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**FERNALD CITIZENS TASK FORCE - MARCH 11, 1995 MEETING
ANNOUNCEMENT TO TASK FORCE MEMBERS - (CONTAINS AGENDA
AND HANDOUTS)**

03/03/95

APPLEGATE TASK FORCE
25
MEMO

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

MEMORANDUM

TO: Task Force Members

FROM: John S. Applegate, Chair

DATE: March 3, 1995

RE: March 11, 1995, Task Force Meeting

Our next meeting will be from 8:30 a.m. to 12:30 p.m. on March 11, 1995, at the Joint Information Center, 6025 Dixie Highway, (Route 4), Fairfield, Ohio. I have enclosed a map for your convenience. A continental breakfast will be served beginning at 8:00 a.m.

I hope you will make every effort to attend this important meeting. We plan to make a decision on what our recommendation will be for cleanup priorities and the timing of these priorities for the Fernald site, plus finalize our resolution on waste disposition.

Enclosed is a copy of the letter Mr. Grumbly sent to me in reply to the budget letter we sent to Secretary O'Leary and him; and a copy of the letter sent to me from the Agency for Toxic Substances and Disease Registry and the report the agency did on the K-65 silos.

If you have any questions, please call me at 556-0114 or Judy Armstrong at 738-0003. I look forward to seeing you on March 11.

Enclosures: Agenda
JIC (Fairfield Training Center) Map
Draft Minutes of February 18, 1995 Meeting
Mr. Grumbly's letter
ATSDR letter and report

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AGENDA

March 11, 1995

1. *Time and Place*

The next regularly scheduled meeting of the Task Force will be on Saturday, March 11, 1995, from 8:30 a.m. to 12:30 p.m., at the Joint Information Center, 6025 Dixie Highway, Fairfield, 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
8:50	Review of New Information
	Budget Discussion
10:00	Break
10:15	Discussion and Draft Resolutions
11:45	Opportunity for Public Comment
12:00	Vote on Resolutions
12:15	Wrap Up
12:30	Adjourn

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)*



*Spinning Fork
Restaurant*

Fairfield Training Center

**Fairfield Training
Center**
6025 Dixie Highway

(Approximately 2.5 miles north of I-275)

Roesch Blvd.

*Banner
Bulck*



*-Route 4
(Dixie Highway)*

*Springdale
Sheraton*

I-275 West

I-275 East

*-Route 4
(Dixie Highway)*

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March 1995

PUBLIC PARTICIPATION CALENDAR

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
			1	2 7:00pm Ross Township - Ross Fire House	3	4
5	6 7:30pm Morgan Township - Civic Center	7	8	9	10	11 8:30am Fernald Citizens Task Force Meeting
12	13 7:30pm Crosby Township - Civic Center	14 7:00pm Community Meeting - Plantation	15	16 7:00pm Ross Township - Ross Fire House	17	18
19	20 7:30pm Morgan Township - Civic Center	21	22	23 7:30pm FRESH - Venice Presbyterian Church	24	25
26	27 Ohio Federal Facilities Forum-Wright Pat. AFB 7:30pm Crosby Township - Civic Center	28 7:00pm OU5 Proposed Plan Workshop-Crosby School-7 to 9	29	30	31	

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Please call Judy Armstrong at 738-0003 for changes.

3/1/1995

April 1995

PUBLIC PARTICIPATION CALENDAR

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

						1
2	3 7:30pm Morgan Township - Civic Center	4	5	6 7:00pm Ross Township - Ross Fire House	7	8 8:30am Fernald Citizens Task Force Meeting
9	10 7:30pm Crosby Township - Civic Center	11	12	13	14	15
16	17 7:30pm Morgan Township - Civic Center	18	19	20 7:00pm Ross Township - Ross Fire House	21	22
23	24 7:30pm Crosby Township - Civic Center	25	26	27 7:30pm FRESH - Venice Presbyterian Church	28	29
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A U.S. DEPARTMENT OF ENERGY SITE-SPECIFIC ADVISORY BOARD

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Thomas Wagner
Dr. Gene Willeke

Alternates:

Russ Beckner
Jackie Embry

Ex Officio:

J. Phillip Hamric
Graham Mitchell
Jim Saric

Minutes from February 18, 1995 Meeting

DRAFT

Members

Present: John Applegate
James Bierer
Marvin Clawson
Lisa Crawford
Pam Dunn
Constance Fox
Guy Guckenberger
Darryl Huff
Gene Jablonowski, U.S. EPA
Graham Mitchell, Ohio EPA
Tom Rentschler
Bob Tabor
Thomas Wagner
Gene Willeke

Members

Absent: Phil Hamric, DOE
Warren Strunk

Guests: Dan Caruso, Mayor, Borough of Canonsburg, Pennsylvania
Jack Craig, DOE

The meeting was called to order by Chair John Applegate at 8:34 a.m. Approximately 25 spectators were in attendance representing FRESH, CLEAN, ODH, GCBCTC, ATSDR, Ross Township, local residents, FERMCO, DOE, U.S. EPA and Ohio EPA, and other interested parties.

1. Approval of Minutes:

The minutes of the January 14, 1995 Fernald Citizens Task Force meeting were approved without amendment or correction.

2. Remarks:

Chair John Applegate announced that the budget and grazing agenda items would be deferred to the end of the meeting in order to proceed with the final discussion and recommendation on waste disposition.

