COMMENTOR NO. 59: INSTITUTE FOR ENERGY AND ENVIRONMENTAL RESEARCH (CONT'D.) TAKOMA PARK, MARYLAND

presence of moist air, UF_6 reacts with the water in the air to form uranyl fluoride particulates (UO_2F_2) and hydrogen fluoride fumes (HF) both of which are very toxic. In water hydrogen fluoride becomes a very corrosive acid. Anhydrous hydrogen fluoride is also corrosive. Other chemical forms are less reactive, the oxide forms of uranium being the most physically and chemically stable. DOE should consider disposal of depleted uranium as an oxide (U_3O_8 or UO_2) under 40 CFR 191 rules.

C. Conclusions

We recognize that in comparing uranium and plutonium on the basis of equal masses of these two elements in pure form, plutonium is far more radioactive than uranium. This is because the half-lives of the isotopes of plutonium shown in Table 2 are far shorter than those of uranium. This means that a given mass of uranium decays more slowly -- that is, it gives off fewer alpha particles per unit of time. However, the far lower specific activity of uranium isotopes in depleted uranium relative to pure plutonium is irrelevant to this discussion because we are examining the properties of materials on the basis of the radioactivity per unit mass of waste to be disposed of. TRU waste is defined as that containing more than 100 nanocuries/gram. By weight it consists mainly of non-radioactive materials mixed with small masses of transuranic elements. By contrast, depleted uranium would be disposed of in nearly pure form, with only the possible addition of and element such as oxygen. As a result, TRU waste is comparable to depleted uranium. DOE TRU waste is slated for disposal in a deep geological repository.

Therefore we believe that depleted uranium should be put in the same category as TRU waste so far as its characteristics for waste management and disposal are concerned. Therefore in the PEIS the DOE should:

- reexamine the waste classification of depleted uranium based on the explicit recognition of the scientific facts discussed above and,
- add one alternative consisting of converting depleted uranium to the oxide form (U_3O_8 or UO_2), and disposing it of in a geologic repository under 40 CFR 191 rules. The proposed PEIS would be fundamentally flawed and deficient if it omitted this option.

The implementation plan for the PEIS should include these two items.

COMMENTOR NO. 60: EDMONDS, ROBERT F., JR.
OAK RIDGE, TENNESSEE

Author: Robert F Edmonds Jr

Subject: Comments on"Programmatic Environmental Impact Statement for

Following are the comments of Duke Engineering and Services Inc. (DE&S) on the draft PEIS dated December 1997.

1. Volume 1, Page S-3: We agree that conversion of the UF6 to U3O8 is the safest next step. This step can and should be initiated soon. The PEIS provides no compelling reason not to proceed with this step. There are abundant safety and environmental reasons, as documented in the PEIS, why continued storage as DUF6 is not the best alternative. Further, conversion to U3O8 does not preclude reuse of the depleted Uranium in the event national defense needs dictate or reuse options are ultimately proven cost effective. **60-1**

2. Cost Analysis Report, Paragraph 4.1.2 Treatment of Empriad Cylinders: The PEIS Cost Report assumes that empty DUF6 cylinders are crushed and sent to DOE facilities for disposal. There is no cost associated wibt disposal. This appears to be a completely unsupported assumption. There will be a cost, possibly a substantial cost, associated with disposal of the empty cylinders. They could be contaminated and require special handling. **60-2**

3. Cost Analysis Report, Paragraph 2.4.3 Use as Uranium Dioxide in DUCRETE for Shielding Applications: Report discusses the conversion of DUF6 to UO2 which in turn would be used to make DUCRETE. It should be pointed out that conversion of DUF6 to U3O8 and then to DUCRETE is an equally acceptable option. **60-3**

4. Cost Analysis Report, Paragraph 4.2.2 Revenue from Sale of Byproduct AHF and CaF2: This paragraph, as well as the PEIS Volume I, speak about sale of AHF byproduct. It should be noted that there is also a market for Aqueous HF. It is an equally acceptable option to make and market Aqueous HF. **60-4**

Thank you for the opportunity to comment. Please address any questions on these comments to Bob Edmonds at the below address.

Robert F. Edmonds, Jr.
Manager, Oak Ridge Office

COMMENTOR NO. 61: BARCLAY, MIKE & JANASKIE, MARK
OAK RIDGE, TENNESSEE

Name: Mike Barclay, Mark Janaskie Organization: DPRA, Inc.

Date Sent: 4/23/98

Document Ref.: PEIS: DUF6 PEIS OVERALL CONTENTS

----- COMMENT -----

Comments on the UF6 PEIS QUESTION:

The preferred UF6 management scenario presented in the PEIS carries with it a huge price tag. As such, would funding availability create performance uncertainties for DOE that need to be acknowledged? Specifically, will the funds to begin conversion be available in the amounts needed to initiate large-scale conversion efforts by the year 2009? Will annual funding be available in sufficient amounts to support conversion of the entire inventory within the expected year conversion period? Both questions point to temporal uncertainties that have a bearing on DOE's strategy for interim storage and maintenance of UF6 cylinders. Lesser amounts of funding would require longer - potentially much longer - storage, and a much greater emphasis on the corrosion protection and reconditioning of UF6 cylinders. As best we can discern from the PEIS and from discussions at the public hearings, DOE's strategy for UF6 cylinder corrosion control s to paint the cylinders with the worst corrosion. Perhaps inherent in this strategy is the idea that conversion efforts will start soon enough (e.g. 2009) and will conclude quickly enough (e.g. 2029) that a larger number of cylinders do not need reconditioning to prevent additional corrosion. Is this generally accurate as to DOE's underlying strategy? How many cylinders does DOE anticipate painting at the three sites? It is our understanding that corrosion coatings from paint will last about ten years. Other corrosion protection options, although slightly more costly initially, offer much longer corrosion protection. Specifically, thermal spray coatings provide 30+ years of corrosion control, and offer other significant advantage including dramatic cost savings potential when life cycle costing is factored into total cost considerations. Has DOE factored life cycle costing into its decision making regarding the choice of paint over other coating options? Why did DOE choose paint as a preferred coating choice? **61-1** **61-2**

QUESTION: As stated in the PEIS, DOE's preference is to convert the entire inventory of UF6 material into usable products. Given the large volume of UF6, it is unclear whether a correspondingly large market demand exists for products arising from the conversion effort. Has DOE conducted a thorough market analysis (applications, demand) for UF6 conversion products? If so, please describe the results of this analysis, and an estimate of the percentage of the inventory for which definable, cost-effective usages exist? **61-3**

QUESTION: Given that there appears to be a limited market for the converted uranium oxide **61-4**

COMMENTOR NO. 61: BARCLAY, MIKE (CONT'D.)
OAK RIDGE, TENNESSEE

(at least based on current information), what will happen to the remainder of the UF 6 stockpile? In terms of program management, it seems certain that the remainder of unconverted UF6 will become a waste (per U.S. EPA regulations), and therefore will likely be transferred to DOE's EM program. Given this scenario, is there an integration of efforts currently taking place between DOE programs to address this kind of future scenario? In addition, have there been any discussions between DOE programs as to how the waste would be formally transitioned into the EM program? Also, given the transition of UF6 as waste into the EM program, is there an existing remediation/cleanup fund established to manage UF6 as waste material? **61-4 (Con't.)**

QUESTION: The PEIS states that there is a very substantial cost associated with transferring the non-conforming cylinders to a central location for conversion. The actual reference case stated in the PEIS estimates this cost at more than $800 million. Of that $800 million, approx. $161 million is for what DOE terms "overcontainers." Given that reference case in the PEIS, we would appreciate responses to the following questions:

1.) Has DOE looked at other options to "re-engineer" the non-conforming cylinders for transport/shipping, so as to eliminate the need to employ overcontainers?
2.) Is there an actual U.S. Dept. of Transportation regulation/requirement to use overcontainers for the UF6 cylinders? If so, what is it? **61-5**
3.) Has the DOE held discussions with the U.S. DOT to discuss the requirements for shipping non-conforming cylinders? If so, is this what DOE based its $161 million overcontainer estimate on in the PEIS?
4.) Using the DOE reference case of $161 million for overcontainers, what is the true unit cost per cylinder for transporting the non-conforming cylinders to a central location for conversion?
5.) Does the term "overcontainers" mean the same as "overpacking", as in waste operations?

QUESTION: We understand at the Nevada Test Site (NTS) has recently changed its Waste Acceptance Criteria in the last year or so, so that it can receive more DOE waste for disposal. Given the scenario that DOE determines that UF6 conversion is not economically feasible or prudent, would anything prevent the DOE from sending the UF6 waste to the NTS for disposal, or even interim storage (retrievable storage) prior to DOE developing a better, more economically efficient method to convert theUF6? **61-5**

COMMENTOR NO. 62: ROSS, WAYNE A., & HAASS, MATHEW, P.E.
RICHLAND, WASHINGTON

COMMENTS ON THE DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR ALTERNATIVE STRATEGIES FOR THE LONG-TERM MANAGEMENT AND USE OF DEPLETED URANIUM HEXAFLUORIDE

BY
Wayne A. Ross, Staff Engineer
Pacific Northwest National Laboratory
And
Mathew Haass, P.E.
Coosafe Corporation, Richland, WA
04/23/98

The following comments represent those of the authors and are not official comments of Battelle PNNL or Coosafe. They result from our continuing interest in the adoption of a lower-cost, long-term management strategy for the depleted uranium hexafluoride (UF6).

We have previously provided information on the Molten Glass Reactor (MGR) Process for the single step immobilization of the uranium hexafluoride. Attached is a copy of the material previous provided in 1995 and 1996 on this process. This process has a factor of at least two lower cost than those included in the EIS. It should also have less environmental impacts. This option was not identified or considered in the EIS and is not within the bounds of the EIS for cost or for impacts. Therefore the EIS failed to consider a reasonable, technically feasible, cost effective and environmentally favorable alternative for the disposition of the depleted UF6. **62-1**

We recognize that additional work will be needed to verify the process, but as was stated in the Summary of the Cost Analysis Report Section 3.0 "Most technologies would require significant engineering development." Thus the MGR process with the previous developments for high-level and mixed waste vitrification and the development of the In-situ-Vitrification Process (ISV) would make the state of development superior to many of the other proposed alternatives. Thus, the lower state of development of the MGR process is not a sufficient reason for omitting it from consideration. **62-2**

The MGR process would be generally consistent with the intent of the preferred alternatives "use of the material." The MGR process would place the uranium in a high concentration in a vitreous state near the earth's surface, thus providing the opportunity to retrieve and reprocess the material as a very high grade ore, if in the future there is a need for depleted uranium. At the same time, the uranium has very low availability to the environment, as the vitreous waste form provides very good containment of the uranium. **62-3**

The "disposition of other alternatives" in the engineering analysis documents (section 4.5) stated "Another possible subaption is vitrification, in which depleted uranium oxide would be enclosed in glass. The basic technology is developed (for disposal of high-level radioactive waste), but other types of waste preparation are generally preferred for depleted uranium. Vitrified waste would require more space for disposal. In addition, a vitrification facility would be more complicated and costly to build and operate than a cementing facility." These statements to dismiss the alternative, while possibly applicable to a stand alone vitrification processing facility that would incorporate the waste into glass in canisters for disposal, are not applicable to the MGR Process and therefore the MGR process does not qualify for exclusion based on it. The MGR would have lower disposal area requirements and lower capital and operating costs that any of the proposed facilities. **62-4**

We are very interesting in developing additional information about the MGR Process. If you would like additional information please contact us.

The following are additional comments from our review of the document:

1. There does not appear to be a strong basis for the preferred option. All alternatives have similar impacts and costs. **62-5**

2. The PEIS Summary document should contain a discussion of the various life cycle cost of the alternatives. **62-6**

COMMENTOR NO. 62: ROSS, WAYNE A., & HAASS, MATHEW, P.E. (CONT'D.) RICHLAND, WASHINGTON

3. The use of discounted cash flow, while technically justifiable, obscures the actual costs for the various processes. I have not seen many DOE projects where the costs have decreased with time. They nearly always increased. Discounting at a rate of 7% makes major operating costs in the out years very small and meaningless. A constant dollar basis is more meaningful, but probably still optimistic. 62-7

4. The projection that all of the materials will be used seems highly speculative. I did not identify in the draft how all the uranium would be used. An accounting of the use of the materials should be included in the final EIS. The accounting could identify future uses currently unidentified. Some order of magnitude calculations give the following results. Page H-10 indicates that 933 casks would be produced for 20 years for a total of 18,660 casks. I don't think there is sufficient uranium to produce that many casks based on other information. The current forecast (DOE/RW-0006 Rev 12, page 2-8) indicates that there will be less than 90,000 MTU of commercial spent fuel. If one uses the Multiple Purpose Cask (MPC) as the model cask, then each cask will hold 21 MTU. Thus if all the spent fuel was to be shipped in MPC, about 4280 shipments is all that would be needed. It seems unrealistic however, that all of the fuel would be shipped to the repository in single use casks. It would be far more economical for reactor operators to use reusable casks that can be use for 100's of shipments. Thus the use of most of the inventory for casks seems unrealistic and the preferred alternatives basis that all materials can be used is high speculative. Your position would be greatly strengthen if you had some statements from DOE-RW that they were planning on using the uranium for this purpose. With respect to the Hanford SNF in K-Basins there has been serious concerns expressed about the presence of uranium metal in the repository. Further, we anticipate that the use of uranium as counter weights would not be highly regarded by industry, when they found the needs for radiation monitoring and inventory control were necessary. This leads us to the conclusion that a significant fraction of the materials will need to be processed and disposed. The MGR being a modular process could accomplish this very effectively and could be implemented in a relatively short period of time. 62-8

5. It was interesting to note that one of the major hazards identified was the shipment of HF. The MGR process converts the fluoride to calcium fluoride and dissolves it in the glass structure thus eliminating the HF hazard. It also means that there is only one transportation operation in the MGR process further reducing transportation impacts. 62-9

6. The conic truncated form of the final waste form requires less land space that other options since all of the uranium could be disposed in an area about 1200 ft by 1200 ft (33 acres). Note this is less than the disturbed area for one cask manufacturing facility (30 acres). 62-10

COMMENTOR NO. 62: ROSS, WAYNE A., & HAASS, MATHEW, P.E. (CONT'D.) RICHLAND, WASHINGTON

Attachment

TREATMENT AND DISPOSAL OF UF_6 BY A MOLTEN GLASS REACTOR

Wayne Ross, John Tixier, and Xiangdon Feng
Pacific Northwest Laboratory[1]

SUMMARY

An economical method for the treatment and disposal of uranium hexafluoride (UF_6) has been conceived and is described in this proposal. The method would react the UF_6 within a large molten glass reactor (MGR), which would leave the uranium in moderate concentration in a highly stable glass form at a disposal site. The large processing capability, minimal need for processing chemicals, and low operational labor should make the process very cost-effective. Order-of-magnitude estimates indicate that it will cost less than one-half of previous estimates which only included costs to convert the UF_6 to UO_2 without considering disposal costs. The process could be implemented in phases using the mobile equipment so large capital expenditures for treatment facilities are not needed. This enables processing of the most hazardous fraction of the current inventory in the near term, in concert with recent recommendations of the Defense Nuclear Facilities Safety Board. The needs of the associated development program are identified.

BACKGROUND

Uranium hexafluoride has been accumulating for 40 years at the nation's enrichment facilities. The national inventory is now of the order of 500,000,000 kilograms, with the largest inventories at Paducah and Portsmouth and a smaller inventory at Oak Ridge. The Defense Nuclear Facilities Safety Board has recently reviewed the situation and found increasing hazards for the continued storage of the tails as uranium hexafluoride and has recommended that DOE take several actions. Its recommendations include: 1) action to protect against the dispersal of large amounts of uranium to soil and groundwater in years to come, 2) an early start to remedial action should be planned and then instituted, and 3) a study be instituted to determine whether a more suitable chemical form should be selected for long-term storage of the depleted uranium. In doing this, the Board also recognized that it would be a massive problem with extraordinary financial costs.

A 1991 study done by Oak Ridge on just the conversion of the material to UO_2 estimated that the cost would be about $2.3-3.1 billion. More recently, in a press release[2], M+4 Technologies estimated that the worldwide market for treatment of uranium hexafluoride tails would be about $6-10 billion. Thus, it is apparent that the costs for treatment and disposal of these materials could be a multi-billion dollar activity and opportunities to significantly reduce those costs should be vigorously pursued.

[1] Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76RLO-1830.

COMMENTOR NO. 63: CRONIN, BILL & HARMON, MELINDA CARBONDALE, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 63-1

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 63-2

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. 62-3

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. 62-4

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commentors to decide where the best place for conversion would be and the best methods. 62-5

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 62-6

Thank you for considering these comments.

Sincerely,

Bill Cronin
Melinda Harmon
95 Lonesome Rd
Carbondale IL 62901

COMMENTOR NO. 64: MURRAY, ALEXANDER P. GAITHERSBURG, MARYLAND

24305 Clematis Drive,
Gaithersburg, MD 20882,
April 21, 1998.

Charles E. Bradley, Jr.,
Office of Facilities (NE-40),
Office of Nuclear Energy, Science, and Technology,
U.S. Department of Energy,
19901 Germantown Road,
Germantown, MD 20874.

RE: Depleted Uranium PEIS:
DOE/EIS-0269, "DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR ALTERNATIVE STRATEGIES FOR THE LONG-TERM MANAGEMENT AND USE OF DEPLETED URANIUM HEXAFLUORIDE " (PEIS), dated December, 1997.

and its supporting documents:
UCRL-AR-124080, "DEPLETED URANIUM MANAGEMENT PROGRAM: THE ENGINEERING ANALYSIS REPORT FOR THE LONG-TERM MANAGEMENT OF DEPLETED URANIUM HEXAFLUORIDE, Rev. 2, Volumes 1 and 2, (EAR), dated May, 1997.

UCRL-AR-127650, "COST ANALYSIS REPORT FOR THE LONG-TERM MANAGEMENT OF DEPLETED URANIUM HEXAFLUORIDE," (CAR), dated May, 1997.

Dear Mr. Bradley,

Thank-you for the opportunity to review and comment on the Depleted Uranium Programmatic Environmental Impact Statement (DU PEIS). I find it to be interesting reading, having worked in and out of uranium-related programs for two decades. I find that the PEIS has over simplified and, in some cases, over-looked important facets of DU that have important implications for its management, and I feel compelled to comment on the subject for the record. My comments are attached. Summarizing, the comments are:

- Disposal and waste management are significant issues not well addressed in the PEIS. It is highly probable that a significant fraction of the DU - perhaps all of it - will end up as a radioactive waste, either as itself or in a reuse "product." It is not until well into the PEIS (Chapter 5) that the reader is informed that near surface disposal will significantly exceed 10 CFR Part 61 limits (for NRC/commercial facilities) and DOE limits for public doses. In other words, codified regulations will be broken. Also, mined cavity disposal, which may be a solution for DU, does not currently exist for LLW, and there are no current plans for mined cavity disposal of LLW in the U.S. 64-1

- Market demand does not and is not likely to exist for the reuse of DU, and the PEIS does not identify routes to build such a market. Currently, cost and liability are almost insurmountable hurdles for the "reuse" of DU, as its competitor for the (most likely) reuse scenarios (spent fuel shielding) is concrete. The use of DU shielding requires an integrated approach to minimize consumer, utility, and DOE costs, and DOE acceptance of DU liability (basically disposal). This implies that even for reuse scenarios, the DU form must be compatible with disposal. Myself and other authors have written on this extensively. 64-2

- No significant uses of DU currently exist in shielding applications. No licensed spent fuel casks use DU shielding, and there are no current plans or pending applications for spent fuel casks 64-3

using DU. DOE-RW has identified DU as a cost and machining disadvantage for spent fuel casks. The PEIS needs to openly state these points, and identify means to resolve them. Again, myself and others have written on this extensively.

- The analyses and alternatives are uneven and neither analyzed at comparable levels nor taken to equivalent endpoints. For example, all of the uranium oxides will perform differently. The gelation-produced uranium dioxide is equivalent to nuclear fuel in terms of high density and low porosity, and will have improved leach resistance, heat transfer, and sizing as compared to the other oxides (including the lower density uranium dioxide) - in short, it's a better material. Significant items have been left out of the analyses (e.g., disposition of shielding, rollup of disposal impacts, and protective action distance impacts on site sizes). There is no reconciliation between known technologies/impacts and those in the report - for example, the proposed uranium dioxide pellet furnaces used for analysis in the PEIS correspond to 100-200 teU/yr capacity, not the 7,000 teU/yr capacity claimed by the analysis. The same pellet technology also currently requires about 1 FTE/teU/yr, not the 0.014 FTE/teU/yr used in the PEIS. The conversion reactors (low number and large size) appear to be very optimistic. The gelation facility includes two plants (one to U3O8, and one to UO2), which is not consistent with the technology and explains why its impacts are slightly higher. The PEIS should recognize these shortcomings, limitations, and differences, and be more equivalent in its analyses. **64-4**

- The limitations of the technologies should be recognized in the PEIS, and means identified to address them. Only the French conversion to U3O8 technology has been used on a scale approaching that needed for the PEIS, and it needed compactors to increase the density to circa 3 g/cc. To state that current pelletization technology is established for the throughputs and equipment used in the PEIS analyses is incorrect - the gelation route with VTF's has actually achieved higher equipment rates per unit floor area. **64-5**

- Recent NRC positions in the area are not stated in the EIS, but are alluded to in the supporting documentation. The NRC (in a response to the FR notice and in a separate EIS) has clearly stated concerns about the lack of a use for the DU, the likely probability that a significant amount (if not all) of the DU will become waste, and the high probability that DU will require "deep disposal" because of unacceptably high MEI doserates from near surface disposal. Such significant conclusions by a regulator should be included and discussed in the PEIS. **64-6**

- DU metal seems to receive a favorable treatment in the PEIS with impacts significantly below historical experience. This appears because some of the release fractions and impacts are underestimated significantly (beyond technological optimism). This should be corrected in the PEIS. **64-7**

- Gelation technology appears to receive a less than favorable treatment in the PEIS, using TCE as a solvent instead of oil, tray instead of tube furnaces, and including a U3O8 production step, followed by nitric acid dissolution and UO2 production (the Abramambone two plants in one misrepresentation). While in the final analysis the difference is small, it is incorrect, and the PEIS should correct the misrepresentation. There are recent published articles (which you have copies of) that give a detailed description of gelation technology as applied to DU, and these should be used as references in the PEIS. **64-8**

- Costs are not brought forward in the PEIS. Costs from the CAR and from published articles should be discussed and reconciled in the PEIS, as cost is likely to be a significant determinant in the DU disposition option selected. **64-9**

- DUSCOBS and PYROC shielding materials are not discussed in the PEIS. DOE appears to have an interest in these materials, and they are likely to have better properties for disposal than either DU metal or uranium oxide in concrete. As such, they should be mentioned and discussed. **64-10**

I hope you find these comments useful and incorporate them into the PEIS. If you have trouble finding any of the publically available articles, please let me know.

Sincerely Yours,
Alex Murray
Alexander P. Murray,
Private Consultant.

Attachment.

COMMENTOR NO. 64: MURRAY, ALEXANDER P. (CONT'D.)
GAITHERSBURG, MARYLAND

Comments:

a. Waste. In Section S.4.8 on page S-40, waste management impacts are discussed. DOE should consider briefly highlighting the potential uranium content of the secondary streams along with a brief assessment of acceptability for either reuse/nonradioactive disposal or disposal as radioactive waste. DOE should expand the discussion in the last paragraph about uranium disposal as LLW. The DOE may wish to cite regulatory agency positions on the wastes, including the NRC position letter (from Beneroi) sent to DOE as part of this EIS process and the NRC LES EIS analysis. For example, the NRC documents provide analyses supporting DU disposal as a LLW, but note that its disposal could require a mine or another means of "deep" (Non near-surface") disposal. Currently, no "deep" disposal sites exist, and all current LLW disposal sites (existing and planned) use near-surface facilities. Thus, it would seem that disposal of DU may have significant impacts and regulatory requirements beyond those listed in the PEIS. DOE should consider adding the cumulative impacts from DU oxide disposal to Section S.4.13 "Cumulative Impacts." — *64-11*

- Leach Rates - Page 2-22 briefly mentions leach rates and waste forms, and states that grouted wastes are representative of immobilized waste forms with low leach rates, with the implication that grouting is also representative of vitrification. DOE should clarify this text, as grouting may be representative for some parameters (e.g., facility size) but not representative in others (e.g., energy usage, emissions). Also, while grouting should provide for somewhat lower leach rates as compared to the ungrouted material, vitrification would be expected to provide for much lower leach rates than grouting (typically, 5-6 orders of magnitude less), and this may be an issue for some disposal options. Consequently, these items should be discussed. — *64-12*
- Empty Cylinders - The impacts from disposition of the empty cylinders are not included, although potential options are listed (page 2-23). It would seem reasonable to provide a brief discussion on these options and include impacts from cylinder disposition in the EIS. — *64-13*
- Water Impacts - The summary table of impacts (Table 2-2) and the supporting text for the water and soil section (page 2-50) note that the groundwater uranium concentrations will exceed drinking water guidelines. It is recommended that the expected concentrations are also expressed in terms of individual radiation doses. — *64-14*
- Waste - Pages 2-52 et seq present a summary of the waste management impacts from the impacts. Comparisons are primarily with the DOE waste management system, although these facilities could also be commercially operated under NRC or State regulations. Consequently, DOE should consider adding a comparison to commercial LLW generation rates and categorization per 10 CFR Part 61. The section should also include estimated uranium levels for the magnesium fluoride waste (from DU metal production) and discuss the aspects of DU disposal, including the potential need for either a dedicated or a deep disposal facility. — *64-15*
- Dilution of Effluents - On page 5-51 the text indicates effluent levels exceeding EPA guidelines for uranium, but notes that the concentration would be much lower and below the guideline after dilution in nearby surface water. This should be clarified, and potential dose consequences of these effluents presented. — *64-16*
- Metal Waste - Page 5-76 of the PEIS presents waste management for the metal cask manufacturing route. Waste management appears to have overlooked secondary — *64-17*

wastes related to manufacturing, which are unique to uranium metal. For example, induction furnaces for uranium metal are usually lined with graphite, which requires periodic removal and replacement (sometimes as frequently as every ten charges or so). Also, while the proposed approach appears to use primarily direct casting, some uranium metal machining operations may be required, and, historically, these generate significant wastes containing partially oxidized uranium metal. The PEIS should include these potential impacts that primarily affect only the metal route. — *64-17*

Doses from DU Disposal: Section 5.6 (pages 5-78 et seq) and Appendix I present the impacts from disposal of the DU, for both the operational phase and the post-closure period. The radiological impacts from the accidents seem unexpectedly high; for example, the analysis shows public doses of up to 1.1 rem and noninvolved worker doses as high as 140 rem, apparently due to earthquake initiated events, without explanation. The routine impacts also seem high for the postclosure phase and appear to follow the radiological order: mine impacts>vault impacts>trench impacts. Calculations appear to use an infiltration area effect and do not account for chemical form, solubility, and kinetic effects. Table I.31 contains zero values for the dry site doses for all three disposal approaches, and no collective dose estimates are included. These points are non-obvious and it is recommended that they are explained in more detail. — *64-18*

b. Unspecified Applications: On page S-11 and later in the summary (pages S-42 et seq), DOE identifies the preferred alternative strategy as use of 100% of the DU hexafluoride inventory, as either uranium oxide, uranium metal, or a combination of both, without specifying the use of the material and the potential impacts (positive and negative) from such DU use. The PEIS also does not provide information indicating a market demand capable of consuming 100% of the DU inventory, but the conversion of the DU hexafluoride would occur as "... uses for these [uranium oxide and metal] products become available" (page S-43). Without applications for significant quantities of DU oxides and metals, these DU materials may ultimately become a waste material. The discussion does not discuss regulatory and licensing requirements for these DU applications. It is recommended that (1) DOE identifies the likely market consumption of DU oxides and metals over the timeframe of the EIS, (2) DOE estimates the impacts from these potential DU uses, (3) DOE considers the potential of the converted DU materials becoming a waste, thus, requiring conversion into forms compatible with disposal, and (4) DOE evaluates the likely regulatory and licensing aspects. — *64-19*

c. DU as Cask Shielding: DOE appears to be relying upon the potential future use of DU as SNF cask shielding for a large consumption of its DU inventory (see page S-43 and 1-8, and Volume 2 of the EAR, which analyzes a DU cask manufacturing facility as the only use of DU). If this is indeed the case, DOE may wish to describe and discuss it in a little more detail in the PEIS summary and in Section 2.5 (pages 2-54 et seq), and it should be noted that no currently licensed or planned SNF cask uses DU. — *64-20*

d. Fate of DU Shielding: As currently written, the PEIS does not include a discussion of the eventual fate and potential impacts of the DU SNF cask after its use (e.g., see pages 2-14 and — *64-21*

2-15). Pages 5-55 and 5-65 also mention that DU cask disposition after use is excluded, and page 5-65 notes that disposal would amount to an additional 180,000 cubic meters (6.4 million cubic feet) of waste requiring disposal, with a (calculated) average specific gravity of 2.2. This does not seem inconsequential, particularly if a dedicated disposal facility is required and the impacts are estimated to be similar to disposal (e.g., page 5-32 et seq; exceeding 10 CFR Part 61.41 dose limits). Also, there are statements in the document that question if significant quantities of DU metal are suitable for disposal (e.g., last paragraph on page 2-21). Inclusion of a discussion about the disposition of the DU cask after use, and potential impacts, is recommended.

