



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
WASHINGTON, DC 20555 - 0001**

February 13, 2012

MEMORANDUM TO: R. W. Borchardt  
Executive Director for Operations

FROM: Edwin M. Hackett, Executive Director /RA/  
Advisory Committee on Reactor Safeguards

SUBJECT: INTERNATIONAL ISOTOPES FLUORINE EXTRACTION  
AND DEPLETED URANIUM DE-CONVERSION PLANT  
SAFETY EVALUATION

During the 591<sup>st</sup> meeting of the Advisory Committee on Reactor Safeguards (ACRS), February 9-11, 2012, the Committee considered the staff's draft final Safety Evaluation Report (SER) for the International Isotopes Fluorine Products, Inc. Fluorine Extraction Process and Depleted Uranium Deconversion Plant. The Committee decided not to review the SER and has no objection to the staff's proposal to issue the SER as final. The attachment provides additional information that supported the Committee's decision. No response to this memorandum is required.

Attachment:  
As stated

Reference:

Safety Evaluation Report for the International Isotopes Fluorine Products, Inc. Fluorine Extraction Process and Depleted Uranium Deconversion Plant, dated September XXXX (ML113140271)

cc: A. Vietti-Cook, SECY                      P. Silva, NMSS  
M. Muessle, OEDO                            S. Jones, NMSS  
M. Kotzalas, OEDO                           M. Bailey, NMSS  
C. Haney, NMSS  
J. Kinneman, NMSS

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DATE	02/14/12	02/14/12	02/15/12	

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February 10, 2012

MEMORANDUM TO: J. Sam Armijo, Chairman  
ACRS

FROM: Michael T. Ryan, Chairman /RA/  
Radiation Protection and Nuclear Materials Subcommittee  
ACRS

SUBJECT: SUBCOMMITTEE REPORT REGARDING THE INTERNATIONAL  
ISOTOPES FLUORINE EXTRACTION AND DEPLETED  
URANIUM DE-CONVERSION PLANT SAFETY EVALUATION

On May 25, 2011, the Subcommittee on Radiation Protection and Nuclear Materials met with the staff and representatives from International Isotopes Fluoride Products, Inc (IIFP), to discuss the staff's safety evaluation and ISA findings regarding IIFP's Fluorine Extraction Process and Depleted Uranium De-conversion Plant (FEP/DUP). The facility will convert depleted uranium hexafluoride ( $\text{DUF}_6$ ) tailings into stable depleted uranium oxide ( $\text{DUO}_2$  or  $\text{DU}_3\text{O}_8$ ) for disposal in a low level waste facility, and in the process generate fluoride products for commercial use. The applicant is the first to submit a license application under 10 CFR Part 40, and perform an Integrated Safety Analysis (ISA) to meet Part 70, Subpart H requirements. The following findings resulted from the May 25, 2011 Subcommittee meeting and review of the staff's draft safety evaluation report (SER):

- (1) The principal safety hazard at DUP/FEP is chemical not radiological. Consequences from a chemical release are small because of the very low population around the site, and large distance to population centers.
- (2) The ISA did not identify any sequences that could lead to intermediate or high radiation dose to workers or the public
- (3) Criticality is not a safety issue because of the absence of special nuclear materials.
- (4) The design is simple. The applicant's ISA summary identified only approximately 100 accident sequences, and 38 IROFS.
- (5) No IROFS were identified to specifically protect against radiation exposure.
- (6) A number of operational design features and controls have been implemented for defense-in-depth purposes.

The conclusion reached from the above findings indicates that the IIFP's DUP/FEP poses little risk to workers, the environment, and the public. The staff's SER provides the basis for approving the licensing application and should be issued. Further action by the ACRS regarding the DUP/FEP license application is not necessary.

## DISCUSSION AND SUMMARY

The IIFP Fluorine Extraction Process and Depleted Uranium De-conversion Plant (FEP/DUP) will become the first commercial de-conversion and fluorine extraction facility licensed by the NRC under 10 CFR Part 40. IIFP will also be the first Part 40 applicant to conduct an Integrated Safety Analysis (ISA) in accordance with Part 70, Subpart H, consistent with Commission direction and pending rulemaking. That rulemaking will require applicants authorized to possess 2000 kilograms (4400 lbs) or more of  $UF_6$ , to perform an ISA. FEP/DUP will exceed these criteria by possessing up to 1.65 Mlbs of  $UF_6$ .

FEP/DUP will be built on a remote site of low population near Hobbes, New Mexico. The facility will both deconvert uranium for disposal in a low level radioactive waste (LLRW) facility, and produce byproduct materials for commercial use including silicon tetrafluoride ( $SiF_4$ ), boron trifluoride ( $BF_3$ ) and anhydrous hydrofluoric acid (AHF). Up to (approximately) 1.5 million pounds of  $SiF_4$ , 1.5 million pounds of  $BF_3$ , and 1 million pounds of AHF will be produced annually for commercial use.

Uranium tailings ( $DUF_6$ ) for processing will be received in 14-ton steel cylinders from suppliers that include URENCO, AREVA, and USEC. Plant operation will involve a two step process. The first step will convert  $DUF_6$  to  $DUF_4$ , and produce AHF as by-product material. The second step will produce  $DUO_2$  or  $DU_3O_8$  for disposal, and  $SiF_4$  and  $BF_3$  as commercial by-product material.  $BF_3$  is the major production gas. Once tailings are processed into  $DUO_2$  or  $DU_3O_8$  for disposal, they will be shipped to licensed disposal facilities, either Energy Solutions facility in Utah, or (if authorized) Waste Control Specialists in Texas.

The principal hazard that could impact public health and safety is chemical not radiological, and is primarily associated with HF either from a direct release, or as a by-product from  $UF_6$ ,  $UF_4$ ,  $SiF_4$ , or  $BF_3$  reaction with air. The much lower level radiological hazard results from  $UF_6$ , and its formation into finely divided  $UO_2F_2$  particles that could become an inhalation hazard when exposed to moisture in air. The ISA did not identify any sequences that could lead to intermediate or high radiation dose to workers or the public; nor have any items relied on for safety (IROFS) been identified to specifically protect against radiation exposure.

The applicant's ISA summary identified approximately 100 accident sequences and 38 associated IROFS for meeting 10 CFR Part 70 performance criteria. Process system integrity, structural design criteria, and fire fighting response were classified as the only "sole" IROFS. Fire detection and suppression system have also been included on the list of IROFS. Criticality is not a safety issue at FEP/DUP because of the absence of special nuclear materials. Incoming materials will be assayed to ensure that only depleted uranium will be processed at the facility.

The applicant's ISA is based on the existing level of design and provides a relationship between the hazards, mitigating capability, and consequences. The applicant used a "what if" process hazards analysis (PHA) to identify sequence initiators. The analysis does not quantify the risk, but helps to systematically evaluate features, events, and processes, and brings into focus the more significant safety areas. Risk ranking is not an option using this approach, but with a less complex design and smaller number of sequences and associated IROFS, as is the case with FEP/DUP, the ISA should be adequate for supporting safety decisions.

The staff concluded that through active and passive engineering features, management oversight of the IROFS, and administrative controls, potential accidents at the DUP/FEP plant pose little risk to workers, the environment, and the public. Because of extensive evaluation by the staff, low radiological risk, and measures taken to limit the potential release of chemical material, further review by the ACRS is not necessary.