

November 17, 1994

MEMORANDUM TO: Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

FROM: Robert F. Burnett, Director
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: FOREIGN TRAVEL TRIP REPORT

I am enclosing a Trip Report covering site visits made by Yawar Faraz and John Hickey to the gaseous diffusion uranium enrichment facility and other uranium hexafluoride facilities operated by Cogema in Pierrelatte, France, and the gas centrifuge uranium enrichment facilities operated by Urenco in Gronau, Germany and in Almelo, The Netherlands.

cc: H. Thompson, DECS
G. Arlotto, NMSS
R. Hauber, GPA

Docket Nos. 70-3070, 70-7001, 70-7002

NRC File Center	PUBLIC	
NMSS R/F	KEverly, SEC	
FCSS R/F	JHickey	YFaraz
FCEB R/F	CSawyer	MHorn
DMartin	WSchwink	YChen
RCastaneira	AGiarratana	TWenck
CCain, RIV	VTharpe	KO'Brien, RIII
CCox, RIII	WAxelson, RIII	JKniceley, RIII
EHoller, OGC	Beveridge/Cornell 1-23	
MJuvelus, ADM	RBachman, OGC	

G:\TRIPRPT.MEM

OFC	FCEB	E	FCEB	FCEB	FCSS	FCSS
NAME	YFaraz	DMartin	JHickey	ETen Eyck	RBurnett	
DATE	11/10/94	11/14/94	11/12/94	11/ /94	11/17/94	

C = COVER

E = COVER & ENCLOSURE

N = NO COPY

OFFICIAL RECORD COPY

9411220369 941117
PDR ADDCK 07003070
C PDR

NRC FILE CENTER COPY

NFOS

November 17, 1994

MEMORANDUM TO: Robert M. Bernero, Director
Office of Nuclear Material Safety
and Safeguards

FROM: Robert F. Burnett, Director
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: FOREIGN TRAVEL TRIP REPORT

I am enclosing a Trip Report covering site visits made by Yawar Faraz and John Hickey to the gaseous diffusion uranium enrichment facility and other uranium hexafluoride facilities operated by Cogema in Pierrelatte, France, and the gas centrifuge uranium enrichment facilities operated by Urenco in Gronau, Germany and in Almelo, The Netherlands.

cc: H. Thompson, DEDS
G. Arlotto, NMSS
R. Hauber, GPA

Docket Nos. 70-3070, 70-7001, 70-7002

NRC File Center
NMSS R/F
FCSS R/F
FCEB R/F
DMartin
RCastaneira
CCain, RIV
CCox, RIII
EHoller, OGC
MJuvelus, ADM

PUBLIC
KEverly, SEC
JHickey
CSawyer
WSchwink
AGiarratana
VTharpe
WAxelson, RIII
Beveridge/Cornell 1-23
RBachman, OGC

YFaraz
MHorn
YChen
TWenck
KO'Brien, RIII
JKniceley, RIII

G:\TRIPRPT.MEM

OFC	FCEB	E	FCEB	FCEB	FCSS	FCSS
	YFaraz	DMartin	JHickey	ETen Eyck	RBurnett	
DATE	11/10/94	11/14/94	11/12/94	11/ /94	11/17/94	

C = COVER

E = COVER & ENCLOSURE

N = NO COPY

OFFICIAL RECORD COPY

ATTACHMENT

Trip Report - Cogema Plants in Pierrelatte/Tricastin, France, and Urenco Plants in Gronau, Germany and Almelo, The Netherlands, October 24-28, 1994

Official Travellers:

Mr. John Hickey, Chief, Enrichment Branch
Mr. Yawar Faraz, Project Manager, Enrichment Branch

Persons Contacted:

Mr. Denis Charuau, Marketing and Technical Support Manager, Cogema, Bethesda, MD
Mr. Pierre Netter, Uranium Division, Cogema, Paris, France
Mr. Alain Louis, Reception Shipping and Inspection Manager, Eurodif, Pierrelatte, France
Mr. M. Boissin, Uranium Chemistry Division Chief, Cogema, Pierrelatte, France
Mr. Giraud Heyraud, Plant Manager, Eurodif, Pierrelatte, France
Mr. Bargues, Manager, Comurhex, Pierrelatte, France
Mr. Peter Leroy, Licensing Manager, LES, Charlotte, NC
Mr. Erich Kraska, Senior Technical Manager, Urenco, Washington, DC
Mr. Joachim Pokar, Licensing Manager, Urenco, Julich, Germany
Mr. Hans-Joachim Christofzik, Plant Operating Manager, Urenco, Gronau, Germany
Mr. Kay Ide, Safety and Safeguards and Health Physics Manager, Urenco, Gronau, Germany
Mr. Ben Dekker, Safety and Safeguards Licensing Manager, Urenco, Almelo, The Netherlands
Mr. Brian Miles, Executive Assistant, Urenco, Almelo, The Netherlands
Dr. Norbert Hootsman, Managing Director, Urenco, Almelo, The Netherlands
Mr. Hank Baan, Health Physics Manager, Urenco, Almelo, The Netherlands
Mr. Reint Abbink, Decontamination Manager, Urenco, Almelo, The Netherlands

Sunday

We drove from Marseille airport in an NRC rental car to L'Esplan hotel located near the Pierrelatte/Tricastin site.

Monday

We were given a brief description (including a 30-minute film) of the civilian fuel cycle activities conducted at the Pierrelatte/Tricastin site. Mr. Alain Louis conducted a tour of the gaseous diffusion uranium enrichment plant operated by Eurodif including the enrichment cascades, the central control room and the feed, product and tails stations. A description of the decontamination activities routinely performed by Socatri at the site was presented followed by a tour of the decontamination facility. Later in the morning we discussed safety analysis conducted as required by the facility's license.

Messrs. Boissin and Netter described the process of converting depleted UF_6 to U_3O_8 conducted at Tricastin and conducted a tour of the defluorination facility operated by Cogema.

Tuesday

Mr. Barges conducted a tour of the uranium feed fluorination facility operated by Comurhex. UF_4 is generated from yellowcake at Comurhex's Malvesi plant located about 100 miles southwest of Tricastin. We were also shown the fluorine-generating electrolysis cells and the ClF_3 generating and storage facility. ClF_3 is a very toxic chemical used to remove uranium deposits from process lines, compressors, valves, and converters. In the evening we flew from Marseille to Amsterdam and then drove to Schepers Inn located near the Gronau site.

Wednesday

We were given a brief description (including a 30-minute film) of the centrifuge enrichment activities conducted at the Gronau facility by Messrs. Pokar and Ide. We also discussed safety analyses conducted as part of the licensing process. Messrs. Pokar, Ide and Christofzik conducted a tour of the plant including the tails storage yard, UF_6 handling areas, cascade halls, control room, liquid effluent treatment facility, product blending and sampling areas, UF_6 cylinder weighing station and the centrifuge assembly building. In the evening we drove to Theater Hotel located near the Almelo site.

Thursday

After a brief historical perspective and descriptions of the four centrifuge enrichment facilities (SP1, SP2, SP3 and SP4) located at the Almelo site, Messrs. Dekker and Miles conducted a tour of the latest SP4 enrichment facility. The tour included areas similar to those of Gronau except for the centrifuge assembly building. Later in the afternoon, Messrs. Dekker and Miles described the safety program instituted at the Almelo site.

Friday

Messrs. Dekker, Miles, Baan and Abink conducted a tour of the cascade halls and the UF_6 handling area of SP3 facility. We were also shown pre-filters, and carbon and HEPA filters contained in the gaseous effluent vent system. This was followed by a tour of the SP1 and SP2 facilities. The Dutch pilot plant SP1 has been completely decommissioned and the building is being used for equipment and cylinder storage. The German pilot plant SP2 is currently being decommissioned. Later in the morning, we discussed environmental and effluent monitoring and the radiation protection program instituted at the Almelo site. In the afternoon we drove to Schipol airport (Amsterdam), returned the rental car and checked into Hotel Mercure. We flew back to Washington the next morning.

General Observations

Eurodif/Cogema

The gaseous diffusion plant was constructed in eight years and started operations in 1982. Optimizing production efficiency with capital cost resulted in three different converter sizes; the largest requiring over 4,400 horsepower. Converters are situated vertically in groups of twenty. There are thirty six groups of large sized converters, twenty of medium sized converters and fourteen of small sized converters. Feed, product and tails withdrawal are conducted in one building. Water in a closed primary loop and not freon is used as coolant. KCl_3 dissolved in the primary loop performs the function of a poison for the purpose of criticality safety.

The unlikely but credible postulated scenario that would result in the greatest off-site impact is the dropping of a 48Y cylinder filled with liquid UF_6 with a subsequent complete shearing of the valve. Modeling of such a release shows that 800 kg of uranium and 800 kg of HF would be released to the atmosphere.

In 1985, an accident occurred in the UF_6 handling facility where a crystallizer ruptured due to overfilling and 400 kg of UF_6 was released inside the process building. Of this amount, only 10 kg was released to the atmosphere outside the building. One worker exceeded a uranium intake of 2.5 mg. Since then additional enclosures have been installed to limit accidental releases to the general atmosphere of the process building. We were also informed that the French Nuclear Institute for Protection and Safety (IPSN) in collaboration with USDOE had conducted a controlled experiment at a French military site where small amounts of UF_6 and HF were systematically released to the environment for the purposes of studying their plume mechanics.

For environmental effluents from the Pierrelatte facilities, the French licensing authority has set up uranium release limits of 3.7 GBq/yr (100 mci/yr) to the atmosphere and 150 MBq/yr (4 mci/yr) to surface waters. During 1980, about 4.5 GBq was released to the atmosphere. Installation of a scrubbing tower and electrostatic filters drastically reduced subsequent annual atmospheric releases.

Depleted uranium is converted from DUF_6 to DU_3O_8 at the Tricastin site. The DU_3O_8 , considered by the French as a resource, is stored indoors in 10-tonne cubicle steel containers. The uranium contained in DU_3O_8 is expected to be used as feed for the laser isotope separation process (SILVA) once it is developed. The annual capacity of the defluorination facility is 20,000 tonnes of DUF_6 . The license originally authorized storage of up to 50,000 tonnes of DUF_6 on site. This limit was temporarily raised to 120,000 tonnes. At the current rate of defluorination, the 50,000-tonne limit is expected to be reinstated in the near future.

Urenco

The centrifuge enrichment facility at Gronau began operation in 1985. Additional capacity (centrifuges) is currently being added. The plant is expected to generate up to 1.0 million kg SWUs in 1999. In comparison to the currently operating Urenco centrifuge enrichment facilities, the design of the CEC resembles the Gronau facility the most.

The centrifuge enrichment facility at Almelo is currently generating at its licensed limit of 1.5 million kg SWUs per year. The Dutch pilot plant SP1 began operation in 1970. The latest centrifuge facility SP4 began operation in 1981. An application to add SP5 and concurrently decommission SP3 is being reviewed by the Dutch regulatory agency. The Almelo plant has a possession limit of 50,000 tonnes of UF_6 .

The experience gained by Urenco in the development and improvement of centrifuge technology has also been applied to many other fields. For example, in a facility adjacent to the centrifuge plants in Almelo, parts such as those involving high speed rotation, are manufactured for the aerospace industry.

The most notable differences observed between the Gronau and Almelo plants and the CEC proposed by LES are:

1. At the CEC, UF_6 feed above atmospheric pressure will only be contained within the feed autoclaves whereas at Gronau and Almelo UF_6 feed above atmospheric pressure is also contained in piping outside (downstream from) the autoclaves up to the pressure reduction stations.
2. Unlike the CEC, perfluorinated (Fomblin) oil, which is inert to UF_6 , is not used in vacuum pumps at Gronau and Almelo.
3. Production at the CEC will be limited by the amount and time of possession of UF_6 (mostly in the form of tails) on site. However, at Gronau and Almelo, production is limited by not only the amount of UF_6 present on site, but also by the yearly SWU production.
4. At Gronau and SP3 in Almelo, desublimers are used to extract product and tails UF_6 from the cascades to their respective receiving stations. At Almelo, in SP4, similar desublimers have been replaced by Normetex pumps. The CEC will have similar low pressure and high pressure pumps to extract product and tails from the cascades.
5. At the Gronau and Almelo facilities, several different types (models) of centrifuges are used, whereas throughout the CEC, only the TC12 centrifuge model will be used.