Avenue and then flows to the creek. In the remaining area, the runoff collects along the Washington-Canonsburg Street Railway and then flows to the creek. The berm created by the ConRail trackbed along George Street isolates the Canonsburg site from upland runoff from Strabane Village (Figure D.1-2, Table D.1-2), and routes runoff toward Chartiers Creek downstream of the Canonsburg site.

Chartiers Creek is polluted by acid mine drainage and industrial and municipal discharges (Table D.1-3). The Pennsylvania water-quality limits (25 PA Code 93) have previously been exceeded for iron, sulfates, manganese, dissolved solids, and fecal coliforms. The high levels of sulfates and iron are a result of acid drainage from abandoned mines in the creek basin. Acid mine drainage and other pollutant discharges to Chartiers Creek still occur and thus the water quality of Chartiers Creek is not expected to improve.

Storm water runoff from the Canonsburg site was analyzed and found to be high in iron, lead, sulfates, and arsenic, exceeding the Pennsylvania water-quality limits (25 PA Code 93) (Table D.1-4). When compared to the present level of contamination in Chartiers Creek upstream of the Canonsburg site, any Canonsburg site contribution to further surface-water quality degradation is not detectable (Table D.1-4). The results of this survey, however, indicated that the Canonsburg site contributes a small but measurable amount of total organic carbon (TOC) and boron to Chartiers Creek.

The public water used in the Canonsburg site area is generally supplied by reservoirs on tributaries to Chartiers Creek. Water served to the Canonsburg site area is provided by the Canonsburg plant of the Western Pennsylvania Water Company, which draws water from Little Chartiers Creek (Table D.1-5). The water treatment plant and intake are located 3.4 miles east of the Canonsburg site (Chnupa, 1983). Chartiers Creek is used as a public-water-supply source; however, the intake of the Western Pennsylvania Water Company's Washington Plant is located upstream of the Canonsburg site. The Western Pennsylvania Water Company uses Chartiers Creek as a water source to supplement their water source from two unnamed tributaries (Chnupa, 1983). Chartiers Creek is a tributary of the Ohio River, which is used as a public-water-supply source in Pennsylvania by five water plants (Chnupa, 1983). They are the following:

1. West View Municipal Authority -- Ohio River mile point 4.9.
2. Dixmont State Hospital -- Ohio River mile point 7.6.
3. Robinson Township Municipal Authority -- Ohio River mile point 8.8.
4. Sewickley Borough Water Authority -- Ohio River mile point 11.2.
5. Midland Borough Municipal Authority -- Ohio River mile point 36.2.

The impact of any current pollution from the Canonsburg site to these communities is nondetectable because the pollutant contribution, if any, from the Canonsburg site to Chartiers Creek is minimal with no degradation in surface-water quality and because water from Chartiers Creek is diluted at least a thousand fold after mixing with the Ohio River.

4.6.1.2 Burrell site

The Burrell site lies in the Conemaugh River basin, along the river's northern bank, directly upstream of Blairsville Borough. The river drains an area of about 1750 square miles. The Burrell site is located approximately 10 miles upstream from the Conemaugh River Dam, which is used to store up to 273,600 acre-feet of water for flood control. Downstream of the dam, the Conemaugh River combines with the Loyalhanna to become the Kiskiminetas River, a tributary of the Allegheny River which in turn joins the Monongahela River to form the Ohio River at Pittsburgh. Other important tributaries of the Conemaugh River are Two Lick, Black Lick, and Yellow Creeks, which join the river between the Burrell site and the Conemaugh Dam. During a storm, flood waters could be retained behind the dam to form a flood pool having a maximum elevation of 975.0 feet, at which point the flood pool would extend 13 miles upstream of the dam and would inundate the Burrell site to an elevation of 975 feet above mean sea level (Figure D.1-3).

Some excavation could occur within the flood plain at the Burrell site under Alternative 2 or 4. Stabilization activities under Alternative 3 or 5 would occur partially below the maximum pool elevation.

River stages past the Burrell site for actual storms during recent years have been less than the maximum flood-pool elevation (Table 4-2).

Table 4-2. River stages during storms -- Burrell site

Storm date	Pool elevation (feet above mean sea level)
June 1972	969.45
March 1964	968.23
April 1960	959.90
March 1967	959.59
July 1977	958.00

The June 1972 storm (Hurricane Agnes) is considered a 1000-year storm, and the elevation of 969.45 feet recorded at the Burrell site at that time is probably the highest that will be realized under natural conditions. No stream realignments or flood-plain shifts resulted from this storm in the vicinity of the Burrell site. The Conemaugh River Dam could impound the river to a higher stage at the Burrell site (975.00 feet), however, this would be pooled water and have little force to change the river's course.

Rainfall draining off the Burrell site discharges either directly into the river or into one of three onsite ponds and subsequently flows to the river through a culvert at the western end of the Burrell site. Of the 49 acres

that make up the Burrell site, 16.4 acres drain directly to the river and 32.6 acres drain to the onsite ponds. The soil at the Burrell site is mostly a porous manmade fill that is interspersed with openings and underground voids; runoff from the 32.6 acres infiltrates ground-water supplies before reaching the onsite ponds. The result is that runoff percolates through the soil and becomes ground water; a portion subsequently discharges to the onsite ponds (see subsection 4.6.2). The total amount of runoff available for direct discharge to the river and for ground-water recharge was computed for several storm events (Table D.1-6). The Burrell site is isolated from runoff from the adjacent area north of the Burrell site by the berm created by the ConRail tracks.

The reach of the Conemaugh River adjacent to the Burrell site is severely polluted by acid drainage from active and abandoned mines, and by industrial and municipal waste-water discharges (Table D.1-7). The Pennsylvania water-quality limits (25 PA Code 93) for fecal coliforms, iron, sulfates, and manganese in the river have been exceeded on a regular basis both up- and downstream of the Burrell site. The pH measurements indicate that river water quality conditions are more acidic at local recording stations than is permissible. This is due to the acid mine drainage and is responsible for iron, manganese, and sulfates leaching above permissible limits (25 PA Code 93). Elevated levels of fecal coliforms are a result of the discharge of untreated or partially treated industrial and municipal waste water into the river. In the Conemaugh Basin some improvement in waste-water treatment is projected (U.S. EPA, 1979). The average fecal coliform levels in Chartiers Creek near the Canonsburg site have decreased five-fold between 1978 and 1982. Conversely, average fecal coliform levels recorded downstream of the Canonsburg site at Carnegie have increased slightly from 1978 - 1982 (Table D.1-3). There are no statewide plans to alleviate acid drainage from abandoned mines, which is the most significant source of pollution, and overwhelms any effects of the effluents leaving the Burrell site.

Currently, 98 percent of the Burrell site area's public-water use is supplied from protected surface waters, usually from reservoirs on tributaries to the Conemaugh River. There are numerous water plants located on the streams between the Burrell site and the Ohio River. The first public water supply below the Burrell site is located on the Conemaugh River at Saltsburg. This intake is approximately 6.3 miles below the Conemaugh Dam. Shortly below this intake the Kiskiminetas River is formed by the junction of the Conemaugh River and Loyalhanna Creek. From the point where the Kiskiminetas River enters the Allegheny River above the Borough of Freeport to Pittsburgh, there are ten public water supplies drawing water from the Allegheny River (Table D.1-8) (Chnupa, 1983). Public water supplies within 3 miles of the Burrell site are listed in Table D.1-5. In addition, Torrance State Hospital has an impounding dam on Shirey Run and a water treatment plant and open finished-water reservoir on the hospital grounds (Chnupa, 1983). Only after the waters of the Conemaugh reach the Ohio River do they become a direct source of drinking water for some localities. Water-year flows in the Ohio River average over 12 times the flow estimated past the Burrell site, an indication of the dilution rate before use.

The Burrell site's pond waters are characterized by sulfate-ion concentrations above the Pennsylvania surface-water quality criteria (25 PA Code 93) for the Conemaugh River (Table D.1-9). All other nonradiological parameters tested were generally within these criteria, except lead. No lead was detected; however, the detection limit was greater than the criterion.

4.6.1.3 Hanover site

The Hanover site lies in the Harmon Creek Basin, which drains an area of approximately 33 square miles in Pennsylvania and West Virginia before discharging into the Ohio River, about 7 miles west of the Hanover site. Approximately 5 square miles of this area is upstream of the Hanover site. The Hanover site is located north of Harmon Creek on the top of a ridge that divides the area into two subbasins of the creek; i.e., Ward Run on the west and an unnamed tributary of Harmon Creek on the east. The area of these subbasins that is directly affected by surface-water runoff is approximately 425 acres. In the absence of USGS water-data-collection stations, it is estimated that the average flow in Harmon Creek to the Ohio River is 68 cubic feet per second, but only an average of 10 cubic feet per second flow past the Hanover site. The Hanover site is located on a ridge top at an average elevation of approximately 100 feet above the nearby streams; extreme flood events, i.e., the probable maximum flood, would not inundate the Hanover site.

Rain falling on the Hanover site runs off in three directions; to Harmon Creek to the south, to an unnamed tributary to the east, and to Ward Run to the west. Runoff volumes for the entire subbasin for several storms were computed (Table D.1-10).

Onsite inspections conducted by the EPA (Downie and Petrone, 1980) in May 1980 during a surface-water sampling program concluded that both Ward Run and the unnamed tributary to Harmon Creek that lies east of the Hanover site are polluted with acid mine drainage (Table D.1-11). Analyses of the runoff in the vicinity of the chemical seep on the Hanover site revealed toxic conditions and a severely depressed pH of 3.2. A sampling program conducted by the owners of the Hanover site during the course of a landfill permit-application process showed high concentrations of iron and dissolved solids, and a high chemical oxygen demand, as well as depressed pH levels at various locations on the property (Figure D.1-4, Table D.1-12).

Because the chemical quality of Ward Run and Harmon Creek is poor, aquatic life is not present and public or industrial uses are either nonexistent (Depmer, 1968) or limited to tributaries isolated from the main stream of Harmon Creek by dams. One such dam (spillway elevation 998) is located upstream of the Hanover site on Harmon Creek, and forms a water-supply reservoir for Smith Township (Table D.1-5). The Dinsmore Dam, which is owned and operated by the Smith Township Municipal Authority, provides water for the

Authority's water treatment plant. The watershed is independent of the Hanover site drainage patterns. The Hanover site is located approximately 1.4 miles northwest of this water supply dam and does not drain into the dam via surface waters. The Authority also utilizes a well that is located below the breast of the dam, it is reported to be a 120-foot deep artesian well (Chnupa, 1983). The Burgettstown Borough receives its drinking water from the Western Pennsylvania Water Company system. Another water distribution system in the Hanover site area is the Paris-Florence Area Water Association that receives its drinking water from Weirton, West Virginia (Chnupa, 1983). The only downstream uses identified are from the Ohio River. As is true for the water from the Canonsburg and Burrell sites, the impact of pollution from the Hanover site on communities using Ohio River water is minimal. The average annual flow in the Ohio River at the closest station to the inflow of Harmon Creek is 32,000 cubic feet per second, indicating a dilution factor of at least 1000.

4.6.2 Ground water

Nonradiological ground-water quality data are presented here. Radiological ground-water quality data are presented in Section 4.8.

4.6.2.1 Canonsburg site

The hydrogeochemical characterization of the ground water is based on field programs conducted from 1979 to 1983. The methods and results of these field programs are presented in Appendix D.2, Figures D.2-1 and D.2-2, and Table D.2-1. Some of the earlier wells were not used in the later studies due to vandalism (plugging wells with stones, soda cans, etc.), but none of the wells have been officially abandoned. Official well abandonment and plugging will be part of the remedial action plan. Ground water at the expanded Canonsburg site occurs in a water-table condition in the unconsolidated (unconfined) material (fill, soil, and alluvium) and in a semi-confined condition in the underlying bedrock (Figure D.2-3).

The piezometric surface contours and permeability and percolation rates for various dates from 1979 to 1983 (Figures D.2-4 through D.2-8) imply that recharge to the unconsolidated material is from direct infiltration of precipitation and from ground-water flow onto the expanded Canonsburg site from the south. The primary recharge area on the Canonsburg site exists over Area A as a result of the presence of permeable fill that allows rapid infiltration of available precipitation (37 inches per year) into the water table.

The dominant boundary condition for the water-table ground-water system is Chartiers Creek, which surrounds the expanded Canonsburg site on the western, northern, and eastern sides, and is the discharge zone for the water-table

system. The cross-section on Figure C.2-1 shows that, the unconsolidated material is not continuous across Chartiers Creek; ground-water flow in this system is radial from Area A into Chartiers Creek, as shown on Figure D.2-4.

This information, combined with the pump test results from well 303R and well 26, confirm that Chartiers Creek is a boundary to flow in the water-table system and shallow bedrock. The ground-water flow rates in the water-table have been estimated at 0.00018 centimeter per second in Areas A and B, and 0.0000018 centimeter per second in Area C. Transmissivity rates for the water-table system are presented in Table 4-3.

Ground water in the bedrock is under semi-confined conditions. Water elevations in the bedrock wells are generally above the screened interval (water intake part of the well) and above the bedrock surface. The relationships between water elevations in paired wells in the unconsolidated material and the shallow bedrock show that with few exceptions there is a vertical gradient downward, indicating that there is communication between the water-table system and the bedrock system. It has been observed that under stressed conditions (pumping), leakage occurs from the upper fill materials toward the shallow bedrock when the bedrock wells are pumped. The term "semi-confined" has been applied to the deep ground-water system on the basis of these data. The fill that lies between the water table and semi-confined systems restricts the downward flow of water, but does not eliminate leakage from the water-table system to the semi-confined system.

The piezometric surface of the semi-confined system (Figures D.2-9 through D.2-13) generally conforms to the slope of the bedrock surface (Figure C.2-9). The main source of recharge to the semi-confined system is from the upland area south of the expanded Canonsburg site. Ground water in the shallow bedrock discharges to Chartiers Creek through the bedrock in the creek bottom. However, the primary direction of ground-water flow in the semi-confined system is across the creek to the northeastern side of the expanded Canonsburg site. The aquifer parameters for the ground-water systems are shown in Table 4-3.

Ground-water quality at the expanded Canonsburg site was determined from samples collected from April 1979 to March 1983 from selected wells. The analysis results are presented in Table D.2-2. The ground-water quality is variable from well-to-well. Concentrations of chloride, sulfate, selenium, and calcium are high in both onsite and upgradient wells, but not in excess of the EPA National Interim Primary Drinking Water Standards (40 CFR 141) or the EPA National Secondary Drinking Water Guidelines (40 CFR 143). The radiological ground-water quality is discussed in subsection 4.8.1.

The major water-supply source in Washington County is surface water, not ground water. Over 80 percent of the county is served by public facilities that obtain 94 percent of their water from surface supplies (Table D.1-5). Data on local ground-water use were collected during the September 1979 socioeconomic survey (Appendix G). This survey sampled 15.2 percent of the households within a one-mile radius of the Canonsburg site, concentrating on

Table 4-3. Aquifer parameters, expanded Canonsburg site

Well number/type	Testing method	Transmissivity sq cm/sec	Storage coefficient
19 - Screened above bedrock	Pump test	1.28	1.5×10^{-2}
302S - Screened above bedrock	Pump test	3.74	---
26 - Screened above bedrock	Pump test	2.60 - 3.83	1.9×10^{-4} 2.3×10^{-4}
16A - Bedrock	Pump test	1.76	1.3×10^{-3}
302R - Bedrock	Pump test	0.76 - 0.295	---
5A - Bedrock	Pump test	1.79	1.9×10^{-4}
305R - Bedrock	Pump test	0.99 - 1.05	1.6×10^{-4} ---
306R - Bedrock	Pump test	0.178 - 1.03	---
303R - Bedrock	Pump test	0.167 - 3.94	---
305 - Screened above bedrock	Slug test	0.244	---
302S - Screened above bedrock	Slug test	0.78	---
306S - Screened above bedrock	Slug test	0.027	
411 - Screened above bedrock	Slug test	0.0165	

Source: Weston 1979-1983 field programs. Data analysis was performed by Weston and TAC.

the Village of Strabane. Of the 302 questionnaires completed, 13 respondents indicated that they had wells on their property (Table D.2-3; the table was updated in 1983 (Chnupa, 1983)). This method of data collection was used because there are virtually no records available regarding wells installed before 1965. None of the respondents to the survey reported that the well water was used for drinking purposes. Newport (1975) lists 176 wells located in Washington County, but does not include any wells within a 1-mile radius of the Canonsburg site. Chnupa (Lash, 1983) stated that all houses within a 1-mile radius of the Canonsburg site are supplied with public water.

4.6.2.2 Burrell site

The hydrologic regime at the Burrell site is directly related to the site's historic use (Figure C.2-3). Before 1949 the Burrell site was established as a Burrell borrow pit for alluvial and colluvial sand and gravel deposits. During the Burrell borrow operations a berm of alluvium was retained along the river's edge (the site's southern boundary). The area between this berm and the railroad right-of-way was then excavated to river bed elevation. When the property was obtained by the Pennsylvania Railroad in the 1950's, the land was filled inward from the elevated edges. This resulted in the Burrell site's present subsurface bowl-like configuration, with the railroad and industrial debris as well as the Canonsburg site's radioactively contaminated materials contained within a hollow lined with alluvial and colluvial material. High permeability fill overlies low-permeability colluvium, alluvium, and bedrock.

Information on the Burrell site's current hydrologic regime was obtained through a ground-water-monitoring program that involved installation of 6 wells into bedrock and 22 into the fill or alluvium and colluvium (Figure D.2-13). The Burrell site is a discharge area, with the ground water flowing into two discharge zones: the onsite ponds and the river bank. The majority of the site has a gentle ground-water gradient except for two relatively steep areas along the river edge and along the northern perimeter adjacent to the bluff.

Permeability and transmissivity were determined by pump testing wells 21 and 27. The transmissivities of the fill and of the alluvium and colluvium were determined to be 52.47 and 0.37 square centimeters per second, respectively. The hydraulic conductivity of the fill and the alluvium and colluvium were determined to be 8.7 and 0.045 centimeters per second, respectively. The difference in hydraulic conductivity between the fill and the underlying alluvium and colluvium indicates that there is no recharge of ground water from the fill into the underlying material into bedrock. The ground water from the fill exits the Burrell site directly and not by way of the bedrock. Ground water exits the Burrell site as effluent to both the onsite ponds and the Conemaugh River. It is estimated that 557 gallons per minute flow through the Burrell site with 200 gallons per minute discharging from the ponds and 357 gallons per minute discharging into the river (Table

D.2-4). The fill's porosity and depth and the rate of ground-water flow through the fill suggest that 2.9×10^8 gallons of water pass through the Burrell site annually. It takes seven months for ground water to completely pass through the fill, which means that since the 1957 disposal, the ground water at the Burrell site has been replaced 40 times.

The ground-water-flow patterns at the Burrell site are based on a complex interaction between ground-water springs and storm-water runoff flowing from the bluff onto the Burrell site, precipitation falling on the Burrell site, and the Burrell site's fill material (Figure D.2-15). The water from the bluff (north of the Burrell site) is characterized by a very acid pH (Figure D.2-16), with a high concentration of dissolved sulfate ions (Figure D.2-17), a high oxidation-reduction potential (ORP), a low concentration of dissolved chloride ions, and a low to nondetectable radionuclide concentration. The ground water at the Burrell site is a pH-buffered water in the mildly alkaline range, with a mildly reduced ORP, low concentrations of soluble chloride and sulfate ions, and very low concentrations of radionuclides (Table D.2-5).

The ground water at the Burrell site is only mildly degraded. Sulfate-ion concentrations exceed the EPA National Interim Primary Drinking-Water Standards (40 CFR 141), but this is a natural condition of the regional geologic makeup. The chloride-ion concentrations are, with one exception, well within the EPA National Secondary Drinking-Water Guidelines (40 CFR 143). The water pH is also generally within the same guidelines. The areas of low pH are most likely a result of the coal-containing bedrock. All other dissolved nonradiological elements analyzed were within the EPA National Interim Primary Drinking-Water Standards (40 CFR 141), except for lead and iron. No lead was actually detected; however, the detection limit was greater than the EPA National Interim Primary Drinking-Water Standards (40 CFR 141). The EPA National Interim Primary Drinking-Water Standard (40 CFR 141) for iron was exceeded in three of the samples, but this is a natural condition for this region.

4.6.2.3 Hanover site

Ground-water hydrology of the Hanover site is closely tied to its topography (Figure C.1-3). Depth to ground water in the sampled wells (Figure D.2-18) varies over the site in relation to topographic differences. In the trench bottom the depth to ground water is less than 10 feet, while alongside it can be as much as 70 feet below the surface. There is 5 feet of relief on the piezometric surface area over a distance of 4000 feet (Figure D.2-19).

The major component of ground-water flow at the Hanover site is from north to south along the length of the disposal trench. Flow into the Hanover site is primarily from the uplands along the north and east. Based on topography and the location of the streams (Figure 1-9), there is apparently a ground-water divide along the western side of the trench so that the major ground-water flow there is away from the Hanover site.

During drilling, water was encountered at or near the interface between the mine-rubble fill and the bedrock surface, and the mine rubble at the southern Hanover site edge was saturated. Ground water in the bedrock occurs in fractures in the rock. Transmissivity in the bedrock was determined to be 5.3 square centimeters per second. The Hanover site is not a recharge area as evidenced by the increased heads with depth displayed in most of the Hanover site wells.

Ground-water quality at the Hanover site is not within the EPA National Interim Primary Drinking-Water Standards (40 CFR 141) (Table D.2-6). This is partially attributable to past activities in the vicinity and to the high concentration of some pollutants that would be expected in a coal strip mine (Figures D.2-20 through D.2-22). The presence and distribution of excessive concentrations of some pollutants indicates that there is a source of contamination south of the Hanover site, in addition to the most obvious disposal area north of the site. Sulfate-ion concentrations are well above the EPA National Secondary Drinking-Water Guideline (40 CFR 143) of 250 milligrams per liter for all wells, with a high of 3030 milligrams per liter. Analysis for priority pollutants in one of the site's wells showed three contaminants above detection limits:

Butyl benzyl phthalate	~ 61.2 micrograms per liter
Methylene chloride	~ 23.5 micrograms per liter
4, 4' DDT	~ 21.6 micrograms per liter

Private wells within 1 mile of the Hanover site are listed in Table D.2-7.

4.7 ECOSYSTEMS

4.7.1 Terrestrial vegetation

4.7.1.1 Canonsburg site

Site-survey information and a vegetation map of the Canonsburg site are presented in Appendix E.1 and on Figure E.1-1. Mature trees line both the banks of Chartiers Creek along Areas B and C, and between the rail line and George Street south of Area A. These strip woodlands consist mainly of elm, box elder, cherry, hickory, and willows characteristic of the region (Kuchler, 1964; Bailey, 1976, 1980). Common early successional tree species such as quaking aspen, black locust, sumac, and cherry are found along the edge of these woodlands, along fences within the Canonsburg site areas, and scattered throughout the Canonsburg site (Table E.1-1).

Areas B and C contain successional old fields. Grasses, mosses, and wildflowers are the dominant ground cover of Areas A, B, and C. Within the fenced part of Area A, broomsedge sparsely covers the tile field (the area north of Building 18), and another thick clump of grass is found along the fence.

The flat top of the dredge fill part of Area B is sparsely covered with various tall grasses and dense patches of clover, while the perimeter slopes of Area B are thickly covered with bunch grass and dense tangles of brambles. Bulrushes also occur in water lenses on top of the dredge fill area and seeps on the slopes. Runoff ditches along the roadways contain small stands of cattail and bulrush.

Area C has a sparse cover of grasses and wildflowers. An examination of soil test pits in the area indicates that grass roots do not penetrate through the red-dog layer covering Area C. There are places in Area C that are entirely devoid of vegetation. These vegetation patterns may be the result of variable species growth on the red-dog fill, fill placement, former maintenance of this area as a ballfield, or geological or radiological survey efforts.

4.7.1.2 Burrell site

Most of the Burrell site is vegetated (Appendix E.1, Figure E.1-2). The vegetation consists primarily of grasses and other herbaceous species. Woody growth is limited to a fringe of intermediate-sized trees along the Conemaugh River bank and along the bluff to the north of the rail lines. Individual trees, approximately 15 years old, are also located randomly over the plateau area. The ravines containing the onsite ponds are largely brush-covered, and reed grass occurs in the wetter ravine areas and along the river bank.

The Burrell site is an old-field habitat type. The herbaceous vegetation includes teasel, burdock, goldenrod, common mullein, and Queen Anne's lace, in addition to numerous grasses (Table E.1-1). Raspberries and other brambles are also present. The trees on the Burrell site are typically early-colonizing species such as sumac, birch, quaking aspen, hawthorn, and black locust. Taller trees include maples, oaks, hickories, and sycamores.

Although many of the trees occurring at the Burrell site typically grow in dense groupings, there are no well-defined stands on the flat areas. This may be a result of the scarcity of soils.

4.7.1.3 Hanover site

The Hanover site conditions are typical of a recently-reclaimed strip mine (Appendix E.1). Its substrate is primarily shale fragments and other rocky rubble. Some areas of the Hanover site, particularly on the steeper slopes, have no vegetation, thereby exposing bare rocky material. The vegetation over most of the Hanover site is limited to low-growing perennial species, mainly clover and grasses (Table E.1-1). There are also cattails growing in low-lying sections of the Hanover site.

There are no trees within the Hanover site area. Early successional species such as sumac and birch occur immediately outside the site boundaries, and stands of trees typical of the region (oaks, maples, hickories, aspens, and conifers) are located in nearby areas that have not been strip mined.

4.7.2 Terrestrial wildlife

4.7.2.1 Canonsburg site

The primary habitat type at the Canonsburg site is old field (Appendix E.1). This habitat exists in most of Areas B and C and the undeveloped portion of Area A. A narrow strip, no more than 20 feet wide, of riparian habitat stretches along Chartiers Creek for the entire length of Areas B and C.

The Canonsburg site's open fields are primarily inhabited by mice, voles, and shrews (Table E.1-2). The field's surfaces are honeycombed with tunnels, runways, and nests. Edge areas surrounding the fields (usually associated with site fences, drainage ditches, and sloped surfaces) provide habitat for rabbits, groundhogs, and opossums whose burrows can be observed along undisturbed areas. Wooded areas on the Canonsburg site provide suitable habitat for passerine birds, while older trees along the creek are used as den trees for raccoons and squirrels. Kestrels have been observed successfully hunting at the Canonsburg site, and it is likely that other carnivores such as screech owls and redtail hawks hunt in the Canonsburg site area.

Muskrats are commonly associated with Chartiers Creek and its tributaries in this area. Migrating waterfowl, such as mallards and wood ducks, also use the creek to a minor extent during spring and fall.

The riparian woodland has the greatest value for wildlife because it represents an undisturbed area in an urban setting. The reach of Chartiers Creek along the Canonsburg site is the one of the few creek segments in the area that has not been channelized for flood control.

4.7.2.2 Burrell site

The Burrell site, an old field habitat type, is used as a feeding and nesting area for a variety of wildlife. The irregular substrate is well suited for burrow- and den-dwelling animals, as evidenced by the numerous den openings and well-worn runs traversing the site (Appendix E.1). Typical site animals include rabbits, opossum, mice, voles, shrews, groundhogs, and possibly fox. A variety of songbirds also inhabit the site (Table E.1-2).

Some forest animals include the Burrell site as part of their range. There is evidence (tracks, droppings, and paths) that deer regularly traverse the area. Kestrels have been observed hunting at the Burrell site, and it is

likely that other hawks, as well as owls, also hunt there. Mallards have been seen on the Burrell site, and it is likely that other waterfowl make some use of the Burrell site during spring and fall.

4.7.2.3 Hanover site

The Hanover site is inhabited by a variety of field-dwelling, burrowing animals such as mice, voles, shrews, groundhogs, and rabbits (Appendix E.1, Table E.1-2). There is insufficient cover at the Hanover site to provide nesting or bedding areas for passerine birds or larger animals. Nevertheless, the Hanover site is used as a feeding area by deer and a number of bird species from nearby wooded areas.

4.7.3 Aquatic biota

4.7.3.1 Canonsburg site

Chartiers Creek is a moderately low-flowing (90 to 130 cubic feet per second) tributary of the Ohio River. Its natural substrate consists primarily of a thin layer of rubble and silt overlying shale bedrock, and its banks are muddy with some bedrock outcroppings. A relatively steep gradient (10 to 20 feet per mile) in the area creates swift currents and numerous riffles. At the Canonsburg site, the stream is tree-lined and shady, and undercut banks are common.

The physical setting of Chartiers Creek along the Canonsburg site provides adequate habitat to support a variety of aquatic organisms (Table E.2-2). The water quality in this reach, however, is poor as a result of upstream discharges from strip- and deep-coal mines, and by sewage and industrial waste waters that contribute high concentrations of iron, sulfates, dissolved solids, and fecal-coliform bacteria. The iron and sulfates and the sewage discharges (organic matter and bacteria) lead to conditions of low pH and low dissolved oxygen, respectively, in the creek, thereby reducing its usefulness as an aquatic habitat.

Biological surveys of Chartiers Creek (Appendix E.2) verified the stream's low habitat potential. No fish were observed near the Canonsburg site; however, carp and white suckers are known to be present (Table E.2-3). The benthic macroinvertebrate community was dominated by oligochaetes (segmented worms), chironomid (midge) larvae, nematodes (thread worms), and physid snails. These species are all tolerant of low pH and low oxygen conditions.

The aquatic vegetation of Chartiers Creek in the Canonsburg site area consists primarily of mats of filamentous algae (green algae), diatoms, and sewage fungi (green and blue-green algae). Like the animals surveyed, these algae are also typical of streams with degraded water quality.

Chartiers Creek is presently classified by the Pennsylvania Fish Commission as a cold water fishery (Weirich, 1982). This is strictly a designation, based mainly on the stream's thermal conditions. Because of its poor water quality, Chartiers Creek in the Canonsburg site vicinity is not stocked with trout or managed as a fishery.

The lack of adequate sewage treatment (although recently improved), and the numerous discharges from abandoned coal mines in its watershed, are the major deterrents to upgrading water quality in this area. Eliminating mine discharges, especially from deep mines, will require complex, expensive restoration. Although the Pennsylvania State Bureau of Mines (within the Pennsylvania Department of Environmental Resources) has implemented programs to control discharges from active mining, the contamination from abandoned mines will be a long-term problem in this area.

4.7.3.2 Burrell site

The Conemaugh River is the major surface-water feature near the Burrell site. There are three onsite ponds, within the 25- to 30-foot-deep ravine, in the western part of the Burrell site, and a shallower pond is located north of the rail lines against the bluff, outside the Burrell site boundaries.

Although the Pennsylvania Fish Commission has classified the Conemaugh River as a warm-water fishery (Weirich, 1982), the segment of the river at the Burrell site is severely polluted by acid-mine drainage, as well as industrial and municipal discharges. The levels of pH, iron, manganese, fecal coliforms, and occasionally sulfates, seriously violate state water-quality standards for this area. Because of the poor water quality, biological productivity and diversity in this segment of the Conemaugh River are very low.

Acid-mine drainage is a prevalent problem in western Pennsylvania. Although new management practices and environmental controls are being implemented at active mine sites, inactive (abandoned) deep-mine discharges are difficult to correct, both from a technical, as well as financial, standpoint. Therefore, it is not expected that contaminant levels in the Conemaugh River resulting from mine drainage will change significantly in the near future.

The Burrell site's ponds have not been surveyed for aquatic biology. No visible signs of aquatic life were noted during the Burrell site visits.

4.7.3.3 Hanover site

The Hanover site does not contain any creeks within its defined boundaries. There are two areas of periodic standing water, one in the northern part of the Hanover site and one in the southern part. These are

formed as the result of the collection of runoff from the low areas, and support no aquatic ecosystems. These areas eventually drain northward into a tributary of Ward Run (which drains into Harmon Creek) or southward to a tributary of Harmon Creek.

The entire area within a 1-1/2-mile radius of the Hanover site has been heavily strip mined. As a result, all of the local waterways are highly contaminated by acid-mine drainage. In addition, leachate from industrial wastes dumped within this area contributes to the pollution of this part of the Harmon Creek network. Water-quality samples taken in the vicinity of the Hanover site are high in chlorides, iron, and dissolved solids, with generally low pH values.

Observations of the Harmon Creek tributaries revealed few aquatic animals. Snapping turtles and frogs were the only organisms observed. Much of the drainage water on the Hanover site was dark red, indicating the presence of iron oxides. No recreationally important fish species (trout, bass, etc.) are known to be in the extremely poor-quality waters in the Harmon Creek system near the Hanover site.

4.7.4 Endangered species

No evidence of Federal or state endangered or threatened species (U.S. DOI, 1982; 47 FR 27616, June 25, 1982) was found during the survey of the three sites. The Pennsylvania Fish Commission, the Pennsylvania Game Commission, and the U.S. Fish and Wildlife Service were contacted regarding endangered or threatened animal species, and the Pennsylvania Bureau of Forestry was contacted, and Wiegman (1979) was reviewed in regard to endangered plant species. Appendix E.3 contains letters from these agencies verifying the absence of such species from the three site areas.

4.8 RADIATION

Radiological surveys of the Canonsburg and Burrell sites were performed by the ORNL (Leggett et al., 1979a, 1979b), Weston, and Bendix Field Engineering Corporation (U.S. DOE, 1982c). These surveys analyzed air, water, soil, and other materials for the levels of radioactivity present. The radiological units used to express concentrations are microcuries (μCi) and picocuries (pCi) per gram or liter and disintegrations per minute (dpm) per area for radionuclide concentrations. The units used to express the radiological exposure rates are microroentgens per hour ($\mu\text{R/hr}$) and milliroentgens per hour (mR/hr). Units used to express dose are microrads (μr) and millirads (mr), and microrems (μrem) and millirems (mrem). For the purposes of this Canonsburg EIS these units (roentgen, rad, and rem) are used interchangeably.

The pertinent regulatory guidelines and standards referred to in this subsection are found in Table F.1-1. These guidelines and standards have been developed to protect the public from radioactive contamination. In addition to the comparisons made throughout this Canonsburg FEIS to the EPA standards (40 CFR 192), there are numerous comparisons between levels of radioactivity at the Canonsburg and Burrell sites and NRC standards (10 CFR 20) and NRC surface contamination guidelines (U.S. NRC, 1976). It should be noted that these NRC standards and NRC guidelines apply to only licensed facilities and, as a matter of law, do not apply to the Canonsburg or Burrell sites. However, these standards and guidelines have been utilized in this Canonsburg FEIS as a basis for identifying levels of contamination that may or may not be allowable in other contexts, e.g., for licensed facilities. Table F.1-1 also lists the maximum values found at the Canonsburg and Burrell sites.

The approximate normal or naturally occurring background radiation levels at the Canonsburg, Burrell, and Hanover site areas are as follows:

1. 10 microroentgens per hour for external gamma radiation at 1 meter above the ground.
2. 0.01 to 0.02 millirad per hour for beta-gamma dose rates at 1 centimeter above the ground.
3. 0.3 picocurie per liter for radon-222 (Rn-222) in air.
4. 1 to 2 picocuries per gram in soil for uranium-238 (U-238), radium-226 (Ra-226), thorium-230 (Th-230), and lead-210 (Pb-210).
5. 0.9 to 2 picocuries per liter of water for uranium-238, radium-226, thorium-230, and lead-210.

4.8.1 Canonsburg site

Surveys at the Canonsburg site indicate that within Area A large quantities of the residual radioactive materials generated during the radium- and uranium-recovery operations still remain on the Canonsburg site. Radium-bearing radioactively contaminated materials are present in the soil beneath and adjacent to many of the buildings, as well as in the top few feet of soil over much of the area. Surface contamination levels (alpha and beta concentrates and beta-gamma dose rates) in some areas of the buildings and outdoors in Area A are above NRC surface contamination guidelines (U.S. NRC, 1976). Under certain circumstances (i.e., continuous exposure for a period of years) external gamma radiation levels in some areas of the Canonsburg site could result in an individual receiving a radiation dose in excess of the recommended levels indicated in the NRC standards (10 CFR 20). Radon-222, radon-daughter products, and thorium-230 levels in some air samples collected in buildings were also above NRC standards (10 CFR 20).

Alpha and beta-gamma levels in Area B are also above the levels recommended in the NRC standards (10 CFR 20); however, they are lower than in Area A. Radium-226 in soil exceeds the EPA standard (40 CFR 192), and radium-226 in some of the ground-water samples taken in Area B is above the NRC standard (10 CFR 20). There appears to be a 2- to 6-foot layer of contaminated soil under approximately 8 to 9 feet of clean fill in this area, a condition that has led to lower radiation levels at the surface of this area than in Area A.

Area C, the former swamp area, was used as a depository for liquid wastes during the uranium- and radium-recovery operations as well as for the disposal of solid wastes during the transfer of the stockpiled contaminated materials from Area A to Area C in 1965. The surface and subsurface soils are more contaminated than those in Areas A and B. A semi-fluid material remains beneath the surface. The concentrations of radium-226 in some ground-water samples are above the NRC standard (10 CFR 20), and the concentration of radium-226 in soil samples from some areas of Area C exceed the EPA standard (40 CFR 192). External gamma radiation levels in Area C are such that under certain use conditions, individuals on the site could receive radiation doses in excess of those recommended by the NRC standard (10 CFR 20).

Radon-222 concentrations have been measured in some offsite buildings in excess of the NRC standard (10 CFR 20). In 1977, the ORNL (Leggett et al., 1979b), measured these concentrations at four locations off the expanded Canonsburg site. At the closest of these locations to the expanded Canonsburg site, just across the ConRail tracks to the south of the expanded Canonsburg site, 72 measurements averaged 8.6 picocuries per liter of radon-222. This elevated level may have been caused by radioactively contaminated materials located on this property rather than by radon emanation from the Canonsburg site. The other three locations had averages below the NRC maximum permissible concentration (10 CFR 20) for radon-222 in air in unrestricted areas (pertaining to unrestricted access and use) of 3 picocuries per liter. This value was exceeded, however, in all of the onsite buildings. Daytime average radon-222 concentrations ranged from 2.6 to 106.5 picocuries per liter, while maximum radon-222 concentrations ranged from 6.5 to 227 picocuries per liter. Measurements of radon daughters in the onsite buildings also exceeded the EPA standard (40 CFR 192) of 0.03 working level, with an average daytime concentration from 0.01 to 0.43 working level.

Building 7 had the highest average external-gamma-radiation value, based on a one-time series of measurements, of 80 microroentgens per hour. The maximum value, found at one spot in Building 10, was 310 microroentgens per hour. These values could result in an individual receiving a radiation dose of 160 millirems per year and 620 millirems per year, respectively, assuming a 2000-hour work year. The latter exceeds the NRC standard (10 CFR 20) limiting any individual from receiving a dose to the whole body in any period of one calendar year to no more than 500 millirems.

All onsite buildings have extensive areas with gross-alpha, gross-beta-gamma, and transferable-alpha and beta contamination exceeding NRC surface contamination guidelines (U.S. NRC, 1976).

Results of radon-222 measurements outdoors in Area A at several locations ranged from 0.80 to 2.7 picocuries per liter. At one location, the measurements ranged from 2.5 to 10 picocuries per liter. At another location, the average was 17 picocuries per liter with a maximum of 69 picocuries per liter.

Over 90 percent of the maximum beta-gamma dose-rate measurements at a 1-centimeter height in Area A exceed the NRC surface contamination guideline (U.S. NRC, 1976) of 0.2 millirad per hour, with some as high as 25 millirads per hour. Virtually all external-gamma levels measured at 1 meter in Area A were greater than 100 microroentgens per hour. Values along the eastern portion of Area A ranged from 300 to 500 microroentgens per hour, with a maximum of 1600 microroentgens per hour. Values for beta-gamma radiation also exceeded the NRC surface contamination guidelines (U.S. NRC, 1976) at many locations in Areas B and C.

Concentrations of radium-226 in surface- and subsurface-soil samples collected by Weston from all three areas were found to be significantly greater than allowed under the EPA standards (40 CFR 192) (Table F.1-2). Radium-226 concentrations in soil samples ranged up to 21,800 picocuries per gram with over half the samples exceeding 5 picocuries per gram. Concentrations of uranium-238 were usually greater than 10 picocuries per gram, with values as high as 51,000 picocuries per gram.

Samples of Chartiers Creek water and streambed sediments were taken at locations near the Canonsburg site by ORNL (Leggett et al., 1979b). All water samples taken by ORNL showed very low concentrations of radium-226; the highest level reported was 4 picocuries per liter. The highest sediment sample reported measured 36 picocuries per gram of radium-226. All other sediment samples taken by ORNL measured 5 picocuries per gram of radium-226 or lower. The 36 picocuries per gram value was at the downstream corner of Area C, the farthest downstream of any of the sampling locations. Table F.1-3 presents only Weston-collected results on the Chartiers Creek sediments.

Radiological ground-water at the expanded Canonsburg site has been determined on the basis of analyses performed on samples collected by Weston from selected onsite and offsite wells. (Radioactivity measured in the ground water was the dissolved (soluble) fraction unless otherwise noted.) Due to low vanadium concentrations in the ground water, uranium is expected to be the most mobile radionuclide in the ground water at the expanded Canonsburg site. Neutral pH conditions and an apparent abundance of bicarbonate as a complexing agent also aid the mobility of uranium and allow uranium to migrate at the fastest rate in the Canonsburg site environment. Uranium is considered the key indicator of contaminant migration. The results of these analyses are shown in Table F.1-4. Radium-226 and uranium-238 are the isotopes that are present in the highest concentrations. The highest concentrations of radionuclides appear in well 205, which is located in the portion of Area C that was used as a waste-disposal lagoon during the periods when the Canonsburg site was in operation. With the exception of wells 407 and 502, all offsite wells show background concentrations of all radionuclides. Wells

407 and 502 are adjacent to each other and immediately north of the expanded Canonsburg site across Chartiers Creek. Well 407 is a shallow bedrock well and well 502 is a deep bedrock well. The location of the screen in well 407 is above the level of Chartiers Creek, and the water elevation in well 407 is slightly above the creek level, showing that the piezometric surface is toward the creek from the east, as expected.

The vicinity properties on the northern side of the creek may be contributing to a slight elevation in radionuclide concentration in ground water. The radionuclide concentration in well 502 (6 parts per billion) could be the result of migration in the ground water from the expanded Canonsburg site since well 502 is downgradient of the expanded Canonsburg site, but this possibility is unlikely. The concentration of radium-226 in both wells 407 and 502 are within the EPA National Interim Primary Drinking Water Standards (40 CFR 141). Assuming that all alpha activity is the result of uranium-238 and radium-226, gross alpha activity would also be within the EPA National Interim Primary Drinking Water Standards (40 CFR 141).

The Illinois State Water Survey Finite Difference Hydrodynamic Flow Model (Prickett and Lonquist, 1971) and the equations developed by Prakash (1982) were used to describe the present steady-state water table and shallow bedrock systems at the expanded Canonsburg site, and to predict post-encapsulation conditions. These calculations show that for a maximum concentration of uranium to originate at well 205 (Area C), the highest concentration of uranium approaching Chartiers Creek would be downgradient from this source. These concentrations were 0.12, 0.06, and 0.003 milligram per liter at distances of 40, 20, and 1 foot west of the creek, respectively. For the shallow bedrock system a source area at wells 306R and 5A was used. The model simulation predicts a uranium concentration of 0.01 milligram per liter 200 feet west of the creek and downgradient of the source. The actual analysis result at well 302R, the nearest shallow bedrock well to the simulation point, was 0.0037 milligram per liter.

4.8.2 Burrell site

Radioactively contaminated materials containing an estimated 6 tons of uranium oxide (approximately 1.5 curies of uranium-238) were transferred from the Canonsburg site to the Burrell site in 1956-1957. Analyses by the ORNL (Leggett et al., 1979a) of subsurface-soil samples from 76 holes drilled on the Burrell site to depths of up to 50 feet revealed the general location of radioactively contaminated materials containing an estimated above-background total uranium-238 activity of 1.3 curies, and an estimated total radium-226 activity of 4 curies. It appeared at that time that more than 75 percent of the radioactively contaminated materials lay at least 10 feet beneath the surface. Some radioactively contaminated materials were also scattered on the surface. At some points the following values were measured in the surface soils:

1. Radium-226 concentrations of several thousand picocuries per gram.
2. Uranium-238 concentrations of 360 picocuries per gram.

3. External-gamma radiation levels at 1 meter above the surface in excess of 600 microroentgens per hour.
4. Beta-gamma dose rates at 1 centimeter above the surface in excess of 5 millirads per hour.

These measurements were not representative of the entire Burrell site area; at most sampling points radionuclide concentrations in the surface soils and radiation levels at the surface and at 1 meter above the surface were less than ten times background levels.

Grid-point measurements of gamma-radiation levels at 1 meter above the surface indicated a maximum gamma-radiation level of 630 microroentgens per hour. Several external-gamma measurements exceeding 300 microroentgens per hour were observed in the western portion of the Burrell site. Many measurements, particularly in the western portion of the Burrell site, were at background levels. The maximum beta-gamma dose rate at 1 centimeter from the surface on this site was 5.4 millirads per hour. The majority of the beta-gamma dose-rate measurements were at background levels.

Concentrations of radium-226 and uranium-238 in surface-soil samples were as high as 5000 picocuries per gram and 360 picocuries per gram, respectively. Radium-226 concentrations in the area that showed general surface contamination averaged 10 picocuries per gram; the EPA standard (40 CFR 192) allows 5 picocuries per gram. The average uranium-238 concentration in this same area was 3.9 picocuries per gram, the NRC guideline (46 FR 52061-52063, October 23, 1981) allows 200 picocuries per gram.

Subsurface-soil contamination was determined by drilling wells to depths of up to 50 feet, measuring in-situ radiation levels with a gamma probe, and analyzing soil samples. The radioactively contaminated materials were widely scattered and were found at depths ranging from the surface to 36 feet deep. No meaningful estimates of maximum or average radium-226 or uranium-238 concentrations could be made because of the sampling method and the heterogeneity of the results. However, this technique did permit an estimation of the total amount of radioactivity present above background levels. It was estimated that 4 curies of radium-226 and 1.3 curies of uranium-238 are buried at this site. According to historical records, approximately 1.5 curies of uranium-238 were transported to the Burrell site for disposal. This agreement indicated that nearly all of the radioactively contaminated materials were dumped in the region surveyed.

Analyses of sediments filtered from some of the water samples taken in drainage areas on and near the Burrell site revealed elevated concentrations of lead-210, and in some samples, thorium-230. However, in all water samples taken on and near the Burrell site, concentrations of radium-226, thorium-230, uranium-238, and lead-210 were below the NRC standards (10 CFR 20).

Concentrations of radium-226, thorium-230, and uranium-238 were measured in ground-water samples taken from the Burrell site wells. The maximum values found were 370 picocuries per liter for thorium-230, 10 picocuries per liter for radium-226, and 403 picocuries per liter for uranium-238. These results are below the NRC standards (10 CFR 20). Analyses of water samples taken from drainage ditches to the Conemaugh River noted lead-210, thorium-230, radium-226, and uranium-238 concentrations below the NRC standards (10 CFR 20); however, the results for lead-210 and uranium-238 were slightly above background levels. Analyses of sediments from these water samples showed similar results.

Average radon-222 levels in air at the Burrell site were at background levels with one exception. The one elevated reading of 1.82 picocuries per liter was below the NRC standard (10 CFR 20) of 3 picocuries per liter. The radon-daughter-product levels in air were all at background levels.

It appeared from these data that there is no significant ground-water or atmospheric transport of radioactivity from the Burrell site.

Subsequent to the surveys just reported, Weston made additional surveys of the Burrell site in 1981 and 1982 (U.S. DOE, 1982c), including measurements of uranium-238 and radium-226 in ground water at 26 wells and gamma-radiation levels at various depths in 28 wells drilled on the Burrell site (Figure F.1-2).

The highest ground-water uranium-238 concentrations were about 12 picocuries per liter in two wells; one in the known dump area and the other 1500 feet east of the dump area (Table F.1-5). Resampling and analysis of ground water from these same wells several months later found uranium-238 activities below 10 picocuries per liter, with the majority of the results at background levels. Radium-226 concentrations were at background levels for all wells tested.

Gamma-radiation levels in 7 of 28 wells sampled were above background activity. One well was contaminated at a depth of 21 feet, another was contaminated at a depth of 11 feet, and the remaining five wells were contaminated at depths of less than 7 feet.

The results found by Weston were confirmed in a separate survey by Bendix in 1982 (U.S. DOE, 1982c). The Bendix surveys consisted of gamma logs in 22 wells and estimations of radium-226 concentrations in the soil around these wells by gamma-spectral analysis. Above-background radioactivity was found in eight wells, at a depth of 12 feet in one and at depths less than 8 feet in the remaining 7 wells. Estimates of the radium-226 content ranged from less than 1 picocurie per gram up to 800 picocuries per gram. The average radium-226 concentration was less than 5 picocuries per gram across the Burrell site.

The ORNL, Weston, and Bendix surveys of the Burrell site identify different levels of radioactive contamination on the Burrell site. The Weston and Bendix surveys in 1981 and 1982, respectively, suggest that the Burrell site presently contains substantially less radioactive material than the 1977 ORNL survey indicated. The results of the Bendix survey agreed with the Weston data and are considered to be the conditions that currently exist on the Burrell site (U.S. DOE, 1982c). Based on these more recent and more extensive data it is believed that only one-third to one-tenth of the radiological activity originally placed on the Burrell site remains there, and that most of this radiological activity occurs at depths of less than 12 feet.

It is assumed that the reduction in the amount of radioactively contaminated materials existing on the Burrell site between the ORNL 1977 survey (Leggett et al., 1979a) and the Weston and Bendix 1981-1982 surveys (U.S. DOE, 1982c) was caused by leaching by ground water or by a redistribution of the radioactively contaminated materials on the Burrell site. Therefore, the Burrell site currently meets the EPA standard (40 CFR 192) except in a few small areas. This in turn, could imply that a much smaller remedial-action plan is necessary than originally envisioned (i.e., acquiring the Burrell site, covering the radioactively contaminated portion of the Burrell site with a minimum soil cover, and designating that portion of the Burrell site as a disposal site as described in Appendix A.2). The Burrell site is currently classified as a vicinity property, but the DOE is proposing to redesignate the Burrell site as a disposal site. The Burrell site's use is currently restricted by the COE as a flood-control easement for the Conemaugh Dam.

4.9 LAND USE

A socioeconomic survey of the Canonsburg site area was conducted in 1979 (Appendix G, subsection G.2). This survey consisted of an interview of residents within a 1-mile radius of the Canonsburg site, and a drive-through of the Canonsburg site vicinity to update the available land-use information. Surveys were also performed in the Burrell and Hanover site areas in January 1982, but because of their more open settings, these surveys relied on drive-throughs of their respective 1-mile radius areas, and extensive agency contacts.

4.9.1 Canonsburg site

The area within a 1-mile radius of the Canonsburg site includes portions of four municipalities: Canonsburg and Houston Boroughs, and Chartiers and North Strabane Townships. Residential use covers nearly 27 percent of this area, and is concentrated primarily in Canonsburg and Houston Boroughs and in

the Village of Strabane (a residential development of North Strabane Township). The 1-mile-radius area also includes the commercial centers of Canonsburg and Houston, and a number of industrial establishments (Appendix G; Figure G-1 and Table G-1).

The Canonsburg site is located in the light-industrial zoning district of the Borough of Canonsburg. Other zoning designations for that part of the Borough within a 1-mile radius of the Canonsburg site include the following:

1. High-density residential in the eastern portion of the Borough.
2. Light-industrial, general commercial, and low-density residential in the northern and northwestern portions.

The sections of the Borough of Houston and North Strabane Township located within a 1-mile radius of the site are zoned primarily for residential use (Figure G-2). The portion of Chartiers Township included in this area is zoned primarily for medium-density residential use, most of which is currently in open space. The composite land-use plan (Figure G-3) for these boroughs and townships specifies development generally in accordance with local zoning designations (Kendree and Shepard Planning Consultants, 1970; Canonsburg Borough Planning Commission, 1971; Selck Minnerly Group, 1974; Houston Borough Zoning Board, 1982).

4.9.2 Burrell site

The area within a 1-mile radius of the Burrell site includes portions of Burrell Township and Blairsville Borough in Indiana County, and Derry Township in Westmoreland County. The major land use in this 1-mile radius area is open space (agriculture, woods, flood plains, and miscellaneous uses such as the Burrell site). Residential areas are primarily in Blairsville Borough and along major highways in Burrell Township; however, there are residential uses close to the Burrell site such as the community of Strangford 1 mile east of the Burrell site, and a small development along the northern edge of the Burrell site on old Route 22 (Appendix G, Figure G-4, and Table G-2).

Burrell Township has no land-use plans, zoning ordinances, or subdivision regulations. The Indiana County Comprehensive Plan places the Burrell site vicinity within the multiple-use flood-control district (Bellante and Clauss, Inc., 1967). The Derry Township section within the 1-mile radius of the Burrell site is in public or semi-public use; primarily the Torrance State Hospital. Blairsville Borough has a zoning ordinance; however, the details of the ordinance are unavailable. Development within the 1-mile radius area in Indiana County is controlled by the County's 1973 Special Recreation and Conservation Ordinance.

4.9.3 Hanover site

The entire 1-mile radius area of the Hanover site is within Hanover Township, except for a very small section in Jefferson Township (Figure G-5). Most of this area is in industrial land use, mainly mining activity. The Hanover site area is currently zoned for rural-residential use (Hanover Township, 1970) (Table G-3), which allows the following:

1. Agriculture.
2. Residences.
3. Community services.
4. Recreation.
5. Planned-residential developments.
6. Mineral extraction.
7. Community facilities and accessory uses.

There are no official land-use plans developed for Hanover Township; hence, the future use of the Hanover site will be guided primarily by the land uses permitted by its zoning designation.

4.10 NOISE

4.10.1 Canonsburg site

An acoustical survey conducted in 1979 by the Franklin Research Center (Hargens, 1979) (Appendix H) revealed that the Canonsburg site and the surrounding community are generally quiet. Nearly all sounds are steady and have very little diurnal variation. The immediate Canonsburg site area has only a few outstanding sound sources, since most of the industrial activities on the Canonsburg site have been shut down. Except for passing aircraft and land vehicles, the background sound levels around the Canonsburg site perimeter range from 45 to 57 dBA. Sounds emanating from Areas B and C are natural in origin, primarily insect and water sounds.

Sound sources off the Canonsburg site that contribute to background levels on the Canonsburg site include nearby roadways, railroads, and residences. West Pike Street runs roughly parallel to the Canonsburg site's northern boundary. This roadway connects the boroughs of Houston and Canonsburg and carries heavy traffic. Residences are located directly across the ConRail tracks in the Village of Strabane (as close as 250 feet to the expanded Canonsburg site) and along Chartiers Creek on Wilson Avenue, and may make minor occasional contributions to sound levels.

4.10.2 Burrell site

The Burrell site is in an open area and is very quiet. Background-sound sources are primarily natural, with irregular rail traffic and aircraft overflights.

4.10.3 Hanover site

The Hanover site is also an open, quiet area. It is 2 miles away from any developed area and transportation routes.

4.11 SCENIC, HISTORICAL, AND CULTURAL RESOURCES

4.11.1 General appearance

The Canonsburg site is located within the general Canonsburg community. The immediate vicinity is largely developed and contains no significant features to distinguish it from other small western Pennsylvania towns. Although the Burrell and Hanover sites are located in more open areas, they exhibit no significant scenic or aesthetic features. Much of the open area surrounding the Burrell site is a wooded flood plain, while the site itself is a former industrial landfill. The Hanover site, like much of its surroundings, is a former strip-mining area.

4.11.2 History

Western Pennsylvania supported numerous American Indian tribes before settlement by Europeans. The movement of settlers into this area was limited until secure passes through the Appalachian ridges were established. As a result traffic was channeled along a limited number of westward routes, and communities subsequently developed along these routes.

The major impetus to the development of western Pennsylvania came with the demand for coal during the industrial age. The availability of coal and other mineral resources attracted industrial development. Industry was also supported by the connection of the Ohio River system with the Mississippi River, allowing products and supplies to be transported and distributed over a much wider area. The Pennsylvania Canal System was developed to provide a waterway connection between the Ohio River and eastern river systems such as the Susquehanna and the Delaware. This system was initially designed to operate in conjunction with some rail lines; however, it was eventually replaced by a complete cross-state rail system connecting Philadelphia, Harrisburg, and Pittsburgh. (The western division of the canal system passed within one mile of the Burrell site.)

The industrial development of western Pennsylvania created an extensive demand for labor. This demand coincided with the periods of heavy immigration from eastern Europe, and many of the immigrants settled in western Pennsylvania.

4.11.3 Places of archaeological, historical, or cultural interest

Many of the significant archaeological resources near the three sites have been disrupted by mining and other development activity. No places of special interest are known to be in the immediate vicinity of the three sites, although several are reported within a 1-mile radius of the Canonsburg, Burrell, and Hanover sites (Table G-4) (Washington County Planning Commission, 1979; Philpott, 1980; Kent, 1982; and Ramsey, 1982).

Within a 1-mile radius of the Canonsburg site are two places that are listed in the National Register: Dr. McMillan's Log School, and the Robert's House, a half Georgian house built in 1805. Other structures of historical interest and significance include several houses and churches.

There are a number of historical findings located within a 1-mile radius of the Burrell site. These include several Indian sites and the remnants of the western division canal.

The Hanover site area includes several covered bridges, such as the remnants of the Doc Hanlin Covered Bridge, which is listed in the National Register, and several other structures of historical significance.

4.12 SOCIOECONOMIC CHARACTERISTICS

Information for subsections 4.12.1 through 4.12.7 was obtained from the 1979 socioeconomic survey of the Canonsburg site area, the 1982 socioeconomic surveys of the Burrell and Hanover site areas, and through contacts with municipal and county agencies. Detailed data from these surveys are contained in Appendix G.

4.12.1 Population

The Canonsburg site is situated within a populated area. Both the Burrell and Hanover sites are situated in rural areas. The population within a 1-mile radius of the Canonsburg site was 7938 in 1980 (Figure G-6, Table G-5). This total is broken down by age and sex on Table G-6. Historical and projected populations of the Canonsburg site area municipalities are given in Table G-7. Using the percent share of the 1980 population within these

municipalities and the area's development potential, it is estimated that the population within 1 mile of the Canonsburg site will decrease slightly to 7929 by the year 2000 (Table G-8). There were only 2312 persons living within 1 mile of the Burrell site in 1980 (Figure G-7, Table G-9). The majority of these people live in Blairsville, west of the site. An increase of 338 people within 1 mile of the Burrell site over the 1980 population is expected by the year 2000 (Table G-10). Hanover Township had 78 people living within 1 mile of the site in 1980 (Table G-11), and this number is expected to increase by only 2 people by the year 2000 (Table G-12). (Projections for the Burrell and Hanover site areas were developed using the percent share of the 1980 population within the associated municipalities, the year 2000 population projections, and the areas' development potential.)

4.12.2 Social structure

The communities within southwestern Pennsylvania have rich ethnic traditions and are bound together by tight family structures. The population centers are old and stable with a small number of transients. There are many civic, social, and religious organizations that serve the population. There are a number of cultural organizations within the Canonsburg site vicinity that serve the Slovenian community in the area. No dominant ethnic culture is present in either the Burrell or Hanover site vicinities.

4.12.3 Economic structure

The mining industry is a strong economic force in southwestern Pennsylvania (Appendix G, subsection G.3). Washington and Indiana Counties are the two largest coal-producing areas in the region. In addition to the mining industry, the manufacture of primary metals, glass-producing machinery, electrical machinery, and food preparation and distribution equipment plays an important role in the regional and local economies. Agriculture provides another major source of income for the region. Dairy products, poultry, meat, field crops, and maple syrup make up the bulk of the agricultural production. The forest industry provides an additional source of income in the more rural areas.

The economic structure of the Hanover site is influenced by its proximity to the steel and titanium industries in West Virginia and Ohio.

4.12.4 Work force

The December 1981 statistics show an unemployment rate of approximately 8-1/2 percent in both Washington and Indiana Counties (Appendix G, subsections G.4.1 and G.4.2). The major losses of employment were in the primary metals,

fabricated metals, machinery, and transportation-related industries. Total employment in December 1981 was 87,700 and 32,200 persons in Washington and Indiana Counties, respectively. Approximately one-half of all employed persons who reside within the 1-mile radius area of the Canonsburg site work within 2 miles of their homes. Employed persons living within the 1-mile radius areas of the Burrell and Hanover sites work at greater distances from their homes, with some Hanover residents working in Weirton, West Virginia.

4.12.5 Housing

The Canonsburg site is situated within an area of dense residential development. The Canonsburg site has been expanded to include seven nearby residences. The closest residence to the Canonsburg site is on Wilson Avenue, about 85 feet from the Canon Industrial Park property line. The closest houses to the expanded Canonsburg site are those in the Village of Strabane immediately across the railline to the south, with some of these houses as close as 250 feet. The Burrell site has fewer houses in its immediate area, with the closest homes being situated along the ridge to the north of the site (over 500 feet away). The Hanover site is situated in an area with very few houses; the nearest one is about 2000 feet away.

The houses in the Canonsburg site area are relatively old but in good condition. Most of the houses are owner-occupied with infrequent turnover. There are only a few rental units available within a 1-mile radius of the Canonsburg site, located mostly in Canonsburg. Historical data on housing stock in the area municipalities are given in Table G-20. Newer housing units are located in the northwestern section of Canonsburg and the Oak Spring Cemetery section of Chartiers Township. Based on a 2-percent vacancy rate, approximately 210 single-family houses are available in the site vicinity. Multifamily housing is limited in the area.

Current property assessments for developed properties near the Canonsburg site range from \$1,927 to \$6,392 per property; this represents about 9 percent of the actual property value. The 1981 assessed value of the properties composing the Canon Industrial Park was \$55,698, representing an approximate market value of about \$619,000. The newer homes in the Canonsburg site vicinity have an average assessed value of \$5,000 (assessed at 9 percent of market value). The asking prices of some houses in the Canonsburg site vicinity, as obtained from local realtors, are presented in Table G-21.

Housing activity in the Burrell site area, and particularly in Burrell and Derry Townships, has expanded rapidly in recent years, particularly in new subdivisions (Table G-20). There is a total of nine houses located within one-quarter mile of the Burrell site, with the nearest one 500 feet from the site. Approximately 550 houses of the 1980 housing stock of the area municipalities are currently vacant, based on the vacancy rates in Indiana and Westmoreland Counties. The cost of vacant land in the vicinity of the Burrell site ranges from \$300 to \$400 per acre. Average home prices are in the \$40,000 to \$45,000 range.

There are only 78 people occupying 26 houses within the 1-mile radius area of the Hanover site (Table G-11), with the nearest house about 2000 feet from the site. Over the last decade, the number of houses in the area municipalities (Hanover, Burgettstown, Jefferson, and Smith Townships) has increased by 13 percent. At a 2-percent vacancy rate, there are about 85 vacant houses in these municipalities. The cost of vacant land in Hanover Township ranges from \$300 per acre for deep-strip-mined land with only minimal use, to as much as \$10,000 per acre for lands suitable for occupiable development (accessible and favorable for sewers) and for development as landfills (mined areas with deep-cut walls).

