

12/21/14 9:56 AM

To: Mr. Gordon Pierce <Gordon.Pierce@State.co.us>
Air Quality Control Commission, CDPHE
From: LeRoy More, PhD <leroymoore@earthlink.net>
Date: December 22, 2014
Re: Permit for Prescribed Burn at the Rocky Flats National Wildlife Refuge
cc: Sarah Gallup <Sarah.Gallup@State.co.us>

Dear Mr. Pierce:

By way of introduction, I am a former academic with a PhD in 1966 from Claremont Graduate University. I taught in theological schools and universities, full-time from 1964 until 1979 and part-time at the University of Colorado from 1980 until I retired in 1996. In 1983 I with others founded the Rocky Mountain Peace and Justice Center, which ever since has been the base for my extensive wholly volunteer work related to the Rocky Flats nuclear weapons plant. After production ended at the plant in 1989 I served on a number of oversight and advisory bodies related to the Superfund cleanup of the site and transfer of land from DOE to U.S. Fish & Wildlife Service (FWS) to create the Rocky Flats National Wildlife Refuge. For several years in the first decade of this century I served on two committees of the National Council for Radiation Protection and Measurements, the major U.S. organization that studies radiation health effects and makes recommendations regarding standards for permissible exposure. The primary author of the *Citizen's Guide to Rocky Flats*, I have written extensively on all aspects of the Rocky Flats issue.

It is from this background that I write to you today. It is my understanding that FWS has filed with your office a request for a permit to conduct a "prescribed burn" at the Rocky Flats National Wildlife Refuge in the spring of 2015. Why was this request filed in the name of the Rocky Mountain Arsenal National Wildlife Refuge rather than the Rocky Flats Refuge? This is confusing to the public that would be directly affected by a burn at the Rocky Flats site. Is there no legal requirement that the party seeking a burn permit must file their request in their legitimate name and in a way that fully informs the public of their intent?

I raise these questions because of the importance to affected people of what FWS plans. FWS has made no public announcement of their plans. They have held no public meeting to hear from those who will be affected and have concerns. Does your office plan a public hearing prior to making a decision on whether or not to issue a permit for the burn? Such a meeting is certainly needed. In our purported democracy it appears that affected people are the last to learn about FWS plans. So far affected citizens have had no opportunity to voice their concerns.

I have examined the "Colorado Air Quality Control Commission, Agenda Item Summary, Item Title: Public hearing regarding a smoke management significant user planning document from United States Fish & Wildlife Service" (attached

071714). The date for the meeting for which FWS then sought approval is July 17, 2014. What is the relation between this document and the current request for a permit to do a “prescribed burn” at the Rocky Flats Wildlife Refuge in the spring of 2015? The document says FWS is applying to renew its burn permit for another ten years. But now it appears that FWS seeks a permit for a specific burn at the Rocky Flats Refuge. Was there a hearing on July 17, 2014? If so, when and where did it take place? And what specifically was covered? And why was the meeting not widely publicized? I follow Rocky Flats issues closely and I am only now learning of the July 17, 2014, meeting.

Evidently FWS must get a separate specific permit for the burn proposed at Rocky Flats for the spring of 2015. Assuming this is true, the present letter is about this specific request for a permit. I will next mention several issues pertinent for your decision on whether to permit the burn FWS proposes to do at Rocky Flats in the spring of 2015.

1) **Clean Air Act:** Have you assessed whether the contemplated burn for certain will not violate the Clean Air Act? Shouldn’t this be demonstrated before any permit to do the burn is issued?

2) **Migration of plutonium and americium:** Those responsible for the Superfund cleanup completed at Rocky Flats in 2005 had to establish for the project standards for permissible exposure to radiation. In doing this they assumed that plutonium and americium left in soil on the site would be “relatively immobile,” as concluded in *Actinide Migration Evaluation [AME] Pathway Analysis: Summary Report*, Kaiser-Hill Report No. ER-108, 2002, p. 28. But in fact plutonium and americium in soil are not immobile. Consider:

The Woman Creek Reservoir Authority recently took 36 soil samples on the reservoir site in which they found low levels of plutonium, americium and uranium. These materials, which are present in the upstream soils on the Rocky Flats site, “flowed off-site and into the reservoir since its construction in 1996, including contaminants that might have been dislodged during the September 2013 flood.” (Rocky Flats Stewardship Council, Monthly Status Report, November 2014, Woman Creek Rehabilitation, p. 3).

The most important finding of plutonium migration in soil at Rocky Flats was in the unusually wet conditions of May 1995 when engineer M. Iggy Litaor, with instruments placed in the field on the Rocky Flats site, found real-time rapid migration of plutonium in subsurface soil. This countered Rocky Flats orthodoxy, but it was an irrefutable discovery that was well known to DOE, EPA, CDPHE and Kaiser-Hill personnel as well as the AME researchers who later said plutonium left in the Rocky Flats environment after the cleanup would be “relatively immobile.” Though for a decade Litaor had been the principal researcher on radionuclides in the Rocky Flats environment about which he had published a dozen articles in peer reviewed technical journals, Kaiser-Hill dismissed him for his momentous finding of

plutonium migration. For two years after he had returned to his native Israel to teach, he, with my assistance, repeatedly asked DOE to send him crucial geological data needed to complete a detailed account of his plutonium-migration findings. DOE promised the data but never sent it, so he was never able to publish a technical report of his finding. He gave several well-attended public talks on the subject. I possess "The Hydrogeochemistry of Pu in Soils of Rocky Flats, Colorado: Summary," the text of a talk he gave in Denver, May 15, 1996. Litaor informed FWS of his findings in his "Open Letter to the U.S. Fish & Wildlife Service concerning its draft plan for the Rocky Flats National Wildlife Refuge," March 10, 2004.

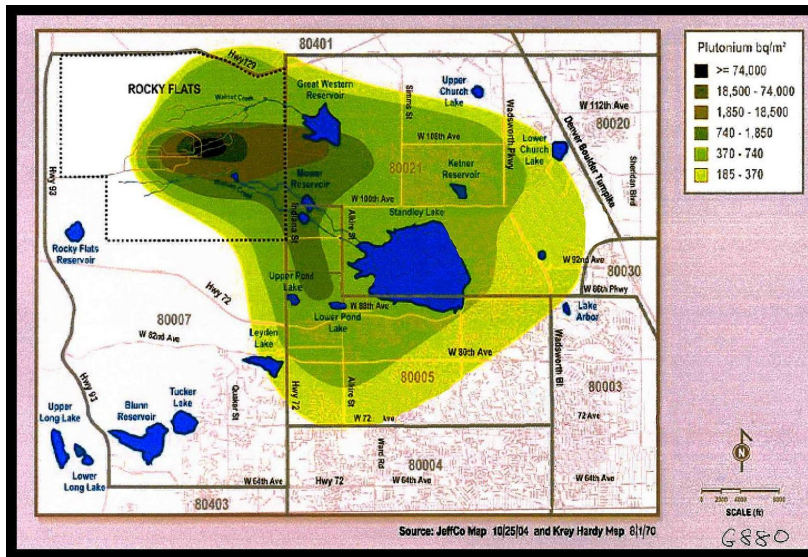
Numerous recent studies done at other locations demonstrate that plutonium in soil is not "relatively immobile," as the AME group concluded and as DOE and the regulators assumed in establishing cleanup exposure standards for Rocky Flats. Best known is the work of Annie B. Kersting of DOE's Livermore Lab. See Kersting et al., "Migration of plutonium in ground water at the Nevada Test Site," *Nature*, vol. 397, no. 7 (7 January 1999). Her later work on this subject is discussed in Arnie Heller, "Plutonium Hitches a Ride on Subsurface Particles," *Science & Technology Review*, Lawrence Livermore National Laboratory, October/November 2011, pp. 16-18. For information on studies that show long-distance plutonium migration, see Alexander P. Novikov et al., "Colloid Transport of Plutonium in the Far-Field of the Mayak Production Association, Russia," *SCIENCE*, vol. 314 (27 October 2006); notes 6 and 8 of this article reference reports of similar long-distance plutonium migration at DOE's Los Alamos and Savannah River sites; note 10 suggests greatly increased public health risk from such migration at Yucca Mountain.

The preceding three paragraphs refer to water as the agency of plutonium migration. But it is also moved by the actions of burrowing animals. In a 1996 study ecologist Shawn Smallwood revealed how burrowing animals redistribute plutonium and other contaminants left in the soil at Rocky Flats. He identified 18 species of burrowing creatures at Rocky Flats, all constantly moving soil and any adhering contaminants. Major diggers burrow to depths of 10 to 16 feet. They constantly take plutonium down and bring plutonium up, and they disturb an estimated 11 to 12% of surface soil at Rocky Flats in any given year. According to his study, what is now buried on the site is likely some day to be brought to the surface for wider dispersal by wind, water, fires or other means. See Smallwood, "Soil Bioturbation and Wind Affect Fate of Hazardous Materials That Were Released at the Rocky Flats Plant, Colorado" (November 23, 1996), Report submitted for plaintiff's counsel in *Cook v. Rockwell*, United States District Court, District of Colorado, No. 90-CV-00181; see also the transcript of Smallwood's appearance in court in this case, pp. 3912-4130. To do his research, Smallwood, who is located in Davis, CA, went onto the Rocky Flats site on three separate occasions in the summer and fall of 1996, each time accompanied by Rocky Flats personnel. He finished his report before the end of that year and two years later, with colleagues, published "Animal Burrowing Attributes Affecting

Hazardous Waste Management,” *Environmental Management*, vol. 22, no. 6, 1998, pp. 831–847. Personnel from DOE, EPA and CDPHE who were responsible for the cleanup had to be aware of his study. Ditto for the AME researchers who influenced the cleanup and then had the audacity to call it “science-based” in David L. Clark, David R. Janecky, and Leonard J. Lane, “Science-based cleanup of Rocky Flats,” *Physics Today* (September 2006), pp. 34-40. Smallwood’s work had important implications for a responsible Rocky Flats cleanup, but his findings, like Litaor’s, were totally ignored.

3) **Plutonium uptake in plants:** The uptake of plutonium in grass is another issue ignored in the cleanup as well as by FWS. An eleven-year study done at DOE’s Savannah River Site in South Carolina demonstrates that plutonium in subsurface sediments at that site moved upward from the buried source material. The authors of this study conclude “that the upward movement was largely the result of invading grasses taking up the plutonium and translocating it upward,” producing a “measurable accumulation of plutonium on the ground surface.” (D. I. Kaplan et al., “Upward Movement of Plutonium to Surface Sediments During an 11-Year Field Study, SRNL-STI-2010-00029, January 25, 2010. On line at <http://sti.srs.gov/fulltext/SRNL-STI-2010-00029.pdf>) By contrast, the AME study at Rocky Flats concluded that “uptake into plant . . . tissues is minor.” (Kaiser-Hill Co., Actinide Migration Evaluation Pathway Analysis Summary Report, ER- 108 [April 2004], p. 28.) The Rocky Flats site consists for the most part of very dry prairie grassland. If grass at the Savannah River Site brings plutonium up to the surface, should we not expect something similar to happen at Rocky Flats? Very likely the grasses at Rocky Flats have roots that run deeper into the soil than those at Savannah River, due to the drier climate at Rocky Flats. The question whether the grass at Rocky Flats brings plutonium to the surface presents an uncertainty worth exploration. Meteorologist W. Gale Biggs, who was commissioned by former Governor Roy Romer to study airborne plutonium at Rocky Flats, raised a related question in a December 8 email. He pointed out that at a location in New Mexico the quantity of plutonium present in surface soil had increased over a period of several decades since the original deposits. The reason given was that the plant's roots were absorbing the plutonium and as the plant grew the plutonium was then transported to the surface. There is ample evidence that plutonium particles in the environment are brought to the surface by plants (other studies could be cited). The map below, based on soil samples taken by two Atomic Energy Commission scientists, shows 1970 wind-driven pattern of plutonium deposits in soil on and near the Rocky Flats site. Because of the 24,110-year half-life of plutonium-239 (the principal isotope at Rocky Flats), most of it should still be present where it was originally deposited or nearby. Areas where plutonium was deposited will also have tiny particles that have been brought to the surface by plants. Any burn in such areas can be expected to release in smoke plutonium particles of a size that can be readily inhaled, inhalation being the worst way to be exposed to plutonium. Inhaled particles lodge in the body, most often in lung, liver or bone. For as long as plutonium remains in the body, typically for the rest of one’s life, it constantly

bombards surrounding tissue with radiation. The result two or three decades later may be cancer, a damaged immune system, genetic harm. No burn permit should be issued for the Rocky Flats Wildlife Refuge before independent detailed exploration of this issue has been done.



Map from P. W. Krey and E. P. Hardy, “Plutonium in Soil Around the Rocky Flats Plant,” HASL 235 (NY: AEC Health and Safety Lab, 1970).

