

**AGENDA AND HANDOUTS FROM OCTOBER 8, 1994 TASK FORCE MEETING**

**10/08/94**

**APPLEGATE      TASK FORCE**  
**30**  
**AGENDA**

# FERNALD CITIZENS TASK FORCE

A U.S. DEPARTMENT OF ENERGY SITE-SPECIFIC ADVISORY BOARD

Chair:

John S. Applegate

Members:

James Bierer  
 Marvin Clawson  
 Lisa Crawford  
 Pam Dunn  
 Dr. Constance Fox  
 Guy Guckenberger  
 Darryl Huff  
 Jerry Monahan  
 Tom B. Rentschler  
 Robert Tabor  
 Warren E. Strunk  
 Thomas Wagner  
 Dr. Gene Willeke

Alternates:

Russ Beckner  
 Jackie Embry

Ex Officio:

J. Phillip Hamric  
 Graham Mitchell  
 Jim Saric

## AGENDA

October 8, 1994

1. *Time and Place*

The next regularly scheduled meeting of the Task Force will be on Saturday, October 8, 1994, from 8:30 a.m. to 12:30 p.m., at the AmeriSuites in Forest Park, Ohio. We will begin the meeting promptly at 8:30.

2. *Subjects*

8:00	Continental breakfast (optional)
8:30	Call to order
	Approval of minutes
	Chair's remarks
	Status of action items and initiatives
8:50	Review New Information
10:00	Break
10:15	Discussion of protection of groundwater (opportunity for public participation)
11:15	Discussion of future use options
12:15	Wrap-up
	Subjects for next meeting
12:30	Adjourn
	Lunch (optional)

3. *Documents*

The documents and other materials relevant to the meeting's subjects are being developed by the Task Force staff. They will be distributed at the meeting.

4. *Chair's Announcements*

5. *Other Meetings of Interest (calendars enclosed)*

## NEVADA LAWSUIT AGAINST DOE<sup>1</sup>

On June 28, 1994, the State of Nevada filed suit in federal court to force the U.S. Department of Energy to conduct a comprehensive Sitewide Environmental Impact Statement (SW-EIS) for the Nevada Test Site. An Environmental Impact Statement, which assesses potential and likely environmental impacts of proposed actions, is required by federal agencies under the provisions of the National Environmental Policy Act (NEPA). The scope of such an EIS for NTS would cover all activities at the NTS, including the shipping of radioactive waste and other disposal operations important to Fernald.

The last EIS completed for the NTS was done in 1977; many people argue that it is out of date and does not adequately cover all the current and planned activities for the site. They claim, therefore, that DOE is out of compliance with NEPA. The major county and cities in southern Nevada did not join the State of Nevada in filing suit against DOE.

The State of Nevada, in the lawsuit as originally filed, sought a court order banning DOE from conducting practically any operations at the NTS until the SW-EIS is completed. (Completing a SW-EIS would take about 2 years.) But NTS employees and the NTS Contractors Association complained that halting activities at NTS until the completion of the SW-EIS would have endangered many jobs, so the State of Nevada amended its lawsuit on July 20. As amended, the lawsuit now seeks to limit the impact to waste management and disposal activities at NTS. The lawsuit specifically named the importation of low-level waste from the Fernald site.

The lawsuit says projections show that "300,000 cubic yards of low-level waste from Fernald" is planned for NTS disposal; this is not correct. The 300,000-cubic-yard reference was

calculated as a worst-case estimate, and was provided by Fernald representatives in meetings in Nevada with officials from DOE, the State, and Nevada stakeholders. (These meetings were held at the request of Fernald officials.)

In actuality, the estimated amount of waste from Fernald to NTS was 158,000 cubic yards, a figure that was presented at the Nevada meetings. However, after further analysis, the current projection is 89,800 cubic yards of low-level waste for shipment to NTS between 1995 and 2025. (89,800 cubic yards would require 4,700 truckloads -- or an average of about 3 trucks a week over the 30-year project.) This figure compares to 134,100 cubic yards already shipped to Nevada through fiscal year 1994.

