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G-000-801.6

**HEALTH CONSULTATION - FOR CONSUMPTION OF PRODUCE GROWN
NEAR THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
(FEMP) FERNALD, HAMILTON COUNTY, OHIO CERCLIS NO.
OH689008976**

01/00/96

**ATSDR
12
REPORT**

PUBLIC

Health Consultation

FOR CONSUMPTION OF PRODUCE GROWN NEAR THE
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT (FEMP)
FERNALD, HAMILTON COUNTY, OHIO
CERCLIS NO. OH6890008976

JANUARY 1996

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia

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.

This document has previously been released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The health consultation has now been reissued. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

HEALTH CONSULTATION
FOR
CONSUMPTION OF PRODUCE GROWN NEAR THE
FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
(FEMP)

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

SUMMARY

The Agency for Toxic Substances and Disease Registry (ATSDR) asked the U.S. Environmental Protection Agency's (EPA) National Air and Radiation Environmental Laboratory (NAREL) to collect and analyze produce grown near the Fernald site to evaluate whether it contains hazardous levels of radionuclides.

ATSDR has determined that uranium and other radioisotopes in locally grown produce does not pose a public health hazard.

BACKGROUND

Some residents near the Fernald site asked ATSDR if eating produce grown locally in soils contaminated with uranium from the Fernald Plant is dangerous [1]. This document presents the results of analyses NAREL performed on produce that we collected and our evaluation of those results.

RESULTS

Comparison of Upwind and Downwind Produce Samples

In August 1994, ATSDR and NAREL personnel collected produce samples from local produce stands near the Fernald site. We bought produce that grew nearby and downwind from the plant because produce grown in these areas is more likely to be affected by airborne releases from Fernald. For "background" samples, we bought the same kinds of produce from stands located in the opposite direction from the prevailing wind so they were least likely to be affected by airborne releases of radionuclides from Fernald.

NAREL's technicians performed uranium isotopic analyses and gamma radiation screening on each sample. The results are presented in Table 1. We analyzed for uranium specifically because we knew uranium compounds comprised most of the radioactive contamination released into the air by the site and because people in the nearby area are concerned about health effects associated with uranium exposures.

The gamma spectrometry analyses detected similar concentrations of the naturally occurring radionuclides potassium-40, thorium-234, lead-212, and protactinium-234m in produce grown both upwind and downwind from the Fernald site. We found no indications that any man-made or unnatural radioactive contamination is present in the produce grown near the Fernald site and we did not detect the naturally occurring radionuclides at levels that would pose a public health hazard.

Estimated Radiation Dose

To confirm that the existing radiation levels are safe, we calculated the doses to a person who consumed this produce. ATSDR health physicists estimated the average amount of produce that people eat using the national ingestion rates reported in the EPA's *Exposure Factors Handbook* [2]. We assumed that the amounts of produce eaten daily in the Fernald area are similar to those reported in the handbook. We also assumed that this locally grown produce is the only source of these particular kinds of fruits and vegetables that Fernald residents eat. The estimated average amounts of produce eaten are presented in Table 2. We then calculated the annual radiation dose to a person who ate all those fruits and vegetables in those amounts.

The total radiation dose that we calculated is 0.028 millirem per year (mrem/yr), including the background radiation dose from the produce. The International Commission on Radiation Protection (ICRP) recommends limiting public radiation doses to 100 mrem/yr above background levels [3]. The dose that we calculated, which includes the background radiation dose, is more than 3,500 times less than the ICRP public dose limit.