Ken Morgan announced that he was the Deputy Designated Federal Official and in this position is a liaison between the Department of Energy (DOE) and the Fernald Citizens Task Force. He announced that Gary Stegner would be fulfilling these duties on a day-to-day basis in the future.

Applegate reported that the National Site Specific Advisory Board (SSAB) meeting, which was held in Washington, D.C. and was attended by six Task Force members, was very informative and provided much information about issues at other sites across the DOE complex.

The date of the May meeting, without objection, was set for May 6, 1995.

3. Environmental Monitoring Committee

Dr. Gene Willeke reported that the Environmental Monitoring Committee has met twice. The committee is concerned that some risks may have been overstated (leaching from the disposal cell) and some understated (the movement of vast quantities of contaminated soil off-site). Willeke also reported on a new federal rule for Uranium Mill Tailings Remediation Action (UMTRA) sites, which sets acceptable levels of total uranium in groundwater at 44 ppm compared to the proposed MCLs of 20 ppm. This was followed by a general discussion of the effect that this ruling would have on the acceptable levels the Task Force has recommended, since the new standard is not directly applicable to the Fernald site. Gene Jablonowski reported that it would be the decision of Region V of the U.S. EPA whether or not to apply these standards to the Fernald site. Lisa Crawford and Pam Dunn expressed the view that the new standards should not be applied to Fernald. Applegate suggested that the Task Force work with the Ohio and U.S. EPAs during the coming months to resolve this issue and that it could be addressed in the Task Force's Final Report.

4. Report on January 25, 1995 Task Force Public Workshop:

Applegate expressed his thanks to the many Task Force members who were present at the January 25, 1995 Workshop. He stated that a good number of the public was in attendance. The input received at the meeting, especially from local Township Trustees will be very helpful to the Task Force. In general, it was a successful meeting.

5. New Information for the Toolbox:

Applegate framed the issue for discussion: "Should any waste material stay at the site, and if so, what should stay, and what should go?". The meeting was turned over to Doug Sarno who explained the corrected and new information in the 1995 Toolbox. The new information includes a new work plan which, due to projected budget constraints, moves the discussion of cleanup priorities to March, 1995. New information was presented regarding the risk assessment assuming respirators, which lowers carcinogenic risk by a factor of ten, but that is offset by increase in exposure time and susceptibility to injury due to accident. Also, the cost to outfit one worker for one work year is approximately \$26,000. Additional information was provided regarding the use of man-made materials in the cell lining system and modelling. The cell proposed by DOE is designed to last for 1,000 years, but for the purpose of modelling, the man-made components are not expected to last 1,000 years and are therefore not included in the model. Sarno discussed the other man-made liners presently on-site and their failures, but pointed out that the proposed cell design incorporates a new system which does not rely on the man-made components.

Sarno presented information regarding the intermodal (train, then truck) shipment of waste to the Nevada Test Site (NTS). Costs would still be higher than shipping by rail to Envirocare because wastes have to be containerized and because of transfer at the rail/truck exchange point. Applegate and Crawford reported that rail transportation to any truck exchange point in Nevada would be negatively viewed by those in Nevada. Risk is negligibly increased in this option.

Jerry Monahan suggested that a piping system carry waste to Nevada. This would be safer and more cost effective than truck or rail shipment, but he agreed that it may not be possible from a political or engineering standpoint. Sarno agreed to investigate whether such a system had ever been evaluated.

Sarno responded to previous questions regarding total complex-wide shipments of waste to NTS. The volumes and trucking routes from all facilities are presented on page 18a of the 1995 Toolbox. At present Fernald is the primary shipper of waste. Fernald is ahead of other sites in its clean-up programs and this accounts for the large volumes of waste coming from Fernald. Sarno reported that full use of the Envirocare facility does not appear to face any immediate political obstacles. Finally, Sarno turned to pages 24 - 25 of the 1995 Toolbox which shows relative activity per Operable Unit (OU). These pages show that the waste in OUs 2, 3, and 5 represent the lowest level waste on the site. Further, the reason these are to be cleaned, from a hazard standpoint, is to protect the Great Miami Aquifer (GMA).

6. Report of Dan Caruso, Mayor of the Borough of Canonsburg, Pennsylvania:

Applegate introduced Dan Caruso, Mayor of Canonsburg, Pennsylvania, who was involved in the siting and design of a disposal cell for radioactive materials in his community. Caruso mentioned that Dennis Carr (FERMCO) who was in the audience, was also involved in the building of the Canonsburg cell. Canonsburg's experience with uranium began in 1911 when uranium was discovered in the area. A large quantity of mill tailings and residues were generated during extraction by the Canonsburg Vitro plant. Two hundred and twenty homes, several parks, and other public areas were contaminated by the time clean-up began in the early 1980s. Of 10 homes located near the site, it was found that 11 deaths due to various cancers occurred. In a community downwind from the site, 17 cancer deaths were found, 14 in one family. At a local Catholic school and religious residence, 5 nuns died from cancer and others experienced cysts. The school was closed. The estimated amount of contaminated material was 123,000 cubic yards. A cost analysis was performed which compared costs of building a disposal cell or shipping the waste off-site. It was decided that the most cost effective method of cleaning the waste would be a disposal cell to which the local community agreed.