On August 10, 1994, DOE published a formal Notice of Intent to prepare a SW-EIS for NTS. Public scoping meetings, at which members of the public can voice their concerns, are scheduled throughout September. In the meantime, waste disposal and other essential DOE activities at NTS continue.

DOE is in the process of responding to the suit, and observers say that the State of Nevada is unlikely to negotiate a settlement prior to the November 1 election.

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<sup>1</sup> Prepared by J. Erich Evered, vice president, Materials Disposition, FERMC0

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**FERNALD**

**CITIZENS**

**TASK**

**FORCE**

**BRIEFING BOOK**

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Version 2  
October 8, 1994

***How long will the cleanup of Fernald  
take and how much will it cost?***

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There have been many estimates of the length and cost of the Fernald cleanup, but the most commonly used is 15-20 years and \$10 billion.

The actual cost and time will depend on Records of Decision issued by the U.S. Environmental Protection Agency for each of the five Operable Units. Records of Decision will determine exactly what cleanup actions are needed based on such fundamental decisions as what the future use of the site will be, to what extent contamination must be removed, and what will be done with all of the waste at the site.

Once these decisions have been made, more realistic estimates of the time and funding needed for the cleanup will be possible.

***What are the health hazards to the public from Fernald?***

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Uranium is the principle contaminant of concern at Fernald. More than 40 years of production work left most of the buildings and a significant portion of the soil contaminated with uranium. There is also some uranium contamination in the aquifer which underlies Fernald. Because this contamination has spread off site to the south, water wells in that area must be carefully monitored to assure that they are safe sources of drinking water.

Airborne uranium emissions have dwindled to less than one pound per year in recent years since there is no longer any production activity at Fernald. Uranium emissions to the Great Miami River also have decreased steadily since production ended.

Fernald conducts an extensive

environmental monitoring program to measure the effects of past and present Fernald activities on the environment. In the most recent Site Environmental Report (for 1992), the radiation dose calculated for a hypothetical individual who lived closest to the site was 1.0 millirem. The International Commission on Radiological Protection limit is 100 millirem.

Those doses and limits do not include radon. In 1992, the calculated dose to the public as a result of radon attributable to Fernald was 51 millirem. The dose received annually from naturally-occurring radon in the environment is 200 millirem.

***What will be done with the wastes at Fernald?***

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While Fernald is currently shipping significant amounts of waste to the Nevada Test Site for burial and has shipped some mixed (hazardous and radioactive) waste to Envirocare in Utah, ultimate disposition of all of the waste is dependent on the Records of Decision issued by the U.S. Environmental Protection Agency for each of the five Operable Units.

In addition, a citizens task force comprising representatives of numerous groups and organizations who have an interest in Fernald will make recommendations to the Department of Energy and the U.S. Environmental Protection Agency about what waste should remain at Fernald and what waste should be sent elsewhere.

Fernald also is testing various types of

treatment technologies to either stabilize the wastes to prevent contamination from migrating or remove the contamination using physical or chemical processes. These technologies will be thoroughly tested for their applicability under the various waste disposition scenarios being considered at Fernald.

***What will the Fernald site be used for  
after it is cleaned up?***

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The Fernald Citizens Task Force, comprising representatives of numerous groups and organizations who have an interest in Fernald, will make recommendations to the Department of Energy and the U.S. Environmental Protection Agency on the future use of the site. The task force has established the future use question as its first priority and hopes to have a recommendation by late 1994.

***Is any cleanup being done?***

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While much of the work at Fernald today centers on environmental investigations which will help determine final cleanup alternatives, there is a great deal of activity under way to remove waste and prevent any further damage to the environment.