Uranium Toxicological Hazard (Non-radiological)

We also considered the toxicological hazard from eating produce containing these levels of uranium because metal toxicity from chronic (regular) ingestion of uranium may be a hazard to the kidneys [4]. We calculated that a person regularly eating this produce would ingest about 1 microgram of uranium per day ($\mu\text{g}/\text{day}$). For people worldwide, the average daily uranium intake is approximately $1.9 \mu\text{g}$ [5]. From ingestion of $1 \mu\text{g}/\text{day}$ of uranium, we calculated a dose of $0.00001 \mu\text{g}$ of uranium per gram of kidney tissue. There is no public health hazard to people who are exposed to a uranium dose of up to $0.02 \mu\text{g}$ of uranium per gram of kidney tissue [5]. In other words, a person would have to ingest more than 2,000 times the quantities of the produce listed in Table 2 before nephrotoxicity (kidney damage) would begin to be a health concern.

CONCLUSIONS

ATSDR has determined that, based on the results of the samples collected and analyzed by NAREL, uranium and other radionuclides in locally grown produce do not pose a public health hazard. Considering only radioactive contaminants, which is all we analyzed for, the produce is safe to eat.

Some limitations of our evaluation are that we analyzed only a few produce samples (9 vegetables and 1 fruit), we did not

collect samples of every type of vegetable or fruit sold at each stand, and we collected samples only once. We did not look at past radiation doses from food grown and eaten during the periods of Fernald's production operations. We also did not analyze the samples for nonradioactive contaminants, because the community's concerns were about uranium and radioactive contaminants.

(Nonradioactive contaminants in the produce may be manufactured and applied, such as pesticides; accidentally released by industry, such as heavy metals; or naturally occurring, such as aflatoxin, a toxic substance released from a natural mold.)

RECOMMENDATIONS

Although ATSDR found only traces of radionuclides that posed no public health concern in locally grown produce, we recommend that DOE continue the present level of produce monitoring through completion of the site remediation program. Remediation of the site will result in substantial movement of soils and other potentially contaminated material, which may become airborne. Careful monitoring of produce will provide a measure of safety to the community.

TABLE 1.

RADIONUCLIDES IN FERNALD PRODUCE In pCi/gram OF EDIBLE MATERIAL ^a					
SAMPLE ID	PRODUCE TYPE	RADIONUCLIDES			
		U-234	U-235	U-238	K-40
1	bell pepper	0.0008	0.0003	0.0003	1.94
2 ^b	bell pepper	0.0002	0.0002	0.0004	1.80
3	bell pepper	0.0005	0.0002	0.0003	1.70
4	tomatoes	0.0002	ND ^c	0.0004	1.74
5	tomatoes	0.0027	0.0008	0.0016	2.12
6	cabbage	0.0005	0.0000	0.0002	2.10
7	cabbage	0.0008	0.0003	0.0003	1.90
8	cabbage	0.0012	0.0004	0.0008	1.70
9	corn	0.0017	0.0004	0.0005	2.26
10	corn	0.0007	0.0002	0.0008	1.70
11	corn	0.0007	0.0004	0.0008	2.54
12	squash	0.0005	0.0001	0.0003	1.70
13	squash	0.0018	0.0001	0.0004	1.80
14	squash	0.0014	0.0002	0.0005	1.70
15	onions	0.0002	0.0001	0.0000	0.81
16	onions	0.0004	0.0001	0.0001	0.99
17	green beans	0.0011	0.0003	0.0005	2.40
18	green beans	0.0005	0.0000	0.0001	2.20
19	green beans	0.0013	0.0000	0.0009	2.50
20	cucumbers	0.0002	0.0000	0.0003	1.60
21	cucumbers	0.0012	0.0003	0.0008	1.20
22	beets	0.0019	0.0002	0.0008	4.14
23	beets	0.0010	0.0001	0.0009	3.71
24	cantaloupe	0.0002	0.0003	0.0005	1.64
25	cantaloupe	0.0012	0.0001	ND	1.70
26	cantaloupe	0.0004	0.0004	0.0003	1.90

^a Units : pCi/gram = picocuries per gram. Data from samples collected in August 1994.
^b Background data (produce collected upwind from Fernald) are in shaded fields.
^c ND means the radionuclide was not detected.

TABLE 2.

PRODUCE INGESTION RATES ^a			
PRODUCE TYPE	SEASON: HIGH/LOW	SEASONAL AMOUNT EATEN (lb/wk)	AVERAGE ANNUAL INGESTION RATE (g/yr)
bell pepper	summer / spring, winter	0.26 / 0.14	4,732
tomatoes	summer / winter	2.04 / 0.75	32,916
cabbage	n/a: slaw 27 g/day: cooked 50 g/day		28,124
corn	summer / winter	1.47 / 0.17	19,344
squash	fall / spring	0.36 / 0.06	4,940
onion	winter / spring	0.57 / 0.39	11,336
green beans	summer / winter	0.54 / 0.29	9,802
cucumbers	winter / summer	0.78 / 0.17	11,206
beets	n/a ^b	0.26	6,136
cantaloupe	summer / winter	1.80 / 0.03	21,606

^a Source: EPA Exposure Factor Handbook.
Units: lb/wk = pounds per week; g/yr = grams per year; g/day = grams per day.
Conversion factor: 1 lb = 454 grams.

^b No values were found in the literature for beets. ATSDR assumes the intake of beets to be the same as the high seasonal value for bell pepper.

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1. Trip Report, ATSDR, February 26, 1993.
2. Exposure Factors Handbook, U.S. Environmental Protection Agency, July 1989.
3. Annals of the ICRP, 1990 Recommendations of the International Commission on Radiological Protection (ICRP), ICRP Publication 60, Pergamon Press, New York, 1991.
4. Toxicological Profile for Uranium, Agency for Toxic Substances and Disease Registry, December 1990.
5. Relationship Between Kidney Burden and Radiation Dose from Chronic Ingestion of U: Implications for Radiation Standards for the Public, Health Physics, Pergamon Press, 1989.

READER EVALUATION

Division of Health Assessment and Consultation

This questionnaire is designed to help us improve our communications. We would like to know if we have presented our findings clearly. Thank you for taking the time to respond.

- 1) Did you read the entire report? Yes No If not, which topics did you read about? (Check all that apply.) Summary Environmental Exposure Health Effects Conclusions/Actions Community Concerns

- 2) How long did it take you to read the report? Less than 2 hours 2-4 hours More than 4 hours

CONCLUSIONS

- 3) Did our report clearly say if people have come into contact with contamination? (Contact means to eat, drink, breathe or touch.) Check all that apply. Soil Air Water Food Chain Yes Possible No Unclear

- 4) Did our report clearly say if health effects are likely from contact? Soil Air Water Food Chain Likely Unlikely Unclear

RECOMMENDATIONS

- 5) Did our report clearly indicate what we recommend be done next? (Check all that apply.) Collect more data Restrict or reduce exposure Health Study Health Education No action at this time

CONTENT

- 6) Does the information in the report support our conclusions and recommendations? Yes No

Comments: _____

- 7) Did you receive this report in the context of your job? Yes No If yes, was enough information provided to allow you to take action? Yes No If you needed more information, what kind? Environmental Exposure Health Effects

Comments: _____

- 8) Were your health questions answered in the assessment? Yes No

If no, what questions do you have? _____

9) Is there information in the report that you found confusing? (Check all that apply.)

- Summary
- Environmental Exposure
- Health Effects
- Conclusions/Actions
- Community Concerns

Comments: _____

10) Is there information in the report that you found unnecessary? (Check all that apply.)

- Summary
- Environmental Exposure
- Health Effects
- Conclusions/Actions
- Community Concerns

Comments: _____

11) Which of these categories would best describe you?

- 1) Concerned member of the community
- 2) Government employee
- 3) Health care professional
- 4) Other (please specify) _____

12) How did you obtain your copy of the report?

- 1) Mailed to you by ATSDR.
- 2) Went to the library to use the copy filed there.
- 3) Received from a friend.
- 4) Other (please specify) _____

Are there any other comments you would like to make about the report?

Please fold in thirds with address on outside, tape closed, and mail back to us. No postage is required. Thank you for responding.

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