The Borough of Canonsburg obtained a grant from the Department of Energy to educate local school children about the radioactive waste. Applegate asked if the feeling of the community had changed in any way over the years and Caruso answered that residents still remain convinced that the cell has not had a detrimental effect on their health. Caruso invited all to come to Canonsburg to see the evidence. He reported that after ten years time, the cell is a moot issue and doesn't concern the residents. Carr reported that the material found at the Canonsburg site was more hazardous than the material found at Fernald, including radium concentrations as high as 40,000 pCi/g.

The mayor presented Applegate with newspaper articles and information regarding the clean-up at Canonsburg. He said that he thought that the Task Force was much more knowledgeable about the task at hand than the Canonsburg citizens group had been. Applegate thanked Mayor Caruso for making the trip to Cincinnati and for his helpful presentation.

7. New Business:

Applegate began the discussion of the waste disposition question by reporting that Bob Tabor (who had to leave early) suggested that the vote be deferred to obtain more local input. Applegate expressed his view that the local view had been fully aired and considered at numerous Task Force meetings and especially at the January 25, 1995 Workshop. Therefore, a vote should be taken at this meeting, as previously

Fernald Citizens Task Force
February 18, 1995 Meeting
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announced. The Task Force schedule had been specifically designed to have a public workshop to get public input before a recommendation was made. Darryl Huff also suggested that the vote be deferred. Milton Whaley, of Ross, Ohio, asked the Task Force to vote for shipment off-site. Ross Township Trustee David Young agreed and suggested that, if given 30 days, he could put together another meeting be held with Ross Township citizens in attendance. Willeke suggested that a decision should be made today, but that the rationale for the decision be listed as a separate item. Jerry Monahan expressed his concern that more public input, specifically from Ross should be received prior to a vote. Applegate reminded everyone that the Task Force has made extraordinary efforts to involve the local community and that their voice has been heard loud and clear. However, there will also be additional opportunities for public input during the OU5 process. Applegate suggested that perhaps an interim decision would be in order; any recommendation that the Task Force makes at this point, is really an interim decision anyway until the Final Report is issued. Tom Rentschler suggested that a resolution be drafted and voted on today, but to amend any statement, if necessary, prior to the Final Report.

Willeke moved that "The Fernald Citizens Task Force recommend favoring an on-site disposal cell that would accept waste only from the site and within acceptable levels." The motion was seconded by Tom Rentschler. Discussion on the motion then took place. Monahan proposed that the motion be tabled until the next meeting. After some parliamentary discussion, the motion to table was seconded by Huff. The motion to table failed with 9 opposed and 2 in favor. Additional discussion took place and the final draft resolution was read to the Task Force:

The Fernald Citizens Task Force recommends the construction of an on-site disposal facility to accept, from the Fernald site only, materials solely with low levels of contamination meeting the waste acceptance criteria.

An amendment to the motion was also presented by Willeke and was added to identify the key considerations that went into making this recommendation. After discussion and additions by members of the Task Force, the considerations included:

- Provides the most immediate way to protect the aquifer,
- Least total transport risk;
- Cost considerations/availability of funds;
- Risk to other communities;
- Risk to environment;
- Availability of disposal area elsewhere;
- Risk to remedial workers and public;
- Political realities;
- Off-site waste;
- Low levels of waste going in;
- Definition of waste acceptance criteria;

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Fernald Citizens Task Force
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Page Six

- Aesthetics, technology, and design;
- Availability of monitoring;
- Long-term ownership (Department of Energy);
- Retrievability/new technology;
- Risk at cell failure.

Monahan noted that he would abstain from the vote on procedural grounds, but that he was in favor of the resolution. The amendment was then withdrawn and a vote taken on the final resolution. The original motion passed with 9 members in favor and 1 opposed (Huff) and 2 not present (Tabor, Strunk).

Willeke then moved that the chair be directed to prepare a complete resolution and rationale, consistent with the above-listed considerations, to be voted on at the next meeting. James Bierer seconded the motion. The motion carried unanimously. Applegate indicated that he would include both reasons for and against an on-site disposal facility, so that all views would be fairly represented.

8. Opportunity for Public Participation:

There were no additional comments on waste disposition, since public input was received during the discussion and the motion to construct a disposal cell. A discussion of the need to have more local input into the disposal cell decision followed.

9. Materials Distributed at Meeting:

OU2 Interim Record of Decision
Interim Report
Revised 1995 Toolbox
Original (1994) Toolbox
CRU 3 Fact Sheet
Consensus Values Worksheet

10. Next Meeting:

Applegate announced that grazing and budget issues would be discussed at the next meeting which would be held at the Joint Information Center on Saturday, March 11, 1995.

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Department of Energy

Washington, DC 20585

~~FEB~~ 21 1995

Mr. John S. Applegate
Chair
Fernald Citizens Task Force
Post Office Box 544
Ross, Ohio 45061

Dear Mr. Applegate:

Thank you for your letter of January 25, 1995, to Secretary O'Leary, expressing the concerns of the Fernald Citizens Task Force regarding the effect of the proposed budget reductions on the Office of Environmental Management. We appreciate your concerns and your willingness to work with us to resolve the problems raised by the proposed budget reductions.

In the last several weeks, the Administration has committed to substantially restructuring the Department and reducing the budget by approximately \$10.4 billion over the next five years. The Environmental Management budget has taken \$4.4 billion of the reductions below the current spending ceilings. To do this will require a nearly one third reduction in the originally anticipated program. We plan to accelerate our productivity improvements to adjust for some of these cuts. We will also initiate significant workforce reductions across the complex. However, the efficiency savings we are committed to producing will not offset all of the proposed budget reductions. This means that the proposed budget reductions may jeopardize our ability to comply with some of the Department's existing agreements, beginning primarily in fiscal year 1997. These reductions will affect not only existing agreements, but we will have to weigh our expected resources as we enter into negotiations to comply with the Federal Facility Compliance Act.

