NRC Staff Comments and ATL Responses on Draft MOX Technical Reports:

"Comparison of the Proposed and Alternative MOX Fuel Fabrication Facility Plutonium Polishing Processes"
and
"Comparison of HEPA and Deep-Bed Sand Filters for Final Air Filtration at MOX Fuel Fabrication Facility"

J. Davis - Comments on ATL Draft of Plutonium Polishing Processes

1. Would NRC prefer the first paragraph of the introduction to describe the review as a "safety" and environmental review (rather than a technical and environmental review)?

ATL Response - The use of the phrase "technical and environmental review" is a direct quote from the scope of work used to describe ATL's duties under Task 1 of contract NRC-02-01-002. Additional wording can be added as requested by the NRC.

2. Document needs technical editing to correct misspellings and grammatical errors.

ATL Response - The final document will be reviewed by ATL's technical editor before submitted to the NRC.

3. The bottom of page 2 describes the uranium stripping process. I recommend the U stripping be shown on Figure 1 as well.

ATL Response - Comment will be incorporated.

4. The advantages and disadvantages of the IX process should be included in section 2.1.2.

ATL Response - Comment will be incorporated.

5. The paragraph at the top of page 5 references the CAR as stating that the "MOX feed chemical impurities maximum content value for gallium given in Table 11.3-27 of the CAR is 12 µg/g Pu (12 ppm)...." however, the Fuel Qualification Plan (and the responses to the ER RAI) states that there must be < 120 ppb of Ga in the MOX feed. This discrepancy should be resolved, or both values listed.

ATL Response - ATL did not have the Fuel Qualification Plan at the time the report was drafted. We will review the referenced documents and revise the report appropriately.

6. Figure 2 lists wastes for the dry process that are not listed in Table 1.

ATL Response - Those other waste streams in Figure 2 were not directly associated with the purification process but rather from either the canning process or resulting from the pit bisection process. Both processes have a decon step so their results may be similar. The waste stream for HEU processing after the plutonium pit has been bisected is unique to the pit disassembly process. Thus, we did not feel they contributed to the comparison between the dry and aqueous plutonium-polishing processes. For consistency, the canning decon wastes will be added to Table 1.

J Davis Comments on ATL Draft of HEPA vs Sand Filters

1. Would NRC prefer the first paragraph of the introduction to describe the review as a "safety" and environmental review (rather than a technical and environmental review)?

ATL Response - See above response to Pu-polishing.

2. Document needs technical editing to correct misspellings and grammatical errors.

ATL Response - See above response to Pu-polishing.

3. The last paragraph on page 1 should make it clear that this report applies only to the two final stages of HEPA filters.

ATL Response - The paragraph will be revised to clarify this potential misunderstanding.

4. Figure 1 looks like air-flow is parallel to the filter media. Is this correct; it seems counter-intuitive?

ATL Response - The figure is meant to show air flowing into the filter. ATL will revise the figure to improve its understandability.

Other comments from 8/9 meeting have been captured in Dave Brown's comments.

D. Brown's comments on ATL's draft of HEPA vs. Sand Filters

5. The report does not address the sensitivity of the cost comparisons to several key assumptions.

   A. For example, the assumed replacement interval of 20 months for every single final exhaust HEPA filter appears conservative. Absent any chemical or physical conditions that will challenge these filters, they will likely remain in place as long

as they meet the limiting conditions for operation on differential pressure and efficiency at each surveillance interval. A more realistic 36 month replacement interval reduces the overall HEPA life-cycle cost from $39 million to $22 million. A 5 year replacement interval reduces costs to $13 million.

ATL Response - It is agreed that the HEPA filters should remain in place as long as they meet the limiting conditions for operation on differential pressure and efficiency. An additional limiting condition for filter life could be the level of radiological contamination trapped by the filter. The assumed 20-month filter life is a conservative number. However, no specific guidance on filter life existed in the construction authorization request (CAR) and ATL selected 20-months as an average of the 18 to 24 month filter life reported by LANL.

B. The assumption that all spent HEPA filters can be disposed of as LLW is non-conservative. Given the relatively low mass of HEPA filters and the assumption that 8 HEPA filters will fit in a B-25 box, the derived TRU concentration for spent filters may well be above 100 nCi/gram (Table 1, 10 CFR 61.55), especially for pre-filters. If one conservatively one assumes that the life-cycle cost for TRU waste applies to all HEPA filters ($6.35 M per facility-wide change-out), the life-cycle cost for HEPA filters jumps to $152.5 M. A more likely scenario might be the disposal of 188 pre-filters as TRU and the 376 HEPA's as LLW.