64-21

e. "Uranium Oxides." The PEIS generally combines all uranium oxide compounds under the title "uranium oxides" for consideration in the alternatives and strategies (see page S-6 et seq). This seems too all inclusive, as uranium oxides have significantly different chemical and physical properties that produce a wide range of ES&H impacts. For example, uranium octoxide is a high porosity powder, with a low density and a significant respirable fraction. Uranium dioxide powder is also porous, and can spontaneously ignite in air. On the other hand, sintered uranium dioxide has the highest density of the uranium oxides and is essentially pore free. The presence (or absence) of pores also has significant implications for the potential disposal of the material, either as a management option or as an end-use item. a denser, essentially pore free material would appear to be advantageous. Thus, a uranium dioxide material sintered to a lower density (say, 4-5 g/cc) would not be expected to perform as well in a disposal environment as a uranium dioxide sintered to a high density (say, 9-10 g/cc). It is recommended that more qualifiers are given to the term "uranium oxides," perhaps including low and high density as the principal discriminators.

64-22

f. Equivalent Bases and Life-Cycle Effects. The text does not seem to incorporate a life-cycle approach to the different management alternatives and compare them on an equivalent basis (see pages S-7 et seq). For example, recycle (if a market exists) and disposal would seem to be the logical endpoints for all of the alternative branches shown in Figure S-2, and may influence the impacts and potential alternative(s) selected. However, disposal is only shown for the disposal as oxide alternative. It would seem that the "manufacture and use" alternatives will ultimately result in impacts from the DU component; for example, the material (perhaps as itself or in a product) could be shipped to a disposal facility. Such potential impacts do not appear to be included in the analysis, and may even preclude some options or require additional conversion and conditioning; for example, without supporting analyses, it is unlikely that significant quantities of DU metal can meet the regulatory requirements of disposal sites. Thus, pursuit of use as a metal option may require another conversion facility (with its impacts) to convert the DU metal into a form compatible with disposal. Other examples of the need for equivalent bases include the oxide conversion routes, due to fundamental differences in the uranium oxide forms. One of the specific oxide conversion routes (gelation) appears to be manufacturing uranium dioxide with properties comparable to high density nuclear fuel which would be anticipated to have improved stability and related properties as compared to the other oxides. The gelation route also appears to include two plants - one for uranium octoxide production and one for dissolution/uranium dioxide production - which appears inconsistent with literature reports on the process (i.e., only one plant; no production of uranium octoxide) and

64-23

COMMENTOR NO. 64: MURRAY, ALEXANDER P. (CONT'D.)
GAITHERSBURG, MARYLAND

the other oxide conversion routes. Long-term storage also appears to lack the realization of *ultimate disposal in the future*. The PEIS should consider and analyze the alternatives on an equivalent basis with the same/comparable endpoints and include life-cycle effects.

g. Results: Pages S-15 et seq summarize and compare the results of the impacts for the alternative management strategies. Some of these results seem inconsistent and are not intuitively obvious. For example, it is not clear why the use as uranium oxide results in higher impacts than the use as uranium metal (see pages S-20 and S-49) - the opposite would be anticipated. Land use impacts seem uneven; conversion and metal use plants would be anticipated to have larger land use because of facility size and require potentially larger setbacks for potential accident mitigation from uranium releases (see the NRC LES EIS). It is not clear if the disposal analyses include all of the potential long-term impacts and doses from uranium leaching from the disposal area. It is recommended that DOE consider greater consistency in the results and clarify the summary.

64-24

h. Ranking: The summary of the results (page S-15 et seq) does not include a ranking of alternatives, and implies that all of the alternatives are acceptable. DOE may wish to rank or identify those alternative(s) that appear more favorable than others based upon the analysis. DOE may also want to consider if any of the proposed alternatives are precluded by the analysis; for example, page 5-84 mentions individual (*groundwater ingestion*) doses of 100 mrem/yr from disposal, thus exceeding 10 CFR Part 61 standards of 25 mrem/yr. Page 5-84 also mentions a scenario for a hypothetical future resident living on the disposal site and receiving radiation doses as high as 10 rem/yr. The PEIS summary also mentions an NOV on storage at the Portsmouth facility, which might imply that a no-action alternative is not a viable option for this site.

64-25

i. Technology and Equipment Development: The PEIS encompasses numerous technologies that are at different stages of development, in terms of process, understanding, equipment, (potential) impacts and uncertainties. For example, of the conversion, application, and disposal impacts discussed within the summary, none are practiced on any scale domestically, and only conversion to the octaoxide is practiced on a large scale internationally, producing a *low density product*. Thus, there is only one direct analogy. DOE should consider including a technology discussion, with status and assessment, perhaps with either a time schedule or probability of success, for some of these technologies. For example, it seems like a significant extension of existing uranium dioxide sintering technology to take pellets from 100 te(U)/yr/line to 7,000 te(U)/yr/line. From the uranium dioxide technology perspective, microspheres (e.g., from gelation) may be the more mature technology because of the (potential) use of tube furnaces and pilot plant tests with equipment processing rates an order of magnitude larger. Similarly, a uranium dioxide/concrete cask approach appears to be a significantly easier technology to understand and scale than casting a 40 te(U) metal shield.

64-26

j. Existing Facilities and Experience: There are obvious analogies with existing, commercial fuel cycle facilities, which process uranium hexafluoride into uranium dioxide (for nuclear fuel) and

COMMENTOR NO. 64: MURRAY, ALEXANDER P. (CONT'D.)
GAITHERSBURG, MARYLAND

8

(to a lesser extent) uranium metal. These facilities are already licensed by the appropriate regulatory agencies. The PEIS does not mention these facilities, either as a source of experience or as a source of processing capacity, particularly during the development of uses for the DU materials and as a means for surge capacity. The PEIS also does not appear to draw upon the operating experience of these facilities, including waste generation and uranium content of byproducts. DOE may wish to include the experience of operating commercial facilities and comment upon their potential use (or non-use) during the development of applications and uses for the DU. 64-27

k. Regulatory Basis for Future Facilities: The PEIS indicates several facilities may be involved for the management alternatives, and may involve DOE, commercial, and/or both types of facilities. DOE should briefly discuss the regulatory bases for these facilities, potential differences (if any), and any impacts, and any effects from facilities transitioning from DOE to the NRC regulatory environment. 64-28

l. Economics: The PEIS mentions a separate Cost Analysis Report (CAR) as providing input to the PEIS (e.g., page 1-7). However, program costs do not appear to be included in the analyses. DOE should consider including the costs and other economic impacts in the PEIS, perhaps as part of the summary (e.g., in Table S-2). 64-29

m. DU Quantities: The insert on page S-2 identifies some 46,422 DU cylinders distributed between the three sites. While the total quantity is listed in the main text of the report, it would be helpful to have the approximate masses (as either MTU or MTUF6) for the three sites listed in the summary as well. The insert on page S-2 also notes that an additional 8,000 cylinders have been produced by USEC. It is suggested that this number is also divided between the sites and expressed in mass quantities. It is also recommended that a brief discussion about the USEC DU is included, perhaps as part of the first paragraph on page S-4. While the EIS excludes the USEC DU from its analysis, it also implies that there is a reasonable probability of it becoming DOE's responsibility. Consequently, DOE may want to consider that possibility in its impact analysis. 64-30

n. Other DU Uses: Page 2-21 mentions non-shield use of DU. No mention is made of quantities or relative percentages of the DU inventory. Also, it is not self-explanatory that DU cask manufacturing and uses bound all of the potential uses; for example, metal uses would appear to require a significant amount of alloying and/or machining, and involve handling and disposal concerns. DOE may wish to include a longer discussion and a better explanation. 64-31

o. Other Sites: Pages 3-58 et seq present information on the generic sites for wet and dry locations, and mention that the site data for each are derived from actual wet and dry sites. It is suggested that the actual sites which provide the basis for the generic locations are listed. 64-32

p. TimeFrame: Page 4-2 lists a 41 year time period for the EIS (through the year 2039), and

COMMENTOR NO. 64: MURRAY, ALEXANDER P. (CONT'D.)
GAITHERSBURG, MARYLAND

9

indicates activities beyond 2039 would be subject to appropriate NEPA reviews and decisions in the future. This appears to truncate the analyses for some of the alternatives which might influence the selection of the preferred option; for example, impacts from wastes in a disposal cell are unlikely to occur by 2039, major cylinder/container replacements may be required for the storage option in the 10-20 years after 2039, significant applications may not have developed etc. DOE may wish to consider a time period consistent with the logical conclusion of the options or their "life-cycle," which may require a timeframe beyond 2039. 64-33

q. Failure Rates: Pages 5-3 and 5-19 discuss the estimated cylinder failure rates for the No Action and UF6 Storage alternative. These appear to use the opposite ends of the failure rate range - No Action uses the lowest failure rate, while Storage uses the highest failure rate - without explanation. Also, the existing cylinders may not have adequate wall thicknesses under either alternative due to corrosion over the years (see Appendix E), and the DU may have to be transferred to new cylinders within the timeframe covered by the EIS. DOE should consider presenting a discussion on these items in the text. Also, on page 5-40 Table 5.4 lists tank rupture accidents as "incredible" events. Usually, these are assigned a value corresponding to the "extremely unlikely" frequency bin. A brief discussion is recommended. 64-34

r. Site Sizes: Page 3-56 identifies land use requirements for the facilities. These seem small, particularly when compared to other proposed facilities performing similar operations (e.g., the LES EIS analyzes a generic conversion facility with a site area of 1,000 acres). The text also does not indicate if any major setbacks, protective action distances (PAD's), or planning zones are likely to be needed around the facility because of the handling of large quantities of DU, the hexafluoride, and/or the metal (including melting operations). DOE should consider a discussion in the text on these subject matters. 64-35

s. Accident Consequences: Pages 5-55 et seq discuss the use and impacts of uranium dioxide as shielding, and pages 5-66 et seq discuss the use and impacts of uranium metal as shielding. Some of the values imply non-intuitively obvious lower impacts from a metal route as compared to the oxide route; it is recommended that these are discussed and explained in more detail. For example, the text on page 5-71 estimates the highest consequences from an accident with the metal route as 15 mrem (from a fire involving three cylinders, an energetic accident with reactive materials), as compared to 270 mrem (from an earthquake during uranium dioxide storage, a low energy event with non-reactive materials) - there is no explanation for the difference. Also, the supporting information in Appendix H shows similar inconsistencies; the unlikely accidents for the oxide (Table H-5, page H-13) are significantly higher than the corresponding accidents for the metal (page H-17). Page H-17 also contains apparent inconsistencies and incongruences; the mishandling/dropping of solid DU metal accident releases a greater quantity of uranium than the molten uranium accidents. Upon further review the source of these apparent anomalies goes back to Section 6.11 of the EAR, where different material at risk and release fractions were used. All of the metal cases examined used the least bounding values, and values inappropriately low for the phenomena being modelled per the DOE accident handbook. These errors should be corrected. 64-36

UNIVERSITY OF MARYLAND
BALTIMORE

UNIVERSITY PROGRAM IN TOXICOLOGY

April 21, 1998

Mr. Charles E. Bradley, Jr.
Office of Facilities (NE-40)
Office Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874

Dear Mr. Bradley:

Enclosed are comments on the Department of Energy's "Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluorides (DOE/EIS-0269). Thank you for the opportunity to comment on this PEIS. We would appreciate being kept informed as this work progresses. If you have any questions regarding our comments, please feel free to contact either Mr. Ted Henry or myself at 410-706-8196.

Sincerely,

Katherine S. Squibb, PhD
Associate Professor

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Comments

on

The Department of Energy's Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexaflouride

By:
Theodore J. Henry, MS
Katherine S. Squibb, Ph.D.

CHAPP Center
Program in Toxicology
University of Maryland, Baltimore
April 20, 1998

Comments on the Department of Energy's
Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride

The Department of Energy's (DOE) Draft Programmatic Environmental Impact Statement (D-PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DU-HF) is lacking with respect to it's assessment of the long-term impacts of converting and using DU-HF. A review of the summary clearly depicts DOE's strong interest in utilizing this stockpile, but the supporting evidence does not adequately address the legitimate environmental concerns associated with DU use - concerns which are based on a growing body of scientific data. While the summary presents a clear picture of DOE's commitment to provide "support for the development of applications for depleted uranium products," it does not, and with our current knowledge probably cannot, adequately assess the current extent of environmental impacts at the three DU-HF sites. In turn, it cannot assess what impacts to the nearby communities and the local environment will result from future releases of the evaluated alternatives. Without better scientific knowledge of the toxicity of DU, it is impossible to provide even a guess of the potential impacts, which makes the risk projections provided within this summary of little value. As a result, we support the long-term storage of this material, with improved containment and monitoring, until we are better equipped to assess the toxicity and safe uses of the DU stockpile. *65-1*

Up front, it should be noted that our limited resources only allowed us to review the summary and not the entire PEIS. Thus, we acknowledge that some discussion within the body of the PEIS itself may address a few of the concerns raised in the comments that follow. We believe that it is acceptable for us to comment based solely on the summary, as this is the main document likely to be reviewed by the commenting public. We hope that these comments are still useful for DOE and we request that these comments be considered with the utmost diligence.

Current Storage

Significant concerns exist with current storage conditions based on the fact that cylinders now show evidence of corrosion and that at least seven cylinders have developed breaches. While the management plan in place is to "continue safe storage," it seems to be in question whether safe storage is currently taking place. This is supported by community concerns that have been expressed from around the sites, and the Notice of Violation that has been issued by the Ohio Environmental Protection Agency. We assume that the Defense Nuclear Facilities Safety Board has suggested improving both inspection time tables and storage approaches. *65-2*

While the summary explains that a dense plug is formed by the reaction of moist air with the exposed DU-HF, the summary does not address if any studies have been made to assess the adequacy of such a plug. Certainly, this plug may not be air tight, allowing additional moisture to enter the container thereby acting as a continued source of HF gas. It would seem prudent for DOE to develop a better storage system regardless of the decision to use or store these cylinders. Either way, many *65-3*

COMMENTOR NO. 65: UNIVERSITY OF MARYLAND (CONT'D.)
BALTIMORE, MARYLAND

of these containers will still house DU-HF for years or decades to come, and will require improved storage capabilities.

Assessment of Risks

While the summary lists various technical assessments that have been or are being conducted, none of these studies nor this PEIS really assess the potential environmental impacts from the current production and storage operations or the proposed alternatives. This flaw has been seen in PEISs produced for other purposes by DoD, where the PEIS selects a direction to focus development dollars, but does not consider the specific technologies that may be employed and does not consider the site-specific characteristics. In the end, such factors will strongly influence the extent of contamination and impacts from the general approach (i.e. use as oxide) selected. Once the process reaches the point where these specific factors are assessed, there will be serious pressures to make the approach work given the time and financial investments made. This limits the adequacy of the site-specific assessments when they are made. In turn, we strongly suggest that DOE take a serious look at the potential risks from converting DU-HF and its use an oxide or metal before one selects a programmatic alternative. Factors that should be considered in this evaluation are the migrating potential of DU that will be released, the cumulative impacts of such releases in conjunction with pre-existing contamination, and the potential impacts on costs of the selected approach when the toxicity of such compounds are elucidated. *65-4*

Affected Environment

The summary sorely lacks a description of the environmental sampling that has been conducted at each site. In the case of Paducah, Kentucky, it is mentioned that the effluent discharges are regulated under Kentucky Pollutant Discharge Elimination System, but there is no discussion of whether radiological parameters and/or uranium metal are monitored in this system. While the specifics of such a monitoring program may be beyond the scope of this summary, whether or not environmental sampling from Big Bayou and Little Bayou Creeks has been considered in selecting the proposed alternative is relevant and critical. The extent of contamination in surface water and sediments is a significant issue, since future activity will add to the levels already present even if future emissions do not exceed the governing release limits of the time. There is no discussion of such sampling, and there clearly needs to be in order to determine the current baseline risk level at the site, both for human health and ecological receptors. The potential exposure pathways (see below) and current ambient levels are important for projecting future exposure scenarios. *65-5*

As with the Paducah site, there is no mention of the current extent of contamination in local media at the Portsmouth site in Ohio. Assuming significant contamination is already present as suggested by the groundwater data that are referenced, would it affect the feasibility of the selected alternative if it were deemed necessary to conduct such operations at other sites? This question requires serious consideration, particularly since the conversion technology to be used to produce the oxide or metal is not assessed in the D-PEIS. If contamination is approaching environmental limits, then even the expected discharges may not be acceptable. As with any Brownfields site, the investor *65-6*

(DOE in this case) certainly should want to know whether they will be able to conduct operations at the site or nearby (as suggested on S-14), requiring adequate site characterization. From the description of environmental settings, it is unclear whether the environmental data on the natural environment are limited to climatic conditions or if the site specific environmental data includes current contamination levels.

65-6 (Con't.)

Exposure Pathway Assessment

In Table S-2, the chemical exposure of concern for both the non-involved worker and the general public is listed as falling below a hazard index of 1. Did the calculation of such risks include all the pertinent exposure pathways which may apply, including fish/game consumption, drinking water, inhalation, etc? It would be inappropriate to consider just the workplace exposure for the non-involved worker, if that person lived nearby and fished in the local stream. In predicting future impacts or risks, one must consider the individual's total exposure. This has been a serious flaw within risk assessments at Superfund sites, and improving this approach is not unreasonable to request: given that 1) this is a "looking forward" assessment which allows us to be more protective since the contamination has not yet been produced, and 2) we are still unable to adequately assess other parameters, such as synergistic effects, which do reduce the conservativeness of the risk projections being made.

65-7

Toxicity of Uranium

Based on the limited research that has been completed on the toxicity of uranium metal, it seems quite premature to be selecting an alternative in this PEIS for the next 40 years. In light of the ignorance with which the Department of Defense exposed Gulf War soldiers to DU, DOE should strongly consider whether it wants to make the same short-sighted mistake. We have been intensively studying lead for decades and we are still learning more everyday about its toxicological effects and the low levels at which such effects are exerted. We are still trying to recover from the use of this metal in paint and gasoline, which is a direct result of our inability or disinterest in predicting environmental accumulation and the resulting impacts if the compound turned out to be toxic. As a society, we must not make the same mistake again by blindly pursuing commercial use of the DU-HF stock.

65-8

Given the extensive research currently underway regarding DU, it does not seem appropriate to be completing this PEIS at the present time. Research at the Armed Forces Radiobiology Research Institute suggests that DU may be more mutagenic than lead, and that this metal can reach the brain and fetuses of exposed animals. Additionally, work is currently being conducted on exposed Gulf War veterans at the VA Hospital in Baltimore, Maryland, which may provide valuable information on the distribution of DU within the body and possible impacts on specific organ systems in humans. It would seem logical to learn from our mistakes and select long-term storage until we are better able to assess potential human health impacts from its toxicity as well as its radiological emissions in localized lung tissue.

65-9

COMMENTOR NO. 65: UNIVERSITY OF MARYLAND (CONT'D.)
BALTIMORE, MARYLAND

Until the results of these various investigations are published and reviewed by the scientific community, we cannot know if the projections of adverse effects are accurate. The chemical toxicity of low level DU exposure does not seem to have been adequately considered. The monitoring of effects in soldiers is still in progress, so we question statements describing how "a few workers have been exposed to estimated amounts of uranium approximately three times the guideline levels used for assessing irreversible adverse effects, but none of these workers actually experienced such effects." The effects used to establish the guideline values do not include low level, chronic effects of DU just now being recognized.

65-9 (Con't.)

Release and Environmental Fate

Predicting the extent of release and long-term fate of the DU released during its conversion and subsequent use should be meticulously evaluated. On page S-42, the authors state the "potential uses that are capable of consuming a substantial fraction or all of the depleted uranium inventory are not yet fully developed, and it is entirely possible that the 100% use scenario may involve some of the material being converted to an oxide and used, with the remaining portion being converted to uranium metal and used." Without reviewing the specific industrial processes to be implemented in the conversion and use alternative, it is impossible to accurately assess how much DU would be released. This is a serious issue since other industrial sites have been closed down due to the excessive release and migration of DU. This quote also reveals that little is known about what commercial applications will exist for the converted material. Despite these unknowns, the PEIS clearly reflects an entrepreneurial eagerness by DOE to utilize the stock in this fashion. This assessment of the summary is further supported by a statement on the following page in which the authors indicate that "this preferred alternative allows flexibility in responding to changing market conditions and to the continued development of new uses for conversion products." We question whether this is appropriate, as the conversion process may be pushed forward without a clear plan and understanding of its eventual use. This, in turn, will evoke significant pressures to find a use for the oxide or metal and likely reduce the quality of the decision process used to determine acceptable use.

65-10

Ecological Impacts

The consideration of ecological impacts in the summary is limited. A full paragraph discusses the loss of habitat resulting from carrying out particular alternatives. However, no concrete information is provided regarding the chemical effects of elevated uranium concentrations on ecological receptors, although the potential for such effects is mentioned. While few data exist for specific ecological impacts, a study by Los Alamos on the long-term fate of DU found significant concentrations in various aquatic plant species as well as aquatic organisms such as tadpoles. Detritus, benthic diatoms and phytoplankton were predicted to contain the highest levels of DU in the environment, and the impacts of the conversion and use alternative on these important parameters of the food chain should be considered. In short, an adequate assessment of the data that do exist should be made, and critical data gaps should be pinpointed before we decide whether use of this stockpile is prudent.

65-11

COMMENTOR NO. 65: UNIVERSITY OF MARYLAND (CONT'D.)
BALTIMORE, MARYLAND

Miscellaneous Assessment Observations

Given the lack of discussion regarding the environmental assessments at the sites, a few observations are worth noting. For instance, radioactivity and/or uranium appear to have been found in groundwater at the Portsmouth and K-25 sites, but not at the Paducah site. As for the estimated maximum radiation dose to a member of the general public, the value presented for the Paducah site is 3 mrem/yr, but only 0.07 mrem/yr for the Portsmouth site. This is quite a difference for two similar sites which raises questions with regard to the adequacy of the assessment, or indicates that significant differences exist between the site estimations and/or quality of operations. Such observations within the summary suggest that DOE should take a closer look at the quality of the assessments conducted or the manner in which the assessment was presented in the summary. Even if it is the latter, this is a significant issue as many from the public who provide comments will only have the time or ability to review the summary. It is important for DOE to be as clear as possible and provide the public with the opportunity to constructively assess the PEIS without undue burden. *65-12*

COMMENTOR NO. 66: GRABER, JEAN & DICK
GOLCONDA, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. *66-1*

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. *66-2*

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. *66-3*

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. *66-4*

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commentors to decide where the best place for conversion would be and the best methods. *66-5*

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. *66-6*

Thank you for considering these comments.

Sincerely,

Jean & Dick Graber

COMMENTOR NO. 67: CONNOLLY, DENNIS
COBDEN, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 67-1

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 67-2

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. 67-3

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. 67-4

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commentors to decide where the best place for conversion would be and the best methods. 67-5

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 67-6

Thank you for considering these comments.

Sincerely,

Dennis Connolly
155 Baker Hill Rd.
Cobden, Illinois
62920 9316
4/13/98

COMMENTOR NO. 68: SHORT, DUANE
STONEFORT, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 68-1

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Thank you for considering these comments.

Sincerely,

Duane Short
Rt. 1 Box 208
Stonefort, IL
62987

COMMENTOR NO. 69: GANYARD, PATRICIA
POMONA, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

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Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 69-6

Thank you for considering these comments.

Sincerely,

Patricia C. Ganyard

COMMENTOR NO. 70: KNOPP, LISA
CARBONDALE, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

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These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 70-2

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Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 70-6

Thank you for considering these comments.

Sincerely,

Lisa Knopp

Lisa Knopp
500 W. Sycamore
Carbondale, IL 62901

COMMENTOR NO. 71: SANTA FE ALLOYS & LOS ALMOS CONSULTANTS ALBUQUERQUE, NEW MEXICO

SANTA FE ALLOYS & LOS ALAMOS CONSULTANTS, (SFA/LAC)
4515 Stockbridge Ave., NW, Albuquerque, NM 87120
(505) 899-2178, E-mail-elliottgrb@juno.com

4/28/98
Mr. Charles E. Bradley, Jr.
Office of Facilities (NE-40)
Office of Nuclear Energy, Science and Technology
US DOE
19901 Germantown Rd.
Germantown, MD 20874
Ph (301) 903-5512; Fax (301) 903-4905; Charles.Bradley@HQ.DOE

Subject: Non-proprietary comments regarding the draft PEIS

Dear Mr. Bradley:

Thank you very much for talking with me and for requesting some opinions from me.

As we have discussed, Santa Fe Alloys (using Federal funding) and Los Alamos Consultants (using private funding) have devised and experimentally developed continuous metallothermic reduction procedures for production of uranium and other metals over a period of nearly 20 years. Most of the successful experiments on these procedures were carried out at the SFA/LAC laboratory in NM.

Comments on the Draft PEIS--This Writer's Opinions:

Overall High Quality. Your wise recommendation, as based on the material presented, is to convert the DUF_6 to metal or oxide and to use the DU for shielding of HLW. It was very much needed. That way the DU will be recoverable later while being protected for now.

To emphasize the need to save DU, the reader should recognize that many of the better uranium sources worldwide have already been destroyed to collect and use U-235, but leaving >99.5% of the natural U unused. Saving the remainder (mostly U-238) as breeder fuel would allow its use substantially fully as reactor fuel (as Pu-239) by future generations. Yet some people seriously recommend burying this fuel as waste! Wasting the DU would be an environmental atrocity.