4) **Poor conditions for a burn:** The attached ATSDR Public Health Assessment for Rocky Flats Environmental Technology Site (5/13/2005) states on p. 11 under Meteorology: “Strong wind gusts are commonly observed at RFETS. In fact, hourly average wind speeds have been found to exceed 20 miles per hour more than 500 times a year. . . . Though summertime thunderstorms are typically accompanied by strong winds, wind gusts in the area tend to be strongest and most frequent between November and April.” The attached “Natural Resources Conservation Service Conservation Practice Standard, Prescribed Burning,” (attached as 338mn) says on p. 2 that one of the “ideal burning conditions” is “steady winds between 5-18 MPH.” Based on this information, the conditions at Rocky Flats are poor for a prescribed burn. April is especially bad, but Rocky Flats is likely to have wind gusts at any time of the year. For a citizen’s account of a 50 acre test burn done at Rocky Flats in April 2000, see <http://www.mindfully.org/Nucs/Prescribed-Burns-Danger-EIN.htm> .

5) **Possible ionization of air above radioactive soil:** I corresponded with physicist Michael Reilly who lives up Coal Creek Canyon west of Rocky Flats. He sent a map produced by Weather Underground (attached Radar over Candelas). His message of November 31 says this: “ Take a look at the attached screen shot from Weather Underground. Since I moved up here, I have noticed that there always seems to be a hot spot over Hwy 93 just west of Rocky Flats. Now that seems to have grown to the east, and it is almost always present. Sometimes it is masked by storms, but on a clear day like today, there should be nothing there. My theory is

that the radioactive soil is ionizing the air, and the ionized air shows up as a radar reflection. Notice that the center of the hot spot is just north of Candela's Parkway, where the soil is being disturbed the most." I was skeptical, but I investigated further. Argonne National Laboratory, a DOE facility says that radioactive material in soil can ionize air and this can be detected remotely by radar. See http://web.anl.gov/eesa/pdfs/posters_exhibits/NuclearDetection_ElectromagneticWaves_poster.pdf A second report saying essentially the same thing comes from IEEE (Institute of Electrical and Electronic Engineers), a professional organization. See http://ieeexplore.ieee.org/xpl/login.jsp?tp=&arnumber=5692809&url=http%3A%2F%2Fieeexplore.ieee.org%2Fexpl%2Fabs_all.jsp%3Farnumber%3D5692809 Perhaps Mr. Reilly is correct, that the construction at Candelas disturbs soil containing radioactive particles and ionizes the air, creating a hot spot on the eastern end of the Candelas development. Would a burn on the Rocky Flats Refuge to the north and just over the fence from Candelas create a hot spot of ionized air? So far as I know no formal study of this phenomenon has been done at Rocky Flats. But a local physicist not connected with the nuclear industry has raised questions that at first seem farfetched but may be spot on.

FWS generally serves the public well in managing more than 600 wildlife refuges. But FWS personnel are ill prepared to manage the Rocky Flats National Wildlife Refuge, the only Refuge that is contaminated with plutonium and other radionuclides. It is most unfortunate that DOE turned most of the radioactive Rocky Flats site over to an agency whose personnel know little about radiation and its adverse health effects. They seem not to realize that they can't manage the Rocky Flats Refuge in the same way as any other. Had the Precautionary Principle been enacted as law in the U.S., as it has in some other countries, those responsible for the cleanup of the Rocky Flats site would have been required to follow the path of caution rather than the carelessness that allows levels of radiation exposure that for some will be harmful. This points to standards for permissible exposure to radiation, an area that cannot be developed here but that is foundational for everything that happens at a site like Rocky Flats. On the controversy of such standards, see my "Lowering the Bar," *Bulletin of the Atomic Scientists*, May/June 2002, on line at http://www.rockyflatsnuclearguardianship.org/wp-content/uploads/2013/07/Lowering-the-Bar_Bulletin-May-02.pdf

I believe this letter provides an abundance of information showing why the Air Quality Control Commission should not give FWS a permit to do the burn they propose for the Rocky Flats National Wildlife Refuge. If there are questions about what I have written, I would be glad to respond to them. I will be out of town from December 24 until late December 29 but can be reached by email. I close by asking two questions. First, can you send me a copy of the proposal you received from FWS regarding the proposed burn? Second, if the Air Quality Control Commission is still considering how to answer FWS application for a permit to do the proposed burn, when and where will the agency hold a public hearing on this matter?

Thank you for considering this letter. See the attachments.