ATL Response - The pre-filters are spark arresters and will provide very little filtering efficiency. Additionally, it may well be that some of the filters will be disposed of as TRU rather than LLW, it may also be that the majority of the filters can be classified non-radiological waste and disposed of at a commercial landfill. Figure 11.4-11 of the CAR shows only 28 of the 376 filters are in HVAC systems that will contain plutonium or uranium during normal operation of the facility. Six HEPA filters serve the very high depressurization (VHD) system which draws air from the glove boxes and another 24 filters serve the process cell exhaust (PCE) which draws from the process cells in the polishing building. The remaining 348 filters are in the high depressurization exhaust (HDE) which serve the laboratories and the moderate depressurization exhaust (MDE) from the office spaces, and general service areas.

ATL made its initial cost estimate assuming that all of the filters would see some level of radiological contamination and proper packaging of the waste would allow them to be treated as LLW. We will modify our estimate for the final report to include D. Brown's comments.

C. The facility life of 40 years is not consistent with the proposed action, and should be justified. The life-cycle cost, as it would be derived by ATL, is very sensitive to this assumption. I calculated costs for different facility lifetimes from startup to deactivation below:

Years	HEPA	Sand Filters
20	**$19,401,600**	**$33,618,467**
25	$24,252,000	$34,368,467
30	$29,102,400	$35,118,467
35	$33,952,800	$35,868,467
40	**$38,803,200**	**$36,618,467**
50	$48,504,000	$38,118,467

ATL Response - ATL agrees that the 40 life cycle is not in agreement with the proposed action. At the time of the initial report development ATL was not aware that the DOE planned to operate the facility for only 10 years. The final report will be revised to reflect this information.

D. No consideration was given to the operating costs of the two options. The substantially higher differential pressure demand of the sand filter, for example, implies a significantly different power demand (and life-cycle electricity cost) for the blowers.

ATL Response - An increased operating cost of $150,000 per year was included for the operation of the sand filter (page 6, paragraph 6 of the draft report). These monies are an estimate of the difference in operating costs between the HEPA filters and deep-bed sand filter. ATL will revise the final document to better explain this cost issue.

E. The costs of decommissioning appear to have been limited to just disposal costs. The costs of performing decommissioning activities, including administrative and engineered protective measures for workers and the environment, should be a consideration. For example, if the sand filter were ever challenged by a severe accident, one might envision a remote-handled decommissioning effort at substantial cost, similar to DOE's 1-acre Pit-9 site at INEEL, for which estimates exceed $300 M. (There's no bag-in/bag-out device on a sand-filter.)

ATL Response - The administrative and engineering costs for decommissioning either the sand filter or the HEPA filters would be equivalent and thus, would have little or no impact on the life-cycle cost comparison of the two systems.

ATL agrees that decommissioning the sand filters with robotic or remote handling equipment would substantially increase decommissioning costs, just as it would if a severe accident challenged the HEPA filters. In the event of a severe accident the only advantage a sand filter offers would be its robust design. The sand filter is large enough that it would, most likely, absorb a pressure surge that would normally breach the HEPA filters.

The MFFF CAR calls for bag-in/bag-out HEPA filters in the single and intermediate states of the HVAC system. It does not identify bag-in/bag-out devices for the final stage HEPA filters so none were included in the cost of HEPA filter replacement. The use of such a device would reduce personnel exposure and the cost of filter replacement.

ALEX Murray's comments on ATL Draft Report on Plutonium Polishing

Alex Murray's comments on HEPA vs. Deep Bed Sand Filters

1. Overall, the report raises the question if HEPA filters can do the job reliably. As written, the public would get the impression that HEPAs at a DOE site do not work reliably. This is more than an economic argument. The report needs to reconcile the conclusions (either HEPA or sand filters can do the job) with the generally negative findings on the DOE experience with HEPA filters.

ATL Response: ATL agrees that – with proper surveillance and maintenance – the HEPA filter is a more cost effective and slightly more efficient solution. The report will be revised to emphasize this. The key issue for using HEPA filters in the DOE is the documented history of poor maintenance and surveillance from the Defense Nuclear Facilities Safety Board (DNFSB).

2. On page 1, paragraph 2, please check the statement in the last sentence. Is there a clear basis for DOE using sand filters historically? Perhaps for major radiochemical facilities?