(See "Management and Disposition of Excess Weapons Plutonium," National Academy Press, 1994, p 28, and DOE/NN-0007, Jan. 1997, p.39, showing that Pu fuel is now used in other countries.)

71-1

COMMENTOR NO. 71: SANTA FE ALLOYS & LOS ALMOS CONSULTANTS (CONT'D.) ALBUQUERQUE, NEW MEXICO

SANTA FE ALLOYS & LOS ALAMOS CONSULTANTS, (SFA/LAC)
4515 Stockbridge Ave., NW, Albuquerque, NM, 87120
(505) 899-2178, E-mail-elliottgrb@juno.com

Avoidance of Too Strict Definitions of Processes to Be Used: From a chemical and engineering view, this PEIS should be looked on as sketches of what sort of approach could be used to convert the DUF_6 to metal or oxide. As such these sketches allow realistic broad decisions such as saving the DU for future use, as just discussed.

However, the current overregulation from within and outside of DOE tends to turn such sketches into rigid models before experiment has shown what would be realistic. Consider, for example, the recent failures of numerous radwaste vitrification units--inadequately tested proposals rigidly specified what turned out to inadequate approaches.

71-2

Here the decision to use continuous metallothermic reductions for production of uranium for cask shielding is sound. However, as discussed below, the writer recommends versions of reductions that differ significantly from the version described, e.g., UCRL-AR-124080 Vols 1 and 2 Rev 2, Sec 6.10-4

However, there is need to examine cost features.

Locations and Types of Facilities Needed for UF_6 Conversions to Metal of Alloy:

Alternative to Hydrogen Reduction of UF_6 to UF_4: Historically this reduction has been used before the continuous metallothermic reductions of UF_4 by Mg in molten salt as done by SFA prior to its work for AVLIS with ORNL (Lockheed Martin) and LLNL.

However, an alternative continuous metallothermic approach (description proprietary by LAC) by SFA would convert UF_6 to UF_4 in molten salt prior to continuous Mg reductions to metal or alloy.

71-3

Incorporating this LAC metallothermic reduction to UF_4 as a precursor to the U-metal production would (a) avoid the cost of separate hydrogen reduction facility and operations, (b) integrate well with the molten salt operations of the Mg-UF_4 reductions, and (c) avoid some shipping and handling.

Alternative to Aqueous Separation of MgF_2 By-product from NaCl Molten Salt Additive: Because of experimental flaws in ORNL pilot tests, which seemed to invalidate containers used by SFA for continuous metallothermic reductions, the separation of MgF_2 by-product continuously from molten salt was abandoned in the system of the PEIS--instead batch aqueous separations were incorporated into the DOE plans.

71-4

SANTA FE ALLOYS & LOS ALAMOS CONSULTANTS, (SFA/LAC)
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(505) 899-2178, E-mail-elliotgrb@juno.com

However, SFA is eager to correct the ORNL flaws and demonstrate that continuous circulation of molten salt carrier with removal of solid, clean MgF_2 by-product can be maintained.

Alternative to Formation of U-3%Fe Alloy in UF_4-Mg Reductions: As described, the continuous metallothermic reductions lead to U-Fe alloy, which has the advantage of a lower melting point than pure U. However, the U-Fe alloy is brittle in castings and unwanted in breeding. Therefore, the production and casting of pure U should be evaluated also. *71-5*

Location of U-Metal Production Facilities: To avoid the expenses and hassles of shipping radioactive materials by people's houses, it seems best to move the DUF_6 cylinders on-site at Paducah, ORNL, and Portsmouth to already HEPA-filtered buildings. Then, movable, also HEPA-filtered, UF_6-UF_4 units for continuous metallothermic reductions can be operated to produce U castings already suitable for use in casks. Then, with one radioactive shipment, the unshielded casks and the shielding castings could be assembled at the HLW site. *71-6*

It seems reasonable, and in accord with many environmentalists' wishes, that the casks could be stored long-term in underground mausoleums, where they were available for remote monitoring and eventually for HLW recycle and DU reactor use.

Reduction of Costs for Operations and Maintenance in the Manufacture of Metallic Shielding: With some $800 million as the cost of Operations and Maintenance (Cost Analysis, UCRL-AR-127650, May 1997, p. 57) for manufacturing metallic shielding, it becomes very important to move the material rapidly through the processing, e.g., in ten years. *71-7*

If an SFA continuous metallothermic reduction unit produced 1 cu ft of DU/hr full time for a year, the unit would produce 8760 cu ft of U. With 820,000 cu ft of U in cylinders, it would take 70.8 unit years to dispose of the DUF_6. With those assumptions, 10 SFA units could dispose of the DUF_6 within ten years.

ACTION:
With billions of dollars at stake, it seems urgent to get more

SANTA FE ALLOYS & LOS ALAMOS CONSULTANTS, (SFA/LAC)
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experimental work from SFA. With even three months work, SFA working in its licensed DU laboratory could (presumably) demonstrate, and revalidate, containment for its water-free operations of continuous metallothermic reductions.

Later, other work could be discussed.

Sincerely,

Guy R. B. Elliott

Guy R. B. Elliott
President

COMMENTOR NO. 72: GOVERNORS PATTON, PAUL E., VOINOVICH, GEORGE V., & SUNDQUIST, DON PADUCAH, KENTUCKY; PORTSMOUTH, OHIO; OAK RIDGE TENNESSEE

April 27, 1998

The Honorable Federico Peña, Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

RE: "Draft PEIS for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride," DOE/EIS-0269 dated December 1997.

Dear Secretary Peña:

More than forty years ago the U.S. Department of Energy began the uranium enrichment initiative that created a common link between Ohio, Kentucky, and Tennessee. This commonality includes the U.S. Department of Energy's legacy of waste, a significant portion of which is made up of depleted uranium hexafluoride. Today, our three states are working together in order to recommend the selection of an appropriate and lawful alternative for the long-term management and use of depleted uranium hexafluoride. We believe that such an alternative must minimize impacts on human health and the environment, as well as benefit the overall mission of our states and the U.S. Department of Energy ("DOE"). 72-1

Ohio, Kentucky, and Tennessee have the following significant concerns regarding the above-referenced document:

- DOE should consider the immediate conversion of all depleted uranium hexafluoride (DUF6) to the less hazardous uranium oxide (U_3O_8) and provide above ground storage of the U_3O_8. We do not believe that waiting for possible market demands for the DUF6 is justification for delaying this project. It is incumbent upon DOE to immediately begin seeking funds from Congress for this conversion. We urge DOE to complete conversion by the year 2018 or earlier and reduce the mortgage of maintaining the cylinders. 72-2
- A long-term strategy for DUF6 must include DOE's entire cylinder inventory, including heel and small cylinders. The 10,000+ cylinders of DUF6 generated by the United States Enrichment Corporation (USEC), which will revert to DOE ownership upon privatization of USEC, must also be considered in any plans. 72-3
- An estimated $480 million has been accrued by USEC since 1993 in order to offset the cost of the future conversion of DUF6 generated by USEC. DOE should work with Congress now to ensure this fund is not diverted into the federal treasury for an unrelated use. In addition, DOE might consider partnering with the future owner of USEC in a long-term strategy for managing and converting DUF6, in order to avoid redundancy of efforts. Any partnering effort, however, must not slow progress toward conversion. 72-4
- Natural phenomena events or accidents may not have been adequately considered in the PEIS. DOE must identify the "worse-case" cylinder conditions and explicitly use this information in the hazard modeling descriptions. 72-5

COMMENTOR NO. 72: GOVERNORS PATTON, PAUL E., VOINOVICH, GEORGE V., & SUNDQUIST, DON PADUCAH, KENTUCKY; PORTSMOUTH, OHIO; OAK RIDGE TENNESSEE (CONT'D.)

- In order for states to effectively evaluate the potential impacts of the preferred alternative, DOE must provide information on the location of the sites where conversion would occur and how wastes generated from this process will be managed. In order to avoid the undue risk of transporting deteriorating cylinders, we recommend that DOE evaluate the feasibility of on-site conversion plants. 72-6
- DOE must ensure that funding for safe storage and maintenance of DUF6 cylinders and storage yards is at an adequate level to protect human health and the environment. 72-7

The States welcome the opportunity to work closely with the Department of Energy in addressing these complex issues and moving rapidly toward an alternative that will well serve the public and the environment. In addition, we urge DOE to carefully consider the more detailed comments being submitted by each of our states' environmental regulatory agencies.

Sincerely,

Governor Paul E. Patton

Governor George V. Voinovich

Governor Don Sundquist

cc: Charles E. Bradley, Jr., U.S. Department of Energy
James Hall, Manager, U.S. Department of Energy U.S. Department of Energy
William H. Timbers, Jr., United States Enrichment Corporation
Ohio Congressional Delegation
Kentucky Congressional Delegation
Tennessee Congressional Delegation

COMMENTOR NO. 73: HARTZOG, GEORGEANN
ALTO PASS, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 73-1

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 73-2

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. 73-3

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Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 73-6

Thank you for considering these comments.

Sincerely,

Georgeann Hartzog
Georgeann Hartzog
470 Bethesda Church Rd
Alto Pass IL 62905

COMMENTOR NO. 74: STAHNKE, LINDA
MURPHYSBORO, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874 April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

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Thank you for considering these comments.

Sincerely,

Linda Stahnke
LINDA STAHNKE
414 N 4th St
MURPHYSBORO IL 62966

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION FRANKFORT, KENTUCKY

JAMES F. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

April 23, 1998

Mr. Charles E. Bradley, Jr., Program Manager
Depleted Uranium Hexafluoride Management Program
Office of Facilities (NF-40)
Office of Nuclear Energy, Science and Technology
Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Re: U.S. Department of Energy's Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269) dated December 18, 1997.

Gentlemen,

The Kentucky Division of Waste Management (Division) has reviewed the December 18, 1997 *U.S. Department of Energy's Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269). Since the Paducah Gaseous Diffusion Plant currently store and manage the largest volume of Depleted Uranium Hexafluoride (DUF6) in the nation, the Division is very interested in the decision making process for the long-term storage and management of the DUF6. Attached are the Division's general and specific concerns of DOE's proposed alternative and long-term strategy.

If you have any questions or require additional information, please contact me or Tuss Taylor at (502)-564-6716.

Sincerely,

Robert H. Daniell, Director
Division of Waste Management

RHD/TTJ/kg

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

cc: Robert Sleeman, DOE
Carl R. Froede Jr., USEPA
Jimmie Hodges, DOE
Myrna Redfield, DOE
James Hall, DOE
William H. Timbers, Jr., USEC
Jimmy Massey, BJLLC
John Morgan, BJLLC
KDWM-Paducah
DWM Main File #980

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

Kentucky Division of Waste Management's General and Specific Comments on the DOE's Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269) dated December 18, 1997.

General Comments:

1. DOE's Preferred Alternative: DOE's preferred alternative, as repeatedly mentioned in PEIS is to use the entire inventory of DUF_6 as metal or oxide. However, no evidence has been documented in the PEIS, which suggests that the market demand exists or will be found for all or even a significant part of DUF_6 inventory in the near future. Moreover, two independent studies (*"Integrity of Uranium Hexafluoride Cylinders", ONRSE/TECH-4, May 5, 1995, and "Affordable Cleanup": Opportunities for Cost Reduction in the Decontaminating and Decommissioning of the Nation's Uranium Enrichment Facilities", Board on Energy and Environmental Systems, Commission on Engineering and Technical Systems, National Research Council of the National Academy of Sciences, February 9, 1996*) also report that the market demand doesn't currently exist for the DUF_6 or its conversion products, nor is the demand anticipated in the near future. In light of the present uncertainties in the market demand, the Division therefore recommends that the DOE should consider converting the entire inventory immediately to the more stable form U_3O_8. The long-term storage of this material is much safer than the current storage of DUF_6 and it can also be retrieved if future demand is obtained. *75-1*

2. Time Frame: The PEIS doesn't justify the 40-year time frame considered. Justification is warranted for the same. The PEIS recommends storing the cylinders until 2040, after which 20 years would be required to convert the entire inventory of DUF_6 using DOE's preferred alternative. During these years, there is continued storage of DUF_6 required, which will also necessitate the continued monitoring activities. The Division therefore recommends that the process of conversion should be expedited in order to minimize the risk to the human health and the environment from continued storage of deteriorating cylinders. This would also help in cutting down the cost on the annual maintenance and surveillance activities. *75-2*

3. Management of USEC cylinders: The PEIS doesn't take into account the cylinders (~8000) produced by United States Enrichment Corporation (USEC) since its privatization. The ownership of these cylinders has yet to be determined. It is the Division's understanding that under the current agreement between DOE and USEC, the USEC will be able to return to DOE, any waste not easily disposed of commercially. In this scenario, if these cylinders are considered waste, there is a possibility that they could be returned to the DOE. This represents a significant *75-3*

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

increase in the inventory. Hence the Division recommends that a contingency plan should be incorporated in the PEIS to address the USEC cylinders.

4. Conversion Facilities/Site Selection: It is the Division's understanding that the DOE has not yet come to the conclusion of final selection of the site, as is evident from the PEIS. The PEIS describes the impact on the environment, considering various generic settings. However, the Division believes that site specific impact is also necessary after final selection of the site. For example, it is clear from the PEIS that the DOE has not given enough attention to the earthquake prone regions, and the seismic activities at the sites proposed for storage of the waste. The Division believes that it is critical and the site-specific information should be included in the PEIS. If PGDP is selected as one of the conversion facilities for example, then new facts gathered about this should be considered. The summary of some recently gathered seismic data at Paducah site is given in the specific comments. *75-4*

5. Generation of Secondary Waste: Preliminary calculations performed by Division indicate that if DOE's preferred alternative were used, large amounts of secondary waste could be generated. More specifically, around 70% of the product stream will consist of Uranium (in the metal or oxide form) and 30% will be in the form of other products (anhydrous HF, CaF_2, or MgF_2). The Division believes that the potential exist that all the handling, transportation, and disposal for uranium left at the end of the treatment process will meet Low-Level Waste (LLW) requirements. Moreover, unless the specific technology is available to totally remove all the radioactive contamination from these secondary products (e.g. HF, CaF_2, MgF_2 etc.), all the disposal, handling, and treatment activities for this waste must follow the (LLW) management guidelines. Please provide a description of all potential anticipated wastes that may be derived from the preferred alternative. *75-5*

Specific Comments:

1. One of the chemicals of potential concern (COPC) identified in the conversion (to oxide or metal) is ammonia. Provide a brief discussion regarding the generation of ammonia. *75-6*

2. DOE has proposed a 40-year time frame for the proposed alternatives. Please provide a detailed justification for the proposed 40-year time frame. *75-7*

3. Consideration of "no-action" alternative should include at a minimum, implementation of Recommendation 95-1 of the Defense Nuclear Facilities Safety Board. *75-8*

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

4. It is clear from the PEIS that DOE has not given enough attention to the earthquake prone regions, and seismic activities at the sites proposed for storage of the waste. The Division believes it is critical that site specific information is included within the PEIS.

   The following is a summary of new information discovered at the PGDP. Dr. Ronald Street of the University of Kentucky, Department of Geological Sciences commenced an investigation of earthquake related features in the vicinity of the PGDP (*Acquisition of Shear Wave Seismic Reflection and Refraction Data in the Area of the Northwestward Trending Contaminant Plume at the PGDP*). The purpose of this investigation is to map geologic contacts between the Mississippian limestone, the McNairy Formation, the lower Continental Deposits, and the upper Continental Deposits. It has been proposed that faulting has created horst and graben features in these units and that these features may affect groundwater flowpaths in the area on the Northwest and Northeast plumes. A pilot study conducted by Dr. Street located a small graben structure north of the PGDP. As part of the current project, Dr. Street has collected 17.3 km of six and twelve fold reflection and refraction data using a 24 bit floating point seismograph unit. Work on this project started in May of 1997 and a final report is due to AIP in May of 1998.

   Preliminary interpretations of the data collected in this study were presented to the AIP in February 1998. These interpretations, which are subject to change, indicate that the PGDP is underlain by a series of northeast trending fault zones exhibiting substantial vertical offset on the surface of the Mississippian limestone as well as the upper surface of the McNairy formation. *75-9*

   In other work conducted by Dr. John Nelson of the Illinois Geological Survey northeast trending faulting was found in sediments north of the PGDP in Southern Illinois. Dr. Nelson identified faulting in road cuts and railroad cuts. He also identified a graben in the surface of the McNairy formation with a vertical offset of 200+ feet.

   Dr. Tom Hildenbrand (USGS, Menlo Park) compiled magnetic, seismic moment, and gravity maps for the Paducah region. An anomalous feature appeared approximately 5 miles northwest of the PDGP on all three maps, gravity high, a magnetic high, and a cluster of small earthquakes. This feature has been interpreted as a mafic intrusion located near the community of Needmore. Earthquakes in the vicinity of this possible intrusion are thought to be the result of the regional compressive stress field being deflected around the structure.

   This evaluation indicates that the probability of significant seismic activities within this region is high and that further consideration is needed within the PEIS.

5. The PEIS should describe clearly the criteria for choosing the sites for treatment/disposal. The Division believes that such information is crucial. It is the *75-10*

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

Division's understanding that several options will be available for the conversion process of UF_6 to either oxide or metal and production of anhydrous HF. Because there are varying chemical products and potential waste products generated with different conversion methods, DOE must provide a general description of waste products and waste which are anticipated to be generated. If a method has been selected, please state the method. *75-10 (Con't.)*

Additionally, DOE must address the management and disposal of miscellaneous wastes that will be generated during the conversion process. This would include management and disposal of potentially large volumes of low-level wastes from the neutralization of HF; also various filters and filtered materials. *75-11*

Finally, discussion is needed for the management of "cylinder heels" from the bottom of the DUF6 cylinder. This material contains a variety of radionuclides (i.e. daughter products and other contaminants) that are not suitable for conversion into uranium oxides or uranium metal. *75-12*

6. While evaluating the alternative "conversion of UF_6 to oxide or metal form", different steps have been delineated as is the case with the other alternatives. In this particular case, the facilities for conversion process, storage of converted uranium form, and the manufacturing of the casks (which is the end use for this alternative, and this is DOE's preferred alternative) are all planned to be located at separate locations. There will be transportation required between these locations. The PEIS should address the impacts of the transportation, including the potential impacts on the environment, human health. However, the transportation impacts could be minimized if DOE would integrate the conversion and manufacturing plants in one complex. This would reduce the amount of land required thereby decreasing possible habitat loss. It is not clear whether DOE has considered this alternative. If not, we recommend that this option be considered. *75-13*

7. A correction is needed on page 3-7, Section 3.1.4.1; the reference to the earthquake magnitude of 7.3 should have been referenced as the "Nuttly Scale" and not as the "Richter Scale". Although, the Nuttly Scale does converts to 8.0 on the Seismic Moment scale sometime referred to as the Richter scale. *75-14*

8. Section 3.1 Paducah Site; U.S. EPA has authorized the Commonwealth of Kentucky for the Resource Conservation and Recovery Act (RCRA) Program. Therefore, when references are made to the U.S. EPA RCRA program, the Kentucky Hazardous Waste should also be referenced. *75-15*

9. Pages2-60 and 2-61; 2-64 and 2-65; 2-68 and 2-69; 3-2 and 3-4; Figure 3.1 of Volume 1 of the Draft DUF6 PEIS are missing. A comprehensive review could not be performed due to the lack of these pages. Provide the missing pages. *75-16*

COMMENTOR NO. 75: COMMONWEALTH OF KENTUCKY, DEPARTMENT FOR ENVIRONMENTAL PROTECTION (CONT'D.) FRANKFORT, KENTUCKY

10. Page 5-108, Section 5.8.2.1 Paducah Site; the last paragraph states that 11 pollutants have been detected in the groundwater effecting quality. This statement is incorrect. Numerous pollutants have been detected at the PGDP. In fact, one of the most predominant contaminants at the site is omitted, Technetium 99. Other radionuclides and organic contaminants have been detected in groundwater throughout the PGDP. *75-17*

COMMENTOR NO. 76: STATE OF OHIO ENVIRONMENTAL PROTECTION AGENCY COLUMBUS, OHIO

OhioEPA
State of Ohio Environmental Protection Agency

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1800 WaterMark Drive
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April 21, 1998

The Honorable Federico Pena, Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

RE: " Draft PEIS for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride," DOE/EIS-0269 dated December 1997.

Dear Secretary Pena:

Ohio EPA has long been interested in the management of depleted uranium hexafluoride (DUF6). Ohio's concerns result from the 13000+ cylinders of DUF6 which have been stored for decades at the Portsmouth Gaseous Diffusion Plant in southern Ohio. As you may know, management of DUF6 at the Portsmouth site was the subject of recent judicial and administrative consent orders signed by the U.S. Department of Energy ("DOE") and the State of Ohio. The State of Ohio is working to support an appropriate lawful alternative for the long term management and use of DUF6. We have reviewed the above-referenced document and offer the following comments:

1 **There is no evidence to suggest that market demand exists or will be found for all or even a large part of DOE's DUF6 inventory in the near term or the foreseeable future. Therefore, conversion should begin as soon as possible and be completed by 2018 or earlier. DOE should begin now to seek funds from Congress for conversion, and should consider the immediate conversion of all the DUF6 to U3O8, and long-term above-ground storage of this material.** According to the draft PEIS, the preferred alternative for long-term use of DUF6 is conversion of 100% of stockpiled DUF6 to oxide (i.e., U3O8 and/or UO2) and depleted uranium metals. Conversion would not begin until 2010, and would occur over a twenty year period on the basis of market demand. However, in the Draft PEIS, DOE states that "the actual percentage of depleted UF6 inventory for which uses will be identified within the time frame assessed in the PEIS (i.e., up to the year 2040) will be determined as uses develop and conversion begins." In other words, this market demand is uncertain. *76-1*

The National Research Council of the National Academy of Sciences (NSF)[1] conducted

[1]"Affordable Cleanup?: Opportunities for Cost Reduction in the Decontaminating and Decommissioning of the Nation's Uranium Enrichment Facilities" Board on Energy and

a review in 1996 of possible uses for depleted uranium in shielding applications, as a fluorinating agent, and for re-enrichment by Atomic Vapor Laser Isotope Separation (AVLIS). According to the NST, market demand does not currently exist for DUF6 or its conversion products, nor is demand anticipated in the near future. This is corroborated by the DNFSB who stated in a 1995 report[2] that according to DOE, only a "small fraction" of depleted uranium has a use in the "foreseeable future".

76-1 (Cont'd.)

We recognize that market demand is, at best, uncertain. DUF6 can be stored more safely in a converted state. Therefore, rather than wait for market demand to drive conversion, DOE should begin now to seek funds from Congress for conversion, and should consider the immediate conversion of all the DUF6 to U3O8, and long-term above-ground storage of this material, which can be retrieved if demand is established. If a market exists for a small percentage of DUF6, only those cylinders in the best condition should remain unconverted for use by the market.

2. **The draft PEIS provides no assurance that DOE will fund and implement an adequate long-term program of inspecting and coating cylinders throughout the life of the DUF6 cylinders, prior to conversion.** Safe cylinder management requires an adequate inspection program combined with an aggressive cylinder coating program. Several times throughout the PEIS, it is indicated that funding for a cylinder coating program is "uncertain". However, DOE states in the PEIS that coating is expected to be successful and therefore, minimal releases of DUF6 from cylinders to air and groundwater are expected. It is unclear how DOE can assume coating will be successful if funding is uncertain and the success rate of coating cylinders is unknown. Even if funded, there is no assurance that coating will be adequately applied and renewed frequently enough to prevent or slow corrosion. DOE must comply with all DNFSB recommendations for management of cylinders and yards, and with the DUF6 management plan contained in Ohio orders.

76-2

3. **DOE should ensure that the PEIS addresses the management of DUF6 in compliance with RCRA and state hazardous waste law. The February 28, 1998 Director's Findings and Orders reiterated Ohio EPA's view that DUF6 is a mixed waste regulated under RCRA and state hazardous waste law. These Findings and Orders provide an exemption from state hazardous waste requirements for a 10-year period to allow DOE to identify and implement an appropriate and lawful strategy for use, reuse, or conversion of this material. The Findings and Orders require compliance with a safe management plan for the DUF6 during the 10-year period. Ohio has also reserved legal rights to reassert state hazardous waste requirements. Thus, it is imperative that the PEIS address the management of DUF6 as a mixed waste under RCRA and state hazardous waste law.**

76-3

4. **A variety of independent and DOE estimates regarding breached cylinders are available but not considered in the draft PEIS.** The draft PEIS estimates that 59 breaches and releases from cylinders could occur over the next forty years, assuming control of external corrosion by painting cylinders. Assuming no control of corrosion, the draft PEIS estimates that 731 breaches and releases could occur. However, according to the Defense Nuclear Facility Safety Board (DNFSB)[1], it has been stated by DOE and the former MMES that 200 cylinders are expected to breach if no corrosion control is undertaken, and more than 1000 cylinders have the potential to breach in storage within 22 years (by the year 2020).

76-4

5. **DOE's estimate of three to four cylinder spill accidents from breaches due to corrosion appears unrealistically low.** The draft PEIS estimates that as a result of all activities associated with the preferred alternative, three to four spill accidents will occur by 2038 as a result of cylinders that will breach due to corrosion. However, DOE records show that from 1990 to 1992, seven cylinders stored at the DOE three gaseous diffusion plants have breached due to corrosion. In light of DOE's own predictions mentioned in comment #2 above, as well as the current age of the cylinders, unknown cylinder corrosion rates, and the uncertainty of a long-term, ongoing cylinder coating program, a more realistic estimate of cylinder spill accidents due to corrosion must be made.

76-5

6. **If cylinder breaching rates have been underestimated, all other calculations made in the draft PEIS that were based on this breach rate, such as the impact of a release of DUF6 to soil, groundwater, human health, etc., have also been underestimated. These estimates should be revised accordingly.**

76-6

7. **Conversion of DUF6 to U3O8 should be expedited in order to minimize the risk to human health and the environment from continued storage of deteriorating cylinders.** In order to implement the preferred alternative in the Draft PEIS, DOE recommends storing cylinders until 2010. Then, a period of twenty years, at a cost of $200 million per year, would be required to convert the entire DUF6 inventory to either depleted metals or oxide at one conversion plant, the site of which has not yet been determined. During conversion, aqueous HF would be generated and marketed. According to the National Research Council, a twenty year conversion rate and was chosen to reduce the cost of plant investment (spread the cost out over twenty years) and to render the HF production rate less disruptive to the market. The rate at which HF would be generated over twenty years is equal to approximately 2% of the estimated annual market in North America. It is recommended that conversion be completed by 2018 or earlier. Expediting conversion will minimize the risk of continued storage and defray the annual cost for cylinder maintenance and surveillance, which is estimated by DOE at $12 to 15 million.

76-7

Environmental Systems, Commission on Engineering and Technical Systems, National Research Council of the National Academy of Sciences, February 9, 1996.

[2]"Integrity of Uranium Hexafluoride Cylinders", Defense Nuclear Facility Safety Board Technical Report, May 5, 1995.

[1]Recommendation 95-1 to the Secretary of Energy pursuant to 42 USC 2286a(5) Atomic Energy Act of 1954, as amended.