Several Removal Actions to reduce immediate risks to Fernald neighbors and the environment have been completed. These include projects to control contaminated stormwater runoff, reduce radon emissions from the K-65 silos, prevent airborne contamination from moving off site, and removing equipment or facilities that are no longer needed. Demolition of Plant 7 was completed on September 17, 1994. Other removal actions are under way to prevent further migration of uranium in groundwater to the south of the site and to dismantle former production buildings and structures.

***How much waste is stored at Fernald?  
What kind of waste?***

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- Residues from past operations are stored in drums and other containers on storage pads and in former production buildings. (Approximately 880,000 cubic feet)
- Six waste pits were used to bury residues, construction rubble, and other waste during production years. (Approximately 471,000 metric tons)
- Three concrete silos contain residues from past operations. Two of the silos contain 8,800 metric tons of radium-bearing materials which produce radon gas. A third silo holds about 3,500 metric tons of production residues.
- Ongoing cleanup activities (construction and demolition) generate

about 22,000 cubic feet of additional low-level radioactive waste per year.

- Mixed (radioactive and hazardous) waste is stored in special-equipped warehouses. There are approximately 12,000 containers of mixed waste on site.
- A total of 1,628 drums of thorium has been shipped from the Fernald site as of September 1994. There are 5,839 drums and 450 white metal boxes of thorium still on site. Each white metal box is equivalent to six drums.

***Why can't you just close Fernald down?***

Simply abandoning the Fernald site would not only be politically unacceptable, it would not prevent the future spread of contamination into the surrounding environment. Whether the site can ever be used for other purposes has yet to be determined, but it is clear that future beneficial use would not be possible without some cleanup.

***How fast can trains go at the crossings in  
Morgan Township?***

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Maximum of 25 miles per hour, according  
to Federal Railroad Administration  
guidelines.

***How many trains are projected for  
Fernald shipping?***

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Unknown. The number of trains and cars per train, will depend on how much waste is actually shipped from the site.

However, it is estimated that Operable Unit 1 wastes will require about 220 trains of 47 cars each over a 5-year period.

***Are the tracks and crossings in Morgan Township going to be upgraded?***

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There are no current plans to upgrade this part of the track. However, the condition of the tracks and crossings is being evaluated as part of the design phase for Operable Unit 1's remedial action.

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***What are the U.S. Department of  
Transportation regulations for shipping?***

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All U.S. Department of Transportation (DOT) regulations are contained in 49 Code of Federal Regulations, Parts 200-268; also Parts 171, 172, 173, 174, 177, and 178. These regulations comprise about three volumes and address such things as types of containers, notifications and marking, routes and speeds, length of trains, and duties and responsibilities.

*What is the history of the Fernald site?*

The Fernald Environmental Management Project, formerly called the Feed Materials Production Center (FMPC), was a large-scale, integrated facility for producing highly-purified uranium metal products used as feed materials in U. S. defense programs. Historically, the plant produced uranium products including derbies, ingots, billets, fuel cores, and targets for DOE sites in Rocky Flats, Colorado; Savannah River, South Carolina; Oak Ridge, Tennessee; and Hanford, Washington. Much of the FMPC product provided "feed material" used in DOE production reactors to make plutonium and tritium.

As of October 1, 1990, DOE management responsibility for Fernald was shifted from the Defense Programs organization to the Office of Environmental Restoration and Waste Management. Production at the facility was suspended in July 1989. In

February 1991 DOE submitted a closure plan to Congress announcing its intention to permanently end the facility's production mission. That closure became effective in June, and the facility was renamed the Fernald Environmental Management Project in August 1991 to reflect its new mission of environmental restoration.

Production peaked at Fernald in the early 1960s at about 10,000 metric tons of uranium (the plant's designed production rate), and then declined to a low of about 1,230 metric tons in 1975. After a period in the 1970s where closure of the FMPC was under consideration, planning for renovation was initiated in 1981 in anticipation of requirements approaching the originally-designed capacity of the facility. However, the site's production requirement decreased dramatically following the placement of the N Reactor at Hanford in cold standby in 1988,

followed by the shutdown of production reactors at Savannah River for repairs and upgrading. Production declined from 10,000 metric tons in 1987 to 7,500 in 1988, to 1,200 metric tons in 1989. All production was suspended in July 1989 to allow concentration of resources on cleanup and environmental restoration activities.