4.12.6 Tax and assessment structure

Canonsburg is the largest borough in Washington County in terms of population, ranking only behind Monongahela and Washington, both third-class cities. The revenue of Canonsburg and its surrounding communities was more than \$3.5 million in 1978 (Table G-22). The majority of the revenue came from real-estate and Act 511 taxes, with lesser amounts coming from Federal and state grants, state highway taxes, and sanitary sewer charges. The revenue was used primarily to provide local services and was approximately 15 percent of the County's government-service outlays. Washington County was reassessed in 1980; the current tax rate is 25 mills. The current property assessment is 9 percent of the market value. Current assessed values, market values, and tax rates for the area municipalities are given in Table G-23.

Revenues for 1978 for both Burrell Township and the Borough of Blairsville, Indiana County, totalled more than \$1 million (Table G-24). The 1980 and 1981 tax rates for these municipalities are given in Table G-25.

Based on population size, Hanover Township represented an average second-class township, while its fiscal statistics (Table G-26) for 1979 were substantially less than average for its size. The rural character of this township accounts for its small-scale revenue needs and expenditures.

4.12.7 Community structure

Community services such as schools, hospitals, fire and police protection, public utilities, and recreational facilities within the site area municipalities are described in Appendix G, section G.4. A school is located within one-quarter mile of the Canonsburg site. No schools are near the Burrell site, and the school closest to the Hanover site is over 2 miles away.

The Canonsburg site also has a number of hospitals and recreational facilities in its general area. Burrell and Hanover Townships rely on regional facilities, parks, and open areas for recreation. This trend affects all of the community services offered at each site; i.e., the services provided near the Canonsburg site are closer and more comprehensive than those near the Burrell or Hanover sites.

4.12.8 Transportation network

A transportation survey of the three site areas was performed to assess the various alternative routes (Transportation and Distribution Associates, Inc., 1982). This survey is presented as Appendix I.

Interstate Highways 70 and 79 are the major highways in the vicinity of the Canonsburg site (Figure 1-1). The principal arterial roads near the Canonsburg site are U.S. Routes 19 and 40 and State Routes (SR) 980, 519, 50, 18, and 88. The main access road to the Canonsburg site is Strabane Avenue. This street becomes Chartiers Street south of the Canonsburg site and joins Pike Street north of the Canonsburg site. Other major roads near the Canonsburg site include North Main Street and Oak Spring Road in Chartiers Township and Boone Avenue and SR 519 in North Strabane Township. The most recent traffic counts on these roads are given in Table G-29. Most of the local streets are narrow, poorly paved, and congested. No major improvements are planned for any of the routes. There are four major railroads serving Canonsburg: the ConRail, the Montour, the Baltimore and Ohio, and the Norfolk and Western (Figure 4-1).

The major roads in Burrell Township are U.S. 22 and 119, SR 217, and several legislative roads (LR). The 1980 traffic counts on the major roads in this area are given in Table G-29. There is currently no major access road to the Burrell site. The only available public road that could be used to connect the Burrell site with the major arterial roads in the region is LR 32006 (Strangford Road; see Figure 1-4). It presently has a 15-ton load limit and is 12 to 15 feet wide. The other closest road to the Burrell site is LR 32179, which intersects LR 32006 nearly 3000 feet northeast of the Burrell site. A ConRail route runs along the northern edge of the Burrell site.

Major highways near the Hanover site include old U.S. 22, new U.S. 22, SR 18, and LRs 62017 and 62122. Access to the Hanover site is through LR 62017 either from old U.S. 22 or from SR 18 and LR 62122. Traffic counts (1980) on these routes are presented in Table G-29.

The Canonsburg and Burrell sites are accessible by railroad mainly through the ConRail lines connecting these two sites via Pittsburgh (Figure 4-1). From Canonsburg one route travels north to Carnegie and Pittsburgh, northeast to Kiskiminetas Junction and to the southeast through Vandergrift, Saltsburg, and Blairsville to the Burrell site. This route is a designated ConRail Hazardous Material (HAZMAT) route. Another route travels from Canonsburg north to Pittsburgh, then basically south and east through Greensburg, Latrobe, and Blairsville to the Burrell site. The Canonsburg-Burrell routes pass through a number of urban centers including about 2.5 miles through the City of Pittsburgh. The Canonsburg-Burrell routes pass through Indiana, Westmoreland, Armstrong, Allegheny, and Washington Counties.

There is no direct railroad line to the Hanover site. A siding to the Hanover site could be provided from the ConRail line south of the Hanover site running between Carnegie, Pennsylvania, and Weirton, West Virginia. This line

is also part of the ConRail HAZMAT route. However, ConRail may be abandoning this section by 1983 in the interest of cost control. This route passes through mostly rural communities.

4.12.9 Public reactions to the remedial-action project

Major public involvement in the remedial action plans at the Canonsburg and Burrell sites began during the identification of potential disposal sites for the radioactively-contaminated material (U.S. DOE, 1981a, b). After two possible disposal areas in Hanover Township, Washington County, were selected, a remedial-action-concept paper (RACP) was written in April 1981. This paper was published and widely distributed in the project area to inform participating agencies and the public of the tentative project plans. The Burgettstown Enterprise printed the entire RACP in its April 22, 1981 issue. (A later version of the RACP has since been published by the DOE (U.S. DOE, 1982b).) Preliminary public meetings on the tentative plans were held in Canonsburg Borough and Hanover Township in April 1981 and in Burrell Township in May 1981.

The notice of intent to prepare an EIS and hold public scoping meetings was published in the Federal Register (46 FR 26807-26810, May 15, 1980). This notice was also given wide publicity by the DOE and appeared in numerous local papers such as the Washington, Pennsylvania Observer Reporter on May 26, 1981, and in television and radio announcements.

Scoping meetings were held on June 3, 1981 in Black Lick (Burrell Township) and Canonsburg, and on June 4, 1981 in Hanover Township.

At these meetings the public was given an opportunity to express any concerns about the tentative project plans. The DOE also requested that those persons wishing to submit written comments do so by June 30, 1981.

The types of concerns expressed by the public include the following:

1. What is the extent of the exposure to radiation that the public and the project workers will receive from the project activities? What levels are expected and what are their health effects? What protective measures and monitoring will be performed and by whom?
2. What is the extent of the exposure to radiation from possible accidents? Who will clean up an accident, and how? What are the possible radiation doses and the subsequent health impacts that could result?
3. What changes in air quality will occur because of dust and other airborne pollutants during the project activities?

4. What will be the effects of the project on the soils and mineral resources in Hanover Township? The soils at this site may be too porous, and the bedrock may be fractured or weakened by mining activities. Disposal of contaminated materials in Hanover Township may eliminate the future use of geologic resources in the immediate vicinity of the site.
5. What will be the effects on surface and ground water? Radioactive contaminants may enter water supplies at the Canonsburg and Burrell sites and at the disposal site. The volumes of runoff from the disposal site(s) will be increased because of the impermeable cover.
6. What will be the effects on plants and animals? The ecological resources of Hanover Township are already seriously degraded from mining and industrial activities.
7. What will be the changes in land use? The disposal of radioactive material at a site will eliminate any future use of that site and make the surrounding area unattractive for further development. Property values will also decrease. Disposal at a site may interfere with the use of nearby institutions (schools, medical facilities), as well as community services.
8. How much will noise levels increase during the project activities?
9. How will the transportation networks be affected? Local roadways and railways may not be able to handle all of the traffic associated with moving the contaminated materials. Transporting the radioactive and construction materials will seriously increase local traffic volumes.
10. What will be the effect of storms during the project activities?
11. What impact will the proposed disposal site at Hanover have on a nearby hunting and fishing area?
12. Will the chemicals associated with the radioactive residues or sulfur and mine acids adversely affect the liners used for the disposal area(s)?
13. What is the possibility of unearthing toxic chemicals at the former Canonsburg lagoon (Area C)?
14. Can the Canonsburg residues be disposed of in shielded containers above ground so that they can be inspected for leakage?
15. Can the residues at the sites be stabilized in place?

The following questions were also asked during the public meetings:

1. Would other radioactive wastes, such as from Three Mile Island, also be disposed of in Hanover Township? Answer: no.
2. In light of the general antagonism toward the nuclear industry, will stopping this project be seen as an attempt to halt nuclear arms production? Answer: no.
3. Will this project halt the current illegal dumping of chemical wastes at the Hanover site? Answer: no.

Following the publication and distribution of the Canonsburg DEIS (U.S. DOE, 1982a) in early December 1982, notice of its availability was published in the Federal Register on December 8, 1982 (47 FR 55305). The notice also announced the date for closing the comment period as January 24, 1983. Inserted in the Canonsburg DEIS (U.S. DOE, 1982a) was the notice of the public hearings to be held in Black Lick (Burrell Township) and Hanover Township on January 11, 1983, and in North Strabane (the Canonsburg area) on January 12, 1983. The Canonsburg DEIS (U.S. DOE, 1982a) was sent to approximately 60 individuals, as well as to Federal and state agencies, elected officials, organizations, and public libraries. Included in the list of individuals were many representatives of the local media. News releases were also disseminated announcing the dates and locations of the public hearings.

In preparation for the public hearings, a public meeting was announced and held on December 16, 1982 in the Canonsburg area (in the North Strabane Township Hall).

All comments received on the Canonsburg DEIS (U.S. DOE, 1982a) are summarized and answered in Chapter 6.

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5 Environmental Consequences

5.1 INTRODUCTION

In assessing the impacts of each alternative, the following principles are basic to all alternatives except Alternative 1:

1. All of the alternatives would limit the release of radioactively contaminated materials from any of the three sites to within the EPA standards (40 CFR 192).
2. All of the alternatives would effectively isolate the radioactively contaminated materials over the long term.
3. All of the alternatives would improve the existing situation at both the Canonsburg and Burrell sites. The potential health and environmental hazards that are a result of the present configuration of the radioactively contaminated materials at both the Canonsburg and Burrell sites would be eliminated.
4. This study addressed the maximum realistic impacts; it is expected that the actual impacts would be less.

5.2 IMPACTS OF RELEASES OF RADIATION

This section assesses the radiological impacts resulting from each of the alternatives. The methods used to perform the assessments are given in Appendices F.2 and F.3. The data used in the impact assessments were collected by ORNL in 1977 (Leggett et al., 1979a, b), by Weston in 1981, and by Bendix in 1982 (U.S. DOE, 1982d). The impact assessment includes estimates of the resulting organ-specific radiation doses and health effects. The general population considered is that within 6.2 miles (10 kilometers) of the Canonsburg site, and 1.24 miles (2 kilometers) of the Burrell and Hanover sites. Predictions are also made for exposures to the remedial-action workers assigned to each site. Radiation doses and health effects resulting from transporting the radioactively contaminated materials under Alternatives 2, 4, and 5 are also estimated for the general population. In performing the dose and health effects calculations as described in Appendix F.3, no credit was taken for any of the mitigating measures that could be employed.

The Canonsburg DEIS (U.S. DOE, 1982a) was issued in November 1982. Public and government comments on the Canonsburg DEIS (U.S. DOE, 1982a) were solicited through a notice in the Federal Register (47 FR 55305, December 8, 1982) and through a series of local public hearings held in January 1983 (see Chapter 6). The Canonsburg FEIS includes several changes from the Canonsburg

DEIS (U.S. DOE, 1982a). These changes pertaining to radiological impacts are summarized in the paragraphs that follow, and are discussed in subsequent sections of the Canonsburg FEIS.

1. The EPA published final standards (40 CFR 192) for remedial actions at inactive uranium-processing sites (48 FR 590-606, January 5, 1983; effective March 7, 1983). These final standards contain several less stringent standards compared to the proposed standards (40 CFR 192 (proposed)) (45 FR 27370-27375, April 22, 1980 and 46 FR 2556-2563, January 9, 1981). The EPA published an EIS (U.S. EPA, 1982) on the development and impacts of the standards. The promulgation of these standards (40 CFR 192) resulted in design changes for the remedial-action program, such as a reduction in the overall cover thickness at the expanded Canonsburg site. One of the main differences between the proposed EPA standards (40 CFR 192 (proposed)) and the final EPA standards (40 CFR 192) is that the amount of radon-222 that may be released from the surface of a disposal site has been increased by a factor of 10 (i.e., from 2 to 20 picocuries per square meter per second).
2. The description of the present (no action) radiological conditions was revised to more accurately reflect the existing situation at the Canonsburg site. The Canonsburg DEIS (U.S. DOE, 1982a) took a worst-case approach and considered the radioactively contaminated materials present on the Canonsburg site to be essentially uncovered and directly exposed to the biosphere. The Canonsburg FEIS considers the existing soil cover over these radioactively contaminated materials. This revision results in a reduction by a factor of 15 in the estimated level of radiological impacts resulting from the current condition (no action) of the Canonsburg site compared with that given in the Canonsburg DEIS (U.S. DOE, 1982a). This revision does not change the actual amounts of radioactively contaminated materials present on the Canonsburg site nor the actual radiological impacts either during or after the remedial action. The revision results only in a revised estimate of the present radiological situation on the Canonsburg site against which the potential radiological impacts during and after remedial action are compared. In other words, the physical impacts do not change, but the estimates of these impacts are more accurate.

The Canonsburg DEIS (U.S. DOE, 1982a) estimated that Alternative 2 or 3 would reduce the potential radiological impacts at the Canonsburg site by a factor of 700 compared with the no action alternative. Because of the changes described in the first two items, the Canonsburg FEIS estimates that Alternative 2 or 3 would reduce the potential radiological impacts at the Canonsburg site by a factor of 4, compared with no action.

The Canonsburg DEIS (U.S. DOE, 1982a) estimated a slight increase in the level of potential radiological impacts during the 96-week remedial-action period at the expanded Canonsburg site, compared with no action. Because the estimate of the potential radiological impacts

under no action has been reduced, as described in this item, the Canonsburg FEIS estimates that these potential radiological impacts under Alternative 2 or 3 would be about twice those of the no action alternative during the 96-week remedial-action period.

3. The geographical area considered in the radiological impact evaluation of the Canonsburg site was increased from 1.24 miles (2 kilometers) to 6.2 miles (10 kilometers). This change permitted a more extensive assessment of the potential environmental impacts resulting from any of the alternative remedial actions.

5.2.1 Impacts of remedial actions

Radiological

The radiation doses for the general population and remedial-action workers under each of the alternatives are presented in Tables F.3-1 to F.3-13. The calculational methods used are described in Appendix F.2. The estimated excess lung cancer deaths among the population of 68,602 people living within 6.2 miles (10 kilometers) of the Canonsburg site, and within 1.24 miles (2 kilometers) of the Burrell and Hanover sites and among the 43 to 75 remedial-action workers (depending on the alternative), are presented in Tables 5-1 through 5-7. The single most important exposure pathway to the general public and the remedial-action workers would be the inhalation of radon-daughter products and the subsequent irradiation of the tracheobronchial system. In addition, the remedial-action workers would have an important secondary pathway through working in close association with the radioactively contaminated materials, direct external exposure of the whole body. In order to put these results in perspective, Table 5-8 presents the estimated background-radiation doses, the EPA standards (40 CFR 192), and the normal cancer-death expectations for the exposed populations.

The population dose calculations indicate that the most exposed resident near the Canonsburg site is currently receiving an excess bronchial dose of about 393 millirems per year (Table F.3-1). This is equivalent to a 1 in 4000 additional chance of that individual dying from lung cancer because of exposure to radon-222 daughter products from the radioactively contaminated materials at the Canonsburg site. Remedial-action Alternative 2 or 3 would reduce this additional exposure to 100 millirems per year (Table F.3-5) or a 1 in 15,000 additional chance of that individual dying from lung cancer. The normal expectation of an individual dying from lung cancer is approximately a 1 in 33 chance (National Academy of Sciences, 1980).

At the Burrell site, the most exposed persons are across the Conemaugh River to the southwest. They currently receive an excess bronchial dose of 134 millirems per year (Table F.3-6), which would be reduced to 30 millirems per year by the remedial action (Table F.3-9). The former dose implies a chance of 1 in 11,000 of that individual dying from lung cancer because of

Table 5-1. Excess annual cancer deaths for the general public within 10 kilometers (6.2 miles) of the Canonsburg site (63,942 people) before and after remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
1 (before)	11	530	0.0106	0.0013	0.0119
2 and 3 (after)	0.254	151	0.00302	0.0000305	0.00305

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-2. Excess annual cancer deaths for the general public within 2 kilometers (1.24 miles) of the Burrell site (4,546 people) before and after remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
1 (before)	0.0864	47.8	0.000956	0.0000104	0.000966
3 and 5 (after)	0.0233	11.5	0.00023	0.0000028	0.000233

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-3. Excess annual cancer deaths for the general public within 2 kilometers (1.24 miles) of the Hanover site (114 people) before and after remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
1 (before)	0	0	0	0	0
4 and 5 (after)	0.000116	0.152	0.00000304	0.0000000139	0.00000305

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-4. Excess total cancer deaths for the general public within 10 kilometers (6.2 miles) of the Canonsburg site (63,942 people) due to radiation exposure during remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
2	22	1858	0.0372	0.00264	0.0398
3	22	1860	0.0372	0.00264	0.0398
4	18	1720	0.0344	0.00216	0.0366
5	18	1720	0.0344	0.00216	0.0366

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-5. Excess total cancer deaths for the general public within 2 kilometers (1.24 miles) of the Burrell site (4546 people) due to radiation exposure during remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
2	0.0934	29.9	0.000598	0.0000112	0.000609
3	0.0311	9.97	0.000199	0.00000373	0.000203
4	0.0934	29.9	0.000598	0.0000112	0.000609
5	0.0311	9.97	0.000199	0.00000373	0.000203

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-6. Excess total cancer deaths for the general public within 2 kilometers (1.24 miles) of the Hanover site (114 people) due to radiation exposure during remedial action

Alternative	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths	All other cancer deaths	Total deaths
2	0	0	0	0	0
3	0	0	0	0	0
4	0.00889	10.3	0.000206	0.00000107	0.000207
5	0.00457	4.88	0.0000976	0.000000548	0.0000981

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-7. Excess total cancer deaths among the remedial-action workers at the Canonsburg and Burrell sites due to radiation exposure during remedial action

Alter-native	No. of work-ers	Whole body dose (man-rems) ^a	Bronchial dose (man-rems) ^b	Lung cancer deaths ^b	All other cancer deaths ^a	Total deaths
2	47	13.7	52.6	0.0011	0.0016	0.0027
3	43	13.6	51.1	0.0010	0.0016	0.0026
4	75	14.9	63.7	0.0013	0.0018	0.0031
5	72	14.4	55.3	0.0011	0.0017	0.0028

^aMainly exposure to gamma radiation.

^bMainly inhalation of radon-daughter products.

Table 5-8. General radiological parameters

Parameter	General public ^a	Remedial action workers ^b
Background external whole body dose (man-rems per year) ^c	6,040	3.8 - 6.6
Background bronchial dose (man-rems per year) ^d	76,900	48 - 84
EPA standard (40 CFR 192) for whole body dose (man-rems per year) ^e	18,000	---
EPA standard (40 CFR 192) for bronchial dose (man-rems per year) ^f	549,000	---
Normal expectation of lung cancer deaths per year (3 percent) ^g	63	0.04 - 0.07
Normal expectation of total cancer deaths per year (16 percent) ^g	338	0.21 - 0.37

^aThe 63,942 people within 10 kilometers of the Canonsburg site, plus the 4,546 people within 2 kilometers of the Burrell site, plus the 114 people within 2 kilometers of the Hanover site.

^b43 to 75 in number depending on the alternative.

^cResulting from a gamma background of 88 millirems per year.

^dResulting from the gamma background plus a radon-daughter background of 0.004 working level.

^eCalculated from the EPA standard (40 CFR 192) of 20 microroentgens per hour, plus the natural background, assuming all members of the population are exposed at that rate.

^fCalculated from the EPA standard (40 CFR 192) in item e, plus the dose from the EPA standard (40 CFR 192) for radon-daughters of 0.03 working level, assuming all members of the population are exposed at that rate.

^gNational Academy of Sciences, 1980.

exposure to radon-222 daughter products from the radioactively contaminated materials at the Burrell site, while the latter dose implies an additional chance of 1 in 50,000.

At the Hanover site, there is no present exposure to radioactively contaminated materials. If either Alternative 4 or 5 is carried out, the most exposed person would be in a house about one-half mile to the northeast. That person would receive an excess bronchial dose of 1.4 millirems per year (Table F.3-12), implying an additional chance of 1 in 1,000,000 of dying from lung cancer.

The current radon emissions from the Canonsburg and Burrell sites have a very minor effect on populations greater than 10 or 2 kilometers away, respectively. There are no major population centers located downwind at any reasonable distance from either the Canonsburg or Burrell site; thus, the incremental population radiation doses given would be unaffected. The largest population center downwind that could be affected by radon emissions from the Canonsburg and Burrell sites is the New York-Philadelphia-Baltimore-Washington, DC complex with a population of about 30 million at a distance of 200 miles or greater from the Canonsburg or Burrell site. At this distance the radiation doses are reduced by at least an additional factor of 1000.

Although no MILDOS calculations were made at distances greater than 10 kilometers, scaling calculations indicate that the dose rate for the no action alternative to the New York-Philadelphia-Boston-Washington, DC corridor is approximately 0.001 millirem per year for a person exposed at these locations or about 30 person-rems per year for the population of 30 million. Using the risk factors given in Appendix F.3, the risk incurred for this population for this exposure would be 0.0006 lung cancer cases per year. This risk is miniscule (less than 1 chance in 1000 of a single case of lung cancer per year in the 30 million people exposed). This same population normally experiences approximately 30,000 deaths per year from lung cancer.

Under Alternative 1, the no-action alternative, additional radiation doses to the bronchial epithelium of the general population (Table F.3-1) will average 0.69 percent of background levels, and 0.097 percent of the EPA standard (40 CFR 192) on an annual basis. This could result in 0.012 additional lung cancer deaths per year among the 68,488 people living near the Canonsburg and Burrell sites (Tables 5-1 and 5-2). This represents an increase of 0.02 percent above the normally expected 63 lung cancer deaths per year. With no action, this rate of excess lung cancer deaths will continue into the future.

The population dose commitments for the estimated 96-week exposure periods would be similar for any of the proposed remedial actions (Alternatives 2 through 5), and about twice the doses for the same period in Alternative 1. These doses would range from 1736 to 1888 man-rems to the bronchial epithelium and from 18 to 22 man-rems for whole body irradiation (Tables F.3-2 to F.3-11). These doses would be due to radioactive particulates and radon-222 and its daughters. On an annual basis, these doses would range from 940 to 1023 man-rems to the bronchial epithelium and 9.8 to 12 man-rems for whole

body irradiation. These doses imply an additional 0.037 to 0.040 total cancer deaths in the exposed populations over their lifetimes due to radioactivity released during the remedial action (Tables 5-4 to 5-6). The radiological impacts under each alternative would be essentially similar, thus there is no reason from a radiological health effects point-of-view to prefer any specific alternative.

Health impacts and doses would decrease significantly once any of the remedial actions are completed. At that time, the bronchial epithelium doses would become 0.21 percent of background levels, and 0.03 percent of the EPA standard (40 CFR 192) on an annual basis. This could result in a total increased cancer death rate of approximately 0.005 percent or 0.003 additional lung cancer deaths per year in the exposed populations. After any remedial-action alternative, the health effects on the exposed populations would be reduced by a factor of about 4. Thus, a decrease in potential cancer deaths should occur as a result of completing any remedial action alternative.

Impacts on the remedial-action workers would be essentially the same under each alternative, but would be higher, on an individual basis, than impacts on the general population. The incremental whole body radiation doses would be approximately twice natural background levels while the tracheobronchial doses would be approximately background with approximately 15 percent of the airborne dose due to fugitive dust, and this would increase the health risk by 0.06 to 0.08 percent of the normally expected lung cancer-death rate of 0.04 to 0.07 deaths per year over the remaining lifetimes of the remedial action workers. These estimates are based on not using radiation-protection procedures for the workers during the remedial-action activities; however, comprehensive radiation-protection practices would be used during any remedial-action activities. These practices would include training programs, contamination-control procedures, personnel-monitoring procedures, and, as necessary, respiratory-protective devices and protective clothing. (See Appendix F.5 of this Canonsburg FEIS.) Thus, the actual impacts on the workers would be lower than has been calculated.

Impacts on the general public and remedial-action workers from transporting the radioactively contaminated materials off the Canonsburg and Burrell sites would occur under Alternatives 2, 4, and 5. It has been estimated that 4600 miles would be traveled while carrying the radioactively contaminated materials in relocating them from the Canonsburg site to the Hanover site. The radiation dose commitment due to radioactively contaminated materials transportation under these alternatives would be 0.00005 man-rem to the general public and 0.1 man-rem to the truck drivers. These doses would be small compared to background and would present no serious impacts on either the general public or the remedial-action workers.

5.2.2 Radiological impacts of transportation accidents

The most probable accident would occur if a truck overturned and spilled radioactively contaminated materials onto the street.

This type of accident could expose nearby people to low levels of gamma radiation, radon gas, and radon daughters associated with these radioactively contaminated materials for a short time (U.S. NRC, 1972). This exposure rate, however, would not exceed that delivered to nearby people during the remedial action because simple steps, taken immediately, would effectively reduce the exposure. Ribbons, flags, and radiation signs would be used at the accident scene to control people. The remedial-action crews would stop their activities, go to the accident scene, and reload the radioactively contaminated spilled materials. The final cleanup would consist of sweeping, and possibly vacuuming, any radioactively contaminated material, with guidance from the safety team who would locate radioactively contaminated materials with their instruments. If the accident occurred during rainy weather, the cleanup work would probably be more difficult because the radioactively contaminated materials might be washed away by runoff. The cleanup procedure would be the same, however, and the extent and risk of public exposure would be minor.

This type of accident would take a few hours at most to clean up. The dose to the cleanup crew and the public would be insignificant. A person standing 1 meter from the spill for 15 minutes would receive a dose of 0.06 millirem. Workers cleaning up this spill would be irradiated at 0.2 millirem per hour; in a 2-hour cleanup a worker's total dose would be 0.4 millirem.

5.2.3 Comparison of radon-222 emissions with the EPA standards (40 CFR 192)

The EPA standard (40 CFR 192) for limiting radon-222 flux from the surface of a stabilized disposal site is 20 picocuries per square meter per second.

Radon-222 is a gas; its daughter products are all solids. As a gas it would diffuse upward through the cover material, decaying en route with a half life of 3.8 days. The solid daughter products would not diffuse upward. Effectively, then, the radon-222 flux would decrease exponentially according to the formula (U.S. NRC, 1979, Appendix P):

$$F = F_0 \exp \left(- \sum_{i=1}^n X_i (\lambda P_i / D_i)^{1/2} \right)$$

Where

F = Radon-222 flux from the surface after attenuation with various cover materials (picocuries per square meter per second).

F₀ = Radon flux at the base surface of the contaminated material (picocuries per square meter per second).

λ = Decay constant for radon-222 (2.1 x 10⁻⁶ s⁻¹).

s = Seconds.

P_i = Porosity or void fraction of the i th layer of the cover (dimensionless).

D_i = Effective diffusion constant for radon in the i th layer (square centimeters per second).

X_i = Thickness of the i th layer (centimeters).

Analyses were made of the effects of various cover configurations on radon-222 flux rates using a computer model developed by Rogers et al. (1981). These analyses showed that the current radon-222 flux would be reduced to well below the EPA standard (40 CFR 192) by the proposed cover (see Appendix A.1, U.S. DOE, 1982b).

Similar calculations have shown that at the Canonsburg site the radon flux from the radioactively contaminated materials not encapsulated (i.e., the material either radioactively contaminated to levels no greater than 100 picocuries per gram or that material radioactively contaminated to levels above 100 picocuries per gram and contained in small amounts) would also be controlled to below the EPA standard (40 CFR 192) with the proposed cover material.

The EPA standards (40 CFR 192) also contain a longevity requirement; i.e., that there is a reasonable expectation that the disposal configuration used will meet the EPA standard (40 CFR 192) for at least 200 years, and to the extent practicable, 1000 years. At the Canonsburg site, longevity would be ensured by two cover characteristics. First, the clay component of the layered cover would stay wet and therefore not crack because it would be in a wet environment and the overlying soil and drain layer would smooth out seasonal changes in rainfall. Second, the cover would be revegetated at the beginning by seeding and later by natural successional processes; it would thus resist erosion.

The amount of erosion can be estimated by using the Universal Soil Loss Equation. This equation predicts an annual loss of soil from the expanded Canonsburg site during construction activities when no soil stabilization techniques can be employed of 12.75 tons per acre (Table A.5-2), or at a density of 100 pounds per cubic foot, an annual loss of soil of 0.006 foot per year. Appendix A.5 also presents estimates of potential soil losses from each site following stabilization with vegetation. These estimates show that at the expanded Canonsburg site the soil lost over 1000 years would be about 0.12 inch (Table A.5-4).

At the Burrell site, the radon-222 flux is already less than 20 picocuries per square meter per second; therefore no additional measures are required under Alternative 3 or 5 to meet the EPA standard (40 CFR 192). The grading and cover proposed at the Burrell site would keep the thickness of soil removed by erosion down to 0.56 inch in 1000 years (Table A.5-4) (U.S. DOE, 1982c).

If the Hanover site is used (Alternative 4 or 5), a burial plan equivalent to the one just analyzed for the expanded Canonsburg site would ensure adherence to the EPA radon-222 flux standard (40 CFR 192). In this case the potential erosion loss during 1000 years would be about 1 inch (Table A.5-4).

5.3 IMPACTS ON AIR QUALITY

Each of Alternatives 2 through 5 would generate the following nonradiological pollutants:

1. Suspended particulates.
2. Nitrogen oxides (NO_x).
3. Sulfur oxides (SO_2).
4. Carbon monoxide (CO).
5. Hydrocarbons (HC). (Although the EPA has revoked the primary and secondary NAAQS (40 CFR 50) for hydrocarbons (48 FR 628-629, January 5, 1983), the revoked hydrocarbons standard is still included for completeness.)

Gaseous pollutants (NO_x , SO_2 , CO, HC) would be generated by tailpipe emissions from the construction vehicles and equipment on the site and from the trucks used to haul fill and radioactively contaminated materials on and off the site. Total suspended-particulate emissions would be generated by a variety of activities, including the following:

1. General construction activities (demolition and earth moving).
2. Storage-pile stacking.
3. Wind erosion from storage piles.
4. Fugitive roadway emissions from hauling.
5. Exhaust emissions from construction vehicles and trucks.

The emissions from all of these activities have been included in calculations of the emission rate for each period, alternative, and site. Appendix B.2 describes the methods used to calculate these emission rates and to estimate the maximum emission rate for each pollutant. Because a conservative approach was used to calculate the emission rates, the results presented in Appendix B.2 are the maximum potential emission rates that the proposed remedial-action activities could produce. For gaseous pollutants, no mitigation procedures were assumed. For particulate emissions the following mitigation measures were assumed:

1. All unpaved roadways would be sprayed at least four times per year during the remedial action with a surfactant based on the frequency of dry periods (Cowherd et al., 1979).

2. All storage piles would be sprayed with water during dry periods.
3. Construction areas would be sprayed with water during dry periods (defined as any 7-day period when precipitation is less than 0.02 inch for all one-hour intervals within the 7 days).

Another assumption, based on an evaluation of fugitive emissions by the EPA (Cowherd et al., 1979), is that the recommended mitigation measures would reduce total suspended-particulate emissions by 90 percent.

The controlled emission rates were used to calculate the ambient air-quality impacts of the alternatives. The first step in modeling the pollutant dispersion used an EPA-approved area-source-screening model, the Climatological Dispersion Model (Busse and Zimmerman, 1977), to calculate the maximum potential offsite impact of the activities in each alternative. This analysis indicated that for some alternatives at some sites, an exceedance of the total suspended particulates standard might occur. Therefore, a more refined modeling approach was used to better quantify the impacts. The EPA-approved Industrial Source Complex Model (Bowers et al., 1979), was used to predict the 1-hour, 3-hour, 8-hour, 24-hour, and annual impacts of the proposed actions. For the short-term impacts, it was assumed that the winds were constant at 6.56 (2 meters) per second and from the same 10-degree sector for 24 hours and that the atmosphere was slightly stable. These conditions occur approximately 5 percent of the time in the area based on the onsite meteorological data collected at the Canonsburg site and the meteorological data from the Pittsburgh Airport (i.e., Hanover site information). For the annual average concentration, the measured meteorological conditions for 1979-1980 were used in the model.

For the Canonsburg site, meteorological data collected on the site were used for the analysis. The Canonsburg site data were corrected for the local topography at the Burrell site, and were used for the Burrell site analysis. Pittsburgh International Airport data were used for the Hanover site. The details of the modeling analysis are found in Appendix B.2. The predicted concentrations are the maximum potential ambient concentrations; they are summarized in Table 5-9. Also included in Table 5-9 are measured background concentrations for each pollutant and the National (40 CFR 50) and State (25 PA Code 131) Ambient Air Quality Standards.

Alternative 3, stabilization of the radioactively contaminated materials in place at both the Canonsburg and Burrell sites, should result in the minimum incremental air-quality impact in the Canonsburg site area. Alternative 2, stabilization of all radioactively contaminated materials at the Canonsburg site, should result in a slightly higher incremental air-quality impact than Alternative 3. The total ambient air-pollutant concentration (incremental plus background) for all pollutants for both the Canonsburg and Burrell sites under either Alternative 2 or 3 is predicted to be below the NAAQS (40 CFR 50).

Table 5-9. Maximum predicted ambient air-quality impacts due to remedial action^a

Alter- native	Site	TSP ^b (μg/m ³)		SO ₂ (μg/m ³)			CO (mg/m ³)		NO _x (μg/m ³)	HC (μg/m ³)	Settleable particulates
		Annual ^c	24-hour	Annual ^c	3-hour	24-hour	1-hour	8-hour	Annual	3-hour	(tons/sq mi-month)
2	Canonsburg	5.9	53	4.9	124	41	1.90	1.86	54	50	0.33
	Burrell	2.1	24	3.1	92	30	2.68	2.60	32	44	0.11
3	Canonsburg	4.4	43	4.6	96	31	1.93	1.89	50	28	0.24
	Burrell	2.8	22	3.3	62	20	1.85	1.80	35	20	0.15
4	Canonsburg	8.9	65	6.2	127	42	2.16	2.11	66	48	0.50
	Burrell	2.1	24	3.1	92	30	2.68	2.60	32	44	0.11
	Hanover	9.0	147	3.2	215	68	1.97	1.81	33	123	3.15
5	Canonsburg	8.9	65	6.2	127	42	2.16	2.11	66	48	0.50
	Burrell	2.8	22	3.3	62	20	1.85	1.80	35	20	0.15
	Hanover	8.3	156	3.2	215	68	1.97	1.87	33	123	2.86
Background concentration		67 ^e	74 ^e	47 ^e			1.14 ^f		20 ^f		18 ^e
National primary standard (40 CFR 50)		75	260	80		365	40	10	100	160	
National secondary standard (guideline) (40 CFR 50)		60 ^g	150		1,300		40	10	100		
Pennsylvania standards (25 PA Code 131) (same as National Primary and Secondary Ambient Air Quality Standards (40 CFR 50))											43

^aIncremental levels must be added to background to determine exceedance of standards.

^bAssumes reduction of TSP by 90 percent due to mitigation measures.

^cAssumes an 8-hour per day, 5-day per week, 50-week per year work schedule.

^dSecondary-standard exceedance.

^eMeasured background; TSP and settleable particulates from 1981 data collected at Washington, Pennsylvania; SO₂ from 1981 data collected at Florence, Pennsylvania.

^fEstimated background based on suggested rural background concentrations (U.S. EPA, 1978).

^gThis value is a guide to be used in assessing implementation plans for achieving the annual maximum 24-hour standard.

At the Hanover site, under both Alternatives 4 and 5, the estimated 24-hour incremental total-suspended-particulate concentrations, when added to the assumed background, are predicted to be greater than the nonhealth-related, secondary NAAQS (40 CFR 50) by 47 to 53 percent. In addition, the predicted annual ambient air pollutant concentration at the Hanover site due to the remedial activities, when added to background, is predicted to exceed the primary NAAQS (40 CFR 50) for total suspended particulates by 1 percent.

It should be noted that the significance of the predicted exceedances is not great for the following reasons:

1. The location of the highest total-suspended-particulate concentrations at the Hanover site would be at the property line; the concentrations would be significantly reduced farther from the property line.
2. The Hanover site area is sparsely populated; the nearest residence to the Hanover site is located approximately 0.65 kilometer from the property line.
3. The project duration would be relatively short (approximately 2 to 3 years).
4. Fugitive emissions from unpaved roadways would be the primary source of particulate emissions during extended dry periods.

All pollutant concentrations, including background, other than total suspended particulates, are predicted to be less than NAAQS (40 CFR 50) at all sites for all alternatives.

This evaluation did not include ozone because ozone modeling has not been developed for this type of project. It is not possible at this time to address ozone concentrations quantitatively. The effect of the remedial-action alternatives on ozone levels is not expected to be significant because the nitrogen oxide and hydrocarbon emissions are not great. Both nitrogen oxides and hydrocarbons for all remedial-action alternatives would be below the NAAQS (40 CFR 50), and the period of activity would be short; therefore, it is not likely that they would have a significant impact on air quality.

The air quality impacts from radioactively contaminated materials movement would be primarily related to total suspended particulates. Effects on transportation routes would not be significant because the high total suspended-particulate concentrations would only be associated with onsite construction and transportation activities. Fugitive-dust emissions are caused by reentrainment of dust deposited on roadways during hauling activities. Covering the trucks would prevent large amounts of dust from reaching the roadways, thereby minimizing the generation of fugitive dust.

Material movement during any of the remedial-action alternatives would have negligible offsite visibility impacts. Most of the particles generated by the activities would be very large and they would settle out quickly. The fugitive particles would be larger than the most effective light-scattering

diameter; therefore, while there would be a high concentration of particles in the immediate site-construction area, any effects on visibility should not extend off the site.

The duration of air-quality impacts (Table 5-10) experienced at each site would be equal to the period of construction and earth-moving.

Table 5-10. Duration of air quality impacts at each site for each alternative

Alternative	Site	Impact duration (months)
2	Canonsburg	23
	Burrell	21
3	Canonsburg	22
	Burrell	7
4	Canonsburg	25
	Burrell	21
	Hanover	30
5	Canonsburg	25
	Burrell	7
	Hanover	26

It should also be noted that the air emissions would not be constant during these periods. The concentrations of airborne materials would be reduced at the close of workdays and during those days when no work was in progress. Because the impacts on air quality would be caused by earth-moving and equipment operation, only the time intervals during which these activities would occur are considered the impact duration (i.e., the actual time frame for air emissions from the sites would be shorter than the entire project duration).

5.4 IMPACTS ON TOPOGRAPHY, SOILS, AND GEOLOGICAL STABILITY

5.4.1 Impacts on topography

The no-action alternative would not alter the topography at any of the three sites.

Alternative 2 would affect both the Burrell and Canonsburg sites. The removal of 80,000 cubic yards of radioactively contaminated materials from the Burrell site and its subsequent replacement with 16,000 cubic yards of fill would lower the overall elevation of the project area. Depending on the final grading plan, to be specified in the final design, the reduction in elevation could increase the extent and frequency of flooding at the Burrell site in areas below the maximum flood-pool elevation. However, the site would have been decontaminated and no radioactively contaminated material could mix with the flood waters to be carried off the Burrell site.

Alternative 2 activities at the Canonsburg site would raise the elevation of Areas A and B. To minimize elevation changes, Area C would be filled with the same amount of material that is excavated. The elevation of Area A would be raised 10 to 20 feet to a maximum of approximately 1006 feet above mean sea level, and the topography of Area B would be changed similarly. The low area along Ward Street between Areas A and B would be eliminated. The final grade would be a smooth slope from Area A and the encapsulation area that would fill Ward Street. Since those residences situated along Wilson Avenue will be demolished, the filling of Ward Street would be economical, and the resultant grade would minimize runoff.

Alternative 3 would have much the same impact as Alternative 2 at the Canonsburg site. At the Burrell site the major change from the present topography would be grading the cover material and smoothing out the present irregular surface.

Alternative 4 would affect all three sites. The impact of this alternative on the Burrell site would be the same as for Alternative 2. The radioactively contaminated materials removed from the Canonsburg site would be replaced by approximately the same amount of fill to pre-project elevations. The impact of Alternative 4 would be significant at the Hanover site. The southern half of the trench along the ridge top would be filled to slightly above the existing trench walls. The northern half of the trench would be untouched; the northern wall of the fill would slope toward the trench floor. Therefore, the northern half of the trench would become a semi-enclosed depression.

The impacts of Alternative 5 at the Canonsburg and Hanover sites would be the same as for Alternative 4. At the Burrell site the impacts would be the same as for Alternative 3.

5.4.2 Impacts on soils

In all of the alternatives but the no-action alternative, soils would be imported from local commercial sources and stockpiled for construction and stabilization. The stockpiles would be surrounded by collection trenches to eliminate soil loss. The amount of materials to be imported are given in Table 1-3. All of the in-situ soil at the Canonsburg and Burrell sites with

radium-226 concentrations of less than 100 picocuries per gram would remain on the sites under stabilization. Because of the presence of large amounts of fill material at all three sites, the soils are not considered productive. The materials needed for covers are readily available, except in the area of the Burrell site (Appendix A.6). The project would not affect the local availability or supplies of these cover materials.

5.4.3 Geological stability

As indicated in subsection 4.5.3.1, there has been extensive mining of the Pittsburgh coal seam that occurs in the general Canonsburg site area. The coal seam originally situated at the Canonsburg site was eroded away by the natural forces creating the Chartiers Creek valley. This has resulted in the Canonsburg site area being situated both topographically and stratigraphically lower than the surrounding coal-bearing areas. Because the Canonsburg site has not been mined and local mining activities have occurred at elevations higher than the Canonsburg site, mine subsidence, where it would occur, could not affect the Canonsburg site. The topographical and stratigraphical differences between the Canonsburg site and the surrounding area should continue to prevent any secondary recovery of Pittsburgh coal in the area from affecting the Canonsburg site.

The next lowest coal seam in the Canonsburg site area is the Freeport, which is about 900 feet below the surface. The risk of subsidence affecting the surface decreases markedly with depth; there is little or no surface hazard at depths greater than 500 feet. Therefore, the possibility of mining the Freeport coal in the Canonsburg site area should not present any subsidence risk to the Canonsburg site. The DOE would acquire the mineral rights under the disposal site.

Another concern over the Canonsburg site's geological stability pertained to the extensive amounts of landfilling that has occurred on the Canonsburg site. Well drilling and bore-hole logs were examined for the Canonsburg site area where the encapsulation cell would be located. These logs revealed a well-packed substrate that should not present any problems under the proposed vertical loading. (Lateral loading by flooding would be prevented by positioning the encapsulation area above the 100-year flood plain.)

The Canonsburg site soils are medium stiff to stiff clays and medium dense to dense sands and silty sands. The clays would settle due to placement of the encapsulation cell. However, as cell construction would be progressive, settlement would also be progressive (to a limit). The settlement should be virtually complete at the close of the encapsulation cell construction. Landslides would not occur because of the construction sequencing and flat slopes. The stability of the banks of Chartiers Creek would be ensured by the placement of rip-rap.

The Burrell site, like the Canonsburg site, contains a large amount of fill material. Unlike the Canonsburg site, the fill material at the Burrell

site is not well compacted. This condition has been taken into account in the design of the remedial action plan for the Burrell site, which would include very little vertical loading. Additionally, the Burrell site disposal area would not be situated in a flood-prone area.

The major geological stability issue for the Hanover site concerns the fact that past mining operations have created a high porosity substrate at the Hanover site. This should be of little concern, however, since the proposed encapsulation cell structure would completely enclose the radioactively contaminated materials within a low permeability cover and liner. This procedure would significantly reduce both the infiltration of precipitation, as well as the possibility of radioactively contaminated materials leaching into the Hanover site's environment.

5.5 IMPACTS ON MINERAL RESOURCES

The Pittsburgh coal seam does not occur at the Canonsburg site because it has been eroded away in past geologic time. It is also absent from the Burrell site, and it has been removed from the Hanover site by strip mining. No deeper layers at the Hanover site are thick enough to be mined economically with present mining methods. Thus, there would be no impact on coal resources at any of the three sites. Oil and gas could still be recovered by directional drilling if they are present at any of the sites. The DOE would acquire the mineral rights under the disposal site(s).

5.6 IMPACTS ON WATER

5.6.1 Impacts on surface water

The no-action alternative would have little effect on surface-water quantities or use of the surface-water systems associated with the Canonsburg, Burrell, or Hanover sites. Chartiers Creek will continue to receive sediment and ground-water discharges from the Canonsburg site. The discharge of ground water has had no detectable effect on surface-water quality to date (see subsection 5.6.2), and would not be expected to have a detectable effect in the future if the current rate and quality of discharge continues. The discharge of radioactively contaminated soil to the creek as sediment resulting from scouring in Area C would be expected during a 500-year flood event. In addition, continued surface erosion of Area C during lesser storm events would contribute radioactively contaminated sediment in runoff because of the elevated levels of radioactivity in the soil on and near the surface of Area C.

The Burrell site would continue to discharge ground water and sediment to the Conemaugh River. The quality of the soil and ground water at the Burrell site is mildly degraded; however, this discharge would have no detectable effect on the Conemaugh River because of the existing poor quality of the river water.

Under Alternative 2 waste waters generated by construction activities would be treated and discharged into Chartiers Creek and the Conemaugh River at the Canonsburg and Burrell sites, respectively. These wastes include process wastes, as well as precipitation collected in and around the work areas. Before discharge, these waste waters would be treated by temporary facilities located at the two sites. Both facilities would be operated under National Pollutant Discharge Elimination System (NPDES) permits, and the discharges would meet all applicable water-quality criteria (40 CFR 124). Further water-quality protection at both sites would be provided by the installation of erosion-control measures including dikes around work areas and along the length of Chartiers Creek at the Canonsburg site. Erosion during normal rains (nonflooding) is not a concern at the Burrell site because the extremely high permeability of the landfill material minimizes any runoff or erosion from the Burrell site.

The expanded Canonsburg site is partially contained within the 100- and 500-year flood plains of Chartiers Creek. During excavation and construction activities within these flood plains, in Area C in particular and in Area B to a lesser degree, some radioactively contaminated soil and fill could be discharged into the creek during flooding or heavy rains. In order to prevent such discharges from occurring, erosion control and flood protection would be provided during the earth-moving activities.

Remedial activities at the expanded Canonsburg site and the Burrell site would have no effect on surface-water quantities at either the expanded Canonsburg site or the Burrell site. The consumptive water use is expected to be less than 20 gallons per minute for any of the remedial actions at any site. This would not place a heavy demand on local water systems. Process water would not be taken from surface-water systems, but would be supplied from the local water system. Discharges at each site would be less than 1 cubic foot per second, which is insignificant in comparison to flows in either Chartiers Creek or the Conemaugh River.

Over the long term, Alternative 2 would have beneficial impacts on surface-water conditions at the expanded Canonsburg site. The current erosion from the expanded Canonsburg site and associated sediment and contaminant loading of Chartiers Creek would be reduced by stabilization of the expanded Canonsburg site and the improved site drainage. Installation of the encapsulation cell and final site grading would divert precipitation from the radioactively contaminated materials and would prevent the radioactively contaminated materials from getting into suspension. Alternative 2 would not cause any change in the water use of Chartiers Creek.

As described in Appendix A.1, the encapsulation cell at the expanded Canonsburg site would be located above the 100-year flood plain and would be

protected against erosion from changes in the creek alignment under Alternatives 2 and 3. Two mitigation measures to protect against active streambank erosion and possible changes in the creek bed would be proposed. First, the area of the abandoned street railway berm would be graded to a much lower level. This would eliminate the constriction of creek flows and reduction of water velocity during flood events. Secondly, a buried wall of rip-rap would be placed along the eastern side of the expanded Canonsburg site. Thus, if the creek bed should spread onto the expanded Canonsburg site, the rip-rap wall would provide a protective barrier against further encroachment.

There would be no changes in the overall site-drainage patterns at the Burrell site following Alternative 2. Precipitation falling onto the Burrell site would continue to percolate into the ground. Any runoff from the filled excavation area would infiltrate the surrounding landfill area. Removing the radioactively contaminated materials from the Burrell site would eliminate any indirect contaminant loading caused by leaching water through the remaining residues. Alternative 2 would not cause any changes in the water uses of the Conemaugh River.

Alternative 3 would have the same short- and long-term effects on the expanded Canonsburg site's surface waters as Alternative 2. The potential for short-term water-quality impacts at the Burrell site would be significantly less in Alternative 3 than in Alternative 2 because there would be no excavation or exposure of the radioactively contaminated materials. As a result, stabilization of the Burrell site would not require a waste-water treatment facility, nor would there be any process water discharge to the Conemaugh River. Standard erosion-control measures would be used to prevent the erosion of stockpiled construction materials during heavy rains.

Alternative 3 could result in an increase in runoff from the stabilized area at the Burrell site due to the cover. As at the expanded Canonsburg site, final site grading would be designed to divert runoff. The permeability of the remaining landfill materials would allow infiltration of this water. The stabilization of the small amount of radioactively-contaminated materials remaining on the Burrell site would have a beneficial impact on the Burrell site area's surface-water system because the cover would reduce the amount of water infiltrating the radioactively contaminated materials and leaching the contaminants. This alternative would have no effect on long-term surface-water usage at either the expanded Canonsburg site or the Burrell site.

Alternative 4 would have the same short-term surface-water impacts at the Canonsburg site as Alternatives 2 and 3, and would include the same protective measures. After this alternative is completed, the radioactively contaminated materials would be eliminated as a possible source of surface-water contamination. As in the other alternatives, the Canonsburg site would be graded to provide improved site drainage and flood protection.

Both the short- and the long-term surface-water impacts at the Burrell site would be the same as for Alternative 2.

Under Alternative 4, the potential for degrading surface-water quality at the Hanover site during construction activities would be offset by the same kind of protective provisions employed during stabilization at the Canonsburg site. An onsite waste-water treatment facility would be operated under an NPDES permit (40 CFR 124) during the project activities. Unlike the Canonsburg site, the Hanover site is not subject to flooding. Protection against erosion from storm-water runoff, including dikes around the work areas, would still be used. There would be no changes in surface-water quantities at the Hanover site during project activities. Water would not be supplied from surface-water systems, and the waste-water treatment facility would discharge less than 1 cubic foot per second.

The remedial actions at the Hanover site would have a long-term beneficial impact on the surface-water system. The final site grading would be a major improvement in site drainage, thereby reducing erosion and contaminant loading into the local watershed. The radioactively contaminated materials would be hydrologically isolated by the encapsulation cell and would not be subject to leaching. The semi-enclosed depression that would be created at the north end of the Hanover site would drain to an adjacent unnamed tributary to Harmon Creek outside the western side of the Hanover site.

Overall, this alternative would have no long-term effect on surface-water use at any of the three sites.

Short- and long-term surface-water impacts at the Canonsburg and Hanover sites under Alternative 5 would be the same as for Alternative 4, while at the Burrell site they would be the same as for Alternative 3.

Thus, in all of the remedial-action alternatives, little, if any, of the sites' radioactively contaminated materials would enter the surface-water systems because rain and flood water would be prevented from entering the radioactively contaminated materials.

5.6.2 Impacts on ground water

The types of ground-water impacts to be considered include changes in quantity and quality. None of the alternatives would affect ground-water use since there is no significant ground-water use in the areas around the three sites, and the three sites' ground-water systems are not tied into major regional aquifers.

Additional ground-water data at the expanded Canonsburg site have been obtained since publication of the Canonsburg DEIS (U.S. DOE, 1982a). These data were collected at both onsite wells on the expanded Canonsburg site and offsite wells both upstream and downstream of the expanded Canonsburg site. These studies provided a better characterization of the hydrological and geological conditions of the expanded Canonsburg site. A computer-modeling study of the groundwater regime at the expanded Canonsburg site has also been completed.

Under Alternative 1 the hydrogeological regimes at the Burrell and Canonsburg sites would remain unaltered. At the Burrell site, only two ground-water samples had appreciable radiation levels (Table F.1-5), one for radium-226 and one for gross alpha. Most of the ground water passing through the Burrell site exits the subsurface system as discharge into the onsite ponds and the Conemaugh River, where it is not detectable because of dilution.

Under Alternative 2, the removal of radioactively contaminated materials from the Burrell site would have a negligible impact on the Burrell site's ground-water quality. The intakes for the Blairsville Borough Water Company are located south of the Burrell site on top of a mountain. This water supply would not be impacted by any leaching occurring at the Burrell site. This is also true of the water supply of the Central Pennsylvania Water Company (High Ridge). The Lower Indiana County Water Authority is a distribution system, and does not operate a water-treatment plant. This Authority obtains finished water from the Central Pennsylvania Water Company (Chnupa, 1983). The Burrell site's radioactively contaminated materials would not act as an additional source of appreciable offsite radiological contamination at the Canonsburg site.

Although none of the alternatives would affect the contaminants presently in the ground water, stabilization of the expanded Canonsburg site would have a beneficial long-term effect on the ground-water quality. Encapsulation of the Canonsburg site's radioactively contaminated materials would largely eliminate this material as a source of potential long-term contamination by greatly retarding further movement of radioactively contaminated materials into the ground water. Regrading the expanded Canonsburg site, adding a low-permeability cover material, and placing the encapsulated area over Ward Street would have an effect on local ground-water-flow patterns. The present ground-water mound in Area A would be reduced since the ground-water mound is largely the result of direct infiltration of precipitation. The low-permeability cover over the whole Canonsburg site and the construction of the encapsulation cell in Areas A and B would reduce the infiltration of precipitation, and therefore, reduce the ground-water mound in Area A, the hydraulic gradients, and the amount of outflow. The effect of such local changes would not be detectable at the expanded Canonsburg site boundary, and would not have a negative effect within the expanded Canonsburg site. The bottom of the encapsulation cell at the expanded Canonsburg site would be located so that it is not resting in ground water. The final encapsulation cell placement at the expanded Canonsburg site would ensure that there is no direct contact between the encapsulated radioactively contaminated materials and the ground water.

For Alternatives 2 and 3, ground-water levels at the expanded Canonsburg site would decline due to reduced infiltration of precipitation. Post-encapsulation water elevations in the water-table system were simulated (Gilbert et al., 1983) using an infiltration rate of 1.5 inches per year through the encapsulation cell and a 50 percent reduction in infiltration over the rest of the expanded Canonsburg site. The calculated decline in water elevation ranges from 1 to 7 feet around the encapsulation cell.

During construction under Alternatives 2 through 5, the water table in Area C of the Canonsburg site would be temporarily lowered to dewater Area C for removal of the radioactively contaminated materials. Pumping would cease when the excavation is complete.

Equations from Gilbert et al. (1983) were used to predict the post-encapsulation transport of uranium from the encapsulated area of the expanded Canonsburg site into the water-table system under Alternatives 2 and 3. The simulation was conducted using both probable and worst-case conditions. Under the probable conditions it was calculated that uranium would not begin leaching from the encapsulated area for 46,000 years, and that the leaching would last for 150,000 years. The uranium concentration in the leachate would be 0.009 milligram per liter. The uranium concentration in the receiving ground water would be lower due to dilution. Under worst-case conditions, uranium would begin leaching after 1100 years and continue to leach for 3775 years. The concentration of uranium in the leachate would be 0.37 milligram per liter. Again, the concentrations in ground water would be lower due to dilution.

The post-encapsulation-uranium migration in the water-table system was calculated for the sources remaining outside the encapsulation area. The source in Area C (source 1) would be reduced by 90 percent due to the absence of the radioactively contaminated materials removed to the encapsulated cell. The source simulated at well 404 (source 4) would remain unchanged. The other two sources (sources 2 and 3) would be removed during the remedial-action program. The predicted concentrations from source 1 are 0.012 milligram per liter and 0.006 milligram per liter, 40 feet and 20 feet upgradient of Chartiers Creek, respectively. Concentrations predicted for source 4 are 0.006 milligram per liter and 0.003 milligram per liter, 40 and 20 feet upgradient of Chartiers Creek, respectively. These releases would occur under Alternatives 2 through 5.

The ground-water impacts under Alternative 3 would be similar to those for Alternative 2 for the expanded Canonsburg site and Alternative 1 for the Burrell site.

The ground-water impacts under Alternative 4 at the Burrell site would be similar to Alternative 2. At the expanded Canonsburg site the removal of the radioactively contaminated materials would have a long-term beneficial effect on water quality. Contamination of the ground water at the Hanover site should not occur because the radioactively contaminated materials disposed of at the Hanover site would be encapsulated.

The ground-water impacts under Alternative 5 would be similar to those under Alternative 4 for the expanded Canonsburg site and the Hanover site and Alternative 1 for the Burrell site.

Acid seeps are not anticipated to occur for the following reasons:

1. At the Canonsburg site, both surface and ground water are neutral to alkaline (Tables D.1-3 and D.2-2). Infiltration of precipitation would be reduced. Therefore, acid seeps are not expected.
2. At the Burrell site, both surface and ground water are acid to neutral (Tables D.1-8 and D.2-6). The acidity can be attributed to the water flowing into the Burrell site from upgradient areas. Infiltration of precipitation would be reduced. New acid seeps are not expected.
3. At the Hanover site, both surface and ground water are acid to neutral (Tables D.1-12, D.1-13, and D.2-7). The acidity can be attributed to the fact that the Hanover site is a reclaimed surface coal mine. Infiltration of precipitation would be reduced. Therefore, new acid seeps are not expected (and in any case, the radioactively contaminated material would be isolated from any acid ground water).

Thus, the remedial-action design would promote neutralization of any acid from pyritic materials by substantially increasing the partial pressure of carbon dioxide under the cover, and preventing fresh influxes of oxygen-carrying water.

The stabilization of radioactively contaminated materials at the expanded Canonsburg site or at the Hanover site would reduce the infiltration of precipitation and isolate the more radioactively contaminated materials from ground water. The part of the ground water that is fed from upgradient ground water would not be affected and would continue to flow laterally under the expanded Canonsburg site and the Hanover site. The net effect would be a lowered ground-water mound, smaller hydraulic gradients, and smaller shallow ground-water velocities.

Almost every water sample analyzed in the three site areas, whether surface or ground water, was high in sulfates. This is a property of the region, not something caused by the radioactively contaminated materials. Note, for instance, the similar sulfate concentrations upstream and downstream of the Canonsburg site in Chartiers Creek (Table D.1-4).

The measured pH values show both surface and ground water at the Canonsburg site to be neutral to alkaline (Tables D.1-3 and D.2-2). At the Burrell and Hanover sites the measured pH values are acid to neutral (Tables D.1-7, D.1-11, D.1-12, D.2-5, and D.2-6). At the Hanover site the acidity of the ground water can be attributed to the fact that the Hanover site is a reclaimed surface coal mine. However, should the Hanover site be used for disposal of radioactively contaminated materials, the radioactively contaminated materials would be isolated from ground water in two respects:

1. The radioactively contaminated materials would be above the water table, which is just above the undisturbed bedrock.

2. The radioactively contaminated materials would be encapsulated with impermeable material completely surrounding it.

In summary, acid seeps are not expected to result at any of the three sites as a result of radioactively contaminated materials handling or stabilization. In addition, at the Hanover site, where there is acid ground water independent of the radioactively contaminated materials, the radioactively contaminated materials would not be in contact with ground water.

The preferred alternative, with respect to ground-water quality and quantity, is Alternative 3 for the following reasons:

1. The major amount ($\pm$ 90 percent) of radioactively contaminated materials at the Canonsburg site would be removed and encapsulated above the ground-water table and would be protected from infiltration of precipitation.
2. Additional radioactively contaminated materials would not be disposed of at the Burrell site. It would be extremely difficult to ensure the integrity of an encapsulation cell at the Burrell site unless the fill were removed. At present the ground water at the Burrell site is only slightly contaminated.
3. Radioactively contaminated materials would not be disposed of at a currently nonradioactively contaminated site.

5.7 IMPACTS ON PLANTS AND ANIMALS

5.7.1 Impacts on terrestrial biota

Under the no-action alternative all of the Burrell and Hanover site areas, and the majority of the expanded Canonsburg site, would remain in open use. Since the succession of these three sites to wooded areas appears to have been arrested by their substrate conditions, these sites would probably remain as old field habitats.

Alternatives 2 through 5 would have the same short-term impacts on the terrestrial biota at all three sites. Both stabilization and decontamination would disrupt terrestrial habitat to the same degree because of the earth-moving activities. The major difference between these alternatives would be the length of time that the sites are disrupted and the number of sites involved. Over the short-term nearly all of the terrestrial vegetation and associated habitat would be disrupted at the project sites. The riparian vegetation along Chartiers Creek may be disturbed, depending on the extent of earth moving required on the expanded Canonsburg site.

All three sites are inhabited primarily by old-field animals (small mammals and some passerine birds). Individual animals could be lost either through road kills or competition when they try to relocate in other areas. The mortality of these individual animals would not threaten the continued survival of any species, since all of the three sites' inhabitants are common throughout the region. Larger animals that feed at the Burrell and Hanover sites would avoid these areas until the construction was completed.

Long-term impacts would not be different for any of the three sites following any of the alternatives. Stabilization at the expanded Canonsburg site, or at the Burrell or Hanover site would mean that the three sites would become perpetual old field habitats since tree growth would be prevented. Once the vegetation has been stabilized, small animals would move back into either of the three sites from the surrounding areas.

Decontamination of the Burrell and Canonsburg sites would also leave portions of these two sites in open space because of the Burrell site's land-use controls and because a portion of the Canonsburg site is within the flood plain of Chartiers Creek. These undeveloped areas could eventually become wooded habitats.

5.7.2 Impacts on aquatic biota

The potential short-term impacts (those occurring during project implementation) on aquatic biota at any of the three sites would be the same during all of the alternatives since each alternative would involve similar earth-moving activities. The only differences between the alternatives would be in the length of time over which the short-term impacts could arise, and the number of sites involved.

All of the alternatives except stabilization at the Burrell site would involve the discharge of process waste waters into nearby watercourses. These discharges would be treated by onsite facilities to meet NPDES requirements (40 CFR 124) before discharge. The average quantity of discharge would be less than 1 cubic foot per second, which would not alter natural flow conditions.

Unplanned releases of radioactively contaminated materials into any of the three surface-water systems could arise from flooding of disturbed areas at the Canonsburg or Burrell sites, or from large-scale runoff from any of the three sites during a high-intensity rainfall. To reduce the possibility of radioactively contaminated materials eroding from the three sites during these situations, flood- and erosion-control structures would be implemented to isolate disturbed areas from surface-water systems. The primary result of an unplanned discharge would be an increase in turbidity. Increases in turbidity are commonly experienced during high-water situations; however, disturbed sites contribute greater than normal quantities of material. Because the surface-water systems associated with the three sites are not closed systems (i.e., they are free-flowing), the suspended soil material would not remain in one place for a long time; it would settle in areas of lower water velocity.

The erosion of disturbed material from the three sites could also carry both radioactively and nonradioactively contaminated materials into the watercourses. The radioactively contaminated materials would remain temporarily suspended in the water column with some possible uptake by aquatic plants and animals. It would eventually settle in the stream beds over a wide area. The radioactively contaminated materials could become incorporated into the substrate, become resuspended and transported downstream, or be assimilated into organisms.

Alternatives 2 through 5 are designed for long-term isolation of the radioactively contaminated materials from surface-water systems. There would be no discharges of radioactively contaminated materials into any of the three sites' associated aquatic ecosystems. Particularly at the Canonsburg and Hanover sites, the remedial actions would increase soil-material stabilization and decrease erosion. The sediment and contaminant loadings from the Canonsburg and Burrell sites would be reduced from the present levels.

5.7.3 Impacts on endangered species

As discussed in subsection 4.7.4, there are no known endangered or threatened species or critical habitats located near any of the three sites (Appendix E.3).

5.8 IMPACTS ON LAND USE

The long-term direct impacts of Alternatives 2 through 5 on the existing and future uses of the three sites are summarized in Table 5-11. The major change in land use at the expanded Canonsburg site under Alternatives 2 and 3 would be the conversion of the 18.5-acre Canonsburg site to controlled (limited use or unusable) open space owned by the Federal government. Alternatives 2 and 3 would also eliminate the residential use of the six houses on Wilson Avenue and one house on George Street and the use of the former Georges Pottery property since these properties would be included in the expanded Canonsburg site because of their proximity to the Canonsburg site. Under Alternatives 4 and 5, depending on the degree of decontamination implemented, the Canonsburg site would either be converted to controlled open space or would be made available for use in accordance with the Borough's land-use controls. Alternative 1 would leave the Canonsburg site in its present condition with its future use questionable because the property has been condemned by the Commonwealth and businesses will be vacated by October 1983. The economic impacts of moving the Canonsburg site's businesses under all alternatives would be minimal because they are entitled to relocation assistance.

Table 5-11. Long-term land-use changes associated with the alternatives

Location	Changes in land use	
	From (existing use)	To (use after remedial action)
<u>Canonsburg site</u> (30 acres)		
Alternative 1	Industrial ^a	Industrial
Alternative 2	Industrial ^a	Unusable or limited-use open space
Alternative 3	Industrial ^a	Unusable or limited-use open space
Alternative 4	Industrial ^a	Usable open space ^b
Alternative 5	Industrial ^a	Usable open space ^b
<u>Burrell site</u> (49 acres) ^c		
Alternative 1	Unusable open space ^b	Limited-use open space
Alternative 2	Unusable open space ^b	Usable open space ^b
Alternative 3	Unusable open space ^b	Unusable or limited-use open space
Alternative 4	Unusable open space ^b	Usable open space ^b
Alternative 5	Unusable open space ^b	Unusable or limited-use open space
<u>Hanover site</u> (50 acres)		
Alternative 1	Strip mine (industrial)	Strip mine (industrial)
Alternative 2	Strip mine (industrial)	Strip mine (industrial)
Alternative 3	Strip mine (industrial)	Strip mine (industrial)
Alternative 4	Strip mine (industrial)	Unusable or limited-use open space
Alternative 5	Strip mine (industrial)	Unusable or limited-use open space

^aThe industrial use is being phased out.

^bUnder Alternatives 4 and 5 for the Canonsburg site, and Alternatives 2 and 4 for the Burrell site, after the decontamination process is completed, the Canonsburg and Burrell sites would be released for any use allowed by the local planning and zoning regulations.

^cThe use of the Burrell site is affected by a combination of factors: a portion of the Burrell site is subject to a perpetual easement from the U.S. Army Corps of Engineers because the Burrell site is situated in the full flood pool of the Conemaugh River Dam. This fact and the Burrell site's inaccessibility limit its possible use and development.

The Burrell site is currently a 49-acre limited-use open space, and would remain that way under Alternative 1. Under Alternatives 3 and 5 it would be unusable or limited-use open space owned by the Federal government. Under Alternatives 2 and 4, after the decontamination process is completed, the Burrell site would be usable as open space or for any other use permitted within the multiple-use flood-control district of Indiana County.

The Hanover site would be affected only by Alternatives 4 and 5, in which radioactively contaminated materials from the Canonsburg and Burrell sites would be brought to and stabilized at the Hanover site. The site is part of a large stretch of strip-mine area south of U.S. Route 22. Under Alternatives 4 and 5, this 50-acre portion of the worked-out strip mine would be separated and controlled as unusable or limited-use open space owned by the Federal government.

All of the remedial actions except Alternative 1 would have direct short-term impacts on land uses in the immediate vicinity of the expanded Canonsburg site. The families on Wilson Avenue and George Street would be relocated during all of the remedial activities. Under Alternatives 2 and 3 these families would be relocated permanently. Other local residents would experience the effects of earth-moving operations, such as increased noise and activity. Users of local streets by the public would be inconvenienced by the temporary closing of Strabane Avenue during all of the alternatives, and Wilson Avenue, George Street, and Ward Street during Alternatives 4 and 5. Ward Street, Wilson Avenue, and George Street would be closed permanently under Alternatives 2 and 3. The temporary closing of Strabane Avenue would necessitate rerouting school buses for the Canon-McMillan School District, thus increasing travel times. Although this closure would not eliminate the accessibility of any area residence or business, it would make travel between Canonsburg and the Village of Strabane more difficult.

The Burrell site is separated from the closest developed land use (residential) by more than 500 feet. Any remedial action at the Burrell site would only have a minor impact on the surrounding land uses. The short-term adverse impact on land uses from Alternatives 2 through 5 would be limited to the inconvenience created by heavy equipment and trucks moving along local streets.

Alternatives 4 and 5 would only have a minor impact on the surrounding land uses at the Hanover site. The few homes along the probable access road (LR 62017) to the site would be inconvenienced by the movement of heavy equipment and trucks for the duration of the project.

Once the remedial work under Alternative 4 or 5 was complete, the Canonsburg site could be developed for use in accordance with the Borough's zoning ordinance and future land-use plans. Under Alternative 1, no action, the Canonsburg site would remain in its present condition with its future use questionable. Alternatives 2 and 3 would dictate that the expanded Canonsburg site would have to remain as a controlled open space, which would not be in conformance with the Canonsburg Borough's current land-use plans and controls for the expanded Canonsburg site area.

The future uses of the Burrell site under Alternatives 2 and 4 would have to conform to the Comprehensive Plan of Indiana County. Under Alternative 1, the Burrell site would remain as limited-use open space, mainly because of its physical instability (from the previous landfill operations) and its poor accessibility. Alternatives 3 and 5 would also leave the Burrell site as unusable or limited-use open space because of the restrictions imposed by the presence of the stabilized radioactively contaminated materials.

Alternatives 4 and 5 would be the only alternatives affecting the Hanover site. As a disposal location, the Hanover site would remain unusable or limited-use open space, which would not be in accordance with the Hanover site's current rural-residential zoning designation.

5.9 IMPACTS ON NOISE LEVELS

The performance of any of the remedial-action alternatives would result in noise from the construction equipment and from the trucks transporting excavated radioactively contaminated and fill materials. All of the alternatives would require roughly the same types of equipment.

The sound levels at 50 feet for the equipment types that would be used for the remedial action range from 65 to 116 dBA (Table 5-12). The operation of several pieces of equipment at one time could increase these noise levels.

The Canonsburg site would be very sensitive to increased noise levels. Offsite residences are within 250 feet of the expanded Canonsburg site, and truck traffic into and out of the Canonsburg site would have to pass through populated residential areas. It has been estimated (Appendix H) that nearby residences could experience occasional noise levels of 60 to 84 dBA indoors. This is in excess of acceptable levels in residences. The Burrell and Hanover sites would be less sensitive since both are located in less densely developed areas with the closest residences at least 500 and 2000 feet from the Burrell or Hanover site, respectively. Also, the associated truck traffic would not pass through an area as heavily developed as that area near the Canonsburg site.

Alternative 3 would generate the minimum noise impacts. At the Burrell site the stabilization alternative would involve short-term activities with minimal equipment use. In-situ stabilization of the Canonsburg site's radioactively contaminated materials would have only minimum impacts since this alternative would require the least amount of truck traffic to and from the Canonsburg site.

Equipment noise levels would be controlled by the use of mufflers and by scheduling activities for daytime work hours only. Through the use of these control measures, the increased noise levels, particularly in the vicinity of the Canonsburg site, should be less of a problem, and public annoyance should

Table 5-12. Noise levels of typical construction equipment

Equipment	Noise level (dBA) at 50 feet
Pneumatic tools	86
Trucks	91
Pile drivers	101
Bulldozers	80
Cranes with wrecking balls-	
derrick	88
mobile	83
Mobile cranes without wrecking balls	83
Power saws	78
Wood chipping equipment	88
Scrapers	88
Wagon drills	98
Jackhammers	88
Graders	85
Rollers	74
Compactors	116
Power shovels	82
Backhoes	85
Gradalls	85
Concrete mixers	
mixer	85
pump	82
vibrator	76
Paving machine	89
Trench diggers	89
Post hole digger	79
Post driver	79
Snow plow and sander	79
Sandblasting	81
Air compressors	81
Small airplane	90
Mowers	65

Source: U.S. Environmental Protection Agency, 1971a, b.

be minimal. Also, since the project activities would occur only during daylight work hours, there would be no impact on the community noise levels during nights.

The local municipalities in the vicinity of the Canonsburg site do not have ordinances on noise levels; however, sections of their zoning ordinances include noise as one of the considerations in land development. For example, the Zoning Ordinance for Chartiers Township, Section 805.1, contains performance standards for commercial districts where sound pressure in excess of 60 decibels is considered as noise and this level is not to be exceeded for a sustained time. This level could be exceeded for short periods during the remedial action, but not in a manner that would be different from other construction sites. There are no ordinances on noise levels for either Burrell or Hanover Township.

5.10 IMPACTS ON SCENIC, HISTORICAL, AND CULTURAL RESOURCES

The Division of Planning and Protection, Bureau for Historic Preservation of the Pennsylvania Historical and Museum Commission has reviewed the project proposed for the Canonsburg, Burrell, and Hanover sites in accordance with Section 106 of the National Historic Preservation Act of 1966, Executive Order 11593, and the regulations of the Advisory Council on Historic Preservation (36 CFR 800) (Appendix G). The Bureau has concluded that "there are no eligible or listed historic or archeological properties in the area(s) of this proposed project and therefore, this project should have no effect upon such resources" (Ramsey, 1982).

5.11 IMPACTS ON POPULATION AND WORK FORCE

The remedial-action alternatives would have no major impact on existing or projected populations in the vicinity of the three sites. The only appreciable effect on population would be the temporary relocation of the families occupying the six houses on Wilson Avenue and the one house on George Street at the Canonsburg site during Alternatives 4 and 5, and the permanent relocation of these families under Alternatives 2 and 3.

The peak employment at each site during any of the alternatives would not exceed 55 workers at one time, as shown in Table 5-13.

Table 5-13. Peak staffing requirements (number of persons) at each site for each alternative

Alternative	Canonsburg	Burrell	Hanover
1	0	0	0
2	55	35	0
3	50	30	0
4	50	35	50
5	50	30	50

Although several of the alternatives could require 26 to 30 months for completion, only the supervisory and administrative staff and environmental engineering and safety personnel would be expected to be on the site for this length of time. The requirements for other staff members would be shorter, ranging from two months to one year.

It is expected that all of the professional and skilled labor needs would be provided by specialized contractors from outside the site areas. The DOE's Remedial Action Contractor (RAC) would be responsible for the overall project coordination. Under his contract, the RAC would use either competitively bid, fixed-price construction contracts; or his own work force to accomplish the stabilization or decontamination work. It is expected that the first option would be used. The subcontractors could come from the Pittsburgh area, but the use of firms from other areas would be possible. At present, levels of unemployment in western Pennsylvania are high. Based on the low staffing requirements for each alternative, and the need for specialized contractors, the remedial-action work would have only a minimal, but beneficial, impact on the local work force. An effort would be made to hire local workers. In the event additional skills would be required, these services could probably be obtained from local labor markets, including mining, the construction trades, and related fields. Because of the short-term nature of the remedial-action alternatives (about 2 years), this could be considered only a temporary benefit.

Based on the estimated work-force requirements, the remedial-action alternatives would not have a significant impact on the local population in terms of people moving into the area or of the subsequent need for additional housing, school capacity, and utilities.

5.12 IMPACTS ON HOUSING, SOCIAL STRUCTURE, AND COMMUNITY SERVICES

Housing, social-structure, and community-service impacts could result directly from long-term (greater than one year) immigration of an outside work force, as well as from the indirect expansion of supporting services. Long-term involvement would be required of supervisory and administrative personnel, and environmental control and waste-water treatment specialists. Workers who would be employed at the sites for less than 1 year and live outside commuting distance, would require short-term housing accommodations. These requirements would be met by the rental of apartments and trailers. Outside workers brought to the sites for periods greater than 1 year would exert long-term housing requirements, which would probably be provided through leasing arrangements.

The peak housing accommodations for long- and short-term employees associated with the alternatives are presented in Table 5-14. These accommodations are based on the worst-case scenario with employees brought to the site areas by contracting firms. In the Canonsburg site vicinity, the implementation of Alternative 2 would require the maximum housing requirements. Under this alternative, 7 long-term and 48 short-term accommodations could be required. In the Burrell site vicinity, 5 long-term and 30 short-term housing accommodations would be needed under Alternatives 2 and 4. In the Hanover site vicinity, Alternatives 4 and 5 would require the same long-term (31), and short-term (19) accommodations.

Table 5-14. Peak housing requirements at each site for each alternative

Alternative	Number of housing units required					
	Canonsburg		Burrell		Hanover	
	Long term	Short term	Long term	Short term	Long term	Short term
1	0	0	0	0	0	0
2	7	48	5	30	0	0
3	7	43	0	30	0	0
4	6	44	5	30	31	19
5	6	44	0	30	31	19

Over 10,500 housing units were reported in the Canonsburg Borough area in 1980. With an estimated 2 percent vacancy, sufficient housing (210 units) would be available in the current housing stock. These units would provide the accommodations for the peak housing needs of Alternative 2. In 1980 the housing stock in the Burrell Township area was estimated at over 8700 units, with an estimated 6.3 percent vacancy (550 units). This vacancy level would

adequately accommodate the peak needs in Alternatives 2 and 4. There were over 4200 housing units in the Hanover Township area in 1980. Based on the estimated 2 percent vacancy in the area, 85 units would be available to provide accommodations for the peak long- and short-term workers needed in Alternatives 4 and 5.

In the vicinity of the Burrell site there are no ethnic or social groups that dominate the cultural and social aspects of the general area. Since the Burrell site is not close to the area's major residential sections, there would be no direct impact on the community structure resulting from the project activities.

There are no identifiable cultural or ethnic groups living within a 1-mile radius of the Hanover site. Therefore, no impact on the social structure of the area would result by implementing either Alternative 4 or 5.

The only noticeable impact of the alternatives (except Alternative 1) on community services in the Canonsburg site vicinity would be traffic-related impacts on the SNPJ Hall and Bowling Alley on Latimer Avenue because of the movement of heavy equipment and trucks along local streets. This community facility caters to the cultural and recreational needs of the major ethnic group in the Village of Strabane, the Slovenian community. The Alexander Cooperative Store on Latimer Avenue would be directly affected by the activities at the Canonsburg site, especially by closing Strabane Avenue during the remedial action. The Alexander Cooperative Store is owned and operated by the local community, and serves a large number of the households in Strabane as well as in the Boroughs of Canonsburg and Houston.

There are no community facilities located near the Burrell or Hanover sites that would be disturbed by the proposed alternatives. However, the truck traffic generated by the remedial action on the probable access routes could impact such facilities. The few homes on these routes would be affected by noise, dust, and congestion.

5.13 IMPACTS ON ECONOMIC STRUCTURE

The money inflow into the project areas would be primarily from salaries, work-force-related living expenditures, and for purchases of materials and supplies. Since the majority of the firms that would be involved in the remedial action would not be located in the immediate project areas and would be expected to already possess the required equipment, only a small amount of money from operational expenses would filter into the three areas. The overall flow of money from the project would vary with each remedial action, because of the staffing levels and the project duration involved.

Estimates of the maximum total project-related wages and salaries for each alternative (Table 5-15) are based on the 1981 wages in the construction industry and the oil- and coal-products sectors of the Pittsburgh SMSA (between \$1,600 and \$2,300 per month). The maximum infusion of income, based on a monthly salary of \$2,300, would be approximately \$2.2 million for Alternative 4.

Table 5-15. Estimated 1981 average annual wages and salaries paid in each alternative

Alternative	Canonsburg	Burrell	Hanover	Total
1	\$ 0	\$ 0	\$ 0	\$ 0
2	\$750,000	\$490,000	\$ 0	\$1,240,000
3	\$778,000	\$246,000	\$ 0	\$1,024,000
4	\$783,000	\$490,000	\$894,000	\$2,167,000
5	\$783,000	\$246,000	\$809,000	\$1,838,000

Source: Washington County Board of County Commissioners (1980) for data on wages and salaries. These data were applied to the scheduling and staffing estimates for the various alternatives.

It is assumed that all project workers would be living in Washington and Indiana Counties during their employment. If these income totals are compared with the annual economic activity for Washington and Indiana Counties, the differences are insignificant. (For example, the average payrolls for deep- and strip-mining alone were over \$80 million for 1976.) The actual inflow of the project-related wages and salaries into the economy of Washington and Indiana Counties would be lessened by those employees who maintain permanent residences outside Washington and Indiana Counties.

The indirect impacts of the wages and salaries generated by the project would be an increase in local business transactions of various types, such as for motor fuel, vehicle services, and restaurant, laundry, and other services. Since the period of employment for these individuals is estimated at only 2 years, it is unlikely that the imported workers would be making appreciable investments or durable-goods purchases. Since the project-related personal income levels would be insignificant in comparison with the total income levels in the three sites' region, the indirect impacts of this income on local economies would be minimal. In general, each of the remedial-action alternatives (Alternatives 2 through 5) would have a slightly beneficial short-term indirect impact on local economies. Also, Alternatives 4 and 5 would open the Canonsburg site for development, which could be considered a long-term beneficial impact.

Material purchases and supplies are the other major sources of project funds that would be put into the local economy (Table 5-16). At a maximum, the material purchases would be at \$1 to \$1.2 million (Alternatives 4 and 5). Although these material purchases could have a significant impact on individual firms, their impact on the local economy would be minimal.

Table 5-16. Estimated material purchases^a (fill, crushed stone, clay, and topsoil) -- 1982 dollars

Alternative	Canonsburg	Burrell	Hanover	Total
1	\$ 0	\$ 0	\$ 0	
2	\$508,000	\$ 32,000	\$ 0	\$ 540,000
3	\$508,000	\$138,000	\$ 0	\$ 646,000
4	\$508,000	\$ 32,000	\$556,000	\$1,096,000
5	\$508,000	\$138,000	\$556,000	\$1,202,000

^aWeston engineering estimates. Estimates of supplies (i.e., concrete, steel, etc.) are not available for costing under each alternative.

5.13.1 Government structure

In 1978 the Borough of Canonsburg collected a total of \$729,923 in taxes from real estate (\$469,873) and Act 511 (\$260,050) sources. All of the alternatives except Alternative 1 would reduce the amount of property taxes collected by closing the Canon Industrial Park (Alternatives 2 through 5), the seven residences (Alternatives 2 and 3), and the former Georges Pottery property (Alternatives 2 and 3).

The taxes lost would be dependent on the assessed value of the properties at the time of closure. In 1981 the assessed value of the industrial park was \$55,698, and \$2,300 in taxes was collected by the Borough. Seventeen nearby properties were assessed at an average value of \$2,839, for a total assessed value of \$48,263. Under Alternatives 2 and 3, it is assumed that the seven residences will be removed as Borough tax sources, without relocation within the Borough. At a tax rate of 41.25 mills, these properties contributed a total of approximately \$820 in taxes in 1981. This would result in a combined tax loss of \$2,300 per year for Alternatives 4 and 5 and \$3,120 per year for Alternatives 2 and 3. Taxes under Act 511 that would be affected at the local, county, and state level include the following:

1. School-district tax of 99 mills (\$99.00 per \$1,000 assessed valuation).
2. County tax of 25 mills.

temperature	4.3.2
transportation	
accidents	5.2.2, 5.16
of radioactively contaminated material	1.5, 3.1, 3.2.1, 5.14, Appendix I
of fill material	1.5, 3.1, 3.2.1
networks	4.12.8, 5.14
trucks; see transportation	
Uranium Mill Tailings Radiation Control Act (UMTRCA)	Chapters 1 and 2, 2.2, 2.3
uranium	1.4, 4.2, 4.6.2, 4.8
standards	2.2
vegetation; see plants	
vicinity properties	1.3, 2.1, 3.1, 6.2.4.1
Vitro Manufacturing Company	1.1, 2.1, 4.1
weather patterns	1.4, 4.3.1
see also meteorology	
wildlife, terrestrial	4.7.2, 5.7.1, E.1
winds	4.3.4, B.1
work force	4.12.4, 5.11, G.4

3. Earned-income tax (0.5 percent each for the borough and school district) from project-related incomes.
4. Revenues from the privilege tax of \$5.00 each to the Borough and school district.
5. Canonsburg mercantile tax of 1 percent.
6. Pennsylvania state income tax of 2.2 percent.
7. Pennsylvania state sales tax of 6 percent.

The project impacts on these taxes would be minor. The possible increases in income- and sales-related taxes would probably be offset by the decline in taxes from the loss of employment associated with the Canon Industrial Park (the 1978 level of employment was about 200 employees; the April 1983 level is about 30). The Canonsburg Borough's involvement in traffic management during the remedial action could also have an impact on its finances. However, following Alternative 4 or 5, the possible development of the Canonsburg site could generate revenue for the Canonsburg Borough in terms of wages, sales, or property taxes.

In 1978 Burrell Township collected a total of \$108,238 in local taxes. Real-estate taxes accounted for over \$21,000, and the remaining \$87,238 was obtained under Act 511. Alternative remedial actions would have little or no impact on property taxes because of the location of the Burrell site.

Based on the estimated average annual wages and salaries for the Burrell site area, which, at a maximum, would be \$500,000, the associated income and other taxes at the local, county, and state levels would also be expected to be minimal.

The total taxes collected in Hanover Township in 1979 were \$113,115. Real-estate taxes accounted for \$25,686, and Act 511 taxes were the remaining \$87,429. Based on the current idle use of the Hanover site, the loss in property taxes, if any, would be minor.

Based on the potential average annual wages and salaries (as much as \$800,000) that could be produced by project personnel, Act 511 taxes in the Hanover Township area could be improved. Earned-income taxes would increase. The revenue from the tax imposed on mechanical devices by Hanover Township could also increase. The total change in the tax structure in Hanover Township would be insignificant, however.

5.13.2 Costs

The net costs for the several alternatives have been estimated (Table 5-17). These costs include excavation of the radioactively contaminated

Table 5-17. Order-of-magnitude costs of the remedial-action alternatives

<u>Alternative</u>	<u>Net cost^a</u>
Alternative 1	0
Alternative 2	\$21.7 million
Alternative 3	\$13.4 million
Alternative 4	\$39.0 million
Alternative 5	\$31.5 million

^aCosts in millions of 1982 dollars.

materials, transporting the radioactively contaminated materials to a final disposal site, preparation of that site, cover and closure of that site, reclamation of that site, and reclamation of the decontaminated site, including the importation of clean fill. These costs also include the costs of monitoring, radiation management, engineering and construction management, legal and administrative activities, and acquiring the needed land. They do not include the cost of cleaning up the Canonsburg vicinity properties other than the Burrell site. The individual cost estimates upon which this summary is based are presented in Appendix A.4.

Cost estimates were prepared on a feasibility level of engineering assumptions of quantities, distances, and characteristics. These costs have an internal contingency of 15 percent on quantities, and an external contingency of 15 percent on the total construction cost. The unit costs used in these estimates are given in Appendix A.4. Since a conceptual design study has not been performed, an additional "uncertainty factor" of plus or minus 25 to 30 percent should be applied to the net costs, as shown in Table 5-17.

The cost of transporting clean fill would be directly affected by its availability and proximity to the sites. As indicated in Appendix A.6, there are several existing clean fill sites within the Canonsburg area. Several contractors have also indicated that clean fill would be available when it is needed (i.e., give someone the contract and they would obtain the fill).

5.14 IMPACTS ON TRANSPORTATION NETWORKS

A study has been conducted to compare rail versus truck hauling of the radioactively contaminated and clean fill materials (Appendix I). The results indicate that trucks are the preferred method from the economic and engineering standpoints. The DOE has determined that rail haul is not feasible.

Except for the no-action alternative, all of the proposed project alternatives would have direct adverse impacts on the transportation networks in the vicinity of the Canonsburg and Burrell sites. The major impacts would come from the movement of heavy equipment and vehicles associated with stabilizing the radioactively contaminated materials at each of the sites, transporting the radioactively contaminated materials from one site to another site, and importing new fill material. The approximate total truck trips required for each alternative for each site are given in Table 5-18. A major impact under all alternatives would be caused by the importation of large amounts of clean fill or cover material. The quantity of fill material required at the three sites is given in Table 1-3 and in Chapter 3, with the descriptions of the alternatives. The effort to locate active borrow pits (Appendix A.6) identified several pits near the Canonsburg site, but none near the Burrell site. Adequate fill material would probably be available locally.

Table 5-18. Approximate total truck (20-ton capacity) trips required at each site for transporting fill and radioactively contaminated materials

Site	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Canonsburg	16,500	12,500	25,000	25,000
Burrell	4,800	3,500	4,800	3,500
Hanover	0	0	26,500	21,000

The roadways leading to the three sites and the regional routes connecting the sites have been evaluated in terms of their physical and structural settings, current speed limits, use limitations, and capacity to handle project-related truck trips. The results of this study are given in Appendix I.

At the Canonsburg site the existing traffic patterns would be affected by the closing of Strabane Avenue under Alternatives 2 through 5 during the construction period. The closing of Strabane Avenue under any of the alternatives would have little or no impact on the economic activities in the immediate vicinity of the Canonsburg site. The impacts on the local residents from the truck traffic generated by these alternatives would be from nuisance, noise, dust, and travel safety. Ward Street, Wilson Avenue, and George Street would be permanently closed under Alternatives 2 and 3, and temporarily closed under Alternatives 4 and 5. Most of the local streets that are currently congested because of their narrow width, would experience more congestion from the projected increase in truck traffic under Alternatives 2 through 5. In addition to disrupting the cross-traffic between Canonsburg and the Village of

Strabane, the closing of Strabane Avenue would require traffic to be detoured to the Jefferson or Central Avenue crossings of Chartiers Creek, about 3/4-mile downstream from Strabane Avenue, or to the Main Street crossing about 4/5-mile upstream (Figure 1-3).

The route via Strabane Avenue and West Pike Street, PA 519 to I-79, would be capable of supporting the projected truck traffic of approximately 12,500 total truck trips during Alternative 3 spread over 50 weeks, with minor improvements along the route for safe turning of trucks. On completion of the project, portions of the route could require resurfacing. However, since this route does not involve any municipal roads, the costs associated with the resurfacing work would not affect local municipalities fiscally.

Other alternative routes considered to avoid the truck traffic along West Pike Street are as follows (see Figure 1-3):

1. Via Strabane Avenue south to Latimer Avenue and west to PA 519.
2. Strabane Avenue, south to Boone Avenue, and then west to PA 519.
3. An access road that could be constructed south of and adjacent to the ConRail line from Strabane Avenue to PA 519.

Except for the third route, where the construction of a new approach road would be involved, these routes would have lesser impacts on community services and the local traffic than the route along West Pike Street.

The feasibility studies (U.S. DOE, 1982b, c) upon which the costs given were based considered the possibility of modifications to the implementation plans that would lower the expected costs. Since these modifications can be evaluated only during further stages of the work, the base case for costs should remain, at this time, the in-situ stabilization alternatives as described for the Canonsburg and Burrell sites.

Access to the Burrell site from nearby Strangford Road (LR 32006; see Figure 1-4) could be provided by the following:

1. Construction of a 1350-foot two-lane gravel and dirt road from the site proper to the ConRail right-of-way.
2. Rehabilitation of a two-lane private gravel grade crossing over the ConRail three-track mainline.
3. Rehabilitation of a two-lane 2800-foot cinder road adjacent to the ConRail tracks to a point of intersection with Strangford Road.

Strangford Road is currently inadequate to handle the volume of truck trips that would be generated by the project, at a rate of 4.6 trucks in each direction per hour for an 8-hour day, 5-days per week for 24 weeks, under Alternatives 2 and 4. Also, Strangford Road with its 12- to 15-foot wide asphalt paving, inadequate shoulders, and horizontal curves would not be suited for moving heavy equipment and vehicles.

The impacts of the project under Alternatives 4 and 5 on the transportation network in the vicinity of the Hanover site would be mainly from the congestion on the access route, LR 62017 (Figure 1-8). The use of LR 62122 that parallels the ConRail mainline and Harmon Creek westward from PA 18 would have minimum impact, except while passing through Burgettstown. The direct impacts on the few residences along this route would be from congestion, inconvenience, noise, and dust.

Alternatives 2, 4, and 5 would also require transporting the radioactively contaminated materials through regional arterial routes.

Under Alternative 2, the radioactively contaminated materials from the Burrell site would be transported to the Canonsburg site for stabilization at the Canonsburg site. The possible routes are as follows:

1. U.S. 22/119, U.S. 22 via Pittsburgh to I-376/U.S. 22, I-279/U.S. 22, and south on I-79 to Canonsburg.
2. U.S. 22/119, U.S. 119 via Greensburg, I-70 to Washington, and north on I-79 to Canonsburg.

In addition to the impacts on local residents in the vicinities of the Burrell and Canonsburg sites, the truck traffic along either alternative route would pass through very high density population centers, such as Pittsburgh, Greensburg and Washington. Using alternative route 1, trucks would have to pass through two tunnels, thereby creating a potentially hazardous situation if the trucks were involved in an accident.

The residents along the routes for the alternatives could be subjected to health hazards if a loaded truck overturned and spilled its contents. Alternative route 2 would also encounter a number of communities along its 77.5-mile stretch through hilly and winding sections of the arterial routes. The traffic is very heavy (49,200 average daily traffic count in 1980) near the I-79 interchange of I-70, and the truck activity during the project would create some additional congestion at this interchange.

For Alternative 4, the trucks originating at the Burrell site would follow alternative route 1 to I-79, and would then continue on U.S. 22 to Florence. The trucks originating at the Canonsburg site would use either I-79 north to U.S. 22 west to Florence, or a very congested route via PA 519, PA 50, PA 18 passing through Houston, Westland, Hickory, and Atlasburg, or via I-79 south, I-70 west to PA 18 north through builtup areas like downtown Washington, Pennsylvania (Figure 1-1). Transporting the radioactively contaminated materials to the Hanover site by truck would interfere with regional and community traffic patterns, and would create congestion and potential hazards to other road users and the residents of communities along the routes.

The impacts of Alternative 5, which would require transporting the Canonsburg site's radioactively contaminated materials to the Hanover site, would be the same as those under Alternative 4; i.e., creating additional traffic on I-79, U.S. 22, and other state and local routes.

Alternatives 2, 4, and 5 would require trucking the radioactively contaminated materials between sites, and thus would impact the regional and local traffic by the additional truck trips, and could create health hazards from overturned trucks and resulting spillage. Fiscal impacts on local municipalities along the regional routes would only be minimal; the restoration of road surfaces after the completion of the project would not be the responsibility of these municipalities since the transportation routes would not include any municipal roads. However, additional road-crossing guards could be required in communities along these routes where the route is near a school.

Alternative 3 would have the least adverse impact on the communities and the local and regional traffic network from the truck transportation perspective.

As addressed in Appendix I, from transportation, engineering, and cost standpoints, the use of trucks is the preferred mode of transportation when compared with railroad use. Adequate truck fleets would be available in the region to handle the quantities of radioactively contaminated materials involved, and the regional road network could connect the three sites with only a minimum capital investment. Conversely, to use the rail system, elaborate additions, and rehabilitation of existing railways would be needed, requiring additional costs and time.

Federal, state, and local ordinances covering the use of roads and the load limits of vehicles traveling on them would be adhered to in routing the traffic at each site during the remedial action.

5.15 USE OF ENERGY AND OTHER RESOURCES

Each of the remedial-action alternatives would require the use of electricity, fuel, water, manpower, and construction materials such as soil and concrete (Table 5-19).

Electricity would be required for personnel services, site lighting, and operation of the waste-water treatment facility. Fuel would be required for the earth-moving equipment and the construction machinery. Construction materials such as concrete would be needed on a long-term basis for constructing the waste-water treatment facility, the truck-washing stations, and the encapsulation basins for sludge from the waste-water treatment facility.

Each of these resources, as well as soil, water, and manpower, are readily available in the areas around the three sites.

Table 5-19. Energy and other resource requirements^a

Alternative/ site	Elec- tricity (kWh)	Engine fuel ^b (gal)	Concrete (cu yds)	Manpower (avg. man- weeks)	Soil and con- struction materials (cubic yards)	Water (gallons)
<u>Alternative 2</u>						
Canonsburg	222,000	232,000	5,000	2,688	250,000	2,120,000
Burrell	140,000	127,000	1,260	1,539	16,000	185,000
Total	362,000	359,000	6,260	4,227	266,000	2,305,000
<u>Alternative 3</u>						
Canonsburg	222,000	228,000	5,260	2,408	250,000	2,120,000
Burrell	8,500	82,000	0	480	70,000	125,000
Total	230,500	310,000	5,260	2,888	320,000	2,245,000
<u>Alternative 4</u>						
Canonsburg	270,000	640,000	7,760	2,912	250,000	5,350,000
Burrell	140,000	127,000	1,260	1,539	16,000	185,000
Hanover	280,000	503,000	4,510	3,360	200,000	4,000,000
Total	690,000	1,270,000	13,530	7,811	466,000	9,535,000
<u>Alternative 5</u>						
Canonsburg	270,000	640,000	7,760	2,912	250,000	5,350,000
Burrell	8,500	82,000	0	480	70,000	125,000
Hanover	280,000	383,000	3,510	1,363	170,000	4,000,000
Total	558,500	1,105,000	11,270	4,755	490,000	9,475,000

^aThe calculations used to derive these estimates are given in Appendix A.3.

^bGasoline and diesel.

5.16 ACCIDENTAL IMPACTS NOT ARISING FROM RELEASES OF RADIATION

Onsite accident possibilities would include those typically associated with construction sites, such as falling into excavated areas. Of particular concern would be the control of these situations during nonworking hours. Therefore, in addition to work place safety controls, off-hours protection would be provided, including restricted site access enforced by site security.

The major potential for offsite accidents would be the movement of trucks over local roadways. This potential would be reduced by careful scheduling to minimize truck traffic during school and rush hours. The DOE has determined that rail transport is not a reasonable alternative (Appendix I).

The expected transportation-related fatalities that would occur as a result of the cleanup activities range from 0.005 deaths for Alternative 3 to 0.07 deaths for Alternative 4 (Table 5-20). These deaths are of the same order of magnitude as the yearly fatalities expected from the presence of the radioactively contaminated materials before and during remedial action. The transportation-connected fatalities would cease when the cleanup is completed, however, the radiation-induced fatalities would continue, but at a lower rate (by a factor of 4 or more) after remedial action as compared to the no action alternative.

Table 5-20. Estimates of transportation-related deaths based on the use of each alternative

Alternative	Truck miles	Total fatalities ^a
2	400,000	0.03
3	70,000	0.005
4	992,000	0.07
5	590,000	0.04

^aBased on 0.00000007 deaths per truck mile (U.S. DOE, 1980).

The Canonsburg site would require special precautions during the building demolition activities. These precautions would include isolating the Canonsburg site area from the public and disconnecting all utility service lines to the buildings. It would be particularly important to monitor the utility service lines during all Canonsburg site activities to prevent accidents connected with exposing live electric wires or rupturing gas lines.

At the Burrell site trucks would have to cross a railroad right-of-way containing three railroad tracks. Since these tracks are minor rail-traffic routes, safe crossings could be ensured by proper scheduling and the use of a railroad flagman.

Unlike the Canonsburg and Burrell sites, the Hanover site is situated in a remote area. The major offsite safety concern would be the condition of the local roadways. Proper road maintenance and careful routing would be necessary to minimize the possibility of trucks overturning.

None of the transportation activities would significantly impact traffic patterns or accident rates on the major arterial routes between the sites. There would be concern over transporting the Canonsburg and Burrell sites' radioactively contaminated materials through Pittsburgh and other urban communities. However, the volume of traffic that would be generated by the remedial-action alternatives would represent only a small portion of the total traffic on the roadways in question.

Alternative 3 would present the least potential for accidents since it would entail activity at only two sites and excavation of radioactively contaminated materials at only one. It also would involve the least amount of truck traffic through residential areas. Alternative 4 would have the greatest potential for both onsite and transportation-related accidents because it would entail excavation at three sites and removal of radioactively contaminated materials from two sites.

5.17 RELATIONSHIPS TO LAND-USE PLANS, POLICIES, AND CONTROLS

Currently the Canonsburg, Burrell, and Hanover sites are being used in accordance with their respective land-use plans and controls (see Section 4.9). Implementation of the stabilization or decontamination alternatives would interfere with current site uses and, at the Canonsburg site, would interrupt some land uses in the vicinity of the Canonsburg site.

Stabilization of the Canonsburg site (Alternatives 2 and 3) would permanently exclude 30 acres from industrial development and residential use, and it would close Strabane Avenue as a major connecting link between Canonsburg and the Village of Strabane for the duration of the work. Ward Street, George Street, and Wilson Avenue would be permanently closed.

Decontamination of the Canonsburg site (Alternatives 4 and 5) would temporarily disrupt its use, including the use of the Wilson Avenue and George Street residences and the use of Strabane Avenue and Ward Street.

Stabilization of the radioactively contaminated materials at the Burrell site (Alternatives 3 and 5) would exclude the Burrell site from any future major development. This would not represent a significant loss of usable open space since development of the Burrell site is already restricted by the flood-plain easement and its present unstable composition.

Decontamination of the Burrell site (Alternatives 2 and 4) could release the Burrell site for as much development as the easement would allow.

The disposal of radioactively contaminated materials at the Hanover site (Alternatives 4 and 5) would eliminate the Hanover site from future use in accordance with its current zoning designation. This would not affect land-use plans or controls in the vicinity of the Hanover site.

5.18 UNAVOIDABLE ADVERSE IMPACTS

This section presents only those adverse impacts that could not be offset by implementing the appropriate project controls (i.e., mitigating measures). The magnitude of the adverse impacts discussed in this section represent an upper bound (i.e., the worst-case situation).

5.18.1 Radiation

Under Alternative 1, 0.012 additional lung-cancer deaths per year above normal are predicted among the 68,488 people living within 10 kilometers (6.2 miles) of the expanded Canonsburg site and 2 kilometers (1.2 miles) of the Burrell site. Under the no action alternative excess deaths would continue at this rate into the future. During implementation of any of Alternatives 2 through 5 this population would receive about twice the radiation exposure as during a like period of time in Alternative 1.

After the remedial action was completed, the local populations would be subject to very low levels of radiation exposure under Alternatives 2 and 3 at the expanded Canonsburg site, under Alternatives 3 and 5 at the Burrell site, and under Alternatives 4 and 5 at the Hanover site. These exposures would result in approximately a 1 in 20,000,000 chance per year above normal of any one individual dying from lung cancer in the 68,602 people living near the Canonsburg, Burrell, and Hanover sites.

The overall radiological impacts on remedial-action workers would be the same for Alternatives 2 through 5; however, the radiation doses to an individual worker would be greater than for the local populace during the short-term exposure. The workers' exposures would be about three times greater than that for the local residents, and the workers' chances of lung cancer deaths would be increased by 0.06 to 0.08 percent above the normal.

5.18.2 Air quality

The implementation of Alternatives 2 through 5 would produce air contaminants, which would be released during the operation of construction equipment. For Alternatives 4 and 5 an exceedance of the annual and 24-hour total-suspended-particulate NAAQS (40 CFR 50) could occur. The predicted concentrations of all of the other pollutants for all alternatives would not result in an exceedance of the NAAQS (40 CFR 50). The concentrations predicted for particulates are based on a given set of engineering assumptions. It could be possible to modify these assumptions and lower the particulate emissions for Alternatives 4 and 5.

5.18.3 Ecology

The implementation of Alternatives 2 through 5 would result in the temporary loss of most of the involved sites' terrestrial habitat. None of these losses would affect any endangered or threatened species, or jeopardize the survival of any species in the sites' areas. After the project was completed, all sites would be revegetated.

5.18.4 Land use

Alternatives 2 through 5 would have virtually the same short-term effects on land use at each site. At the Canonsburg site, under Alternatives 4 and 5, the use of the Canon Industrial Park, the former Georges Pottery property, and the seven residences would be temporarily discontinued.

Under Alternatives 2 and 3 the long-term adverse impacts to land use in the Canonsburg site area would occur from the demolition of the seven adjacent residences and the loss of the former Georges Pottery and Canon Industrial Park properties. Stabilization at the Burrell site (Alternatives 3 and 5) and stabilization at the Hanover site (Alternatives 4 and 5) would eliminate these sites from future development.

5.18.5 Noise

All remedial-action alternatives, except Alternative 1, would raise noise levels in the project site areas. The greatest noise impact would be at the Canonsburg site because of its proximity to nearby residences. Noise generation could, at times, reach annoyance levels.

5.18.6 Transportation networks

All of the remedial-actions (Alternatives 2 through 5) would adversely affect local transportation systems during project implementation. The Canonsburg site area would be the most sensitive of the three sites since it is the most densely developed area. The movement of large dump trucks into and out of the Canonsburg site would create traffic and noise-related problems, increase safety concerns along the route through Canonsburg, and make accessibility to local residences more difficult. The greatest impact would be from Alternatives 4 and 5 since these would involve the heaviest volume of material transportation. Ward Street, Wilson Avenue, George Street, and Strabane Avenue would be closed during the implementation of all of the alternatives. Under Alternatives 2 and 3 all of these roads, except Strabane Avenue, would be closed permanently. Strabane Avenue is a major connecting artery between the Borough of Canonsburg and the Village of Strabane.

The Burrell and Hanover site areas would also experience increased traffic congestion and noise levels. However, the Burrell and Hanover sites would not be as sensitive as the Canonsburg site area because of their more open settings.

5.19 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

All of the remedial-action alternatives (except Alternative 1) would require the same types of resource inputs. These would include electricity, engine fuel, concrete, fill material, manpower, water, and land. Table 5-19 presents the resource requirements that would be required for these alternatives. Long-term monitoring would require the commitment of those resources necessary to accomplish this program.

5.20 RELATIONSHIP BETWEEN THE SHORT-TERM USE OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Under Alternative 1, no action, there would be no short-term or long-term changes in the environment. The existing radioactively contaminated materials would remain at both the Canonsburg and the Burrell sites, thereby continuing the present low productivity of both the Canonsburg and Burrell sites. The Canon Industrial Park has been acquired by the Commonwealth and is not available for any use. Development of the Burrell site would be restricted by a combination of factors; its land-use controls, the presence of radioactively contaminated materials, and its unstable substrate.

All of the other alternatives have impacts that would result in some long-term changes in productivity. These are summarized in Table 5-21.

Under Alternative 2 the expanded Canonsburg site and the Burrell site areas would experience short-term impacts. During project implementation, the expanded Canonsburg site and the Burrell site would be unavailable for any use. The access roads, Wilson Avenue, Ward and George Streets, along with Strabane Avenue, would be closed to public use. Earth-moving activities would affect other local roads in the expanded Canonsburg site area by increasing truck traffic and causing detours in travel between the Borough of Canonsburg and the Village of Strabane. Terrestrial habitats would also be temporarily disrupted.

Following the completion of Alternative 2, the future development and use of the expanded Canonsburg site would be limited. Wilson Avenue, George Street, and Ward Street would remain closed, but Strabane Avenue would be reopened. Radiological emissions from the Canonsburg site would be reduced from current levels to meet the EPA standards (40 CFR 192).

Table 5-21. Short-term uses and long-term productivity

Site	Alternative				
	1	2	3	4	5
<u>Short term</u>					
Canonsburg	NC	D	D	D	D
Burrell	NC	D	D	D	D
Hanover	NC	NC	NC	D	D
<u>Long term</u>					
Canonsburg	NC	S	S	R	R
Burrell	NC	R	S	R	S
Hanover	NC	NC	NC	C	C

NC = No change.

D = Short-term disruption with increased air emissions, noise, and traffic.

R = Improved by removal of radioactively contaminated materials.

S = Improved by stabilization of radioactively contaminated materials.

C = Commitment of a previously uninvolved site.

The long-term productivity and stability of the Burrell site would be enhanced by removing the radioactively contaminated materials and replacing the railroad ties with soil. The future development of the Burrell site would still be restricted by local land-use controls.

Under Alternative 3 the short- and long-term conditions at the expanded Canonsburg site would be identical to Alternative 2, except that the project length and the traffic impacts would be less because the Burrell site's radioactively contaminated material would not be moved to the expanded Canonsburg site.

The short-term impacts at the Burrell site would be significantly less than for Alternative 2 because the radioactively contaminated materials would not be excavated. Thus, air emissions would be insignificant and there would be very little truck traffic.

The long-term conditions of the Burrell site would be enhanced by stabilization of its radioactively contaminated materials. There would be no major change in the site's ecological productivity or substrate stability compared to preproject levels.

The short-term impacts at the Canonsburg site during Alternative 4 would be similar to Alternatives 2 and 3, but would be of a greater magnitude because of the increased amount of radioactively contaminated materials handling and the longer period of activity required.

The long-term productivity potential of the Canonsburg site would be enhanced as a result of removing the Canonsburg site's radioactively contaminated materials under Alternatives 4 and 5. This would release the property for unrestricted use and development. In addition, Wilson Avenue, George Street, and Ward Street, the adjacent residences and the former Georges Pottery buildings would be returned to their preproject uses. All of the offsite impacts would cease at the project's completion.

All short- and long-term impacts at the Burrell site under Alternative 4 would be identical to those for Alternative 2.

Under Alternative 4 the Hanover site would experience the same types of short-term impacts as during the stabilization activity at the Canonsburg site. There would be increased truck traffic, noise levels, and air emissions, and a disruption of terrestrial habitats.

The Hanover site would remain in restricted open use. This would not represent a significant change from the existing conditions, since the Hanover site's rocky substrate limits its future development.

Alternative 5 would create the same short- and long-term conditions for the Canonsburg and Burrell sites as Alternatives 4 and 3, respectively. The situation at the Hanover site would be approximately the same as for Alternative 4.

Over the long term, the decontaminated sites would experience a greater potential for human use than the stabilized sites. Environmental productivity after decontamination would be about the same as following stabilization, since both types of remedial action would eliminate the uncontrolled release of radiation and would meet all EPA standards (40 CFR 192).

An additional consideration is that Alternatives 4 and 5 would involve a previously nonradioactively contaminated property, and would commit it as a radioactively contaminated materials disposal site. This commitment would be counterbalanced by the accompanying release of the formerly radioactively contaminated sites for general use.

5.21 MITIGATION MEASURES DURING THE REMEDIAL ACTION

The DOE, with the concurrence of the NRC, would establish and operate a monitoring program throughout the remedial-action project. This would consist of routine field sampling and laboratory analysis, and comparison of the resulting data with both the rates predicted in the Canonsburg FEIS and the levels specified in the EPA standards (40 CFR 192), and in the NRC regulations (10 CFR 20) and guidelines. If any significant deviation were recorded, immediate action will be taken to eliminate the problem.

5.21.1 Mitigation of impacts from the release of radiation

The release of radioactively contaminated particulates would be reduced by dampening the radioactively contaminated materials when they were uncovered, by covering them with tarps or plastic sheeting when feasible, by stopping radioactively contaminated material-handling operations during adverse weather conditions, and by using trucks with tight-fitting tailgates and covers when the radioactively contaminated materials were moved off the site.

The offsite transportation of radioactively contaminated materials would be controlled by the use of decontamination facilities (e.g., truck wash stations) to clean trucks and vehicles before they left the site. All wastewater streams would be treated before disposal, and all disturbed areas would be isolated from surface-water systems by the erosion-control methods described in subsection 5.21.3.

Human exposure to radioactively contaminated materials would be reduced by relocating, either temporarily or permanently, the residents of the seven houses within the expanded Canonsburg site, by restricting access to the project sites, and by providing the protective equipment necessary for use by the remedial-action workers.

Appendices F.4 and F.5 discuss the proposed radiological monitoring and safety plans.

5.21.2 Mitigation of impacts from air emissions

The exhausts resulting from the combustion of fuels in equipment and vehicles would be addressed by keeping the engines tuned to reduce emissions to a practical minimum.

Construction areas would be sprayed with water and surfactants as needed to control fugitive dust, and roads would be sprayed with water and surfactants during the remedial-action period. Strict Best Available Technology (BAT) dust-control measures would be used during all material-handling activities. If necessary, covers could be placed over the excavated areas. All materials, both radioactively contaminated and nonradioactively contaminated, would be transported in covered trucks. No material would be disrupted during adverse weather conditions.

5.21.3 Mitigation of impacts from water contamination

To prevent possible flooding of the sites during excavation and handling of the radioactively contaminated materials, protective dikes isolating the disturbed radioactively contaminated materials from surface-water systems would be installed. The construction of a collecting and settling pond and an associated waste-water-treatment plant at all of the sites requiring them would permit the collection and treatment of waste water resulting from washing vehicles and equipment, and would permit the treatment of radioactively contaminated storm water that could collect in excavations or as runoff from the radioactively contaminated areas. In addition, ground water pumped from Area C at the Canonsburg site would also be routed through this waste-water treatment facility before it was discharged to Chartiers Creek. The effluent water would be treated to meet NPDES water-quality criteria (40 CFR 124) before being discharged to surface-water systems. The sediment from the collecting ponds and the resins and residues from the waste-water-treatment plants would be disposed of on the sites.

5.21.4 Mitigation of impacts of noise

The impacts of noise would be reduced by using mufflers on vehicles and equipment, and by scheduling the remedial action for daytime hours only.

5.21.5 Mitigation of impacts on transportation networks

Whenever feasible, the high-capacity, primary road networks would be used to minimize the possibility of damage to the transportation network and to avoid congestion that could be a nuisance to the local populace. Truck traffic through the Borough of Canonsburg would be scheduled to minimize traffic near school zones during school activity times, and congested areas during peak use times. Road repairs, maintenance, and improvements would be evaluated during all transportation actions. Based on the transportation engineering study (Appendix I), material transportation between the three sites by rail is not an economical or viable engineering alternative.

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6 Comments Received on the Canonsburg Draft Environmental Impact Statement and the Responses

6.1 INTRODUCTION AND BACKGROUND

This chapter responds to the substantive comments made by private citizens and government reviewers (Federal and state) on the Canonsburg DEIS (U.S. DOE, 1982a) for remedial actions at the former Vitro Rare Metals Company Plant site in Canonsburg, Pennsylvania.

Comments on the Canonsburg DEIS (U.S. DOE, 1982a) were obtained from the public, citizens' groups, and government agencies during 2 days of public hearings and a 47-day^a written comment period. The public hearings were held in Black Lick and Hanover, Pennsylvania on January 11, 1983, and in North Strabane, Pennsylvania on January 12, 1983. A total of 26 persons presented oral statements on the remedial action project. Nineteen letters, some as long as 15 pages, were received during the written comment period. Table 6-1 lists the persons who presented oral statements at the public hearings, and Table 6-2 lists the persons, groups, and agencies that submitted written comments.

To put all of the comments into an easily accessible form, each oral statement and letter was analyzed in detail, and comments on specific issues were identified (Table 6-3). The individual comments were numbered in such a way as to provide a general differentiation between their sources (i.e., numbers 1 through 84 cover hearing comments, 101 through 156 and 233 cover individual letters, and 157 through 232 cover agencies). In those cases where a person made the same comment both orally and in a letter, it was given one number from the oral transcripts. The comments were then excerpted in-toto from the transcripts and letters, categorized according to subject matter, and placed into an indexing system to facilitate rapid retrieval of all comments dealing with a specific subject (Table 6-4). This allowed the preparers of the Canonsburg FEIS to consider all comments received on a subject, while revising the parts of the document dealing with that subject.

To organize the comment/response process, the comments were grouped into 13 major categories according to their subject matter. Many of these topics were further organized into subcategories pertaining to specific groupings of issues within that topic (Table 6-5). In those cases where different persons raised the same issue, or where several comments could be addressed by one single expanded response, these comments were grouped together as one issue and provided with a combined response.

^aThe notice of availability of the Canonsburg DEIS (U.S. DOE, 1982a) was published by the EPA in the Federal Register on December 8, 1982 (47 FR 55305). This notice allowed a 47-day comment period through January 24, 1983. All written comments received on the Canonsburg DEIS (U.S. DOE, 1982a) are considered in the Canonsburg FEIS.

The presentation of issues and responses within this chapter follows this organizational format. Subsections 6.2.1 through 6.2.13 correspond to each of the major categories as shown in Table 6-5. Each subsection includes a summary of the topic, a description of the comments received on the topic, a summarization of the DOE's response, and, if necessary, a reference to the section of the Canonsburg FEIS in which the issue is resolved. The numbers in parentheses following each issue refer to the individual comments concerned with the particular issue. Section 6.3 contains specific comments taken from the hearing transcripts. Section 6.4 contains, in full, copies of the letters received concerning the Canonsburg DEIS (U.S. DOE, 1982a).