COMMENTOR NO. 76: STATE OF OHIO ENVIRONMENTAL PROTECTION AGENCY (CONT'D.) COLUMBUS, OHIO

8. **Rather than construct a conversion plant at a single location and transport all cylinders to the conversion site, DOE should evaluate the feasibility of on-site conversion of DUF6 to U3O8.** According to DOE, 50% to 95% of the DUF6 cylinders have corroded to the point that they are not capable of being handled and transported without undue risk. The draft PEIS states that cylinders would be over packed or their contents transferred into new containers prior to transporting them to an undetermined conversion plant. If cylinders can be converted onsite without transporting them, this will minimize the number of times they are handled, therefore, limiting the risks associated with transferring cylinder contents and transporting them to conversion sites. In addition, the time required for over packing, transferring contents, and transporting cylinders could be saved. The use of a mobile treatment unit that could be transported to each GDP site should be considered. In the alternative, DOE could construct a plant onsite at each GDP (if seismic conditions allow), within an existing, unused gaseous diffusion building. *76-8*

9. **Seismic and flooding concerns were not adequately discussed in the draft PEIS.** For example, Paducah, Kentucky is located approximately 60 miles from the New Madrid fault. Earthquakes of a magnitude of 8.4 to 8.8 on the Richter scale have been measured in the region. These have the potential to damage stored cylinders. The majority of cylinders are stored at Paducah. Seismic issues for Ohio, Kentucky and Tennessee must be adequately considered in the PEIS, especially in light of continued storage of cylinders until at least 2010, and conversion at an unknown site. *76-9*

10. **DOE should evaluate a long-term strategy for DUF6 that would include DOE's entire cylinder inventory including heel and small cylinders as well as the current inventory of 10,000+ cylinders of DUF6 generated by USEC since it's 1993 inception.** When privatization occurs, these USEC-generated cylinders will become the responsibility of DOE. Pursuant to the federal privatization legislation, funds have been accrued for each kilogram of DUF6 generated by USEC in order to pay for future treatment of tails. Currently, this fund may now hold as much as $480 million. When USEC is privatized, this fund will be turned over to the federal treasury. DOE should take steps to secure these funds to offset the cost of conversion of the DUF6 to be accrued from USEC, as well its existing inventory of DUF6. *76-10*

Ohio EPA is willing to work closely with DOE on this issue. We suggest forming a workgroup that includes representatives of Ohio, Kentucky and Tennessee that can work with DOE to find a solution that meets the needs of all three states as well as DOE. Please contact Donna Goodman of my staff at (740)385-8501 if you have any questions or wish to discuss this further.

Sincerely,

Donald R. Schregardus
Director

COMMENTOR NO. 77: WATKIN, MARY ELLEN & MONTEITH, JERRY COBDEN, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874

April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. *77-1*

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. *77-2*

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. *77-3*

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. *77-4*

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commenters to decide where the best place for conversion would be and the best methods. *77-5*

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. *77-6*

Thank you for considering these comments.

Sincerely,

Mary Ellen Watkin
Jerry C. Monteith
117 Oak St.
Cobden, IL 62920

(MARY ELLEN WATKIN)

(Jerry Monteith)

* PADUCAH IS 25 miles from our home in Southern Illinois.

COMMENTOR NO. 78: BELLETIRE, KATHY
MARION, ILLINOIS

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd
Germantown, MD 20874

April 13, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 78-1

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 78-2

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. 78-3

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. 78-4

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commentors to decide where the best place for conversion would be and the best methods. 78-5

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 78-6

Thank you for considering these comments

Sincerely,

Kathy Belletire
6710 Wards Mill
Marion IL 62959

COMMENTOR NO. 79: COOTS, LOU
PADUCAH, KENTUCKY

Charles Bradley
US DOE (NE-40)
19901 Germantown Rd.
Germantown, MD 20874

April 23, 1998

Dear Mr. Bradley,

These are the comments of the undersigned on the Depleted Uranium cylinders DPEIS. There are some 50,000 plus cylinders of the DUF6 containing from 10 to 14 tons of material apiece currently stored in the three sites, Paducah, Portsmouth, and Oak Ridge.

The scope of the DPEIS is inadequate to cover the activities required to deal with the cylinders. Implementing either of the conversion alternatives will trigger a series of events which will have to take place in order to complete the conversion. These include building factories to do the conversion and for cleaning the highly radioactive residues out of the emptied cylinders. The DUF6 will have to be defluorinated, which is a highly dangerous activity. The converted material and the empty cylinders will have to disposed or stored, as will the hydrogen fluoride which is separated from the DUF6. 79-1

These activities are all connected actions which require a hard look in combination with the ongoing cleanup activities at the three facilities where the cylinders are stored - Paducah, Portsmouth, and Oak Ridge. There are clearly cumulative effects from these proposals and projects which are not adequately addressed in the draft. 79-2

Although the largest majority of cylinders, some 40,000, are at Paducah, they are inadequately stacked and stored presently. These are vulnerable to the high seismic risk at Paducah from the New Madrid fault. Because it will be decades or longer before this material can be converted, the risks from earthquake damage go greater as time goes on. Any conversion facilities planned for Paducah have to fully consider the earthquake potential at Paducah, and any construction of conversion facilities at Paducah would have to be made to an earthquake standard. The extra costs of this need to be disclosed. 79-3

If cylinders are going to be transported for conversion, then the risks transportation needs to be considered carefully. This would require many thousands of shipments. Many of the older cylinders may not be capable of being lifted or loaded for transportation. Some may not be able to be heated to be emptied. All of these problems could significantly increase the cost. The DOE needs to be more up-front about the real dollar costs of this problem. 79-4

Although it appears that the best alternative is converting the material from the reactive UF 6 form to the more stable uranium oxide form, the DPEIS doesn't give enough information for the commentors to decide where the best place for conversion would be and the best methods. 79-5

Finally, it seems ill-advised to continue to fill more cylinders daily with more DUF6 while this huge problem of disposal continues to accumulate. If the nuclear industry cannot manufacture its product without creating such huge amounts of toxic waste, it should strongly consider ceasing production. 79-6

Thank you for considering these comments.

Sincerely

Ms. Lou Coots
Ms Lou Coots
330 N 38th St.
Paducah, KY 42001

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY MCDERMOTT, OHIO

Portsmouth-Piketon
Residents for
Environmental
Safety and
Security

P.R.E.S.S.

Vina K. Colley, President
3706 McDermott Pond Creek
McDermott, Ohio 45652-8932
Telephone: (614) 259-4688
Fax: (614) 259-3912

Hello,

My name is Vina Colley a former worker who suffers form a disabling illnesses as the result of U235 in my lungs and toxic exposures from working at the Portsmouth /Piketon Uranium Enrichment plant located here in Piketon.

I am here today representing PRESS Portsmouth/Piketon Residents for Environmental Safety and Security. Press is an member group of several national organizations representing communities living in the shadows of the U.S. nuclear weapons complex such as the Alliance for Nuclear Accountability (formerly the Military Production Network),Military Toxic Project, Reclamation & Conversion Project, and Task Force on Radiation and Human Right.

Press doesn't represent the union body of the Piketon plant but workers like my myself that have been effect from this facility. PRESS represents the interests members of the directly affected.

We are her today to speak about one of the biggest problems facing the public from the DOE/DOD programs the Uranium Hexafluoride Cells (UF6) DU cylinders. A hazardous materials specialist, David Kozlowski was quote as saying " Uranium Hexafluoride is highly corrosive ", its effect to those hydrochloric acid. Sites such as Piketon, he said are regarded as potential "general emergency" sites by the DOE, meaning if there were gas formation it could require evacuation of nearby areas. While in D.C. last year with the national groups we were told by another top person for the DOE that painting, these cylinders was like putting lipstick on a corpse. Slightly contaminated DU cylinders become a problem equal to high level radioactive waste as they age because of the decay daughter product to radium. **80-1**

I would like to remind you of the 1978 spill here at the plant when over 21 thousand LBS left this site by air, ground and water many workers where effected. In September of 1995 another airborne plume went off site and in between the lithuim storage building and the national guards bulding. This airborne plume headed toward Wakefield. I have been told that workers were paid over time and told to stay inside, I also called a reporter when this was happening, he called the plant and they lied about the release and two days later put there own story in the paper. I would like someone to tell me why we have alarms and run through drills and when there is an actual potential **80-2** **80-3** **80-4**

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

dangerous releases there is no sound of alarms to warn the citizens of the surrounding communities. Residents didn't know about the situation so therefore didn't know to stay inside. **80-4 (Con't.)**

Charles Bradley you didn't seem to believe me about the airborne plume from the DU cylinder could form,you though it would suck back inside the cylinder like the video that was show here. That video is misleading in ways. [redacted] removed tape not updated **80-5**

I would like to view another picture of children standing around DU cylinders, This should not be allowed with all the information about the hazard of this product,and the problems with on site hazards here at Piketon **80-6**

PRESS considers a decision that there is little effect to the public and it's workfore to be a serious environmental justice concern and and was not address adequately in the draft PEIS.

PRESS along with the Military Toxic Project is asking for the comment period be extended to six months to give folks the opportunity to meet with you in a roundtable meetings, much like the Funeral Facilities Restoration Dialogue meetings. We need to have the opportunity to discuss the strategies that have been proposed. **80-7**

I am putting in records the letter form the Military Toxic Project.

PRESS an other viewer should see in writing all agreement between the state of all three facilities OakRidge, Paducah, and Piketon.

All agreements between CONGRESS the USEC,DOD, DOE, and any others involved. **80-8**

The EPA was to fine this facility I believe over the DU cilinders, would like to know how much, and why.

I would like to remind you that Piketon has never been licensed to accept or store Radioactive waste and we have broken many laws by doing so. You have consistenly withheld information from the citizens about radioactive release whether planned, routine, or accidently, PRESS feels that there is a number of cylinders no long inventory and would like to know who is hidding them, or where they stolen,or is some one all ready doing conversion? **80-9**

PRESS is worried that a earthquake would create multiple cylinder failures at all the sites,also worried over the possibly of aircraft wrecking and hidding the cylinders. **80-10**

Press feels we need to look at some real problem that the National Research Council as put on the table. **80-11**

We feel that untill we find a safe way to handle these cylinders they should be put in earthquake proof containers or maybe find away to heat them up in the place where stored, then put then in new cylinder untill new safe technology comes along. **80-12**

I have a report from George Hoffman to put in Record

I would like to put in record a report from Gene Hoffman. At request, I will make a copy for people here that would like one. Also a letter sent to NY TIMES BUREAU from Leonard A. Dietz, [redacted] about the Dai issue.
I would like to thank you for this time to speak.

80-13

Vivian Calling
PRESS

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.)
MCDERMOTT, OHIO

SCIENCE FOR DEMOCRATIC ACTION
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Worker Radiation Dose Records Deeply Flawed

BY ARJUN MAKHIJANI AND BERND FRANKE

As part of its responsibility for the production and testing of nuclear weapons, the Department of Energy (DOE) and its predecessor agencies (the Atomic Energy Commission, 1947–1974; and the Energy Research and Development Administration, 1974–1977) have been responsible for ensuring that workers were not exposed to more than the allowable amounts of radiation. The DOE has also been responsible to adhere to what is called the "ALARA" principle—the idea that radiation exposures should be kept "As Low As Reasonably Achievable" with available technology.

The goal of setting radiation dose limits and following the ALARA guideline is to protect worker health by limiting exposure. But if exposure is not properly measured, radiation exposure regulations cannot be enforced nor can guidelines be followed. Health monitoring personnel may not be aware of instances when workers are overexposed. Diseases that workers may be at greater risk of contracting may go undetected, harming them and their families. Health studies based on worker dose data would produce misleading results because dose records would be incomplete and knowledge of doses would be inaccurate.

A worker at the Plutonium Finishing Plant at Hanford, Washington receives a whole-body survey to detect potential radioactive contamination.

From the beginning of the nuclear era until 1989, *radiation doses from radioactive materials inhaled or ingested by workers were not calculated or included in worker dose records.* This was revealed by DOE in a background paper sent to IEER on April 7, 1997.[1] DOE and its predecessor agencies did make measurements of internal exposures to radioactive materials, though often sporadic (see below), mainly by taking urine samples. After the mid-to-late 1960s, there was also selective use of more sophisticated counters that

See **Worker Doses**, *page 4*

Editorial

Identify Groups of Workers at Risk

As noted in the accompanying article, the Department of Energy has stated that it did not calculate internal doses for workers, and therefore did not integrate them into dose records until 1989. This single fact means that historical worker dose records for 500,000 to 600,000 DOE workers are open to question and that a large number of them—those belonging to workers at risk of internal exposure—are flawed.

The DOE was not actually required to do such integration of internal and external doses, as we note in the article. Still, in the 1950s it was possible to crudely calculate internal worker doses and enter them into worker dose records (though such estimates would often have underestimated exposures). Relatively precise estimates were possible after the mid-1960s by matching up urine data with direct measurements of lung burdens, as IEER did in the case brought against

See **Editorial**, *page 3*

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Editorial, *from page 1*

National Lead of Ohio by workers at the Fernald Plant in 1991. (See SDA Vol. 5 No. 3). But the AEC, its successor agencies, and their contractors did not make the effort until 1989, when new regulations required it.

As the case of iodine 131 in fallout shows, (see article, p. 3) the nuclear weapons establishment chose not to properly inform the public about the risks and sacrifices that it was imposing upon them. The counterpart for workers of the public relations campaign that accompanied atmospheric testing was constant reassurances that doses were under allowable limits—and vigorous contestation of worker compensation claims even though the DOE and its predecessor agencies had failed to do their homework on what worker exposures actually were, and though relatively accurate estimates were possible after the mid-1960s.

It is time for the DOE to straighten out the mess by commissioning an independent assessment of the state of internal and external dose data. Simultaneously, the DOE must expeditiously review workers' records to determine which *groups of workers* who labored to make and test this country's huge nuclear arsenal were at risk of high internal exposures and/or high lifetime exposures. The reconstruction of individual worker doses would be a very costly and difficult exercise, which would in many or most cases also be frustrating because huge uncertainties will inevitably remain. That is why we advocate the calculation of doses to groups of workers to determine at-risk groups for the purposes of medical monitoring and, if warranted, compensation. That way most resources can be devoted to workers rather than technical studies.

It is also possible that the DOE and its contractors have used incomplete dose records to argue its case in compensation cases and other law suits. It is improper for the government to continue to fight workers' claims based on exposure data that systematically underestimated doses. A review should be conducted to determine if DOE or its contractors have presented any pre-1989 records as accurate data on internal worker doses.

Relatively precise estimates of internal doses were possible after the mid-1960s.

Private industry failed to calculate internal worker doses until the 1991–1994 period. We have not examined any set of data relating to workers in the private sector of the nuclear industry. The industry's failure to measure internal doses needs to be reviewed and an assessment should be made of its impact on workers.

There are two rays of hope in this dismal picture. One is that DOE began in 1989 to incorporate internal dose estimates into worker dose records. The other is that DOE and its predecessor agencies appear to have taken sufficient measurements to enable group worker doses to be approximately calculated, at least in the one instance where IEER has had access to the raw data. Since its inception, the DOE has made some effort to track individual worker exposures, which has undoubtedly resulted in lower overall exposures than would have occurred if no effort were made. But these measures have been grossly inadequate. If the DOE can spend $4.5 billion a year on laboratory testing and computer simulation of nuclear weapons, which we have found to be essentially unnecessary for maintaining safety (See SDA Vol. 5 No. 2), it can find the resources to do justice to the people exposed to radiation while building nuclear weapons. SF

—ARJUN MAKHIJANI AND BERND FRANKE

SCIENCE FOR DEMOCRATIC ACTION

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COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Let Them Drink Milk

Iodine-131 Doses from Nuclear Weapons Testing

BY PAT ORTMEYER

...it seems necessary to adopt a rather conservative attitude toward the involuntary exposure of the general populations. An error on the radical side will not be immediately apparent, but the chickens will inevitably come home to roost at some later date.

-Howard L. Andrews,
National Institutes of Health,
September 13, 1953[1]

The National Cancer Institute (NCI) recently released results of its 14-year study showing that fallout of iodine-131 from atmospheric tests conducted in Nevada in the 1950s and early 1960s resulted in thyroid doses to virtually all of the 160 million people living in the United States at the time. The estimated 150 million curies of iodine-131 released from the tests resulted in a cumulative average thyroid dose to the population of 2 rad.[2] Children were particularly affected; their doses averaged 6 to 14 rad, with some doses as high as 112 rad. Prior to this study, the most recent estimates of children's thyroid doses from iodine-131 in fallout, reported to Congress in 1959 and cited as recently as 1997, gave a dose range for children of 0.2 to 0.4 rad—15 to 70 times less than the NCI dose estimates.[3] (Note: These are estimates of thyroid doses, not whole body doses. See Centerfold table on dose.)

Thyroid irradiation increases the risk of cancer to children. A 1995 peer-reviewed publication says there is "convincing evidence" of increased thyroid cancer risk to children under age 15 whose thyroids are exposed to 10 rad or more.[4] This study mostly concerned individuals exposed to external radiation sources such as X-rays, but the effect on tissues from ionizing radiation from internal sources is essentially the same.[5] (See footnote for full explanation.)

Thyroid cancer is relatively rare, but the NCI estimates that 10,000 to 75,000 thyroid cancers can be expected as a result of these doses, roughly five to ten percent of which will be fatal. (The upper estimate of 75,000 is more plausible, since the lower estimate assumes that internal radiation doses from iodine-131 are "as little as one-fifth as hazardous" as the same dose of external radiation.[6] This assumption is very dubious, not based on human data, and not protective of public health.) About 90 percent of thyroid cancers due to iodine 131 fallout have yet to be diagnosed, according to the NCI,[7] and survivors of thyroid cancer require lifelong treatment with a synthetic thyroid hormone essential for metabolism and other physiological functions. Thyroid irradiation has also been linked to other thyroid disorders, such as autoimmune hypothyroidism, autoimmune thyroiditis, hyperthyroidism incident to Grave's disease, and thyroid nodules.[8] Estimates of the level of dose at which these effects occur vary considerably.

Some of the highest thyroid doses in the country were in areas far from the test site.

While NCI has not estimated the number of children who were put at risk due to fallout, simple demographics coupled with the published numbers indicate that millions of people who were under 15 during the period in question may have received over 10 rad. Doses to girls may be of particular significance, as the incidence of thyroid cancer among women is more than twice that of men.[2]

Iodine can be inhaled, or ingested through contaminated eggs, cottage cheese, or leafy plants and vegetables. But the main pathway of exposure was through ingestion of contaminated milk. As fallout settled on fields and pastures after each test, cows and goats would eat the grass and the iodine would become concentrated in their milk. Children received higher doses because in general they consumed more milk than adults, and their thyroids were smaller and growing more rapidly. The estimated 20,000 people in the country at the time who drank goat's milk also received higher doses—up to 20 times greater than those drinking cow's milk—because goat's milk concentrates iodine-131 more than cow's milk.[10] Doses to goat's milk drinkers could, in the most affected counties, have been as high as 180 to 316 rad.

High doses were not limited to those areas directly downwind of the tests. Local precipitation or wind patterns in areas far from the test site caused selective deposition of fallout, or "hot spots," a phenomenon understood by the Atomic Energy Commission (AEC) from the time of the first test, "Trinity," in 1945. As a result, some of the highest estimated thyroid doses in the country were in areas far from Nevada, such as in Meagher County, Montana, with an average dose of 15.8 rad, and Custer County, Idaho with 15.4 rad. Other high doses were estimated throughout the midwest: 8.6 rad in Lyman, South Dakota (26 to 60 rad for children), and 8.1 rad in Lewis County, Missouri (24 to 57 rad for children).[1]

The Atomic Energy Commission understood early on that locating the test site in the western part of the

See **Milk**, *page 11*

Worker Doses *from page 1*

directly measure radionuclides in workers' bodies. The DOE was not required by regulations to calculate worker doses, but only to keep records of whether workers were internally exposed to more than certain amounts of radionuclides.

The lack of historical internal dose data in worker dose records has important consequences for public policy on health issues, for scientific investigations of radiation risk, and most of all for the more than half a million workers (and their families) who have been involved since the Manhattan Project in making and testing US nuclear warheads. In 1989, DOE began to correct this historical problem by initiating a program of investigating internal and external worker doses.

Exposure Limits

Limits for allowable exposure have varied over the years, and have generally tended to decline as evolving knowledge about the cancer risks from radiation indicated that the dangers it posed were greater than previously thought. (See Centerfold.) In order to ensure that workers are not overexposed, the most important routes of exposure must be properly monitored. Consideration must also be given to the fact that ionizing radiation affects people in various ways.

When only external radiation is involved, measurement of worker dose is accomplished by the use of film badges, (small photographic plates sensitive to gamma and beta radiation), or thermoluminiscent dosimeters (reusable devices that measure external radiation—also referred to as TLDs). These devices can measure how much radiation a worker has been exposed to, but not the amount of radiation that may have been taken into the body through inhalation, ingestion or other means.

Internal radiation exposure occurs when radioactive materials get inside the body and decay, irradiating nearby tissues. Internal radiation is often more organ-specific than external radiation. If the radionuclides become lodged in particular parts of the body, such as the lungs or bones, for instance, these areas are irradiated far more than others. Risk of internal exposure is high in workplaces where the air becomes contaminated with radioactive materials or dust, as has frequently occurred in various kinds of uranium processing plants and in uranium mines. Workers can also be exposed internally through ingestion of radioactive materials (if the radioactive materials get into the mouth from the air, for example) or by absorption through wounds or cuts.

From the beginning of the nuclear era until 1989, internal radiation doses were not calculated or included in worker dose records.

Internal exposure is less likely in situations where the radioactive materials are sealed or separated in some other way from the work environment, such as in glove boxes. However, if accidents occur in these situations, or if equipment such as a ventilating system or glove box is not efficient or in proper working order, then workers could be exposed internally as well.

For almost the entire period of nuclear weapons production, limits have been imposed on exposure from both internal and external routes. Some current limits apply to combined external and internal exposure, while past limits have applied specifically to particular organs, such as the lungs. For instance, the limit for lung exposure until 1958 was 15 rem per year for workers and off-site populations. It was lowered for off-site populations to 1.5 rem per year in 1959.

Monitoring Doses

Internal dose is monitored in various ways. One common way is to measure radionuclide concentrations in urine. If one knows the rates of excretion corresponding to various body burdens, then is possible to calculate these body burdens and thereby infer the radiation dose.

Another method is to measure the gamma radiation being emitted by the radionuclide inside the body. Since a portion of gamma radiation penetrates the body, a fraction of the gamma rays emitted by radionuclides inside the body escape outside it. This is measured by putting the worker or part of his or her body into a "counter," which is a chamber that measures gamma radiation. Thus, we have "whole body counters," "lung counters," and so on. Care must be taken to exclude or adjust for other sources of environmental radioactivity in the measurement of internal body burdens, notably radon and its decay products.

Internal doses can also be assessed indirectly by measuring the concentrations of radionuclides in the air in the plant. In areas where exposure is more likely, workers can wear portable air monitoring devices to measure concentrations of radionuclides in the "breathing zone"—that is, in the air very close to their faces. Internal worker doses can be estimated if breathing rates, efficiencies of protective devices worn by workers (if any), and other factors are known.

It is essential that radiation monitoring be carried out accurately and in sufficient detail. For instance, filter badges and TLDs must be stored properly when not in use, so that they are not contaminated between worker exposure times. Also, workers at risk of internal exposures must be monitored frequently enough to accurately determine internal body burdens of radionuclides. This is because over time the body eliminates radionuclides:

See **Worker Doses**, *page 5*

Worker Doses *from page 4*

some are excreted in a very short time, while others are eliminated very slowly. (The amount of time it takes to eliminate half of the body burden of a radionuclide is called its biological half-life.) It is also important to know the chemical form of the inhaled or ingested radionuclide because the rate at which it is eliminated from the body depends on the solubility of the particular chemical compound.

Failure to Monitor

The April 7, 1993 background paper sent to IEER by the US Department of Energy Office of Worker Protection Programs and Hazards Management clearly set forth what IEER had suspected for several years, that

> ...[u]ntil 1989 in DOE and 1991-1994 in the nuclear industry (NRC and Agreement States) internal radiation doses were not calculated [or] for workers. Radiation activity in excess of percent of body burdens were recorded in the DOE prior to 1989

Thus, while workers were being monitored for internal body burdens, these body burdens were not being translated into radiation dose estimates; nor were any radiation dose estimates corresponding to internal radionuclide body burdens entered into the dose records of workers.

While there was no regulatory requirement to actually calculate worker doses, the lack of internal radiation dose estimates in worker dose records means that the records of workers who were at risk of internal exposures are incomplete, misleading, and inaccurate. The degree of incompleteness and inaccuracy will vary from one worker to the next, from one historical period to the next, and from one facility to the next. But the overall result is that *large numbers of workers have received information about their radiation exposures which systematically underrates their actual exposures.*

Another consequence of the incomplete internal dose records before 1989 is that in compensation cases involving workers who had internal exposures, the DOE and its contractors may have based their arguments on incomplete data that underestimated exposures. Many cases may therefore have been unjustly decided against workers. Whether the DOE or its predecessor agencies knowingly omitted internal dose information from some worker compensation cases is, at this time, an open question, but a reasonable one to pose.

While it is not possible to give an accurate estimate of the proportion of the 500,000 to 600,000 workers who have worked for the DOE that were at risk of exposure beyond allowable limits, we note that at the uranium processing plant in Ohio commonly called the Fernald Plant, most workers were at risk in the early years. In fact, in 1955, the worst year for worker exposure, IEER estimates that almost 90 percent of workers were exposed to more than the allowable dose limit of 15 rem to the lung. (See SDA Vol. 5 No. 3.)

There are a number of other direct consequences of seriously incomplete dose records:

- Internal exposures of uranium workers may also have led in some cases to heavy metal poisoning, notably of the kidneys. Such cases could have been better detected had internal dose information been a part of dose records.
- Improper medical diagnoses may have resulted in some cases because dose records were incomplete.
- Corrective measures to improve working conditions were likely delayed or not implemented in many cases because dose records did not show overexposures.

The problem was most acute in the period before the mid-to-late 1960s for two reasons. First, evidence indicates that this was the period when workplace conditions were the dirtiest and when workers were at higher risk of exposure. This observation cannot be used to arrive at conclusions about specific workers or even specific plants. But to date, most of the evidence we have examined indicates that for various reasons, exposures were generally highest in this period.

Second, this period is prior to the availability of counting techniques that allowed for direct measurement of body burdens. Action levels were set for radionuclides in urine. So long as the content of specific radionuclides was below those action levels, body burdens and worker doses were assumed to be below the maximum allowable limits. After lung and body counters became available in the early 1960s, there were delays in using them. Even after they were brought into use, for example in 1968 at Fernald, urine measurements continued to be the main method for monitoring internal dose.

Unfortunately, the monitoring procedure adopted by the DOE and its contractors was flawed. IEER's analysis of Fernald dose records in 1985 revealed the following problems:

- The lung burden inferred from urine data was consistently underestimated because of improper assumptions about the ratio of urinary excretion per unit of uranium lodged in lung tissues.
- Urine was not monitored for all radionuclides.
- Urine monitoring was generally too infrequent to allow for accurate determination of body burdens and their change with time. Since many chemical forms of radionuclides are excreted relatively rapidly, infrequent monitoring was likely to miss doses from accidents and other occasional but high exposures. Further, in many cases, urine measurements were so infrequent that even chemical forms with relatively long biological half-lives would not have been accurately detected. As a result, low urine concentrations may not have corresponded to low exposure, but merely to a long

See **Worker Doses**, *page 6*

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) McDERMOTT, OHIO

Worker Doses, *from page 5*
time lapse between the intake of the radionuclide and the taking of urine samples (or lung counts).