We intend to abide by the collaborative process the Department and the states began more than two years ago to address compliance with the Federal Facility Compliance Act. At the same time, however, we are concerned about the effect that the proposed budget reduction may have on our ability to commit to outyear milestones in the Federal Facility Compliance Act site treatment plans and to meet existing commitments, including the Fernald consent agreement.



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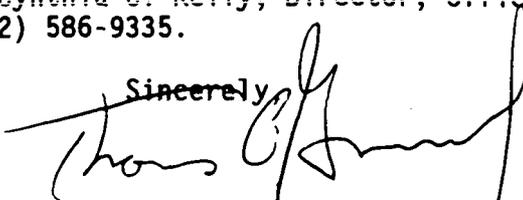
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We welcome the cooperation of the states, tribal governments, our advisory boards, and all of our stakeholders and look forward to a mutually satisfactory resolution of the problems raised by the budget realities. By working together to address the most pressing health, safety, and environmental concerns at the sites, we can further our mutual goal of accelerating the final cleanup at the Fernald site.

If you have further questions, please contact me, or have a member of your staff contact Cynthia C. Kelly, Director, Office of Public Accountability, at (202) 586-9335.

Sincerely,



Thomas P. Grumbly
Assistant Secretary for
Environmental Management



DEPARTMENT OF HEALTH & HUMAN SERVICES

6678

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

February 15, 1995

Mr. John Applegate, Esq.
Fernald Citizens Task Force
University of Cincinnati
College of Law
P.O. Box 210040
Cincinnati, OH 45221-0040

Dear Mr. Applegate:

The Agency for Toxic Substances and Disease Registry (ATSDR) is committed to keeping the Fernald community informed of our actions at the U.S. Department of Energy's Fernald Environmental Management Project (FEMP). This letter is to update you regarding ATSDR's recent activities at the FEMP.

Local citizens requested that ATSDR determine if radon releases from the K-65 silos are a public health concern. To this end, ATSDR conducted an independent radon screening program. Enclosed are three copies of ATSDR's health consultation on the K-65 silos at Fernald.

The public is invited to comment on the consultation. There will be a time period for written comment which will run from February 20, 1995 to April 7, 1995. In addition, ATSDR is planning a public information sharing session where our staff will be available to discuss this health consultation.

Please send any comments to the following address:

Chief, Program Evaluation, Records,
and Information Services Branch
ATTN: (DOE) Fernald Environmental Management Project
Agency for Toxic Substances and Disease Registry
1600 Clifton Road, NE (E56)
Atlanta, GA 30333

If there are any questions, please direct them to L. F. (French) Bell, P.E. or Bill Taylor, Ph.D. at (404) 639-6068.

Sincerely yours,

Karen W. Fuchs

for Max M. Howie, Jr.

Chief

Program Evaluation, Records,
and Information Services Branch
Division of Health Assessment
and Consultation

Enclosure

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Health Consultation

Public Comment Release

FOR K-65 SILOS

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERNALD, HAMILTON COUNTY, OHIO

FEBRUARY 1995

Comment Period Ends: April 7, 1995

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Office of Regional Operations

Atlanta, Georgia 30333

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Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material. In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members.

The Public Comment Period is an opportunity for the general public to comment on Agency findings or proposed activities for this written consultation. The purposes of the comment period are to 1) provide the public, particularly the community associated with a site, the opportunity to comment on the public health findings, 2) evaluate whether the community health concerns have been adequately addressed, and 3) provide ATSDR with additional information.

The conclusions and recommendations presented in this health consultation are the result of site specific analyses and are not to be cited or quoted for other evaluations or health consultations.

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HEALTH CONSULTATION

FOR K-65 SILOS

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

FERNALD, HAMILTON COUNTY, OHIO

CERCLIS NO. OH6890008976

Prepared by

**Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Federal Facilities Assessment Branch
Energy Section B**

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DISCLAIMER

The mention of the name of any company or product does not constitute endorsement by the Agency for Toxic Substances and Disease Registry or by the U.S. Environmental Protection Agency.

BACKGROUND AND STATEMENT OF ISSUES

Statement of Issues:

The Agency for Toxic Substances and Disease Registry (ATSDR) initiated this health consultation addressing radon emissions from the Fernald Environmental Management Project (FEMP), Fernald, Ohio, in response to concerns expressed by members of the community surrounding the site. This consultation evaluates the public health implications of radon emissions from the FEMP after the Department of Energy (DOE) completed a removal action on the K-65 Silos. In 1991, DOE placed a layer of bentonite clay in the headspace of K-65 Silos 1 and 2. DOE reported that this work resulted in lower levels of radon gas and related contaminant emissions from the silos [1]. To address citizens' concerns about the adequacy of the removal action and address whether current radon emissions from the site pose a public health hazard, ATSDR enlisted the assistance of the National Air and Radiation Environmental Laboratory (NAREL) of the United States Environmental Protection Agency (EPA), through an interagency agreement, to monitor environmental radon. In this health consultation, ATSDR evaluates the data we collected as well as selected DOE radon monitoring data.