Table 6-1. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
-- public hearing responses

Location/date	Comment no.	Response subsection	Person	Affiliation
<u>Burrell Township</u>				
January 11, 1983	43	6.2.1.1	Ardell, Danelle	Allegheny Conservation Committee, Sierra Club, Pittsburgh, Pennsylvania
	44	6.2.3, 6.2.9.2		
	45	6.2.1.1		
	---		Donaldson, Jerry	Supervisor, Burrell Township, Pennsylvania
	46	6.2.1.1	Wolford, Jean	Resident, Burrell Township, Pennsylvania
<u>Hanover Township</u>				
January 11, 1983	56	6.2.10	Coulter, William	Resident, Hanover Township, Pennsylvania
	57	6.2.10		
	58	6.2.7.1		
	80	6.2.2.1		
	---		Griffith, Martin H.	Vice President, Student Body, Burgettstown Area Junior-Senior High School, Burgettstown, Pennsylvania
	---		Kondik, Andrew J.	Emergency Service Director, Hancock County, West Virginia
	67	6.2.10	Louder, Donald	Resident, Hanover Township, Pennsylvania
	68	6.2.5.1	Lucchino, George M.	Spokesperson, Concerned Citizens of Southwestern Pennsylvania
	69	6.2.12.1		
	70	6.2.12.1		
	71	6.2.9.1		
	72	6.2.8.3		
	73	6.2.7.1		
	74	6.2.13		
	75	6.2.10		
	76	6.2.6.1		
	77	6.2.8.1		
	78	6.2.4.3		
	79	6.2.1.1		

Table 6-1. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- public hearing responses (continued)

Location/date	Comment no.	Response subsection	Person	Affiliation
	51	6.2.7.1	Mastrantoni, Patricia	Resident, Hanover Township, Pennsylvania
	52	6.2.8.1		
	53	6.2.7.1		
	54	6.2.3		
	55	6.2.10		
	--		Menzer, Donald T.	Mayor, Weirton, West Virginia
	47	6.2.1.2	Murphy, Austin	U.S. Congressman, 22nd District, Pennsylvania
	81	6.2.9.2	Plunkett, Ruth	Reporter, Weirton Daily Times, Weirton, West Virginia
	82	6.2.9.2		
	83	6.2.10		
	84	6.2.10		
	48	6.2.10	Stewart, Cynthia J.	Resident, Hanover Township, Pennsylvania
	49	6.2.7.1		
	50	6.2.5.2		
	---		Trushel, Barbara	Weirton Junior Women's Club, Weirton, West Virginia
	---		Yerace, Felix	Resident, Hanover Township, Pennsylvania
	59	6.2.8.1	Zibritosky, George	Member, Concerned Citizens of Southwestern Pennsylvania; Board of Supervisors, Smith Township, Pennsylvania
	60	6.2.7.1		
	61	6.2.7.1		
	62	6.2.7.1		
	63	6.2.6.2		
	64	6.2.5.2		
	65	6.2.12.1		
	66	6.2.7.2		
<u>Canonsburg</u>				
January 12, 1983	13	6.2.1.2	Amarose, Anthony	Resident, Canonsburg, Pennsylvania; Former employee, Vitro Rare Metals Company, Canonsburg, Pennsylvania

Table 6-1. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- public hearing responses (continued)

Location/date	Comment no.	Response subsection	Person	Affiliation
	20	6.2.6.1	Dunn, Janis C.	Spokesperson, Families Opposed to Radioactive Contamination Exposure (FORCE), Canonsburg, Pennsylvania
	21	6.2.5.1		
	22	6.2.5.1		
	23	6.2.5.1		
	24	6.2.5.1		
	25	6.2.3		
	26	6.2.1.2		
	27	6.2.3, 6.2.12.2		
	28	6.2.10		
	29	6.2.3		
	30	6.2.2.1		
	31	6.2.1.2		
	32	6.2.10		
	1	6.2.2.2	Faiella, Joyce	Committee, St. Patrick's School, Canonsburg, Pennsylvania
	2	6.2.3		
	3	6.2.3		
	4	6.2.5.2		
	5	6.2.2.1		
	6	6.2.2.1		
	7	6.2.2.1		
	8	6.2.2.1		
	9	6.2.3		
	42	6.2.4.3	Johnsrud, Judith, Ph.D.	Spokesperson, Coalition on Nuclear Power; Steering Committee, Eastern Federation of Nuclear Opponents and Safer Energy Proponents; National Solar Lobby
	40	6.2.12.1	Mirisciotti, Sam	Resident, Canonsburg, Pennsylvania
	41	6.2.3		
	---		Murphy, Austin	U.S. Congressman, 22nd District, Pennsylvania
	10	6.2.4.1	Polinski, Henry	Mayor, Houston, Pennsylvania
	11	6.2.5.1		
	12	6.2.1.1		

Table 6-1. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- public hearing responses (continued)

Location/date	Comment no.	Response subsection	Person	Affiliation
	16	6.2.2.1	Solic, Nicholas P.	Chairman, Allegheny Conservation Committee, Sierra Club, Pittsburgh, Pennsylvania
	17	6.2.2.1		
	18	6.2.3		
	19	6.2.1.1		
	33	6.2.5.1	Sperling, Lawrence I.	President, Environmental Law Council, University of Pittsburgh School of Law, Pittsburgh, Pennsylvania
	34	6.2.13		
	35	6.2.2.1		
	36	6.2.1.1		
	37	6.2.2.1		
	38	6.2.1.1		
	39	6.2.1.1, 6.2.1.2		
	---		Stewart, Julie M.	Spokesperson, Pennsylvania Public Interest Coalition
	14	6.2.12.1	Sweet, David W.	Pennsylvania State Representative, 48th District, Pennsylvania
	15	6.2.1.3		
	---		Walter, Donald	Aide, U.S. Senator John Heinz, Pennsylvania

Table 6-2. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
-- written responses

Comment no.	Response subsection	Individual/agency	Affiliation	Date of letter
43	6.2.1.1	Ardell, Danelle	Allegheny Conservation Committee, Sierra Club, Pittsburgh, Pennsylvania	January 20, 1983
44	6.2.3, 6.2.9.2			
45	6.2.1.1			
101	6.2.10	Benish, Joan E.	Resident, Hanover Township, Pennsylvania	January 16, 1983
20	6.2.6.1	Dunn, Janis C.	Spokesperson, Families Opposed to Radioactive Contamination Exposure (FORCE), Canonsburg, Pennsylvania	January 12, 1983
21	6.2.5.1			
22	6.2.5.1			
23	6.2.5.1			
24	6.2.5.1			
27	6.2.3, 6.2.12.2			
28	6.2.10			
29	6.2.3			
30	6.2.2.1			
31	6.2.1.2			
32	6.2.10			
25	6.2.3	Gofman, John W., Ph.D., M.D.	Professor, Division of Medical Physics, Department of Physics, University of California, Berkeley, California	December 10, 1982
26	6.2.1.2			
102	6.2.3			
103	6.2.5.2			
104	6.2.5.2	Engel, Agnes	Resident, Canonsburg, Pennsylvania	January 24, 1983
105	6.2.5.1			
106	6.2.9.1			
107	6.2.5.2			
108	6.2.5.2			
109	6.2.2.2			
110	6.2.2.2	Faiella, Joyce	Committee, St. Patrick's School, Canonsburg, Pennsylvania	January 12, 1983
1	6.2.2.2			
2	6.2.3			
3	6.2.3			
4	6.2.5.2			
5	6.2.2.1			
6	6.2.2.1			
7	6.2.2.1			
8	6.2.2.1			
9	6.2.3			

Table 6-2. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- written responses (continued)

Comment no.	Response subsection	Individual/agency	Affiliation	Date of letter
111	6.2.13	Fracke, Sue	Resident, Sugarloaf, Pennsylvania	January 12, 1983
---		Heinz, John	United States Senator, Pennsylvania	January 11, 1983
112	6.2.4.1	Leney, George W., P.E.	Consulting geologist, Pittsburgh, Pennsylvania	January 21, 1983
113	6.2.4.1			
114	6.2.2.1			
115	6.2.2.1			
116	6.2.1.1			
117	6.2.1.1			
118	6.2.1.1			
119	6.2.1.1			
120	6.2.1.1			
121	6.2.8.2			
122	6.2.5.2			
123	6.2.5.1			
124	6.2.2.2			
125	6.2.1.1			
126	6.2.2.1			
127	6.2.2.1			
128	6.2.1.2			
129	6.2.1.2			
130	6.2.5.2	Lochstet, William A.	Professor, Department of Physics, College of Science, Pennsylvania State University, University Park, Pennsylvania	January 18, 1983
131	6.2.5.2			
132	6.2.1.3			
133	6.2.2.1			
134	6.2.1.3			
135	6.2.1.2			
136	6.2.2.2			
137	6.2.4.1			
138	6.2.8.2			
233	6.2.13	Oppenheimer, Carol	Staff attorney, Southwest Research and Information Center, Albuquerque, New Mexico	January 26, 1983

Table 6-2. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
-- written responses (continued)

Comment no.	Response subsection	Individual/agency	Affiliation	Date of letter
33	6.2.5.1	Sperling, Lawrence I.	President, Environmental Law Council, University of Pittsburgh School of Law, Pittsburgh, Pennsylvania	January 20, 1983
34	6.2.13			
35	6.2.2.1			
36	6.2.1.1			
37	6.2.2.1			
38	6.2.2.1			
39	6.2.1.1, 6.2.1.2			
139	6.2.5.1			
140	6.2.4.3			
141	6.2.3	Strang, Donald W.	Superintendent of Schools, Canon-McMillan School District, Canonsburg, Pennsylvania	January 21, 1983
142	6.2.2.2			
143	6.2.2.2			
144	6.2.3			
145	6.2.3			
146	6.2.2.2			
14	6.2.12.1	Sweet, David W.	Pennsylvania State Representative, 48th District, Pennsylvania	January 12, 1983
15	6.2.1.3			
147	6.2.5.2			
148	6.2.2.1			
149	6.2.5.1	Terrill, James G., Jr.	James G. Terrill, Jr. and Associates, Environmental Engineers, Murrys-ville, Pennsylvania	January 22, 1983
150	6.2.5.2			
151	6.2.4.2			
152	6.2.4.2			
153	6.2.11			
154	6.2.11			
155	6.2.2.1			
156	6.2.2.1			
157	6.2.9.2	U.S. Department of the Interior, Office of the Secretary, Environmental Project Review, Washington, DC		February 4, 1983
158	6.2.7.1			
159	6.2.4.3	U.S. Environmental Protection Agency, Region III, Philadelphia, Pennsylvania		February 4, 1983
160	6.2.3			
161	6.2.4.3			
162	6.2.5.2			
163	6.2.5.2			

Table 6-2. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- written responses (continued)

Comment no.	Response subsection	Individual/agency	Affiliation	Date of letter
164	6.2.4.2	U.S. Environmental Protection Agency, Region III, Philadelphia, February 4, 1983 Pennsylvania (continued)		
165	6.2.5.2			
166	6.2.5.2			
167	6.2.5.2			
168	6.2.5.2			
169	6.2.5.2			
170	6.2.5.2			
171	6.2.5.2			
172	6.2.5.2			
173	6.2.4.1			
174	6.2.4.1			
175	6.2.9.2			
176	6.2.9.2			
177	6.2.9.1			
178	6.2.9.1			
179	6.2.9.1			
180	6.2.7.1			
181	6.2.9.1			
182	6.2.7.1			
183	6.2.4.1			
184	6.2.9.1			
185	6.2.9.2			
186	6.2.9.1			
187	6.2.9.1			
188	6.2.9.1			
189	6.2.6.2			
190	6.2.6.2			
191	6.2.6.2			
192	6.2.6.2			
193	6.2.6.2			
194	6.2.6.2			
195	6.2.6.2			
196	6.2.6.2			
197	6.2.6.2			
198	6.2.6.2			
199	6.2.6.2			
200	6.2.6.2			
201	6.2.6.2			
202	6.2.2.1			
203	6.2.2.1			
204	6.2.2.1			
205	6.2.2.1			

Table 6-2. Comments received on the Canonsburg DEIS (U.S. DOE, 1982a)
 -- written responses (continued)

Comment no.	Response subsection	Individual/agency	Affiliation	Date of letter
206	6.2.9.2	U.S. Environmental Protection Agency, Region III, Philadelphia, Pennsylvania (continued)		February 4, 1983
207	6.2.2.1			
208	6.2.2.1			
209	6.2.2.1			
210	6.2.2.1			
211	6.2.7.1			
212	6.2.2.1			
213	6.2.8.3			
214	6.2.9.2			
215	6.2.9.2			
216	6.2.8.3			
217	6.2.8.2			
218	6.2.4.3			
219	6.2.9.2			
220	6.2.7.1			
221	6.2.2.1			
222	6.2.4.1			
223	6.2.5.2			
224	6.2.9.1			
225	6.2.7.2			
226	6.2.4.1			
227	6.2.5.2			
228	6.2.5.2			
---		U.S. Department of Housing and Urban Development, Region III, Philadelphia, Pennsylvania		January 24, 1983
229	6.2.8.1	Pennsylvania Department of Environmental Resources, Office of the Special Deputy, Harrisburg, Pennsylvania		February 4, 1983
230	6.2.8.3			
231	6.2.8.3			
232	6.2.13			

Table 6-3. Comment/response subsection cross-reference guide

Comment no.	Comment page no.	Response subsection no.	Response page no.	Comment no.	Comment page no.	Response subsection no.	Response page no.
1	6-70	6.2.2.2	6-33	23	6-75	6.2.5.1	6-39
2	6-70	6.2.3	6-33, 6-62	24	6-75	6.2.5.1	6-39
3	6-70	6.2.3	6-33	25	6-75	6.2.3	6-33
4	6-70	6.2.5.2	6-42	26	6-76	6.2.1.2	6-25
5	6-71	6.2.2.1	6-29	27	6-76	6.2.3, 6.2.12.2	6-33, 6-62
6	6-71	6.2.2.1	6-27	28	6-76	6.2.10	6-59
7	6-71	6.2.2.1	6-29	29	6-76	6.2.3	6-33
8	6-71	6.2.2.1	6-30	30	6-77	6.2.2.1	6-27
9	6-71	6.2.3	6-33	31	6-77	6.2.1.2	6-25
10	6-71	6.2.4.1	6-34	32	6-77	6.2.10	6-58
11	6-71	6.2.5.1	6-39	33	6-77	6.2.5.1	6-39
12	6-72	6.2.1.1	6-24	34	6-78	6.2.13	6-63
13	6-72	6.2.1.2	6-26	35	6-78	6.2.2.1	6-31
14	6-72	6.2.12.1	6-62	36	6-78	6.2.1.1	6-25
15	6-72	6.2.1.3	6-26	37	6-78	6.2.2.1	6-27
16	6-72	6.2.2.1	6-31	38	6-79	6.2.1.1	6-24
17	6-73	6.2.2.1	6-27	39	6-79	6.2.1.1, 6.2.1.2	6-24, 6-25
18	6-73	6.2.3	6-33	40	6-79	6.2.12.1	6-62
19	6-74	6.2.1.1	6-24	41	6-79	6.2.3	6-33
20	6-74	6.2.6.1	6-45	42	6-80	6.2.4.3	6-37
21	6-74	6.2.5.1	6-39	43	6-80	6.2.1.1	6-24
22	6-74	6.2.5.1	6-39	44	6-80	6.2.3, 6.2.9.2	6-33, 6-58

Table 6-3. Comment/response subsection cross-reference guide (continued)

Comment no.	Comment page no.	Response subsection no.	Response page no.	Comment no.	Comment page no.	Response subsection no.	Response page no.
45	6-81	6.2.1.1	6-24, 6-25	67	6-86	6.2.10	6-58
46	6-81	6.2.3	6-33	68	6-86	6.2.5.1	6-39
47	6-81	6.2.1.2	6-25	69	6-86	6.2.12.1	6-62
48	6-81	6.2.10	6-59	70	6-87	6.2.12.1	6-62
49	6-81	6.2.7.1	6-48	71	6-87	6.2.9.1	6-55
50	6-82	6.2.5.2	6-44	72	6-87	6.2.8.3	6-52
51	6-82	6.2.7.1	6-48	73	6-87	6.2.7.1	6-48
52	6-82	6.2.8.1	6-50	74	6-87	6.2.13	6-64
53	6-82	6.2.7.1	6-48	75	6-88	6.2.10	6-59
54	6-83	6.2.3	6-33	76	6-88	6.2.6.1	6-45
55	6-83	6.2.10	6-59	77	6-88	6.2.8.1	6-50
56	6-83	6.2.10	6-58	78	6-88	6.2.4.3	6-37
57	6-83	6.2.10	6-59	79	6-88	6.2.1.1	6-24
58	6-83	6.2.7.1	6-48	80	6-88	6.2.2.1	6-29
59	6-84	6.2.8.1	6-50	81	6-89	6.2.9.2	6-57
60	6-84	6.2.7.1	6-48	82	6-89	6.2.9.2	6-57
61	6-84	6.2.7.1	6-48	83	6-89	6.2.10	6-60
62	6-85	6.2.7.1	6-48	84	6-89	6.2.10	6-60
63	6-85	6.2.6.2	6-45	85	} Only 84 public hearing comments were received.		
64	6-85	6.2.5.2	6-40	86			
65	6-86	6.2.12.1	6-62	87			
66	6-86	6.2.7.2	6-49	88			

Table 6-3. Comment/response subsection cross-reference guide (continued)

Comment no.	Comment page no.	Response subsection no.	Response page no.	Comment no.	Comment page no.	Response subsection no.	Response page no.
89	Only 84 public hearing comments were received.			111	6-112	6.2.13	6-63
90				112	6-113	6.2.4.1	6-34
91				113	6-114	6.2.4.1	6-34
92				114	6-114	6.2.2.1	6-27
93				115	6-115	6.2.2.1	6-27, 6-29
94				116	6-115	6.2.1.1	6-25
95				117	6-116	6.2.11	6-60
96				118	6-116	6.2.11	6-60
97				119	6-117	6.2.11	6-60
98				120	6-117	6.2.11	6-60
99				121	6-117	6.2.8.2	6-50
100				122	6-117	6.2.5.2	6-42
101	6-97	6.2.10	6-58	123	6-117	6.2.5.1	6-39
102	6-102	6.2.3	6-33	124	6-117	6.2.2.2	6-32
103	6-102	6.2.5.2	6-42	125	6-118	6.2.11	6-61
104	6-102	6.2.5.2	6-43	126	6-118	6.2.2.1	6-28
105	6-108	6.2.5.1	6-39	127	6-118	6.2.2.1	6-32
106	6-108	6.2.9.1	6-55	128	6-118	6.2.1.2	6-25
107	6-108	6.2.5.2	6-41	129	6-119	6.2.1.2	6-25
108	6-109	6.2.5.2	6-39	130	6-121	6.2.5.2	6-42
109	6-109	6.2.2.2	6-33	131	6-121	6.2.5.2	6-42
110	6-109	6.2.2.2	6-32	132	6-123	6.2.1.3	6-26

Table 6-3. Comment/response subsection cross-reference guide (continued)

Comment no.	Comment page no.	Response subsection no.	Response page no.	Comment no.	Comment page no.	Response subsection no.	Response page no.
133	6-123	6.2.2.1	6-30	155	6-141	6.2.2.1	6-27
134	6-123	6.2.1.3	6-27	156	6-141	6.2.2.1	6-27
135	6-123	6.2.1.2	6-26	157	6-142	6.2.9.2	6-57
136	6-123	6.2.2.2	6-33	158	6-142	6.2.7.1	6-49
137	6-123	6.2.4.1	6-35	159	6-143	6.2.4.3	6-38
138	6-123	6.2.8.2	6-50	160	6-144	6.2.3	6-33
139	6-131	6.2.5.1	6-39	161	6-144	6.2.4.3	6-38
140	6-133	6.2.4.3	6-37	162	6-144	6.2.5.2	6-42
141	6-136	6.2.3	6-33	163	6-144	6.2.5.2	6-42
142	6-136	6.2.2.2	6-33	164	6-144	6.2.4.2	6-37
143	6-136	6.2.2.2	6-32	165	6-144	6.2.5.2	6-42
144	6-136	6.2.3	6-33	166	6-145	6.2.5.2	6-39
145	6-136	6.2.3	6-33	167	6-145	6.2.5.2	6-42
146	6-136	6.2.2.2	6-32	168	6-145	6.2.5.2	6-44
147	6-138	6.2.5.2	6-40	169	6-145	6.2.5.2	6-41
148	6-138	6.2.2.1	6-27	170	6-145	6.2.5.2	6-43
149	6-139	6.2.5.1	6-39	171	6-145	6.2.5.2	6-44
150	6-139	6.2.5.2	6-50	172	6-145	6.2.5.2	6-39
151	6-140	6.2.4.2	6-37	173	6-145	6.2.4.1	6-36
152	6-140	6.2.4.2	6-37	174	6-145	6.2.4.1	6-34
153	6-140	6.2.1.1	6-61	175	6-145	6.2.9.2	6-57
154	6-141	6.2.1.1	6-61	176	6-146	6.2.9.2	6-58

Table 6-3. Comment/response subsection cross-reference guide (continued)

Comment no.	Comment page no.	Response subsection no.	Response page no.	Comment no.	Comment page no.	Response subsection no.	Response page no.
177	6-146	6.2.9.1	6-53	199	6-147	6.2.6.2	6-46
178	6-146	6.2.9.1	6-54	200	6-147	6.2.6.2	6-47
179	6-146	6.2.9.1	6-53	201	6-147	6.2.6.2	6-47
180	6-146	6.2.7.1	6-49	202	6-147	6.2.2.1	6-27
181	6-146	6.2.9.1	6-54	203	6-147	6.2.2.1	6-28
182	6-146	6.2.7.1	6-48	204	6-148	6.2.2.1	6-27
183	6-146	6.2.4.1	6-36	205	6-148	6.2.2.1	6-30
184	6-146	6.2.9.1	6-56	206	6-148	6.2.9.2	6-58
185	6-146	6.2.9.2	6-57	207	6-148	6.2.2.1	6-27
186	6-146	6.2.9.1	6-56	208	6-148	6.2.2.1	6-28
187	6-146	6.2.9.1	6-56	209	6-148	6.2.2.1	6-29
188	6-147	6.2.9.1	6-55	210	6-148	6.2.2.1	6-27
189	6-147	6.2.6.2	6-46	211	6-148	6.2.7.1	6-49
190	6-147	6.2.6.2	6-46	212	6-148	6.2.2.1	6-28
191	6-147	6.2.6.2	6-46	213	6-148	6.2.8.3	6-52
192	6-147	6.2.6.2	6-46	214	6-149	6.2.9.2	6-57
193	6-147	6.2.6.2	6-46	215	6-149	6.2.9.2	6-57
194	6-147	6.2.6.2	6-47	216	6-149	6.2.8.3	6-52
195	6-147	6.2.6.2	6-46	217	6-149	6.2.8.2	6-51
196	6-147	6.2.6.2	6-47	218	6-149	6.2.4.3	6-38
197	6-147	6.2.6.2	6-47	219	6-149	6.2.9.2	6-57
198	6-147	6.2.6.2	6-46	220	6-149	6.2.7.1	6-48

Table 6-3. Comment/response subsection cross-reference guide (continued)

Comment no.	Comment page no.	Response subsection no.	Response page no.
221	6-149	6.2.2.1	6-30
222	6-149	6.2.4.1	6-35
223	6-149	6.2.5.2	6-44
224	6-149	6.2.9.1	6-54
225	6-150	6.2.7.2	6-49
226	6-150	6.2.4.1	6-35
227	6-150	6.2.5.2	6-42
228	6-150	6.2.5.2	6-42
229	6-152	6.2.8.1	6-50
230	6-153	6.2.8.3	6-52
231	6-153	6.2.8.3	6-52
232	6-153	6.2.13	6-63
233	6-125	6.2.13	6-63

Table 6-4. Number of comments received per category on the Canonsburg Canonsburg DEIS (U.S. DOE, 1982a)

Category title	Hearings	Letters		Total
		Personal	Agency	
6.2.1.1	8	1	0	9
6.2.1.2	5	3	0	8
6.2.1.3	<u>1</u>	<u>2</u>	<u>0</u>	<u>3</u>
Subtotal	14	6	0	20
6.2.2.1	10	8	10	28
6.2.2.2	<u>1</u>	<u>7</u>	<u>0</u>	<u>8</u>
Subtotal	11	15	10	36
6.2.3	<u>11</u>	<u>4</u>	<u>1</u>	<u>16</u>
Subtotal	11	4	1	16
6.2.4.1	1	3	5	9
6.2.4.2	0	2	1	3
6.2.4.3	<u>2</u>	<u>1</u>	<u>3</u>	<u>6</u>
Subtotal	3	6	9	18
6.2.5.1	7	4	0	11
6.2.5.2	<u>3</u>	<u>9</u>	<u>13</u>	<u>25</u>
Subtotal	10	13	13	36
6.2.6.1	2	0	0	2
6.2.6.2	<u>1</u>	<u>0</u>	<u>13</u>	<u>14</u>
Subtotal	3	0	13	16
6.2.7.1	8	0	5	13
6.2.7.2	<u>1</u>	<u>0</u>	<u>1</u>	<u>2</u>
Subtotal	9	0	6	15

Table 6-4. Number of comments received per category on the
Canonsburg DEIS (U.S. DOE, 1982a) (continued)

Category title	Hearings	Letters		Total
		Personal	Agency	
6.2.8.1	3	0	1	4
6.2.8.2	0	2	1	3
6.2.8.3	<u>1</u>	<u>0</u>	<u>4</u>	<u>5</u>
Subtotal	4	2	6	12
6.2.9.1	1	1	9	11
6.2.9.2	<u>3</u>	<u>0</u>	<u>8</u>	<u>11</u>
Subtotal	4	1	17	22
6.2.10	<u>10</u>	<u>1</u>	<u>0</u>	<u>11</u>
Subtotal	10	1	0	11
6.2.11	<u>0</u>	<u>7</u>	<u>0</u>	<u>7</u>
Subtotal	0	7	0	7
6.2.12.1	5	0	0	5
6.2.12.2	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>
Subtotal	6	0	0	6
6.2.13	<u>2</u>	<u>2</u>	<u>1</u>	<u>5</u>
Subtotal	<u>2</u>	<u>2</u>	<u>1</u>	<u>5</u>
Total	87	57	76	220

Table 6-5. Categories of public/agency comments received on the
Canonsburg DEIS (U.S. DOE, 1982a)

Category	Comment numbers
6.2.1 <u>Alternative remedial actions</u>	
6.2.1.1 Various stabilization strategies	12, 19, 36, 38, 39, 43, 45, 79, 116
6.2.1.2 Various decontamination strategies	13, 26, 31, 39, 47, 128, 129, 135
6.2.1.3 Selection process	15, 132, 134
6.2.2 <u>Engineering</u>	
6.2.2.1 Project design	5, 6, 7, 8, 16, 17, 30, 35, 37, 80, 114, 115, 126, 127, 133, 148, 155, 156, 202, 203, 204, 205, 207, 208, 209, 210, 212, 221
6.2.2.2 Mitigation measures	1, 109, 110, 124, 136, 142, 143, 146
6.2.3 <u>Safety</u>	2, 3, 9, 18, 25, 27, 29, 41, 44, 46, 54, 102, 141, 144, 145, 160
6.2.4 <u>Radiation</u>	
6.2.4.1 Current radioactive contamination	10, 112, 113, 137, 173, 174, 183, 222, 226
6.2.4.2 Measurements	151, 152, 164
6.2.4.3 Standards	42, 78, 140, 159, 161, 218
6.2.5 <u>Health</u>	
6.2.5.1 Current situation	11, 21, 22, 23, 24, 33, 68, 105, 123, 139, 149
6.2.5.2 Future situation	4, 50, 64, 103, 104, 107, 108, 122, 130, 131, 147, 150, 162, 163, 165, 166, 167, 168, 169, 170, 171, 172, 223, 227, 228

Table 6-5. Categories of public/agency comments received on the
Canonsburg DEIS (U.S. DOE, 1982a) (continued)

Category	Comment numbers
6.2.6 <u>Meteorology/air quality</u>	
6.2.6.1 Meteorological conditions	20, 76
6.2.6.2 Air quality impact modeling	63, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201
6.2.7 <u>Geology</u>	
6.2.7.1 Baseline conditions	49, 51, 53, 58, 60, 61, 62, 73, 158, 180, 182, 211, 220
6.2.7.2 Impacts predictions	66, 225
6.2.8 <u>Surface water</u>	
6.2.8.1 Public water supplies	52, 59, 77, 229
6.2.8.2 Erosion	121, 138, 217
6.2.8.3 Water quality	72, 213, 216, 230, 231
6.2.9 <u>Ground water</u>	
6.2.9.1 Baseline conditions	71, 106, 177, 178, 179, 181, 184, 186, 187, 188, 224
6.2.9.2 Impact predictions	44, 81, 82, 157, 175, 176, 185, 206, 214, 215, 219
6.2.10 <u>Socioeconomics</u>	28, 32, 48, 55, 56, 57, 67, 75, 83, 84, 101
6.2.11 <u>Costs</u>	117, 118, 119, 120, 125, 153, 154
6.2.12 <u>Relocation of residents</u>	
6.2.12.1 Wilson Avenue (Ward Street) and George Street residents	14, 40, 65, 69, 70
6.2.12.2 Other residents near the expanded Canonsburg site	27
6.2.13 <u>Procedural matters</u>	34, 74, 111, 232, 233

6.2 COMMENTS AND RESPONSES

This subsection presents the comments and questions received concerning the information contained in the Canonsburg DEIS (U.S. DOE, 1982a) at the public hearings, in personal letters, and from Federal and state agencies. Responses are included to answer, expand, and clarify the questions and comments that were received.

The comments/responses are grouped under the following headings:

Subsection	Title	Page no.
6.2.1	Alternative remedial actions.	6-23
6.2.1.1	Various stabilization strategies: above-ground containers, monitored retrievable storage, and other encapsulation techniques.	6-23
6.2.1.2	Decontamination; removing the radioactively contaminated materials to a remote location.	6-25
6.2.1.3	Selection process inadequacies.	6-26
6.2.2	Engineering.	6-27
6.2.2.1	Project design.	6-27
6.2.2.2	Mitigation measures.	6-32
6.2.3	Safety.	6-33
6.2.4	Radiation.	6-34
6.2.4.1	Current radioactive contamination.	6-34
6.2.4.2	Measurements.	6-37
6.2.4.3	Standards.	6-37
6.2.5	Health.	6-38
6.2.5.1	Current situation.	6-38
6.2.5.2	Future situation.	6-39
6.2.6	Meteorology and air quality.	6-45
6.2.6.1	Meteorological conditions.	6-45

Subsection	Title	Page no.
6.2.6.2	Air-quality impact modeling.	6-45
6.2.7	Geology.	6-48
6.2.7.1	Baseline conditions.	6-48
6.2.7.2	Impact predictions.	6-49
6.2.8	Surface water.	6-50
6.2.8.1	Public water supplies.	6-50
6.2.8.2	Erosion.	6-50
6.2.8.3	Water quality.	6-51
6.2.9	Ground water.	6-53
6.2.9.1	Baseline conditions.	6-53
6.2.9.2	Impact predictions.	6-56
6.2.10	Socioeconomics.	6-58
6.2.11	Costs.	6-60
6.2.12	Relocation of residents.	6-61
6.2.12.1	Wilson Avenue (Ward Street) and George Street residents.	6-61
6.2.12.2	Other residents near the expanded Canonsburg site.	6-62
6.2.13	Procedural matters.	6-63

6.2.1 Alternative remedial actions

Twenty comments were received on the alternatives discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 14 came during the public hearings and 6 personal letters were received.

6.2.1.1 Various stabilization strategies: above-ground containers, monitored retrievable storage, and other encapsulation techniques

Issue 1: Four commenters stated that the radioactively contaminated materials from the Canonsburg and Burrell sites should be placed in above-ground containers. (19, 39, 43, 45, 79)

- Response 1: The reasons for eliminating this alternative are given in subsection 3.1.6.3 of the Canonsburg FEIS.
- Issue 2: One commenter stated that the Canonsburg FEIS should include an examination of the various possible engineering alternatives for encapsulation. It should include an analysis of the long-term integrity of a variety of possible materials and of alternative designs. (38)
- Response 2: After a thorough performance evaluation of various man-made and natural materials (U.S. DOE, 1982b), and drawing on the data generated from the UMTRAP research and technology development program, it was decided that the maximum use of "natural" materials would be used in cover and barrier systems. These naturally occurring materials include soils, clays, and sand and gravel in lieu of synthetic liners or membranes. It is known that these naturally occurring materials are "stable" over geologic time, exhibit a high resistance to biochemical degradation, and should provide long-term integrity within the design basis. The use of natural materials in the proposed design represents the most technologically feasible choice to meet the environmental regulations and remain economically viable.
- Issue 3: One commenter stated that the Canonsburg site's radioactively contaminated materials should be stabilized by covering them with a lead shield and property soil. (12)
- Response 3: Lead shielding, which is commonly used as a means of protecting individuals from exposure to electromagnetic radiation (e.g., x-rays, gamma rays), would not be needed to protect the public from gamma radiation from the Canonsburg site's radioactively contaminated materials. Gamma radiation is reduced by the mass of the matter between the source of the gamma radiation and the receptor, and the proposed soil cover would effectively reduce the gamma radiation to acceptable levels (U.S. EPA, 1982) as specified by the EPA standards (40 CFR 192). Emplacement of most of the Canonsburg site's radioactively contaminated materials in a specially designed encapsulation cell would allow control of those factors (e.g., human intrusion, infiltration, wind and water erosion) that increase public health hazards and environmental degradation. Thus, the proposed design would greatly reduce the risk to the public and minimize environmental effects.
- Issue 4: One commenter stated that if the Canonsburg site's radioactively contaminated materials really are uranium mill tailings, an alternative to decontamination is to disperse the radionuclides and return them to their natural environment. This would be done by allowing ground-water percolation to gradually remove

the contaminants and disperse them into the natural environment. Conversely, encapsulation would preserve these radioactively contaminated materials in a concentrated area just below the surface, forever. (116)

Response 4: The Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 requires that remedial action at the Canonsburg site meet the EPA standards (40 CFR 192) discussed in Section 2.2 of the Canonsburg FEIS. Continued uncontrolled infiltration and dilution of the radionuclides by ground water would not meet the EPA standards (40 CFR 192), nor would the NRC approve such a method for disposition of the radioactively contaminated materials. Therefore, the more highly radioactively contaminated materials would be moved out of the flood plain and would not be in direct contact with ground water.

Issue 5: Two commenters stated that the disposal of the radioactively contaminated materials should be considered only temporary and that a monitored, retrievable storage system should be used. (36, 45)

Response 5: As discussed in subsection 3.1.6.3 of the Canonsburg FEIS, above-ground containment of the radioactively contaminated materials would require a large containment structure that would be subject to decay. The proposed remedial action and the attendant monitoring and maintenance plans are considered an acceptable method to both stabilize the radioactively contaminated materials through the use of natural materials and to provide a method for monitoring the achievement of this goal. The proposed remedial action would permit the radioactively contaminated materials to be retrieved in the future, if necessary.

6.2.1.2 Decontamination; removing the radioactively contaminated materials to a remote location

Issue 1: Four commenters stated that the Canonsburg site should be completely decontaminated and the radioactively contaminated materials should be removed to a truly remote location. The opinion was expressed that the radioactively contaminated materials should be taken to a Federal repository, ideally a central one for all of the UMTRAP sites. (26, 31, 39, 47, 128, 129)

Response 1: Subsection 3.1.6.4 has been added to the Canonsburg FEIS to discuss the reasons for eliminating this alternative.

Issue 2: One commenter stated that it would be in the national interest to use rail over trucks because of fuel efficiency. Also, one commenter stated that since the radioactively contaminated materials were originally brought to the Canonsburg site by rail, they should be removed by the same means. (13, 135)

Response 2: Chapter 3 of the Canonsburg FEIS has been revised to discuss the reasons for eliminating rail transport as an alternative for hauling the radioactively contaminated materials or the clean fill.

6.2.1.3 Selection process inadequacies

Issue 1: One commenter stated that it appears that the choice of Alternative 3 as the proposed action is based on nonscientific factors such as cost and the public outcry in Hanover Township. (15)

Response 1: This Canonsburg FEIS presents the results of several years of detailed technical study at the various sites. The primary intent of these studies was to assemble baseline information on site radioactive contamination (Canonsburg and Burrell sites), as well as site suitability information (all three sites). This information was used in the feasibility and impact analyses. The evaluation process fundamentally considered environmental and engineering factors, of which cost is an unavoidable one. This Canonsburg FEIS is intended to present the environmental and engineering inputs to the decision-making process.

Issue 2: One commenter stated that the Canonsburg DEIS (U.S. DOE, 1982a) does not show that the NRC principle of "ALARA" (10 CFR 50, Appendix I) has been applied. This is used to determine how much money should be spent to improve control measures to decrease radiation exposure. (132)

Response 2: Strictly speaking, 10 CFR 50 does not apply because the law (PL 95-604) directs the DOE to perform remedial actions that conform to the EPA standards (40 CFR 192). However, ALARA (as low as reasonably achievable) is a good general principle. Its application depends very much on what is meant by the word "reasonably." Practicality and cost must enter into that judgement. The DOE has tried to be reasonable, and the NRC, as provided in the law (PL 95-604), will judge whether that goal has been reached.

Issue 3: One commenter indicated that a better location for the Canonsburg site's radioactively contaminated materials should be chosen. It might be possible to find a location with stable geology that would allow for deep underground disposal. (134)

Response 3: Subsection 3.1.6.5 has been added to the Canonsburg FEIS to discuss the reasons for eliminating this alternative.

6.2.2 Engineering

Thirty-six comments were received on the engineering design and possible mitigation measures under the various alternatives discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 11 came from the public hearings, and 15 personal letters and 10 comments from the EPA were received.

6.2.2.1 Project design

Issue 1: Eight commenters focused on what they felt were optimistic expectations of the design components (i.e., cover and liner system) and the anticipated use of natural materials (e.g., bentonite or other clays). Concern was expressed about failure of the cover, as a barrier to infiltration, resulting in the "bathtub" effect and the release of contaminants. Also mentioned was differential settlement, the effect of the freeze-thaw cycle, and wetting/drying as affecting cover integrity and, thus, the ability of the site to protect the public and the environment over the long-term. (6, 17, 30, 37, 114, 115, 148, 155, 156, 202, 210)

Response 1: The concept design (proposed action) presented in Appendix A.1 of the Canonsburg FEIS is only the first step in a process to produce a final design. Section 1.6 of the Canonsburg FEIS presents the additional design documents that will be published. The development of a final design, which will vary only in minor detail from the proposed design, will be based on detailed analyses and material testing to assess the effects of all of the factors for which commenters expressed concern. The remedial action plan and design will incorporate state-of-the-art research and technology. All work will be reviewed by the NRC, the Commonwealth, the DOE, and the DOE's technical assistance contractor. Subsection 3.1.2 has been changed to discuss the comments received on these subjects.

Issue 2: One commenter stated that the integrity of the liner or cover materials may be affected by inorganic acids in the radioactively contaminated materials or by organic acids in the liner or cover. Research has shown that low pH and high metals content increase permeability. (204, 207)

Response 2: The DOE recognizes the potential for adverse waste/cover/liner interaction. Accordingly, the DOE has contracted with Battelle's Pacific Northwest Laboratory to evaluate the chemical interaction of leachate from the Canonsburg site's radioactively

contaminated materials (Area C sludge) with local soil (borrow pit material). Effects of soil amendments, including hydrous oxides, quartz sand, or coarse-grained natural zeolites, will be evaluated to determine the soil's performance as an engineered liner material.

Interaction studies will be performed in batch tests and permeability columns. The batch tests will evaluate the sorption characteristics of the soil for selected contaminants, including thorium, radium, and uranium. Distribution ratios will be determined for thorium, radium, and uranium, as well as for heavy metals including arsenic, selenium, and molybdenum.

Issue 3: Two commenters were concerned about the apparent need for long-term maintenance for continued compliance with the EPA standards (40 CFR 192) and the associated long-term costs. (126, 212)

Response 3: The proposed concept design relies on passive remedial measures (e.g., cover thickness and composition) that will not require active maintenance (e.g., additional cover in a few years). Given the EPA longevity requirement (40 CFR 192) of 200 to 1000 years, those natural phenomena (e.g., erosion, floods, seismic events) that could affect site integrity have been evaluated in subsections 4.3.3, 4.5.1, 4.5.4, and Appendix A.1 of the Canonsburg FEIS. These concerns will be further addressed in the site conceptual design and the final design and specifications documents.

Nevertheless, after completion of the remedial action, monitoring, surveillance, and custodial maintenance would be required. These activities would be undertaken to ensure that security measures are intact and functioning, and that the disposal site had not been disturbed. These activities, and their anticipated minimal costs, would be conducted by a Federal agency pursuant to the license issued by the NRC.

Issue 4: One commenter felt that all radioactively contaminated materials, encapsulated or otherwise, should be isolated above ground water. (203, 208)

Response 4: The encapsulation cell containing the majority ($\pm$ 90 percent) of the more highly radioactively contaminated materials would be above the ground-water level in Areas A and B. In addition, demolition and abandonment of underground structures to eliminate sewer recharge and the reduction of infiltration by the Canonsburg site cover should lower ground-water levels and eliminate mounding in Areas A and B. Some isolated small amounts of radioactively contaminated materials, largely in Area B, would not be encapsulated, but would be covered by additional soil. Further details are available in Appendix A.1 of the Canonsburg FEIS.

Issue 5: One commenter asked if the containment area at the Canonsburg site would be outside the Chartiers Creek flood plain? Two commenters asked if the containment area could really be sealed from the creek? (7, 80, 115)

Response 5: Early in the construction effort, low-lying areas along Ward Street would be filled above the existing grade (see Appendix J of the Canonsburg FEIS). The bottom of the encapsulation cell would be above the 100-year flood level (Appendix A.1 of the Canonsburg FEIS), and the slope would be protected to above the 1000-year flood level (Appendix A.1 of the Canonsburg FEIS). The encapsulated radioactively contaminated materials would be isolated above the 500-year flood plain.

Issue 6: One commenter questioned whether any parts of the Canonsburg site buildings would be sold as salvage? (5)

Response 6: After thorough decontamination, steel may be salvaged from the buildings (see subsection 3.1.2 of the Canonsburg FEIS).

Issue 7: One commenter indicated that mention is made of the attempts that would be made to control vegetation on the areas above the modules. What would be done to guard against invasion by burrowing animals? What precautions would be implemented to be sure that the vegetation, especially deep-rooted vegetation, does not "pipe" radionuclides into above-ground plant tissues? (209)

Response 7: As part of the DOE's research and technology development program, Battelle's Pacific Northwest Laboratory (PNL) has studied the effect of burrows and openings along roots. The effects of vegetation are minor, not like the boring into the pile of radioactively contaminated materials. Nevertheless, several methods have been investigated and considered for control of root and animal penetration. These include selection of an intermediate gravel layer between the vegetation cover and the clay cap. Proper selection of the size and gradation of the gravel or crushed stone to be used as an intermediate layer would be done to discourage burrowing animals and root penetration. Section 3.1 of the Canonsburg FEIS includes a general discussion of the potential penetration controls that would be used. Appendix A.1 of the Canonsburg FEIS provides additional information.

Issue 8: One commenter indicated that no mention is made of any sanitary facilities at the Canonsburg site. Was an onsite system used or was it connected with a public system in the area? (221)

- Response 8: A preliminary evaluation has identified above- and underground water mains, gas lines, power lines, sewer lines, etc. It appears that the Canon Industrial Park used onsite disposal systems. Additional details are available in Appendix A.1 of the Canonsburg FEIS.
- Issue 9: One commenter questioned what is the future use proposed for the Canonsburg site? What legal guarantee is there that no more radioactively contaminated materials will be brought onto the site? (8)
- Response 9: Under Alternatives 2 and 3, the expanded Canonsburg site would be used as a disposal site owned by the Federal government with long-term maintenance and monitoring licensed by the NRC. Most likely its future use for other purposes would be restricted. The addition of other radioactively contaminated materials would be subject to future legislation and separate environmental documentation and analysis.
- Issue 10: One commenter stated that the DOE should consider doing the clean-up properly rather than pushing a little dirt over the problem and going away. It would appear that that was the procedure used in 1965-1966 and found to be unacceptable in 1977. (133)
- Response 10: The proposed remedial action differs significantly from the relatively simple attempts to clean up the Canonsburg site conducted in the mid-1960's. The proposed remedial action is designed to excavate those radioactively contaminated materials that are "more" radioactively contaminated, and to relocate them to a specially designed encapsulation cell. In this way the vast majority (+ 90 percent) of the radioactive source would be controlled in one area (the encapsulation cell) and, as such, would not be subject to natural or human influence that could result in dispersal of the radioactively contaminated materials into the environment. The remaining radioactively contaminated materials would be stabilized outside the encapsulation cell by covering them with soil. To ensure that all factors were considered, the design and remedial action would be subject to review and approval by the NRC, the Commonwealth, and the DOE.
- Issue 11: One commenter questioned the Burrell remedial action design, especially its ability to maintain the radioactively contaminated materials in a dry state. (205)
- Response 11: The water table at the Burrell site is more than 20 feet below the surface in the area where the radioactively contaminated materials are located. The recent more extensive surveys by Weston and Bendix (U.S. DOE, 1982c) show that little, if any, radioactively contaminated materials currently exist at depths

below 15 feet from the surface. The earlier ORNL surveys (Leggett et al., 1979) showed radioactively contaminated materials existing to depths of 36 feet and into the water table. (See subsection 4.8.2 of the Canonsburg FEIS.) The recent surveys were more extensive and conducted with better equipment than the earlier survey. Therefore, the recent survey results are taken to represent the existing Burrell site conditions.

The proposed remedial action (see Appendix A.2 of the Canonsburg FEIS) would reduce the water infiltrating from the surface (from precipitation) and would further lower the water table. This design will satisfy the EPA standards (40 CFR 192).

It is assumed that the reduction in the amount of radioactively contaminated materials existing at the Burrell site from the ORNL survey in 1977 to the Weston and Bendix surveys in 1981 and 1982 was caused either by leaching of the radioactively contaminated materials by ground water, or by a redistribution of the radioactively contaminated materials on the Burrell site.

The result of the proposed remedial action would be to slow down the leaching by ensuring that the radioactively contaminated materials are above the water table and by limiting infiltration. It should be noted that if any leaching has occurred in the past, it has been so slow and the flow of the Conemaugh River so great that no measurable radioactive contamination has been detected in the river water.

Issue 12: Two commenters refer to the Interagency Review Group's (IRG) 1979 report to the President. This report said that mill tailings present a greater potential problem than either deeply buried high-level or transuranic wastes (HLW and TRU). The commenters believe that the radioactively contaminated materials at the Canonsburg site should be treated with the same long-term care as the DOE would employ with high-level and transuranic wastes. (16, 35)

Response 12: The IRG (1979) report did not imply that tailings should be put into the same deep geologic disposal as recommended for HLW and TRU. Rather, the tailings problem was characterized as potentially worse because there is such a large amount of tailings material throughout the United States, and up to the time of the report most of these tailings were out in the open, entirely unprotected from dispersal by either natural causes or human carelessness.

Issue 13: One commenter stated that concentration of all of the Canonsburg site's radioactively contaminated materials within a small capsule may violate the EPA standard (40 CFR 192) that radium-226 must not exceed 15 picocuries per gram over 15-centimeter thick layers, more than 15 centimeters below the

surface. It is probable that a breach in the encapsulation cell could occur before there is any significant decrease in radioactivity. (127)

Response 13: The EPA standards (40 CFR 192) cited by the commenter refer to Subpart B of the standards for cleanup of open lands and buildings. They do not apply to the final disposal site, which is covered in Subpart A of the standards. The encapsulation cell would be designed to meet the EPA standard (40 CFR 192) that requires control of radioactively contaminated materials for at least 200 years. The subject of the length of time required for the integrity of the remedial action is discussed in the EPA's FEIS on the standards (U.S. EPA, 1982).

6.2.2.2 Mitigation measures

Issue 1: Three commenters asked about various aspects of the schedule. One asked if the project timeframes are all-inclusive and whether they allow for things such as inclement weather. One commenter asked whether the excavation of radioactively contaminated materials could be restricted to the summer months when school is not in session, or when athletic events are not scheduled for Big Mac stadium. One commenter referred to the elevated noise levels and suggested that a reduced scale of operations would be indicated. (110, 124, 143, 146)

Response 1: Subsection 3.1.2 of the Canonsburg FEIS has been changed to indicate that the construction time estimates include all activities from the first day of mobilization at the Canonsburg site through the final demobilization. This includes some provision for weather-related delays. The schedule assumes year-round activity, but controlled where necessary by monitoring on and off the site to protect workers and the nearby public from elevated levels of radiation. The construction activities would normally occur only during daytime hours, and hence, the associated noise should have only a minimal effect on the local community. The specific scheduling would be related to the number of crews and kinds of equipment to be used by the contractor. These subjects will be described in the final design and specifications, and will be subject to review by the NRC and the Commonwealth.

Issue 2: Concern was expressed by three commenters that airborne contaminants would be deposited off the site during remedial action. Commenters suggested several means to control the dispersal of contaminated dust, including wetting soil, covering vehicles, and constructing tents. (1, 136, 142)

Response 2: Subsection 3.1.2 of the Canonsburg FEIS has been changed to include the discussion of the dust control strategies that would be used.

Issue 3: One commenter suggested that a footbridge should be installed over Chartiers Creek to replace the closing of Strabane Avenue. (109)

Response 3: The need for this footbridge will be considered in the final design document.

6.2.3 Safety

Sixteen comments were received on the proposed safety measures discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 11 came during the public hearings, and 4 personal letters and 1 comment from the EPA were received.

Issue 1: Four commenters requested more information on short-term surveillance (i.e., monitoring) during project activities. This should include provisions to control the offsite movement of radiation, and emergency response plans in the event of elevated radiation levels. Specific concern should be paid to local schools. (2, 3, 25, 27, 41, 141, 144, 145)

Response 1: The remedial action plan will include the health and safety plan and the radiological support plan. The basic elements of this program include worker and equipment monitoring for radioactive contamination and offsite monitoring of radioactive contaminants in air and water. These plans will be subject to approval by the NRC and the Commonwealth and will be made available to the public before the remedial action begins. All reasonable precautions would be taken to ensure that radioactively contaminated materials do not migrate off the sites during the remedial action. The details of the type of monitoring and safety measures to be employed are described in Appendices F.4 and F.5 of the Canonsburg FEIS.

Issue 2: Eight commenters requested more information on long-term surveillance (i.e., inspection and monitoring) and maintenance plans. (9, 18, 29, 44, 46, 54, 102, 160)

Response 2: The details of these plans will be found in the UMTRA project licensing plan and the site surveillance maintenance plan. These documents are subject to review and approval by the NRC and the Commonwealth, and will be available to the public prior to completion of the remedial action. Appendix F.4 of the Canonsburg FEIS discusses this subject.

6.2.4 Radiation

Eighteen comments were received concerning the radiation exposures discussed in the Canonsburg DEIS (U.S. DOE, 1982a); three came during the public hearings, and six personal letters and nine comments from the EPA were received.

6.2.4.1 Current radioactive contamination

Issue 1: One commenter questioned the classification of the Canonsburg site's residual radioactive materials as uranium mill tailings. According to the historical descriptions of its uranium content, these residual radioactive materials might be more accurately classified as "low-level radioactive waste." This classification change might require that a different type of remedial action be performed. Another commenter asked about the isotopes present on the Canonsburg site. (10, 112)

Response 1: The Canonsburg site's residual radioactive materials are not uranium mill tailings but are defined in the UMTRCA as "residual radioactive materials." The term residual radioactive materials means radioactive waste in the form of tailings resulting from processing ores for the extraction of uranium and other valuable constituents of the ores, and other radioactive wastes related to such processing, including any residual stock of unprocessed ores or low-grade radioactive materials.

Issue 2: One commenter recommended a more rigorous characterization of the contaminated areas at the Canonsburg site. This should include extensive site sampling as well as examination of old AEC and Vitro records. (113)

Response 2: The Canonsburg site has already been characterized in sufficient detail to identify and evaluate remedial-action alternatives.

Issue 3: One commenter asked if the radionuclides in the ground water are suspended or dissolved, and what is the fraction of each? This may make a difference in the type of water treatment needed. Our review failed to note an assessment of the total quantity of radioactivity in the ground water at the Canonsburg site. (174)

Response 3: Radioactivity measured in water was the dissolved (soluble) fraction except where otherwise noted. Waste water will be treated to reduce concentrations of contaminants to levels specified in the NPDES permit (40 CFR 124) before the water leaves the Canonsburg site. The selection of the waste treatment system will be made during the final design program.

- Issue 4: One commenter indicated that no mention is made of an analysis for Po-210. We suggest this nuclide be included in all analyses of surface water, ground water, and sediments. In addition, stream sediment analyses will be very useful for long-term monitoring. (226)
- Response 4: Both polonium-210 and lead-210 are part of the uranium-238 decay chain, as is radium-226. Since uranium-238 and radium-226 analyses were performed, it was not considered necessary to also measure polonium-210. However, the usefulness of measuring polonium-210 and lead-210 will be considered in future monitoring programs. Stream sediment analyses will also be considered in long-term site monitoring programs (refer to Appendix F.4 of the Canonsburg FEIS).
- Issue 5: One commenter asked when George's Pottery was built and for how long a period did it operate? Was any of the Vitro uranium or other radioactive materials used in the pottery and glazing? (222)
- Response 5: The former George's Pottery property is being included as part of the expanded Canonsburg site remedial-action program, and it has been subject to radiological sampling. It is not known whether any radioactively contaminated materials from the Canonsburg site were used in the pottery operations.
- Issue 6: One commenter disagreed with the statement that the Wilson Avenue and George Street residences are nonradioactively contaminated; it was stated that one house has a radioactively contaminated chimney. (137)
- Response 6: This statement has been changed in subsection 3.1.2 of the Canonsburg FEIS. Radioactively contaminated residences will be treated either under the vicinity property program (cleanup) or the Canonsburg site remedial-action program (acquisition), therefore, any radioactive contamination of these properties will be remedied. Five of the six houses on Wilson Avenue and the one house on George Street have already been designated as vicinity properties (155 Wilson Avenue has not been so designated as of April 1983).
- Issue 7: One commenter indicated that it appears the study has overlooked the area to the south of the expanded Canonsburg site (beyond the railroad tracks). Since it is known that radioactive contamination exists and has moved off the expanded Canonsburg site, then this area might be studied further. However, this may be a vicinity property. If so, should anything be said regarding any radioactive contamination remedial activities? (183)

Response 7: Preliminary cleanup action is currently underway at radioactively contaminated offsite areas under the vicinity properties cleanup program. This program includes properties south of the railroad tracks. This action is being performed separately from the remedial action at the Canonsburg site, and an Environmental Assessment (U.S. DOE, 1982d) has been prepared on it (available from the DOE UMTRA project office in Albuquerque, New Mexico). Ground-water quality south of the railroad tracks is addressed in subsection 4.6.2.

Issue 8: One commenter asked if there is any theory as to why the 1977 surveys at the Burrell site are so different from the more recent studies? Will further sampling be done to verify the recent data? The variation between the radioactive contamination level reported for the 1977 studies and those reported in this document should receive further explanation. Is it possible, for example, that leaching has taken place at the Burrell site to the extent that radioactive leachate contamination in the future will be negligible? If so, would this argue against further remedial action at the Burrell site? (173)

Response 8: The results of the Bendix survey in 1982 agreed with the Weston data of 1981 and are considered to be the conditions that currently exist on the site (U.S. DOE, 1982c). Based on these more recent and more extensive data, it is assumed that only one-third to one-tenth the radiological activity originally placed on the Burrell site remains there, and that most of this radiological activity occurs at depths of less than 12 feet. It is assumed that the reduction in the amount of radioactively contaminated materials existing on the Burrell site from the ORNL 1977 survey (Leggett et al., 1979) and the Weston and Bendix 1981-1982 surveys (U.S. DOE, 1982c) was due to leaching by ground water or by a redistribution of the radioactively contaminated materials at the Burrell site. The Burrell site currently meets the EPA standard (40 CFR 192), except in a few small areas. This, in turn, could imply that a much smaller remedial-action plan is necessary than originally envisioned (i.e., acquiring the Burrell site, covering the radioactively contaminated portion of the Burrell site with a minimum soil cover, and designating that portion of the Burrell site as a disposal site as described in Appendix A.2). The Burrell site is currently classified as a vicinity property, but the DOE is proposing to redesignate the Burrell site as a disposal site. The Burrell site's use is currently restricted by the U.S. Army Corps of Engineers flood-control easement for the Conemaugh Dam.

6.2.4.2 Measurements

Issue 1: One commenter stated that radiological measurements should be explained better. For example, the Canonsburg DEIS (U.S. DOE, 1982a) refers to a radon-222 release of 2 picocuries per square meter per second. How do you propose to measure that? Also, the Canonsburg DEIS (U.S. DOE, 1982a) often uses "picocuries per gram" -- per gram of what? (151, 152)

Response 1: Because of the procedural difficulty in measuring radon-222 flux rates, there are no standard instruments that may be used to monitor the performance of the remedial action (40 CFR 192). As specified by the EPA standards (40 CFR 192) in Section 192.02, footnote a, "Because the standard applies to design, monitoring after disposal is not required to demonstrate compliance." This concept is discussed in the EPA's FEIS on the Remedial Action Standards for Inactive Uranium Processing Sites (U.S. EPA, 1982). The "gram" in this unit would refer to the medium being sampled (e.g., soil).

Issue 2: It was suggested by one commenter that a working level for radon be defined in the report and in the definitions. (164)

Response 2: Definitions of "working level" and "working level month" are given in the glossary of the Canonsburg FEIS.

6.2.4.3 Standards

Issue 1: Three persons commented on the less stringent requirements of the final EPA standards (40 CFR 192), especially the 200-year limit for stabilization. One person also stated that according to the final EPA standards (40 CFR 192), five sites previously listed under the UMTRA program can now be removed from the program. (42, 78, 140)

Response 1: The EPA standards (40 CFR 192) state that the requirement for longevity is "up to 1000 years to the extent reasonably achievable, but at least 200 years." The law (PL 95-604) requires the DOE to conform to the EPA standards. The EPA has published an EIS (U.S. EPA, 1982) on the development and impacts of the standards. The question of whether some of the other sites under the UMTRA program may be removed from the program is not relevant to action at the Canonsburg site.

Issue 2: One commenter stated that the Canonsburg FEIS should specify how the remedial action will meet the EPA standards (40 CFR 192), instead of saying that they will be met. (159, 161)

Response 2: The preliminary design analyses in the Canonsburg FEIS have shown that the proposed conceptual design will meet the EPA standards (40 CFR 192). The models used to predict cover thickness to attenuate radon and to withstand erosion are discussed in subsections 5.2.3 and Appendix A.5 of the Canonsburg FEIS; the issue of ground-water radioactive contamination (current and future) is examined in subsections 4.6.2 and 5.6.2 of the Canonsburg FEIS; seismicity is discussed in subsection 4.5.4 of the Canonsburg FEIS; and Appendices A.1 and A.2 of the Canonsburg FEIS discuss the conceptual design for the expanded Canonsburg site and the Burrell site, respectively. Additional site and project documents, as outlined in Section 1.6, will present further design information.

Issue 3: One commenter indicated that on page 4-32 (last paragraph) of the Canonsburg DEIS (U.S. DOE, 1982a), the EPA (40 CFR 192) and NRC (10 CFR 20) standards are different but the EPA standards (40 CFR 192) cover this project. Since the document is intended to be widely distributed to both the scientific community and the public, an explanation should accompany the text so that confusion over the various standards is avoided. The differing purposes of the EPA (40 CFR 192) and NRC (10 CFR 20) standards should be explained. (218)

Response 3: Section 4.8 of the Canonsburg FEIS explains that the NRC standards (10 CFR 20) do not specifically apply to the cleanup of abandoned uranium-mill-tailings sites. The NRC standards (10 CFR 201) are used in the Canonsburg FEIS only as a basis for comparison.

6.2.5 Health

Thirty-six comments were received on the health matters discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 10 came from the public hearings, and 13 personal letters and 13 comments from the EPA were received.

6.2.5.1 Current situation

Issue 1: Six persons said that the Canonsburg DEIS (U.S. DOE, 1982a) does not adequately address the existing health problems in the Canonsburg site area. They ask that the Federal government perform a health study and include its results in the Canonsburg FEIS. Several objected to the mention of the use of the University of Pittsburgh's Canonsburg health study (Lanes, 1982), saying it did not include any of the area families with known lung cancers. (22, 23, 24, 33, 68, 105, 123, 139, 149)

Response 1: The specific purpose of this Canonsburg FEIS is to analyze the impacts of alternative approaches on the proposed cleanup of the Canonsburg site. What has happened in the past will not affect what remedial action will be chosen. While the existing health problems in the Canonsburg site area and their possible relationship to the Canonsburg site, both historically and presently, are of concern, they are outside the scope of this Canonsburg FEIS. The limitations of the University of Pittsburgh studies (Lanes, 1982; Talbott et al., 1982) are noted in Section 1.5 of the Canonsburg FEIS.

Issue 2: One of the Wilson Avenue (Ward Street) residents questioned the statement that the nearest home is 250 feet from the Canonsburg site. Her house measures 80 feet from its back wall to the Canonsburg site's property line. (21)

Response 2: The 250-foot value is the distance from the edge of the expanded Canonsburg site to the nearest houses across the railroad tracks to the south that will remain after remedial action under Alternatives 2 or 3. The distance from the edge of the Canon Industrial Park portion of the expanded Canonsburg site to the nearest home on the expanded Canonsburg site is approximately 80 feet. A change has been made in subsection 4.12.5 of the Canonsburg FEIS to clarify this situation.

Issue 3: One commenter asked whether the present condition of the Canonsburg site really poses a health hazard. (11)

Response 3: Tables 5-1 and F.3-1, and the discussion in subsection 5.2.1 of the Canonsburg FEIS contain information on the potential health impacts under "no action" for the Canonsburg site (i.e., continuation of the present situation).

6.2.5.2 Future situation

Issue 1: Three commenters questioned the accuracy of the radiological impact predictions. One person asked if cancer rates can really be predicted accurately. One asked about the uncertainty of the health effects from radon progeny. The third questioned the statement on page F.2-3 of the Canonsburg DEIS (U.S. DOE, 1982a) that "calculated doses are within 20 percent of the doses likely to be received by the general public and remedial-action workers." (108, 166, 172)

Response 1: These matters are discussed in Appendix F.2, subsections F.2.2 and F.2.3 of the Canonsburg FEIS. The accuracy of the predictions is usually taken to be within a factor of 2. (The 20 percent figure is only the calculational accuracy, assuming the complete accuracy of the inputs to the calculations.)

- Issue 2: One commenter stated that the Canonsburg DEIS (U.S. DOE, 1982a) still leaves the reader uncertain about the health hazards to which residents have already been exposed, future hazards to be caused by cleanup efforts, and the ultimate safety following stabilization. (147)
- Response 2: Section 5.2 of the Canonsburg FEIS has been rewritten to make it clearer and to give more details of the results of the calculations. Also refer to Appendix F.2 of the Canonsburg FEIS for information on the analytical process used.
- Issue 3: One commenter does not agree that since remedial action will reduce lung cancer incidents by a factor of 700 that the rate for "no action" can be divided by 700 to determine the rate after remedial action. (64)
- Response 3: This is not how it was done. The cancer incidence for each of the alternatives (1 through 5) was determined separately. The results of each action alternative were then compared against the result for "no action" to determine the reduction factor. The reduction factor of 700 no longer appears in the Canonsburg FEIS. Chapter 1 and Section 5.2 of the Canonsburg FEIS indicate why the 700 number was eliminated and discuss the revised impact assessment.
- Issue 4: One commenter disagreed with expressing cancer deaths in terms of fractions. Instead, they should be rounded off to whole numbers and given as a range (e.g., 10 to 20). Also, the incidence of cancer should be expressed in terms other than death. (150)
- Response 4: The cancer death rates were presented in standard epidemiological format, which is not necessarily limited to whole numbers. Based on the current status of medical advancement, the majority of lung cancers result in death.
- Issue 5: A number of persons questioned the results of the radiological impact predictions. One such person questioned the statement that Canonsburg residents will be receiving about the same radiation exposure during the remedial action as under no action. A situation was cited during the cleanup of vicinity properties in the fall of 1982 when the Canonsburg site area experienced slightly increased radon levels. Since this material is less radioactively contaminated than the Canonsburg site's radioactively contaminated materials, the potential exists for significantly elevated radon levels during the remedial action. (107)

Response 5: The predictions in the Canonsburg DEIS (U.S. DOE, 1982a) were made by assuming that the radioactively contaminated materials are bare and not mostly covered as they actually are now. The radioactively contaminated materials could, in any case, be partially exposed during remedial action. Thus, the exposure rates were calculated for worst-case situations. The commenter's observation is correct; remedial action, no matter what the alternative, would mean more exposure than no action, because the radioactively contaminated materials would be uncovered and stirred up. The predictions in the Canonsburg FEIS for no action have been changed to take account of the fact that the radioactively contaminated materials are currently covered. This change reduces the predictions for no action and could make exposure rates during the remedial action about twice what they are now. However, this increased exposure would be controlled so that there would be no significant health effects received by the residents during the remedial-action activities. After 96 weeks time, however, the exposure rates will be decreased from what they are now by a factor of about 4 (see Section 5.2 of the Canonsburg FEIS for additional information).

It is not known at present if the vicinity-property remedial-action activities were responsible for the slight increase in radon levels. Factors that may increase or decrease radon levels (e.g., climatic conditions) may have affected radon emanation.

Issue 6: One person commented that the estimate that the workers would increase their risk of cancer 0.3 to 0.6 percent may be a factor of 10 too high. From Tables 5-4 and 5-5 of the Canonsburg DEIS (U.S. DOE, 1982d) the risk would be increased 0.0004 to 0.0008 or 0.04 to 0.08 percent. Should this be corrected? (169)

Response 6: The risk has been corrected to 0.06 to 0.08 percent (see subsection 5.2.1 of the Canonsburg FEIS). The method of calculation used compared total lung cancer deaths due to the remedial action to those lung cancer deaths normally expected (Tables 5-7 and 5-8 of the Canonsburg FEIS). This yielded $0.0013/(0.07 \times 32.5)$ and $0.0010/(0.04 \times 32.5)$ increased risks or 0.06 to 0.08 percent.

Issue 7: One commenter stated that it should be explained why the status quo (8300 man-rems) results in more cancer deaths than the 12,000-man-rem short-term exposure for remedial action. The reason is the latter dose is a whole-body dose while the former dose is a dose to the lungs. (163)

- Response 7: This is a misinterpretation of the table. Under "no-action" the exposure would continue indefinitely, while under any of the remedial actions, it would only occur for about 2 years. Table 1-3 of the Canonsburg FEIS has been reformatted to provide clarification.
- Issue 8: Two commenters questioned the size of the area used in calculating health impacts. One stated that the analysis should address an area less than 2 kilometers downwind from the Canonsburg site, while the other stated that the analysis should consider persons living further than 2 kilometers from the Canonsburg site. (122, 131)
- Response 8: The study area has been expanded to include a 10-kilometer radius around the Canonsburg site (see Section 5.2 of the Canonsburg FEIS).
- Issue 9: Two commenters raised questions regarding the length of the exposure period given. The Canonsburg DEIS (U.S. DOE, 1982a) states that under "no action" there would be 5.4 additional deaths in the next 32.5 years. How long does that rate continue? (130, 162, 165, 167)
- Response 9: Where it was feasible to do so, the Canonsburg FEIS has been changed to present all risk and health impact values on an annual basis. This rate will continue into the future (see Subsection 5.2 of the Canonsburg FEIS).
- Issue 10: Because the radioactively contaminated materials are randomly scattered over the Canonsburg site, one commenter questioned the use of a single radon exhalation rate. (227, 228)
- Response 10: The Canonsburg site was divided into three source areas for the calculations. Further subdivision of the source areas would not have improved the accuracy of the predictions.
- Issue 11: Two commenters addressed the fact that children are more sensitive to radiation exposure than are adults. Information on radon and radon-daughter levels projected for the St. Patrick's school was requested, as well as for the short- and long-term health effects on the children. (4, 103)
- Response 11: The age and sex distribution of the public are taken into account in the health risk factors used. Dose rates specific for the St. Patrick's and Canon-McMillan Schools are given in Tables F.3-1 through F.3-5 of the Canonsburg FEIS.
- Issue 12: One commenter stated that residents should be concerned that locally grown foodstuffs might be a source of further radiation exposure, since radium in surface waters or in the soil can be taken up by plants. (104)

Response 12: Information on agricultural production within the study area has been taken into account in the analysis of radiation exposures (see Appendix F.3 of the Canonsburg FEIS).

Issue 13: One commenter objected to the Canonsburg DEIS (U.S. DOE, 1982a) using MILDOS to estimate radiological doses. They said that MILDOS and its related programs is not state-of-the-art, depending on ICRP-2 (International Commission on Radiological Protection (ICRP), 1959) and other old data bases, and that the programs give dose estimates considerably lower than a more up-to-date code like INREM (a computer code for calculating internal radiation dose equivalent) for some cases.

A better estimate could have been made using AIRDOS (conversion of air concentration to dose radionuclides) or AIRDOS-EPA with INREM II (computer implementation of recent models for estimating the dose equivalent to organs of man from an ingested or inhaled radionuclide) or ICRP-30 models and data base. This would lend support to the remedial action. (170)

Response 13: AIRDOS and INREM do not contain all of the critical pathways and critical radionuclide dose analyses that are available in MILDOS. Doses calculated using AIRDOS or INREM may not be as accurate or as useful in this situation, as MILDOS. MILDOS is the code recommended for use by the NRC. MILDOS provides a complete accounting of the proposed impacts and a relative comparison of the proposed impacts (see Response 14 of this subsection for additional information).

Issue 14: One commenter said the risk coefficients are wrong: they should be $100/10^6$ (100 per million).

1. The lung cancer risk coefficient $100/10^6$ PWLM (person working level months) ($20/10^6$ person-rem) is taken from Evans et al. (1981) with a conversion factor of 5 rem/WLM perhaps from BEIR III (National Academy of Sciences, 1980). One of the coauthors of the paper by Evans, et al. (J.H. Harley), has pointed out that this is at least a factor of 2 lower than what he thought was agreed upon (Stratton Hearings, 1982). It is about a factor of 4 lower than a reasonable estimate, and further supports the decision to do the remedial work.
2. The "all-cancer-death" risk, $120/10^6$ person-rem, is taken from Cohen (1981). Cohen derived his numbers from the linear quadratic estimates in BEIR III. The BEIR III estimate was force fit to an $2/1$ coefficient derived from the analysis of gamma and neutron risk coefficients for leukemia in the Hiroshima-Nagasaki data (BEIR III, pp 185-188; National Academy of Sciences, 1980). Since it

subsequently was shown there was no appreciable neutron exposure in Japan, the BEIR III estimate is wrong since it is force fit to nonexistent coefficients. A more reasonable risk estimate based on BEIR I and UNSCEAR 1972 (United Nations Scientific Committee on the Effects of Atomic Radiation) is $200/10^6$ person-rem. (171)

Response 14: It should be emphasized that the purpose of these analyses is to provide a comparison among alternatives, and as long as the same risk factor is used for each analysis, the comparison is valid. The use of higher or lower risk factors would not change the relative comparison among the alternatives. Harley's factor of 2 was taken into account in interpreting the outputs from the MILDOS code (see subsection F.2.3 of the Canonsburg FEIS). Modifications of the BEIR III estimates are being studied by a committee of the ICRP, with recommendations expected in 1984.

Issue 15: One commenter asked how many more people would be exposed to radiation by moving the Canonsburg site's radioactively contaminated materials to the Hanover site than if it remains in place. (50)

Response 15: About 30 more workers are needed for Alternatives 4 or 5 than for Alternatives 2 or 3. There are also the people who live along the transportation route between the Canonsburg and Hanover sites. Finally, there are the 114 people within 2 kilometers of the Hanover site. The levels of exposure these people would receive are given in Section 5.2 of the Canonsburg FEIS.