Construction of the facility began in 1951, with full production starting in 1953. Initial construction cost was \$117 million, followed by a \$60 million expansion in the mid-1950s.

From 1951 to 1985 the FMPC was operated by NLO, Inc., under a contract with the DOE and its predecessor agencies. Westinghouse Materials Company of Ohio (WMCO), a subsidiary of Westinghouse Electric Corporation, took over operation of the facility in 1986. WMCO became the Westinghouse

**Environmental Management Company of Ohio (WEMCO) in July 1991.**

**In December 1991, DOE issued a Request for Proposals for its first Environmental Restoration Management Contractor (ERMC) to take responsibility for the cleanup and final remediation of Fernald. The Fernald Environmental Restoration Management Corporation, a subsidiary of Fluor Daniel Inc., was awarded the ERMC contract in August 1992. Following a three-month transition period, FERMCO assumed responsibility for the Fernald cleanup on December 1, 1992.**

**Chronology of Key Events/Activities for the Fernald site**

**1953: Feed Materials Production Center (FMPC) began operations under National Lead of Ohio (NLO) and**

- produced finished uranium  
metal products
- 1956: Staffing level reached 2,891  
employees; DOE Site Office  
was 12-15 employees
- 1960-62: Production reached peak of  
10,000 metric tons
- 1962: DOE extrusion press  
transferred to Reactive  
Metals, Inc., in Ashtabula,  
Ohio
- 1964: Production began to decline
- 1972: DOE Site Office closed
- 1975: Production low of 1,230  
metric tons
- 1979: Employment low of 538  
employees

- 1982: Planning for FMPC renovation to support Savannah River and continued operation of Hanford N Reactor
- 1984: New product requirement for depleted uranium added to FMPC mission
- 12/7/84: Uranium release -- Plant 9
- 12/14/84: Uranium release -- Plant 5
- 2/85: DOE Site Manager appointed and re-opened Site Office
- 9/85: Westinghouse Materials Company of Ohio (WMCO) selected as new FMPC operating contractor
- 10/85: WMCO awarded a transition

contract

- 1/1/86: WMCO became operating contractor of FMPC
- 1988: Production requirements began to decline due to closure of Hanford N Reactor
- 7/89: Production suspended to focus efforts on ending production mission
- 11/89: FMPC placed on National Priorities List
- 4/90: DOE signed CERCLA Consent Agreement with EPA
- 
- 10/90: FMPC transferred from Defense Programs to Office of Environmental

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**Restoration and Waste  
Management (EM)**

- 2/91:** Closure and retraining plans submitted to Congress (120-day notice)
- 6/91:** Closure became official
- 8/91:** Facility renamed Fernald Environmental Management Project (FEMP); WMCO renamed Westinghouse Environmental Management Company of Ohio (WEMCO)
- 9/91:** DOE and U. S. EPA signed Amended Consent Agreement establishing revised schedule for Fernald cleanup
- 12/91:** DOE issued Request for

**Proposal for Environmental  
Restoration Management  
Contractor (ERMC) to  
manage cleanup of Fernald  
Site**

- 8/92:** Fernald Environmental  
Restoration Management  
Corporation (FERMCO)  
selected as Fernald ERMC  
contractor
- 12/92:** FERMCO assumed  
responsibility for Fernald  
cleanup

## ***What is the Consent Agreement?***

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A key activity in the long-term environmental restoration at Fernald is the remedial effort under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to define the environmental problems associated with the site and develop recommended remedial actions to address those concerns.

Under a Consent Agreement between DOE and the U.S. Environmental Protection Agency, the site has been divided into five Operable Units addressing various problem areas. An individual Remedial Investigation/Feasibility Study (RI/FS) is being be conducted for each of these Operable Units. Under this system design and implementation work can begin on specific environmental concerns as soon as the alternatives are developed. The Operable Units were defined based on their location or the potential for similar

response actions and include:

- Waste Pit Area
- Other Waste Units (solid waste landfill, south field disposal areas, flyash piles, lime sludge ponds)
- Production Area
- Silos 1-4
- Environmental media (groundwater, soil, sediments, surface water, air, vegetation, wildlife)

The RI/FS work includes extensive sampling and analysis of soil, water, and other media to detect and quantify levels of contamination present in the various Operable Unit areas. Once the nature and extent of the contamination has been defined, a structured analysis of alternative methods of removing or containing the contamination is undertaken.

A Record of Decision will be prepared to specify the remedial alternative for each

Operable Unit. DOE and U. S. EPA signed an Amended Consent Agreement in September 1991 which included new schedules for completion of the RI/FS work and acceleration of near-term remediation activities or Removal Actions. Under the amended agreement, the first Record of Decision (Operable Unit 4) is scheduled for initial submittal to the U.S. Environmental Protection Agency in June 1994, followed by Operable Unit 1 in November 1994, Operable Unit 2 in January 1995, Operable Unit 5 in July 1995, and Operable Unit 3 in April 1997.

Removal Actions are initiated when there is a need to accelerate remediation of releases of hazardous substances posing a significant potential threat to the environment or to the human population. Removal Actions are coordinated with both Ohio and U. S. EPA to ensure that they are consistent with the long-term corrective actions expected as a result of Records of

Decision generated through the RI/FS  
process.

***What is the Fernald area residents' class action suit?***

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The Fernald Area Residents' Class Action Suit was filed January 23, 1985, on behalf of persons who lived or worked within five miles of the Fernald Site for at least two years prior to December 1984.

The class action was a consolidation of several individual suits filed against National Lead of Ohio, the managing and operating contractor for the Fernald site from 1951-1985. The suit claimed \$300 million in damages for lost property values and emotional trauma resulting from operation of the Feed Materials Production Center.

A non-binding summary jury trial was held in June 1989, and resulted in a jury recommendation of \$1 million in compensatory damages, \$55 million in punitive damages, and \$80 million for

medical monitoring. DOE and representatives of the class action plaintiffs reached a settlement agreement that provided \$78 million for medical monitoring and payments to individuals who can prove emotional distress or loss of property values.

Claims for emotional distress and diminished property value, as well as requests for medical monitoring, are being handled by a court-appointed panel of trustees.

The deadline for filing property value claims was June 30, 1991, while the deadline for emotional distress claims was December 31, 1991. Applications for medical monitoring are still being accepted.

Eligible claimants must have owned property or a mobile home within five miles of the Fernald site for at least two

years between 1952 and 1984. Other individuals who lived or worked in the area during those years were also eligible for lump sum payments as determined by the trustees.

The Fernald Settlement Fund Trustees are charged with administering payments from the settlement fund to individuals who lived or worked within five miles of the U.S. Department of Energy's (DOE) Feed Materials Production Center (now called the Fernald Environmental Management Project) for at least two consecutive years between January 1, 1952, and December 18, 1984.

DOE provided \$78 million for the fund, including \$5 million set aside exclusively for diminution of values of commercial or industrial property within the five-mile radius of the Fernald Site's boundaries.

The settlement fund is composed of five

separate programs (described below) through which qualifying individuals can receive medical monitoring or compensation. Questions about these programs should be directed to:

Fernald Settlement Fund Trustees  
525 Vine St.  
Suite 1300  
Cincinnati, Ohio 45202  
Telephone: (513) 421-4410

Specific information regarding who has received payments and at what amounts is available at the Hamilton County Courthouse. This information cannot be provided by telephone.