- The solubility of the compound inhaled or ingested was not determined or, if known, was not recorded.
- The relationship of urine sampling time to exposure was, in most cases, unknown.

As a result of all these factors, the assumption that the dose was below allowable limits if the concentration of a radionuclide in urine was below the action level was scientifically unsound. Even when the actual doses were below allowable limits, the internal doses should have been entered into worker dose records and added to external doses in appropriate ways.

Whole-Body and Organ-Specific Doses

Radiation standards limit dose both to specific organs as well as to the whole body. Consider, for example, doses to the lung. The lung may be exposed by external gamma radiation from sources outside the body, resulting in doses essentially equal to those for other organs in the body. It may also be exposed from inhaled radionuclides. In order to ensure compliance with the lung dose limit, which was 15 rem in the 1950s through 1980s, DOE and its contractors only had to consider internal body burdens of radionuclides. (However, as we have indicated, before 1989 internal doses were not calculated from these data.) In most cases, such as at the Fernald plant, lung doses were inferred from measurements of uranium in urine. If these were found to be below allowable concentrations, compliance with the 15 rem/year limit was assumed to have been demonstrated.

In the period since the late 1980s, the regulatory practice has been to use "committed effective dose equivalents."[2] In this model, "effective dose" is calculated by multiplying doses to individual organs or tissues, like the thyroid, bone tissue, or the lung, with a weighting factor that accounts for the relative likelihood of cancer mortality from exposure to a particular organ. This allows exposures to a single organ and exposure of the whole body to be considered together. Further, internal organ doses are calculated on the basis of a fifty-year "committed" dose —that is, the entire dose from a radionuclide to an organ over a fifty year period (in most cases, the majority of the dose is delivered in a few years or less). These two concepts, "effective dose equivalent" and "committed dose" are put together to arrive at "committed effective dose equivalent." For regulatory purposes, the entire committed dose is attributed to the year in which the radionuclide is incorporated into the body. But even in this new practice, the organ doses arising from internal radiation must be known, because without that data, the correct effective dose equivalent cannot be calculated. This change in regulations requiring calculation of effective dose equivalents caused DOE to begin to move to a policy of integrating internal and external radiation doses.

The same institutional outlook that put weapons production before environmental protection also relegated sound worker dose records into second place until after the Cold War.

While the unavailability of precise scientific techniques before the mid-1960s would have precluded accurate internal dose assessment, the doses could have been inferred from urine data and integrated into dose records, but were not. After the mid-1960s, the AEC and its contractors could have made relatively accurate worker dose estimates, but still failed to do so. It would appear that the same institutional outlook that put weapons production before environmental protection also relegated sound worker dose records into second place until the Cold War began to wind down.

Consequences of Underestimating Dose

Underestimation of internal doses is not just poor practice for worker health protection. It also creates problems for epidemiological studies. Accurate epidemiological work is needed to estimate the health risk of radiation exposure, and this requires studies with sound data on doses to various groups of workers.

Cohort studies, for example, compare the health status of people with various degrees of exposure. Such studies are common among worker populations and help to assess the risk of exposure to radiation (or other disease-causing agents). But if worker dose records are distorted by omission of a crucial component of dose, highly exposed workers and workers with low exposures could be jumbled up in ways for which no statistical control is possible.

For instance, studies that consider external exposure only would group workers with low external doses together and those with high external doses in another group. If some or all of the low external exposure group workers had higher internal doses than the high external exposure group, the study would be comparing workers with high exposure to others also with high exposure![3] Such a study would be misleading and tend to underestimate risk estimates. By contrast, if the high external exposure group had even higher internal exposures, the study would also be misleading and would tend to overestimate radiation risk.

See **Worker Doses,** *page 7*

Worker Doses, *from page 6*
The April 1997 DOE background paper also points out that lifetime dose records have not been carefully maintained though the risk to workers is based on lifetime radiation dose. If dose records are not transferred from one contractor to the next at a plant, or from one plant to another when the worker changes jobs, worker health as well as public health is compromised because it becomes impossible to accurately track the health effects of occupational exposure. Of course, this is another complicating factor in doing epidemiological studies and assessing radiation risk.

External Exposure Data

The state of external dose data also needs to be carefully examined. The DOE has admitted the following problems[4]:

- External exposure data are often incomplete and unreliable.
- Raw dose data and electronic versions of the data (which are often used by researchers in studies) do not always agree.
- In some cases, worker dose records contain entries stating that the dose was zero, regardless of what the actual dosimeter reading may have been.

Finally, there were very few measurements made of worker exposure to non-radioactive hazardous materials. But we do know from the nature of work done at nuclear weapons plants that many workers were exposed to or were at risk of exposure to acids, organic solvents, beryllium, fluorine and fluorides, and heavy metals.

As a result of all of these problems we can conclude that knowledge of workplace exposure during nuclear weapons production and testing was poor, and the results of at least some epidemiological studies are likely to be misleading. At present, it is impossible to say what health effects might be revealed by properly conducted studies. But we can say with confidence that the radiation doses for large numbers of workers were higher than those that are apparent from their dose records because internal doses were omitted until 1989, and because there were many deficiencies in other dose records.

1. The background paper was faxed to IEER on April 7, 1997 in preparation for a meeting. An IEER staff member was meeting with the staff of DOE's Office of Worker Protection Programs and Hazards Management on April 11, 1997.
2. This model is adapted from the ICRP 30 dosimetric model. ICRP is the International Commission on Radiological Protection. The model was introduced in publication 30.
3. This kind of situation is quite possible because many important radionuclides, including uranium-235, plutonium-239, strontium-90, and tritium would typically provide low external doses but high internal doses.
4. For more on problems with DOE's external dose data see A. Makhijani, H. Hu and K. Yih, eds., Nuclear Wastelands, (Cambridge: MIT Press, 1995), pp. 262-67.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

A CENTERFOLD FOR TECHNO-WEENIES

Exposure and Dose

This Centerfold provides information about dose in rad and how it relates to energy deposited in tissue, as well as a brief history of the evolution of radiation exposure standards and regulations. We also include additional information about iodine-131 and thyroid doses received by the US public during the years of atmospheric testing.

A rad is defined as the deposition of 100 ergs of energy per gram of tissue. Since the measurement is *per gram*, then the same dose in rad can reflect very different radiation exposures, depending on the mass into which the energy is deposited:

If the dose is:	... and the total mass into which the energy is deposited is:	... then the total energy deposited is:
2 rad	2 grams (weight of an infant's thyroid)	400 ergs*
2 rad	20 grams (weight of an adult's thyroid)	4,000 ergs
2 rad	70,000 grams (the official definition of "standard man" in radiation protection practice; equal to about 154 lbs.)	14 million ergs

Conversely, the same amount of deposited energy can result in very different *doses*, depending on the mass into which the energy is deposited:

If the total energy deposited is:	... and the total mass into which the energy is deposited is:	... then the dose is:
4,000 ergs	2 grams (weight of an infant's thyroid)	20 rad
4,000 ergs	20 grams (weight of an adult's thyroid)	2 rad
4,000 ergs	70,000 grams (the official definition of "standard man" in radiation protection practice; equal to about 154 lbs.)	0.0006 rad

* In everyday terms, an erg is a very small amount of energy. It takes almost 1.5 million ergs to light a 40-watt bulb for one hour. But in the context of the tiny cells that make up living beings, 100 ergs is a large amount of energy. One erg is enough energy to disrupt tens of billions of the chemical bonds that hold molecules together.

For more on rad, rem and roentgen, see "Dear Arjun," page 13.

Iodine-131

- **General:** Its name is from the Greek word "ioeides," meaning "violet colored," after the violet color of iodine in a gas form. As a solid it is shiny, black and non-metallic. In its non-radioactive form occurs on land and in sea in sodium and potassium compounds, and is necessary for proper functioning of the thyroid.
- **Half-life:** 8.04 days
- **Atomic number:** 53.
- **Decay mode:** beta radiation.
- **Sources:** Fission product created in nuclear reactors and in nuclear weapons explosions.
- **Release of iodine-131 per kiloton of fission explosive power:** 125,000 curies.
- **National Cancer Institute estimate of iodine-131 releases from the Nevada Tests:** 150 million curies.
- **Organ most affected:** thyroid.
- **Main pathway:** milk.
- **Other pathways:** ingestion of other dairy products, vegetables, fruits, and eggs; inhalation; and external irradiation.
- **Direct physical effects:** radioactive iodine damages or destroys thyroid cells.
- **Health effects:** Increased risk of thyroid tumors, notably in children. Likely increase of thyroid cancer risk in children exposed before the age of 15 years. Children under five at highest risk. Females have more than twice the risk of males. Linked to other thyroid disorders, such as autoimmune hypothyroidism, autoimmune thyroiditis, hyperthyroidism incident to Grave's disease, and thyroid nodules.
- **NCI estimate of thyroid dose from Nevada Tests averaged over entire country:** 2 rad.
- **NCI estimate of thyroid dose to children aged 3 months to five years in high fallout areas:** 27 to 112 rad.
- **Official iodine-131 release estimate from Chernobyl:** 7.3 million curies – decay-corrected to ten days after the start of the accident.
- **Iodine-131 inventory in the Chernobyl reactor on April 26, 1986, the day the accident started:** approximately 85 million curies.
- **IEER's rough estimate of actual releases from Chernobyl over the course of the ten-day fire:** 10 to 15 million curies (assuming the official estimate of a 20% release fraction is correct)

1931–34	US Advisory Committee on X-Ray and Radium Protection (precursor to the National Council on Radiation Protection and Measurements) adopts X-ray "tolerance dose" of 0.1 roentgen *per day*.
1940–41	US Advisory Committee proposes, but does not implement, lowering the X-ray tolerance dose to 0.02 roentgen *per day*
1942	U. of Chicago Metallurgical Laboratory adopts a "maximum permissible exposure" standard of 0.1 roentgen *per day*. Becomes standard for entire Manhattan Project.
1954	Atomic Energy Commission adopts National Bureau of Standards recommended dose limit of 5 rem *per year*. Sets additional limits for internal exposures at 15 rem per year for most organs.
1959	Dose limit for workers remains 5 rem per year. AEC also adopts dose limits for the public equal to one-tenth of those allowed for workers: 0.5 rem for external exposure; and 1.5 rem for most organs for internal exposure.
late 1980s –1990	Department of Energy adopts dose limit for the public of 100 millirem (0.1 rem) per year; dose limit for workers remains 5 rem per year. A new model for calculation of internal doses to workers is adopted, the "*committed effective dose equivalent*." (See main article.)
1991	International Committee for Radiological Protection recommends worker dose limit be reduced to 2 rem per year. Recommendation is not adopted by DOE.

NOTE: For external radiation [illegible] roentgen and rem are [illegible] equivalent.

Sources: [illegible]

Commentor No. 80: Portsmouth-Piketon Residents for Environmental Safety and Security (Cont'd.) McDermott, Ohio

IEER Releases New Report on "Clean-up" of Nuclear Weapons Complex

More than half a century of nuclear weapons production in the United States has created tens of millions of cubic meters of long-lived radioactive waste, decommissioning problems associated with thousands of contaminated facilities, and environmental problems involving contaminated land and water. The production of 70,000 nuclear warheads and bombs would have resulted in a problem of environmental remediation and waste management in any case. But the neglect and mismanagement of radioactive and toxic wastes have created problems that are far more costly than they might have been: some appear to be intractable with current technology.

IEER's newly released report, *Containing the Cold War Mess*, looks at the problem of environmental remediation and waste management of the nuclear weapons complex through case studies of three rather different problems, each important in its own way: a) transuranic waste management; b) high-level waste tank farms at Hanford; and c) radium- and thorium-contaminated waste at Fernald. It also outlines alternatives that could be considered in reforming the environmental management program of DOE. The main findings of this report and a summary of recommendations are given below.

Main Findings

1. Nuclear weapons production and associated activities have created tens of millions of cubic meters of dangerous wastes and roughly two billion cubic meters of contaminated soil and water.

2. Since 1989, DOE has made considerable progress in characterizing many of the crucial problems of environmental remediation and waste management in the nuclear weapons complex, but much remains to be done.

3. DOE is proceeding with the most expensive environmental program in history without national remediation standards to govern and guide the process.

4. Despite about $40 billion dollars in expenditures since 1989, DOE does not have a sound direction, plan, priorities, or implementation strategy for dealing with remediation and waste management problems. Institutional factors are the single most crucial element in DOE's failure to achieve a sound direction.

The principal institutional problems that we have identified are:

- an attachment to Cold War technologies related to weapons research, development, testing, and production
- a tendency toward "monumentalism"—that is, rushing into big projects without proper preparatory scientific and engineering work (this tendency perhaps deriving from a desire to also maximize the flow of funds into the weapons complex)
- a lack of sound internal scientific and technical peer review that actually matters in decision-making, or in approval and implementation of large projects, and a corresponding tendency to ignore inconvenient extra-departmental advice
- a tendency to approve large budget increases for contractors without thorough engineering-based reviews of the problems that led to the budget changes
- a failure to learn lessons from past mistakes
- an attachment to the Yucca Mountain and Waste Isolation Pilot Project (WIPP) repository programs out of institutional, legal, political, and financial inertia even though these are compromising a much larger effort to remediate the weapons complex, manage long-lived highly-radioactive wastes, and develop a scientifically sound long-term high-level waste management program
- a lack of independent regulation of DOE's nuclear activities.

5. The U.S. waste classification system is an unsound basis for implementing waste management or environmental remediation decisions. (See SDA Vol. 6 No. 1.)

6. DOE is not holding contractors sufficiently accountable for project mismanagement and poor technical decisions.

7. A number of problems cannot be satisfactorily solved with presently available technology. Sound research and development and careful project planning will be needed over a long period.

Main Recommendations

The most important single reform that is needed is institutional in nature. DOE can make internal reforms at once. It should:

- create a project review structure for large projects that is both technical and financial in scope.
- create a standing advisory committee to review projects from early stages through implementation both as regards their technical aspects and the reasonableness of budgets from an engineering standpoint. The majority of members on this committee should be free of conflicts of interest in regard to contracting with DOE or its contractors.
- reinstate the practice of issuing annual Baseline Environmental Management Reports, and make them more complete by including all sites, whether

See **Report**, page 16

Commentor No. 80: Portsmouth-Piketon Residents for Environmental Safety and Security (Cont'd.) McDermott, Ohio

Milk, from page 3

country would result in fallout spreading over most of the country. In a 1948 memo, an Air Force meteorologist advised the committee assigned to finding a test site that "Because the United States is predominantly under the influence of westerly winds, it seems obvious that the eastern coast areas of the United States may provide a suitable site."[13] But the site was located in the west, where the proximity to the weapons laboratories would allow for acceleration of the weapons program.

Doses Avoidable

Iodine 131 is a relatively short-lived radionuclide with a half life of 8 days. (See Centerfold for more information.) Therefore, radioactivity levels in contaminated milk would have decreased significantly several weeks after the time of detonation, making most of the iodine-131 doses to the public avoidable. Contaminated milk could have been dumped or diverted from the market and used for products such as dried milk, butter or cheese, which take longer to process and would allow time for the radioiodine to decay. But the government made no such provisions, though they were aware as early as 1953 of the "milk pathway," the primary route of exposure for iodine-131 in humans. Warnings about iodine-131 in milk were also issued at the 1955 United Nations Conference on Peaceful Uses of Atomic Energy, where researchers suggested that the then-allowable air concentration limits for iodine-131 were ten thousand times too high and should be lowered:

> This limit should be reduced by four orders of magnitude to assure radiation safety for grazing animals. Approximately the same reduction is required for the safety of humans eating large quantities of fresh garden produce and drinking milk from cows grazing on iodine 131-contaminated pasture.[13]

An Oxford University delegation to the conference stressed that "human beings whose diet consists largely of milk, notably infants . . . because of their youth may be considered super-susceptible to the effects of radiation."[14] The advice of the UN delegates, while ignored by the AEC, was heeded by British officials in 1957 when, after a reactor accident that resulted in a release of 16,000 to 27,000 curies of iodine-131, ordered that milk within a 200-square mile area around the plant be dumped as a health precaution.

But even in the early 1960s, when the milk pathway was widely understood, the US government refused to acknowledge the risk of iodine-131 contamination or take measures to reduce it. In 1962 officials in Utah and Minnesota diverted possibly contaminated milk from the market when iodine levels exceeded radiation guidelines set by the Federal Radiation Council (FRC). In response, the FRC, whose members included the chairman of the AEC and the Secretary of Defense, declared that they did "not recommend such actions" and that such "countermeasures may have a net adverse rather than favorable effect on the public well-being."[15] Further, the FRC made the remarkable determination that their own radiation guidelines should not be applied to fallout without further detailed studies because "any possible health risk which may be associated with exposures even many times above the guide levels would not result in a *detectable* increase in the incidence of disease"[16] (emphasis added). Since thyroid cancers can develop many years after radiation exposure and are therefore not immediately detectable, this reassurance was highly misleading.

While the public was not warned to refrain from milk consumption and was continually reassured that fallout posed no danger, the AEC was providing advance notice of tests, including "forecasts of contaminated areas based on meteorological data"[17] to the National Association of Photographic Manufacturers. This was done so that they could "anticipate local contamination and take preventive action"[18] to protect photographic film from being ruined by radiation exposure. The warning to the photographic industry began in 1951—the first year of testing in Nevada—as a result of the Eastman Kodak Company's threat to sue the AEC over damaged film from nuclear fallout. The warnings continued throughout the atmospheric testing program but were not extended to the public.

Other Doses from Fallout

The United Nations Scientific Committee on the Effects of Atomic Radiation estimates that globally, iodine 131 doses comprise only about 2% of the overall radiation dose from weapons testing (dose integration time to the year 2000).[19] Ninety-eight percent of the dose is from other radionuclides. These calculations do not take hot spots into account, which may increase the relative share of iodine 131 dose. In addition, in areas of high precipitation both in the US and in other countries, hot spots probably resulted in high concentrations of other radionuclides besides iodine-131. Further work is needed to clarify which populations were most affected by testing throughout the world. Soviet and Chinese testing could have affected populations in Alaska, for example, and there may be incidences of hot spots in the Pacific, including Hawaii, from French, British, and US Pacific area testing. There is also evidence from the NCI study that hot spots occurred in Canada and may have occurred in northern Mexico from Nevada tests.

A thorough assessment of the effects of all nuclear testing—not just US tests—is needed so that those at risk of high doses can receive proper screening. Soviet tests, for example,

See **Milk**, page 12

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Milk, *from page 11*

had a larger total fission yield than US tests (110.9 megatons compared to 72.1 megatons), and the combined fission yield of Chinese, British and French tests was 34.2 megatons. IEER estimates that only a small fraction of the cesium-137 in the soil in the eastern United States is due to fallout from detonations at the Nevada Test Site. In light of the NCI findings, we make the following recommendations:

- An international study should be funded to carry out a global assessment of the effects of nuclear weapons testing and should follow a process that is open to the general public.
- France, Britain, China and the former Soviet Union should make public all their data on fallout.
- Further study should be conducted to assess the risk of cancer and other thyroid disorders from radiation doses.
- The US government should provide thyroid screening for those who were children at the time of atmospheric testing living in high fallout areas in the United States. The Agency for Toxic Substances and Disease Registry has suggested screening for those who received a cumulative dose of 10 rad or more while they were age 15 or younger.[20]
- The results of the NCI study should be made widely available to the public in a format that is accessible and understandable so that those who may be at risk can receive proper screening in a manner that reduces risk of disease.

This article is based on an article that appeared in the November-December issue of The Bulletin of the Atomic Scientists, *entitled "Worse Than We Knew." It is available on the web at "www.bullatomsci.org," and on IEER's webpage, "http://www.ieer.org/latest/iodnart.html."*

The full text of NCI's study can be found on the web at "http://www.rex.nci.nih.gov/massmedia/Fallout/contents.html."

1. Howard L. Andrews, "Residual Radioactivity Associated With the Testing of Nuclear Devices Within the Continental Limits of the United States, September 13, 1955, pp. 7-8, supplement to the report of The Committee To Study the Nevada Proving Grounds.
2. A rad is a unit of absorbed dose of radiation, equivalent to the deposition of 100 ergs of energy per gram of tissue. According to NCI, one rad is about equal to the radiation dose from 2 mammograms. (See table in Centerfold.)
3. E.B. Lewis, "Aspects of Somatic Effects of Fallout Radiation," statement in *Fallout From Nuclear Weapons Tests, Hearings Before the Special Subcommittee on Radiation of the Joint Committee on Atomic Energy, Congress of the United States, Eighty-Sixth Congress, First Session on Fallout from Nuclear Weapons Tests, May 5, 6, 7, and 8, 1959,* (Washington: US Government Printing Office, 1959), Vol. 2, p. 1532; and Merril Eisenbud and Thomas Gesell, *Environmental Radioactivity From Natural, Industrial and Military Sources,* Fourth Edition, (San Diego: Academic Press, 1997), p. 312.
4. Elaine Ron, et al., "Thyroid Cancer after Exposure to External Radiation: A Pooled Analysis of Seven Studies," *Radiation Research*, vol. 141, 1995, pp. 259.
5. Iodine-131 decays through beta radiation. Radiation risk for exposure from external gamma radiation is considered to be about the same as that from internal beta radiation. The theoretical reason for this equivalency is that damage to tissue from radiation exposure is not produced by the gamma photons that deliver the energy but by the electrons which are liberated as a result of the ionization caused by the photons. Therefore, in the case of internal iodine-131 doses compared to external X-ray doses, it does not matter if the photon originates externally or internally. "Once a photon liberates an electron, the subsequent events depend only on the properties of the electron and not on the gamma photon that liberated it." Jacob Shapiro, *Radiation Protection, A Guide for Scientists and Physicians,* Third Edition, (Cambridge: Harvard University Press, 1990), p. 22. Of course, in practice, some of the details of the ways in which electrons and photons of various energies transfer energy to living cells can create differences in biological effect.
6. National Cancer Institute Press Release, "Questions and Answers on the NCI Fallout Report," August 1, 1997, pp. 2-3.
7. Ibid, p. 3.
8. Jan Beyea, "Fallout exposures from US weapons tests: health effects other than thyroid cancer," Testimony before the Senate Appropriations Committee on Labor, Health and Human Services and Education, October 1, 1997.
9. National Cancer Institute Press Release, July 25, 1997, p. 1.
10. "Executive Summary, National Cancer Institute Study Estimating Thyroid Doses of I-131 Received by Americans From Nevada Atmospheric Nuclear Bomb Tests," p. 4. (Released in National Cancer Institute Press Packet, August 1, 1997.)
11. NCI, Interim Text, Table Total/01. "Estimates of per capita average (geometric means) GSD individual thyroid doses, associated uncertainties (geometric standard deviations, GSD), and populations in each county of the contiguous U.S. resulting from all tests," pp. 1-51. (Released in NCI Press Packet, August 1, 1997.)
12. Colonel B.G. Holzman, USAF, Staff Meteorologist, memorandum to Admiral Parsons, "Subject: Site for Atomic Bomb Experiments," April 21, 1948. Annex A to US Commanding Lieutenant General J.E. Hull, memorandum to the US Army Chief of Staff, "Subject: Location of Proving Ground for Atomic Weapons," p. 17. [The site suggested was coastal North Carolina. It is important to note that testing in this region would also have caused significant problems, but the suggestion of the site indicates an awareness that testing in the west would cause widespread fallout.]
13. R.G. Thompson, H.M. Parker, and H.A. Kornberg (General Electric Company): "Validity of Maximum Permissible Standards for Internal Exposure," in *Proceedings of the International Conference on the Peaceful Uses of Atomic Energy, Vol. 13: Legal, Administrative, Health and Safety Aspects of Large-Scale Use of Nuclear Energy* (New York: United Nations, 1956), 1956, Vol. 13, p. 205.
14. A.C. Chamberlain, J.F. Loutit, R.P. Martin, and R. Scott Russell, (Atomic Energy Research Establishment, Harwell; Medical Research Council and Department of Agriculture, University of Oxford), "The Behaviour of I-131, Sr-89 and Sr-90 in Certain Agricultural Food Chains," in United Nations, 1958, Vol. 18, p. 360.
15. Federal Radiation Council Press Release, "Federal Radiation Council Position on Current Fallout Levels," September 17, 1962, pp. 1-3.
16. Ibid, p. 2.
17. US Atomic Energy Commission, *Twenty-first Semiannual Report of the Atomic Energy Commission,* (Washington: US Government Printing Office), January, 1957, p. 211.
18. US Atomic Energy Commission, "Report by the Director of Military Application, Summary of Relations between the AEC and the Photographic Industry Regarding Radioactive Contamination from Atomic Weapon Tests, from January through December 1951," January 17, 1952, p. 8.
19. IEER and International Physicians for the Prevention of Nuclear War, *Radioactive Heaven and Earth,* (New York: Apex Press, 1991), p. 37. Figures are based on whole body committed effective dose equivalent.
20. Robert F. Spengler, ed., "Hanford Medical Monitoring Program: Background Consideration Document and ATSDR Decisions," publication number PB97-103039, (Atlanta: US Dept. of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry), July 1997, p. 17.

Errata

In SDA Vol. 6 No. 1 (on radioactive waste management), the entry in the "Radioactivity" column of the "Depleted Uranium" row on the table appearing on pages 10-11 should read "0.2." In that same table, the entry in the "Regulatory Status" column of the "Uranium Mill Tailings" row should read "UMTRA and Uranium Mill Tailings Radiation Control Act."

In SDA Vol. 5 No. 4 (on MOX), lines 9 and 10 of the middle column of page 2 should read, ". . . between 8 to 10 million gallons of liquid waste . . ." Our thanks to James C. Warf of Los Angeles, CA for pointing out this error. *You win $25!* **This is a standing offer to SDA readers! IEER** will award $25 to the first person sending in a correction of arithmetic errors appearing in SDA, as well as our gratitude for keeping us on our toes!

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

"Dear Arjun"

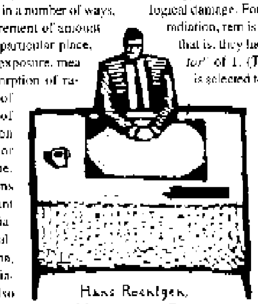
Dear Arjun:
What's the difference between a rad, a rem, and a roentgen?
—Mixed-up in Margaritaville

Dear Mixed-Up:
In the 1960s in the United States, individuals who were deeply involved with the so-called counter-culture were sometimes referred to as *radical,* or "*rad*" for short. There were also individuals who didn't want to rock the boat too much, but still liked to be associated with the counter-culture, who were called "*rem*," short for "regularly enlightened mainstreamers." Everyone else was considered by the rad and rem to be part of the "rank and file," which was later shortened to "*roentgen* file," after a particularly mainstream leader of the time, Hans Roentgen.

But unbeknownst to these radicals, *rad, rem* and *roentgen* had already been used as units to express doses from radiation exposure. Radiation dose is calculated in a number of ways, including measurement of amount of radiation at a particular place, measurement of exposure, measurement of absorption of radioactivity, and of relative effect of that absorption on different organs or types of tissue. Dose calculations take into account the type of radiation involved (alpha, beta, gamma, or neutrons). Radiation doses can also be expressed in standard international units, sieverts or grays (one sievert equals 100 rem, one gray equals 100 rad).

A *rad,* or "radiation absorbed dose," is a unit of *absorbed* dose equivalent to the deposition of 100 ergs of energy per gram of tissue. (See Centerfold for more on rad and ergs.) Since a rad measures deposition of energy *per gram of tissue,* a 2-rad dose to a certain organ, like the thyroid (which weighs roughly 20 grams), reflects a very different total deposition of energy than does a 2-rad dose to the entire body (typical weights range from 40,000 to 100,000 grams).

A *rem,* or "radiation equivalent man," is a unit of absorbed dose that takes into account the relative biological damage caused by the various ways that ionizing radiation deposits its energy in tissue (known as the Relative Biological Effectiveness, or RBE). In general the larger the amount of energy absorbed, the larger the biological damage. For beta and gamma radiation, rem is equivalent to rad; that is, they have a "*quality factor*" of 1. (The quality factor is selected to approximate the RBE as it relates to overall risk, and is used in regulatory practice to convert radiation dose measured by energy deposited to radiation dose measured in terms of biological damage.) For alpha radiation, which involves heavy particles, much more damage is done per unit of energy deposited, increasing the ratio between damage to tissue and energy deposited. The currently accepted quality factor for alpha radiation is 20, but may change as more is learned about damage due to ionizing radiation. Neutron radiation has a varying quality factor between 5 and 20, depending on neutron energy. Rem is the unit used to express regulatory limits for radiation exposures.


Hans Roentgen, Mainstream Guy

A *roentgen* (abbreviated "R" and pronounced "rent-gen") measures gamma and beta radiation dose based on the amount of ionization in the air. It is the common form of calibration of radiation measuring instruments because the beta and gamma radiation ionize air inside the instrument, creating electrically charged particles which can be measured by creating an electric current in the instrument. A roentgen is a unit of radiation dose that causes an ionization charge equal to 2.58×10^{-4} (0.000258) coulombs per kilogram of air.* Because it measures ionization in air and not in tissue, there is no exact, fixed correspondence between roentgen and rad, but an approximate equivalence is that one roentgen equals 0.93 rad for non-bony biological tissue. Since the uncertainties in dose calculation are typically far larger than 7 percent, one roentgen is often considered about equal to one rad, for convenience.

* A coulomb is a unit of electrical charge. The charge of an electron is 1.6×10^{-19} coulombs.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

It Pays to Increase Your Jargon Power

by Dr. Egghead

1. body burden

a. The strain felt by writers when they have written introductory and closing paragraphs, but still have to write the rest of an essay.

b. What diet pill companies want people to believe they have.

c. What you feel when you get the bill from the auto body shop.

d. The amount of a radioactive material deposited in the body at a given point in time (in units of mass or radioactivity).

2. whole body counter

a. A specially-designed surface in diners where customers can eat while lying down.

b. Someone not content to do just a headcount.

c. A hospital employee whose job it is to count how many whole bodies come out of the operating room.

d. A chamber equipped with instruments to measure gamma radiation being emitted from anywhere in the body.

3. ALARA

a. The younger, lesser-known sister of Evita.

b. Name of a failed apple harvesting company.

c. Acting in the manner of Ra.

d. Acronym for "As Low As Reasonable Achievable." Usually "ALARA Principle," which dictates that radioactivity released to the environment and radiation doses be not merely in compliance with regulations, but further reduced below the allowable limits, given the technologies and financial resources available.

4. effective dose equivalent

a. The number of naps taken during the day by a nuclear plant operator working night shifts to effectively enable him or her to stay awake on the job.

b. The dose delivered by a placebo that works as intended.

c. What a swig of whiskey was back in the days before anesthesia.

d. A dose estimate that takes into account the combined effects of internal and external radiation, the selective uptake and distribution of radionuclides, and their varying effects on different organs. The effective dose equivalent is calculated by multiplying the dose to an individual organ, such as the lung, by a weighting factor which addresses the likelihood of a cancer mortality from radiation exposure to that particular organ.

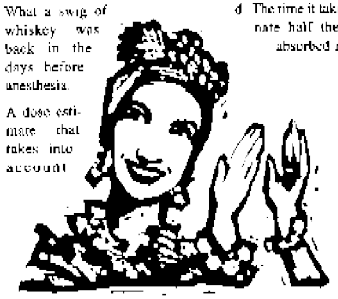
5. biological half-life

a. The time it takes for half a room of biology students to fall asleep.

b. The portion of a soccer player's life spent playing halfback.

c. The time it takes for half a log to decay.

d. The time it takes the body to eliminate half the mass of a given absorbed radionuclide.



ALARA

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

ATOMIC PUZZLER

Gamma dosing on the job . . .

Back in the late 1980s, when Dr. Egghead's trusty sleuthing dog Gamma was just a pup, the Department of Energy began using a method of worker dose calculation referred to as the "committed effective dose equivalent." Even then, Gamma was interested in such things and would entertain himself by calculating effective dose equivalents for workers. (Always the workhound, that Gamma.) He recently fetched his old records and was hoping for some help in completing some unfinished dose estimates. Note that Gamma was at that time learning the Standard International units of becquerels and sieverts, and so was converting from rems and picocuries to sieverts and becquerels. His notes are reprinted below, paw prints, conversions, and all, except for the final dose calculation:

A worker is exposed to an annual average concentration of uranium 238 of 27 picocuries per cubic meter of air—or 1 becquerel per cubic meter of air.

The worker breathes 9.6 m^3 (cubic meters) of air on each working shift (8 hours) and works 200 shifts per year.

The dose conversion factor for the lung is 9.84×10^{-4} rem per picocurie—or 2.66×10^{-4} sieverts per becquerel. (Gamma converted rems to sieverts by dividing by 100. He then multiplied the result by 27 because there are 27 picocuries per becquerel. Try it!)

The weighting factor for the lung is 0.12.

Assuming no other organ is affected, what is this worker's dose in rem? (Note: This dose is called the "committed effective dose equivalent." See main article.) Round to 2 decimal points. What is the committed effective dose equivalent in sieverts?

Hint: The dose conversion factor is used to convert radiation intake into dose. The weighting factor converts the lung dose into the effective dose equivalent.

Gamma the puppy calculating worker doses.

Send us your answers via fax (301-270-9029), e-mail (ieer@ieer.org), or regular mail (IEER 6935 Laurel Ave., Suite 204, Takoma Park, MD 20912), postmarked by Dec. 19, 1997. IEER will award 25 prizes of $10 each to people who send in a solution to the puzzle (by the deadline), right or wrong. There is one $25 prize for a correct entry, to be drawn at random if more than one correct answer is submitted.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Report *from page 10*

closed or operational.

Such internal reforms are unlikely to solve the entrenched problems that we have discussed above. We recommend that President Clinton appoint a commission on Institutional Reform of Environmental Remediation and Waste Management. The commission should hold hearings around the country and make definitive recommendations within a six- to twelve-month period.

Wherever the reform chosen, general technical principles will need to be adopted and reforms implemented to restructure the environmental management program. Specifically, the government should:

1. *Create a new, rational, environmentally-protective system of radioactive waste classification* according to longevity and specific activity, so that comparable hazards are managed comparably.

2. *Coordinate waste management and environmental remediation* and make reduction of short-term risks compatible with minimizing long-term risks.

3. *Approach remediation with independently enforced, national, health-based cleanup and waste management standards*, including specific provisions to protect groundwater resources and mandatory guidelines to keep doses as low as reasonably achievable (ALARA) both for workers and for off-site populations. The ALARA guideline for releasing sites for unrestricted use should be to remediate to background levels, if reasonable, or else to keep doses to under 2 millirem per year (which is the British ALARA guideline).

4. *Suspend the politically expedient Yucca Mountain and WIPP repository programs and put in place a scientifically sound program of long-term high level waste management*, including repository research, sub-seabed disposal research, and research on materials to contain radioactivity that are analogous to natural materials that can last for millions of years.

5. *Provide funds and technical support to communities that have residual contamination* so that they can monitor the environment and keep themselves informed. Such funds are needed to protect communities against future known risks and also against risks due to inadequate characterization or to present incomplete understanding of risks. The size of the fund should depend on the size and character of the residual radioactive and non-radioactive hazardous contamination of land, remaining structures, surface waters, river beds, and groundwater, as well as the total amount of radioactivity and non-radiogenic hazardous material left in disposal areas on site.

6. *Manage non-radioactive toxic components of wastes in ways that do not seriously compromise management of radioactive components.*

7. *Stabilize wastes so as to greatly reduce or eliminate the most serious environmental and health threats* and store it on site while sound long-term management strategies are developed.

8. *Provide the states, Indian tribes, and the public* (with special emphasis on the affected communities and workers) *with timely information* so that they can participate effectively in decision making. ☆

To order a copy of the full 300-page report, see the publication information box on p. 7.

The Institute for Energy and Environmental Research
6935 Laurel Avenue, Suite 204
Takoma Park, MD 20912

Address correction requested.

80 February 20, 1998
Printed on recycled paper.

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COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

The Portsmouth Daily Times
Friday, September 20, 1996
Page A9

Cylinder plug damaged at Lockheed Martin plant

By Martin Poston
Times Staff Writer

The U.S. Department of Energy reported that there was a small release of material at Lockheed Martin Energy Systems in Piketon as a result of a damaged cylinder plug on a 14-ton cylinder, which contained about 16 pounds of uranium-238.

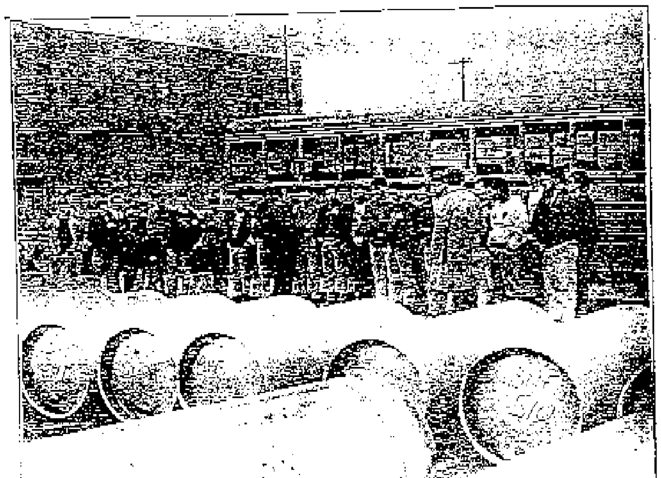
The cylinder plug was replaced, and a precautionary environmental sampling was taken.

Officials at the plant said that a worker was operating a vehicle to move cylinders in a storage yard, when he accidentally struck a cylinder plug on a cylinder that contained uranium hexafluoride. There were no injuries in the accident, and the cylinder contained no enriched uranium.

As a precautionary measure, traffic on the perimeter road of the plant was rerouted for a brief period between the north and west access roads.

Commentor No. 80: Portsmouth-Piketon Residents for Environmental Safety and Security (Cont'd.) McDermott, Ohio

The Waverly News Watchman
April 6, 1993
Page 6
5,900 (Tues. & Thurs.)



Students tour A-plant

Students from the Vern Riffe Joint Vocational School's electricity classes were given a tour of the U.S. Department of Energy's Portsmouth Gaseous Diffusion Plant near Piketon, March 11. [illegible]

Commentor No. 80: Portsmouth-Piketon Residents for Environmental Safety and Security (Cont'd.) McDermott, Ohio

MILITARY TOXICS PROJECT

National Office
471 Main Street, 2nd Floor
Lewiston, ME 04240

phone: (207)783-5091
fax: (207)783-5096
e-mail: mtp@igc.apc.org

February 4, 1998

Charles E. Bradley, Jr.
U.S. Department of Energy
Office of Nuclear Energy, Science and Technology
19901 Germantown Road
Germantown, MD 20874

Copy of this Letter into Records with support From PRESS.

Press is a member group of Military Toxics Project

Dear Mr. Bradley

Secretary Pena recently held a press conference in Washington D.C. to tout his Openess Intiative. We hope that this willingness to be open includes efforts to be more inclusive in DoE's outreach to impacted, or potentially impacted communities.

Specifically of concern to the Military Toxics Project and the Indigenous Environmental Network is the **Draft Programmatic Environmental Impact Statement For Alternative Strategies For The Long-Term Management And Use Of Depleted Uranium Hexafluoride.**

We believe that all of the strategies that proposed have serious environmental justice concerns and potential impacts to communities that you have not adequately reached with the draft PEIS. We also believe that the meetings that the DoE has held in the past, as well as the ones that are beginning on February 19, 1998 in Paducah, are not properly reaching people who are or may be impacted by decisions that your agency will be making regarding the long-term plan for the use of this dangerous material.

Keeping with the spirit and intent of **President Clinton's Executive Order on Environmental Justice**, and Secretary **Pena's Openess Intiative**, we feel that it would be reasonable to request that the DoE initiate roundtable meetings, much like the **Federal Facilities Restoration Dialogue meetings**. We beleive that it is necessary and just to bring in grassroots leaders from community, labor and environmental justice groups to further discuss the implications of strategies that have been proposed.

We further request that the comment period be extended to six months to give these folks the opportunity to meet with you, in addition to the hearings that are taken place now, as well as the opportunity to obtain expert technical advice regarding the impact of the various different strategies.

Please respond to our request in writing. We will be happy to suggest participants for a roundtable discussion.

Sincerely,

Cathy Lemar — Cathy Lemar, Director, Military Toxics Project

Tom Goldtooth — Tom Goldtooth, Director, Indigenous Environmental Network

Dan Fahey — Dan Fahey, Swords To Plowshares

cc: Energy Secretary Federico Pena

MTP is a project of the Tides Center

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COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

1126 Morgan Road
Pittsgrove, NY 12303-1315
(518) 377-8262

June 29, 1997

NY Times Bureau
Attention: Mr. Matthew L. Wald
1627 I Street NW
Washington, DC 20006

Dear Mr. Wald:

I am writing to you regarding an article you published in the NY times on March 14, 1997. The title of the article is, "Danger From Uranium Waste Grows as Government Considers Its Fate." Midway through the article you say, "But there was never enough thought given to the final use of the uranium-238, and the leftovers have accumulated like raisin bran with all the raisins picked out. But this leftover is still slightly radioactive because a little of the uranium-235 remains." This statement that the depleted uranium in the storage cylinders at Piketon, Ohio is only slightly radioactive unfortunately is not true. Contrary to public perception, the uranium-235 isotope plays only a very minor role in the radioactivity of either natural uranium or depleted uranium.

I am a retired physicist who worked at the Knolls Atomic Power Laboratory from 1955 to 1985 in Schenectady, NY. On the 26th of June I testified before Congressman Christopher Shays' Sub-Committee on Human Resources concerning the use of depleted uranium munitions during the Gulf War and its potential as one of the causes of Gulf War Illness, also called Gulf War syndrome. On the panel with me was Dr. Asaf Durakovic, former Chief of Nuclear Medicine Service, Wilmington, DE, Veterans Affairs Medical Center. Dr. Durakovic is an internationally recognized expert on the internal contamination of radioisotopes. A copy of his testimony is attached, in which he states that "DU is still very radiotoxic..."

I would like to illustrate for you the physics reality underlying Durakovic's statement. In Table I I have listed the isotopic compositions of natural uranium and depleted uranium. Using these values I have computed the disintegrations per second of each isotope in one gram of uranium. The results are given in Table II.

Table I. Isotopic composition of natural and depleted uranium in atom percent. The isotopic compositions for uranium-234 (U-234), uranium-235 (U-235), and uranium-238 (U-238) were measured in highly sensitive and accurate mass spectrometers at the Knolls Atomic Power Laboratory, Schenectady, NY.

	U-234	U-235	U-238
Natural Uranium	0.0055	0.7198	99.2749
Depleted Uranium	0.0008	0.2015	99.7947

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Table II. The number of nuclear transformations (disintegrations) per second for each isotope in 1-gram of natural uranium and in 1-gram of depleted uranium. These are the alpha particle activities only.

	U-234	U-235	U-238
Natural Uranium	12280	565	12260
Depleted Uranium	1788	160	12325

Theoretically, the disintegration rates of U-234 and U-238 in natural uranium should be identical, because the U-234 is in secular equilibrium with its parent isotope, U-238, the first isotope in the long uranium decay chain. The slight difference results from using only two significant figures in reporting the 0.0055% and small errors in measuring its abundance by mass spectrometry. From Table II we see that the U-235 activity in natural uranium is 565/(12280 + 565 + 12260) = 0.022, or only 2.2% of the alpha particle activity in natural uranium. Similarly, the U-235 activity in depleted uranium is 160/(1788 + 160 + 12325) = 0.011, or only 1.1% of the alpha particle activity in depleted uranium. Clearly, U-235 contributes little to the total alpha particle radioactivity of each kind of uranium.

But this is not even half of the story about the radioactivity of depleted uranium. U-238 decays into thorium-234 (Th-234); thorium-234 decays into protactinium-234 (Pa-234); and protactinium-234 decays into U-234, etc. down the long uranium decay chain. The thorium and protactinium emit energetic beta particles and gamma rays; both have short half lives and therefore are in secular equilibrium with U-238, i.e. all three isotopes are decaying at the same rate. See Table III.

Table III. Disintegrations per second in 1-gram of natural uranium and in 1-gram of depleted uranium for U-238, Th-234 and Pa-234 in secular equilibrium with each other. Half lives used: U-238 = 4.47 billion years; Th-234 = 24.10 days; Pa-234 = 1.17 minutes, 6.66 hours (two decay pathways).

	U-238	--> Th-234	--> Pa-234
Natural Uranium	12260	12280	12260
Depleted Uranium	12325	12325	12325

Note that in depleted uranium the U-238 and its decay progeny are decaying at slightly higher rates than the corresponding isotopes in natural uranium. This is because 0.5% of the U-235 in natural uranium has been removed, as is shown in Table I.

You could not have gotten your statement about the low radioactivity of depleted uranium in storage at Piketon, Ohio from any scientific publication, therefore I assume that someone told you this. Whoever it was, he or she did you a great disservice, because it is so far off the mark that it damages your credibility in the scientific community. Furthermore, Dr. Durakovic's testimony indicates how easily micrometer aerosol particles of uranium can be inhaled and pass from the lung into the blood stream, from whence they can go anywhere in the body. This makes inestimated depleted uranium particles (or any other kind of uranium) extremely dangerous to health. Furthermore, it is well known that the 2.23 million electron volt beta particles (fast electrons) from

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Pa-234 have a range of 0.3-inch in water. Our bodies are at least 75% water and have an average density close to that of water, therefore one of these fast electrons can penetrate the same distance in body tissue. This means that each Pa-234 beta particle can traverse more than 500 body cells, potentially damaging DNA molecules in the nuclei of cells. A sufficient number of these hits eventually will cause cancer.

I urge you to show this letter to someone you trust, a person with a scientific background who understands the physics of radioactive decay chains and can make independent calculations of the results I show in Tables I through III.

For the latest background information available on the depleted uranium munitions issue and its possible link to Gulf War illnesses, obtain a copy of the recently published book, *Metal of Dishonor*. A copy can be obtained from the International Action Center (Sara Flounders/Frank Alexander; Tel: 212-633-6646; Fax: 212-633-2889). It contains a chapter by me entitled, "DU Spread and Contamination of Gulf War Veterans and Others." I submitted it as my written testimony before the Congressional Sub-Committee on Human Resources. Dr. Durakovic can be reached at Tel: 301-681-8258; Fax: 302-633-5490.

A final comment: When are you folks at the New York Times going to stop letting Bill Meslet at *The Nation* run circles around you, scooping you at every turn about the growing scandal surrounding depleted uranium and its use in the Gulf War, and how it is now suspected of causing some of the illnesses being experienced by sick veterans? For example, I testified to the Sub-Committee that in 1979 my colleagues and I at the Knolls Atomic Power Laboratory had measured depleted uranium emissions in air filters exposed at the Knolls site and documented the measurements in a 1980 report. The contamination was coming from the National Lead Industries plant outside Albany, NY, 10 miles east of the Knolls site. We also measured the airborne depleted uranium emissions at another site 26 miles NW of the NL plant. I stated that I had given a copy of my report to the Sub-Committee. Yet, after my testimony, an Army colonel testified that because uranium is dense and heavy, they had measured that it falls to the ground close to a struck vehicle. When Chairman Shays challenged him about my 26 mile fallout statement, the colonel had no answer. At the conclusion of all the testimony, another Army colonel from the Armed Forces Radiobiology Research Institute (AFRRI) made the following statement, "I want to go on record that it is AFRRI's position that depleted uranium is not dangerous." Incredible!

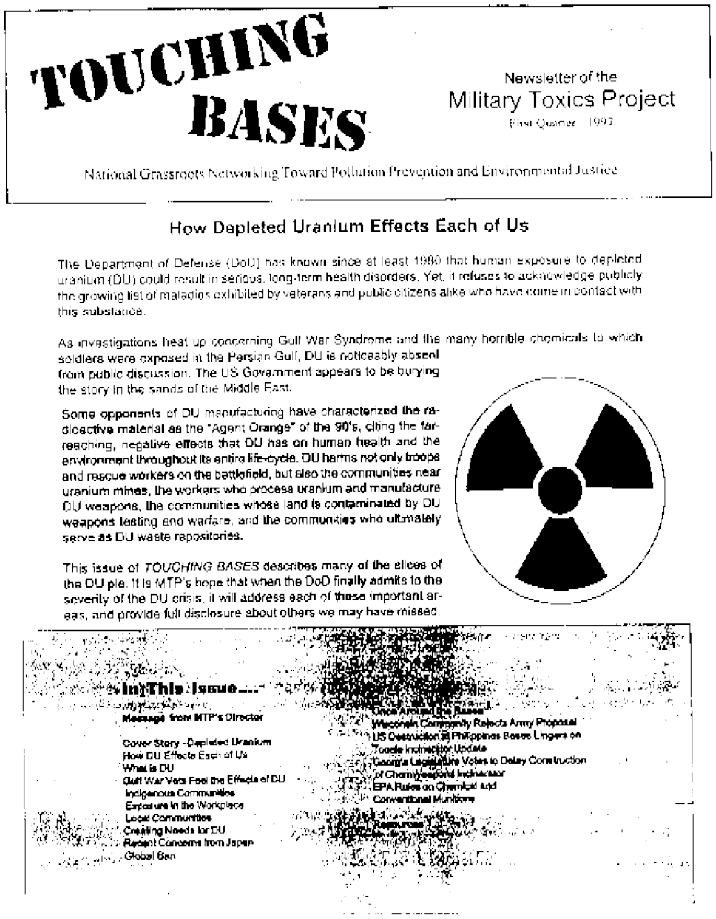
Sincerely,

Leonard A. Dietz

Attachment

Copy to: Philip Shenon, NY Times, 1627 I Street, NW, Washington, DC 20006

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO



TOUCHING BASES

Newsletter of the Military Toxics Project

First Quarter 1997

National Grassroots Networking Toward Pollution Prevention and Environmental Justice

How Depleted Uranium Effects Each of Us

The Department of Defense (DoD) has known since at least 1980 that human exposure to depleted uranium (DU) could result in serious, long-term health disorders. Yet, it refuses to acknowledge publicly the growing list of maladies exhibited by veterans and public citizens alike who have come in contact with this substance.

As investigations heat up concerning Gulf War Syndrome and the many horrible chemicals to which soldiers were exposed in the Persian Gulf, DU is noticeably absent from public discussion. The US Government appears to be burying the story in the sands of the Middle East.

Some opponents of DU manufacturing have characterized the radioactive material as the "Agent Orange" of the 90's, citing the far-reaching, negative effects that DU has on human health and the environment throughout its entire life-cycle. DU harms not only troops and rescue workers on the battlefield, but also the communities near uranium mines, the workers who process uranium and manufacture DU weapons, the communities whose land is contaminated by DU weapons testing and warfare, and the communities who ultimately serve as DU waste repositories.

This issue of *TOUCHING BASES* describes many of the slices of the DU pie. It is MTP's hope that when the DoD finally admits to the severity of the DU crisis, it will address each of these important areas, and provide full disclosure about others we may have missed.

In This Issue....

Message from MTP's Director

Cover Story - Depleted Uranium

How DU Effects Each of Us

What is DU

Gulf War Vets Feel the Effects of DU

Indigenous Communities

Exposure in the Workplace

Local Communities

Cradling Needs for DU

Recent Concerns from Japan

Global Ban

Wisconsin Community Rejects Army Proposal

US Destruction of Philippines Bases Lingers on

Textile Industry Update

Georgia Legislature Votes to Delay Construction of Chemical/Incinerator

EPA Rules on Chemical Aid

Conventional Munitions

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Touching Bases
Newsletter of the Military Toxics Project
First Quarter 1997

Touching Bases is published periodically by the Military Toxics Project (MTP). MTP is a national network of groups working to clean up military pollution, safe-guard the transportation of hazardous materials, and advance pollution prevention at US Department of Defense installations. MTP encourages the translation, reprinting and dissemination of information contained in this newsletter provided that credit is given to *Touching Bases*, Military Toxics Project, First Quarter, 1997.

Guest Editors - Heather Spalding, Mike Hyde

To be placed on the MTP mailing list, to order MTP publications, or to send a donation, write to: Military Toxics Project, 471 Main Street, Lewiston, Maine (ME) 04240, Telephone: 207-783-5091 Fax: 207-783-5096. Email: mtp@igc.org

The Military Toxics Project is a project of the Tides Center.

The Curry Print Shop printed this issue of *Touching Bases*, using non bleached paper and soy-based inks.

A Message From MTP's Director

As we come into Spring, there is a lot of activity in the MTP office, as well as in MTP campaigns. We are glad that we have the opportunity to work with all of you and look forward to continuing that relationship.

This issue of *Touching Bases* is long overdue. All of us are excited about the new look and all the good news that is being reported by all of you. This issue is dedicated to the problems associated with Depleted Uranium (DU). What we hope to do is to show the *full picture* of DU -- from cradle to grave -- and the many lives it has affected. We hope that after you read the information provided, you will get as angry as we are that, thanks to Uncle Sam, these weapons still are being produced, tested, used and disposed of in this country and in others. The Pentagon would prefer that we all just go away and leave this particular subject alone. But, the continued production, testing and use of these weapons has the potential to affect the health of many generations to come. We are going to bring together each piece of the DU pie, so that readers will have the total picture. We hope that you get mad enough to let your Congressional Representatives know what you think of DU munitions.

MTP also is gearing up for Board Elections once again. This is the time to get in your nominations for at-large elections. For members of MTP network campaigns, it is time to start thinking of what member in your network you want to have representing your concerns on the MTP Board. Nomination ballots will be mailed out soon to all network members.

This summer, MTP will hold its annual Board Meeting, which will be open to all MTP members and allies. At this meeting, the Executive Committee will be elected. This will also be the first meeting that new board members will be attending.

Finally, we are so proud of those of you out on the *front lines* in communities, workplaces and veterans organizations that have done so much for so many. Keep up the good work!

Cathy Lamar
Executive Director

80

What Is Depleted Uranium?

The *Handbook of Chemistry and Physics* states, "Uranium is a silvery metal, which is pyrochonic [i.e., capable of igniting spontaneously] when finely divided. It has fourteen isotopes, all of which are radioactive." Naturally existing uranium refined from ore is made up largely of U-238, a relatively stable isotope of the element, from which the highly fissionable isotope U-235 is extracted for nuclear weapons and power uses. After the U-235 is partially extracted (reduced from approximately .7% to .2% of the natural uranium), the remainder is misleadingly called "depleted uranium." It still can be used for nuclear weapons and energy programs by being transformed into plutonium in a breeder reactor, and it is still radioactive and toxic. Recent studies indicate there is no threshold level of radiation below which an exposed person is safe from radiation damage, and though DU is less radioactive than U-235 or plutonium, it remains an extremely harmful substance with the chemically toxic properties of many heavy metals.

Because of uranium's extreme density, DU can be used to make munitions and armor of great density. The penetrators made with DU have great range and velocity -- velocity that gives them an ability to penetrate most kinds of armor (including otherwise virtually impenetrable DU armor, as Gulf War friendly fire casualties demonstrated.

DU burns on impact, spreading into the atmosphere and creating a small-scale fallout of aerosolized uranium particles which can be inhaled or ingested from the air or by contact with contaminated materials and sites. The particles can travel anywhere that dust goes.

Gulf War Vets Feel the Effects of DU
by Dan Fahey, Swords to Plowshares

Armor-piercing projectiles and tank armor made of DU proved highly effective in their first combat test during Operation Desert Storm. However, military commanders blatantly ignored the serious health and environmental impacts of shooting bullets made of radioactive waste. As a result, tens of thousands of soldiers and civilians were exposed to more than 600,000 pounds of DU contamination, which still remains on Gulf War battlefields. Though the proliferation of DU weapons since the Gulf War threatens to accelerate the spread of DU around the world, the impacts of DU weapons can be prevented if action is taken now.

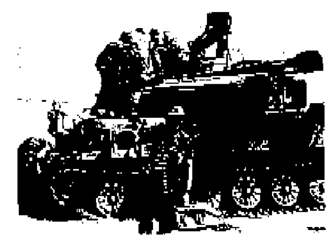


PHOTO COURTESY OF CHRIS KORNKVEN, GULF WAR VET EXPOSED TO DU PARTICLES

When a DU round strikes a target, up to 70% of the round burns, scattering radioactive and chemically toxic dust in and around the target. DU poses its greatest danger to human health when its dust is inhaled or ingested. An Army report on DU completed six months before Desert Storm noted that "aerosol DU exposures to soldiers on the battlefield could be significant with potential radiological and toxicological effects." The same report also stated that "short term effects of high doses can result in death, while long term effects of low doses have been implicated in cancer." Despite these warnings, military officials failed to inform soldiers about the use and dangers of DU weapons during Operation Desert Storm.

During and after the ground war, tens of thousands of soldiers climbed on and entered destroyed vehicles -- many of which were covered in uranium dust -- to look for hiding Iraqi soldiers, to remove any usable equipment, or just to examine the shattered hulks. It was not until a week after the cease fire ending Desert Storm

Commentor No. 80: Portsmouth-Piketon Residents for Environmental Safety and Security (Cont'd.) McDermott, Ohio

that a message was sent to Army commanders warning that "any system struck by a DU penetrator can be assumed to be contaminated with DU." Yet, even after this message was sent, information about the presence and dangers of DU contamination was never passed on to soldiers in the field.

A 1993 General Accounting Office report, aptly titled *Army Not Adequately Prepared to Deal with Depleted Uranium Contamination*, revealed that even the soldiers of the 144th Supply Company of the National Guard, who were tasked with recovering US vehicles contaminated by DU in friendly fire incidents, were never told of "the existence of DU contamination or radiation hazards," and that they worked on contaminated vehicles for several weeks "without any protective gear."

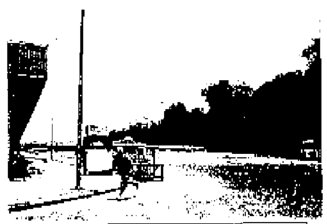
Mark Panzera, who served an active tour of duty for nine months with the 144th Supply Company, reported that more than twenty soldiers worked for five months at the King Khalid Military Camp in Saudi Arabia, cleaning tanks contaminated with radioactive dust. For the first month and a half, the soldiers had no idea that they were dealing with radioactive dust.

In March 1991, the Pentagon sent civilians to the camp to take measurements of the radioactivity. Dressed in full protective gear with rubber gloves, respirators, dosimeters and Geiger counters, the civilians went about their work. After two weeks, they concluded that the soldiers had been exposed to ionizing radiation.

The soldiers got no relief, when their commanding officer ordered them back to work with no additional protective equipment.

When GAO investigators inquired about the widespread lack of awareness among US troops about the use and dangers of DU munitions, Army officials stated that "DU protective methods can be ignored during combat and other life-threatening situations because DU-related health risks are greatly outweighed by the risks of combat." This line of military logic was also used to justify exposing soldiers and civilians to poisonous herbicides such as Agent Orange and radiation from atomic testing and fallout.

In July 1991, a fire broke out at a US Army Base at Doha, Kuwait. Nearly $40 million in equipment and ammunition was destroyed, including 660 DU tank rounds and four fully loaded Abrams tanks. The 660 tank rounds destroyed represented more than 7,000 pounds of highly toxic, radioactive uranium that was spread around the Doha base and ejected into the atmosphere during more than 4 hours of explosions.



Explosion at the U.S. Army base at Doha, Kuwait on July 11, 1991. Photo courtesy of Michael Flores.

At the time of the fire, nearly 3,000 troops were at the base. After the fires burned themselves out, explosive safety personnel returned to identify and clear out unexploded ordinance, followed by other soldiers detailed to clean the area. Soldiers approached burned DU armored tanks, carried debris and shrapnel with their bare hands, inhaled the toxic DU dust -- and never knew it. Soldiers involved in the cleanup of the fire area were not provided any radiation protection equipment, and no contamination cleanup of areas was apparently done.

Several of the National Guardsmen exposed to DU in Saudi Arabia have developed serious health disorders since Desert Storm. Symptoms include headaches, cold sweats, hypertension, numbness in the extremeties, diarrhea, insomnia, bronchitis and renal disorders. Some have had children with birth defects.

Because troops were exposed to many potentially hazardous substances in the Gulf War, it is difficult to determine how much of a role DU had to play in the cumulative health disorders of ailing soldiers. However, Dr. Asaf Durakovic, one of the military's top nuclear contamination experts, recently stated: "Every atom of uranium lodged in a human body is dangerous and a potential health hazard."

80

Dr. Durakovic treated two dozen of the soldiers from the 144th Division who cleaned the DU-contaminated tanks in Saudi Arabia. He accuses the Department of Veterans Affairs of terminating his position with the VA, and harassing him "for pursuing the proper medical management of veterans exposed to depleted uranium." He also claims that medical records of the soldiers he had examined have mysteriously disappeared, an allegation the VA firmly denies.

Since the Gulf War, the Pentagon has downplayed the dangers of DU and the significance of DU exposures in the Gulf War because it does not want to draw negative attention to a prized weapon system. The Department of Veterans Affairs (VA) has accepted the Pentagon's assurances obediently, and denied testing and treatment to other veterans suffering from kidney problems and cancers which may be related to DU exposure. Both the Pentagon and VA have expressed, in writing, a desire to avoid the costs of medical care and disability payments for veterans who develop DU-related health problems.

Dan Fahey works closely with sick Gulf War Veterans as the Legal Assistant for Swords to Plowshares, a San Francisco-based non-profit organization which helps war veterans meet their basic needs. Representing Veterans for Peace, Mr. Fahey also serves on MTP's Board of Directors. He recently released a report entitled The Silence is Deafening: A Report on Exposures of Persian Gulf War Veterans and Others to Depleted Uranium Munitions, which is available from MTP headquarters. ***For more information about Gulf War Veterans' illnesses, contact Swords to Plowshares at 995 Market Street, 3rd Floor, San Francisco, CA 94103, Phone: 415-247-8777.***

The Military Toxics Project organizes activities of the Depleted Uranium Citizens' Network. On November 12, 1994, in Jonesborough, Tennessee, the DU Citizens' Network adopted the following mission statement:

In response to the latest form of military radioactive pollution, the mission of the Depleted Uranium Citizen's Network is to provide outreach and unite people affected by the production, testing, and use of depleted uranium for military purposes; and to demand cleanup, health care, compensation and the end of depleted uranium munitions use worldwide to help ensure the survival of future generations.

For more information about DU weapons and efforts to help Gulf War veterans and civilians impacted by DU, contact:

Depleted Uranium Citizens' Network, Military Toxics Project, 471 Main Street, 2nd Floor, Lewiston, Maine 04240.

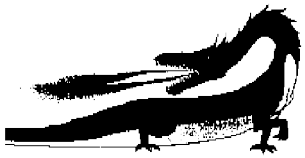
Going to the Source:

How Uranium Mining Destroys Indigenous Communities

By Philippa Winkler, Desert Concerns

Mamat, the Rainbow Serpent, sleeps in the earth, guarding those elements/powers that lie outside of mankind's control. Any attempt made to steal these underworld powers will disturb the serpent and bring destruction and death upon the Earth. -- An Indigenous Peoples' Belief, Australia

When evaluating the need for different materials in modern-day life, it is imperative to go to the beginning of a product's life-cycle. For DU, the life-cycle begins with uranium mining, often on Indigenous lands.



Uranium is mined in many countries around the world, with Australia, Canada, Kazakhstan, Namibia, Niger, Russia, South Africa, the US, and Uzbekistan leading world production. US uranium mining began in earnest in New Mexico, right after World War II, when the US government realized the capabilities of the metal.

Uranium mining in the desert Southwest has left open and permanent scars on the land, which many Indigenous communities hold sacred. Pollution from the mining has resulted in an epidemic of cancer cases.

Since the 1970s, tourism has exploded in the American Southwest. The rivers, washes and canyons, the sandstone and shale, the mesas and the spectacular red "cathedral" rocks are familiar to us from countless magazine photographs, advertisements, and films. But, no tourist brochure mentions the following scenarios:

Since World War II, the Navajo Nation and developers of uranium mines have been engaged in a continuous power struggle. The Navajo Nation has called for an international ban on uranium mining, while the uranium industry has fought such resistance. A moratorium on uranium mining on Navajo lands has been in effect since 1983.

Of more than 2000 Navajo uranium miners who worked in the Four Corners (Northeast Arizona, Northwest New Mexico, Southeast Utah, and Southwest Colorado) mines from 1947 to 1971, most have died of lung cancer and other sicknesses linked to radiation exposure. Yet, only fifty Navajo widows have been compensated under the 1990 Radiation Exposure Compensation Act.

Cancer clusters have been found in Indigenous Peoples -- especially among children and those only living downwind and downstream of uranium mines.

In one community, at Shiprock, New Mexico, the Special Olympics Games take place annually because of the high number of disabled children.

Church Rock, New Mexico, part of the Checkerboard Area of the Eastern Navajo Agency, was the site of a 1979 radioactive waste spill, the largest in US history.

Church Rock is one of the communities targeted by Hydro Resources, Inc., of Dallas, Texas, for involvement in the construction and operation of two uranium mines and related processing plants in the Checkerboard Area. This is the equivalent of recommissioning the nuclear power plant at Three Mile Island.

From 1945 to 1986, more than 13 million tons of uranium ore were mined on the Navajo reservation to make atomic bombs. More than a thousand abandoned, yet highly radioactive, mines have not been cleaned up or reclaimed.

Despite evidence that cancer is ravaging the Navajo communities, the US Government has routinely denied funding for a complete epidemiological study. According to Arizona Department of Health Physiologist Al Goodman, "the highest birth defect rate in the state -- equal to seven times the national average -- was in the Cameron-Gray Mountain area of the Navajo Reservation north of Flagstaff. The area is pockmarked by numerous open pit uranium mines."

In the mid-eighties, the Federal Government began efforts to remove Indigenous Peoples from their ancestral homes in the mineral-rich land of Northwest Arizona. The government intended to mine coal and uranium for further industrial and military uses.

In 1992, the World Uranium Hearings convened in Salzburg, Austria to call for worldwide protection of Indigenous peoples and lands, and the end to nuclear technology. Despite all these efforts, Navajo communities face continual threats. Yet the struggle of Indigenous communities continues.

The Havasupai People, who live at the south rim of the Grand Canyon in Colorado, are current by fighting ura-

nium mine developments, while the Navajo are struggling against planned uranium mining operations in New Mexico.

Philippa Winkler works for Desert Concerns, a project of the World Survival Foundation. The group examines the health effects of uranium mines of the Southwestern US and uranium battlefields of the Middle East. Contact Desert Concerns at PO Box 1145, Clarkdale, Arizona, 86324. Phone: 520-634-4327.

Activists Raising Funds For New Video on DU

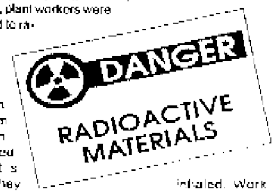
Three organizations, including Desert Concerns, World Survival Foundation, and Southwest Indigenous Uranium Forum, seek funding for a 30-minute documentary on the environmental and human health hazards of uranium mining and depleted uranium. The video will address the entire life-cycle of depleted uranium, and is provisionally titled, *Radioactive Mines -- Radioactive Bullets*. If you would like to contribute to this effort, or assist in fundraising for this important resource, please contact Daniel Robicheau or Philippa Winkler at Desert Concerns, PO Box 1145, Clarkdale, Arizona 86324. Phone: 520-634-4327.

DU Exposure in the Workplace

One of the manufacturers of DU is Aerojet, formerly TNS, Inc., located in Jonesborough, Tennessee. In 1991, employees walked out of their work place in protest of hazardous working conditions.

The plant uses DU to produce armor-piercing projectiles primarily for the US Air Force. Prior to the employee walk-out, the US Department of Energy had been sending a powdery substance known as *green salt* to the contractor in 55-gallon drums. The green salt was actually uranium tetrafluoride which was used to manufacture DU.

At virtually every stage of the production process, plant workers were exposed to radioactive substances, often in the form of contaminated dusts which they inhaled. Workers moved the drums from the warehouse to the plant foundry with a forklift. Often, the forklift pierced the drums, spilling green salt onto the plant floor. When the workers tried to clean up the mess with shovels and brooms, they dispersed it into the air. The weighing and blending stages further spread the hazardous substance around the plant, and onto employees. The exhaust system did little to vent the dust and fumes away from the workers who complained of having green salt in their ears, nostrils and mouths. Workers also described violent furnace blow-outs which expelled contaminated material into the workplace.



Many employees began to complain of discharging black mucus from their noses, having chronic nose bleeds, lower back pain and difficulty in urinating. TNS refused to acknowledge that DU was potentially responsible for the health problems, despite their own records indicating airborne contamination in the plant.

In 1980, more than 8% of the workforce sustained whole body doses of radiation ten times as great as the average exposure for workers in the nuclear industry nationwide.

After the workers' walkout, employee exposure to radiation declined significantly. The plant upgraded the blending and weighing equipment to remote-controlled devices, disposed of the old equipment in a landfill, and installed a new dust collector.

The Oil, Chemical & Atomic Workers International Union (OCAW) represented roughly 100 TNS employees in a 1994 legal suit in the United States Court of Appeals. Although the workers won their suit, the company challenged the ruling, and it was overturned. Since then, OCAW has appealed and is awaiting a final decision.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

DU Weapons Threaten Local Communities

by Judy Scotchie

In 1994, the American public learned that the U.S. government had secretly exposed to radiation its own citizens including pregnant women, teenagers, sick people, atomic plant workers, military and civilian populations - all without their consent during a period from the 1940's to the early 1970's.

Now in the 1990's another involuntary human radiation experiment begun years ago during the Cold War era continues. It is the production, manufacture, development, testing and use of depleted uranium as a military weapon. In the Persian Gulf War the depleted uranium projectile, a weapon made from the nuclear fuel enrichment cycle, was used for the first time. Even though this uranium metal weapon is highly toxic, both chemically and radiologically, it is currently classified as a conventional weapon.

The Army Environmental Policy Institute (AEPI) **"Health and Environmental Consequences of Depleted Uranium Use in the U.S. Army: Technical Report"** of almost 200 pages does not really tell us much about the health and environmental consequences of DU use. There are no long-term health studies of DU production or manufacturing workers and their offspring. Nor are there health studies of residential populations that have been exposed to radiation from aerosol or ingested DU from DU production, manufacturing or testing. There are no health studies of Gulf War Veterans who were exposed to DU through inhalation or ingestion, and there are no studies of these veterans' children born after the Gulf War. How then can there be the following finding in the AEPI report Executive Summary.

> *"After an exhaustive review of weapons systems containing DU, AEPI concluded that the Army has done an excellent job attending to the environmental and health impact of these systems."*

The AEPI report reports specific action on the effects of DU on the environment consists of three paragraphs on pages 145 - 146. In these, only two sources are cited on the effects of DU on plant life. One, Hanson and Miera in 1978, (almost 30 years ago), concluded that in DU contaminated soil most injury occured in the roots of plants. In the other study at Eglin Air Force Base, Florida in 1989, 25 vegetation samples were collected and yucca roots were found to have "the highest apparent radiation concentrations." Is this a scientific basis for concluding what DU's impact is on plant life in the environment? In the report, there is very limited and superficial discussion of the effects of DU on animal life. An ongoing monitoring of plants and animals should be integral to assessing the effects of DU on the environment.

There are 50 different sites in the United States where DU has been produced, developed, manufactured, tested and stored. A major shortcoming of the AEPI report is the lack of consideration given to the health and environmental consequences on the adults and children at the 50 sites.

In Concord, Massachusetts, near Nuclear Metals, Inc. (NMI), there are two middle schools and one elementary school. NMI has been a manufacturing site using uranium metals for 37 years. It is currently one of the two manufacturers in the U.S. of the DU penetrator.

Citizens' Research and Environmental Watch (CREW) has found DU contaminated soil as far away as nine-tenths of a mile from NMI. Among the contaminated areas on NMI's 46.4 acre site is an unlined pit that has 400,000 pounds of uranium wastes which are leaching and migrating.

The State of Massachusetts has designated the NMI property as a Superfund site.

A November 1984 internal memo from the Nuclear Regulatory Commission states, *"migration [of the uranium plume in the groundwater under NMI] might have already reached the site boundry, or at any rate will reach it soon at the projected rate of movement in [bedrock fissures]."*

NMI is but one example of contamination, on and off site, caused by the U.S. Army's use of DU that is not revealed in the AEPI report. How many other examples similar to NMI can be found at the other 49 sites? And what about their nearby neighborhoods, schools, public lands and waterways?

And what of the health of all the people living near those sites? In August 1995, CREW researcher Bill Smith completed a statistical study of cancer in Concord. Using the Massachusetts Cancer Registry data available (1982-1990), Smith found that Concord had a higher incidence of six types of cancer relative to state averages. Concord had the second highest incidence of thyroid cancer in the state, nearly two and a half times the state average. The reason for this higher incidence of cancer is not known.

For further information, contact: CREW, 52 Putnam Street, Concord, MA 01742. (508)369-7146

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

TOXIC SHOTS HEARD ROUND THE WORLD

Radioactive Weapons and Waste in Concord

Sunday, April 27, 1997
3:00 p.m.
First Parish Church
20 Lexington Road
Concord Center, MA

Panelists from Massachusetts, New York, Tennessee and Louisiana will discuss:

* The hazards of radioactive contamination from the manufacture of the depleted uranium penetrator at Nuclear Metals Inc. in Concord, MA and at other sites in the US.

* Clean-up of the toxic and radioactive wastes generated by DU.

* Gulf War veterans' exposure to DU contamination.

Co-sponsored by Grassroots Actions for Peace and the Social Action Council of First Parish Church. Supported in part by the Military Toxics Project Community Exchange Program.

Recent Concerns from Japan

The latest DU weapons incident to hit the news happened on an uninhabited island in Japan in late 1995 and early 1996. The US Marine Corps publicly stated that it accidentally fired 1,520 DU bullets on the island of Tori Shima near Okinawa. While the rounds had been labelled "armor-piercing," they were not specifically marked "depleted uranium."

While the Marine Corps apologized to Japan for firing the rounds and cleaned up 192 of the bullets, it downplayed the likihood that any health or environmental threat remained in the area.

Dan Boyd, a US Air Force spokesman in Japan told Reuter news service that the amount of radiation released on Tori Shima was "absolutely insignificant," and likened it to that of early television sets.

Yet, Japanese officials, citizens and local fishermen are skeptical. Last month, a staffer for a Japanese Parliment member contacted the MTP office asking for information on DU as they try to determine the extent of contamination from the bullets fired on and around Tori Shima.

While the incident on Tori Shima raises concerns about how US military use of DU threatens Japanese communities, it is important to keep the situation in perspective. During Operation Desert Storm, when DU bullets were first introduced, US forces fired 940,000 small-caliber and 4,000 large-caliber DU rounds in combat. Six years after the war, none of the more than 500,000 pounds of DU has been cleaned up, and no apologies have been issued to exposed Gulf War veterans or the populations of Kuwait and Iraq who live amidst this contamination. A classified United Kingdom Atomic Energy Authority report warned in 1991 that depleted uranium contamination on Gulf War battlefields could cause 500,000 deaths among soldiers and civilians.

A Global Ban on DU The Only Solution

By Chris Larson, Patriots for Peace

The first international conference on DU was held at the United Nations (UN) in New York City on September 12, 1996. People from around the world crowded into the standing-room-only hall to learn about the complex DU issue and initiate a global ban on DU weapons through public education.

One conference participant raised the following question: "What would you do if you owned a portion of the US nuclear waste?" The answer: "Essentially, each of us does." Virtually all of us are taxpaying citizens on the grid (using electricity via nuclear power) and thereby own a portion of the waste created. As shareholders in the nuclear waste crisis, each of us has a responsibility to stop the use of waste uranium for further destruction, and to demand environmentally safe and renewable power supplies.

Conference keynote speaker and former US Attorney General Ramsey Clark stressed the need to create a worldwide ban against the use of DU, and many other speakers described their personal experiences with DU. Native Americans, war veterans, scientists and activists all agreed that DU has no place in modern society.

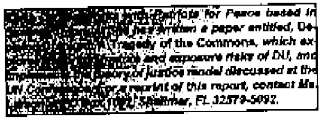
International efforts to curtail the DU problem were evident throughout the forum. Dr. Jay Gould, former Environmental Protection Agency Science Advisory Board member, announced a "tooth fairy" grant that he had received from the United Methodist Church to analyze New England children's baby teeth for proof of DU exposure. A London physician distributed DU fact sheets to the UN delegations. Kenk van der Keur, a Dutch participant, presented information on LAKA, a data collection and research center in the Netherlands that gathers and shares information on nuclear energy issues internationally with interested parties. A film crew from Japan Broadcasting Corporation attended the conference and developed a 50 minute documentary on DU.

Conference participants pondered a Thomas Jefferson decree that citizens hold their government accountable for its actions, and considered a model for constructive, patriotic participation to address the DU problem. The model contains the following three levels of awareness: personal understanding and conviction; interpersonal cooperation, and omni-personal respect for the Commons, or the life-sustaining ecosystem we all share.

Many people at the conference characterized the mainstream media as a major obstacle to accurate information about the DU crisis, and agreed to develop alternative information sources for public education. Conference-goers stressed the importance of seeking alternative news and information sources, and encouraged others to join the **Military Toxic Project's DU Citizen's Network**, which works to ensure that prompt, accurate information about DU is disseminated by grassroots organizations. Participants gathered more than $1800 to begin a comprehensive DU book that will be written in lay terminology.

Nuclear physicist Dr. Michio Kaku delivered perhaps the most inspiring statement of the conference when he proclaimed, "There is one power stronger than plutonium, the power of educated people."

MTP's DU Citizens' Network currently is developing a resolution for global action on DU. The Network seeks to strengthen an August 1995 UN resolution which urges all States to "curb production and spread of weapons of mass destruction" or with indiscriminate effect, in particular nuclear weapons, chemical weapons, fuel-air bombs, napalm, cluster bombs, biological weaponry and weaponry containing depleted uranium." The stronger resolution would ban, not just curb, the production and spread of DU weapons.



Dan Fahey and Chris Larson at the September UAC conference on DU

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.)
MCDERMOTT, OHIO

Metal of Dishonor: How the Pentagon Radiates Soldiers & Civilians With DU Weapons. Published by the International Action Center (IAC), with selections by Dr. Rosalie Bertell, Dr. Helen Caldicott, Ramsey Clark, Dr. Leonard Dietz, Pat Broudy, Carol Picou, Dan Fahey, Dolores Lymburner, Dr. Michio Kaku, Manuel Pino, and Dr. Victor Sidel. Focuses on the environmental and health effects of depleted uranium. Book and companion video to be released in late April 1997. $12.95 plus $4.00 shipping and handling for the first copy. $1.00 for each additional copy. Available at discounted bulk rates for organizing, educational, or fundraising use by community organizations. The companion video - 45 minutes. $20.00 for individuals, $40.00 for institutions plus $4.00 shipping and handling for first copy. $1.00 for each additional copy. All mail orders must be pre-paid. Send check or money order to:

IAC, 39 West 14th Street, Room 206, New York, NY 10011. Phone: 212-633-6646. Fax: 212-633-2889.

Project CENSORED Honors MTP For DU Research

MTP's Depleted Uranium Citizen's Network report, **"Radioactive Battlefields of the 1990s: A Response to the Army's Unreleased Report on Depleted Uranium Weaponry,"** took honors as the ninth most "censored" or "under-reported" story of 1996. Project Censored, based at Sonoma State University in California, identified twenty-five issues to be reviewed in the organization's annual yearbook. Of those issues, the top ten ranked stories will become the primary focus of public discussion on more than 125 radio and television talk shows during the spring and summer. MTP will receive a small cash award from Project Censored for its efforts to educate the public about the environmental and health threats of DU.

Creating Needs for DU

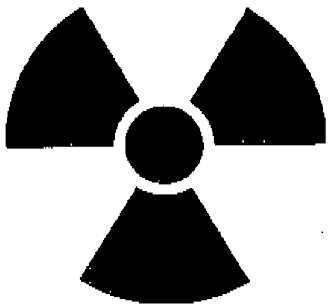
By Dolly Lymburner
National Organizer, MTP's DU Citizens' Network

Depleted uranium has been licensed for a new use by the Idaho National Engineering Laboratory (INEL) as containers for spent nuclear fuel.

The US Department of Energy currently has an estimated 555,000 metric tons of DU that it is trying to dispose of or use. The production of containers for spent nuclear fuel will use large quantities of DU. Originally, the plan was to convert DU into a metal, but this was considered very costly. A cheaper course evaluated by INEL was using a DU rock-like aggregate as an ingredient in concrete. This material is called "DUCRETETM". INEL has completed initial testing and Lockheed Martin Idaho Technologies Company is obtaining patents here in the U.S. and in other countries.

DUCRETETM will replace the concrete and steel casts currently being developed. According to INEL, DU, because of its density, will better shield radiation from spent fuel. They also state that these new casts will be thinner and lighter in weight, making handling and transportation at the storage sites easier.

Teton Technologies, Inc. has formed a partnership with Nuclear Metals, Inc (NMI) to further develop the process and marketing strategy. Initial production will be at NMI's facilities in Barnwell, South Carolina with production starting this year.



COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

ONCE AROUND THE BASES

Wisconsin Community Rejects Army Base Conversion Plan

By Laura Olah, Citizens for Safe Water Around Badger

Environmentalists, local government officials, and regulatory agencies alike rejected a recent Army base conversion proposal in Wisconsin.

At issue is the **Badger Army Ammunition Plant (BAAP)**, a defunct 7,400-acre facility which has been on stand-by since 1975. BAAP has become the focus of a county-wide battle to preserve the area's rural quality of life, its endangered natural resources, and its local economic health.

Opposition to the reindustrialization plan, spearheaded by Citizens for Safe Water Around Badger (CSWAB), arose in response to a September 18, 1995 announcement by **Olin Corporation and the US** Army to initiate an aggressive marketing scheme which would bring the pulp and paper industry; varnish, paint and lacquer manufacturers; ethanol and cosmetics industries; and nitrogenous fertilizer plants to BAAP by 1997.

BAAP identified the target industries in a Strategic Planning Process which excluded nearby communities, local town, village and county boards, planning and zoning authorities, and other stakeholders. Through a nine-month planning process -- costing 275,000 taxpayer dollars -- BAAP hosted no public meetings.

The reindustrialization proposal is the result of the 1992 Armament Retooling and Support Act (ARMS). The ARMS initiative encourages private firms to use Army ammunition facilities (specifically government-owned, contractor-operated facilities) for commercial purposes. The US Government authorized ARMS to create jobs at facilities like Virginia's Radford Army Ammunition Plant, where a recent lay-off resulted in the loss of hundreds of positions. Opponents of the BAAP conversion proposal noted that, by contrast, BAAP had not had a significant job loss since the mid-1970s, and today employs only about 100 people.

Under the ARMS program, the Department of Defense makes contracts available to private industry for one or more years. Companies receive *Facilities Use Contracts* to develop and implement a reuse plan and, in return, receive part of the rent from new industries brought on-site. At BAAP, the operating contractor is Olin Corporation.

One of the objectives of the ARMS program is to perpetuate Badger and other Army ammunition plants as military facilities, avoiding closure and allowing deferral of cleanup efforts. This tactic contradicts a February 20, 1997 report from the Government Accounting Office which concludes that BAAP and three other military plants could be eliminated because alternative sources exist to provide the capabilities that these plants provide.

In the Community around Badger, there is a strong sentiment that the ARMS program is neither applicable nor appropriate for the BAAP facility and Sauk County. A flat labor market, housing shortages, overflowing schools, and other stressed infrastructure are all signs that additional development in the area is not warranted. Community members maintain that other possible uses for the site have not yet been evaluated. The other options may, in fact, provide much greater benefits to the Community than reindustrialization.

One of the assets cited by the Strategic Plan is open, currently undeveloped land. Local residents are very concerned that reindustrialization may promote uncontrolled development of agricultural lands within the plant for new industry. Contrary to statements in the Strategic Plan, there is a decline in available farmland in Sauk County, which is reflected by local farm and preservation ordinances. Moreover, the value of farmland and small farms is highly prized in the area.

BAAP itself lies primarily on the terrain of the former Sauk Prairie, a bioregion which hosts remnants of many diverse ecosystems including prairie, oak savanna, dry forest, southern hardwood swamp and sandy meadow.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

ONCE AROUND THE BASES

The base is also home to a wide variety of animal species including some that have been classified as rare, endangered and threatened. BAAP is surrounded by the Baraboo Range -- a National Natural Landmark. Composed of quartzite, the hardest rock on Earth, it covers 144,000 acres in parts of Sauk and Columbia counties. This 25-mile Range extends from Rock Springs in the West to just west of the interstate highway in adjoining Columbia County in the East. It stands as high as 799 feet above the Wisconsin River and is one of the largest and most ancient rock outcrops in North America.

The Range includes 55,000 acres of forest -- the largest tract of southern upland forest remaining in an ecoregion which covers 40,000,000 acres in parts of five states (central Minnesota through southern Wisconsin, northeastern Iowa, northern Illinois, and northwestern Indiana.) Although the Range covers less than 0.5% of this area, it supports 58% of all breeding bird species, 44% of all mammal species, and 37% of all reptile species found in the ecoregion. This ecoregion is home to more than 18,000 species of plants and animals, including 135 species of breeding birds alone. Seventy-seven of these plant and animal species are rare or imperiled in Wisconsin, and 25 are on the State or Federal lists of threatened or endangered species.

Reindustrialization of the region has met broad opposition at local, state, national and federal levels.

The Town of Merrimac, the Village of Merrimac, the Town of Sumpter, the Town of Honey Creek, the Town of Spring Green, and Sauk County all have passed resolutions opposing the proposed conversion plan. Local business organizations, including the Baraboo Economic Development Council, have drafted resolutions opposing BAAP's proposal, citing unfair competition from new industries coming into the plant which would be exempt from real estate and property taxes. The Sauk Prairie School District Administration also has written to the Army objecting to the negative financial impact on the district.

At least sixteen environmental groups, including the Rural Alliance for Military Accountability, the Sierra Club, the Madison Audubon Society, the Aldo Leopold Chapter of the Society for Conservation Biology, the Baraboo Range Preservation Association, and several chapters of Physicians for Social Responsibility have co-signed a letter opposing the proposed reindustrialization.

The Wisconsin Department of Natural resources, the US Department of Interior, and the US Environmental Protection Agency all have written letters forewarning potentially negative primary and secondary impacts on the adjacent Baraboo Range ecosystem. The Ferry Bluff Eagle Council, a non-profit organization whose mission is to protect wintering American Bald Eagles, has documented serious concerns about the potential harm to this endangered species and its habitat.

In response to the proposed reindustrialization of BAAP, CSWAB hosted a series of four public meetings to encourage and solicit community input and consensus. Public meetings averaged 60 participants. CSWAB has collected more than 600 signatures from local residents opposing reindustrialization.

CSWAB has called for the closure of BAAP, citing that maintenance of the plant -- although out of operation since the 1970s -- costs taxpayers millions of dollars each year. In 1991 alone, maintenance costs exceeded $17 million. Built in 1942 in response to World War II, the BAAP production facilities are obsolete and would require more than $119 million in upgrades to meet current state and federal environmental standards. Environmental damage continues to plague the facility -- since 1975, there have been more than 56 chemical spills and incidents.

Environmental cleanup of the Badger plant, operating intermittently since 1942, is expected to exceed $250 million. Of the 40 contaminated military sites in Wisconsin, the Defense Environmental Restoration Agency has cited BAAP as the most contaminated -- 32 areas within the plant are polluted with high levels of solvents, toxic metals and explosive wastes. Groundwater beneath the plant is saturated with cancer-causing chemicals, including carbon tetrachloride, trichloroethylene and dinitrotoluenes. An area know as the Propellant Burning Grounds is the source of a three-mile long plume of contaminated groundwater that has migrated several miles offsite, polluting private drinking water wells in its path and dumping into the Wisconsin River.

CSWAB was organized in 1990 when the community learned that private drinking water wells near BAAP were polluted with high levels of cancer-causing chemicals. The founders believed that community involvement could have prevented this tragedy and consequently organized CSWAB both to empower and to protect nearby residents and plant workers from further harm. For more information, contact CSWAB at E12626 Weigand's Bay South, Merrimac, Wisconsin. Phone: (608) 643-3124; Fax: (608) 643-0005; Alternate Fax: (608) 643-2662; Email: olah@speagle.com.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

ONCE AROUND THE BASES

PHILIPPINES

Toxic Threat at Former US Bases in the Philippines Lingers On

By Myrla Baldonado

Almost five years have passed since the US Military agreed to terminate operations at Subic and Clark Bases in the Philippines. Despite findings of a 1992 report from the US General Accounting Office which stated that "the costs for environmental cleanup and restoration could approach Superfund proportions," there has been no comprehensive investigation nor clean-up.

To date, the US Government's only act regarding the bases is the release of incomplete Drawdown Reports which were supposed to have been turned over to the Philippines Governments prior to the pullout.

During President Clinton's official visit to the Philippines in 1994, base clean-up advocates managed to put the issue on the discussion agenda, despite the reluctance of both governments to touch the issue.

At a joint press conference of Presidents Ramos and Clinton at Malacanang, President Clinton was asked about the toxic contamination at the former Clark Air Base and Subic Naval Station, his Government's offer of financial and technical assistance, and his willingness to accept the moral and financial responsibility for any necessary cleanup.

President Clinton responded by stating that the U.S. was "continuing to work with the Philippine government on this and will continue to do so." He added, "it is very important not to let the general policy pronouncements or the rhetoric outrun the facts we have on the case, so we decided we should focus on finding the facts now, and when we find them, deal then with the facts as they are."

A few months later, the Philippine Health Department asked for a consultation from the US Center for Disease Control (CDC) to help test the drinking water of wells in an area inside Clark that used to be a motor pool. The official response was that the agency adhered to a US State Department policy of "no responsibility," and that they would send a technical person if the Philippine Government could pay for his transportation and per diem.

During the November APEC Summit in Manila, delegates of the 1996 International Forum on US Military Toxics and Bases Clean-up lobbied for the inclusion of the toxics problem in the bilateral talks between the two governments. As a result, former Secretary of State Warren Christopher and Philippine Foreign Affairs Secretary Domingo Siazon discussed the matter. Secretary Christopher assured US willingness to help with the clean-up, but a quick follow-up by supporters in Washington, DC revealed that the State Department would not confirm what Mr. Christopher said, nor admit knowing anything about it.

The current policy of the US Department of Defense (DoD) requires host countries to demonstrate "imminent and substantial danger" at former overseas bases used by the US Military before it provides further assistance. The People's Task Force for Bases Clean-up, with headquarters in Manila, is targeting DoD's reckless scheme, hoping to shift the burden of proof back to the entity that created the mess in the first place.

The requirement to technically demonstrate imminent and substantial threat is beyond the capacity of the Philippines and many other Third World countries. Thus, the US must responsibly assist its former host countries with the task of meeting this requirement.

Myrla Baldonado is the coordinator of the People's Task Force for Bases Clean-up in Manila. For more information about the ongoing campaign to fight US military pollution in the Philippines, contact the group at: Room 511, J & T Building, 3594 R. Magsaysay Boulevard, Sta. Mesa, Manila, PHILIPPINES. Phone/Fax: 632-716-1084. Email: mbaldonado@ipc.apc.org. The US Working Group for Philippine Bases Cleanup is assisting the Task Force, and can be reached at: PO box 5644, Hercules, CA 94547. Phone/Fax: 510-799-2551.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

ONCE AROUND THE BASES

Chemical Weapons

Activists Call For Permanent Shutdown of Tooele Incinerator

The Kentucky-based Chemical Weapons Working Group (CWWG), the Sierra Club and the Vietnam Veterans of America Foundation have joined forces and filed suit in Federal Court to permanently close the chemical weapons incinerator in Tooele County, Utah.

The US Army owns the Tooele facility, while the defense contractor EG&G Defense Materials, Inc. operates it.

The controversial incinerator has suspended operations six times since it opened in August 1996. The latest shutdown occurred in late January when lethal nerve agent leaked inside the plant to areas often occupied by unprotected workers and visitors.

According to an Army "Unusual Occurrence Report," air pressure adjustments being made to stabilize flame strength in the liquid agent incinerator resulted in agent leaking into two observation corridors. Personnel donned gas masks and evacuated the building. Utah state officials asked the Army to close the facility until they determined the cause of the problem and corrected it.

"Yet another dangerous incident illustrates this plant's defective design, poor operating procedures, and lack of safety culture," said Craig Williams, national spokesman for the CWWG. "Instead of suggesting that the plant should be closed for a couple of days, the State should protect the workers and local residents by suspending the Army's permit until a safe approach can be implemented."

Craig Williams, Senior Investigator, Peace Office of the Chemical Weapons Working Group

Since a trial-burn in July 1996, two former employees of the Tooele incinerator have come forward with evidence of numerous major safety and environmental problems at the plant. This new evidence supports charges made by Steve Jones, the plant's former chief Safety Officer, who EG&G fired in 1994 for refusing to approve the plant's level of safety and environmental compliance.

Former General Plant Manager Gary Miller, also fired for raising concerns about incineration operations, likens the safety mind-set at the Tooele facility to that which preceded the Three Mile Island and Challenger disasters.

On January 8, 1997, former plant employee John R. Hall made public similar accusations and filed a wrongful termination suit against EG&G with the Department of Labor. Mr. Hall claims retaliation and eventual termination due to raising concerns about the incinerator's safety and environmental compliance.

An estimated 180 million Americans live downwind of proposed chemical weapons incinerators, and face the risk of agent contamination.

The Pentagon admits that small amounts of the kinds of nerve agent that may have contributed to Gulf War illnesses are emitted in smokestack exhaust at the Tooele incinerator, yet it claims that the amounts are so low that citizens downwind should not be concerned.

Gulf War Illnesses researcher, Howard Urnovitz, Ph.D., a leading researcher on immune system damage caused by low-level chemical agent exposure said, "Study after study indicates that there is a link between low-level exposure to chemical agents and chronic health problems. There is no proven acceptable level of exposure to these chemicals."

Due to public opposition to incineration, cost overruns, and technical problems at facilities in the Pacific and Utah, the Army announced its recommendation to abandon incineration in Maryland and Indiana to pursue non-incineration technologies. Through the 1997 Defense Appropriations Act, the US Congress has funded and mandated demonstration of safer, non-incineration technologies for assembled munitions, such as those stored in Utah.

"The CWWG advocates the use of alternative technologies," said Mr. Williams. "The Army has demonstrated effective use of such technologies in Maryland and Indiana, so there is no excuse not to do the same in Utah and at all chemicals weapons storage sites."

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

As this issue of *Touching Bases* goes to press, the Tooele chemical weapons incinerator is back up and running, and the Oregon Environmental Quality Commission has issued a permit to begin constructing a similar facility in that state. The CWWG remains committed to shutting down all chemical weapons incinerators, and preventing the permitting of all new chemical weapons incineration facilities.

Georgia Legislators Stall Construction of Alabama Incinerator

In February, the Georgia House of Representatives passed a unanimous resolution calling for a federal hearing on Pentagon plans to build a chemical weapons incinerator in Anniston, Alabama. The proposed facility would be located less than two miles from a school in the community.

The resolution, H.R. 174, includes the following language, which other communities may wish to use when fighting permitting of chemical weapons incinerators:

> Urging the Georgia congressional delegation to urge Congress to request the Environmental Protection Agency to hold public hearings in northwest Georgia, and for other purposes.
>
> Whereas, the Alabama Department of Environmental Management, the United States Army, and Westinghouse plan to construct a chemical weapons incinerator in Anniston, Alabama; and
>
> Whereas, the operation of such a facility has the potential to affect the air quality, health, quality of life, and economy of the residents of northwest and west central Georgia; and
>
> Whereas, other states, including Maryland, Indiana, and Kentucky, have passed legislation precluding the construction of such a facility within their boundaries; and
>
> Whereas, noninciniration and chemical neutralization methods are being studied by the United States Army which may prove to be safer alternatives for the destruction of chemical weapons; and
>
> Whereas, Georgia residents have expressed concern about the construction of such a facility because of issues that might be released into the air and harmful economic repercussions.
>
> NOW, THEREFORE, BE IT RESOLVED BY THE GENERAL ASSEMBLY OF GEORGIA that the members of this body urge the Georgia congressional delegation to encourage Congress to take steps to initiate public hearings conducted by the Environmental Protection Agency in northwest Georgia prior to the construction and operation of the chemical weapons incinerator in Anniston, Alabama.
>
> BE IT FURTHER RESOLVED that the Clerk of the House of Representatives is authorized and directed to transmit an appropriate copy of this resolution to the members of the Georgia congressional delegation.

For more information about the incineration of U.S. chemical weapons, contact: Chemical Weapons Working Group, PO Box 467, Berea, Kentucky 40403. Phone: 606-986-7565. Fax: 606-986-2695

MTP To Sue EPA Over Munitions Rule

On February 13, the US Environmental Protection Agency (EPA) released its final ruling clarifying when conventional and chemical military munitions become a hazardous waste under the Resource Conservation and Recovery Act (RCRA). After reviewing the Rule, the Military Toxics Project (MTP) decided to sue EPA.

Attorney Rena Steinzor, with the University of Maryland Environmental Law Clinic in Baltimore, Maryland, is representing MTP.

Members of MTP's Conventional Munitions Network who reviewed the Rule were outraged by EPA's failure to promulgate legislation that "shall assure protection of human health and the environment," as the directive from Congress clearly states.

"The EPA has proposed that the DoD regulate itself," stated Laura Olah, MTP member and Director of Citizens for Safe Water Around Badger, in Wisconsin. "The EPA has failed to meet its obligation as defined by law, and has let down both communities and Congress by proposing self-regulation."

On December 3, 1995, the Conventional Munitions Network adopted a position on EPA's proposed rule. EPA failed to address most of the concerns that the Network raised more than two years ago.

While States and Tribal Governments will retain their right to adopt and enforce more stringent requirements than those adopted nationally, EPA's final rule:

allows the DoD to determine whether to do anything about the environmental damage caused by munitions scattered over hundreds of thousands of acres of active military ranges;

postpones action on unexploded ordnance and explosive wastes on closed and transferred ranges in part because the DoD has not yet issued its range rule currently under development; and

flagrantly disregards the environmental and cultural impact of military munitions activities on indigenous lands, communities of color, and poor rural communities.

In December, 1994, MTP testified before the National Environmental Justice Advisory Committee (NEJAC) on how the proposed rule did not follow the Presidential Executive Order on Environmental Justice in Minority Populations and Low-Income Populations.

"Our review of problems associated with military facilities suggests that military munitions activities heavily impact many communities of color, other poor, rural communities, and particularly the lands of Native Americans, Native Alaskans, and Native Hawaiians," stated Al Larson, Sr. who represents the Indigenous Environmental Network (IEN) from Chickaloon Village, Alaska. "EPA Administrator Carol Browner signed the final document that fails to protect the health and way of life of my people."

In February, 1994, MTP filed a *Notice of Intent to File Suit of EPA Failure to Act*, and subsequently sued the EPA because it was in violation of the Federal Facilities Compliance Act, which amended the Solid Waste Disposal Act, in which Congress required that the EPA Administrator propose the Munitions Rule by April 1993. MTP brought legal action against the Administrator of the EPA for failure to perform a non-discretionary duty imposed by Congress. MTP filed a consent decree in the US Court of Appeals for the District of Columbia.

MTP has decided to do a special reprint of citizen's testimonies submitted to EPA more than a year ago regarding the EPA's ruling on when conventional and chemical weapons become hazardous waste in light of the recent ruling which effectively allows the Department of Defense to regulate itself. It is clear that EPA ignored the valid concerns of these and many other citizens. The testimonies reprinted below were originally submitted to the Environmental Protection Agency's Resource Conservation and Recovery Act (RCRA) Docket #F-94-MMP-FFFFF.

From Mary Grisco, Chair, Military Accountability Committee, Sierra Club, Alaska Chapter -- January 3, 1995

We of the Alaska Chapter of the Sierra Club, 1200 Alaskans, add our voice of strong concern about the proposed rule on military munitions. We know that if adopted in its current form particularly with the options that allow increased self-regulation by the Department of Defense, our public health will be endangered and our environment more damaged...

...Ft. Richardson, within the Anchorage municipal area, has been "training" at Eagle River flats for years -- exploding munitions that were killing migratory waterfowl and impairing water quality and recreational hunter safety. We spent many years forcing the US Fish and Wildlife Service to force the Army to comply with environmental standards. Only recently did the Army finally announce that it is working to protect our water and wildlife. Ft. Greeley, outside of Fairbanks contains many unexploded ordinance as well as storage areas of unclassified weapons. Neighbors complain of headaches and nausea and wildlife (their subsistence) testing "funky." Ft. Greeley continues training while issuing statements that public health is not being threatened.

These two small examples of the way the Department of Defense conducts business throughout our state lead us to support the critique of the proposed rule adopted by the Military Toxics Project's Conventional Munitions Network. In the Federal Facilities Compliance Act, Congress clearly legislated that the military cannot be allowed to regulate itself. External oversight, including the constitutional right of states to set more stringent standards than those established nationally, are basic for protecting our health and environment. The growing partnership of regulatory agencies and public stakeholders that is emerging in the cleanup of federal facilities requires that the military not be allowed to continue its cold war "announce and defend" mentality. We are the owners of these facilities and expect a level playing field for decision making...

From Bruce K. Gagnon, State Coordinator, Florida Coalition for Peace & Justice -- December 14, 1995

...We write to express our deep concern and outrage that the EPA is even considering allowing the Pentagon to regulate themselves in your proposed rule on military munitions.

We have several munitions impact ranges and disposal sites in our state and know that the military has a poor record of maintaining the health and safety standards at these locations.

In Florida, where our water table is so vulnerable, we are sure that allowing the military to "do as they please" will endanger our drinking water quality as toxic wastes from munitions leaks into the aquifer.

The Pentagon should not be allowed to regulate itself under any circumstance. If the EPA won't stand up to protect the American people then who will?

External oversight, from the EPA and the states must be strengthened, not dismantled.

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

Please make it known that our organization demands that the final rule preserves the intent of Congress to fully protect our communities. EPA should not back down to the Pentagon for one moment...

From Grace Bukowski, Military Land and Airspace Program Director, Rural Alliance for Military Accountability (RAMA), Reno, Nevada -- January 12, 1996

Today, Nevada hosts 20% of our nations military lands (over 4 million acres) including the largest military installation in the western hemisphere, Nellis Air Force Base. The Hawthorne Army Weapons Depot is the site of our nation's largest munitions stockpile nationally. Nevada also hosts the Department of Energy Nevada Test Site, and Fallon Naval Air Station...

...The Defense Department should not be rewarded for their contamination of public lands and Indian lands. Nevada has experienced first hand the hazards associated with off-range bomb contamination of public and Indian lands. Currently, 25,000 acres of public lands surrounding bombing ranges at Naval Air Station Fallon are closed to the public. Five thousand six hundred acres of the Walker River Paiute Reservation are contaminated with live munitions. Instead of cleaning up the land, the Navy is trying to take it over and the proposed rule would allow it. We note that Naval officials knew of this contamination for over a decade and failed to notify the State of Nevada or the Walker River Paiute Tribe

The Defense Department view that withdrawal is the only solution to their careless contamination of public lands, is a bygone concept. We consider rewarding mismanagement a very serious policy issue. The off-range ordnance problem is wholly the Defense Department's doing and the magnitude of the problems points to a record of decades of ... mismanagement of public lands. To ... to the withdrawal of these ... from the public domain as the only solution to contamination exacerbates the known problem. The proposed rule would permit, with EPA blessing, the deliberate contamination of public lands. How will the Defense Department acquire lands in the future? The answer is simple: illegally bomb the perspective lands then request a withdrawal for public health and safety protection...

From Suzanne Marshall, Chair, SAFE (Serving Alabama's Future Environment) -- January 2, 1996

I am writing as Chair of SAFE -- Serving Alabama's Future Environment, an organization of citizens in Alabama who work to end toxic pollution, especially military toxics generated by Fort McClellan and the Anniston Army Depot. We are very concerned about the proposed rule on the military munitions and how it will impact the US chemical weapons disposal program since we are a site targeted for a nerve gas incinerator. We also have weapons testing ranges and non-stockpile chemical weapons at Fort McClellan, which was recently added to the base closure list. Our comment is:

States, such as Alabama, that have chemical weapons stockpiles must keep their right to make and enforce laws regarding chemical weapons disposal that are stricter than federal laws. The incineration of chemical weapons is not acceptable to people in Alabama because it is an unsafe, unproven, out-dated, dioxin-producing technology. The proposed rule could stop our state from passing the stringent, necessary laws to regulate the disposal of chemical weapons and protect the health and safety of our communities...

We advocate the research and development of closed-loop treatment and disposal technologies for chemical weapons and other munitions. The DOD has agreed to look into some of the alternatives. The EPA rule should reflect the need for the development of innovative, citizen approved disposal technologies.

3

COMMENTOR NO. 80: PORTSMOUTH-PIKETON RESIDENTS FOR ENVIRONMENTAL SAFETY AND SECURITY (CONT'D.) MCDERMOTT, OHIO

We support cooperation among the DOD, the EPA, and the public in creating good solutions to military munitions disposal problems. We know that the best solutions come when all affected groups -- especially citizens near disposal sites -- take part in making decisions

We wholeheartedly support the critique of the proposed rule adopted by the Military Toxics Project's Conventional Munitions Network of December 3, 1995. In the Federal Facilities Compliance Act, congress decided that the military should not be permitted to regulated itself -veryobvious,fair,and logical decision. We believe that external oversight, including citizen participation, and state ability to pass tougher laws than those passed nationally, are crucially important if we are truly going to protect the health of people and the environment.

We hope that the final rule will coincide with the intent of Congress -- that the Army should not regulate itself -- and that we can all work together to clean up our world...

Resources

All resources listed below are available from the national headquarters of the Military Toxics Project unless otherwise noted. Checks should be made payable to "Tides Center/Military Toxics Project." **California residents should add 8.5% sales tax.**

Covering the Map: A Survey of Military Pollution Sites in the United States. Co-published by Physicians for Social Responsibility and The Military Toxics Project. May 1993. 116 pp. $15.00.

Fighting Military Toxics: A Citizen's Organizing Manual. Published by the Military Toxics Project. January 1991, 48 pp. **$10.00.**

Citizen's Guide to Military Base Cleanup & Conversion. Co-published by The Center for Economic Conversion and The Military Toxics Project. 1993. 75 pp. $15.00

Chemical Weapons Disposal and Environmental Justice. Published by the Kentucky Environmental Foundation. 33 pp. Free. Contact Kentucky Environmental Foundation, PO Box 467, Berea, KY 40403. Phone: 606-986-7565.

Smoking Guns: The Environmental, Economic and Cultural Impacts from Conventional Munitions. A fact sheet published by the Military Toxics Project. 2 pp. $1.00.

Depleted Uranium: A Tragedy of the Commons. Written by Christina E. Larson, Department of Psychology, University of West Florida. Published in *Peace and Conflict: Journal of Peace Psychology*, 2(3), 217-232. 1996. Lawrence Erlbaum Associates, Inc. Requests for reports should be sent to Christina Larson, PO Box 1052. Shalimar. FL 32579-5092.

Friendly Fire: The Link Between Depleted Uranium Munitions and Human Health Risks. Co-published by The New Mexico Progressive Alliance for Community Empowerment (PACE) and The National Depleted Uranium Citizens Network of The Military Toxics Project (MTP). Second Edition, March 1995. 12 pp. $5.00.

Radioactive Battlefields of the 1990s: The United States Army's Use of Depleted Uranium and its Consequences for Human Health and the Environment. Published by the Military Toxics Project's Depleted Uranium Citizens' Network, January 16, 1996. 7 pp. $5.00.

The Silence Is Deafening: A Report on Exposures of Persian Gulf War Veterans and Others to Depleted Uranium Munitions. Written and published by Dan Fahey of Swords to Plowshares. February 20, 1997, 19 pp. 415-247-8777

Angels Don't Play This HAARP: Advances In Tesla Technology. By Jeane Manning and Dr. Nick Begich. **This book looks at the Pentagon's $30 million HAARP (High frequency Active Auroral Research Program) which is designed to beam more than 4.7 gigawatts (billion watts) of radiated power into the ionosphere. The authors explain how HAARP could not only lead to a new class of military weapons, but also manipulate global weather pat**terns; damage the earth's ecosystem; knock out electronic communications; and change human moods and mental states. Published by Earthpulse Press. 1995. 233 pp. $14.95. Available from Dr. Nick Begich, PO Box 201393, Anchorage, Alaska, 99520. To order by VISA or Master Card, call 907-249-9111.

Deadlines for Submissions to 1997 issues of *Touching Bases*.

Second Quarter - May 16
Third Quarter - August 8
Fourth Quarter - November 7

Direct all submissions to:
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