Issue 16: One commenter stated that the EPA standard (40 CFR 192) is misinterpreted. It is not a standard for man-rem to a lumped population; it is a standard for indoor radiation levels for buildings constructed from or near tailings materials. Table 5-5 of the Canonsburg DEIS (U.S. DOE, 1982a) needs further work. (168)

Response 16: Table 5-8 of the Canonsburg FEIS has been amended to reflect this correction.

Issue 17: One commenter requested that quantitative estimates of accidental death be presented rather than the qualitative statements given. (223)

Response 17: Section 5.16 of the Canonsburg FEIS has been changed to include these estimates.

6.2.6 Meteorology and air quality

Sixteen comments were received on meteorology and air quality as discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 3 came during the public hearings, and 13 comments were received from the EPA.

6.2.6.1 Meteorological conditions

Issue 1: Two commenters questioned the use of short-term (2 years) wind data as it does not accurately portray maximum wind speeds. One person referred to the occurrence of wind gusts at the Canonsburg site greater than the values given in the Canonsburg DEIS (U.S. DOE, 1982a). (20, 76)

Response 1: As stated in Section 4.3 and Appendix B.1 of the Canonsburg FEIS, meteorological data for the Canonsburg site were obtained through onsite monitoring. This was necessary because the only long-term information available for this area is from the Pittsburgh Airport and these data are not appropriate for the Canonsburg site. Therefore, the only meteorological data available for the Canonsburg site are those from the 2-year monitoring program. Although longer-term information is available for the Hanover site, two years of data were used to be consistent. All meteorological information is given as hourly averages. Therefore, the maximum wind speeds are not absolute values, but averages for 1-hour intervals. This clarification has been made in subsection 4.3.4 of the Canonsburg FEIS.

6.2.6.2 Air-quality impact modeling

Issue 1: One commenter stated that the transportation of the Canonsburg site's radioactively contaminated materials to the Hanover site could adversely affect air quality. (63)

Response 1: The potential air quality impacts associated with each of the remedial-action alternatives are presented in Section 5.3 and summarized in Table 5-9 of the Canonsburg FEIS. As explained in Section 5.3, the major air quality impact at the Hanover site area will be the possibility for exceedance of the NAAQS for total suspended particulates. This would result principally from truck travel over unpaved access and onsite roadways.

Issue 2: One commenter questioned Table 1-3 of the Canonsburg DEIS (U.S. DOE, 1982a) which gives air impacts in grams per cubic meter. Should this be micrograms per cubic meter? (189)

- Response 2: This has been corrected to micrograms per cubic meter in Table 1-3 of the Canonsburg FEIS.
- Issue 3: One commenter stated that the Canonsburg DEIS (U.S. DOE, 1982a) refers to the total suspended particulate 60-microgram per cubic meter secondary air quality standard (40 CFR 50). This is not a standard but merely a guideline to meet the 150 micrograms per cubic meter 24-hour standard. It is not necessary to meet the 60 micrograms per cubic meter guideline level. (190, 192, 195)
- Response 3: Table 5-9 of the Canonsburg FEIS has been changed to reflect the fact that the 60 micrograms per cubic meter total suspended particulate concentration is a guideline value and not a standard (40 CFR 50).
- Issue 4: One commenter stated that a statement is made that the Southwest Pennsylvania AQCR (Air Quality Control Region) is in attainment for all pollutants but ozone. This is not true. The AQCR is nonattainment for SO₂ and total suspended particulates, although the Canonsburg area is most likely in attainment. (191)
- Response 4: The portion of the Southwest Pennsylvania AQCR in which the three sites are located is an attainment area for all pollutants, except ozone. Sections 1.4 and 4.4 of the Canonsburg FEIS have modified to indicate that the statement only refers to the portion of the AQCR in which the three sites are located.
- Issue 5: One commenter stated that water spray is not effective for control of total suspended particulates from unpaved roads, and can be counter-productive if vehicles are not washed before entering streets as mud can be tracked out. A petroleum-based agglomerating agent or some other equally suitable agent would be more appropriate. Stabilizing agents should be applied monthly, not quarterly. (193, 198, 199)
- Response 5: The DOE recognizes that there are several means of controlling dust from various sources during remedial action. As discussed in subsection 3.1.2 of the Canonsburg FEIS, a specific control procedure would be prepared prior to initiation of remedial action and would be subject to Commonwealth review and approval. Best Available Technology would be used and could include methods such as water sprays, water or petroleum-based surfactants, sprays under pressure, and the like. The control procedure would probably reduce emissions by 85 to 90 percent (a 90 percent reduction was used in the air quality impact calculations).

Issue 6: One commenter stated that the NO_x calculations predicting standards violations are dubious, since the standard (40 CFR 50) would be violated at every major construction project and in every city if this were the case. This may be a problem with the way the ISC (Industrial Source Complex) model has been applied -- probably the initial sigma is too small. Also, note that the hydrocarbon standard will be withdrawn shortly by the EPA. This issue should be resolved because NO₂ violations were predicted for the NAAQS. (194, 196, 200)

Response 6: The NO_x concentrations were computed using an area source formulation of the ISC model. A revised modeling analysis has been conducted that uses a volume source formulation as suggested by the U.S. EPA, Region III. This approach does not predict NO_x concentrations that would violate the NAAQS. Appendix B.2 and Sections 4.4 and 5.3 of the Canonsburg FEIS have been modified to reflect the new values using the revised modeling approach. Appendix B.2 of the Canonsburg FEIS also contains a complete listing of the options used in the analysis.

The DOE is aware of the EPA's withdrawal of the hydrocarbon standard (48 FR 628-629, January 5, 1983).

Issue 7: One commenter stated that the AP-42 emission factors (U.S. EPA, 1977) should be checked for currency since many recent changes have been made. (197)

Response 7: Discussions with Mr. Bill Lamason (1983) of the U.S. EPA, Research Triangle Park, North Carolina confirms that there are no new AP-42 emission factors for construction vehicles. Mr. Lamason is responsible for updating the sections of AP-42 relative to construction vehicle emissions. The assumptions used in the air quality modeling analysis are documented in Appendix B.2 of the Canonsburg FEIS.

Issue 8: One commenter stated there is no systematic relationship between total suspended particulates and settleable dust. Note that the ISC model has an option that would allow settled dust to be calculated, but the calculation should be done for a rooftop location since this is where dustfall is routinely measured. (201)

Response 8: The deposition rate for particulates was recalculated using the ISC long-term model and the measured particle size distributions at the sites (see Appendix B.2 of the Canonsburg FEIS). The results of this analysis are incorporated in the Canonsburg FEIS.

6.2.7 Geology

Fifteen comments were received on the geology of the three sites presented in the Canonsburg DEIS (U.S. DOE, 1982a); nine came during the public hearings, and six were received from the U.S. EPA and the U.S. Department of the Interior.

6.2.7.1 Baseline conditions

Issue 1: Four commenters stated that the Hanover site has been dynamited during past mining operations. This has created fractures and, together with the remaining mine rubble, causes high porosity in the Hanover site's substrate, therefore, safe disposal is impossible. (49, 51, 58, 60, 61, 62)

Response 1: Subsection 5.4.3 has been added to the Canonsburg FEIS to address this concern.

Issue 2: Two commenters questioned whether disposal at the Hanover site is feasible because of the unknown interactions that would occur between the radioactively contaminated materials and chemical wastes, and between the chemical wastes and the liner. (53, 73)

Response 2: Subsections 3.1.4, 4.6.2, and 5.6.2 of the Canonsburg FEIS address this concern.

Issue 3: One commenter stated that there is confusion over the use of the term, "red dog." (220)

Response 3: "Red dog" is defined in the glossary of the Canonsburg FEIS.

Issue 4: One commenter stated that in Appendix C of the Canonsburg DEIS (U.S. DOE, 1982a), there is an inconsistency with respect to the material directly overlying the bedrock at the Canonsburg site. It is described as grey to brown silt and sand, and brown sandy silt and clay in the same location. (182)

Response 4: This discrepancy has been corrected in Appendix C of the Canonsburg FEIS.

Issue 5: One commenter stated that the discussion on the difference between the permeability of the fill and the bedrock presented in the Canonsburg DEIS (U.S. DOE, 1982a) does not include a value for the permeability of the bedrock. Even though the fill at the Burrell site has a much higher permeability than that of the alluvium and the bedrock, this is not conclusive proof that recharge is not occurring. The difference in head between the two units will ultimately control whether any recharge can

occur. Permeabilities will influence the amount of recharge. Appendix D.2 should provide data on the head differences between the various units. (180)

Response 5: Flow net calculations appear in Table D.2-4 of the Canonsburg FEIS.

Issue 6: One commenter stated that since the Canonsburg area has been mined extensively for coal, the Canonsburg DEIS (U.S. DOE, 1982a) would benefit from additional information about mine subsidence which could affect the structural and hydrological integrity of the site. (158)

Response 6: Subsection 5.4.3 has been added to the Canonsburg FEIS to address this concern.

Issue 7: One commenter stated that the random fill that exists at the Canonsburg and Burrell sites raises questions concerning the stability of the fill under loading. Landsliding and subsidence would seem to be likely risks. Has the ability of this random fill to support vertical or lateral (due to flood water for example) loads been assessed? (211)

Response 7: Subsection 5.4.3 has been added to the Canonsburg FEIS to address this concern.

6.2.7.2 Impact predictions

Issue 1: One commenter stated that disposal of the Canonsburg site's radioactively contaminated materials at the Hanover site may adversely affect the use of the Hanover site area's geological resources, since there are oil and gas wells within 1 mile of the Hanover site. (66)

Response 1: Disposal of the radioactively contaminated materials at the Hanover site would probably not affect oil and gas recovery beneath the Hanover site or in the immediate Hanover site vicinity. These resources, if suitable in quality and quantity to warrant extraction and at sufficient depth, could be tapped by directional drilling.

Issue 2: One commenter stated that in the future, coal currently considered unmineable (for technological or economic reasons) may become accessible. The DOE should either reserve any of this coal in the Canonsburg site area, or analyze for any possible deep contamination resulting from future development of these reserves. (225)

Response 2: Subsection 5.4.3 has been added to the Canonsburg FEIS to address this concern.

6.2.8 Surface Water

Twelve comments were received concerning the surface water at the three sites as discussed in the Canonsburg DEIS (U.S. DOE, 1982a); four came during the public hearings, and two personal letters and six comments from the U.S. EPA and the Pennsylvania DER were received.

6.2.8.1 Public water supplies

Issue 1: Three commenters felt that the possibility for contamination of surface waters beyond the boundaries of the Hanover site was discussed too lightly. They expressed concern that drainage from the Hanover site enters sources of drinking water such as the Ohio River and the Smith Township water supply reservoir. (52, 59, 77)

Response 1: The remedial-action design concept that would be used, should the radioactively contaminated materials be moved to the Hanover site, would include measures to prevent runoff from leaving the Hanover site during remedial action. Once the Hanover site has been covered, rain would run off without passing through the radioactively contaminated materials. Thus, radioactively contaminated materials could not reach the Ohio River or the Smith Township water supply reservoir (which, in any case, is in a different watershed).

Issue 2: It was stated by one commeter that the Canonsburg DEIS (U.S. DOE, 1982a) needs to discuss potential impacts to public water suppliers in the three site areas. (229)

Response 2: Table D.1-5 has been added to the Canonsburg FEIS to indicate the public water supplies within 3 miles of each site. Subsection 5.6.2 of the Canonsburg FEIS discusses the impacts of the alternatives on ground water at each site.

6.2.8.2 Erosion

Issue 1: Two commenters stated that long-term erosion after remedial action, both on the site (e.g., by rills or gullying) and by river meanders, should be more fully evaluated. Soil loss predictions appear to be too low. Erosion enhanced by all-terrain vehicles should be considered. (121, 138)

Response 1: The soil cover loss for each alternative was estimated using the Universal Soil Loss Equation (refer to Appendix A.5 of the Canonsburg FEIS). The Universal Soil Loss Equation makes use of

estimates of precipitation, soil erodibility, topography, cover, area, and other factors, to evaluate the yearly cover loss. Although the predicted soil loss over 1000 years is small, it is a reasonable estimate given the cover systems and access controls (i.e., fencing to prevent human or vehicle intrusion) proposed in conjunction with occasional site inspection, and custodial maintenance.

Appendices A.1 and A.2 of the Canonsburg FEIS discuss the potential tendency of Chartiers Creek and the Conemaugh River to meander into the Canonsburg and Burrell sites, respectively. Appendix A.1 of the Canonsburg FEIS also discusses measures that would be taken to protect against stream-bank erosion at the expanded Canonsburg site.

The DOE recognizes that the issue of erosion requires a careful evaluation to ensure the integrity of the sites over 200 to 1000 years. Accordingly, detailed assessments are underway to model gully, rill, and sheet erosion on the pile and to model changes in creek and river morphology (e.g., by analysis of aerial photographs and land shapes). Design details will be altered, should the studies so dictate. The results of this work will be included in the remedial action plan.

Issue 2: One commenter stated that the changes in surface- and ground-water configurations may be further complicated by streambed realignment, which is always accompanied by flood-plain shifts. Since the design is for a period of at least several hundred years, an attempt should be made to anticipate any problems that may result from extreme flood events, i.e., the probable maximum flood or storm with the one-in-ten chance of occurring for the 1000-year period. (217)

Response 2: Appendix A.1 of the Canonsburg FEIS addresses these concerns. A brief discussion of extreme flooding events for the Canonsburg, Burrell, and Hanover sites has been added to their respective discussions (subsections 4.6.1.1, 4.6.1.2, and 4.6.1.3) of the Canonsburg FEIS. Discussions of the use of and effects on the flood plains are presented in Appendix J of the Canonsburg FEIS.

6.2.8.3 Water quality

Issue 1: One commenter questioned the statement that sulfate and iron concentrations in Chartiers Creek are a result of operating mines in the drainage basin. Except for the discharge of acid mine drainage from abandoned operations, all discharges within the basin are operating under Pennsylvania DER permits that have effluent limits to protect water quality. A major abandoned

mine discharge to Chartiers Creek, just above Carnegie, causes water quality degradation as noted in Table D.1-3 of the Canonsburg DEIS (U.S. DOE, 1982a). (230)

Response 1: Subsection 4.6.1.1 of the Canonsburg FEIS has been corrected to reflect this situation.

Issue 2: One commenter stated that the water-quality criteria in Table D.1-3 of the Canonsburg DEIS (U.S. DOE, 1982a) are wrong.

1. The Pennsylvania DER does not have a sulfate limit for Chartiers Creek.
2. Total dissolved solids is expressed as 750 milligrams per liter.
3. It was noted that the fecal coliform data for Chartiers Creek are from 1978. Since then, both the Washington and East Washington sewage treatment plants have been upgraded, thus this information needs updating. (231)

Response 2: Table D.1-3 of the Canonsburg FEIS has been updated using more recent data.

Issue 3: One commenter questioned the validity of the results of a surface-water sampling program performed by the owners of the Hanover site. This should have been done by an independent consulting firm. (72)

Response 3: The Canonsburg FEIS uses data from the U.S. EPA (Downie and Petrone, 1980) as well as data from the current owners of the Hanover site. These data are the most representative of current conditions. No additional data were necessary for impact assessment.

Issue 4: One commenter stated that projects of this kind where surface configuration is changed could carry implications for surface runoff water quality. The major concerns are the water-quality problems that could be expected if pyritic minerals are disturbed, and runoff and seeps from those areas where low-level radioactively contaminated materials are to be buried. Current runoff patterns and seeps probably cannot be used for predicting the picture after the project is completed. Very little information is included regarding surface runoff and its quality impacts on the receiving streams. (213, 216)

Response 4: Subsection 5.6.2 of the Canonsburg FEIS has been expanded to address this concern.

6.2.9 Ground water

Twenty-two comments were received on ground water at the three sites as discussed in the Canonsburg DEIS (U.S. DOE, 1982a); 4 came during the public hearings, and one personal letter and 17 comments from the U.S. EPA and the U.S. Department of the Interior were received.

6.2.9.1 Baseline conditions

Issue 1: One commenter indicated that it is stated in the Canonsburg DEIS (U.S. DOE, 1982a) that not all of the Canonsburg site's 1979 wells were used in the 1982 studies because some wells had been plugged and vandalized. There is no mention of how the wells were plugged or if the vandalized wells were subsequently plugged. This is important, since these wells could serve as conduits for contaminants to the deeper aquifer. Also, the description does not clear up the issue of any effects or lack of effects from radioactively contaminated materials. The hydrogeological study appears to be incomplete and will need to be resolved by additional evaluations as design proceeds. On the other hand, as the design proceeds, it will become clear that the remedial action should reduce radionuclide contamination of ground waters if done properly. (177)

Response 1: Subsection 4.6.2.1 of the Canonsburg FEIS has been changed to address well vandalism. Appendix A.1 of the Canonsburg FEIS and the remedial action plan address the need for hydrogeological monitoring.

Issue 2: One commenter stated that an effort should be made to identify background levels for both radioactively and nonradioactively contaminated materials. For example, the reason for the concentration of selenium significantly exceeding the EPA's National Interim Primary Drinking Water Standards (40 CFR 141) at the Canonsburg site was speculated as either associated with Canonsburg site activities or due to selenium's natural occurrence as a trace constituent in coal. To assess the current and potential impacts, a clearer picture of the background water quality is necessary, and a sufficient number of upgradient monitoring points should be established. (179)

Response 2: See subsection 4.8.1 of the Canonsburg FEIS for background radiological information, and subsection 4.6.2 of the Canonsburg FEIS for background nonradiological information. Upgradient wells have been drilled and sampled since the Canonsburg DEIS (U.S. DOE, 1982a) was written. The results of this additional sampling program are now included in the above referenced sections of the Canonsburg FEIS.

- Issue 3: One commenter stated that the results of analyses for priority pollutants for three contaminants at the Hanover site are shown at values above detection limits. Two of the three, butyl benzyl phthalate and methylene chloride, are often found as contaminants of the sampling and analytical protocols since they can be found in sampling and analytical equipment (as a plasticizer in plastic tubing) or laboratories (as a cleaning solvent). This should be noted in the Canonsburg FEIS, unless quality control blanks were evaluated and can be used as a basis for substantiating the values given. Any quality control information that substantiates the presence of these two contaminants in the ground water should be reported. (181)
- Response 3: Neither butyl benzyl phthalate nor methylene chloride were used in the sampling equipment, or in the preparation of laboratory equipment. However, both are ubiquitous in the environment because they are so commonly used.
- Issue 4: One commenter stated that the socioeconomic survey of the area within 1 mile of the Canonsburg site states that none of the respondents to the survey reported that the ground water was used for drinking purposes. Based on Appendix G, pages G-2 through 5 of the Canonsburg DEIS (U.S. DOE, 1982a), only 10 percent of the residents of the Village of Strabane were asked this question specifically. Since there are wells in this area, perhaps further investigations should be conducted, unless the responses constitute a statistically acceptable basis for conclusions. (178)
- Response 4: In addition to the responses from the Canonsburg site area socioeconomic survey, well data were sought by examining well permit files. No permitted wells were identified within 1 mile of the Canonsburg site. Subsections 4.6.1 and 4.6.2 and Appendix D of the Canonsburg FEIS have been updated with information received from Chnupa (1983).
- Issue 5: One commenter asked if there is any information available regarding the condition and final disposition of the 4000 tons of water mentioned in connection with the Burrell site? The possibility exists that it already has all leached away and presents no problem towards blocking design of the remedial action. (224)
- Response 5: The figure of 4000 tons of water represents an estimate made in 1956 of how much of the wet radioactively contaminated materials was actually water. Subsection 4.2.2 of the Canonsburg FEIS has been changed to provide this clarification.

Issue 6: One commenter stated that the Canonsburg DEIS (U.S. DOE, 1982a) describes an area on the Canonsburg site that was once a swamp, but has since been used as a repository for radioactively contaminated materials. This area may serve as a ground-water discharge area or flood plain, or both. It could also have been supplied by a spring or seep which should be investigated before the area is reclaimed. This area could carry implications for the flood plain as well as for ground water. (188)

Response 6: Subsequent hydrological testing of Area C was conducted after the Canonsburg DEIS (U.S. DOE, 1982a) was issued. Subsection 4.6.2 of the Canonsburg FEIS includes this additional information, which addresses this concern.

Issue 7: One commenter indicated that the Canonsburg DEIS (U.S. DOE, 1982a) states that ground water at the Hanover site does not meet the then EPA proposed ground-water quality standards (40 CFR 192 (proposed)). What does it contain? (71)

Response 7: See Table D.2-6 of the Canonsburg FEIS.

Issue 8: One commenter stated that the ground-water information for the expanded Canonsburg site appears to be incomplete. This information will be necessary to evaluate the possibility for transport of radioactively contaminated materials from onsite to offsite wells. (106)

Response 8: Additional ground-water information for the expanded Canonsburg site, including data from offsite wells, has been collected since publication of the Canonsburg DEIS (U.S. DOE, 1982a). Subsection 4.6.2 and Appendices C and D of the Canonsburg FEIS include this additional information.

Issue 9: One commenter stated that some very assured statements are made regarding the ground-water flow directions. Neither Chapter 4 nor Appendix D.2 of the Canonsburg DEIS (U.S. DOE, 1982a) sufficiently describes how the conclusions were derived. (184)

One commenter stated that Appendix D of the Canonsburg DEIS (U.S. DOE, 1982a) describes some constraints to the ground-water investigations. These constraints appear to have required the investigators to arrive at their conclusions using assumptions rather than hard data. In addition, the limited sampling information is inadequate to arrive at definite conclusions. A clear example is found on the first page of Appendix D of the Canonsburg DEIS (U.S. DOE, 1982a). The second paragraph states that "...the slug tests were not considered reliable. Therefore, other measurements ... had to be used...", but these are apparently not described in the Appendix D of the Canonsburg DEIS (U.S. DOE, 1982a). The Canonsburg FEIS should describe how design progress has cleaned up this deficiency. (186)

One commenter stated that if, on the other hand, the ground-water information is correct, especially for the Burrell site, then additional analysis might be considered. (187)

Response 9: Chapter 4 and Appendices C and D of the Canonsburg FEIS have been revised to reflect additional data collected since publication of the Canonsburg DEIS (U.S. DOE, 1982a).

6.2.9.2 Impact predictions

Issue 1: One commenter stated that Table D.2-1 of the Canonsburg DEIS (U.S. DOE, 1982a) shows elevated sulfate levels at the Canonsburg site. This may indicate the presence of pyritic minerals which can cause acidic ground-water seeps if surface disturbance allows such pyritic materials to be exposed to oxidation. Low pH water may carry implications for the mobilization of radionuclides. Are any other contaminants present in the ground water as a result of activities at the Canonsburg site? (185)

One commenter stated that acid mine drainage is a very real problem in the area of Pennsylvania where Canonsburg is located. This is a result of exposure of iron and other metal sulfides to air. As this reaction develops, the lowered pH, which results from the oxidation of the compounds, tends to encourage an increase in reaction rates and, in addition, ubiquitous bacteria complicate the problem by specifically using sulfide as an energy source. Once started, this reaction goes on until all metal sulfides are oxidized and under current technology there is no site where this situation prevails that has ever stopped producing acid mine drainage. Occasionally, a flooded deep mine (one or two exist in the anthracite region of Pennsylvania) will slow or even cease producing acid mine drainage for a time, but the potential to resume production is there merely waiting for the mine pool level to go down. Such an acid condition could provide a means for the mobilization of radionuclides. (214)

One commenter stated that disturbance of such areas followed by stabilization can be expected to eventually have a reestablished ground-water system. These almost always are difficult to predict with any precision. If this condition prevails, i.e., the production of acid mine drainage, then seeps can be expected to develop around the periphery of the reclaimed area and these may mobilize many ions that are soluble at low pH's. Current state-of-the-art technology exists to assess this possibility and should be incorporated into the Canonsburg FEIS by reference, as part of the long-term monitoring program. (215)

One commenter stated that ground-water quality at the Hanover site indicates the possible presence of pyrites which cause acid mine drainage. (219)

Response 1: Subsection 5.6.2 of the Canonsburg FEIS addresses this concern.

Issue 2: One commenter questioned the potential at the Hanover site for leaching of contaminants (Alternative 4, short-term impact)? (175)

Response 2: The use of an encapsulation cell at the Hanover site will minimize the potential for leaching (see Appendix A.1 of the Canonsburg FEIS for additional information).

Issue 3: One commenter asked whether sufficient ground water is available at the Hanover site to decontaminate trucks? Also, if ground water is already of such poor quality, maybe it is being contaminated with something other than radioactivity. (81, 82)

Response 3: Ground-water quantity is not a problem at the Hanover site. As discussed in Section 3.1 of the Canonsburg FEIS, waste waters would be treated by an onsite facility prior to offsite disposal. The present poor ground-water quality at the Hanover site is not due to radionuclides, but to sulfates and total dissolved solids (see Table D.2-6 of the Canonsburg FEIS).

Issue 4: One commenter indicated that the Canonsburg FEIS should address the fate of pollutants already in the ground water at the Canonsburg site. It is not clear whether the remedial-action plan includes provisions for withdrawing and treating ground water until the EPA standards (40 CFR 192) are met in the aquifer. (157)

Response 4: The radioactively contaminated ground water under the expanded Canonsburg site is either discharging so slowly to Chartiers Creek, or is so diluted when it enters the creek, or both, that it cannot be detected. Therefore, the remedial-action plan does not include withdrawal and treatment of the ground water, per se. Nevertheless, there would be monitoring of ground water after completion of the remedial action. This monitoring program would ascertain that radioactively contaminated water remaining under the expanded Canonsburg site is not migrating off the expanded Canonsburg site.

Issue 5: One commenter stated that no mention is made of ground-water impacts associated with the remedial methods described for decontamination or stabilization. These impacts may be substantial and deserve attention. (176)

Response 5: The DOE expects these impacts to be minor, or at the worst, controllable. This possibility is part of the reason for having a waste-water treatment plant and a sedimentation and flow equalization basin in the remedial-action plan.

Issue 6: Two commenters pointed out that it is stated that the new cover at the Burrell site would reduce percolation by a factor of 4 allowing about 8 inches of precipitation per year to penetrate to the radioactively contaminated materials. It appears that the Burrell site has been designed to allow percolation (from precipitation above and ground water below) to leach radioactively contaminated materials from their matrix into a swale that will carry the mixture to the Conemaugh River where dilution will take place. The DOE should design against further contamination of surface waters by any unscheduled releases of radionuclides. (44, 206)

Response 6: Subsection 4.8.2 of the Canonsburg FEIS addresses this concern.

6.2.10 Socioeconomics

Eleven comments were received concerning the socioeconomic information presented in the Canonsburg DEIS (U.S. DOE, 1982a); ten came during the public hearings, and one personal letter was received.

Issue 1: Three commenters expressed the concern that the Hanover site area is already economically depressed, and that disposal of the Canonsburg site's radioactively contaminated materials there would cause further property devaluation and discourage new businesses from moving to the Hanover site area. (56, 67, 101)

Response 1: This type of potential impact is difficult to predict or quantify. It can only be restated that the disposal of the Canonsburg site's radioactively contaminated materials at the Hanover site would be a one-time action. Congressional action would be required to dispose of any additional radioactively contaminated materials at the Hanover site. The Hanover site would remain permanently closed and administered by the DOE.

Issue 2: One commenter stated that stabilization of the radioactively contaminated materials at the Canonsburg site will make local properties worthless forever. (32)

Response 2: The value of properties near the Canonsburg site may currently be affected by concern over the existing Canonsburg site condition. Following stabilization, this concern is expected to lessen. This in turn should benefit local real estate prices.

Issue 3: One commentor requested financial reimbursement or aid for the Hanover site families who might be adversely affected by the disposal of the Canonsburg site's radioactively contaminated materials at the Hanover site. (55)

Response 3: The remedial alternatives involving the disposal of the Canonsburg site's radioactively contaminated materials at the Hanover site (Alternatives 4 and 5) have been designed to avoid adversely affecting any Hanover Township families. Therefore, financial aid would be unnecessary. Additionally, this type of reimbursement is not authorized under Public Law 95-604.

Issue 4: Two commenters objected to moving the Canonsburg site's radioactively contaminated materials to the Hanover site where there is a growing population. (28, 48)

Response 4: In 1980 there were 78 persons living within 1 mile of the Hanover site. This total is projected to increase by only 2 persons by the year 2000 (see subsection 4.12.1 of the Canonsburg FEIS).

Issue 5: One commenter expressed concern over the proximity of Harmon Creek to the Colliers School in Colliers Township, West Virginia. Runoff from the Hanover site comes close to this school. (57)

Response 5: The Colliers School is approximately 5 miles downstream (west) from the Hanover site on Harmon Creek. If the Hanover site were to be used to dispose of radioactively contaminated materials from the Canonsburg and Burrell sites, the encapsulation cell built at the Hanover site would preclude any release of the radioactively contaminated materials into the Harmon Creek watershed that would pose a danger to the Colliers School.

Issue 6: One commenter stated that the public reaction section of the Canonsburg DEIS (U.S. DOE, 1982a) is too general. (75)

Response 6: Subsection 4.12.9 of the Canonsburg FEIS is presented to reflect the general reactions of individuals and groups to the present situation at the Canonsburg and Burrell sites and the alternatives for remedial action. The complete transcripts of the scoping meetings and the public hearings are available in libraries near the Canonsburg, Burrell, and Hanover sites. In addition, this chapter addresses specific public reactions presented during the public hearings, as well as those comments received in writing.

Issue 7: One commenter disagreed with the statement in the Canonsburg DEIS (U.S. DOE, 1982a) that there are no future land-use plans for the Hanover area. Starvaggi Industries, the site owner, has future development plans. (83)

Response 7: Subsection 4.9.3 of the Canonsburg FEIS has been revised to refer to official land-use plans. Hanover Township has not developed any official future land use plans under the comprehensive planning process. Individual land owners may have plans for future development or use of their properties, but these plans have not been incorporated into any official plans for Hanover Township.

Issue 8: One commenter disagreed with the value of \$202 given in the Canonsburg DEIS (U.S. DOE, 1982a) for real estate taxes for the Hanover site area. Taxes in this area are broken up into the Hanover Township Tax, the Burgettstown School Tax, and the Washington County Tax. The average total is closer to \$992. (84)

Response 8: Table G-26 of the Canonsburg FEIS has been updated with 1979 values. The total real estate tax collected in 1979 in Hanover Township was \$25,686 (Pennsylvania Department of Community Affairs, 1982).

6.2.11 Costs

Seven comments were received on the estimated costs of the remedial action discussed in the Canonsburg DEIS (U.S. DOE, 1982a); these comments came through personal letters.

Issue 1: One commenter suggested that the costs given in Appendix A.4 of the Canonsburg DEIS (U.S. DOE, 1982a) for Alternatives 2, 4, and 5 are overstated. Specific discrepancies cited pertain to the costs for transportation, site preparation, encapsulation, monitoring, and legal/administration. (117, 118, 119).

Response 1: The discrepancies in transportation, site preparation, and encapsulation costs have been corrected in the Canonsburg FEIS. The monitoring and legal and administrative costs are directly tied to the level of effort at the project sites under each alternative and, therefore, will show some variation.

Issue 2: One commenter indicated that the big cost weakness in the Canonsburg DEIS (U.S. DOE, 1982a) is its lack of engineering support, especially material amounts. (120)

Response 2: Detailed design engineering has not been completed for the Canonsburg FEIS; therefore, complete supporting engineering data are not yet available. Section 1.6 indicates the timetable for publication of the final design and specifications document. However, estimated material amounts based on currently available information were used for the designs as described. Present data are adequate to support a decision among the alternatives.

Issue 3: One commenter stated that since this will be a model project, it should include all identifiable costs, such as: development of methodology, development of the Canonsburg FEIS, land purchase, public meetings, NRC interaction, vicinity property cleanup, maintenance and monitoring, and health monitoring. (153)

Response 3: Maintenance monitoring and health monitoring costs are included in the 15 percent value given for monitoring and radiation management in Table A.4-1 of the Canonsburg FEIS. Methods development and Canonsburg FEIS development are included in Table A.4-1 of the Canonsburg FEIS in the amount given for engineering and construction management, and the legal and administrative costs. The cost for vicinity-property cleanup is the same under all alternatives and need not be addressed in the Canonsburg FEIS.

Issue 4: One commenter questioned the value given for grading (\$22.50 per square foot) on page A.4-7 of the Canonsburg DEIS (U.S. DOE, 1982a). (154)

Response 4: This was a typographical error. Table A.4-6 of the Canonsburg FEIS has been corrected.

Issue 5: One commenter stated that the cost section should include "societal costs" such as: health concerns, depressed property values, industry relocations, and emigration. (125)

Response 5: Dollar values were not assigned to these societal values, but the potential positive and negative impacts of each alternative relative to socioeconomic concerns are discussed in Chapters 4 and 5 and Appendix G of the Canonsburg FEIS.

6.2.12 Relocation of residents

Six comments were received concerning the relocation of local residents, as discussed in the Canonsburg DEIS (U.S. DOE, 1982a); these comments came during the public hearings.

6.2.12.1 Wilson Avenue (Ward Street) and George Street residents

Issue 1: Four commenters stated that it appears that the seven residences slated for acquisition as part of the expanded Canonsburg site are to be bought for less than fair market prices. (14, 40, 65, 69, 70)

Response 1: Under the terms of the cooperative agreement between the Commonwealth and the DOE, the Commonwealth is not obligated to acquire the seven residences and the former Georges Pottery property that comprise the expanded Canonsburg site. Therefore, the DOE would acquire these properties directly if Alternative 2 or 3 is chosen.

First, the DOE has entered into a Task Agreement with the U.S. Army Corps of Engineers, which has many years of real estate experience. Under the Task Agreement, the Corps will map, gather title evidence, and appraise the properties. The Corps has begun this preliminary effort. The appraisals will evaluate the fair market value of the properties on the basis of comparable sales of other similar residences in the Canonsburg area. It is important to note that the bulk of any residential property's fair market value is in the buildings and improvements.

Second, if Alternative 2 or 3 is selected, the DOE will ask the Corps to attempt to negotiate the purchase of the properties from the owners. The Corps would at that time make available to the owners a summary of the appraisal information that they have to date. The Corps would advise the owners of the relocation assistance available to them under Federal law. The relocation assistance would include items such as financial assistance in moving and purchasing a new home. This step would not take place until after the Record of Decision (ROD) on the Canonsburg site is issued, which is anticipated in August 1983.

Third, if the Corps could not negotiate a purchase, the DOE would request that the Corps and the United States Attorney General's Office in Pittsburgh commence condemnation proceedings. Hopefully, this could be avoided. In that event, the DOE would be obligated to deposit with the U.S. District Court the estimated just compensation for the property. The property owner is entitled to this money as soon as it is deposited, and the issue of fair market value would subsequently be decided by the Court.

6.2.12.2 Other residents near the expanded Canonsburg site

Issue 1: One commenter stated that the residents of streets near the expanded Canonsburg site should be relocated. (27)

Response 1: Based on the potential impacts calculated for each alternative, it has been determined that it would be unnecessary to relocate any residents on streets near the expanded Canonsburg site, either during or after the remedial action.

6.2.13 Procedural matters

Five comments were received on several procedural matters in the Canonsburg DEIS (U.S. DOE, 1982a); two comments came during the public hearings, two were received in personal letters, and one was received from the Pennsylvania DER.

Issue 1: Three commenters stated that the DOE failed to provide adequate notice in the Federal Register, about either the availability of the Canonsburg DEIS (U.S. DOE, 1982a) or notice of the date of the public hearings. (34, 111, 233)

Response 1: The DOE provided adequate notice of availability of the Canonsburg DEIS (U.S. DOE, 1982a). Notice of its availability was published in the Federal Register on December 8, 1982 (47 FR:55305) along with the announced closing date (January 24, 1983) for comments. Copies of the Canonsburg DEIS (U.S. DOE, 1982a) mailed on December 3, 1982 contained a notice of the public hearing dates. The Canonsburg DEISs (U.S. DOE, 1982a) were mailed to those persons and groups shown in "List of Agencies, Organizations and Persons to Whom Copies of This Statement are Being Sent" in the Canonsburg DEIS (U.S. DOE, 1982a). Included in this list are many representatives of the local media, including radio and television stations and newspaper personnel, and local public libraries. Additionally, news releases were disseminated in the affected areas concerning the dates and places of the public hearings. All comments received are included in the Canonsburg FEIS.

Issue 2: One commenter stated that when the project is undertaken, the proper Commonwealth permits to control erosion and sedimentation will be required. Permits will also be required in accordance with the Dam Encroachment Act and/or the Pennsylvania Flood Plain Management Act (232).

Response 2: The necessary Commonwealth permits to control erosion and sedimentation will be obtained by the remedial-action contractor. Appendix J of the Canonsburg FEIS has been added to provide the flood plain assessment required by the DOE regulations (10 CFR 1022). It brings together in one place in the Canonsburg FEIS the information necessary to comply with the Pennsylvania Flood Plain Management Act. The preparation of the flood-plain assessment required by the Pennsylvania Flood Plain Management Act will be completed after the Record of Decision (ROD) is published.

Issue 3:

One commenter referred to the listing of persons to whom copies of the Canonsburg DEIS (U.S. DOE, 1982a) were sent. Fifty names are listed, but there were 500 persons at the Hanover site public meeting. (74)

Response 3:

Copies of the Canonsburg DEIS (U.S. DOE, 1982a) were sent to everyone who requested one. They were also made available in local libraries.

6.3 TRANSCRIPT EXCERPTS

Public hearings were held on January 11 and 12, 1983 to solicit public comments on the Canonsburg DEIS (U.S. DOE, 1982a). Official transcripts were made of these hearings. The statements presented in this subsection are excerpts taken verbatim from these transcripts. The name of the person making the comment is given in parentheses at the end of each excerpt. Tables 6-6, 6-7, and 6-8 show the names of the commenters and the page numbers where their statements may be found for the Canonsburg, Burrell, and Hanover sites, respectively.

Table 6-6. Excerpts from the Canonsburg public hearing -- January 12, 1983

Commenter	Comment no.	Comment page no.
Amarose, Anthony	13	6-72
Dunn, Janis C.	20	6-74
	21	6-74
	22	6-74
	23	6-75
	24	6-75
	25	6-75
	26	6-76
	27	6-76
	28	6-76
	29	6-76
	30	6-77
	31	6-77
	32	6-77
Faiella, Joyce	1	6-70
	2	6-70
	3	6-70
	4	6-70
	5	6-71
	6	6-71
	7	6-71
	8	6-71
	9	6-71
Johnsrud, Judith, Ph.D.	42	6-80
Mirisciotti, Sam	40	6-79
	41	6-79
Polinski, Henry	10	6-71
	11	6-71
	12	6-72
Solic, Nicholas P.	16	6-72
	17	6-73
	18	6-73
	19	6-74

Table 6-6. Excerpts from the Canonsburg public hearing
 -- January 12, 1983 (continued)

Commenter	Comment no.	Comment page no.
Sperling, Lawrence I.	33	6-77
	34	6-78
	35	6-78
	36	6-78
	37	6-78
	38	6-79
	39	6-79
Sweet, David W.	14	6-72
	15	6-72

Table 6-7. Excerpts from the Burrell Township public hearing
 -- January 11, 1983

Commenter	Comment no.	Comment page no.
Ardell, Danelle	43	6-80
	44	6-80
	45	6-81
Wolford, Jean	46	6-81

Table 6-8. Excerpts from the Hanover Township public hearing
-- January 11, 1983

Commenter	Comment no.	Comment page no.
Coulter, William	56	6-83
	57	6-83
	58	6-83
	80	6-88
Louder, Donald	67	6-86
Lucchino, George M.	68	6-86
	69	6-86
	70	6-86
	71	6-71
	72	6-87
	73	6-87
	74	6-87
	75	6-88
	76	6-88
	77	6-88
	78	6-88
	79	6-88
Mastrantoni, Patricia	51	6-82
	52	6-82
	53	6-82
	54	6-83
	55	6-83
Murphy, Austin	47	6-81
Plunkett, Ruth	81	6-89
	82	6-89
	83	6-89
	84	6-89
Stewart, Cynthia J.	48	6-81
	49	6-81
	50	6-82

Table 6-8. Excerpts from the Hanover Township public hearing
 -- January 11, 1983 (continued)

Commenter	Comment no.	Comment page no.
Zibritosky, George	59	6-84
	60	6-84
	61	6-84
	62	6-85
	63	6-85
	64	6-85
	65	6-86
	66	6-86

Comment no./
response
subsection no.

Comment

Canonsburg Public Hearing -- January 12, 1983

1
6.2.2.2 However, since the recommended course of action is to stabilize the material at the site, our following questions and comments are based on that fact. We would recommend that the least amount of contaminated earth be disturbed to minimize the chance of airborne contamination. Also as noted in the EIS draft, contaminated materials should be dampened to further reduce the chance of airborne contamination and all vehicles transporting this material should be adequately covered. (Faiella)

2
6.2.3 Regarding the monitoring of onsite activity as it relates to airborne contamination, we would recommend that the onsite monitors be equipped with alarm systems to notify personnel to stop work when minimal health standards are exceeded. We do not want to be informed at a later date that work continued after healthful limits for children were exceeded; nor do we want to be put in a position of not having protected our children and teachers if for some reason this limit is exceeded for a long period of time. (Faiella)

3
6.2.3 While the cleanup activities are in progress, offsite monitoring of conditions should also continue. It is imperative that monitors be placed in and around the school during remedial action and results of these be given daily. Also, some type of alarm and measuring system be set up in the event levels in and around the school increase.

Along with the above mentioned systems, DOE should work with St. Patrick's School to set up guidelines for evacuation on a short-term and long-term basis in the event of an emergency. Mention is made in the Environmental Impact Draft Statement of measures that would be taken if an emergency would arise at the working site but not at the school or nearby areas. (Faiella)

4
6.2.5.2 As we read through the EIS draft, many questions are raised. One, exactly what levels of radon gas and radon daughters are projected to show up in and around St. Patrick's during the cleanup activities? We want to know to what levels our children will be exposed to the radon gas picocuries per liter and the radon daughters in working levels.

Two, since children are ten times more susceptible to problems from radiation exposure, what are the long-term and short-term health effects on the children?

Comment no./
response
subsection no.

Comment

Three, what increase in risk of cancer or other health problems are projected in children as a result of the remedial action? Should not the Environmental Impact Statement Draft have included information regarding questions such as these? Questions pertaining specifically to children. (Faiella)

5 The engineering plans and specific procedures to be followed during
6.2.2.1 the cleanup activities are also questioned. One, will any or any
 parts of the buildings be sold as salvage? (Faiella)

6 Two, will bentonite clay capsules be adequate? Will there be any
6.2.2.1 leakage from the capsule in the distant future? (Faiella)

7 Three, will the containment area be outside of the flood plain?
6.2.2.1 (Faiella)

8 We need to be informed as to the future proposed for this site. It is
6.2.2.1 our strong feeling that no other than storage of the material
 presently there should be contemplated. We are adamant concerning the
 issue and want the NRC to legally guarantee that no additional
 radioactive material will ever be brought to the site for storage,
 disposal, or handling. (Faiella)

9 Further, to insure that this site never again is the health hazard
6.2.3 that it presently is, we want monitors and personnel to interpret the
 data permanently assigned to the site to insure that it will never
 again exceed the health and public safety standards as developed by
 the EPA. (Faiella)

10 I would like to know the chemical weights that we are working with
6.2.4.1 here and what will be the chemical weights after it is completed? The
 Government did not know what they were playing with when they brought
 it in and I don't think they still know. We do know 238 and 235 mixed
 together are very dangerous. We don't want this to happen here.
 (Polinski)

11 I would like to know how many rem our people is going to be receiving
6.2.5.1 after and what we are taking now? Is it a health hazard as your
 say? I can show you where a man lived right next to this. He is 101
 years old. Is this a health hazard? I can show you a woman, Mrs.
 Lux (phonetic), lived to be 100. Is this a health hazard? (Polinski)

Comment no./
response
subsection no.

Comment

- 12 Why play with something when you don't know what you are doing with it
6.2.1.1 and the same way with moving that. I would say, yes, contain it, put
it in Canonsburg, put a lead shield around it, cover it in properly
so it will not get out of there. That is the only way. (Polinski)
- 13 One more thing I want to say, if you brought this stuff in when I
6.2.1.2 worked down there on rails, Mister, take it out on rails. Where you
put it is your business. (Amarose)
- 14 A second point ... has been Federal legal interpretations about what
6.2.12.1 constitutes fair market value for contaminated properties. I think
those interpretations have been grossly unfair and they have and will
continue to result in costly and expensive litigation not only for
those who must join in that litigation from the Plaintiff's point of
view but also for the taxpayers who must pay for the Government's
attorneys. I think that it is not at all fair for us to have
appraised the property that has already been appraised at its value
post-knowledge of contamination rather than its value pre-1977.
(Sweet)
- 15 I can't help but conclude that your recommendation 3 is based upon
6.2.1.3 non-scientific factors. I can't help but conclude that it was
determined that, number 1, all other recommendations were extremely
expensive and, number 2, that public outcry in places like Hanover
Township was so great that in effect our hands were thrown up and we
said perhaps we will leave it in Canonsburg. (Sweet)
- 16 Second, the report to the President by the Interagency Review Group
6.2.2.1 on Nuclear Waste Management in March 1979, stated, "The relative
magnitude of actinide elements, for example, uranium, thorium, radium,
radon, et cetera, in mill tailings, high-level wastes and transuranic
wastes per unit of energy generated suggest that all of these waste
streams may present problems of comparable magnitude for the very
long, that is, beyond a period of 1000 years. By virtue of their
presence at the surface, these actinide elements in mill tailings may
constitute a greater potential problem even than those in deeply
buried high-level waste or transuranic waste sites. Due to the long
half-life of thorium-230, the parent of radium, the quality of radon
and radium in the tailings will diminish by only half in roughly in
80,000 years.
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"Moreover, this long half-life of thorium-230 dictates that the research and development in tailing stabilization must consider the effects of geological processes operating over geological time upon the transport of radon and radium through biosphere and hydrosphere surrounding the tailings.

"The ultimate objective should be to dispose of the tailings in such a manner that emissions of radon and radium are released to or as near background levels as can reasonably be achieved and that no active institutional care be required to keep the tailings isolated from people following disposal." This statement indicates the major potential problem at the site and this should not be overlooked.
(Solic)

17
6.2.2.1 I have not been able to find any studies which prove that a clay liner for the site's contaminating material would meet the above criteria. It is my understanding that the only field study, a liner evaluation for uranium mill tailngs as presented in the DOE Nuclear Waste Management Quarterly Progress Report, July to September 1980, is not yet scheduled for completion. Therefore, we must depend only upon laboratory studies to predict the performance of the bentonite, gravel and sand mixture liner as proposed for this site. (Solic)

18
6.2.3 Third, maintenance and monitoring for the site is only described in three short sentences in the draft EIS. I quote, "After all of the cleanup work is finished, the DOE or another Federal agency charged with custody of the disposal site will continue to monitor the final disposal site to ascertain whether the remedial action program continues to comply with the EPA standards. This will include measurements of parameters such as air and water contaminant levels as specified by the NRC in its license and maintenance of the site as required. All EPA standards will have to be met before the remedial action is considered officially completed."

For what I believe is unproven technology, I would want the monitoring schedule spelled out in more than general statements. I am thinking how the monitoring wells are spaced over the site; how often samples are taken; availability of the the data which would indicate leaching, etc.; the availability to local citizens and local groups. How are we to evaluate the adequacy of the draft EIS if important considerations of monitoring and eventual responsibility for the site are not really presented to us. (Solic)

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- 19
6.2.1.1 Since the solution preferred by DOE includes stabilization at the site, as opposed to relocation, I feel this is justified in terms of the large volumes of material contaminated at the site; anywhere from 200,000 to 600,000 tons. But in the light of the questions I have raised and if stabilization is going to be at the site, I would prefer an alternative which would be more easily monitored and repaired; namely, stabilization in above-ground containment buildings properly shielded. (Solic)
- 20
6.2.6.1 Section 4, Paragraph 9-4.3.4, "Wind," tells us that the average wind speed is 4.7 miles per hour and we never have winds exceeding 22.4 miles per hour; at least not from 1979 to 1980 when the winds were measured. I have to question this statement because I am well aware of the fact that it is not uncommon for us to have wind gusts up to 35 and 40 miles per hour. We did all day last Friday, January 7, and the second day the NIO was working at the American Legion, they had to stop work because of the high winds. We measured up to 32 and 35 miles per hour. We've had wind gusts up to 68 and 70 miles per hour usually in February and March. I think that is pertinent information that should be included in the final EIS. (Dunn)
- 21
6.2.5.1 Section 4, paragraph -- page 41, paragraph 4.12.5 under "Housing" tells us that the closest houses to the Canonsburg site are as near as 250 feet away. Now I borrowed my husband's measuring tape and I stretched it from the fence across my yard inside the kitchen by 2 inches and I measured 80 feet. So I ask that this correction be made in the FEIS. (Dunn)
- 22
6.2.5.1 The DEIS covers every imaginable subject and would lead one to believe that nothing is left unsaid; but, I can find nothing in the Canonsburg DEIS about the 11 cancer deaths in the Davis family who live on Payne Avenue; only feet away from the lagoon.

There is nothing mentioned about the fact that every house on Strabane Avenue, Payne Avenue and the lagoon side of Youngstown Street has experienced cancer or a cancer-related death. The national leukemia rate is 3 or 4 in 100,000. We have three on Strabane Avenue; a street with only 10 houses. I didn't read this in the DEIS.

An unusually high number of 1979 Canon-McMillan graduates have experienced cancer; 9 out 385. Two have died from it. After this information was made public seven other members of the 1979 class phoned to report conditions and illnesses that were labeled by their physicians as hard to diagnose and unusual for people that young.

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Because the school is within three-quarters of a mile of the site, because some of these people played ball on the lagoon and because of all of the other cancers near the site, I feel there should be a thorough investigation to determine if there is a link between the cancers and the radiation. (Dunn)

23 We request that the Federal Government provide a health study to
6.2.5.1 include all of the facts about our health in the final EIS. If the
EIS becomes final without these health facts, it will be incomplete.
(Dunn)

24 The DEIS states that under Alternative number 1 (no remedial action),
6.2.5.1 the present situation would remain and that the main impact of this
alternative is the 5.4 lung cancer deaths over the next 32.5 years
within 1 and a quarter miles of the site. These figures are totally
inaccurate for the Canonsburg area. We have had eight lung cancers
within only 200 yards of the site in approximately 12 years. There
are three on Strabane Avenue, one on West Pike Street, two on Payne
Avenue, one on Youngstown Street and one admitted on Latimer Avenue.
The others -- there are two others suspected but they haven't been
admitted.

Steven Lanes, from the University of Pittsburgh, conducted a lung
study of the Canonsburg area. Not one of the homes where I mentioned
above where the lung cancers occurred was included in the study and
yet the DEIS uses his study as a reference. I think this is
unfortunate and irresponsible.

The DEIS states that, "After any of the other alternatives are
completed, the chance of dying from lung cancer will be reduced to 1
in 1,000,000. How can we believe these figures when it is obvious
from the Option 1 figures that the data from which these were taken
does not apply to our area? When I surveyed my neighbors' health
problems, I was astounded by the many cancers in my area and
suspected that radiation was the cause. (Dunn)

25 Also they should indeed be concerned about just how any remedial
6.2.3 action is proposed to be taken. There is a grave danger that more
radium can be suspended into the air in an improper effort to move
any of the contaminated materials within sites or to other
locations. This is going to require serious consideration of ongoing
capable monitoring and may well raise the question in the residents'
minds that they may wish to seek evacuation from the area during any
proposed remedial action. (Dunn)

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- 26 The ideal solution would be to get all of this contaminated material,
6.2.1.2 hundreds of thousands of tons of it, out of this area that is an
 inhabited area and take it to some isolated area hopefully virtually
 free of human inhabitants and with care a repository for the
 contaminated material should be created wherefrom the radioactivity
 has as small a chance as is possible of gaining access either to the
 air or to surface waters. While this is an ideal solution, it carries
 risks with it. The stirring up of all the contaminated material will
 create a hazard for vicinity residents; the transport to some distant
 site may avoid -- must avoid spills if we are not to increase the
 existing hazard. It is easy for people to talk of doing this with
 good engineering practice, but it would be highly advisable that the
 residents of the area have some way of achieving confidence that this
 will indeed be done without adding to their radiation exposure in a
 serious manner. And they should be fully informed about all this so
 that the issue of possible evacuation can be considered and discussed
 before such remedial action. (Dunn)
- 27 Now, the DEIS does state that there will be an additional health
6.2.3 hazard created during remedial action when contaminated particles
 will be stirred up but no provisions have been made to relocate the
 residents during this time. We have been told that this is not
 necessary because every precaution will be taken to prevent this
 hazard but the Department of Energy can't give us a written guarantee
 that there will not be this additional exposure -- hazard at this
 time.
- 27 None of us wants to be here. We shouldn't be living here now I don't
6.2.12.2 believe. So I would like you to include provisions for our
 relocation in the FEIS; not just Ward Avenue but also the other
 streets that are near the site. (Dunn)
- 28 It seems to make no sense to move these wastes to Hanover where they
6.2.10 are already overburdened with waste problems. I can't see the sense
 in creating another waste dump. (Dunn)
- 29 In-situ stabilization in Canonsburg does not come with a guarantee
6.2.3 that the dump will be monitored and maintained until it becomes
 inactive. This material has a half-life of approximately 1500 years.
 We have no guarantee that it will remain intact over 200 years; if
 that long. (Dunn)
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30 This is what the EPA has to say about secure landfills. My reference
6.2.2.1 source is Low-Level Waste Policy Act, 94 Statute 3347-9, Public Law
No. 96-573, 96th Congress, December 22, 1980. There is good
theoretical and empirical evidence that the hazardous constituents
which are placed in land disposal facilities very likely will migrate
from the facility in the broader environment. This may occur several
years, even many decades, after placement of the waste in the facility
but data and scientific prediction indicate that, in most cases, even
with the application of the very best available land disposal
technology it will occur eventually.

So it seems inevitable that somewhere down the line those living in
this area will be experiencing problems with this dump. I don't want
my great, great, great, great grandchildren to experience the same
hell I am going through. I don't want them to search the records to
learn that in 1983 we had a chance to be rid of this problem but
instead decided to patch it up and hand it down to them. If we allow
this to happen, they have every right to curse us and call us fools
for indeed we will have been. (Dunn)

31 I believe there is one solution to this problem which exists in 25
6.2.1.2 different locations; I believe a central repository should be found
immediately. All contaminated material should be brought to this
depository creating one dump instead of 25. It would seem this would
be in the long run financially feasible since one dump would need to
be monitored and maintained instead of 25. (Dunn)

32 Finally, if number 3, stabilization in Canonsburg is chosen, the
6.2.10 properties within 1 mile radius would be forever worthless. I
believe that eventually it will become a dead area. There are no
provisions in the DEIS to compensate the residents for their loss.
(Dunn)

33 The confidence of the local community and the competency of Federal
6.2.5.1 agencies to permanently isolate these wastes and contaminated
materials from their environment have been shattered by the severity
of the current situation. Citizens of Canonsburg and Strabane live in
daily fear of exposure to radiation, nuclear contamination, cancer,
chromosome damage, et cetera; yet as we have heard this evening, DOE
from the start bases its varied assumptions about the current public
health effects on studies which are incomplete, inaccurate and which,
to my knowledge, have not been available to the public. (Sperling)

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34
6.2.13 Furthermore, I have become aware that the Department of Energy has failed to provide adequate public notice of the very publication of this Draft Environmental Impact Statement. These examples are indicative of a failure throughout the DEIS to meet the goal of improving public knowledge of participation in the Nuclear Waste Management Program which was -- a goal which was called for in the program summary document. (Sperling)

35
6.2.2.1 To insure the public confidence in the proposals submitted in this EIS, it is imperative at the very least that the DOE, in its final EIS, address this statement made in the Interagency Review Group Report and develop a proposal engineered to insure that the mill tailings in Canonsburg will be treated with the same degree of longterm care as DOE would treat high-level wastes and transuranic wastes. (Sperling)

36
6.2.1.1 In light of this Interagency Review Group recommendation, the onsite stabilization of mill tailings, if an onsite option were to be selected, it should be treated along the lines of monitored, retrievable, temporary storage rather than permanent disposal. This DEIS conspicuously lacks any detailed discussion of long-term monitoring of the site.

While it is true that a monitoring license must be obtained from the NRC, this requirement does not mitigate the importance of analyzing monitoring systems in the EIS for several reasons.

First of all, an adequate monitoring system should be incorporated in the engineering design of containment facilities itself; specifically if the facility is below ground where there is a substantial risk that the integrity of the capsule may be disrupted without detection.

Furthermore, monitoring systems will affect the overall cost of the project and possibly influence the choice of alternatives. (Sperling)

37
6.2.2.1 Most importantly, however, an EIS which fails to adequately guarantee the long-term safety of the community from radioactive contamination fails to achieve its fundamental purpose of insuring public confidence. There is in fact no discussion in the DEIS of how long the proposed encapsulation will last, while there are intimations that water will begin to percolate through the system within a very few short years. (Sperling)

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- 38
6.2.1.1 It is thus conspicuous indeed that the DEIS fails to examine engineering alternatives for encapsulation techniques. Without such an examination the DEIS again fails in its purpose of ensuring public confidence that the proposed action is truly in the interest of long-term public health. A proper analysis should examine the long-term integrity of a variety of possible materials and of alternative designs which include monitoring systems and should make clear how long each alternative is expected to last. (Sperling)
- 39
6.2.1.1 Furthermore, in light of the long-term radiological hazards of mill tailings, the disposition of these wastes in a populated area should also be viewed as temporary. The Canonsburg DEIS should at least include proposals for eventual complete decontamination of the site.
- 39
6.2.1.2 Many experts and laymen alike look to the possibility of above-ground storage options for meeting this need and suggest that an above-ground facility will also expedite adequate monitoring and decrease the possibility of undetected destabilization. The advantages of such an option in the savings and monitoring costs may well outweigh the added construction costs and aesthetic detractions and should at least be examined as a reasonable alternative rather than dismissed cursorily in order to insure public confidence that the ultimate proposal is not chosen merely because it is the cheapest. And furthermore, I would like to lend support to Janis Dunn's suggestion that -- to solve all these problems right now and find a central, permanent repository for all the mill tailings sites. (Sperling)
- 40
6.2.12.1 Comment on the purchase of homes, the seven or so homes that are within the area of these tailngs. I feel that these people are not given -- have been given considerations about the worth of their properties; whether they want to label it fair market value. I would sooner label it fair replacement price. They are not going to take their money and run. I am sure they want to relocate and they need that money to purchase something to live in that is equal to what they are living in. (Mirisciotti)
- 41
6.2.3 I would also like to see a monitoring system devised so the local citizens may understand what is going on, and to use an expression, be able to read it like a simple meter; so many degrees Fahrenheit and so on and have a representative from the area who is a local citizen be part of the monitoring team so that he too may have an office and phone number so it might alleviate any anxieties that are caused by whatever procedures are taking place and I am sure it would give the people in the area more confidence of what is transpiring. (Mirisciotti)
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42
6.2.4.3 Now, the new EPA standard, I have had time to glance through enough to discover, takes a much more relaxed approach; especially in the matter of the timing of consideration and I would like to emphasize to you that 200 years is in the realm of scarcely the beginning of a drop in the bucket of time that mill tailings piles will remain hazardous to the public. The 1000-year period the EPA had previously indicated is only a slightly larger drop. The full period of toxicity is the time period that should be indeed considered and I would refer you to both the National Environmental Policy Act and the two court interpretations of that Act that I believe would apply in DOE's consideration of time period.

Now 6 feet of cover simply won't do it because we are in fact talking about geological time. We are not talking about 200 years. We are not talking about 1000 years. We are talking about a much longer time period. (Johnsrud)

Burrell Township Public Hearing -- January 11, 1983

43
6.2.1.1 So after we carefully reviewed the Environmental Impact Statement, I feel that the eliminated alternative to stabilize the uranium mill tailings above ground at the Burrell site is the most feasible. (Ardell)

44
6.2.9.2 Alternative 3 proposes to stabilize the nuclear waste at the Burrell site under 3 feet of landfill. The Environmental Impact Statement states of the 40 inches of rain falling on the site per year, 8 inches, or 20 percent, will infiltrate to the underlying contaminated zone. The report goes on to say that as time goes on, decomposition of the landfill will cause surface depressions and more water will percolate to the nuclear waste. This proposal shows precipitate draining into a drainage swale. Through leaching, the contaminated water will get into the ground water and then will be channeled into the Conemaugh River. The radioactivity level of this runoff will become greater as the fill settles. The Environmental Impact
44
6.2.3 Statement also states this method will "keep infiltration under reasonable control for perhaps 50 years." A maximum of 50 years. But parts of the uranium mill tailings waste have a half-life of 80,000 years. Whose responsibility will it be when infiltration is no longer under reasonable control? Whose responsibility will it be when the radioactivity level reaches unacceptable proportions in the Conemaugh River? (Ardell)

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45
6.2.1.1 In review of the maintenance and monitoring section, the DOE does not submit to how long they will continue to monitor the cleanup site to be certain that EPA standards are met. I would like to see more details as to how often and how thoroughly these standards are checked and for how long. I feel that just by their nature, all nuclear dump sites should be considered temporary.

The storage of radioactive waste should be monitored and retrievable. This would indicate to me above the ground storage. (Ardell)

46
6.2.3 I talked before when you had the meeting before, and I keep on saying, I want to keep agreed to stabilization of Burrell Township material, and also we want nothing or no more brought into the area. We want to stabilize it, cover it over and also be monitored during the years because the level might go up. We don't know that. But we want it to keep stabilized and we don't want it moved. (Wolford)

Hanover Township Public Hearing -- January 11, 1983

47
6.2.1.2 Although Options 2 to 5 do, as you stated, provide an improvement to the current situation, most of us would have preferred an additional option of transporting the material far away to a truly unpopulated area. Options 4 and 5 would merely provide a disturbing and transporting of the material a short distance from one populated area to another populated area; albeit this area has perhaps less of a population, it is nevertheless a populated and growing area which does not seem to me to be the wisest choice. (Murphy)

48
6.2.10 I sympathize with the people of Canonsburg greatly. I understand how they feel about the contamination and the radiation being there all these years. I know they do want it out of there. But when you talk about the years that it would take to move it from there to here and how much damage it may do to the people of the future generations by moving it to our area, when we could stabilize it there in Canonsburg, and if you had to relocate some of the people, I could even understand and justify the cost for that. But I cannot see taking it from that area and bringing it up here where our population is growing. (Stewart)

49
6.2.7.1 We are a land in Hanover Township that is consistent with underground streams. We have underground mines and caves and your are going to put this contaminated radiation waste into this area where it is going to move out like a sieve, it is going to go -- just funnel into

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all these different areas from Hanover-Beaver to Hanover-Washington, to Findley Township, Burgettstown, Avella, Cross Creek; it is going to affect the people, Weirton, West Virginia -- thousands upon thousands of people. (Stewart)

50
6.2.5.2 An article recently appeared in the Pittsburgh Press on the Sunday, December 19 issue, where Canonsburg residents estimated that in 20 years four deaths will occur from this radiation that is there now. But in 20 years, how many other people would have been exposed to it by moving it up to this area? (Stewart)

51
6.2.7.1 The Starvaggi Industries land, which you are considering for the dumping site, has been strip mined for some time. Dynamite was used in the course of this operation and I stated before that I was very concerned about the possibility of fracture damage to this area. (Mastrantoni)

52
6.2.8.1 Page 415 (4-15) of the Draft Environmental Impact Statement states, "It is possible that there was fracture at the Hanover site caused by this type of blasting during the strip mine operations." Your own studies have proven that water at Hanover drains into the Ohio River.