This health consultation addresses the following issues:

- 1) Are radon releases from the FEMP during the monitoring period of public health concern?
- 2) What are the results of the ATSDR/NAREL sampling thus far?
- 3) Is DOE's radon monitoring program adequate and are quality assurance procedures sufficient to ensure the quality of the data?

Background:

FEMP, formerly called the Feed Materials Production Center (FMPC), was constructed by the Atomic Energy Commission (AEC) to produce the quality and amount of uranium metal needed for postwar defense purposes. The site was operated by contractors for DOE and its predecessors from 1951 until late 1989. The FMPC produced most of the uranium metal products used by other DOE facilities, including the plants at Hanford, Savannah River, and Oak Ridge.

In accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), Fernald was placed on the National Priorities List (NPL) in November 1989. In February 1991, DOE announced formal closure of the plant, effective June 1991. In August 1991, the site was renamed the FEMP to reflect its change of mission to environmental restoration of the site and local area [1].

In accordance with an amended consent agreement, FEMP and EPA divided the plant into six work areas called Operable Units (OUs). Operable Unit 4 (OU4) consists of four large cylindrical concrete waste storage tanks, designated Silos 1, 2, 3, and 4. These silos are situated approximately 200 feet east of Paddy's Run Creek on the western edge of the former production area. The nearest residence is approximately 1,200 feet from the silos.

The silos were constructed above ground level in 1952 for the temporary storage of radium-bearing residues created from processing pitchblende, a uranium-rich ore. Silos 1 and 2 are called the K-65 silos because they are used to store residues from the K-65 uranium ore refinement process. Silos 1 and 2 presently contain 2,630 curies¹ (Ci) (97.3 terabecquerels²--TBq) and 1,140 Ci (42.2 TBq), respectively, of radium-226 (Ra-226), which decays to radon-222 (Rn-222). Silo 3 contains 450 Ci (16.7 TBq) of thorium-230 (Th-230), which also decays to Rn-222 [3]. FEMP reports that Silo 4 has never been used and is empty except for standing water which contains low concentrations of uranium and inorganic chemicals. FEMP does not consider Silo 4 to be a source of contaminant releases [4].

FEMP conducted several studies on the silos since their initial construction. These studies indicate the silos had structural problems and emitted high levels of radon [5]. As a result, in 1964 FEMP constructed earthen berms against the outer faces of the silo walls to bolster them and retard radon emissions. In

¹ One curie = 3.7×10^{10} disintegrations per second.

² A terabecquerel is 1×10^{12} becquerels. One becquerel = 1 disintegration per second.

1983, FEMP enlarged the berms [5]. Other efforts to stabilize Silos 1 and 2 have included installation of protective dome caps over the center of the silo domes (January 1986), application of rigid, insulating polyurethane foam over the exterior surface of the domes (December 1987), and construction and operation of a radon removal system using charcoal adsorption (1987) [5].

In 1991, FEMP conducted a CERCLA removal action to further reduce fugitive emissions. With the concurrence of EPA and the Ohio Environmental Protection Agency (OEPA), FEMP installed a layer of bentonite clay approximately one foot thick in the headspace area between the concrete dome cover of each K-65 silo and its contents to reduce radon accumulation in the headspaces and thus reduce radon emissions to the environment. The clay caps are also intended to serve as a protective shield should a dome structure fail or if the silo is damaged by severe weather [3]. FEMP reported in its 1992 Fernald Site Environmental Report that radon concentrations in the silo headspaces had been reduced substantially since the bentonite seal was placed in the K-65 silos [1].

In addition to the silos, other sources of radon gas from the site include any areas contaminated with uranium, radium, or thorium. These include surface soils and the soil under the OU1 waste pits. However, the quantity of radon-producing wastes in the OU4 silos far exceeds the quantity in other areas [1].

In 1992, ATSDR entered into an interagency agreement with NAREL to conduct limited off-site environmental sampling at DOE Superfund sites where there is known or suspected off-site radiological contamination. Subsequently, ATSDR and NAREL prepared the *Work Plan for Environmental Studies Near the Fernald Environmental Management Project* [6], which included the plans for the off-site air monitoring reported here.

ATSDR/NAREL AIR MONITORING

Procedures:

We began off-site air monitoring in December 1993 by placing long-term electret ion chambers³ (EICs) at six locations around the site and at one background location. (See Figure 1 for the locations of the EICs.) Duplicate EICs were set up at two of the seven locations. (The EICs measure radon exposure over a period of time. A voltage drop on an electret plate within the detector is proportional to the radon concentration in air. The voltage

³ The long-term electret ion chambers used in this monitoring program are Electret-Passive Environmental Radon Measurement Systems (E-PERMs), a trademark device manufactured by Rad Elec, Inc.

drop is caused by the alpha particle from radon decay within the detector and, to a lesser extent, by penetrating gamma radiation originating outside the EIC [8].) We placed the EICs in specially designed housings to minimize the possibility of direct moisture affecting their operation. We placed six thermoluminescent dosimeters⁴ (TLDs), in two sets of three, next to the EIC in each housing. (The TLDs measure gamma radiation near the EIC so that the EIC readings can be corrected for a slight response to gamma radiation.) We then secured the housings and monitoring devices to upright objects, such as trees, on the property of consenting owners.

On March 15 and 16, 1994, we removed the EICs from their housings and recorded the voltage and condition of each EIC. We then replaced the EICs in their protective housing to continue exposing them to the air for the next three months. We also removed one set of TLDs from each housing at the time of reading the EIC voltages and shipped them to the manufacturer for analysis. We followed this same procedure on June 14, 1994, to collect the data for the March through June period.

⁴ Thermoluminescent dosimeters manufactured by Landauer, Inc., of Glenwood, IL.

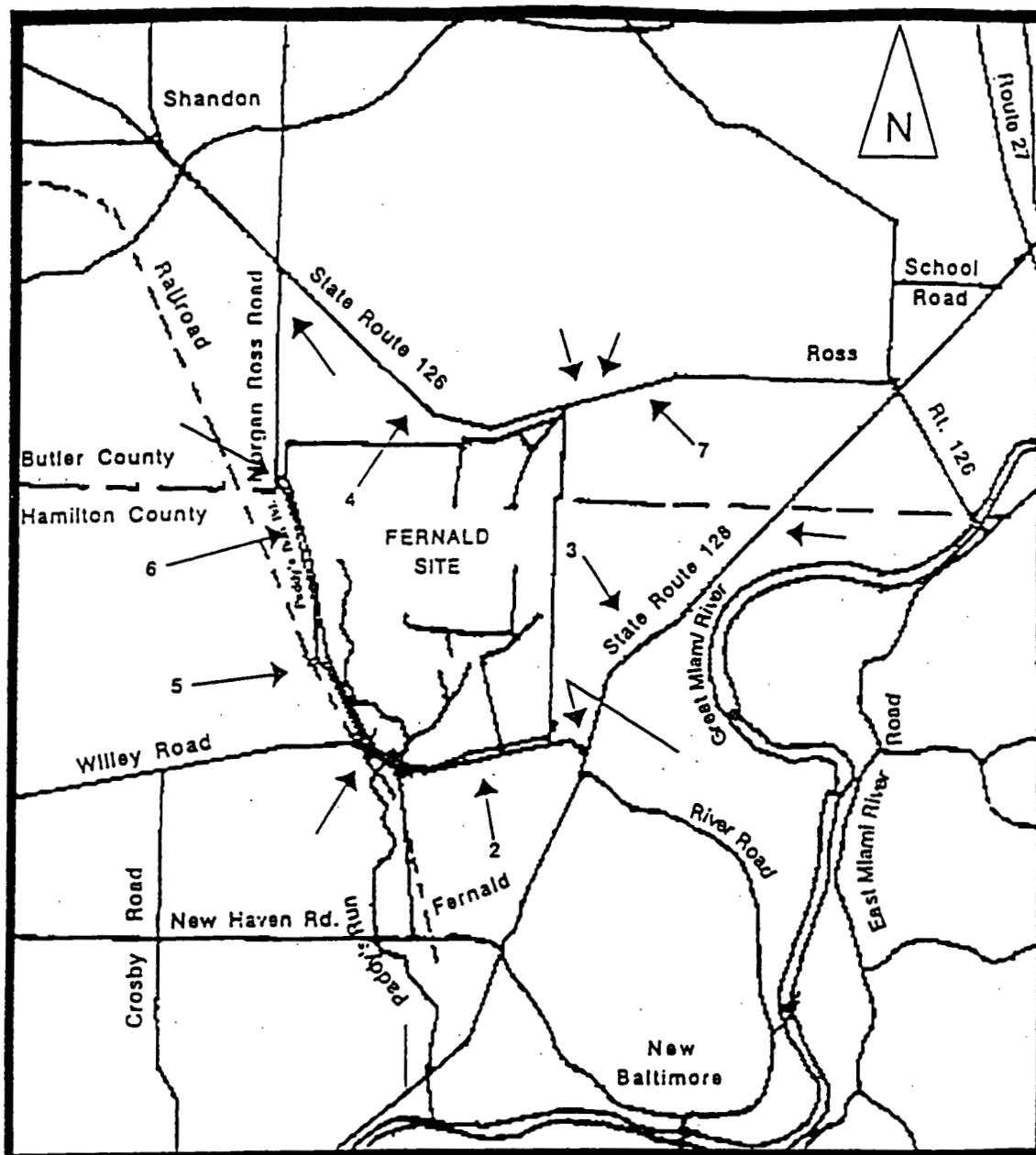


FIGURE 1.

LOCATIONS OF ATSDR/NAREL ELECTRET ION CHAMBERS (EICs).

Location 1 (not shown) is the EIC background site.

Locations 2 through 7 are the original six monitoring sites.

Seven unnumbered arrows are the locations of EICs added in June 1994.

Results:

We calculated the average radon concentration for each EIC for each sample period, and the results are shown in Table 1.

EIC Location Number	Direction and Distance (miles) from Center of K-65 Silos 1 and 2	Average Radon Concentration for First 3-Month Period ^(a)		Average Radon Concentration for Second 3-Month Period ^(b)	
		pCi/L ^(c)	mBq/L ^(d)	pCi/L ^(e)	mBq/L ^(d)
1 ^(a)	S, 6.1	0.5	18.5	1.0	37.0
2	SE, 1.0	0.5	18.5	1.1	40.7
3	E, 1.0	0.5	18.5	1.1	40.7
4	NNE, 0.8	2.7	99.9	1.2	44.4
5	SW, 0.5	0.9	33.3	0.2	7.4
6	NW, 0.5	7.9 ^m	292.3 ^m	0.5 ^m	18.5 ^m
7	NE, 1.5	0.5	18.5	0.4	14.8

(a) December 7-8, 1993 through March 15-16, 1994.
(b) March 15-16, 1994 through June 14, 1994.
(c) pCi/L = picocuries per liter.
(d) mBq/L = millibecquerels per liter.
(e) Location 1 is the background location.
(f) The EIC that recorded these data failed during subsequent spot field testing and these numbers are not considered reliable.

During the first 3-month period, ambient radon concentrations ranged from 0.5 to 7.9 pCi/L (18.5 - 292.3 mBq/L). Elevated radon concentrations were recorded at EICs 4 and 6. Ambient radon concentrations during the second period ranged from 0.2 to 1.2 pCi/L (7.4-44.4 mBq/L). The values in the second three months are comparable to the natural background concentration of radon measured.

Quality Assurance:

During the initial phase of the screening program, quality control measures included prior testing of EIC units, duplication of EICs at two locations, duplicate readings of initial and final EIC voltages, and triplicate TLDs within the EIC housing units. However, the elevated readings during the initial three months underscored the need for greater quality assurance measures because these readings were recorded at locations without duplicate EIC units and we had no internal means of verifying these data.

To improve quality assurance, we increased the scope of our ambient radon screening around the FEMP. In June 1994, we placed EICs at seven additional locations (13 total, plus background) and placed duplicate detectors at locations where elevated readings occurred. (See Figure 1, seven unnumbered arrows, for locations where EICs were added in June 1994.)

In September 1994, we relocated the EIC at location 7 closer to the FEMP fenceline and added detectors to each location. (There are now a total of three detectors at each site except the background location which has two detectors.) At this time, we also replaced the EIC that produced the highest reading (7.9 pCi/L) because it failed during a spot field test. We read the charge on this EIC on two consecutive days and noted that the charge had dropped significantly on the second day; we noted no drop in the charge of two co-located EICs. The charge on the suspect EIC was so low that no further testing was possible. This behavior indicates the EIC was not performing correctly and so we replaced it. Therefore, we do not think the reading of 7.9 pCi/L is reliable.

INVESTIGATION OF ELEVATED READINGS

We compared FEMP monitoring data to our EIC data for the period coinciding with our screening program to determine whether the FEMP data support our elevated readings.

FEMP monitors ambient radon on site around the Production Area and the silos, at the site boundary, and off site at three area residences and four background locations [1]. They use two types of monitoring devices to measure ambient radon on and off site: alpha-scintillation detectors⁵, and alpha-track etch detectors. The alpha-scintillation detectors collect radon measurements hourly [7]. The alpha-track etch detectors, like the EICs,

⁵ Model AB-5 Portable Radiation Monitors manufactured by the Pylon Electronic Development Company, Ltd.

provide integrated long-term radon measurements; FEMP exchanges these detectors every three months.

The alpha-scintillation detectors are the primary radon monitoring system for the FEMP because they provide hourly data. The data collected by the alpha-scintillation detectors are more useful than those collected by the alpha-track etch detectors because they can establish radon release times more precisely than data collected and averaged over three months. The less expensive alpha-track etch detectors are the backup radon monitoring system for the FEMP. We are more interested in the hourly data because of its greater precision.

The FEMP alpha-track etch detector data (3-month averages) at the three off-site residences do not show elevated radon concentrations [10].

The FEMP alpha-scintillation detectors (hourly data) show some extremely high, but erratic readings [11]. (See Table 2 for the alpha-scintillation detector data.) Since these detectors were exposed to temperatures below their recommended operating temperature for over 10% of the December 1993 through March 1994 period (and nearly 25% of the time during January 1994), the data recorded during cold weather periods (below -10° Celsius⁶) cannot be considered reliable [7]. Therefore, we looked at the hourly data again, after eliminating the readings recorded below -10 degrees Celsius.

When the alpha-scintillation detectors were operating at temperatures within their operating range (above -10° Celsius), some of the data (averaged over the three months) are similar in magnitude to our elevated readings; however, these particular data are from the monitors located on site near the K-65 silos, whereas our data are collected outside the FEMP fenceline. The alpha-scintillation data recorded at the FEMP fenceline, when averaged over three months, are at background levels. Therefore, none of the FEMP data support either of our two elevated readings recorded during the first 3-month ATSDR/NAREL monitoring period.

However, the FEMP data do not necessarily refute our elevated readings either. This is because there are gaps in the alpha-scintillation data when the temperatures dipped below -10 degrees Celsius (data we consider unreliable as discussed above) and when the alpha-scintillation detectors were otherwise missing or not operable⁷ during parts of the 3-month period from January though

⁶ -10° Celsius is +14° Fahrenheit.

⁷ The alpha-scintillation detector at location AMS-1 was out of commission due to monitor malfunction for a period of six days from January 19 through January 25, 1994. The unit at AMS-6 was out of commission due to operator error

March 1994. Each of these data gaps represents periods when hourly radon monitoring was not conducted for these locations. These data gaps may include periods when radon was detected at our EIC monitors (i.e., our two elevated readings) and not recorded at FEMP's monitors.

Table 2
Average DOE Alpha-Scintillation Detector Readings^(a)

Monitor Identification	Data at All Temperatures		Data at Temperatures Greater Than -10° Celsius ^(b)	
	pCi/L ^(c)	mBq/L ^(d)	pCi/L ^(c)	mBq/L ^(d)
AMS-1	16.8	621	0.7	24
AMS-5	11.2	415	0.5	20
AMS-6	3.4	126	0.6	22
AMS-7	14.0	517	0.7	26
K65-NW	30.6	1133	2.5	91
K65-SW	8.8	324	1.7	64
K65-NE	23.1	854	5.9	220
K65-SE	6.4	237	2.8	102
Meteorological Tower	34.1	1261	0.8	31
Background	4.0	147	1.4	53

(a) January through March, 1994.
 (b) - 10° Celsius = 14° Fahrenheit.
 (c) pCi/L = picocuries per liter.
 (d) mBq/L = millibecquerels per liter.

from February 7 through February 16, 1994. It may have been out of commission until February 21, 1994, based on the abnormally low instrument reading during the period of the 16th through the 21st. Finally, the alpha-scintillation detector at the meteorological tower was removed and transferred to a different location on March 1, 1994. A replacement detector was put at this location, but not until March 14.

DISCUSSION

Both our radon screening and FEMP's monitoring show low levels of radon were released from the FEMP during the early months of 1994. However, based on our calculations of potential exposures to the radon we measured, we do not believe that any of these radon levels are of public health concern.

The primary adverse health effect from long term exposure to radon and its short-lived decay products (progeny) is lung cancer [9]. Inhalation of radon and its progeny is the only important exposure pathway. The likelihood of developing lung cancer from exposure to radon and its progeny is related to the total amount of radon and progeny breathed. Short term exposures to high levels of radon are not known to cause acute adverse health effects.

To explore the worst-case exposure scenario for the elevated radon concentrations that we measured during the first 3-month monitoring period, we estimated the radiation dose⁸ a person would have received based on our highest reliable radon reading of 2.7 pCi/L (99.9 mBq/L). The dose from this exposure was estimated to be 40 millirems (mrem). The calculations assume that a person was exposed 24 hours per day for the 96-day measurement period. We do not think exposures exceeded three months, since measured radon levels were not elevated during the second 3-month monitoring period.

To put the 40 mrem dose in perspective, the Committee on the Biological Effects of Ionizing Radiations estimates that people in the United States receive a total average effective radiation dose of approximately 300 mrem/year from naturally occurring sources [14]. An additional radiation dose of 60 mrem per year is contributed from consumer products and medical uses of radiation. Studies of populations residing in areas of high natural background radiation (600-800 mrem/year) have been unable to show that these populations exhibit higher cancer rates than populations living in low background areas. Finally; an excess number of malignancies (statistically significant at the 95% level) resulting from radiation exposures has been found only in populations exposed to radiation at effective doses exceeding 20,000 mrem. From these comparisons we conclude that the radon released from the FEMP during the initial period of our monitoring did not pose a health hazard.

⁸ We calculated an effective dose to the lung as defined by the International Commission on Radiological Protection (ICRP) in ICRP Publication 60 [12]. The methodology used to estimate this dose is based on information obtained from ICRP Publication 65 [13].

We have questions about the reliability of the data generated by both our initial radon screening and FEMP's radon monitoring programs.

Although our screening resulted in two EIC readings above background levels during the December 1993 to March 1994 period, we have reason to question the reliability of the higher reading (7.9 pCi/L). Both high readings were collected from EICs where duplicate EICs were not in use. Subsequently, when we field-tested the EIC that was located where the higher reading occurred, the EIC failed the test. This result indicates the 7.9 pCi/L is not reliable.

We compared FEMP's radon monitoring data to ours to see if their data support ours. Their data neither support nor refute our data. The FEMP data indicate there were low levels of radon released from the site, but we don't know how much because their hourly monitors were not always operational and much of their data were collected when the detectors were operating outside their recommended temperature range.

We consider that the FEMP hourly radon monitoring program is an important part of their overall environmental monitoring program because of the large quantity of radon-producing wastes stored in the K-65 silos. FEMP does not employ duplicate hourly monitors at monitor locations and their data indicate they do not have backup equipment available for alpha-scintillation detectors that fail. Therefore, we are recommending that FEMP reevaluate their radon monitoring program and improve the quality assurance of their hourly radon monitoring.

As we continue our program to address community health concerns about potential radon releases from the K-65 silos, we recognize the need to improve the reliability of our system and to correct the previously noted deficiencies. To this end, we have set up triplicate EICs at all our monitoring locations around the FEMP. We have also extended our screening period. At this time, it is likely that we will continue our radon screening program until at least July 1995.

CONCLUSIONS

- 1) Radon releases from the FEMP during the monitoring period do not appear to be a public health concern.
- 2) The highest radon measurement obtained during the initial phase of the ATSDR and NAREL screening program apparently represents an equipment failure, rather than a real radon exposure.
- 3) The FEMP radon monitoring program is deficient because
 - a) the hourly radon monitoring equipment is unreliable when it is employed outside of its operational temperature range;
 - b) FEMP does not obtain duplicate hourly radon measurements;
 - and c) FEMP does not maintain backup hourly radon monitoring equipment to replace inoperable detectors.

RECOMMENDATIONS

1. FEMP should modify their hourly monitors so that they can be made to reliably operate throughout the range of environmental temperatures expected in the area. If this cannot be accomplished, FEMP should supplement the existing hourly monitoring equipment with hourly radon monitoring equipment capable of operating during periods of expected cold weather.
2. FEMP should employ sufficient backup equipment and quality assurance procedures to ensure the reliability of their data.
 - a. FEMP should place duplicate hourly radon monitors at several locations.
 - b. FEMP should maintain backup, or spare, hourly radon detectors to replace failed monitors.
 - c. FEMP should review their hourly radon monitoring data on a regular basis to ensure proper equipment operations.

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