The Fernald Settlement Fund Trustees are:

Dr. Raymond Suskind  
J. Kermit Smith  
William T. Hayden

Paul DeMarco of Waite, Schneider, Bayless and Chesley Law Firm, represents claimants in the Fernald Settlement and can be reached at (513) 621-0267.

### **The Medical Monitoring Program**

The program provides a complete physical examination at Mercy Hospital to all qualifying individuals (those who lived or worked within five miles of Fernald for two consecutive years between January 1, 1952 and December 18, 1984). The value of this service is estimated at about \$800.

One year after the initial physical examination, the qualifying individual is sent a questionnaire on which to report any changes in physical condition, etc. In the third year, each individual will be provided with another physical examination. It is anticipated that all participants will continue to receive questionnaires to

update their physical condition annually thereafter.

The settlement fund provides no compensation for physical illness claimed to result from living or working near the Fernald Site.

Individuals who wish to participate in the medical monitoring program should contact the Fernald Settlement Fund Trustees.

### **The Emotional Distress Program**

Eligibility for this program is the same as for the other programs.

Claimants sent a claim form to the trustees to establish eligibility for the program.

Those who were eligible received a lengthy questionnaire from a team of psychologists at Washington University, St. Louis, Missouri. Different

questionnaires were used for adults and for children.

The returned questionnaires were scored by the Washington University psychologists, who also determined whether follow-up telephone or personal interviews were necessary to clarify responses to the questions.

The psychologists assigned a value or rank to each claim based on the results of the questionnaires and interviews. Four levels of severity were established for children: minimal, mild, moderate, and severe. The same four levels were established for adults, with each of those levels further subdivided into levels of low, medium, and high.

Payments to individuals ranged from \$550 to \$11,000 for adults and from \$1,000 to \$4,000 for children. These payments were reduced, however, by whatever amount

was paid to the individual under the Phase I and Phase II Compensation Programs described below.

The deadline for applying for compensation under the Emotional Distress Program has passed and no further claims will be considered.

### **The Real Property Value Diminution Program**

Claims under this program were limited to individuals who owned property (including mobile homes) near the Fernald Site on December 18, 1984.

Persons who owned residential or commercial/industrial real property within two miles of the Fernald boundary received a percentage of the assessed value of their property as determined in 1984 tax records of Hamilton and Butler Counties.

Persons who owned mobile homes within one mile of the Fernald Site received \$2,000; those who owned mobile homes within two miles received \$1,000.

While it was not established that property outside the two-mile boundary had diminished in value, the trustees awarded payments of \$800 to owners of property from two to three miles from the site and \$400 to owners of property from three to five miles from the site.

The deadline for applying for compensation under the Real Property Value Diminution Program has passed and no further claims will be considered.

### **The Phase One Compensation Program**

Any qualifying individual who lived or worked within two miles of the Fernald Site received a one-time payment of \$500.

## **The Phase Two Compensation Program**

Any qualifying individual who lived or worked within two to three miles of the site received a one-time payment of \$300.

Any qualifying individual who lived or worked within three to four miles of the site received a one-time payment of \$200.

The deadlines for applying for compensation under the Phase One and Phase Two Compensation Programs have passed and no further claims will be considered.

***What is the velocity of the South Plume?  
How fast was it moving prior to pumping?  
What is the velocity of the South Plume,  
now that pumping is underway? Do  
floods or periods of heavy rainfall  
increase the velocity of the South Plume?  
Do the pumps get all the contamination  
that is in the South Plume at the  
extraction point? Does the underground  
geology increase the speed of the aquifer  
as it flows?***

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Within the Great Miami Aquifer, the groundwater is moving at approximately 220 feet per year. However, in the area of Fernald, the groundwater travels at approximately 2.5 feet per day, or a total of about 912 feet per year, because of the steeper gradient. The uranium in the area of contaminated groundwater, known as the South Plume, is moving about 20 feet a year. The velocity has remained relatively stable since pumping of the South Plume began in August 1993. The velocity of the

groundwater increases as it nears the wells because of the pumping. Floods or periods of heavy rainfall increase the velocity somewhat, but in very small amounts. Any increase in velocity associated with heavy rains is localized and negligible.

Current data indicates that the pumps are extracting all the contamination to about 5 parts per billion (ppb). The standard for drinking water proposed by the the U.S. Environmental Protection Agency is 20 parts per billion.

The geology of the area does increase the velocity. As the groundwater goes between bedrock highs that cause channel restrictions, velocity increases. A similar analogy would be where a stream channel narrows and the water velocity increases. Groundwater velocities aren't as dramatic, however, because the aquifer material impedes groundwater flow.

***How radioactive is flyash? Above background?***

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Coal flyash naturally contains radionuclides. The following table compares radionuclide levels for typical flyash.

Lead-210	Polonium-210	Ra-226	Escaping Radon-222	Th-232	Total Thorium	U-238	Total Uranium
12.5 pCi/g	10.3 pCi/g	5.3 pCi/g	0.1 pCi/L	4.3 pCi/g	330.0 µg/g	6.1 pCi/g	19.0 µg/g

According to the Operable Unit 2 Remedial Investigation Report, the FEMP flyash from the Active Flyash Pile exceeded these typical flyash background values for 4 radionuclides:

- 1 out of 10 samples for radium-226
- 1 out of 10 samples for thorium-232
- 8 out of 18 samples for uranium-238
- 6 out of 16 samples for total uranium

The highest detection of uranium-238 was 12.6 pCi/g and the highest concentration of total uranium was 31.3 µg/g.

The Operable Unit 2 Remedial Investigation Report also compared the flyash results to surface and subsurface soil background levels. Flyash from the Active Flyash Pile was above surface soil background for 15 radionuclides and above subsurface soil background for 14 radionuclides. The following table summarizes the results for the major radionuclides (radium, thorium, and uranium).

**ACTIVE FLYASH PILE SAMPLES COMPARED TO SOIL BACKGROUND LEVELS**

Radionuclide	Units	Background Concentration	Number of Analyses	Number of Detects Above Background	Maximum Concentration
<b>SURFACE FLYASH SAMPLES COMPARED TO SURFACE SOIL BACKGROUND</b>					
Radium-226	pCi/g	1.42	14	12	4.61
Radium-228	pCi/g	1.25	14	13	3.17
Thorium-228	pCi/g	1.43	14	11	3.871
Thorium-230	pCi/g	1.97	14	11	6.74
Thorium-232	pCi/g	1.36	14	12	3.74
Thorium-total	µg/g	10.7	14	13	34.1
Uranium-234	pCi/g	1.24	14	14	4.43
Uranium-235/236	pCi/g	0.15	14	9	.199
Uranium-238	pCi/g	1.22	14	14	4.39
Uranium-total	µg/g	3.7	14	14	14.8
<b>SUBSURFACE FLYASH SAMPLES COMPARED TO SUBSURFACE SOIL BACKGROUND LEVELS</b>					
Radium-226	pCi/g	1.47	16	16	6.22
Radium-228	pCi/g	1.31	16	16	5.32
Thorium-228	pCi/g	1.33	16	16	5.79
Thorium-230	pCi/g	1.88	16	16	6.08
Thorium-232	pCi/g	1.26	16	16	5.08
Thorium-total	µg/g	9.47	16	16	45.8
Uranium-234	pCi/g	1.04	16	16	17.3
Uranium-235/236	pCi/g	0.15	16	6	4.12
Uranium-238	pCi/g	1.12	18	18	12.6
Uranium-total	µg/g	3.4	16	16	31.3

*Does flyash become concentrated and, therefore, more radioactive?*

Although the majority of the coal is burned away during combustion, the heavier metals remain in the ash. Because the volume of material is reduced during combustion, the metals would be expected to exist at higher concentrations in the flyash than in the unburned coal. Since uranium and other radionuclides are metals, they also would be concentrated.