Page 420 (4-20) also states, "The area of these sub-basins that is directly affected by surface water runoff is approximately 425 acres." Since millions of people depend on the Ohio River for their drinking water, contamination of this river by radioactive waste even if the dilution fraction is within EPA guidelines, is totally unacceptable. (Mastrantoni)

53
6.2.7.1 It is well known that if these radioactive tailings were to come in contact with other waste which is incompatible, the chemical reactions which result from such contact can cause injury, intoxication or death of workers, members of the public, wildlife and domestic animals. As I told you last year, many long-term residents of this strip mined area have witnessed chemical trucks entering this area and dumping their truckloads of chemicals. Since they carried no visible signs naming their chemical contents, residents were never sure of what chemicals had been dumped. I requested that extensive testing be done of the soil above and below ground level in the area being considered for waste disposal to assure that dangerous chemical reactions could not occur.

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On Page 429 you note that water samples in this area are highly contaminated by acid rain, chlorides, iron, and dissolved solvents. However, the kind of extensive soil testing I had requested has not been conducted to my knowledge. If this is true, you have completed only half the job in the area of testing. (Mastrantoni)

- 54
6.2.3 Number 3, long-range monitoring. Last year I also requested the detailed plans for the constant and thorough monitoring of the soil, air, and water in the area surrounding the proposed dumping site be presented for citizen approval before any wastes are disposed of in this area. You have discussed environmental consequences in your statement. You have also discussed mitigation measures during the remedial action. However, I have not come across long-range, detailed plans for the constant and thorough monitoring of the soil, air and water in this area. (Mastrantoni)
- 55
6.2.10 Since the possibility does exist that future medical studies may prove loss of life or health, directly associated by that contamination, I requested that before any dumping of radioactive waste occurs in this area, provisions would be made for financial reimbursement to victims and/or the families if future contamination occurs in this area and proves financially, physically or emotionally harmful to the people and/or their land in this area. I do not believe that such financial provisions have been made. (Mastrantoni)
- 56
6.2.10 We are about to lose maybe Weirton Steel as one of the biggest employers around this community. If that was to happen and they was to move this tailings into this area, it would only add a burden on our community to induce other businesses to come into our area. (Coulter)
- 57
6.2.10 One of the things in my mind, though, is our school. It is so close to this area. We have a big playground here and also that the runoff from this area runs right within 300 feet of a school in Colliers and these are the main issues I feel. Plus the fact that with the loss of the money in this community right now there is no way that we could rebuild another school in any other place around here. I don't believe we could get any bond issues floated or anything else for one. (Coulter)
- 58
6.2.7.1 I do know, I was in this area years ago when we had small earth-moving equipment. At that time we had to shoot extra-heavy dynamite to open these pits up. I seen them shoot so hard when they got down to where
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the coal was, the coal was under the spoil piles. They just blew the coal clear -- they didn't know where the coal went when they got there, that is how hard of dynamite they was doing back in them days. So it had to get on down and crack up the formations in underneath. I felt these shots as far as five miles away when they was doing this dynamiting. (Coulter)

59
6.2.8.1 At the time of last June, I had indicated that the lack of credibility of the site selection team in selecting one of the sites in Hanover Township which included the watershed of the Smith Township water supply; it is the pond, lake and so on. And I think it further shows the lack of credibility on the reviewers who had permitted it to go on rather than to eliminate that as one of the sites. But that is perhaps one of the main concerns. (Zibritosky)

60
6.2.7.1 It is stated that near surface geology at the Hanover site has been disturbed by strip mining of the Pittsburgh coal seam. The site is now underlain by mine rubble which is quite porous and enhances the permeability and transmissibility of the surface and ground water. Furthermore, it is more susceptible to additional movement and settlement. In many areas within Hanover site, the clay layer typically found below the Pittsburgh coal seam was presumably removed by the strip-mining operation. Below the clay it was reported that the Castleman formation exists and it was fractured. It was common practice in the area to blast the rock formations under the coal seam to facilitate drainage. Okay. What are the probable effects of this surface geology and fractured rock strata underlying the real coal seam. A case in point is the affected water wells which were properly cased in the nearby Smith Township watershed which is adjacent to one of the current sites that is being considered for this disposal. It serves -- our water supply area serves approximately 1300 customers. They were wells drilled in the area where the Pittsburgh coal seam was nonexistent; that is, it cropped out into the hills and down in the valley where there was no coal or no disturbed layers or strata or geological formations. Wells have been drilled, properly cased, and water was, prior to the strip mining operation and so on, was of good quality -- drinking quality. (Zibritosky)

61
6.2.7.1 Subsequently the water has become polluted and it contains all the indications of mine drainage and this supports what the two previous speakers indicated that this is removed some distance from the strip mine operation itself and it just shows you that rock structure underneath the coal had been fractured or contains faults which permitted this water to penetrate into the area and penetrated into

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the ground water and into the wells. So this is a case in point that supports what the two previous speakers have indicated. Penetration of the water with the acid rain drainage characteristics into the wells whose immediate surroundings were unaffected by the strip mine operations may be attributed as I said to faults and fracture of the rock strata below the coal. Thus, we may draw conclusions that the coal rubble which is proposed to be used in effecting the encapsulation is highly porous. Water percolating through coal rubble becomes acidic and therefore becomes significantly more active which will make it increasingly more difficult to achieve safe encapsulation. The subsurface rock strata are either faulted or fractured or both resulting in growing areal ground-water pollution and contamination as indicated by this so-called well. I think there are three wells in the watershed that was at one time used as a supply to the water authority. Any leaks in the encapsulation structure will therefore enter the ground water and subsurface strata because of the fractured strata. (Zibritosky)

62
6.2.7.1 Because of the coal rubble (rock, coal, shale and so forth) which makes up coal rubble, settlement will likely occur with its attendant stresses placed on the encapsulation structure. Therefore, the thinking would be that cracks would be generated. (Zibritosky)

63
6.2.6.2 Another factor is air quality at Hanover Township. Total suspended, particulates also already exceed National Ambient Air Quality Standards. The proposed transportation of materials from the Canonsburg site will further adversely affect the air quality via dust and exhaust fumes from vehicles utilized in transportation, disposition of the material on the site. (Zibritosky)

64
6.2.5.2 The radiation effects on health. You people have indicated in your Canonsburg DEIS that 5.4 people of the relatively 14,000 people in the Canonsburg area might contract lung cancer within the next 32 years. In your DEIS, you have indicated with proper stabilization -- or the stabilization type that you people are proposing, that this [lung cancer] would be reduced by a factor of 700 and you indicate then that you just divide 5.4 by 700 and you assume it is a linear relation and I think that is incorrect. It would be more -- it would be by a greater factor because of the lower intensity level of radiation and therefore it should have less influence or less effect on any individual. (Zibritosky)

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- 65 I attended the meeting that was held in Canonsburg just recently and
6.2.12.1 one of the main -- one of the primary complaints was by the seven
home owners in the area that would be directly affected and I think
one of their main complaints was that they would be compensated an
amount which would be determined by local realtors who would assess
the value of those particular houses as is and where they are
presently located and they say that of course will adversely affect
their prices of their house or what they will get. I think in
addition you will find that they have a real legitimate complaint in
that you are going to require, if these people do retain their house
and so on, that they are going to have to vacate them for two or
three years during this so-called stabilization or removal to say a
proposed site such as Hanover. I think that there is error on the
DOE and whomever is responsible for making this statement that the
price -- or the value of the house that will be established by local
realtors on the as is condition and I think that is unfair and I
think some of the costs that might be saved should be applied toward
that because those houses will be vandalized. They are going to have
to be repaired if those people elect to reclaim them after the
removal and so on. (Zibritosky)
- 66 This 100 acres in this particular area is underlaid with another seam
6.2.7.2 of coal which is known as Upper Freeport. In addition, this -- the
Appalachian overthrust belt, which is an oil-bearing belt, extends
down from Alabama up through New York and it extends up through this
particular area and also presume into the Canonsburg area. However,
oil wells and gas wells are located within a mile of this Hanover site
area and I think it would therefore affect somewhat economic resources
of this area. (Zibritosky)
- 67 This area now is hard hit by the economic depression. If the tailings
6.2.10 are brought here, you really are just going to make it harder for
businesses to be attracted to this area. (Lounder)
- 68 It [the Canonsburg DEIS] is not complete; very general. It talks
6.2.5.1 about birds, talks about air, talks about water, but does not talk
about people - the people in Canonsburg.
- It does not bring up the fact that we have a high rate of cancer
deaths in Canonsburg. (Lucchino)
- 69 As we stated in our previous testimony, we felt that the people
6.2.12.1 located next to this property should be relocated as soon as possible.
As of now they have not been relocated.
-

Comment no./
response
subsection no.

Comment

The people should be moved, relocated, and they should have -- know that any health effects affected from this, like I said before, Government screw-up, these people will be compensated so they don't have to worry about medical bills. (Lucchino)

70
6.2.12.1 Also I understood that the properties were going to be bought up at values way below market value. They are going to be bought up at values because they live next to a dump which this is not their fault. (Lucchino)

71
6.2.9.1 Okay. On page 4-20, you talk about ground water does not meet EPA water standards. Okay. What does it contain? I mean you say it doesn't meet the standards, but we don't -- you know, we just generalized on it and why doesn't it meet the standards? What is in the water? What problems do we have with this water? (Lucchino)

72
6.2.8.3 You have here on 4-20, "A sampling program conducted by the owner of the site was done," and they talk about the problems of that site. That should have been done by individual -- a consulting firm separate from it. (Lucchino)

73
6.2.7.1 I look at your DOE 169, their evaluation of the site, and on page 16, they basically said there is a possibility an unauthorized dumping of toxic and hazardous waste in the past. This was one of our concerns. If you put down this garbage bag liner that we basically do not know what has been dumped there in the past and how it will affect that liner. But it would seem that the EIS has just skimmed over it and passed by it like it doesn't even exist or, you know, there is no great concern there.

So we feel, you know, there should be a much lengthy study on that site if you people still consider on bringing this out here. This would be one of our major concerns. (Lucchino)

74
6.2.13 In the EIS here, you have here "Members of the general public" and we have 50 people's names listed there. If I remember, I think there was like 500 people that were considered general public. This is I think an oversight or -- deliberate or not, I don't know -- but as a matter of fact, there is not even a page number. It talks about the different agencies, organizations and persons who copies of statements are being sent and it has Federal, elected agencies and then it has "Members of the general public." (Lucchino)

Comment no./
response
subsection no.

Comment

- 75
6.2.10 You talk about the public reaction. That was very general. It was fair enough that you people had undercover State Police here protecting you. Also we had a lot of press coverage. We know the way the DOE went about releasing this to the news media caused almost a riot out here. So that was just, you know, gone over real gently. Nothing there. (Lucchino)
- 76
6.2.6.1 Okay. Also we have here about wind. You took surveys from the Greater Pittsburgh Airport. I think you said our maximum wind speed out here is 19 miles an hour. That is general. There should have been maybe a 5- or 10-year review of wind speed for Canonsburg and this area out here to see exactly what it is. (Lucchino)
- 77
6.2.8.1 You brought up about the water. You said there is a watershed in the area; didn't look into it close enough. Also you didn't bring up that this water from this area drains into the Ohio and also the water from this supplies for downstream Weirton. That was very -- real loosely put together. (Lucchino)
- 78
6.2.4.3 Now, you bring up in this EIS about new standards that are to be adopted. We didn't have -- we haven't had a complete review of the new standards but what was told to me was the new standards are not as stringent as the old standards and also that five sites could be eliminated out of the whole Tailing Act. So there you are loosing the credibility and I can understand what your people's hands are tied but you have to look at us that we look at you, you are the only people we can see, and we have no trust in you when we see what has happened to the toxic waste issue and we can see what is happening in Washington. (Lucchino)
- 79
6.2.1.1 Now, if you people can't even help those people in Canonsburg, just like it was brought up again, you know, the state-of-the-art which is just propaganda, what is going to happen 30 years from now when we have the state-of-the-art over here in Hanover and it has been moved? I think our position we will state is the same, that the material should be stored in above-ground containment buildings at the site of generation, which is Canonsburg. (Lucchino)
- 80
6.2.2.1 This Chartiers Creek running down through here close to the site up there at Canonsburg turns right around and goes back in towards Pittsburgh through several large towns and back down the Ohio River, or one of the rivers, and goes right down past our door again. It's been hard for me to understand how they are going to be able to seal
-

Comment no./
response
subsection no.

Comment

this stuff from moving on towards this creek. My question is, is it possible to seal this from that creek? (Coulter)

- 81
6.2.9.2 On page 3-16 it states, "A temporary water supply well and pond will be constructed." I guess after the analysis of the water in the area of Hanover, and I am addressing only my comments on the Hanover statements in the DEIS, because I feel that that is what this meeting is for tonight, I think that there is a question whether water would be available to decontaminate the trucks which are to haul the radioactive material to the Hanover site. (Plunkett)
- 82
6.2.9.2 If the water is of such terrible quality, I wonder if it wouldn't be getting contaminated with something else besides the radioactivity. (Plunkett)
- 83
6.2.10 On page 437, Section 4.9.3, it states, "There are no future land use plans." At the scoping meeting, Donald Darnel of Starvaggi Industries outlined some of the future plans they had for that area. (Plunkett)
- 84
6.2.10 On page 5-35, the real estate taxes collected in Hanover Township were \$202. Now, that may have been the property transfer taxes but I don't think there is a Hanover Township resident in this room that didn't pay more than \$202 on real estate taxes. We do have them divided up. There is a Hanover Township tax. There is a Burgettstown area school tax and there is a Washington County tax and I am sure that all of those added up to more than \$202 out of I think that it was estimated 95 or maybe it was 87 or something like that, \$992. But anyway, I think that those things should be corrected in your EIS. (Plunkett)
-

6.4 LETTERS RECEIVED DURING THE COMMENT PERIOD

The letters received on the Canonsburg DEIS (U.S. DOE, 1982a) during the comment period are reproduced in full in this subsection. The comments that have been addressed in this Canonsburg FEIS are bracketed and numbered. The subsection where the comment is discussed appears under the comment number. Table 6-9 lists the name of the commenter, the comment numbers, and the page number where the letter appears.

Table 6-9. Letters received during the Canonsburg DEIS
(U.S. DOE, 1982a) comment period

Commenter	Comment no.	Page no.
Ardell, Danelle	43	6-96
	44	6-96
	45	6-96
Benish, Joan E.	101	6-97
Dunn, Janis C.	20	6-98
	21	6-98
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	27	6-99
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	31	6-99
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Gofman, John W., Ph.D., M.D.	102	6-102
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Engel, Agnes	105	6-108
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	108	6-109
	109	6-109
	110	6-109
Faiella, Joyce	1	6-110
	2	6-110
	3	6-110
	4	6-110
	5	6-111
	6	6-111
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	8	6-111
	9	6-111

Table 6-9. Letters received during the Canonsburg DEIS
(U.S. DOE, 1982a) comment period (continued)

Commenter	Comment no.	Page no.
Fracke, Sue	111	6-112
Heinz, John	---	
Leney, George W., P.E.	112	6-113
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	123	6-117
	124	6-117
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	127	6-118
	128	6-118
	129	6-119
Lochstet, William A.	130	6-121
	131	6-121
	132	6-123
	133	6-123
	134	6-123
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	137	6-123
	138	6-123
	233	6-125
Oppenheimer, Carol		
Sperling, Lawrence I.	33	6-131
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	34	6-132
	35	6-132
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	37	6-133
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	39	6-133

Table 6-9. Letters received during the Canonsburg DEIS
(U.S. DOE, 1982a) comment period (continued)

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Strang, Donald W.	141	6-136
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Sweet, David W.	14	6-138
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Terrill, James G., Jr.	149	6-139
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U.S. Department of the Interior	157	6-142
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U.S. Environmental Protection Agency	159	6-143
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Table 6-9. Letters received during the Canonsburg DEIS
(U.S. DOE, 1982a) comment period (continued)

Commenter	Comment no.	Page no.
U.S. Environmental Protection Agency (continued)	177	6-146
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Table 6-9. Letters received during the Canonsburg DEIS
(U.S. DOE, 1982a) comment period (continued)

Commenter	Comment no.	Page no.
U.S. Environmental Protection Agency (continued)	219	6-149
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U.S. Department of Housing and Urban Development	---	
Pennsylvania Department of Environmental Resources	229	6-152
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3542 Beechwood BL
Pittsburgh, PA 15217
Jan 20, 1983

Mr James A Morley
Uranium Mill Tailings Project
US DOE
PO Box 5400
Albuquerque, NM 87115

Dear Sirs,

As a member of the Allegheny Sierra Club Conservation Committee I would like to comment on the Draft Environmental Impact Statement dealing with Remedial Actions at Vito Rare Metals Site.

My remarks address the Burrell site only. After careful review of the Environmental Impact Statement, I feel the eliminated alternative to stabilize the uranium mill tailings above ground at the Burrell site is most feasible. Proposed alternatives 2+4 involve transport of hazardous material through major populations. The expense, noise levels, and risks involved make these proposals unacceptable.

Alternative 3 proposes to stabilize the nuclear waste at the Burrell site under 3 feet of land fill. The EIS states of the 40 inches of rain falling on the site per year, 8 inches or 20% will infiltrate to the underlying contaminated zone. The report goes on to say that as time goes on decomposition of the fill will cause surface depressions and more water will percolate to the nuclear waste. This proposal shows precipitate draining into drainage ditches through leaching, the contaminated water will get into the ground water & then be channeled into the Conemaugh River. The radioactivity level of this runoff will become greater as the fill settles.

The EIS states this method will "keep infiltration under reasonable control for perhaps 50 years" A maximum of 50 years. But parts of the uranium mill tailings waste have a half life of 80,000 years. Whose responsibility will it be when infiltration is no longer under reasonable control? Whose responsibility will it be when the radioactivity levels reach unacceptable proportions in the Conemaugh River?

In view of the Maintenance & Monitoring Section, DOE does not commit to how long they will continue to monitor the cleaned up site to be certain EPA standards are met. I would like to see more details as to how often and how thoroughly these standards are checked and how long.

I feel that just by their nature, all nuclear dump sites should be considered temporary. The storage of radioactive wastes should be monitored and retrievable. This would indicate to me above ground storage. Citizens of Burrell have indicated a desire to stabilize existing tailings at the site with minimal disruption. Thus dangerous transport of contaminated materials is eliminated.

A building of steel or lead would house the hazardous material on site. Accurate monitoring of radiation levels could be achieved. The buildings would also serve to remind the community of the tremendous waste generated by nuclear industry and that the problem has not gone away.

Sincerely,
Denelle Ardell

R. D. 1
Bulwer, Pa. 15019
January 16, 1983

Uranium Mill Tailings Project Office
U. S. Department of Energy
Albuquerque Operations
P. O. Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Morley:

I reviewed your study on the uranium mill tailings located in Canonsburg and also attended the DOE meeting January 11, 1983 at Hanover Township. After reviewing and listening to all of the speakers comments it is my conclusion that alternative 3--the stabilization of waste in Canonsburg and Burrell Twp. is the best selection. My arguments for this are:

1. The health and safety factors of workers moving materials from one site to another. I cannot see how peoples safety could possibly be guaranteed.
2. Transporting of waste materials will surely create the possibility for accidents, spills and the wind factor is another problem for spreading contamination.
3. We already have 2 contaminated sites, 1 contaminated creek and 1 contaminated river. I cannot see creating another contaminated site--another creek (Harmon Creek) and another river, the Ohio.
4. This area has suffered ground fracturing due to heavy dynamite blasting by strip-mining. This is bound to have affects on ground water in the area. As I stated at a previous meeting--only 1/3 of all of the water in the world is fresh water. If the government does not stop the polluting of water there will be no where for them to run either.
5. Also as stated at the Hanover meeting, the contaminated Conemaugh River passes several small towns then comes back around Pittsburgh to enter the Ohio River which would be further contaminated.
6. Another point brought up was what was intended to be done with the contaminated water which is to be used to hose down contaminated trucks carrying waste materials?

In conclusion I feel that if the residents of Canonsburg were given fair market prices for their homes and re-location and a guarantee for health benefits should they arise--it would be much less costly than 34.5 or 44.6 million dollars to move the site. Put the effort and money in the present site.

101
6.2.10

The Hanover Twp. site is already a depressed area due to the closing of Weirton Steel Co. I see no reason to add to the de-valuation of property to an already depressed area.

I also feel that large corporations who create hazardous waste should be liable for proper disposal and storage of the waste and the cost of cleanup of already polluted sites.

I do hope this letter will help in making a just and fair decision for all the people concerned in this matter.

Very truly yours,

Joan E. Benish

Janis C. Dunn-Spokesperson for FORCE (Families Opposed to Radioactive Contamination Exposure)

The Environmental Impact Statement is quite a comprehensive study of the area in and around the Canonsburg Industrial Park.

It tells us about our weather patterns, temperatures, the number of cars that travel our roads each day---section 4...page 9....paragraph 4.3.4. WINDS tells us that our average wind speed is 4.7 miles per hour and that we never have winds exceeding 22.4 miles per hour, at least not from 1979 to 1980 when the winds were measured.

I have to question this statement because I am well aware that it is not uncommon for us to have wind gusts of 35 and 40 miles per hour. We did all day Friday, January 7 of this year. NLC had to stop work several times the second day of clean-up at the American Legion because of high winds that we measured at 32 and 35 miles per hour most of the day. We have had wind gusts up to 68 and 70 miles per hour - usually in February and March. I think that this is pertinent information that should be included in the Final EIS.

Section 4...page 41...paragraph 4.12.5 HOUSING - tells us that the closest houses to the Canonsburg Site are as near as 250 feet away. I borrowed my husband's measuring tape and stretched it from the fence on site to the inside of my kitchen by 2 inches and measured 80 feet. I ask that this correction be made in the FEIS.

The DEIS covers every imaginable subject and would lead one to believe that nothing is left unsaid - but....I can find nothing in the DEIS about the 11 cancer deaths in the Davis family who live on Payne Ave.----feet away from the Lagoon.

There is nothing mentioned about the fact that every house on Strabane Ave., Payne Ave. and the Lagoon side of Youngstown St. has experienced cancer or a cancer-related death.

The nat'l Leukemia rate is 3 or 4 in 100,000. We have had 3 on Strabane Ave.----a street with only 10 houses. I didn't read this in the DEIS.

An unusually high number of 1979 Canon-McMillan graduates have experienced cancer...9 out of 385 - 2 have died from it.

After this information was made public 7 other members of the 1979 class phoned to report conditions and illnesses that were labelled by their physicians as - hard to diagnose or unusual for young people

Because the school is within 3/4 mile of the site -- because some of these people played ball on the Lagoon and because of all the other cancers near the site---there should be a thorough investigation to determine if there is a link between the cancers and the radiation.

The Uranium Mill Tailings Radiation Control Act of 1978 - Public Law 95-604 was passed after Congress heard testimony that potential hazards to the public exists because of exposure to the radioactive wastes....the DEIS, in the summary and in several other sections states that "this EIS evaluates five alternatives for removing the potential public health hazard associated with the contaminated material."

I believe that it is safe for me to conclude, after reading these statements, that I and my neighbors are the important part of this whole issue....we are the reason for all of these studies and reports. Yet, 50 million dollars have been spent to study birds, grass, flowers, dirt, buildings....everything above, on and below the ground.....not one cent has been spent to study our bodies..

The Federal Government caused this problem for us -- we have every right to know the extent of the damages we have received because of it.

We have a right to know how much radiation our bodies have absorbed. We have a right to know how our blood and our organs have been effected by exposure to these hazardous wastes.

We request that the Federal Government provide a health study to include all of the facts about our health in the Final EIS. If the EIS becomes final without these health facts---it will be incomplete.

The DEIS states that under Alternative 1 (no remedial action) --- the present situation would remain and that the main impact of this alternative is the 5.4 lung cancer deaths over the next 32.5 years within 1.24 miles of the site. These figures are totally inaccurate for the Canonsburg area.

We have had 8 lung cancers within only 200 yards of the site in approximately 12 years. There have been 3 on Strabane Ave.--1 on West Pike St.----2 on Payne Ave.----1 on Youngstown St. and 1 admitted on Latimer Ave. Two others are suspected but have not been admitted.

Steven Lanes, from the University of Pittsburgh, conducted a lung study of the Canonsburg area. Not one of the homes mentioned above, where the lung cancers occurred, was included in his study, yet the DEIS uses his study as a reference. This is unfortunate and irresponsible.

The DEIS states that "after any of the other alternatives are completed the chance of dying from lung cancer will be reduced to 1 in 1,000,000. How can we believe these figures when it is obvious from the option 1 figures that the data from which these were taken do not apply to our area?!!?!!

When I surveyed my neighbors health problems I was astounded by the many cancers in my area and suspected that radiation was the cause. Not sure of my assumptions I began consulting with experts in the field of radiation research. After reviewing the facts these scientists advised that there was no doubt in their mind that radiation was the cause.

One of these scientists, who is one of the world's foremost experts in the field of radiation research is Dr. John W. Gofman. He is also one of the most admired and respected scientists in the world today.

I introduce into evidence the affidavit of Dr. Gofman - given under oath. Attached to his affidavit are his qualifications. These will be given to the Dept. of Energy and I ask that they be recorded in their entirety.

Because this affidavit is lengthy it would take up too much time to read all of it here and so I have chosen several paragraphs which I believe should be read at this time.

The DEIS states that additional health hazards will be created during remedial action when the contaminated particles will be stirred-up. No provisions have been made to relocate the residents during this time. We have been told that this is not necessary because every precaution will be taken to prevent these hazards. The Dept. of Energy will not give us a guarantee that we will not receive additional exposure at that time. None of us wants to be here----we shouldn't be living near those wastes now---- please include provisions for our relocation in the FEIS. Not just Ward Ave. but also the other streets near the site.

The DEIS evaluates two main options for remedying the situation - move the wastes to Hanover or stabilize them in Canonsburg. Neither will cure our problem.

It makes no sense to move these wastes to Hanover -- already overburdened with waste problems - why create another waste dump?!

In-situ stabilization in Canonsburg does not come with a guarantee that the dump will be monitored and maintained until it becomes inactive.

This material has a half-life of approx. 1500 years --we have no guarantee that it will remain intact after 200 years -- if that long.

This is what the EPA has to say about secure land fills(ref. source "Low-Level Waste Policy Act," 94 Statute 3347-9, Public Law 96-573, 96th Congress, Dec. 22, 1980.)

There is good theoretical and empirical evidence that the hazardous constituents which are placed in land disposal facilities very likely will migrate from the facility into the broader environment. This may occur several years, even many decades after placement of the waste in the facility, but data and scientific prediction indicate that, in most cases, even with the application of best available land disposal technology, it will occur eventually.

So, it seems inevitable that somewhere down the line those living in this area will be experiencing problems with this dump. I don't want my great, great, great grandchildren to experience the same hell that I'm going through. I don't want them to search the records to learn that in 1983 we had the chance to solve this problem but instead decided to patch it up and hand it down to them.

If we allow this to happen then they have every right to curse us and call us fools - for indeed we will have been.

The decision to stabilize the wastes in Canonsburg automatically guarantees that all of the other 24 sites will also be stabilized in place. What will we have after millions and millions of dollars are spent on this project?? We will still have 25 waste dumps that promise to give us more problems in the future. What kind of sense is this?!!?

I believe that there can be only one solution to this problem which exists in 25 different locations. A central repository should be found immediately---all contaminated material should be brought to this repository....creating one dump instead of 25. It would seem that this would be, in the long run, financially feasible, since one dump would need to be monitored and maintained instead of 25.

If No. 3 - Stabilization in Canonsburg is chosen the properties within a mile radius of Canonsburg would be forever worthless --- I believe that eventually it will become a dead area - yet, there are no provisions in the EIS to compensate the residents for this loss.

Are we, indeed, the most important part of this issue????????
The Final Environmental Impact Statement will tell us the truth.

AFFIDAVIT

John W. Gofman, M.D., Ph.D.

In re: C.A. No. 82-0437 CLASS ACTION COMPLAINT FOR INJUNCTIVE RELIEF(IN THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT
OF PENNSYLVANIA)

Dr. John W. Gofman being duly sworn, deposes and says:

As a result of my extensive education, training, teaching, research, and radiation-industrial medical experience, as detailed in the curriculum vitae attached as Exhibit 1, I feel qualified to make the statements which follow in this affidavit.

If called upon to testify in this litigation, I would testify as follows:

(1) Persons exposed to ionizing radiation, either externally from gamma rays, x-rays, beta particles, or alpha particles or internally from the same types of radiation received as the result of ingestion, inhalation, or absorption of radionuclides from open cuts or wounds, have indeed sustained extremely serious personal physical injury to their bodies. The injury will be increased as the total dose of radiation is increased, there being no dose, however small, which is free from such injurious effects. The larger is the dose, the greater will be the injury sustained. There is no reversing any sustained personal injury from radiation beyond the first few hours after radiation. And there is no way that any person can exercise any special or due care to prevent such injury from being sustained other than avoidance of receiving the radiation itself. Since each personal injury is sustained and persists as injury for many decades, it follows that each incremental dose of ionizing radiation adds to the total personal injury received. So radiation injury is said to be cumulative.

(2) Said personal physical injury is definite with respect to a variety of chromosomal damage both to somatic cells throughout the bodies of the exposed individuals and the reproductive cells (sperm-line cells and ova), plus genetic damage to DNA molecules, the bearers of genetic information in the cells of humans. Such damage to chromosomes and to genes, while unequivocal, does not necessarily constitute the only physical damages that have been sustained from ionizing radiation. There may be additional damage to cellular structures, e.g. cell or organelle membrane damage, over and above the chromosomal and gene damage. Both the chromosomal and gene damage, as well as other damage to cells, manifest themselves later clinically. While the clinical manifestations occur later, the physical damage to the individuals occurs at the time of the irradiation.

(3) In connection with this litigation, I have had access to and have reviewed the following documents:

1. DOE/EV-0003/3 Revised. "Formerly Utilized MED/AEC Sites Remedial Action Program :Radiological Survey of the Former VITRO Rare Metals Plant Canonsburg, Pennsylvania", June 1979, FINAL REPORT.
2. DRAFT "Remedial Action Concept Paper For the Uranium Mill Tailings Site At Canonsburg, Pennsylvania", April 1981 (Rev. April 23, 1981), Uranium Mill Tailings Remedial Actions Project Office, DOE, Albuquerque, New Mexico, 87115
3. UMTRA-DOE/ALO-226, GEOR #R-811, "Geochemical Investigation of UMTRAP Designated Site At Canonsburg, Pa." Markos, G., Bush, K.J., and T. Freeman, May, 1981 .
4. DOE/UMT -0101, FBDO 360-20, U.C. 70, "Engineering Assessment of Inactive Uranium Mill Tailings, CANONSBURG SITE, CANONSBURG, PENNSYLVANIA" by Ford, Bacon, & Davis Utah Inc., April, 1982.
5. UMTRA-DOE/ALO-10 "Uranium Mill Tailings Remedial Action Project (UMTRAP) Public Participation Plan" The Mitre Corporation, February, 1982.
6. UMTRA-DOE/ALO-168 "Preliminary Evaluation of Areas for Canonsburg Residues" Roy. F. Weston, Inc. September, 1981.
7. UMTRA- DOE/ALO-31 " Remedial Action Concept Paper For the Uranium Mill Tailings Site at Canonsburg, Pennsylvania" February, 1982.
8. UMTRA-DOE/ALO- 169 "Evaluation of Site Suitability for Canonsburg Residues" Roy. F. Weston, Inc. September, 1981.
9. Class Action Complaint C.A. No. 82-0437.
10. Class Action Complaint C.A. No. 82-0438.
11. DOE/NE-0025 "Annual Status Report on the Uranium Mill Tailings Remedial Action Program" U.S. Department of Energy, Assistant Secretary for Nuclear Energy, December, 1981.
12. Letters from William E. Mott, Acting Director, Public Safety Division, Office of Operational Safety, Department of Energy (December 23, 1980, February, 1981, and July 27, 1982) pertaining to the radiological surveys of certain specific properties. (Vicinity Property CA 090, 143 Ward Avenue, Canonsburg, 155 Ward Avenue, Canonsburg, and Lot west of 143 Ward Avenue, Canonsburg.)
13. Press Release from the University of Pittsburgh entitled "Results Presented from the Study of Canonsburg-Strabane People Adjacent to a Uranium Processing Plant" August 11, 1982.
14. Canonsburg Town Meeting Agenda for Presentation of the Canonsburg Health Effects Study, Wednesday, August 11, 1982.

(4) Based upon my knowledge and experience in this particular field and the materials made available to me for review, it is clear to me that persons who have lived in this Canonsburg area, within one mile of the Plant Site, for a period, say, 20 years, have indeed suffered personal physical harm to their bodies. It is clear that radiation levels in vicinity properties, in

the streets and fields, and in the area within one mile in general have been elevated over what they would have been if there had never been this Plant operating in the vicinity. It is evident from the record of measurements that radioactivity has definitely escaped confinement at the Plant Site, and has spread into the surroundings, including the use of contaminated materials from the site in construction of buildings. Since this radioactivity has been spread in this manner, it is inevitable that persons within the one mile distance from the site have received ionizing radiation. And since there is no "safe, threshold" dose of ionizing radiation, it can be correctly stated that physical injury to individuals in this area began with their first exposure to such ionizing radiation, and that such physical injury will be added to cumulatively with each additional exposure.

I do not suggest here that a 20 year exposure is required for serious harm to be done to these people. Serious harm is done with each exposure, since there is no safe exposure, but I simply am emphasizing that 20 years of such exposure is serious indeed. There can be no question that a substantial danger to health has occurred for those exposed. The danger to health has been fixed into these people's bodies in the form of chromosomal and gene damage. This cannot be undone. The clinical manifestation, in the form of extra cases of cancers of a variety of organs, leukemias, and genetic and chromosomal disorders in offspring, come at variable times after the damage to the chromosomes and genes. So it is correct to say the damage is done already at the time of the irradiation. The visible clinical expression of the damage is manifest years to decades later in the exposed generation, and in offspring from the exposed generation.

I regard the danger to health to have been substantial from the extent of elevation of radiation levels in the area within one mile from the site. And such damage is being added to at the present time from the persistent radiation in the environment and from radionuclides which have inevitably been taken into people's bodies.

(5) There are several types of injury that must have occurred, based upon the evidence I have reviewed. First of all, it is clear that ²²⁶Radium has been transported off the Plant Site, in part, no doubt, by winds, and in part, by the use of contaminated materials from the site. The presence of such ²²⁶Radium has produced the result of elevated gamma ray levels in the vicinity properties (quite variably between properties). Residence in and movement about in areas with elevated gamma ray levels guarantees that there will be health injuries of the types I have already described. (Cancer, leukemia, and genetic-chromosomal injuries).

Secondly, the ²²⁶Radium which is transported by the winds is in the form of fine particles (which is why it is picked up by the winds), and such fine particles are intercepted by humans breathing as the particles descend to earth. The fate of such inhaled particles depends upon their particular particle size. If they are relatively large (over 10 micrometers in diameter), they will be rejected up the respiratory tree and will largely be swallowed into the intestinal tract. Such particles then have two fates. If they represent soluble material, the radium will be absorbed into the blood stream, go to bones, remain there for many decades, and enhance the risk of bone cancers over what would have been the case without the radium. If the particles are insoluble, they will slowly pass through the colon, and on so doing, irradiate sensitive colon cells and lead to an excess of colon cancers over what would have occurred without the radium.

If the particles are smaller, then they will get down into the bronchioles of the lung, and may remain there for hundreds of days, irradiating the sensitive bronchial cells and leading to an excess of bronchogenic (lung) cancer over what would have occurred had the radium not been present. If some of the particles are relatively soluble, they will pass into lymph and blood streams, and in time get deposited in bone, again enhancing the risk of bone cancer as well as leukemia.

Third, ²²²Radon is emanated (said to be "breathed") out of any deposits of ²²⁶Radium, because the radioactive decay of ²²⁶Radium leads to creation of ²²²Radon, a gas. When ²²²Radon is inhaled by humans, it and some of its radioactive "daughter products", irradiate the sensitive tissues of the bronchi. There is no doubt at all of the effectiveness of radon daughter products in producing human lung cancer and death. The higher the radon concentration in breathed air, the greater is the risk of later manifestation of a lung cancer. Elevated radon levels have been found in vicinity properties, partially from radon wafting from the Plant Site itself and partly from ²²⁶Radium that has itself been transported to vicinity properties.

Fourth, the gamma radiation coming from ²²⁶Radium depositions in soil or building materials will irradiate the sperm and ova-line cells and the chromosomal-gene damage in such cells can become manifest later as a defective newborn human.

As to which of the ways of escape of radioactivity from the Site are important, I would say all modes of escape are serious. Obviously, the use of contaminated materials from the Site for purposes of building houses or other structures where humans will spend time is a very serious matter indeed. Second, wind-transported ²²⁶Radium to be deposited on soils in the vicinity means that there will be long, long periods of years of continued gamma-ray exposure of people in the vicinity.

From the amount of uranium tailings which have been dumped or stored on the various parts of the site (Parcel A, Parcel B, Parcel C) there is the ever-present danger that the ²²⁶Radium will find its way into sources of area drinking water. That would be serious indeed, but as yet the evidence I have seen does not show this to be a major part of the radiation exposure problem the people of this class are experiencing or have experienced. This requires careful monitoring for a long time into the future, lest such a source become important but not appreciated.

6. It is to be emphasized that the hazards to health which have been described above are by no means "theoretical" for the individuals concerned. There is a massive body of human experience (as well as experimental animal study) which demonstrates unequivocally that ionizing radiation does indeed cause human cancers of virtually every known type of cancer, does indeed cause every type of human leukemia, with the exception of the one leukemia called "chronic lymphatic leukemia". and that human genes and chromosomes suffer demonstrable injury from these radiations. Moreover, such evidence exists for all the kinds of ionizing radiation, the alpha particles of radium, radon, and radon daughter products, for the gamma rays and x-rays coming out of several of the radionuclides in the radium decay chain, and for the beta particles which also come out of some of the nuclides in the chain of uranium-radium decays.

Further, there is no "minimum" amount of radiation exposure required to produce such damage and disease. The evidence is overwhelming that the effect starts at the very lowest doses of radiation, and that the risk of additional cancers, leukemias, and chromosomal-genetic damage goes up proportional to dose. This evidence is outlined in extenso, with hundreds of literature references, in my book RADIATION AND HUMAN HEALTH, Sierra Club Books, Inc, 1981.

So it is clear that there is a very sound body of scientific knowledge accepted by experts in this field concerning the kinds of health problems which have occurred in the people exposed in this area or the health problems which will yet manifest themselves as the result of exposure.

7. There is excellent reason for the residents of this area to be seriously concerned about harm accruing to themselves and to their children from the exposure which has been thrust upon them as a result of escape of radionuclides from this Plant site. This potential harm in the form of cancer or leukemia is not a hypothetical thing. The evidence is overwhelming that it occurs, and any person should indeed be concerned about receiving any unnecessary radiation. And what is more it is eminently reasonable that the residents be very concerned about the exposure of

their children to the ionizing radiation which has been thrust upon them, because it is well-known, and thoroughly documented, that children are many times more sensitive to the cancer-producing effects of such ionizing radiation than are adults.

I wish to make it clear that radiation is not the only cause of cancer and leukemia and genetic-chromosomal damage in humans. There are other causes. But what is important to realize is that radiation is a powerful cancer producer, produces almost every type of human cancer, and is effective even down to the lowest doses. Also, I wish to make it clear that while every person experiences injury to cells at the time of irradiation, it still does not follow that every person so exposed will manifest the injury in the form of a cancer. We are not sure why some persons do manifest the cancer and others do not, but we have no doubt at all about radiation causation of human cancer and leukemia.

I would also wish to make it clear that the residents should indeed be very concerned about the earliest possible resolution of this problem in a sound manner. They and their children are receiving additional injury from the ongoing radiation, and hence experiencing an added risk of future cancers with each passing month.

Also they should indeed be concerned about just how any remedial action is proposed to be taken. There is grave danger that more radium can be suspended into the air in an improper effort to move any of the contaminated materials, within sites, or to other locations. This is going to require serious consideration of on-going capable monitoring, and may well raise the question in the residents' minds that they may wish to seek evacuation from the area during any proposed remedial action.

All these types of concerns of the residents for themselves and their children are eminently reasonable, given the facts concerning this Plant site and what has already happened.

It should also be pointed out that the residents would have a reasonable fear that foodstuffs grown locally might be a source of further radioactivity exposure to them and their families, since radium in surface waters or in soil can definitely be taken up by plants and be ingested thereby by humans.

8. I would certainly agree with the Department of Energy that remedial action is necessary in the Canonsburg area. Harms have been done to humans, and the harm will increase until and unless remedial action is taken. The ideal solution would be to get all of this contaminated material (hundreds of thousands of tons of it) out of this area that is an inhabited area, and take it to some isolated area, hopefully virtually free of human inhabitants, and with care

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6.2.1

a repository for the contaminated material should be created wherefrom the radioactivity has as small a chance as is possible of gaining access either to the air or to surface waters. While this is the ideal solution, it carries risks with it. The stirring up of all the contaminated material will create a hazard for vicinity residents, the transport to some distant site must avoid spills if we are not to increase the existing hazard. It is easy for people to talk of doing this with "good engineering practice", but it would be highly advisable that the residents of the area have some way of achieving confidence that this will indeed be done without adding to their radiation exposure in a serious manner. And they should be fully informed about all this, so that the issue of possible evacuation can be considered and discussed before such remedial action.

Even if the option is suggested that there might be a lower hazard to try to immobilize the contaminated material at the current site, the necessary action will by no means be free of risk. The possibility is discussed in some of the engineering reports that a liner system would have to be installed on the site, and that would mean digging up and moving contaminated material from one part of the site to another, a procedure the residents should wish to know a great deal about, and to have been assured with careful studies and careful proposals for monitoring if it be done this way.

There is no perfect solution to a problem created by the totally ill-advised use that has been made of a site in a populated area. The Plant should not have been in this area in the first place, but the task is now to be constructive and to stop further increases in the radiation harm to the residents.

9. One might ask the question of whether it is certain that all the processing activities of the defendants is indeed the cause of the area contamination and the high radiation levels encountered. Having reviewed the evidence concerning how the radioactivity is distributed, having reviewed the kind of operations done at the Plant site (processing ores, residues, dumping tailings, and storing wastes), and knowing of such operations in other locations in the world, I can state with a very high degree of confidence that it is indeed the activities of this plant which have created the problem of radiation exposure for the residents of the area. There is no possibility, in my opinion, that the distribution of radioactivity is "natural", and not the result of man's actions here.

10. The kinds of effects of the radioactivity distributed through the defendants conduct are a general class of effects, and will be observed in persons throughout this area. In other words, if radioactivity has escaped and been

distributed so that people east of the plant get a particular dose of ionizing radiation therefrom, we have every reason to expect identical types of effects on other humans west, or south, or north of the plant who get a similar dose of ionizing radiation from distribution from the plant site. To be sure, the larger the dose, the more frequent will be the radiation-caused cancers in the exposed group, but precisely the same kinds of effects will occur in the persons in one direction from the plant as in any other direction, if radiation is experienced by the people.

11. In summary, residents of the area within a mile of the Plant site have already experienced irreversible physical injury from ionizing radiation thrust upon them by the conduct of the defendants in this litigation. That irreversible physical injury will manifest itself some time after the radiation in the form of clinical cancer or leukemia or defective children. But this later manifestation clinically should not deceive us about the physical injury to genes and chromosomes. That injury has been done. And with further radiation exposure, either in vicinity properties, or from still further releases from the plant site, the injuries will increase.

There is no credible basis for assigning the source of this added radiation to the residents to anything other than the activities of the Plant Site and those who operated it and condoned its operation.

Remedial action is itself a source of further danger to the residents, and the fullest, early exposition of the possibilities must be made with the residents so they can make reasonable choices for their own and their children's health.

December 10, 1982

San Francisco, California

John W. Gofman, M.D., Ph.D.
John W. Gofman, M.D., Ph.D.

Subscribed and sworn to before me this
____ day of _____, 1982
_____, Notary Public.
State of California - Principal Office, San Francisco County

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Exhibit 1
CURRICULUM VITAE
John W. Gofman

Birth: September 21, 1918 in Cleveland, Ohio.

Education:

Grade and high school in Cleveland, Ohio.

A.B. in Chemistry from Oberlin College, 1939.

Ph.D. in Nuclear/Physical Chemistry from the University of California at Berkeley, 1943.

Dissertation:

The discovery of Pa-232, U-232, Pa-233, and U-233.

The slow and fast neutron fissionability of U-233.

The discovery of the $4n + 1$ radioactive series.

M.D. from the School of Medicine, University of California at San Francisco, 1946.

Internship in internal medicine at the University of California Hospital, San Francisco, 1946-1947.

Positions:

Academic appointment in 1947 in the Division of Medical Physics, Department of Physics, University of California at Berkeley. Advancement in 1954 to the full professorship, a position held to the present time, with shift to Emeritus status in December, 1973.

Concurrent appointment since 1947 as either instructor or lecturer in Medicine in the Department of Medicine, University of California, San Francisco.

Additional appointments held:

(1) Associate Director, Lawrence Livermore Laboratory, 1963-1969. Resigned this post to return to full-time teaching and research. Remained as Research Associate at Lawrence Laboratory through February, 1973.

(2) Founder and first Director of the Biomedical Research Division of the Lawrence Livermore Laboratory, 1963-1965. This work was done at the request of the Atomic Energy Commission for the purpose of establishing a program of overall evaluation of the effects of all types of nuclear energy activities upon man and the biosphere.

(3) Member of the U.S. government's Advisory Board for NERVA (Nuclear Engine Rocket Vehicle Application), approximately 1963-1966.

(4) Member of the Reactor Safeguard Committee, University of California, Berkeley, approximately 1955-1960.

(5) Group Leader with the Plutonium Project (for the Manhattan Project) at the University of California, Berkeley, 1941-1943.

(6) Physician in Radioisotope Therapy, Donner Clinic, University of California, Berkeley, 1947-1951.

(7) Consultant to the Research Division of the Lederle Laboratories, American Cyanamid Corporation, 1952-1955.

(8) Medical Director, Lawrence Radiation Laboratory (Livermore), 1954-1957.

(9) Consultant to the Research Division of the Riker Laboratories, approximately 1962-1966.

(10) Medical consultant to the Aerojet-General Nucleonics Corporation, with special emphasis on the hazards of ionizing radiation, for approximately eight years during the 1960's.

(11) Scientific consultant to Vida Medical Systems, 1970-1974; co-invented the VIDA heart monitor, a pocket-worn computer to detect and announce the occurrence of serious cardiac irregularities; invented a skin cardiographic electrode now widely used throughout the USA.

- (1) Gold headed Cane Award University of California Medical School 1946, presented to the graduating senior who most fully personified the qualities of a "true physician"
- (2) Modern Medicine Award, 1954, for outstanding contributions to heart disease research
- (3) The Lyman Duff Lectureship Award of the American Heart Association in 1965, for research in atherosclerosis and coronary heart disease
- (4) The Stouffer Prize (shared) 1972, for outstanding contributions to research in arteriosclerosis
- (5) American College of Cardiology, 1974, selection as one of twenty-five leading researchers in cardiology of the past quarter century

Publications

Approximately 150 scientific publications in the following fields

- (1) Lipoproteins, atherosclerosis, and coronary heart disease
- (2) Ultracentrifugal discovery and analysis of the serum lipoproteins
- (3) Characterization of familial lipoprotein disorders
- (4) The determination of trace elements by X-ray spectrochemical analysis
- (5) The relationship of human chromosomes to cancer
- (6) The biological and medical effects of ionizing radiation, with particular reference to cancer, leukemia, and genetic diseases
- (7) The lung-cancer hazard of plutonium
- (8) Problems associated with nuclear power production

Books

- (1) What We Do Know about Heart Attacks
- (2) Dietary Prevention and Treatment of Heart Attacks (with Alex V. Nichols and E. Virginia Dobbin)
- (3) Coronary Heart Disease
- (4) Population Control through Nuclear Pollution (with Arthur Tamplin)
- (5) Poisoned Power The Case against Nuclear Power Plants (with Arthur Tamplin)
- (6) Advances in Biological and Medical Physics (co-editor with John H. Lawrence and Thomas Hayes, a multi volume series)
- (7) Contributor of chapters to numerous books including some on nuclear engineering, cancer induction, biochemical and biophysical research methods, heart disease, and effects of radiation

Teaching

- (1) Application of radioactive tracers to chemical, biological, and medical problems
- (2) The biological and medical effects of ionizing radiation
- (3) Mechanisms of cancer induction
- (4) Atherosclerosis and heart disease
- (5) Environmental factors in the induction of cancer
- (6) Epidemiological approaches in cancer and heart-disease research
- (7) Research guidance of some 25 students toward the doctorate in biophysics or medical physics

Patents

- (1) The slow and fast neutron fissionability of uranium-233, with its application to production of nuclear power or nuclear weapons
- (2) The sodium uranyl acetate process for the separation of plutonium from uranium and fission products from irradiated fuel
- (3) The columbium oxide process for the separation of plutonium from uranium and fission products from irradiated fuel

Current work

- (1) Continuation of research on induction of cancer and leukemia by ionizing radiations from radionuclides and X-ray sources, as well as the biological hazards of plutonium
- (2) Guidance of Ph D research dissertations of students in the biophysics program at the University of California
- (3) Independent consulting
- (4) Chairman, The Committee for Nuclear Responsibility (uncompensated public-interest work)

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Current Work (Supplemental Data)

- (5) Publication: Gofman, John W. "The Question of Radiation Causation of Cancer in Hanford Workers", Health Physics 37, 617-639, 1979.
- (6) Publication: Gofman, John W. "Response to the Letter of P. Spiegler on Radiation Causation of Cancer in Hanford Workers" Health Physics 40,412, 414, 1981.
- (7) Publication: Gofman, John W. "Response to Dr. C.L. Chan's "Exact Test for All Fourfold Tables and Comments on Hanford Findings of Gofman" Health Physics , 39, 833-835, 1980.
- (8) Publication: Gofman, John W. "The Use of Gofman's Doubling Dose in Estimating Low-level Radiation Risk : Response to D. David Maillie's Letter" Health Physics , 41,204-208, 1981.
- (9) Publication (Book): Gofman, John W. "Radiation and Human Health", Sierra Club Books, San Francisco, 1981. 908 pages.
- (10) Publication: Gofman, John W. "Ionizing Radiation: Concepts for the Dental Assistant" (In three parts), The Dental Assistant July/August, 1982, Sept/Oct, 1982, and Nov/Dec, 1982.
- (11) Publications: Chapters by John W. Gofman in two recent books. Both are on ionizing radiation and their health effects.

January 24, 1983

Agnes Engel
565 Ash Street
Canonsburg, PA 15317

Uranium Mill Tailings Project Office
U.S. Department of Energy
P.O. Box 5400
Albuquerque, New Mexico 87115

Dear Sir,

Attached are comments and questions which I would like documented for evaluation, as part of the preparation process for the final draft of the Environmental Impact Statement.

Respectfully Submitted,

Agnes Engel

Enclosure:
DEIS Comments

Ps. Per agreement by telephone conversation with Dick McKee, in charge of Public Information, the attached comments were to be accepted even if delivered after the January 24, 1983 deadline.

QUESTIONS AND COMMENTS PRESENTED FOR REVIEW
IN PREPARATION OF THE FINAL DRAFT OF THE
ENVIRONMENTAL IMPACT STATEMENT FOR THE
CANONSBURG REMEDIAL ACTION PROCESS

RESPECTFULLY SUBMITTED:

AGNES ENGEL
565 ASH STREET
CANONSBURG, PA 15317

412-745-4898

My name is Agnes Engel, and I presently live at 565 Ash Street, Canonsburg, PA 15317 (1-412-745-4398). I have been a life long resident of North Strabane Township, Washington County, having lived within two or three blocks of the Canonsburg Industrial Site property, for close to forty years.

During the past four and one-half years, I devoted many hours to researching and cataloging historical facts about the old Standard Chemical Company; reviewing and trying to decipher mountains of data pertaining to the Canonsburg Industrial Site, as well as radiation in general; obtaining volunteers and assisting Mound Facility, Monsanto Research Division, in setting up a radon monitoring network in the Canonsburg area; and I independently prepared a residential research survey of thyroid disease in Strabane. Because of the effort I have put forth, I do not claim to be an expert, or even regard myself as having all the answers. What I do claim, as a result of my own personal observation, is inadequate distribution of authority and priorities have kept, and are still keeping, the biggest part of the radiation problem here in Canonsburg improperly serviced.

While reviewing the DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS), the long awaited salvation of progress for cleanup at the Canonsburg Industrial Park, I came to better understand the problems we are facing here in Canonsburg, and why we continue to be an eternal skeleton in DOE's closet. The proposed options for remedial action, presented in the DEIS, along with the other impressive information concerning air, truck transportation, water, animals, plants, etc., failed miserably to gain my confidence in the spending of taxpayers dollars. One would not think that my feelings

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had legal justification, considering that surely there would have to be some pertinent information contained somewhere in the over 700 pages. To be honest, it was not so much the information compiled within the DEIS that caused me to doubt proper spending of tax dollars, it was the lack of priority given to the most important part of the environment.....the human being!

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6.2.5

During the preceding four and one-half years, every indication points to adequate time being available for a comprehensive health survey to have been completed. Although a whole-hearted attempt was made to obtain information concerning radiation health effects in the Canonsburg area, only inconclusive information resulted. As a main factor in the environment, the health of the residents of the Canonsburg area appears to be a concern addressed in the DEIS. In reality, now much of a concern was evidenced by comparing the information compiled on the effects of radiation on plants and animals in our environment, and realizing the effects of radiation on the health of the residents, depended on inconclusive information? In the setting of priorities, where did the health of the Canonsburg residents rate on the financial scale of government spending?

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6.2.9

At the time of the DEIS printing, ground water information concerning the possible contamination of off-site wells, was still incomplete. The importance of this information would seem to mandate the final choice of option for remedial action. As transportation of contaminated well water, to off-site wells, would indicate additional problems for the decontamination process, how would this be addressed in option "2" and "3"?

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6.2.5

During the implementation of Alternatives 2 through 5, the DEIS indicates the Canonsburg population will continue to

to receive approximately the same radiation exposure as during Alternative 1. How can this reassurance be justified, when radon monitoring results during the fall off-site cleanup period indicated slight elevations in the radon concentration levels? Considering that the majority of the waste removal in the fall (82) was mainly reprocessed ore, and not compared to that which is buried in Area C, what will the true radiation exposure projection be during the cleanup of especially Area C in particular?

As there is no positive way of determining the immediate effect when combining low level long term exposure, previous excessive exposure during the operation or cleanup of the site, slightly elevated risks during the remedial action process or even the possible effect radiation may have had congenitally on an individual, how can a true expectation rate for cancer be projected, giving all the above considerations? Also, is the possibility of a PREDISPOSED CONDITION susceptible to acceleration by the slightly elevated risks during the remedial action process?

The term "TEMPORARY CLOSING" is often referred to the closing of Strabane Avenue, during the remedial action process. In my opinion, this "TEMPORARY CLOSING" will be a "HARD SHIP" to those who have no automobile, walk to church or school, must catch a bus on Pike Street for Pittsburgh, partake in activities anywhere in Canonsburg or Strabane, or just wish to visit a friend in either community. With all due consideration of the possible remedial action process, given to the fact that there may be increased railroad traffic, attempts to reach Canonsburg or Strabane via the railroad tracks will prove very hazardous. As a safety precaution, is there a possibility that a foot bridge could be constructed for the convenience of the residents of

the area involved? Possible access routes that may be considered are: Selwyn Street to the rear of the W.S. George Pottery to W. Pike Street; or Latimer Avenue near the SNPJ to Youngstown Street. As the radiation problem has caused the area residents more problems than they wish to admit, the construction of an access route to their sister community would at least be a small consolation to the temporary closing.

During remedial action, option 3, the estimated projected clean up time would take approximately 86 weeks. Are the winter months calculated in to those 86 weeks when work will no doubt cease? Can we assume that an additional 24 weeks will be added for completion of the job, if the above is the case?

After waiting several years for the DEIS to be released, the fact that little consideration was given to timing, (or possible strategic consideration was given when less people might be less likely to have time to respond), in no way upgraded my ongoing lack of confidence in the Canonsburg remedial action process. It amazes me that we, the residents of the Canonsburg area, were made to wait years for the completion of the DEIS, and as soon as we finally receive it, everything is put on rush! Like cheap wine, maybe if we consume it quickly, we won't have time to dwell on the poor vintage.

As a matter of record, Page 4-40 Sec. 4.12.2, Line 6 should read SLOVENIAN, not Lituanian. Thank You.

cc

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6.2.5109
6.2.2108
6.2.5110
6.2.2109
6.2.2

601-69

My name is Joyce Faiella. I am member of a committee representing St. Patrick School in Canonsburg. Other members of our committee are: Reverend Raymond Cercone, Pastor; Sister Elaine Hromulak, Principal; Mrs. Agnes Engel; Mr. Kenneth Krupa; Mr. Francis O'Malley and Dr. Stephen Sawyer. We formed as a group to assess the impact of the clean-up activities at the former Vitro Metals Site on the health and safety of the children and teachers at our school.

We do not specifically support any one alternative over another, except to say that it is our understanding that the clean-up and stabilization of this area has been needed for a long time, and that it is essential that this action be taken for the long-term health and social benefit of the Canonsburg area of which St. Patrick's School is a part.

However, since the recommended course of action is to stabilize the material at the site, our following questions and comments are based on that fact. We would recommend that the least amount of contaminated earth be disturbed to minimize the chance of airborne contamination. Also, as noted in the EIS draft, contaminated material should be dampened to further reduce the chance of airborne contamination and all vehicles transporting this material should be adequately covered.

Regarding the monitoring of on-site activity as it relates to airborne contamination, we would recommend that the on-site monitors be equipped with alarm systems to notify personnel to stop work when minimal health standards are exceeded. We do not want to be informed at a later date that work continued after healthful limits for children were exceeded, nor do we want to be put in a position of not having protected our children and teachers, if for some reason, this limit is exceeded for a long period of time. While the clean-up activities are in progress, off-site monitoring of conditions should also continue.

It is imperative that monitors be placed in and around the school during remedial action and results of these be given daily; also, that some type of alarm and measuring system be set up in the event that the levels in and around the school increase.

Along with the above mentioned systems DOE should work with St. Patrick's School to set up guidelines for evacuation on short-term and long-term basis in the event of an emergency. Mention is made in the Environmental Impact Draft Statement of measures that would be taken if an emergency would arise at the working site but not at the school or nearby areas.

As we read through the Environmental Impact Statement Draft, many questions are raised.

1. Exactly what levels of radon gas and radon daughters are projected to show up in and around St. Patrick's during the clean-up activities? We want to know to what levels our children will be exposed:
Radon Gas in PCi/l (pico cures per liter)
Radon Daughters in WL (Working Levels)
2. Since children are ten times more susceptible to problems from radiation exposure, what are the long and short-term health effects on the children?
3. What increase in risk of cancer or other health problems are projected in children as a result of the remedial action?

Should not the Environmental Impact Statement Draft have included information regarding questions such as these ... questions pertaining specifically to children? At St. Patrick's School there are 260 students from ages 5-14 on a daily basis. On weekends there are approximately 600 additional children

who study religion at the school. In Chapter 4 (4.12.7) of the Impact Statement entitled AFFECTED ENVIRONMENT, our school is mentioned as being located within one-quarter mile of the site. Is this not a precarious enough position to warrant inclusion of specific guidelines, recommendations and projections concerning St. Patrick's in the final draft of the Impact Statement?

The engineering plans and specific procedures to be followed during the clean-up activities are also questioned.

1. Will any or any parts of the buildings be sold as salvage?
2. Will the bentonite (clay) capsule be adequate? Will there be any leakage from the capsule in the distant future?
3. Will the containment area be outside the floodplain?

These are examples of some of the questions that concern us. We, as a committee, expect to be informed of the proposed engineering designs and specific methods to be used to accomplish them. Again, we do not want to be put in the position of having the work finalized and activity begun before we can comment.

The study notes that the site will be "transferred to the DOE and its future use restricted as specified in the NRC license". We need to be informed as to the future use proposed for the site. It is our strong feeling that no use other than storage of the material presently there should be contemplated. We are adamant concerning the issue and want the NRC to legally guarantee that no additional radioactive material will ever be brought to the site for storage, disposal or handling.

Further, to insure that this site never again is the health hazard that it presently is, we would want monitors and personnel to interpret this data

permanently assigned to the site to insure that it will never again exceed the health and public safety standards as developed by the EPA.

The government has the unequivocal and absolute responsibility to insure and guarantee to its citizens that they will be protected from actions that endanger their health and welfare, even if the government was not directly responsible for this matter.

On behalf of the students, parents, teachers and administrators of St. Patrick Parish, we would like to thank the Department of Energy for this opportunity to express our feelings concerning the Environmental Impact Statement Draft and the clean-up of the industrial park.

PITTSBURGH REGIONAL OFFICE
2031 FEDERAL BUILDING
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United States Senate

JOHN HEINZ
PENNSYLVANIA

FOR: MORLEY

January 11, 1983

R.D.2, Box 261A
Sugarloaf, Pa. 16249
January 12, 1983

Donald Model, Secretary of Energy
U.S. Department of Energy
Washington, D.C. 20530

Dear Secretary Model,

It has just come to my attention that the Department of Energy is requesting comment on the remedial action program at Canonsburg, Pa. It is my understanding that DOE failed to publish a federal register notice on the availability of its draft Environmental Impact Statement or on the date and place of the public hearing, therefore, I request that the DOE extend the closing date for written comments on this issue, which affects on people reach far beyond the Canonsburg area.

Please send me a copy of the draft of the Environmental Impact Statement on Canonsburg.

Thank you,

Sue Fracke

Sue Fracke

Mr. Mark L. Matthews, Lead Project Manager
Uranium Mill Tailings Remedial Action Project
Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Matthews:

In 1978, the passage of the "Uranium Mill Tailings Radiation Control Act" (the Federal government) committed to "clean up" twenty ^{known} sites contaminated by the remains of uranium ore extraction. Today, almost five years later, a very large portion of this radioactive material continues to contaminate the air, ground, and water at these sites, including the one at Canonsburg, Pennsylvania.

The Department of Energy along with the Pennsylvania Department of Environmental Resources and other groups have produced remedial action options in order to find the best methods of clearing the area of radon and radon daughter products. These options may be subject to change even though the Environmental Protection Agency has published their final assessment of the environmental impact of each of the proposed remedial action options. The EPA's delay in releasing such final standards has caused considerable hardship and anguish among the residents of the Canonsburg area.

Although the choice of a remedial action option has not been made and will be preceded by a careful review of all factors, including comments from affected residents and local officials, it is apparent that the stabilization of the contaminated material on site would satisfy most, if not all, of the criteria posited thus far.

The residents of the affected area have a right to expect that the completion of remedial action will clear the environment of harmful radioactive particles. If, however, the DOE can not make such assurances, other alternatives that will alleviate the problem must be found.

It must be made clear to the people of this area that the Federal government is and will be responsible for the results of the remedial action efforts. The swift, safe, complete clean-up of the contaminated sites is nothing less than an obligation incumbent on the government.

Sincerely,

John Heinz
John Heinz
United States Senate

JH/dww

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January 21, 1983

Mr. James A. Morley, Project Manager
Uranium Mill Tailings Project Office
U.S. Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Morley:

Attached are some written comments on the Draft Environmental Impact Statement DOE/EIS-0096-D entitled "Remedial Actions at the Former Vitro Rare Metals Plant Site, Canonsburg, Washington County, Pennsylvania".

The comments are submitted for your consideration in preparation of the final EIS as indicated in the handout at the North Strabane Township Public Hearing on January 12, 1983, and in the cover sheet for the subject report.

We appreciate the opportunity to submit our comments in this matter.

Yours truly,

George W. Leney
George W. Leney

G. Leney
243 Whitehall Center, Pittsburgh, PA 15227

Comments on Draft Environmental Impact Statement DOE/EIS-0096-D

"Remedial Actions at the Former Vitro Rare Metals Plant Site,
Canonsburg, Washington County, Pennsylvania"
U.S. Department of Energy, November, 1982

George W. Leney is a consulting geologist and Registered Pennsylvania Professional Engineer (PE-025696-E)

I. WASTE MATERIALS NOT ADEQUATELY CHARACTERIZED.

It is necessary to ask for the record:

"Is the Canonsburg site appropriately classified as "uranium mill tailings", or should it be placed in another classification which might require another type of remedial action?"

In discussions at the Canonsburg Umtra Meeting, December 16, 1982, both DOE and Contractor representatives repeatedly referred to the materials at Canonsburg and Burrell as "low-level radioactive waste", and this terminology was also used extensively in news media accounts of the public informational meetings and proposed remedial action. The use of this description in contrast to the classification as "uranium mill tailings" immediately raises the question as to the type of material actually present.

The DEIS is not enlightening in this regard. The wastes are characterized as "various ores, concentrates, and scrap materials brought from different AEC installations"(p1-3). It notes that "process wastes from this operation and other AEC contract work were stored here." (p2-2)

The wastes at Canonsburg are certainly not normal uranium mill tailings. "Vitro records show that in October, 1948, approximately 15 tons of uranium oxide (U_3O_8) were being extracted per month from 150 tons of waste received from different AEC installations. Under AEC contract requirements, Vitro retained

its solid process wastes on the site." (p4-4) This recovery of 10% from waste, is about 100 times the grade of normal uranium ores, which average 0.12% U_3O_8 . The residues moved to Burrell had 0.097% U_3O_8 , or about the same as normal ore, and much more than normal mill tails. It raises the question if the wastes are residues of naturally occurring minerals, or if they include chemical, metallurgical or reactor products that are not in normal mill tailings, and would represent a hazard not ordinarily present.

Contamination with this type of material might require reclassification of the Canonsburg site to one of the other categories of Low-Level Waste, or even as contaminated with High-Level Waste. The site is unacceptable for Low-Level Waste disposal under NRC 10CFR Part 61, or for High-Level Waste, and stabilization would be precluded as an alternative, both from a legal point of view, and in consideration of public health.

The lack of adequate sample data also obscures the choice of alternatives. The amount, distribution, concentrations, equilibrium condition, radioactive half-life, and character of the contaminants are inadequately described. More detailed information might suggest that decontamination is feasible, or that alternative remedial action is preferred. Such detailed geologic and metallurgical exploration is a routine part of the exploration of any uranium ore body, and should be readily possible at this shallow waste dump.

II. ENCAPSULATION NOT A PROVEN OR NECESSARILY DESIRABLE TECHNIQUE.

Encapsulation represents an attempt to create a low permeability medium that will effectively seal off the waste from ground water

movement. Although the use of clay liners in ponds or settling basins is not new, its use in encapsulation of radioactive wastes, which will generate heat, gases, and acid solutions to attack the clay, has not been tried. Experience with storage of low-level waste in natural mediums of low permeability has been poor. The cover either cracks or leaks, and the capsule fills with water creating a "bathtub effect". Eventually the capsule is breached or the bathtub overflows releasing plumes of highly contaminated water saturated with waste elements.

The problem was discussed at several recent symposia sponsored by the U.S. Nuclear Regulatory Commission and the Oak Ridge National Laboratory. Observations from some of the papers were:

G. Lewis Meyer, Office of Radiation Programs, U.S. Environmental Protection Agency

"Three disposal sites in the humid eastern United States have over 20 feet of clay-rich overburden with very low permeability. However, experience at them has not been good--- primarily because site engineering did not keep rain water from infiltrating into the trenches. Infiltrating rain water has soaked the wastes, formed radioactive leachates, and overflowed from the trenches to ground surface. At another disposal site, also in humid eastern United States, which has a more permeable disposal medium, no significant problem has been encountered with the collection of leachate in the trenches or with overflow of the leachate."

Patrick G. Tucker, U.S. Army Engineers Waterway Experiment Station

"Subsidence, the "bathtub effect", and the infiltration of ground water into the disposal trench have cast doubts on the ability of some facilities to control the movement of their buried radionuclides."

John B. Robertson, U.S. Geological Survey

"At the Oak Ridge site, raising the ground surface by fill material actually induced the water table upward into the waste in some cases. (Webster, 1979)."

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Thomas M. Johnson, State Geological Survey Division, Illinois
Department of Energy and Natural Resources

"A study funded by the U.S. Nuclear Regulatory Commission is underway to evaluate the potential use of layered trench covers to minimize infiltration at low-level radioactive waste disposal sites."

Amir A. Mitry and Michael A. Corbin, Roy F. Weston, Inc.

"Several concepts and control options are presented. These included chemical fixation, grouting, bentonite, slurry barrier, hydrologic isolation, impermeable covers and liners, ion exchange barrier, etc. A total containment concept includes the following (1) Installation of clay liner ----- (2) Installation of complex covers consisting of 1) clay layer, 2) sand or gravel layer, 3) soil layer, 4) vegetation cover."

It is clear that the encapsulation proposed for Canonsburg is an experimental concept, and not a proven technique. Encapsulation has not worked in natural low-permeability mediums, and Canonsburg would be the first test if a man-made liner will work. Since it is experimental, evaluation depends on engineering calculations and intuitive judgements. In order to be a success, integrity must be maintained for whatever period of risk is assigned. Engineering calculations can determine infiltration under some assumed condition, but it is anybody's guess as to the probability of breaching due to erosion, cracking from swelling, compaction or subsidence, shrinkage or dessication, intrusion by plant roots or burrowing animals, and inadvertent or deliberate human intrusion. Success depends on the egress of infiltrating ground water at the same rate as entry. An induced or natural rise in the water table, already at the level of the capsule floor, will limit ground water escape, and breaching or overflow will release a plume of highly contaminated water to the creek or bed rock water table.

Assuming encapsulation were a complete success, one may still question if it is a desirable alternative. The principle radionuclides measured (Table F.1-2), all have long half lives, U_{238} = 4.5 billion years, U_{235} = 710 million years, U_{234} = 248,000 years, and Ra_{226} = 1620 years. Losses of the U_{234} and Ra_{226} daughters are continuously replaced by new disintegrations of the parents. Whatever concentration of these materials is brought together in the capsule is guaranteed to remain forever, or at least until the repository is breached and erosion scatters it down Chartiers Creek. As long as it is sealed in the capsule, nothing much will change, or improve. The choice of a time frame for institutional maintenance and monitoring is a purely arbitrary decision that beyond a certain number of years we are unable to predict what will happen, so there is no use worrying about it.

If the Canonsburg wastes are entirely residues of natural ores, they represent concentrations of minerals and elements already present in the soils, rocks, water, and air in the area. The amounts that occur in nature are not small. Uranium averages 10-20 parts per million in the black shales under most of Ohio, and about 70 parts per million in the Chattanooga shale of Tennessee. It is about one third as common as lead. In the rocks as Canonsburg, it probably averages 2-4 parts per million, which yields 100,000-250,000 tons of uranium within a radius of 1 2/4 miles to a depth of one mile. This is 300-1000 times as much as could conceivably be present on the site. The alternative to decontamination should be to disperse the radionuclides and return them to their natural environment as quickly as possible, consistent with the health and safety

of the residents, and in compliance with the regulations designed to protect them. It is the only way in which there will ever be any light at the end of the tunnel.

In this view, encapsulation is an unsuitable and undesirable alternative. It would be better to demolish the buildings and bury them with contaminated surface soils under sufficient cover to eliminate direct surface radiation and the escape of gaseous radon daughters. Ground water percolation should be allowed to gradually remove the contaminants in solution and disperse them in the natural environment, from whence they came. Monitoring would be the same as under the encapsulation alternative.

Such a system is already effectively in operation in Area B and at Burrell, and seems to be working well. At Canonsburg there is no surface water or stream sediment contamination in Chartiers Creek (p 4-33), and the proposed EPA ground water quality standards are already being met. Waste in water is diluted at least 1000 fold after mixing with the Ohio River (p 4-18). At Burrell, if the 1977 and 1981-82 data are correct, ground water has been replaced at least forty times, and percolation has reduced the Ra_{226} concentration by a factor of 3, and U_{238} by a factor of 24 in just five years from 1977 to 1982 (p A.2-10). Such data offers the hope that natural processes could safely eliminate the contamination within the life span of a few generations. Such hopes would be utterly destroyed by encapsulation. Even if it worked, the capsule would preserve these materials, dangerously concentrated, and and lurking there, just ten feet below the surface, forever.

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III. COST DATA ARE POORLY ORGANIZED AND MISLEADING.

Cost estimates to stabilize or decontaminate both Canonsburg and Burrell are presented in Tables A.4-2, A.4-3, A.4-4, and A.4-5, and are used to estimate costs of alternatives 2, 3, 4, and 5 in Table A.4-1.

We question items of costing as follows:

1. Alternative 2 is to decontaminate Burrell and encapsulate its waste with the Canonsburg waste at Canonsburg. Total costs appear to be overstated by about \$4,200,000.
 - a. Costs for hauling 80,000 yd³ to Canonsburg are taken as \$2,080,000, but are given as \$696,000 in the transportation appendix (p I-35)
 - b. "Material filling" to encapsulate 5 acres with Burrell waste is \$800,000 (Table A.4-2), compared to only \$80,000 for 3 acres at Canonsburg. This appears to overstate costs by about \$700,000.
 - c. After decontaminating Burrell, monitoring costs should be less than in alternative 3, and we see no obvious reason why legal and administrative costs would increase from \$1,656,000 to \$2,800,000. The result seems to be to overstate costs by \$2,116,000.
2. Alternative 4 is to decontaminate both Canonsburg and Burrell and encapsulate the wastes at Hanover. Costs appear to be overstated by \$7,127,000.
 - a. Burrell costs for transportation and material filling appear to be overstated by \$1,384,000 and \$700,000 as in items 1a and 1b above.
 - b. Hanover site preparation costs of \$1,500,000 include \$500,000 from Table A.4-3 for Burrell waste (50 acres) and \$1,000,000 from Table A.4-5 for Canonsburg waste (100 acres @ \$10,000/a). Since the Hanover site is only 50 acres, costs appear to be overstated by 100 acres = \$1,000,000
 - c. Costs of hauling 250,000 yd³ from Canonsburg to Hanover are given as \$2,000,000 compared to \$1,050,000 in the transportation index (p I-35). Costs appear to be overstated by \$950,000.

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- d. Costs for monitoring at Hanover should be the same or less than in alternative 3, and appear to be overstated by at least \$3,093,000.
3. Alternative 5 is to encapsulate the Canonsburg materials at Hanover, and stabilize Burrell. Costs appear to be overstated by \$3,496,000.
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- a. Total cost to encapsulate Canonsburg waste at Hanover is the same as alternative 4, which overstates them by \$950,000 as in 2c above.
- b. Hanover costs include \$1,000,000 for site preparation which overstates them by \$500,000 as in 2b above.
- c. Monitoring costs to monitor Burrell and Hanover should be no more than alternative 3, and are overstated by \$2,046,000.

IV. LACK OF ENGINEERING SUPPORT TO COST DATA.

Independent of treatment of cost data, the real weakness of costing information is that they lack engineering support.

At Canonsburg, estimates are based on handling 23,985 yd³ of contaminated soils, 4700 tons of contaminated steel, and 18,000 yd³ of demolition debris, to be placed in a 3 acre capsule. The estimates rise to 250,000yd³ for decontamination. This amounts to 8.4 ft over the entire site. No data are presented to support these numbers. Values of 140,000 yd³, 34,000 yd³ and 76,000 yd³ in areas A, B, and C correspond to depths of 7.9 ft, 4.7 ft, and 15.7 ft. These are larger numbers than would be suggested by an average depth of contamination of 4.0 ft in A., and an average depth of 10-12 feet to Chartiers Creek in area C. Estimates were based on meeting an EPA proposed standard of 2 pCi/m²sec. This has been raised to 20 pCi/m²sec in the final standard. The effect will be to drastically reduce the 250,000 yd³ figure, perhaps to as little as 25,000 yd³. Volumes could also be minimized by in situ sorting of contaminated soils during excavation.

Such a change would drastically alter the cost data and evaluation of alternatives.

V. GENERAL COMMENT

A. The figures for soil loss after remedial action seem unreasonably low. Calculations showing one-eighth inch loss in a thousand years resulted from changing the soil cover to reduce erosion by a factor of 150 times.

B. Health impacts would be more meaningful if calculated for a smaller area and downwind from the site. Almost all health impacts will be in this area, and probably should not be averaged over the larger population.

C. The Vitro site has been there for seventy-two years. An evaluation of actual health impacts could have been made as an alternative, and for comparison with theoretically calculated data from dosage rates.

D. Appendix H (p H-7,10,13) suggests noise levels from the proposed action which have the potential for hearing damage outdoors, would be above acceptable levels in residences, and would be likely to cause widespread complaints. A reduced scale of operations is indicated.

CONCLUSIONS AND SUGGESTIONS FOR CONSIDERATION

I. Characterization.

We believe a more rigorous characterization of the contaminated areas at Canonsburg is necessary before a meaningful calculation of impacts, costs, and selection of alternatives is possible.

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This should include detailed radiological and soils mapping on a survey grid at a scale of no more than fifty feet to the inch. Contaminated areas should be systematically sampled with auger, split spoon, or drill holes to bed rock. Holes should be close spaced to define each contaminated area and should have radioactive logs with radon gas and alpha radiation determinations as necessary. Samples from holes should be analyzed for chemical, mineralogical, and radioelement composition to determine the exact nature of nature of contaminants, probable half-life, and state of equilibrium. Vitro and AEC records should be examined to determine the types and amounts of waste deposited at the Canonsburg site.

II. Classification.

If the detailed characterization revealed the presence of waste elements or minerals not naturally occurring in uranium ores or mill tailings, or in excessive amounts, the site should be appropriately reclassified. Examples might be chemical or metallurgical process waste, toxic waste, other low-level radioactive waste, high level wastes, or military wastes. Presence of these materials might preclude stabilization as an alternative.

III. Remedial Action.

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The history of the Canonsburg site is one of temporary expedients which soon prove to be unsatisfactory and require further remedial action within a few years. We view encapsulation as one more of the same. It requires that the site be restricted from other activity, and that it be maintained and monitored for as long as Canonsburg remains an inhabited area. The health

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concerns of the residents will persist, property values will remain depressed, industry will avoid the area or relocate elsewhere, and the population will gradually be driven away. We believe these "societal costs" should be factored into the choice of remedial actions, and will show encapsulation to be an expensive alternative.

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We further believe it is unreasonable to expect the site and capsule to remain intact for anything like the time frame visualized for institutional maintainence. We anticipate continuing and substantial expense for repairs, maintainence, monitoring, and further remedial actions.

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We also consider it undesirable to concentrate the most highly radioactive wastes within a small capsule. It is a certainty that the capsule will be breached before any significant decline in radioactivity, and when it is, the higher concentrations will present a greater hazard to public health. Concentration may also violate the new EPA standard that Ra_{226} may not exceed 15 pCi/gm over 15 cm thick layers more than 15 cm below the surface.

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We suggest stabilization at Burrell, and decontamination of Canonsburg as the favored alternative. Arguments are:

1. Burrell presents no demonstrated health hazard for the foreseeable future, it has no alternative residential or commercial use except for land fill, and natural ground water movement appears to be rapidly dissipating the remaining contaminants.
2. Detailed characterization of the Canonsburg wastes is expected to confirm that they are not normal "uranium mill tailings" and require reclassification in some other category.

Reclassification may preclude stabilization as an alternative.

3. Detailed characterization may also demonstrate that the volume of contaminated materials is much less than the 250,000 yd³ estimated for decontamination.

4. Relaxation of the final EPA Standards 40CFR Chapter I, Subchapter F, Part 192 should also reduce the volume of material that it is necessary to move for decontamination.

5. Better cost estimates from detailed characterization will reduce the difference between stabilization and decontamination alternatives.

6. When overall "societal costs" are considered, decontamination is the most desirable alternative.

7. Encapsulation of greater than 100 pCi/gm waste in a concentrated area may be prohibited under new final EPA standards.

We do not, however, believe that Hanover is an acceptable alternative site. If detailed characterization precludes stabilization at Canonsburg, it may also eliminate Hanover, and encapsulation might still violate the new EPA standards. Hanover may not be acceptable for Low-Level Waste disposal under NRC regulations.

Neither do we believe that Pennsylvania should accept a ruling that it is illegal to move the waste across state boundaries, or that it is too expensive to ship them to an acceptable site. Having shipped them in, it seems unreasonable to let the government slam the door and leave Canonsburg to cope with them.

If it is truly impossible to send them to a current repository, a change in classification to "Low-Level Waste", which may be

mandated by detailed characterization, would require them to be moved to a licensed "Low-Level Waste Repository". If a currently acceptable repository is not accessible, they may be left in place until one is. The recent Low-Level Waste Repository Act (Public Law 96-573) requires the designation of new repositories by 1986. The regulations for selection, licensing, maintenance, and monitoring come from the U.S. Nuclear Regulatory Commission, and are much more stringent than for UMTRA sites. Large amounts of highly radioactive debris will also be accumulated in the near future, from decommissioning of the experimental reactor at Shippingport. Provision might be made to dispose of Canonsburg wastes with them.

If decontamination is refused, it appears the second best alternative would be to demolish the buildings and store the debris, along with contaminated surface soils from Area A, in the depression along Ward Street. The site should then be graded and covered with sufficient clean fill to eliminate the health hazards from direct surface radiation and radon emissions. This type of remedial action is effectively in operation at present in Area B, and appears to be working well. Ground water and surface water off-site is not contaminated, and additional clay fill with soil cover should reduce ground water infiltration. Contaminated soils on the flood plain in Area C do not appear to be a problem. They have already withstood the effect of hurricane Agnes, considered to be a 1000 year storm (p 4-8,19), and there is no assurance that moving them would make them less vulnerable.

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The philosophy behind these suggestions is to eliminate the health hazards, while permitting percolation of ground water to gradually disperse the radioactive wastes and return them to the natural environment that they were originally derived from.

We recommend these comments and observations for your consideration.

A handwritten signature in cursive script, reading "G. W. Leney", is written over a horizontal line.

G. W. Leney
January 20, 1983

Rec'd 1-24-83

THE PENNSYLVANIA STATE UNIVERSITY

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College of Science
Department of Physics

Area Code 814

18 January 1983

An Evaluation of
Radioactive Waste
at Canonsburg, Pa
by

William A. Lochstet, Ph.D.

The Pennsylvania State University*
January 1983

Mr. Richard H. Campbell
Manager
Uranium Mill Tailings Remedial Action Project
U.S. Department of Energy
Albuquerque Operations Office
5301 Central Ave, N.E. , Suite 1700
Albuquerque, New Mexico
87108

Dear Mr Campbell:

Enclosed are my comments on the Draft Environmental
Statement related to the Canonsburg site, DOE/EIS-0096-D.
Please note that the calculations and positions taken herein do
not necessarily reflect the position of the Pennsylvania
State University.

I hope that this information is used in developing the
Final Environmental Statement, and your choice for action.

Would you please send me a copy of the Final EIS when it
is available.

Sincerely,

William A. Lochstet

Wm. A. Lochstet

The Department of Energy has presented a draft environmental
impact statement on the "Remedial Actions at the Former Vitro
Rare Metals Plant Site, Canonsburg, Pa." (Ref. 1). The hazard
present is partially depleted uranium mill tailings and other
tailings at two sites, one at Canonsburg, and the other in
nearby Burrell Township. The department (DOE) has chosen to present
a report which ignores the real hazard of the situation even though
this was demonstrated at the "Scoping Meeting" held in Canonsburg
on 3 June 1981. In particular, DOE presents the worst possible
environmental impact to be the death of only 5.4 people in the
next 32.5 years, which will continue if no action is taken.
At this death rate of 0.16 per year there is no discussion of
how long it will last, or what the possible total might be.
Since the major hazard is derived from uranium-238, it might
be reasonable to consider one half life of 4.5×10^9 years,
for a total of 747 million dead. The lack of any number of
deaths greater than 10 implies a clear bias.

Similarly, DOE refuses to consider the deaths of people
living further than 2 kilometers (1.24 miles) from the site
in question (Ref. 1, P. 1-21, Sec. 1-5).

In 1976 Pohl pointed out (Ref. 2) that the thorium-230
in uranium mill tailings decays to radium-226, which in turn
decays to radon-222 with a time scale determined by the 80,000

* The calculations and opinions presented here are my own, and
not necessarily those of the Pennsylvania State University.
My affiliation is given here for identification purposes only.

year half life of the thorium-230. Later that same year, the NRC Staff pointed out in the GESMO proceeding (Ref. 3) that it is important to consider that the uranium-238 in mill tailings decays thru several steps to radon-222. It is necessary to consider the health effects of this radon generation, in order to find the total environmental impact, rather than merely a description of a way to meet the regulations. The requirement of NEPA is an evaluation of the impacts.

First consider the consequences of no action. At present the Canonsburg site is emitting radon at a rate of 2158 Ci/year, and the Burrell site is emitting radon at a rate of 111 Ci/year (Ref. 1, App. F). As a result of the extraction processes, these materials are not in secular equilibrium. This is due to the removal of radium from some of the ores and uranium from others. It is here assumed that the uranium recovery was 90% efficient, so that 10% of the uranium remains at the sites. Thus, 10% of the radon emissions are in secular equilibrium with the parent, uranium-238, and will continue with a time scale determined by its half life. Thus, starting at 227 Ci/year, a total of 1.5×10^{12} curies of radon-222 will be released (1.5 trillion curies).

The population at risk is the entire population living down wind from the site, not merely those living within 1.24 miles. It is clearly not possible to predict the U.S. population many thousands of years into the future. That does not excuse us from a reasonable attempt. A reasonable first estimate is the present population in its present distribution. The NRC Staff (not some wild-eyed crazy) has done this, using a U.S. population of 300 million for radon released from a western state (Ref. 4). Since people live very far apart in western states, this assumes few residents within a few tens of miles, and thus, does not include the people within the 1.24 miles considered in the Draft.

The NRC result is that the release of one curie results in a total of 0.56 person-rem to the bronchial epithelium, for the total population. After considering the state by state distribution of population to the easterly directions of such sites, it is here estimated that release of radon from a site near Pittsburgh would result in about half as much exposure or 0.28 person-rem. However, to be safe, one third ($0.56/3$), or 0.19 person-rem will be used here. The result is $1.5 \times 10^{12} \times 0.19$, or 2.7×10^{11} person-rem to the bronchial epithelium.

The Draft chooses to use a risk factor of 20 deaths per million person-rem to the bronchial epithelium from radon-222 and succeeding isotopes. This is probably too small, but will be used here. The result is $2.7 \times 10^{11} \times 20/10^6$ or 5.5 million deaths. It would certainly not be appropriate to consider the "no action" alternative. This very optimistic estimate ignores the effects of erosion. Rain will fall, soil will wash away, and Chartiers creek will erode away at the base of the site. The result is less soil cover, and higher radon emissions, and thus more deaths.

The Draft (Ref. 1) considers four remedial action alternatives. The expected radon emissions are listed in Appendix F.2 for the various sites. The result would be a radon emission rate of 7.6 to 10.1 Curie per year, total for the sites involved. The consequences of a nominal starting rate of 10 Ci/year will be considered here as representative of these alternatives.

As before a uranium extraction efficiency of 90% would imply that 10% of the 10 curie per year, or one curie per year would be in secular equilibrium with the uranium-238 parent and will continue at that time scale. The result, is 6.5×10^9 curies of radon released. For the population considered previously, receiving 0.19 person-rem per curie, the dose is 1.21×10^9

131 person-rem to the bronchial epithelium. Using the DOE risk factor
6.2.5 of 20 deaths per million person-rem, the result is 24,000 deaths.
Thus , the proposed remedial actions reduce the death total from
five million to twenty four thousand. This is certainly justification
for not taking no action. The cost of this program would be
\$45 million, or less (Ref. 1, App. A.4).

132 The NRC has a principle of as low as reasonably achievable
6.2.1 (ALARA) which is put forth in the law at 10 CFR 50 Appendix I.
This is used to determine how much money should be spent to
improve a control measure to decrease radiation exposures.
The rule says that efforts can stop when it costs \$1000 to
reduce the population exposure by one person-rem to the whole body.
The DOE risk factor for whole body exposure is 120 deaths per
million person-rem (Ref. 1, P. F.3-4). Combined with the NRC rule
equates 120 deaths with 1,000,000 x \$1000, or a billion dollars.
This means that a billion dollars should be spent if it will
save over 120 lives. The death toll from the alternatives presented
is 24,000, which would imply \$200 billion might be spent to save
all these lives. Since the DOE has not considered this, they have
not satisfied the law (10 CFR 50).

133 It is clear that DOE should consider doing the cleanup
6.2.2 properly, rather than pushing a little dirt over the problem and
going away. It would appear that that was the procedure used in
1965-1966 (Ref. 1, P.4-4) and found to be unacceptable in 1977.
If this procedure is used again, it would be expected that one
of the alternatives (2-5) would be completed by 1987 and found
unacceptable by the year 1999.

134 A better location should be found for the waste material.
6.2.1 The locality of the present site (greater Pittsburgh) is too
densely populated, and will continue to be too densely populated
to justify shallow land burial of this material. It might be possible

134 to find a location with stable geology that would allow deep
6.2.1 geological disposal. I understand that DOE is looking for such
a site. Something similar to the Waste Isolation Pilot Plant
site in New Mexico. The WIPP site has been shown to be
inadequate, so it cannot be used. Certainly this could be done
within a \$200 billion budget. The cost of transportation can
also be justified. It would also be in the national interest
to use rail rather than truck due to the greater fuel efficiency
of rail.

135 The excavation of the sites as outlined would seem to
6.2.1 lead to the loading and dumping of dry material in the open.
This may be condoned in an open area in the west, but is not
appropriate in a site with dwellings just across the Conrail
tracks. It is suggested that a tent be placed over the excavation
area as has been done for other exhumations of buried low level
radioactive waste. It would also seem prudent to keep the
material wet and move mud rather than dry material. This would
generate less dust. It is very important that the contamination
not be spread over a larger area due to the work to be done.

137 It is stated on page 3-9 of the Draft (Ref. 1) that the
6.2.4 Wilson Avenue and George Street residences are uncontaminated.
One of these houses has a contaminated chimney (Ref. 5).

138 Erosion must be considered more carefully. The erosion of
6.2.8 Chartiers Creek at Canonsburg and the Conemaugh River at Burrell
Township will eventually carry away the material presently there.
The validity of this is obvious if you compare this to the Grand
Canyon which is over a mile deep, due totally to erosion.
The calculations of Appendix A.5 (Ref. 1) do not seem to have
considered stream erosion, gullving , or the effects of
off road vehicles (dirt bikes).

Canonsburg

Jan 1983

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The document presented by DOE (Ref. 1) sets forth the way in which the Department intends to meet certain existing or proposed regulations, such as the EPA limits for mill tails. It does not assess the full environmental impact of the proposed action as is required by NEPA. NEPA requires an honest and reasoned attempt to evaluate the full environmental and health impact of these wastes. This must go beyond 1000, or even 1,000,000 years, because the hazard will still be there. This evaluation must also go beyond 2 km (1.24 miles) because the hazard does not stop at this or any magical boundary. It was shown in the case of reactor accidents that the health effects are greater for a larger population farther away with less dose per person, because there are so many more persons (Ref. 6).

It is hoped that DOE meets its statutory requirements under NEPA and ALARA.

Canonsburg

Jan 1983

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References

- 1 "Draft Environmental Impact Statement, Remedial Actions at the Former Vitro Rare Metals Plant Site, Canonsburg, Washington County, Pennsylvania", DOE/EIS-0096-D, U.S. DOE, (November 1982)
- 2 R.O. Pohla, "Health Effects of Radon-222 from Uranium Mining", Search, 7 (5), 345-350 (August 1976).
- 3 "NRC Staff's Written Answers to Questions on Chapter IV F and G (Including 7 Answers Pertaining to IV E)" NRC Staff before the GESMO Hearing Board, 13 December 1976, Docket No RM-50-5.
- 4 Affidavit of Dr. R. L. Gotchy, NRC Staff, "Appendix", "Radiological Impact of Radon-222 Releases", NRC, in the matter of Three Mile Island Unit 2 operating license, (January 20, 1978).
- 5 Private Communication, Resident, 3 June 1981
- 6 "Report to the American Physical Society by the Study group on light-water reactor safety", H.V. Lewis, et al., Reviews of Modern Physics, Vol 47, Supp No 1, Summer 1975

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(505) 262 1862

January 6, 1983

Mr. James Morley, Director
Uranium Mill Tailings Project Office
United States Department of Energy
Albuquerque Operations Office
Post Office Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Morley:

On behalf of Southwest Research and Information Center (SRIC) we are hereby requesting an extension of time for submission of both oral and written comments on the Draft Environmental Impact Statement (DEIS) pertaining to the Canonsburg, Pennsylvania inactive uranium mill tailings processing site. Developed pursuant to the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), the DEIS contains proposed remedial action to minimize or eliminate health hazards resulting from exposure of the public to residual radioactive materials.

SRIC has demonstrated a longstanding concern with the environmental, health, and safety problems associated with uranium mill tailings. Moreover, SRIC, through a variety of advocacy activities both legislative and regulatory, has played an active role in this region and at the national level to ensure maximum protection of affected communities from the adverse effects of exposure to uranium mill tailings. It is for these reasons that we are so concerned about the Canonsburg, Pennsylvania situation.

We believe that an extension of the comment period is essential to secure meaningful public participation on the DEIS for the following reasons.

1. Requirements for public participation under both UMTRCA and NEPA will be violated if our request for an extension is denied.

Both the National Environmental Policy Act (NEPA) and UMTRCA presuppose active public involvement in governmental decision-making that affects the environment. Specifically, Section 111 of UMTRCA mandates public participation. Section 111 provides as follows:

In carrying out the provisions of this title, including the designation of processing sites, establishing priorities for such sites, the selection of remedial actions, and the execution of cooperative agreements, the

Mr. James Morley
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Secretary, the Administrator and the Commission shall encourage public participation and, where appropriate, the Secretary shall hold public hearings relative to such matters in the States where processing sites and disposal sites are located [emphasis added].

See also Council on Environmental Quality Guidelines for NEPA requiring an agency that has prepared a DEIS to "request comments from the public, affirmatively soliciting comments from those persons or organizations who may be interested or affected." 40 C.F.R. §1503.1 (a)(4)(1981). The public notice on the Canonsburg DEIS in fact fails to "encourage public participation."

The notice appeared in the Federal Register on December 8, 1982. 47 F.R. 55305 (1982). The notice omitted any mention of the public hearing scheduled for January 11-12, 1983. The notice only indicates that comments must be submitted by January 24, 1983. Because the December 8, 1982 notice nowhere informs the public about the scheduled hearing date, it is hard to see how the Department has met UMTRCA's public participation requirement, at least as to the proposed public hearing. Furthermore, the Council on Environmental Quality Guidelines also make it clear that the notice in the Federal Register should have included the scheduled hearing date. 40 C.F.R. §§1506.6 (a), (b) (1981).

In addition, the timing of release of the DEIS was simply unfortunate because it coincided with the Christmas holidays. Thus, many concerned and effected individuals never learned about the public hearings until after January 1, 1983. They should not be denied an opportunity to be heard.

2. Because the decisions made regarding the Canonsburg site hold such significant precedential import for the entire DOE remedial action program, maximum public involvement is even more critical than it would be otherwise.

Canonsburg, Pennsylvania is the first of twenty-four DOE sites designated for remedial action pursuant to UMTRCA. This is the first opportunity granted the public to comment on a DOE remedial action plan. Whatever is decided in Canonsburg will inevitably serve as a precedent for remedial action programs at the other twenty-three sites. Therefore, it is absolutely critical that the agency permit a full airing of public views so that as many considerations as possible are taken into account in the final design of this remedial action program.

3. An extension of time will not adversely affect the UMTRA Master Site Schedule. According to the UMTRA Project Status Review presented at the Grand Junction, Colorado meeting on October 26-27, 1982, the completion of the NEPA process for Canonsburg was scheduled for the middle of the second quarter of 1983 (see attachment). Thus, the completion of the comment period by January 24, 1983 puts DOE well ahead of

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schedule. We submit that a short extension of time will not compromise DOE's schedule and will inestimably benefit the entire planning process by allowing for the meaningful participation of concerned citizens. Based on the foregoing reasons, we propose the following:

1. Extend the comment period from January 24, 1983 to February 24, 1983.
2. At the close of the hearing scheduled for January 11-12, 1983, recess the hearing and reconvene it on February 1-2, 1983 to enable those who have not been given adequate notice an opportunity to provide oral testimony.

We believe this proposal gives all interested parties, including those prepared to testify on January 11-12, 1983 the opportunity to have their views known. We appreciate your consideration of this important matter.

Sincerely,

Carol Oppenheimer
CAROL OPPENHEIMER
Staff Attorney

CO/ms

cc: Mr. Robert McNeill, Secretary
New Mexico Department of Health and Environment

Senator Jeff Bingaman

Representative Bill Richardson

§ 1506.2

(c) While work on a required program environmental impact statement is in progress and the action is not covered by an existing program statement, agencies shall not undertake in the interim any major Federal action covered by the program which may significantly affect the quality of the human environment unless such action:

(1) is justified independently of the program;

(2) is itself accompanied by an adequate environmental impact statement; and

(3) Will not prejudice the ultimate decision on the program. Interim action prejudices the ultimate decision on the program when it tends to determine subsequent development or limit alternatives.

(d) This section does not preclude development by applicants of plans or designs or performance of other work necessary to support an application for Federal, State or local permits or assistance. Nothing in this section shall preclude Rural Electrification Administration approval of minimal expenditures not affecting the environment (e.g. long leadtime equipment and purchase options) made by non-governmental entities seeking loan guarantees from the Administration.

§ 1506.2 Elimination of duplication with State and local procedures.

(a) Agencies authorized by law to cooperate with State agencies of statewide jurisdiction pursuant to section 102(2)(D) of the Act may do so.

(b) Agencies shall cooperate with State and local agencies to the fullest extent possible to reduce duplication between NEPA and State and local requirements, unless the agencies are specifically barred from doing so by some other law. Except for cases covered by paragraph (a) of this section, such cooperation shall to the fullest extent possible include:

(1) Joint planning processes.

(2) Joint environmental research and studies.

(3) Joint public hearings (except where otherwise provided by statute).

(4) Joint environmental assessments.

(c) Agencies shall cooperate with State and local agencies to the fullest

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extent possible to reduce duplication between NEPA and comparable State and local requirements, unless the agencies are specifically barred from doing so by some other law. Except for cases covered by paragraph (a) of this section, such cooperation shall to the fullest extent possible include joint environmental impact statements. In such cases one or more Federal agencies and one or more State or local agencies shall be joint lead agencies. Where State laws or local ordinances have environmental impact statement requirements in addition to but not in conflict with those in NEPA, Federal agencies shall cooperate in fulfilling these requirements as well as those of Federal laws so that one document will comply with all applicable laws.

(d) To better integrate environmental impact statements into State or local planning processes, statements shall discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law.

§ 1506.3 Adoption.

(a) An agency may adopt a Federal draft or final environmental impact statement or portion thereof provided that the statement or portion thereof meets the standards for an adequate statement under these regulations.

(b) If the actions covered by the original environmental impact statement and the proposed action are substantially the same, the agency adopting another agency's statement is not required to recirculate it except as a final statement. Otherwise the adopting agency shall treat the statement as a draft and recirculate it (except as provided in paragraph (c) of this section).

(c) A cooperating agency may adopt without recirculating the environmental impact statement of a lead agency when, after an independent review of the statement, the cooperating agency concludes that its comments and suggestions have been satisfied.

(d) When an agency adopts a statement which is not final within the

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agency that prepared it, or when the action it assesses is the subject of a referral under Part 1504, or when the statement's adequacy is the subject of a judicial action which is not final, the agency shall so specify

§ 1506.4 Combining documents.

Any environmental document in compliance with NEPA may be combined with any other agency document to reduce duplication and paperwork

§ 1506.5 Agency responsibility

(a) *Information* If an agency requires an applicant to submit environmental information for possible use by the agency in preparing an environmental impact statement, then the agency should assist the applicant by outlining the types of information required. The agency shall independently evaluate the information submitted and shall be responsible for its accuracy. If the agency chooses to use the information submitted by the applicant in the environmental impact statement, either directly or by reference, then the names of the persons responsible for the independent evaluation shall be included in the list of preparers (§ 1502.17). It is the intent of this paragraph that acceptable work not be redone, but that it be verified by the agency.

(b) *Environmental assessments.* If an agency permits an applicant to prepare an environmental assessment, the agency, besides fulfilling the requirements of paragraph (a) of this section, shall make its own evaluation of the environmental issues and take responsibility for the scope and content of the environmental assessment.

(c) *Environmental impact statements.* Except as provided in §§ 1506.2 and 1506.3 any environmental impact statement prepared pursuant to the requirements of NEPA shall be prepared directly by or by a contractor selected by the lead agency or where appropriate under § 1501.6(b), a cooperating agency. It is the intent of these regulations that the contractor be chosen solely by the lead agency, or by the lead agency in cooperation with cooperating agencies, or where appropriate by a cooperating agency to

avoid any conflict of interest. Contractors shall execute a disclosure statement prepared by the lead agency, or where appropriate the cooperating agency, specifying that they have no financial or other interest in the outcome of the project. If the document is prepared by contract, the responsible Federal official shall furnish guidance and participate in the preparation and shall independently evaluate the statement prior to its approval and take responsibility for its scope and contents. Nothing in this section is intended to prohibit any agency from requesting any person to submit information to it or to prohibit any person from submitting information to any agency.

§ 1506.6 Public involvement.

Agencies shall (a) Make diligent efforts to involve the public in preparing and implementing their NEPA procedures.

(b) Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or affected.

(1) In all cases the agency shall mail notice to those who have requested it on an individual action.

(2) In the case of an action with effects of national concern notice shall include publication in the *Federal Register* and notice by mail to national organizations reasonably expected to be interested in the matter and may include listing in the *102 Monitor*. An agency engaged in rulemaking may provide notice by mail to national organizations who have requested that notice regularly be provided. Agencies shall maintain a list of such organizations.

(3) In the case of an action with effects primarily of local concern the notice may include:

(i) Notice to State and area-wide clearinghouses pursuant to OMB Circular A-95 (Revised).

(ii) Notice to Indian tribes when effects may occur on reservations.

(iii) Following the affected State's public notice procedures for comparable actions.

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(iv) Publication in local newspapers (in papers of general circulation rather than legal papers).

(v) Notice through other local media.

(vi) Notice to potentially interested community organizations including small business associations.

(vii) Publication in newsletters that may be expected to reach potentially interested persons.

(viii) Direct mailing to owners and occupants of nearby or affected property.

(ix) Posting of notice on and off site in the area where the action is to be located.

(c) Hold or sponsor public hearings or public meetings whenever appropriate or in accordance with statutory requirements applicable to the agency. Criteria shall include whether there is:

(1) Substantial environmental controversy concerning the proposed action or substantial interest in holding the hearing.

(2) A request for a hearing by an other agency with jurisdiction over the action supported by reasons why a hearing will be helpful. If a draft environmental impact statement is to be considered at a public hearing the agency should make the statement available to the public at least 15 days in advance (unless the purpose of the hearing is to provide information for the draft environmental impact statement).

(d) Solicit appropriate information from the public.

(e) Explain in its procedures where interested persons can get information or status reports on environmental impact statements and other elements of the NEPA process.

(f) Make environmental impact statements, the comments received, and any underlying documents available to the public pursuant to the provisions of the Freedom of Information Act (5 U.S.C. 552), without regard to the exclusion for interagency memoranda where such memoranda transmit comments of Federal agencies on the environmental impact of the proposed action. Materials to be made available to the public shall be provided to the public without charge to the extent practicable, or at a fee

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which is not more than the actual costs of reproducing copies required to be sent to other Federal agencies, including the Council.

§ 1506.7 Further guidance

The Council may provide further guidance concerning NEPA and its procedures including:

(a) A handbook which the Council may supplement from time to time, which shall in plain language provide guidance and instructions concerning the application of NEPA and these regulations.

(b) Publication of the Council's Memoranda to Heads of Agencies.

(c) In conjunction with the Environmental Protection Agency and the publication of the 102 Monitor, notice of:

(1) Research activities.

(2) Meetings and conferences related to NEPA, and

(3) Successful and innovative procedures used by agencies to implement NEPA.

§ 1506.8 Proposals for legislation

(a) The NEPA process for proposals for legislation (§ 1508.17) significantly affecting the quality of the human environment shall be integrated with the legislative process of the Congress. A legislative environmental impact statement is the detailed statement required by law to be included in a recommendation or report on a legislative proposal to Congress. A legislative environmental impact statement shall be considered part of the formal transmittal of a legislative proposal to Congress, however, it may be transmitted to Congress up to 30 days later in order to allow time for completion of an accurate statement which can serve as the basis for public and Congressional debate. The statement must be available in time for Congressional hearings and deliberations.

(b) Preparation of a legislative environmental impact statement shall conform to the requirements of these regulations except as follows:

(1) There need not be a scoping process.

(2) The legislative statement shall be prepared in the same manner as a draft statement, but shall be considered

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§ 1506.10

ered the "detailed statement" required by statute; *Provided*, That when any of the following conditions exist both the draft and final environmental impact statement on the legislative proposal shall be prepared and circulated as provided by §§ 1503.1 and 1506.10.

(i) A Congressional Committee with jurisdiction over the proposal has a rule requiring both draft and final environmental impact statements.

(ii) The proposal results from a study process required by statute (such as those required by the Wild and Scenic Rivers Act (16 U.S.C. 1271 et seq.) and the Wilderness Act (16 U.S.C. 1131 et seq.)).

(iii) Legislative approval is sought for Federal or federally assisted construction or other projects which the agency recommends be located at specific geographic locations. For proposals requiring an environmental impact statement for the acquisition of space by the General Services Administration, a draft statement shall accompany the Prospectus or the 11(b) Report of Building Project Surveys to the Congress, and a final statement shall be completed before site acquisition.

(iv) The agency decides to prepare draft and final statements.

(c) Comments on the legislative statement shall be given to the lead agency which shall forward them along with its own responses to the Congressional committees with jurisdiction.

§ 1506.9 Filing requirements.

Environmental impact statements together with comments and responses shall be filed with the Environmental Protection Agency, attention Office of Federal Activities (A-104), 401 M Street SW., Washington, D.C. 20460. Statements shall be filed with EPA no earlier than they are also transmitted to commenting agencies and made available to the public. EPA shall deliver one copy of each statement to the Council, which shall satisfy the requirement of availability to the President. EPA may issue guidelines to agencies to implement its responsibilities under this section and § 1506.10 below.

§ 1506.10 Timing of agency action.

(a) The Environmental Protection Agency shall publish a notice in the *FEDERAL REGISTER* each week of the environmental impact statements filed during the preceding week. The minimum time periods set forth in this section shall be calculated from the date of publication of this notice.

(b) No decision on the proposed action shall be made or recorded under § 1505.2 by a Federal agency until the later of the following dates:

(1) Ninety (90) days after publication of the notice described above in paragraph (a) of this section for a draft environmental impact statement.

(2) Thirty (30) days after publication of the notice described above in paragraph (a) of this section for a final environmental impact statement.

An exception to the rules on timing may be made in the case of an agency decision which is subject to a formal internal appeal. Some agencies have a formally established appeal process which allows other agencies or the public to take appeals on a decision and make their views known, after publication of the final environmental impact statement. In such cases, where a real opportunity exists to alter the decision, the decision may be made and recorded at the same time the environmental impact statement is published. This means that the period for appeal of the decision and the 30-day period prescribed in paragraph (b)(2) of this section may run concurrently. In such cases the environmental impact statement shall explain the timing and the public's right of appeal. An agency engaged in rule-making under the Administrative Procedure Act or other statute for the purpose of protecting the public health or safety, may waive the time period in paragraph (b)(2) of this section and publish a decision on the final rule simultaneously with publication of the notice of the availability of the final environmental impact statement as described in paragraph (a) of this section.

(c) If the final environmental impact statement is filed within ninety (90) days after a draft environmental impact statement is filed with the Environmental Protection Agency, the

University of Pittsburgh

SCHOOL OF LAW
Environmental Law Council

REC'D 1-24-83

January 20, 1983

Project Manager
Uranium Mill Tailings Remedial Action Project
United States Department of Energy
Albuquerque Operations Office
5301 Central Avenue NE
Suite 1700
Albuquerque, NM 87108

Gentlemen:

Enclosed please find my written comments on the Draft Environmental Impact Statement on Proposed Remedial Action at the Former Vitro Rare Metals Plant Uranium Mill Tailings Site, Canonsburg, Pennsylvania.

I hope that you will give full consideration to the issues raised in this statement. I feel that they point out some important deficiencies in this DEIS which go to the very heart of the NEPA process and the National Nuclear Waste Management Program.

Cooperatively yours,

Lawrence I. Sperling

Statement of Lawrence Sperling,
President, Environmental Law Council,
University of Pittsburgh School of Law,
in response to the Department of Energy's Draft Environmental
Impact Statement Proposing Remedial Actions at the Former
Vitro Rare Metals Plant Uranium Mill Tailings Site,
Canonsburg, Pennsylvania.

January 12, 1983

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My name is Lawrence Sperling and I am president of the Environmental Law Council, an organization of students at the University of Pittsburgh School of Law which studies issues of environmental law and assists members of the local community in working toward environmental protection.

I appreciate the opportunity to say a few words this evening in response to proposals outlined in the Draft Environmental Impact Statement for remedial action at the Canonsburg Uranium Mill Tailings site.

THE NEED TO ENSURE PUBLIC CONFIDENCE

The preparation of Draft Environmental Impact statements and the hearing of public responses are required by the National Environmental Policy Act of 1969 and subsequent regulations promulgated by the Council of Environmental Quality. A fundamental purpose of these NEPA proceedings is to ensure the confidence of the public that proposed federal actions will not create serious adverse consequences on public health and the human environment. In addition, the Uranium Mill Tailings Control Act of 1978 which has directed the Department of Energy to take remedial action at the Canonsburg site calls for public participation in the decisionmaking process for similar reasons.

The Department of Energy's National Nuclear Waste Management policy recognizes this need to ensure public confidence in its handling of nuclear wastes. DOE's Nuclear Waste Management Program Summary Document states that before constructing a nuclear waste disposal facility, "The public must be convinced that the disposal method is safe, that the local communities will not be

exposed to radiation or threatened with nuclear contamination, and that property values will not be significantly depressed by a waste facility." (DOE/NE-0008 March 1980, p.215) The Draft Environmental Impact Statement under review today fails to accomplish this task in several respects.

INADEQUACY OF BASIC PUBLIC HEALTH ASSUMPTIONS

The confidence of the local community in the competency of federal agencies to permanently isolate these wastes and contaminated materials from their environment has been shattered by the severity of the current situation. Citizens of Canonsburg and Strabane live in daily fear of exposure to radiation, contamination of property, cancer, chromosome damage, etc. Yet, as we have heard this evening DOE from the start bases its very assumptions about the current public health effects on studies which are incomplete, inaccurate, and which have not been made available to the public. Our first recommendation is that, in light of the current and continuing local health hazard created by the Canonsburg site, DOE and other appropriate agencies take immediate actions to protect the public by conducting complete, authoritative radiological surveys of the surrounding areas, including analysis of blood samples of residents for radioactive contamination, and effect evacuation of residents within a radius in which any significant contamination is detected. These steps should be taken immediately, prior to the initiation of remedial action.

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AN ISSUE OF NATIONAL CONCERN

The failure of DOE to base its public health assumptions on authoritative, available studies is indicative of a failure throughout the DEIS to meet the goal of improving public knowledge of, participation in, and confidence in the nuclear waste management program; a goal called for in the Program Summary Document. Because the Canonsburg remedial action project is at the forefront of a long list of mill tailings and Manhattan Engineer District sites across the country which require remedial action, it is imperative that this stated policy goal be fully met.

LONG-TERM HAZARDS OF MILL TAILINGS
COMPARED TO OTHER NUCLEAR WASTES

A major influence on DOE's nuclear waste management program was the 1979 Report to the President by the Interagency Review Group on Nuclear Waste Management. This report summarizes and analyzes alternatives for disposing of all types of nuclear waste. Its conclusions on uranium mill tailings state the following:

Due to the long half-life of thorium-230, the parent of radium, the quantity of radon and radium in the tailings will diminish by only one-half in roughly 80,000 years. The relative magnitude of actinide elements in mill tailings, high level wastes, and transuranic wastes, per unit of energy generated, suggests that all these wastes streams may present problems of comparable magnitude for the very long term, that is, beyond a period of a thousand years. By virtue of their presence at the surface, the actinide elements in mill tailings may constitute a greater potential problem than those in deeply buried HLW and TRU wastes. Thus, disposal of these tailings must be managed as carefully as that for high level wastes and transuranic wastes." (E 1.28 TID-29442 pp. 80-81; emphasis added.)

FAILURE TO ADDRESS IRG CONCLUSIONS

While DOE claims that this Interagency Review Group Report to the President "helped mold DOE programs into their present form" (Program Summary Document, p. 11), DOE has apparently never addressed or rebutted this recommendation on mill tailings in a publicly available policy document, and instead chooses to ignore it. The Department has developed a nuclear waste management policy which favors eventual disposal of high-level and transuranic wastes in deep geologic depositories. For example, while transuranic wastes are currently being shipped to New Mexico for disposal in salt domes under the Waste Isolation Pilot Project, DOE proposes the "permanent disposal" of uranium mill tailings in a simple clay structure just a few feet below the surface.

To ensure public confidence in the proposal submitted in this EIS, it is imperative at the very least that DOE, in its final EIS, address this statement made in the Interagency Review Group report, and develop a proposal engineered to ensure that the mill tailings in Canonsburg will be treated with the same degree of long-term care as DOE would treat high-level and transuranic wastes.

NEED TO ADDRESS MONITORING ISSUES

In light of the Interagency Review Group recommendations, any on-site or local stabilization of mill tailings should be treated as monitored, retrievable, temporary storage. Meanwhile, DOE should analyze the legal and technical issues involved in, and make proposals for, the siting of a central, permanent repository for all wastes covered in the Remedial Action Program.

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Moreover, this DEIS conspicuously lacks any detailed discussion of long-term monitoring of the site. While it is true that a monitoring license must be obtained from NRC, this requirement does not mitigate the importance of analyzing monitoring systems in this EIS, for several reasons. First of all it seems logical that an adequate monitoring system should be incorporated in the engineering design of the containment facility itself, especially if the facility is below ground, where there is a substantial risk that the integrity of the capsule may be disrupted without detection.

Furthermore, monitoring systems will affect the overall cost of the project, and possibly influence the choice of alternatives.

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Finally, an EIS for proposed remedial action at an existing nuclear waste site which fails to adequately guarantee the long-term safety of the community from radioactive contamination fails to achieve its fundamental purpose of ensuring public confidence.

NEED TO ADDRESS TEMPORARY NATURE OF PROPOSED ACTION

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Furthermore, while the DEIS fails to discuss how long the proposed encapsulation is expected to last, there are indications that water will begin to leach through the system within a few very short years. EPA's final standards for this project call for

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stabilization for at least 200 years. The adequacy of this standard is questionable in light of the Interagency Review Group's conclusions about the long-term potential hazard of mill tailings. Yet, it is doubtful that the proposed system will even meet EPA's standard. Thus, in addition to the need to incorporate

monitoring systems into the design, the final EIS should reckon with the temporary nature of any on-site stabilization technique and include a consideration of the steps necessary to re-stabilize, or totally decontaminate the site in the event of either a future malfunction in the containment system or the siting of a permanent depository.

FAILURE TO EXAMINE ALTERNATIVES

In light of the potential inadequacy of the clay-lined capsule, it is particularly conspicuous that the EIS fails to examine engineering alternatives for the encapsulation of the wastes. Instead, the DEIS meets NEPA's mandate of assessing alternatives by playing a shell game. The type of shell is a foregone conclusion--the only alternatives examined are where to put the shell. Without an examination of actual design alternatives the DEIS again fails in its purpose of ensuring public confidence that the proposed action is truly in the interests of the public health of the local community. A proper analysis should examine the long-term integrity of a variety of possible materials, and of alternative designs which include monitoring systems, and should make clear how long each alternative is expected to last.

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CURSORY DISMISSAL OF ABOVE-GROUND OPTION

Many experts and laymen alike have suggested the possibility that an above-ground storage facility will expedite adequate monitoring and decrease the possibility of undetected de-stabilization, while providing a safe method for eventual decontamination. The advantages of such an option and the savings

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in monitoring costs may well outweigh the added construction costs and aesthetic detractions, and should at least be examined as a reasonable alternative, rather than dismissed cursorily, in order to ensure public confidence that the ultimate proposal is not chosen merely because it is the cheapest.

In conclusion, I hope that the Department of Energy will give these comments thoughtful consideration. The Canonsburg remedial action project will set the stage for the clean up of mill tailings and Manhattan Project sites around the country. A failure to fully address the issues raised at this stage of the project will engender in the local communities near these sites, and in the American public as a whole an overwhelming apprehension that the DOE will place costs above the well-being of the public in the National Nuclear Waste Management Program.

"BIG MAC"

Canon - McMillan School District

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SUPERINTENDENT

DR. JAMES S. JOHNSTON
ASSISTANT SUPERINTENDENT

LOUIS J. POPIOLKOWSKI
ADMINISTRATIVE ASSISTANT

JOHN G. FRANJONE
SECRETARY
BOARD OF SCHOOL DIRECTORS

January 21, 1983

Mr. James A. Morley, Project Manager
Uranium Mill Tailings Project Office
U. S. Dept. of Energy
Albuquerque Operations Office
P. O. Box 5400
Albuquerque, New Mexico 87115

Dear Mr. Morley:

Enclosed please find some comments and questions concerning the possible remedial action at the Vitro Rare Metals Site in Canonsburg, Pennsylvania. As Superintendent of the Canon-McMillan School District I am very anxious to work with you during the remedial action that is being planned at this site. I would specifically request a reply to the questions that I have raised on the enclosed papers.

I would be very glad to meet with you or any representative that you would designate to discuss the manner that I can work with you in protecting the safety of the school children during this remedial action.

Sincerely,

CANON-McMILLAN SCHOOL DISTRICT

Donald W. Strang
Donald W. Strang
Superintendent of Schools

DWS/sae

Enclosure

CANON-McMILLAN SCHOOL DISTRICT
STATEMENT OF DR. DONALD W. STRANG
SUPERINTENDENT OF SCHOOLS
JANUARY 20, 1983

My name is Donald W. Strang. I am the superintendent of the Canon-McMillan School District. I have read the Environmental Impact Statement of November 1982 on the REMEDIAL ACTIONS AT THE FORMER VITRO RARE METALS PLANT SITE, Canonsburg, Washington County, Pennsylvania. My concern is for the safety of the children who attend our schools, located in close proximity to the project during the proposed remedial actions planned for this site.

After reading the Affidavit of John W. Gofman, as it relates to persons exposed to ionizing radiation and its effects, especially on young people, my concerns become even more grave. We have the following buildings located within the one mile radius of the site described on page 6 - 6 of the Impact Statement. This year we have an approximate student population of 2,543 children in these buildings. Enrollment is as follows:

Hawthorne Elementary	-	138
South Central Elementary	-	410
Jr. High at Canonsburg	-	795
Canon-McMillan Senior High	-	1,200

Many of the children live within the one mile radius of the site. However, for the 180 days of school we transport children to the junior high school and the senior high school who live a substantial distance from the site.

We are anxious to work with you during this remedial action to insure that our students are not exposed to harmful radiation during the uncovering and encapsulation of the radio active material.

Another concern that I wish to express is that on certain fall evenings we bring crowds of approximately 5,000 persons to view athletic contests. The majority of these persons live well outside the mile radius of the site. The stadium, where the events occur, is within one half mile of the site.

Before a final decision is made, will you provide a written response to the following questions, and have a representative meet with me so that we may coordinate our efforts for the safety of persons involved?

STATEMENT OF DONALD W. STRANG
SUPERINTENDENT OF SCHOOLS
JANUARY 20, 1983
PAGE TWO

QUESTION # 1

141
6.2.3

When the materials are exposed to the air, what increased amount of radiation will escape into the environment? What efforts are being taken to control the spread of radiation beyond the immediate work site?

QUESTION # 2

142
6.2.2

Is it feasible to construct a temporary building over the site to maintain any radiation that escapes from spreading over the surrounding area?

QUESTION # 3

143
6.2.2

Would it be possible to schedule the uncovering of the radiation material to the summer months, June 5 through August 30, when schools are not in session?

QUESTION # 4

144
6.2.3

What monitoring of radiation will be provided at the site? Can the schools be provided with monitoring devices that will alert us to increased levels of radiation?

QUESTION # 5

145
6.2.3

Would it be wise to develop an emergency evacuation plan to take the students home if we are alerted to an increase in radiation? Such a plan would be feasible from our point of view, since we do have school buses that could be used to evacuate the area.

QUESTION # 6

146
6.2.2

Most evening events which attract large numbers of people to the stadium usually occur on Fridays. Could the remedial work be scheduled in such a way to avoid the uncovering of the material,

STATEMENT OF DONALD W. STRANG
SUPERINTENDENT OF SCHOOLS
JANUARY 20, 1983
PAGE THREE

QUESTION # 6, cont.

146
6.2.2

and possibly releasing radiation, to time when events are not scheduled at the stadium?

We recognize that the impact of radiation at the site and to the surrounding areas will be directly related to the period of work at the site. Our concerns simply stated are:

1. we would like to be assured that all precautions are taken that address the hazards you name in your study;
2. we would like to be assured that all precautions are taken to monitor the site and the schools in the immediate area, and that in the event of substantial increase in the level of radio activity that we are alerted to move the children from the area.

DAVID W. SWEET MEMBER
BOROUGH BUILDING ROOM 208
CANONSBURG PENNSYLVANIA 15317
PHONE (412) 746 3782

HOUSE POST OFFICE BOX 53
HARRISBURG PENNSYLVANIA 17120
PHONE (717) 787 3569

HOUSE OF REPRESENTATIVES
COMMONWEALTH OF PENNSYLVANIA
HARRISBURG

COMMITTEES
MINES & ENERGY MANAGEMENT
MINORITY VICE CHAIRMAN
INSURANCE
JUDICIARY
PENNSYLVANIA PUBLIC TELEVISION
COMMISSION
TASK FORCE ON DECEDENTS
ESTATES

STATEMENT OF STATE REPRESENTATIVE DAVID W. SWEET:

Public Hearing, January 12, 1983—Draft Environmental
Impact Statement, Remedial Action at Former Vitro Site,
Canonsburg, PA

Ladies and Gentlemen,

We are nearing the end of what has been a long and frustrating
history of bureaucratic decision-making. Soon, a key decision will
be made, and remedial action will commence at the Industrial Park
site.

This all started for me during my first year in office, 1977,
when I received a phone call from a DER official advising that
"routine" monitoring of the site would take place shortly. The
results and ensuing events are all too well-known and anything
but routine.

A brief chronology of events reveals an unbelievable amount
of paper-shuffling, buck-passing and inaction.

The United States Congress passed the Uranium Mill Tailings
Act, effective November 8, 1978.

It took one year for the Secretary of Energy to decide that
the Vitro site should be given a "high priority". It was not until
23 months later that the cooperative agreement between the federal
and state governments was signed. Standards from the federal
Environmental Protection Agency were not adopted until December of
1982, more than four years after the Tailings Act was passed.

Page Two

During this period, the Canonsburg and Strabane communities
have been beset with confusion, frustration, bitterness and a
resigned sense of powerlessness. It is with all these emotions
and sentiments that I come here tonight.

Our community is confronted now with a fait accompli. We
trusted the system during the pre- and post-World War II periods
of nuclear research and were left with an unsafe dump. We trusted
again over the last few years and have again found that faith
unrewarded.

It would be futile and counter-productive at this point to
attempt to block the adoption of recommendation Three, which calls
for on-site stabilization. Such delay would only drive up the
costs, continue the uncertainty and jeopardize the chances for
any remedial action. However, we will be left with a legacy of
litigation, doubt and the very real possibility that the future
is being mortgaged to settle today's debts.

The burden of proof is on the federal government. Many
people, including myself, still have reasonable doubts.

Several questions and problems arise, some of which can only
be resolved by amendments to the federal law.

- 1.) Only Washington County locations were surveyed for
possible off-site deposit. We were forced into a
fracas with our neighbors. Surely other less populated
areas of Pennsylvania would have been more appropriate.
But none were suggested by DER. (The Act, at 42 USC§7916,
prohibits the transportation of the tailings to another
state, unless either the governor of that state approves
or the state already contains one of the targetted sites.
The closest such state is Idaho.)

6-137

14
6.2.12

2.) Federal legal interpretations of what constitutes fair market value for contaminated properties have been grossly unfair, resulting in extended and costly litigation.

3.) The federal statute fails to provide for sufficient health screening, medical benefits, job training and other social service needs. The bureaucratic interpretations of the law have been extremely narrow and miserly. Again, litigation is the result.

147
6.2.5

4.) Despite all the talk, studies and reports, we are still uncertain as to dangers to which residents have already been exposed, future hazards to be caused by clean-up efforts, and the ultimate safety of the area following "stabilization".

148
6.2.2

5.) We are asked to calmly accept a recommendation to leave thousands of tons of waste material in our community, protected only by a relatively untested technology that may or may not hold up in the decades ahead. (See a report dated November 1982 by the Sierra Club for a discussion of a number of failed attempts to secure low-level radioactive materials.)

15
6.2.1

I cannot help but conclude that the decision to recommend the stabilization option is based on non-scientific factors. The draft EIS all but admits that fiscal concerns, as well as the public outcry in Hanover Township, led to today's recommendation.

The task to be undertaken is massive. Thousands of tons of material must be excavated; hundreds of thousands of gallons of water

pumped and treated; bentonite liner placed underground; and hundreds of trucks loaded, unloaded and driven thousands of miles. More than two years' work lies ahead.

To say stop or to urge another option would be like throwing sand against the wind. The current federal administration cares little for this area or its people. Delay would threaten the entire project's funding from Washington, D.C.

Therefore, we in Canonsburg and Strabane must go along, with some pursuing collateral remedies in the courts. Yet, the burden of proof has not been met. We are left with only faith that the job will be done right. Faith was defined by St. Paul as "the evidence of things unseen; the substance of things hoped for."

I hope your draft EIS is accurate, that the work is done quickly and safely, and that no leaching or contamination of water supplies occurs. None of us want to face our children and grandchildren years hence, after all the federal officials have long gone, and explain why we allowed this problem to go unsolved.

JAMES G TERRILL, JR AND ASSOCIATES
Environmental Engineers

Professional Engineer
Civil / Sanitary
Diplomate
American Academy of
Environmental Engineers

Diplomate
American Academy of
Industrial Hygiene
Certified Health Physicist,
American Board of
Health Physics

January 22, 1983

Project Manager
Uranium Mill Tailings Project Office
Albuquerque Operations Office
U S Dept of Energy
P O Box 5400
Albuquerque, New Mexico 87115

Dear Sir

Attached are more detailed notes on the D E I S, dated
November, 1982, for Remedial Actions related to the former Vitro Rare
Metals Plant Site, Canonsburg, Pennsylvania.

The option you have selected seems reasonable, even though I
can't follow the relative emphasis you gave the various items in the
matrix. To me, the important item is health impacts. These should
probably be so small after remedial actions are taken through any of the
options, that current interest should focus on getting the remedial
actions completed.

Sincerely,

James G Terrill, Jr

JT at
Enclosure

NOTES ON DRAFT ENVIRONMENTAL IMPACT STATEMENT
ON REMEDIAL ACTIONS AT THE FORMER VITRO RARE METALS PLANT SITE -
CANONSBURG, WASHINGTON, COUNTY, PENNSYLVANIA
DATED NOVEMBER 1982

1 Health Concerns

The draft conscientiously followed the outline for a standard EIS. In
doing this it minimized the coverage of the principle concern--health
effects, which has been the dominating reason for consideration of the
remedial action. Starting with the Index, 'health' is not mentioned as
a major item, but only as a sub-item under "radioactivity". The same
general comment is true of the "Table of Contents". Throughout the
document, health effects are actually "calculated" health effects. I
could discover no references or summaries related to the studies of the
University of Pittsburgh. No mention of health studies made by health
agencies or officials was found. The authors of the referenced documents
are largely physicists and health physicists. Even data which must be
available on the vital statistics of the communities is lacking. What
explanation would be available if the cancer incidence actually increased
regardless of the actions taken by DOE? DOE would be caught without
an explanation. Some effort should be made to define the limits of the
incidence of diseases as well as cancer deaths related to radiation and
other factors in view of the general health conditions of the community.
Both upper and lower limits should be considered. If time is of the
essence, provision for future health evaluations as well as radiation
monitoring should be made and budgeted.

Please do not express the number of cancer deaths in terms of fractions.
Round off the figures, and allow a range 0-10 or 10-20. Find a way
to express the incidence of cancer in terms other than death. Many
people have cancer who do not die of cancer, but are exposed to surgery,
chemotherapy, diagnosis, expense and anxiety. There are numerous
organized groups who consider cancer in a much broader way than death.
Information and suggestions on this can be obtained from the National
Cancer Institute.

2. Measurements

Some methods of measurements are sufficiently standardized so the limiting concentrations of radioactivity and exposures to external radiation have real meaning in the field. However, even these should be spelled out in reference documents that are generally available as well as in government documents and reports. Probably some of the people active in this program as well as the professionals generally, will get mixed up when you refer to the several EPA standards. This is supposed to be a public document. In the public's frustrations to follow the logic of the draft, they may turn to legal processes to contest the project.

In many places in the report references are made to radon-222 release of 2 picocuries per square meter per second? I have no specific quarrel with the number but how do you propose to measure this in the field? I know that this type of measurement was once considered, but found impractical in the uranium mines, and the professionals shifted emphasis to the "working level" concept which could be measured in the field.

For soils, waste and other solids the term picocuries per gram is used. Per gram of what? (For example, Pg. 1-16.) Per gram of radioactive concentrates; per gram of radioactive and nonradioactive materials; per gram of a mixture of miscellaneous materials? Should all materials above a certain size be excluded; what size samples should be taken; and how many samples should be taken per acre, per acre foot, etc? All of these things as well as the EPA number will have to be considered at sometime, in the field if not in the EIS, if the remedial actions are to meet estimated costs or even to determine the final costs of the project, which may involve multiple cost-plus contracts. Somewhere down the line systematic reports for payments will be necessary, or "all" material rather than "contaminated material" buried deeper than 6 feet, would be stabilized in place by covering the entire site with a layer of uncontaminated fill up to 6 feet thick. (See Pg. 1-16.) Perhaps a cover of 6 feet might be a good approach anyway, and cost estimates relying on this methodology might be in order.

3. Costs

In the cost presentations I think all identifiable costs should be listed. This is particularly desirable since DOE personnel have indicated that this project and the Salt Lake City project will be used as models for remedial actions at about twenty more sites. Complete cost data would also indicate to the public the degree of concern of the Federal government related to the sites more comprehensively. Examples of items not included, and related costs picked up at the meeting in Pittsburgh are:

Development of methodology	\$1.8 Million
Development of Env. Impact Statement	0.8 Million
Cost of land purchased by the State	?
but \$650,000 has been paid by the State as a downpayment	0.65 Million
Cost of public meetings, interaction with NRC, etc.	?
Cost of cleaning about 100 houses in the vicinity of the plant. This is currently underway but no costs were given--for the present say \$10,000 per house for cleaning and since they talked about then purchasing the property at say \$40,000. The work is underway but no houses have been certified as clean to date.	~4.0 Million
Monitoring and maintenance, in perpetuity	(no cost given)
Health Monitoring (an additional item)	?
TOTAL	\$7.25 Million Plus

154 [Incidentally, on Page A.4-7, a unit cost for grading is given as \$22.50
6.2.11 [per square foot. If this isn't an error an explanation is in order.

Encapsulation

155 [While your draft EIS was being reviewed, a NRC, Office of Regulatory
6.2.2 [Research document entitled, "Draft Regulatory Guide and Value/Impact
Statement; Design, Installation and Inspection of Seepage Control Liners
at Uranium Recovery Facilities" came to my attention. It is dated
November 1982, Contact H. Graves (301)443-5892. It would seem that some
reference to this should be made in the Final EIS. Perhaps, based
upon your experience, both DOE and NRC could benefit from discussions.
I can find no reference to this in your draft EIS. Likewise, I can find
no reference to Bentonite in the NRC draft.

156 [Reconsideration of Bentonite (Pg. A.1-11) or a reference to justify its
6.2.2 [use would be appropriate. The cost of Bentonite is given as \$543.00 per
ton. I am familiar with its use to minimize seepage, but I am not
familiar with its use to control radon. If research or experience data
shows that the Bentonite will materially affect the estimates for radon
emission and hence cancer deaths, the extra expense may be justified.
Otherwise, dependence upon clean local clays is probably preferable.
Indirectly, the NRC draft referenced above seems to support this view.
Apparently, DOE doesn't think the leachate factor is an important consid-
eration from a health viewpoint so why not forget the Bentonite?

I hope these limited comments will be helpful to the DOE.

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

FEB 4 1983

Richard H. Campbell, Manager
Uranium Mill Tailings Remedial Action Project
U.S. Department of Energy
5301 Central Avenue, N.E., Suite 1700
Albuquerque, New Mexico 87108

Dear Mr. Campbell:

We have reviewed the draft environmental impact statement for Remedial Actions at the Former Vitro Rare Metals Plant Site, Canonsburg, Washington County, Pennsylvania, and have the following comments.

157
6.2.9

The final statement should address more clearly the fate of pollutants already in ground water beneath the Canonsburg site. For example, it is not clear whether the plan includes treating ground water withdrawn from the shallow aquifer until such time as the proposed Environmental Protection Agency standards are satisfied for the water still in the aquifer.

158
6.2.7

Because the Canonsburg site is an area extensively mined for coal as noted on page 1-19, we believe that the final statement would benefit from additional information concerning mine subsidence that may affect the structural and hydrologic integrity of the site. The propagation of mine-roof collapse fissures associated with mine subsidence may increase the hydraulic connection of ground- and surface-water sources, which in turn may affect the migration of contaminated water to other ground-water bodies and to surface water.

We believe the draft statement adequately addresses impacts on fish and wildlife resources within the proposed project area.

We hope these comments will be helpful to you in the preparation of a final statement.

Sincerely,

Bruce Blanchard, Director
Environmental Project Review

6-142

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION III

6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

-2-

February 4, 1983

Mr. James Morley
Project Manager
Uranium Mill Tailings Project Office
U.S. Dept. of Energy
Albuquerque Operations Office
Albuquerque, NM 87115

Dear Mr. Morley:

Thank you for the opportunity to comment on the Draft EIS for the Canonsburg Remedial Actions at the Former Vitro Rare Metals Plant Site. In accord with Section 309 of the Clean Air Act, please find attached our comments on technical aspects of the project. EPA appreciates also your compliance with NEPA in sending us the draft EIS for review. While DOE has done considerable work in dealing with many of the environmental problems, parts of the project have raised some questions voiced by reviewers within the Agency. We have given the Draft EIS a rating of ER-2 which means that we have Environmental Reservations due to insufficient information and more information is needed to address our concerns. A schedule of the EPA ratings is enclosed for your information.

We appreciate the fact that some of the technology slated for use in this project requires further design refinements. However, some other areas are insufficiently detailed even though technology to resolve questions is well known. We understand that DOE is publishing reports covering design and evaluation (as discussed in paragraph 3 below), in accord with agreements with cooperating agencies, that may cover many of these concerns. On the other hand, EPA is not satisfied that all technical issues have been thoroughly examined in the Draft EIS for the following areas of concern: radiation, groundwater, air pollution, and floodplains and surface runoff. Under radiation, our comments center on the use of statistics and are not expected to materially change the course of the project or the alternative selected. Our comments on groundwater relate to problems with conflicting data which we understand will be resolved during the Final EIS process and the additional technical evaluation underway. The air pollution section of our technical comments involve the implications of control technology, but these too are not expected to affect the orderly progress of the project. The main point with the alternatives discussion that follows is the encapsulating technology, primarily placement. It appears that DOE may be able to address our concerns through optimization of the selected alternative

through refinement of the final design. Two main concerns relate to the floodplain and surface runoff questions: they are any anticipated adverse effects created by the oxidation of pyritic minerals and runoff or seeps from the areas where low level wastes are to be buried.

Since this Document has been published, new EPA standards have appeared in the Federal Register (40 CFR 192) and should be reflected in the Final EIS. It is important to note that the new EPA regulations specify a range of performance standards rather than strict requirements. For example, the target longevity of a remedial action is 1000 years while a 200 year span would be acceptable under limited circumstances. The Final EIS should specify the performance expected from this Remedial Action rather than merely saying that they will be met.

159
6.2.4

The Final EIS should be completed on schedule so that the project can be completed in a timely fashion regardless of some evaluations that may span the time frame of its publication. We understand that DOE is preparing documents covering areas represented by but not limited to this list in accord with the agreement mentioned in the second paragraph above: 1) Leachate quality assessment; 2) Adjustments in the encapsulating design, location as well as other remedial measures and evaluations; 3) Groundwater implications: status of contaminants and quality; 4) Surface water: long term monitoring and sediment analyses; 5) Long term area security and land use controls. Meetings between DOE, its contractor and EPA during the preparation phase of the Final EIS should suffice to address many of these questions.

EPA's specific technical comments are attached. Thank you again for the opportunity to review and comment on this important EIS. We look forward to working closely with you in the future to resolve our questions. If you or your staff have any questions regarding the technical aspects of our comments, please do not hesitate to contact either me or Bob Davis (597-4388) of my staff.

Sincerely yours,

Stanley L. Laskowski
Deputy Regional Administrator

Enclosure

6-143

Definition of Codes for the General Nature of EPA Comments

Environmental Impact of the Action**LO--Lack of Objections**

EPA has no objections to the proposed action as described in the draft impact statement or suggests only minor changes in the proposed action.

ER--Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to reassess these aspects.

EU--Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement**Category 1--Adequate**

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2--Insufficient information

EPA believes that the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3--Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the draft statement.

If a draft impact statement is assigned a Category 3, ordinarily no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

Technical Comments

Draft EIS for the Remedial Actions at the
Former Vitro Rare Metals Plant Site, Cannonsburg, PA

General Comments

160
6.2.3

On page two of the Cover Sheet and in the sixth paragraph on page 3-21, long-term monitoring is mentioned. The specifics of post-stabilization and post-decontamination environmental monitoring programs, in accord with NRC regulations, if planned, should be detailed and compared to pre-operational conditions. EPA would like to have the opportunity to comment on these plans. They also should be detailed in the FEIS. The FEIS should also specify what measures will be taken if monitoring discloses an increase in groundwater contamination.

161
6.2.4

As stated in the cover letter of these comments, new standards have been promulgated since the Draft EIS was published. These new standards are substantially different from proposed standards they replaced and so must be reflected in the Final EIS. If DOE decides upon the alternative preferred in the EIS and has a specified level of performance and longevity of the remedial action, then the FEIS should include the way in which the new standards will be met.

Radiation

Comments mainly center on the use of statistics in reporting radiation concerns regarding the health issues, but some concerns have been noted regarding the completeness of the technical work. EPA reviewers acknowledge the fact that computer codes and multipliers follow a rapidly changing state-of-the-art, and any re-run of these would not be expected to materially change the feasibility of the project or the selection of alternatives. The remarks below should be read in that light. These are merely items that EPA would prefer to see explained or documented.

162
6.2.5

Impacts of expected deaths for the status quo option are given only for persons now living. The effect on those yet to be exposed is ignored. It should be clearly stated that the true impact of the status quo is much larger for long time spans.

163
6.2.5

Page 1-22, Table 1-3: It should be explained why the status quo (8300 man-rems) results in more cancer deaths than the 12000 man-rem short-term exposure for remedial action. The reason is the latter dose is a whole-body dose while the former is a dose to the lungs.

164
6.2.4

Page 4-31: In the interest of making the report readable to the public, a working level for radon should be defined here and in the definitions.

165
6.2.5

Page 5-2: The second paragraph states a 14 in 1000 increased risk of death to the closest resident as a result of being near the Cannonsburg site. Does this risk assume a lifetime exposure? Is the increase each year or over a lifetime? The same questions apply to the Burrell risk data.

166 The technical work done on the Draft EIS casts some doubts about the health
6.2.5 effects estimates from the radon progeny. Can the uncertainty for those health effects be estimated?

167 Page 5-2, Section 5.2.1: It should be pointed out that the risk for the
6.2.5 closest individual from the radon released is for a 32.5 year period while the normal expectation of dying of lung cancer is for a 71 year period. The reviewers appreciate the fact that DOE was consistent in the statistical approach used, it's just that EPA reviewers prefer the other approach. Thus, the risk at Canonsburg for the status quo is due to slightly more than a doubling dose of radon, i.e., life time risk for lung cancer at that point is slightly more than twice the "normal expectation."

168 Page 5-5: The proposed EPA standard is misinterpreted. It is not a
6.2.5 standard for man-rem/s to a lumped population; it is a standard for indoor radiation levels for buildings constructed from or near tailings materials. Table 5-5 needs further work.

169 Page 5-43, Section 5.18.1, last paragraph: The estimate that the workers
6.2.5 will increase their risk of cancer 0.3 to 0.6% may be a factor of 10 too high. From Tables 5-4 and 5-5 the risk would be increased 0.0004 to 0.0008 or 0.04 to 0.08%. Should this be corrected?

170 Page F.3-3, Section F.3.2, Methods of Impact Assessment: The Draft EIS uses
6.2.5 MILDOS to estimate radiological doses. MILDOS and its related programs are not state of the art, depending on ICRP-2, 1959 (International Committee on Radiological Protection) and other old data bases. The programs give dose estimates considerably lower than a more up-to-date code like INREM (a computer code for calculating internal radiation dose equivalent) for some cases.

A better estimate could have been made using AIRDOS (conversion of air concentration to dose radionuclides) or AIRDOS-EPA with INREM II (computer implementation of recent models for estimating the dose equivalent to organs of man from an ingested or inhaled radionuclide) or ICRP-30 models and data base. As elsewhere stated, this would lend support to the remedial action.

Page F.3-4, last paragraph: The risk coefficients are wrong: they should be $100/10^6$ (100 per million).

171 1. The lung cancer risk coefficient $100/10^6$ PWLM (person working level
6.2.5 months) ($20/10^6$ Prem) is taken from Evans et al (1981) with a conversion factor of 5 rem/WLM perhaps from BEIR III (biological effects of ionizing radiation-1980). One of the co-authors, J.H. Harley, of the paper by Evans, et al, has pointed out this is at least a factor of 2 lower than what he thought was agreed upon (Stratton Hearings 1982). It is about a factor of 4 lower than a reasonable estimate, and further supports the decision to do the remedial work.

2. The "all-cancer-death" risk, $120/10^6$ Prem is taken from B. Cohen, 1981. Cohen derived his numbers from the linear quadratic estimates in BEIR III. The BEIR III estimate was force fit to an α_2/α_1 coefficient derived from the analysis of gamma and neutron risk coefficients for leukemia in the Hiroshima-Nagasaki data (BEIR III, pp. 185-188). Since it subsequently was shown there was no appreciable neutron exposure in Japan, the BEIR III estimate is wrong since it is force fit to nonexistent coefficients. A more reasonable risk estimate based on BEIR I and UNSCEAR 1972 (United Nations Scientific Committee on the Effects of Atomic Radiation) is $200/10^6$ Prem.

Page F. 2-3: The statement that "calculated doses are within 20 percent of the doses likely to be received by the general public and remedial-action workers at each site under each alternative," is unduly optimistic. The estimates presented appear reasonable but the accuracy estimate is not carefully developed. On the whole, it appears that the impacts on health due to radon gas have been somewhat underestimated. This will strengthen the conclusion that a remedial action is needed at this site.

It is important to re-emphasize that many of these comments reflect the continually changing computer codes as information is documented and any further time spent in conforming to new codes would probably not be appropriate. The above comments are made for purposes of future action at this or other sites, and so that EPA is on record at recognizing this situation. However, the following general radiation comment should be addressed in the Final EIS.

Page 5-1, Item 4: Is there any theory as to why the 1977 surveys are so different from the more recent studies? Will further sampling be done to verify the recent data? (See comment below under groundwater, referring to page 4-23 and the disparity between 1977 data and current information.)

Groundwater

Even though this topic is intricately connected with the previous discussion on radiation effects, it is sufficiently important to be considered separately. The following comments on groundwater point out problems with conflicting data which we understand will be resolved during the Final EIS process through additional technical evaluation.

Are the radionuclides in the groundwater suspended or dissolved and what fraction of each? This may make a difference in the type of water treatment needed. Our review failed to note an assessment of the total quantity of radioactivity in the groundwater at the Canonsburg site.

Page 1-23: What is the potential at the Hanover site for leaching of contaminants (alternative No. 4, short term impact)? (See Comment No. 1 miscellaneous, this letter.)

176
6.2.9 On 3-18 (Section 3.2.1) no mention is made of groundwater impacts associated with the remedial methods described for decontamination or stabilization. These may be substantial and deserve attention. The same comments apply to the last paragraph, page 3-21.

177
6.2.9 On Page 4-21, paragraph 2, it is stated that not all of the 1979 wells were used in the 1982 studies because some wells had been plugged and vandalized. There is no mention of how the wells were plugged or if the vandalized wells were subsequently plugged. This is important, since these wells could serve as conduits for contaminants to the deeper aquifer. Also, the description of this page does not clear up the issue of any effects or lack of effects from contaminated material. The hydrogeological study appears to be incomplete and will need to be resolved by additional evaluations as design proceeds. On the other hand, as the design proceeds, it will become clear that the remedial action should reduce radionuclide contamination of groundwaters if done properly.

178
6.2.9 Paragraph 2 on page 4-22 mentions the socioeconomic survey of the area within one mile of the site. It states that none of the respondents to the survey reported that the groundwater was used for drinking purposes. Based on Appendix G, pages G-2 thru 5, only 10% of the residents of the Village of Strabane were asked this question specifically. Since there are wells in this area, perhaps further investigations should be conducted, unless the responses constitute a statistically acceptable basis for conclusions.

179
6.2.9 An effort should be made to identify background levels for both radioactive and non-radioactive constituents. For example, on page 4-22 the reason for concentration of selenium significantly exceeding the Primary Drinking Water Standards at the Canonsburg site was speculated as either associated with site activities or due to selenium's natural occurrence as a trace constituent in coal. We believe that to assess the current and potential impacts, a cleaner picture of the background water quality is necessary, and recommend that a sufficient number of upgradient monitoring points be established. It is our understanding that the reporting procedures mentioned in the second paragraph of the cover letter will cover this issue.

180
6.2.7 On page 4-23, paragraph 2, a discussion on the difference between the permeability of the fill and the bedrock is presented. However, this discussion does not include a value for the permeability of the bedrock. Even though the fill at the Burrell site has a much higher permeability than that of the alluvium and the bedrock, this is not conclusive proof that no recharge is occurring. The difference in head between the two units will ultimately control whether any recharge can occur. Permeabilities will influence the amount of recharge. Appendix D.2 should provide data on the head differences between the various units.

173
6.2.4 The variation between the contamination levels reported for 1977 studies and those reported in this document should receive further explanation. Is it possible, for example, that leaching has taken place at the Burrell site to the extent that leachate contamination in the future will be negligible? If so, would this argue against further remedial action at that site?

181
6.2.9 On page 4-24, 4th paragraph the results of analyses for priority pollutants for three contaminants are shown at values above detection limits. Two of the three, butyl benzyl phthalate and methylene chloride are often found as contaminants of the sampling and analytical protocols since they can be found in sampling and analytical equipment (as a plasticizer in plastic tubing) or laboratories (as a cleaning solvent). This should be noted in the Final EIS, unless quality control blanks were evaluated and can be used as a basis for substantiating the values given. Any quality control information that substantiates the presence of these two contaminants in the groundwater should be reported.

182
6.2.7 In Appendix C, page C.2-2, there is an inconsistency with respect to the material directly overlying the bedrock. It is described as grey to brown silt and sand, and brown sandy silt and clay in the same location. This discrepancy should be clarified. Precise soils information plays an important role in such a remedial action, but such clarifications should not interfere with the orderly progress of design.

183
6.2.4 It appears the study has overlooked the area to the south of the Canonsburg site (beyond the railroad tracks). Since it is known that contamination exists and has moved off-site, then this area might be studied further. However, this may be a vicinity property. If so, should anything be said regarding any radioactive contamination remedial activities? In addition, long-term monitoring should be preceded by development of background information off-site. This seems to be in need of attention, but can be done as design and operation phases progress.

184
6.2.9 Some very assured statements are made regarding the groundwater flow directions. Neither Chapter 4 nor Appendix D.2 sufficiently describes how the conclusions were derived. Page A.1-17 bears out this suspicion of insufficient data.

185
6.2.9 Table D.2-11 shows elevated sulfate levels. This may indicate the presence of pyritic minerals which can cause acidic groundwater seeps if surface disturbance allows such materials to be exposed to oxidation. Low pH water may carry implications for the mobilization of radionuclides. Are any other contaminants present in the groundwater as result of activities at this site?

186
6.2.9 Appendix D describes some constraints to the groundwater investigations. These constraints appear to have required the investigators to arrive at their conclusions using assumptions rather than hard data. In addition, the limited sampling information is inadequate to arrive at definite conclusions. A clear example is found on the first page of Appendix D. The second paragraph states that "...the slug tests were not considered reliable. Therefore, other measurements...had to be used...", but these are apparently not described in the Appendix. The Final EIS should describe how design progress has cleaned up this deficiency.

187
6.2.9 If, on the other hand, the groundwater information is correct, especially for the Burrell site, then additional analysis might be considered. These are discussed below under the Alternatives section of this review.

188 [Finally, the document describes an area that was once a swamp, but has since
6.2.9 [been used as a repository for waste. This area may serve as either
groundwater recharge or floodplain, or both. It could also have been
supplied by a spring or seep which should be investigated before the area is
reclaimed. The area could carry implications for the floodplain as well as
for groundwater.

Air Pollution

Along with the obvious air pollution implications related to radon and other
airborne radionuclides, many other questions have been raised with regard to
air pollution. Reviewers have cited several places where further work
appears to be necessary, or where different control techniques from those
proposed are appropriate. These comments will not affect the outcome of the
project, but mitigative measures suggested here should be included in the
Final EIS.

189 [Also on 1-22, air impacts are given in grams per cubic meter. Was it
6.2.6 [intended to be micrograms per cubic meter?

190 [On page 3-19, last paragraph the text refers to the 60 microgram per cubic
6.2.6 [meter secondary air quality standard. This is not a standard but merely a
guideline to meet the 150 ug/m³ 24-hour standard. It is not necessary to
meet the 60 ug/m³ guideline level.

191 [On page 4-2, a statement is made that the Southwest Pennsylvania AQCR (Air
6.2.6 [Quality Control Region) is in attainment for all pollutants but ozone. This
is not true. The AQCR has non-attainment for SO₂ and TSP, though the
Canonsburg area itself is most likely in attainment.

192 [Page 4-11: Again, there is no annual secondary standard to TSP.
6.2.6 [

193 [Page 5-10: Water spray is not effective for control of TSP from unpaved
6.2.6 [roads. A petroleum-based agglomerating agent or some other equally
appropriate agent would be more appropriate. One such agent is marketed
under the brand name CohereX, though EPA does not specifically endorse it.

194 [Page 5-11: The NO_x calculations predicting standards violations are
6.2.6 [dubious, since the standard would be violated at every major construction
project and in every city if this were the case. This may be a problem with
the way the ISC (Industrial Source Complex) model has been applied -
probably the initial sigma "z" is too small. Also, note that the hydro-
carbon standard will be withdrawn shortly by EPA. This issue should be
resolved because NO₂ violations were predicted for the NAAQS. EPA does
not believe this will happen. A predicted violation of this standard would
make the remedial action less attractive and could even precipitate legal
action to stop the project if allowed to stand.

195 [Page 5-12: Again there is no annual secondary TSP standard.
6.2.6 [

196 [Page 5-44: Again, NO_x calculations look suspicious. The air modeling
6.2.6 [documentation is not sufficient to determine what was done.

197 [Page 5-2-2: The AP-42 emission factors (1977) should be checked for
6.2.6 [currency since many recent changes have been made.

198 [Page 5-2-10: Water spray can be counter-productive if vehicles are not
6.2.6 [washed before entering streets to prevent mud track-out. Stabilizing agents
should be applied monthly, not quarterly.

199 [Page 5-2-13: A 95% reduction in TSP emissions is unreasonable for the
6.2.6 [control measures proposed. 80 or 90% is more likely for a good control
program. A poorly handled water spray program can actually enhance the
problem through mud track-out onto streets.

200 [Page 5-2-12: The fact that the ISC model was used is not sufficient
6.2.6 [detail. The model has many options controllable by the modeler. A detailed
description of the input parameters is needed to properly evaluate the
modeling.

201 [Page 5-2-16: There is no systematic relationship between TSP and settled
6.2.6 [dust. Note that ISC has an option that would allow settled dust to be
calculated, but the calculation should be done for a rooftop location since
this is where dustfall is routinely measured.

Alternatives

Several questions have been raised over the alternative selected. The
questions range from anticipated groundwater problems through questionable
encapsulation design. Our review comments center on the alternative
selected. It will be necessary to do some additional analyses and perhaps
optimize the alternatives. However, this will not detract from the overall
need for the remedial action.

202 [EPA experts in hazardous waste isolation have raised questions regarding the
6.2.2 [optimistic expectations of the clay capsule. The rigors of wetting and
drying compounded by freezing and thawing (if capsules are placed within the
frost zone) may ultimately reduce the integrity of the encapsulating
material. In light of this, DOE should at least carry out a worst-case
analysis and if that has already been done describe the scenario in the
Final EIS or an additional document in accord with the continuing reporting
system discussed elsewhere in this review.

203 [It appears that the encapsulating modules will be buried where they will be
6.2.2 [constantly in contact with the water table. On Page 3-9, last paragraph,
while the groundwater level in Area C is high, so also is the water table in
Areas A and B. Page D.2-1, fourth paragraph states that a groundwater high
exists in Area A. This is supported by Figures D.2-2 through D.2-7 which
show that the piezometric surface contours are generally within about 10
feet of the surface in Areas A and B. Hence contaminated materials,
including some at levels greater than 100 pCi/g, will be beneath the
piezometric surface. Although some waste will be encapsulated, it is hard
to envision an encapsulation cell which would be less than 10 feet deep and

therefore above the groundwater although design may be able to handle this appropriately. It appears that the burial site at Canonsburg will be below the water table. Given the fact that clay liners leak, the encapsulated material could eventually become totally saturated. The Final EIS should discuss the design progress in answer to this question.

The proposed remedial methods for both the Burrell and the Canonsburg sites have raised questions. As discussed in the review comments on groundwater, the oxidation of pyritic minerals needs to be included in the deliberations. There should be some discussion as to the long term quality of the resulting leachate and its impact on the liner. If the pH of the leachate decreases inside the capsule (Page 4-12 states the pH in Area C, which will form the most part of the cell's contents, is as low as 2.8) and the metals content of the leachate increases, the liner may be ineffectual in preventing leaking, as both low pH and high metals solutions have been shown to cause an increase in permeability. EPA's experience has shown that proper compaction of material as fine as that found at the remedial action site, along with establishing a good vegetative cover, will reduce infiltration water to acceptable levels. In addition, reference should be made to the design measures being made to assure minimal effects of pH on liner integrity.

Page 3-12, Section 3.1.3 and Page A.2-17. We question the effectiveness of the design for the Burrell site to maintain the tailings in a nearly dry state. The design may result in a bathtub effect and possibly increase the leaching of the waste, resulting in periodic discharges of contaminated water to the Conemaugh River. The remedial design for the preferred alternative calls for emplacement of a slag-filled trench with a gravel drain at its bottom (Page A.2-17). This trench would be in the middle of the fill in the low-lying swale. This slag and gravel will have a much larger pore size and probably a much higher permeability than the contaminated fill. This will create an interface between the fill and the drain where there will be a large capillary pressure that must be overcome before water can move across the interface. In order for this to occur, the water table in the fill will have to rise, thereby saturating the fill to overcome the capillary pressure in the large pores of the slag drain. A pulse of water would then move into the drain. Because of the high permeability of the drain, this pulse would discharge rapidly, making it impossible to maintain saturated conditions in the drain for more than a short time. This would result in a repeat of the rise in levels in the fill area. Further design might provide a drain that will maintain the water level at the base of the fill with a minimum water level fluctuation. The alternative possibility exists that extensive leaching has already eliminated a major portion of the leachates, as indicated by the low levels of contaminants reported in the Draft EIS.

Page 3-14, fourth paragraph This paragraph states that the new cover at the Burrell site would reduce percolation by a factor of four allowing about 8 inches of precipitation per year to penetrate to the contaminated material. It appears that this site has been designed to allow percolation (from precipitation above and groundwater below) to leach contaminants from their matrix into a swale which will carry the mixture to the Conemaugh River where dilution will take place. EPA feels DOE should design against further contamination of surface waters by any unscheduled releases of radionuclides.

Furthermore, as discussed on page 3-10 (first paragraph) a liner constructed with native materials is suspect due to the fact that they will very likely contain humic acid and some by-products which could jeopardize the liner's integrity.

Page 3-18, Section 3.1.6.3. We agree that disposal in surface structures is an alternative that does not warrant further consideration. However, the Draft EIS presents evidence indicating the contaminated materials and capsules will finally reside in the groundwater. EPA's position is that all contaminated materials, encapsulated and otherwise, should be isolated above the groundwater. This is a design refinement and should be covered as the project proceeds and through optimization of the alternative selected.

Mention is made on page 3-10 of the attempts that will be made to control vegetation on the areas above the modules. What will be done to guard against invasion by burrowing animals? What precautions will be carried out to be sure that the vegetation, especially deep rooted vegetation, does not "pipe" radionuclides into above ground plant tissues?

Has the design included analyses of the effects of differential settlement on the geotextile? Such information should have been included in both parts of Appendix A.

The random fill that exists at Canonsburg and at Burrell (Page 4-13 and Page 4-12) raises questions concerning the stability of the fill under loading. Landsliding and subsidence would seem to be likely risks. Has the ability of this random fill to support vertical or lateral (due to flood waters for example) loads been assessed?

Some indication exists the DOE anticipates that future work will be required. On page 3-14, (fourth paragraph) it is stated that further work in re-contouring may be necessary after a period of 50 years. What contingency plans are being considered to cover such an occurrence 50 to 100 years hence? In light of this, some confusion exists with regard to the alternative No. 3 as described starting on page 3-12. Further explanations of how this additional remedial work is to be done will clear this up. While we understand that NRC licensing requires long-term surveillance and monitoring (and EPA agrees with this wholly) EPA prefers designs that do not depend upon continued maintenance. Under the new EPA standards, it will now be necessary to specifically state the expected lifetimes of the remedial action, regardless of the alternative selected. This presumably will differ according to the alternative under consideration.

Floodplains and Surface Runoff

Projects of this kind where surface configuration is changed may carry implications for surface runoff water quality. Two major concerns are described here that should be addressed by DOE before design is completed. They are water quality problems that may be expected if pyritic minerals are disturbed and runoff and seeps from those areas where low level wastes are to be buried.

As discussed elsewhere, acid mine drainage is a very real problem in the area of Pa. where Canonsburg is located. This is a result of exposure of iron and other metal sulfides to air. As this reaction develops, the lowered pH, which results from the oxidation of the compounds, tends to encourage an increase in reaction rates and, in addition, ubiquitous bacteria complicate the problem by specifically using sulfide as an energy source. Once started, this reaction goes on until all metal sulfides are oxidized and under current technology there is no site where this situation prevails that has ever stopped producing acid mine drainage. Occasionally, a flooded deep mine (one or two exist in the anthracite region of Pa.) will slow or even cease producing acid mine drainage for a time, but the potential to resume production is there merely waiting for the mine pool level to go down. As also mentioned elsewhere in these comments, such an acid condition could provide a means for the mobilization of radionuclides.

Disturbance of such areas followed by stabilization can be expected to eventually have a re-established groundwater system. These almost always are difficult to predict with any precision. If the above condition prevails, i.e., the production of acid mine drainage, then seeps can be expected to develop around the periphery of the reclaimed area and these may mobilize many ions that are soluble at low pH's. Current state-of-the-art technology exists to assess this possibility and, as stated in the cover letter, should be incorporated into the Final EIS by reference, as part of the long-term monitoring program.

Current runoff patterns and seeps probably cannot be used for predicting the picture after the project is completed. Reviewers also noted that very little information is included regarding surface runoff and its quality impacts on the receiving streams. The information that is presented indicates little impact at this time, but as stated above this situation can conceivably change after project completion. The Final EIS should discuss how this is to be done.

These changes in surface and groundwater configurations may be further complicated by streambed realignment which is always accompanied by floodplain shifts. Since the design is for a period of time of at least several hundred years, an attempt should be made to anticipate any problems that may result from extreme flood events, i.e., the probable maximum flood or storm with the one-in-ten chance of occurring for the 1000 year period. (40 CFR 192) (Reference to pages 5-21, D.1-2, & 3-13, Draft EIS). A worst-case scenario would probably suffice. Again, as stated elsewhere in this letter, relocation of materials out of the floodplain is preferred.

Miscellaneous

1. On page 4-32 (last paragraph), EPA and NRC standards are different but the EPA standards cover this project. Since the document is intended to be widely distributed to both the scientific community and the public, an explanation should accompany the text so that confusion over the various standards is avoided. The differing purposes of the EPA and NRC standards should be explained.

2. EPA agrees that the Hanover site is the least desirable because a very clear possibility exists that an acid mine drainage problem may develop. Groundwater quality indicates the possible presence of pyrites which cause acid mine drainage. Reasons stated elsewhere in this review have detailed our concerns regarding this possibility.

Related to this is confusion over the use of the term, "red dog." On page 4-4 (third paragraph) it is identified as steel-milling slag while on page C.1-8 it is called burned overburden from coal mines. We agree with the latter more than the former, but in any case if steel-milling slag is indeed correct for the text on 4-4, then high pH conditions probably exist. Does high pH carry any implication for mobilization of radionuclides or any other pollutants? On the other hand, if it is residue from burned out coal mining wastes, then the possibility exists that a low pH situation prevails. It is EPA's recommendation that some weathering tests be carried out to determine the quality of groundwater resulting both from infiltration as well as interflows. Such tests are regularly performed in advance of coal mining in the east and procedures can be found in EPA 600/2-78-054 (pp 182ff), entitled Field and Laboratory Methods Applicable to Overburdens and Minesoils, available from the National Technical Information Service under PB 280 495. The results should be published as part of the continuing reporting schedules in accord with the agreements between DOE and cooperating agencies. The tests could be carried out over time as part of a long-term monitoring program.

3. No mention is made of any sanitary facilities at the Canonsburg site. Was an on-site system used or was it connected with a public system in the area? Does the possibility exist that investigations would turn up useful information for the Final EIS? Continuing environmental assessment may lay this issue to rest and should not be considered serious enough to delay design of the remedial action.

4. When was George's Pottery built and for how long a period did it operate? Was any of the Vitro uranium or other materials used in the pottery and glazing? These two comments are made merely to assure that a careful attempt has been made to track the fate of radioactive material from the site.

5. Quantitative estimates of accidental death should be presented rather than the qualitative statements given. It might be appropriate to plug this information into the summary tables. This will not affect the choice of alternatives except to show that the alternatives involving less movement of materials is favored. It may also be worthwhile to investigate this risk to life and health because the risks may be of a similar magnitude as those from the radiation.

6. Is any information available regarding the condition and final disposition of the 4000 tons of water mentioned in connection with the Burrell site? The possibility exists that it already has all leached away and presents no problem towards blocking design of the remedial action.

- 225 7. Presumably, within the lifetime of this facility, coal considered
6 2 7 currently unmineable (for technological and economic reasons) will become
accessible using innovative techniques. DOE should either reserve this coal
so that no possible disturbance will ever result, or analyze for any
possible deep contamination resulting from development of these reserves
(see page 4-16). This is not an issue of immediacy and does not warrant
delaying design of the remedial action.
- 226 8. On pages 5-20, F.1-6 and 4-33, no mention is made of analysis for
6 2 4 Po-210. We suggest this nuclide be included in all analyses of surface
water, groundwater and sediments. In addition, and stream sediment analyses
will be very useful for long-term monitoring. The Final EIS can address
this issue for its worthiness in post operation tasks.
- 227 9. Apparently the model used in estimating the radon exhalation rate for
6 2 5 the Canonsburg site was based on the assumption that uniformity exists for
the area. The tailings, to our knowledge at least, are randomly
distributed. Off-site comparisons should have been carried out so that
closer precision for the estimates can be realized than is described in the
document. However, this may be associated more with epidemiology than with
the intent of the Draft EIS. For this reason and for the reason that the
results of such a test probably would not materially change the project
outcome, EPA has placed this in a low priority category. It is not
considered a deficiency of major consequence.
- 228 10. The contaminated material is randomly scattered throughout the area
6 2 5 inasmuch as it has been employed for various uses. The assumption of a
single radon exhalation rate for the Canonsburg site may underestimate the
health effects and would argue in favor of the remedial action.

All questions regarding these technical comments should be directed to Mr.
R.S. Davis, EPA, Region III, (215) 597-4388.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
PHILADELPHIA REGIONAL OFFICE
CURTIS BUILDING, SIXTH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

REGION III

IN REPLY REFER TO:

1983

Mr. Richard H. Campbell, Manager
Uranium Mill Tailings Remedial Action Project
U.S. Department of Energy
Albuquerque Operations Office
5301 Central Avenue N.E., Suite 1700
Albuquerque, New Mexico 87108

Dear Mr. Campbell:

We have completed our review of the DEIS of Remedial Actions at the former Vitro Rare Metals Plant site in Canonsburg, Pa. with special attention to those nonradiological impacts which fall within the purview of HUD interest and expertise. It is our opinion that the housing and community impacts of each alternative have been well studied with appropriate mitigations recommended, where necessary. The selected alternative number three appears to be the least disruptive to the affected communities.

Thank you for the opportunity to comment.

Sincerely,

Thomas J. Gola
Regional Administrator, 3S

AREA OFFICES

Baltimore, Maryland - Philadelphia, Pennsylvania - Pittsburgh, Pennsylvania - Richmond, Virginia - Washington, D.C.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120
February 4, 1983

Office of the Special Deputy

Richard H. Campbell, Project Manager
Uranium Mill Tailings Remedial Action Project
U.S. Department of Energy
Albuquerque Operations Office
5301 Central Avenue NE, Suite 1700
Albuquerque, NM 87108

Dear Mr. Campbell:

We have reviewed the Draft Environmental Impact Statement for Remedial Actions at the Former Vitro Rare Metals Plant Site, Canonsburg, Pennsylvania. We would like to offer the following comments:

1. The Draft EIS does not discuss the impact of the project on public water supplies in the vicinity of sites.
2. The public health impact of the alternatives analyzed will be minimal. The "no action" alternative would not be satisfactory.
3. There are several inconsistencies in the information reviewing water quality impacts.

These points are explained in detail in the attached comments submitted by Commonwealth Agencies.

Thank you for the opportunity to review this Draft EIS.

Sincerely,

MARY T. WEBBER
Special Deputy Secretary

Attachment

STAFF COMMENTS:
COMMONWEALTH AGENCIES
DEIS REMEDIAL ACTIONS AT THE FORMER
VITRO RARE METALS PLANT SITE, CANONSBURG.

We have the following comments to make on the Draft Environmental Impact Statement. These comments cover three general topics: 1. discussion of project impact on public water supplies, 2. public health impacts of the alternatives, and 3. errors in information reviewing water quality impacts.

PUBLIC WATER SUPPLIES

We do not find any discussion concerning the impacts of the public water suppliers in the vicinity of these sites. We strongly feel they should be thoroughly discussed in the Draft EIS. We have attached three maps to these comments showing the sources and/or service areas of those public water supplies within a 3-mile radius of the two sites.

The following is a list of public water supplies within three miles of the sites.

A. Canonsburg Site

1. Western Pennsylvania Water Company - Washington District
62 East Wheeling Street
Washington, Pennsylvania 15301

B. Burrell Township Site

1. Blairsville Borough Water Authority
244 South Stewart Street
Blairsville, Pennsylvania 15717
2. Lower Indiana County Municipal Authority
P. O. Box 444
Blacklick, Pennsylvania 15716
3. Central Pennsylvania Water Supply Company
P. O. Box 367
10th and Chestnut Streets
New Florence, Pennsylvania 15944

C. Hanover Township Site

1. Smith Township Municipal Authority
P. O. Box 387
Burgettstown, Pennsylvania 15021

PUBLIC HEALTH IMPACTS

It seems apparent that alternative 1 (no action) would not be satisfactory from a public health point of view but that some remedial action must be done (alternatives 2 through 5). Consequences to the health of the general population appear to be minimal after any of the remedial actions, particularly in relation to radiation cancers. That is the end point of the alternatives 2 through 5 is

basically equivalent. There is a small difference in low level radiation at the different sites depending on which alternative would be used, but again, the overall health end point is not much different. The health effects of alternatives 2 through 5 during remedial action indicate a similar risk as if nothing were done (alternative 1). In other words, all alternatives 2 through 5 are, again, basically equivalent regarding the level of risk to the general population.

WATER QUALITY IMPACTS

The last paragraph on Page 4-17 states that the sulphate and iron concentrations are a result of operating mines in the drainage basin. Except for the discharge of acid mine drainage from abandoned operations, all discharges within the basin are operating under Department of Environmental Resources permit, which have effluent limits established to protect water quality. A major abandoned mine discharge to the Chartiers Creek, just above Carnegie, causes the water quality degradation as noted in table D1-3.

The water quality criteria as listed in table D1-3 is in error. The Department of Environmental Resources regulations do not list a sulphate criteria for Chartiers Creek and a total dissolved solids (TDS) criteria is not designated in the concentration limits as shown but rather expressed as 50 miliosmoles per kilogram. In addition, the fecal coliform data is from 1978 and is not considered to be valid at this time. Both the Washington-East Washington and Canonsburg Sewage Treatment Plants have been expanded and upgraded and we do not feel the fecal coliform limits as expressed are indicative of water quality today.

Please be advised that when the project is undertaken, the proper State permits to control erosion and sedimentation will be required. Also, permits will be required in accordance with the Dams Encroachment Act and/or the Flood Plain Management Act.

TO SHEET NO. 3

79° 15'

79° 10'

6-154

REFERENCES FOR CHAPTER 6

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Abbreviations and Acronyms

ADT	Average daily traffic
AEC	U.S. Atomic Energy Commission
ALARA	As low as reasonably achievable
AQCR	Air Quality Control Region
ASTM	American Society of Testing and Materials
BAT	Best available technology
BEIR	Advisory Committee on the Biological Effects of Ionizing Radiation of the National Academy of Sciences (also their report)
Bendix	Bendix Field Engineering Corporation, Grand Junction, Colorado
BOD	Biological oxygen demand
CDM	Climatological dispersion model
CFR	Code of Federal Regulations
CO	Carbon monoxide
COD	Chemical oxygen demand
COE	U.S. Army Corps of Engineers
dBA	Decibels on the A scale; a logarithmically based unit of sound intensity
DOE	U.S. Department of Energy
dpm	Disintegrations per minute
EA	Environmental assessment
EGR	External gamma radiation
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FR	Federal Register
FUSRAP	Formerly Utilized MED/AEC Sites Remedial Action Program
g	Grams; a unit of weight = 0.035 ounce
HC	Hydrocarbon
ICRP	International Commission on Radiological Protection
ISC	Industrial Source Complex model
kWh	Kilowatt hours
l	Liter; a unit of volume = 1.057 quarts
LC ₅₀	Concentration at which 50 percent of the organisms are killed in 96 hours
LR	Pennsylvania state traffic (legislative) route
m	Meter; a unit of length = 3.28 feet; also milli, a prefix meaning one-thousandth (10^{-3})
MED	U.S. Army Corps of Engineers, Manhattan Engineering District
MeV	Million electron volts

mg	Milligrams; a thousandth of a gram
mgd	Million gallons per day
MILDOS	A computer code used to calculate both the spread of radon and particulates in the atmosphere and the consequent radiation doses
MPC	Maximum permissible concentration
MPN	Most probable number
mr/hr	Milliroentgens per hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969 (PL 91-190)
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
O ₃	Ozone
ORNL	Oak Ridge National Laboratory, Oak Ridge, Tennessee
ORO	Oak Ridge, Tennessee office of the DOE
ORP	Oxidation-reduction potential; the same as redox potential or Eh
p	Pico, a prefix meaning one-trillionth (10 ⁻¹²)
PA DER	Pennsylvania Department of Environmental Resources
Pb	Lead
pCi/g	Picocuries per gram
pCi/l	Picocuries per liter
PE	Thornwaite Precipitation-Evaporation Index
pH	A logarithmic scale of hydrogen-ion concentration, and hence, an indication of acidity or alkalinity: pH = 7 is neutral; pH less than 7 is acidic; pH greater than 7 is alkaline
PMP	Probable maximum precipitation
Prem	Person-rem
PWLM	Person working level month
RA	Remedial action
Ra-226	Radium-226
RAC	Remedial-action contractor
RACP	Remedial-Action Concept Paper
RDC	Radon-daughter concentration
Rn-222	Radon-222
ROD	Record of Decision
RQD ₂₅	Rock quality data -- index of all rock fragments above 0.25 foot in length
RQD ₅₀	Rock quality data -- index of all rock fragments above 0.50 foot in length
Sandia	Sandia National Laboratories, Albuquerque, New Mexico
SIC	Standard Industrial Classification
SMSA	Standard Metropolitan Statistical Area
SO ₂	Sulfur dioxide
SR	Pennsylvania state traffic route
SU	Standard unit; used in this report to indicate a pH change of one

TOC	Total organic carbon
TSP	Total suspended particulates
TSS	Total suspended solids
U-234	Uranium-234
U-235	Uranium-235
U-238	Uranium-238
U ₃ O ₈	Uranium oxide; also called yellow cake
UMTRAP	Uranium Mill Tailings Remedial Action Project
UMTRCA	Uranium Mill Tailings Radiation Control Act of 1978 (PL 95-604)
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USGS	U.S. Geological Survey
Vitro	Vitro Manufacturing Company, Canonsburg, Pennsylvania
Weston	Roy F. Weston, Inc., West Chester, Pennsylvania
WL	Working level (a measure of radon-daughter-product concentration)
WLM	Working-level month (exposure to 1 WL for 170 hours)
WWTP	Waste-water treatment plant
$\bar{X}$	Mean (average) value of the variable
μ	Micro; a prefix meaning one-millionth (10^{-6})

Glossary

absorbed dose, radiological	Radiation energy absorbed per unit mass, usually given in units of rads.
acid mine drainage	Water that has come in contact with iron disulfide in rock strata and coal seams in the presence of oxygen. This causes the formation of sulfuric acid and ferrous sulfate and lowers the pH of the water.
Act 511 of 1965	"The Local Tax Enabling Act of Pennsylvania," i.e., the authority under which municipalities levy a number of taxes other than real estate and occupation taxes that were previously levied under Act 481 of 1947. These taxes may include per capita, earned income, trailer, mechanical devices, and mercantile taxes.
alluvium	Sediment deposited by a flowing river.
alpha particle	A positively charged particle emitted from certain radionuclides. It is composed of two protons and two neutrons, and is identical to the helium nucleus.
anticline	A fold in the underground rock structure that is convex upward. Its core contains the stratigraphically older rocks.
aquifer	A subsurface formation containing sufficiently saturated permeable material to yield significant quantities of water.
aquitard	A confining bed that retards but does not prevent the flow of water to or from an aquifer.
atom	A unit of matter; the smallest unit of an element consisting of a dense, central, positively charged nucleus surrounded by a system of electrons, equal in number to the number of nuclear protons and characteristically remaining undivided in chemical reactions except for limited removal, transfer, or exchange of certain electrons.
A-weighted sound levels	A method of measuring sound intensity that simulates an individual's sound perception
background radiation	Radiation arising from radioactive material other than that under consideration. Background radiation due to cosmic rays and natural radioactivity is always present, and there is always background radiation due to the presence of radioactive substances in building materials, etc.

beta particle	Charged particle emitted from the nucleus of an atom, with mass and charge equal to those of an electron.
borough	A political subdivision of a county with a defined boundary over which a municipal administration has been established to provide local government functions and facilities. In Pennsylvania, a borough is a minor civil division within a county with similar administrative and political functions as a city or a township.
colluvium	Rock fragments, sand, and soil that accumulate on steep slopes or at the foot of hills.
confined aquifer	An aquifer bounded above and below by relatively impermeable beds.
contamination	In this report, the presence of radioactive material in undesirable concentrations.
daughter product(s)	A nuclide resulting from radioactive disintegration of a radionuclide, formed either directly or as a result of successive transformations in a radioactive series; it may be either radioactive or stable.
decay, radioactive	Disintegration of the nucleus of an unstable nuclide by spontaneous emission of charged particles, photons, or both.
decibel	A unit expressing relative sound levels.
decontamination	The reduction of radioactive contamination from an area to a predetermined level set by a standards-setting body such as the EPA by removing the contaminated material.
disintegrations per minute or second	The number of radioactive decay events occurring per minute or second.
disposal	The planned safe permanent placement of radioactive waste.
dose	A general term denoting the quantity of radiation or energy absorbed; for special purposes, it must be qualified; if unqualified, it refers to absorbed dose.
dose, absorbed	The amount of energy imparted to matter by ionizing radiation per unit mass of irradiated material at the point of interest; given in units of rads.
dose commitment	The cumulative dose equivalent that results and will result from exposure to radioactive materials over a discrete time period; given in units of rems.

dose equivalent	The quantity that expresses all kinds of radiation on a common scale for calculating the effective absorbed dose; defined as the product of the absorbed dose in rads and modifying factors, especially the qualifying factor; given in terms of rems. Often abbreviated "dose."
electron	A negatively charged particle found either free or surrounding the nucleus of an atom.
equipotential lines	Lines of equal pressure within an aquifer.
excess lifetime cancer deaths	The number of cancer deaths occurring in the lifetime of a particular population that is in excess of the number normally expected.
exposure	The presence of radiation that may deposit energy in an individual; given in units of roentgens.
external dose	The absorbed dose or dose commitment that is due to a radioactive source external to the individual as opposed to radiation emitted by inhaled or ingested sources.
fault	A surface or zone of rock fracture along which there has been movement.
fecal coliforms	Bacteria indicative of human waste.
flood plain	Lowland or relatively flat areas that are subject to a 1 percent or greater probability of flooding in any given year (i.e., a 100 year or more common flood).
flux, radon	The emission of radon gas from the earth or other material, usually measured in units of picocuries per square meter per second.
gamma dose	Radiation dose caused by gamma radiation.
gamma logging (or logs)	A technique for determining gamma radiation levels at various depths in a bore hole.
gamma ray or radiation	High energy electromagnetic radiation emitted from some radionuclides. The energy levels are specific for different radionuclides.
gamma spectral analysis (gamma spectroscopy)	An analytical technique for identifying radionuclides based on their different gamma energy levels.

geotextile	A manmade fabric used for physical stabilization, such as erosion or embankment control.
ground water	Water below the land surface, generally in a zone of saturation.
half life	The time it takes for 50 percent of the quantity of a radionuclide to decay into its daughters.
in situ	In the natural or original position.
internal dose	The absorbed dose or dose commitment resulting from inhaled or ingested radioactivity.
isotopes	Nuclides having the same number of protons in their nuclei, but differing in the number of neutrons: the chemical properties of isotopes of a particular element are almost identical.
legislative route	A state-maintained roadway serving less than an arterial capacity.
licensing	In this report, the process by which the NRC will, after the remedial actions are completed, approve the final disposition and controls over a disposal site. It will include a finding that the site does not and will not constitute a danger to the public health and safety.
lineament	Any line on the ground or on an aerial photograph, that is structurally controlled.
made land	A miscellaneous land type where the soil has been covered, moved, or graded by man.
man-rem	Unit of population exposure obtained by summing individual dose-equivalent values for all people in the population. Thus, the number of man-rem attributed to 1 person exposed to 100 rems is equal to that attributed to 100 people each exposed to 1 rem.
micro	A prefix meaning one millionth ($\times 1/1,000,000$ or 10^{-6}).
milli	A prefix meaning one thousandth ($\times 1/1000$ or 10^{-3}).
Modified Mercalli (scale)	A standard scale for the evaluation of the local intensity of earthquakes based on observed phenomena such as the resulting level of damage. Not to be confused with magnitude, such as measured by the Richter scale, which is a measure of the comparative strength of earthquakes at their sources.
municipality	General term for a city, town, borough, village, or other district incorporated for self-government.

neutron	An electrically neutral particle found in or emitted from the nucleus of an atom.
nucleus	The positively charged center of an atom.
nuclide	A kind of atom characterized by the constitution of its nucleus. It is specified by the number of protons and the number of neutrons in the nucleus.
passerine	Birds in the order Passeriformes, which includes perching birds and all song birds.
permeability	The ease with which liquids or gases penetrate or pass through a layer of soil. Technically, it is the volume of fluid that will flow through a unit area under a unit hydraulic gradient, measured in centimeters per second or equivalent units.
permissible dose	That dose of ionizing radiation that is considered acceptable by standards-setting bodies such as the EPA. Also, the dose of radiation that may be received by an individual within a specified period with the expectation of no substantially harmful result.
person-rem	Same as man-rem.
pico	A prefix meaning one trillionth ($\times 1/1,000,000,000,000$ or 10^{-12}).
picocurie	A unit of radioactivity defined as 0.037 disintegrations per second.
piezometric surface	The potentiometric surface of an aquifer. This represents the pressure exerted on a confined aquifer, or the water table in an unconfined aquifer.
population dose (exposure)	The sum of individual radiation doses received by all of those exposed to the source of interest.
priority pollutant	One of 65 toxic substances officially recognized by the EPA and declared toxic under Section 307(a) of the Clean Water Act of 1977 by the U.S. Congress. The EPA has promulgated guidelines for the analytical methods to be used for testing for these pollutants.
probable maximum precipitation (PMP)	Maximum precipitation that could occur from the most severe combination of meteorological conditions that are reasonably possible in a region.
proton	An electrically positive elementary particle found in the nucleus of an atom. Also, the nucleus of a hydrogen atom.

quality factor (QF)	The principal modifying factor by which absorbed doses are multiplied to obtain dose equivalents for radiation-protection purposes and thus express the effectiveness of absorbed doses on a common scale for all kinds of ionizing radiation. The quality factor depends on the type and the energy of the radiation being considered.
rad	A unit of measure for the absorbed dose of radiation. It is equivalent to 100 ergs per gram of material.
radioactively contaminated material	Waste that includes residual radioactive material and any other material that has become radioactively contaminated with radiation from this residual radioactive material.
radioactivity (radioactive decay)	The property of some nuclides of spontaneously emitting particles or gamma radiation or of spontaneous fission.
radioisotope	A radioactive isotope of an element with which it shares almost identical chemical properties.
radionuclide	A radioactive nuclide.
radium-226	A radioactive daughter product of uranium-238. Radium is present in all uranium-bearing ores; it has a half life of 1620 years.
radon-222	The gaseous radioactive daughter product of radium-226; it has a half life of 3.8 days.
radon-daughter product	One of several short-lived radioactive daughter products of radon-222. All are solids.
red dog	A reddish-brown slag produced by steel mills.
rem	A unit of dose equivalent equal to the absorbed dose in rads times quality factor times any other necessary modifying factor. It represents the quantity of radiation that is equivalent in biological damage to 1 rad of x-rays.
residual-radio- active material	Waste in the form of tailings from processing ores for the extraction of uranium and other valuable constituents in the ores and other waste relating to such processing, including any residual stock of unprocessed ores or low-grade materials.
riparian	Pertaining to a river bank.
roentgen	A unit of measure of ionizing radiation in air; 1 roentgen in air is approximately equal to 1 rad and 1 rem in tissue.

sands	In this report, relatively coarse-grained waste products of uranium-ore processing.
second-class township	A classification based on the ranking of a municipality (i.e., township) based on population size. A second-class township is any township not classified as a first-class township; a first-class township contains a minimum population density of 300 persons per square mile.
slimes	In this report, fine-grained waste materials from uranium-ore processing that are mixed with small amounts of water.
soil infiltration rate	The rate at which water enters the soil surface and moves vertically.
soil percolation rate	The rate at which water moves through soil in all directions.
source term	The rate at which radionuclides are released from a radioactively contaminated area.
specific conductance	A measure of the electrical conductivity of a solution, expressed in mhos per centimeter. It is an indicator of the presence of free ions (cations and anions) in the solution.
stabilization	The reduction of radioactive contamination in an area to a predetermined level by a standards-setting board such as the EPA, by encapsulating or covering the contaminated material.
state route	A Pennsylvania traffic route. It is a state-maintained arterial road.
syncline	A fold in the rock structure that is concave upward.
tailings, uranium-mill	The wastes remaining after most of the uranium has been extracted from uranium ore.
thorium-230	A radioactive-daughter product of uranium-238; it has a half life of 80,000 years and is the parent of radium-226.
transmissivity, hydraulic	A measure of the ability of an aquifer to transmit water equal to the product of the permeability and the thickness of the aquifer, expressed in gallons per day per foot of drawdown.
unconfined aquifer	An aquifer that is not confined by impermeable beds. The upper surface is called the water table.

uranium-238 A naturally occurring radioisotope with a half life of 4.5 billion years; it is the parent of uranium-234, thorium-230, radium-226, radon-222, and others.

vicinity property A property in the vicinity of the Canon Industrial Park that is determined by the DOE, in consultation with the NRC, to be contaminated with residual radioactive material derived from the Canon Industrial Park, and which is determined by the DOE to require remedial action.

water table The level from which water can be drawn from a well.

working level
 (WL) A measure of radon-daughter-product concentrations. Technically, it is any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of alpha particles with a total energy of 130,000 MeV.

working-level
 month (WLM) Exposure to a worker resulting from inhalation of air with a concentration of 1 WL of radon daughters for 170 working hours. Continuous exposure of a member of the general public to 1 WL for one year results in approximately 27 WLM of exposure after allowing for lighter breathing rates during nonworking hours; 1 WLM is approximately equal to 5 rem.

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Environmental Defense Fund
Friends of the Earth
National Audubon Society

National Wildlife Federation
Natural Resources Defense Council, Inc.
New Mexico Mining Association
Pennsylvania Public Interest Coalition
Julie Stewart
Sierra Club (3 locations)
Southwest Research and Information Center
Paul Robinson
U. C. A. R. E.
Agnes Engel

Libraries

Burgettstown Community Library Burgettstown, Pennsylvania	U.S. Department of Energy Albuquerque Operations Office Albuquerque, New Mexico
Burrell Township Library Black Lick, Pennsylvania	U.S. Department of Energy Chicago Operations Office Argonne, Illinois
Canonsburg Library Canonsburg, Pennsylvania	U.S. Department of Energy Idaho Operations Office Idaho Falls, Idaho
Chartiers-Houston Community Library Houston, Pennsylvania	U.S. Department of Energy Nevada Operations Office Las Vegas, Nevada
Mary H. Weir Public Library Weirton, West Virginia	U.S. Department of Energy Oak Ridge Operations Office Oak Ridge, Tennessee
U.S. Department of Energy Freedom of Information Reading Room Washington, DC	U.S. Department of Energy Richland Operations Office Richland, Washington
	U.S. Department of Energy Energy Resource Center Oakland, California
	U.S. Department of Energy Savannah River Operations Office Aiken, South Carolina
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