ATL Response:

3. On page 1, paragraph 5, please identify which HEPAs are IROFS and credited in the safety analyses. Also, please check the SCFM value of 201,880 and include a reference point for comparison, such as a DOE facility (Purex?) or Melox.

ATL Response: The document will be revised to clarify which HEPA filters are considered important to safety.

4. On page 2, paragraph 2: recommend including portions of the DNFSB quote.

ATL Response: The document will be revised to include quoted material from the DNFSB.

5. On page 2, paragraph 3: please rephrase the last sentence to address the "excellent" generalization; perhaps something like, "The performance history for HEPA filters has shown that design basis performance characteristics can be achieved by proper design and installation, routine testing and monitoring, regular and proactive preventative maintenance, and periodic filter replacement. Without these appropriate management measures, HEPA filter performance may decline and not meet design basis values."

ATL Response: The document will be revised to incorporate the recommended sentence.

6. On page 2, Section 4: recommend listing some facilities (both DOE and commercial) with HEPAs for plutonium/fuels use , and some performance information, both good and bad. If possible, DCS experience with HEPAs should be included - the Melox experience? Perhaps the experience can be correlated to the maintenance programs. Fundamentally, can HEPAs work reliably for Pu applications?

ATL Response: The fundamental question is correct, "Can HEPA Not much information is publicly available on the performance of HEPA filters for plutonium/fuels use in the commercial sector. ATL will research and report on the performance of the filters in other types of commercial facilities and in DOE's

7. On page 3, the paragraph after Figure 1: please explain/clarify how the calculation of 376 HEPA filters was obtained - Figure 11.4 (11.4-11?) of the CAR does not give a total number.

ATL Response: The figure is a summation of the total filters identified on each filter house shown on Figure 11.4-11 (e.g., the VHD HVAC system on the upper right side of figure 11.4-11 shows 2 filter houses. Each filter house is identified as containing "1 cell wide X 1 cell high." Likewise, the MDE HVAC system shown in the lower left of the same figure shows 11 filter houses and each house contains "2 cells wide X 3 cells high."

The number 376 is determined by adding all of the cells in each filter house. A summary of these numbers is shown in the following table:

HVAC System	# of Filter Houses	HEPA Filters/House	# of Filters/HVAC
VHD	2	2	4
PDE	2	12	24
HDE	18	12	432
MDE	11	12	132
Total	33		592

8. On page 4, after paragraph 3: there needs to be some specific assessment about the potential benefits of HEPAs versus the hazards of their not working, poor upkeep etc. - it's more than an economic argument.

ATL Response:

9. On page 4, please clarify if any final HEPAs would be TRU waste (i.e., due to the HEPAs not credited for safety) or what percentage was assumed as TRU.

ATL Response:

10. On page 5, paragraph 1: please include at least one reference for "... similar D&D activities by the DOE ..."

ATL Response:

11. On page 5, Section 5: recommend listing some sand filters and specific info (flow rates, year etc.). F and H canyon sand filters should be included. The DWPF sand filter should also be included. Any commercial examples should be mentioned (GE Morris?). If possible, DOE and commercial experience should be cited. Fundamentally, have sand filters achieved adequate performance? (I think the answer is yes, but "we" have to be clear.)

ATL Response:

12. On page 6, 3rd paragraph from the bottom: a reference is needed for the $150,000 per year value.

ATL Response:

13. On page 6, 2nd paragraph from the bottom: need specifics and a reference for closed DOE sand filters (B semiworks at Hanford?). Also, we need to note what is DOE's current plan/approach for the F/H/DWPF sand filters - if they intend to dispose of in

place, then that should be noted as an option for the MOX facility (the facility would be returned to DOE for D&D) with a potential cost savings.

ATL Response:

14. Page 7 is good but a non-sequitur - it should follow after the 2nd to last paragraph on page 5.

ATL Response:

15. On page 8, the conclusions should add more qualifiers - under 1, "if HEPA filters are properly inspected and maintained, then they provide a slightly higher efficiency. The change in the estimated impact on potential releases from postulated accidents is very small, however, and well within expected uncertainties."
    a. under 3, it is not clear how a HEPA system will work as well as a sand filter during fire and smoke events.
    b. The impacts from in-place disposal of sand filters should be noted in Table 2.

ATL Response:

16. On page 9, first paragraph: it probably should note the effectiveness of the HEPA inspection/maintenance program as being a key consideration. However, it should also note that it is difficult to get around the DNFSB findings.

ATL Response: