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SECRETARY OF STATE FOR ENERGY
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Prime Minister

The story here seems good. We have decided to use a French-developed process, which we have acquired for little or no cost, and which offers a substantial saving (see P. 3). We are asked to keep quiet about the saving for the present.

MAP 2/x

If anything goes wrong, radioactivity can be isolated in a batch process in a way that is not possible in a continuous (French) process. MT.

M Pattison Esq
Private Secretary
10 Downing St
London SW1

2 October 1980

Dear Mike,

CHOICE OF COMMERCIAL PROCESS FOR HIGHLY RADIOACTIVE WASTES

During the Prime Minister's recent visit to Harwell, Sir John Hill mentioned that BNFL have recently chosen the French AVM, rather than the UKAEA's HARVEST process, for their commercial glassification plant at Windscale. You may wish to know the background.

Environment Ministers are responsible for radioactive waste management policy, which includes the decision on this process. They will be considering the full implications of BNFL's choice for that policy when their officials have obtained all the necessary technical and other information from the Company. In the meantime, the Prime Minister will wish to know BNFL's reasons for preferring the AVM process.

Background

HARVEST has its origins in research carried out at Harwell in the late 1950's and early 1960's into a batch process for manufacturing glass from highly active liquid reprocessing wastes. The research culminated in a small number of glass blocks being made from the Windscale reprocessing liquor in 1966. In 1972, it was decided to modify the process to manufacture large blocks capable of solidifying the expected arisings of liquor in the 1980's. Engineering studies were undertaken, mainly by BNFL, while the UKAEA concentrated on process development and glass technology. In the light

of decisions at the time, this work was given a relatively low priority and no "active" plant has been constructed.

Meanwhile the French had been developing a continuous casting process for glass manufacture which became known as AVM. The Thermal Reprocessing Technology Exchange Agreement of 1973 between BNFL and the French CEA gave BNFL (but not UKAEA or government departments) access to the French glassification information until 1975.

By 1978 the French had completed construction of an industrial scale fully active plant (AVM) and in 1979 the BNFL - CEA Agreement was reactivated. This allowed BNFL to make a detailed comparison of the HARVEST and AVM processes before proceeding to a capital-intensive development programme. The BNFL review has concluded that AVM is the preferable process, and the Company is seeking to negotiate a contractual arrangement with SGN (a subsidiary of COGEMA, the French reprocessing organisation) for use of the process.

Reasons for the Selection of AVM

BNFL consider that AVM offers significant advantages over HARVEST in several key areas. Particularly, AVM is proven and has operated successfully for more than two years, whereas HARVEST is still at the research stage. AVM could be commissioned earlier, would involve a smaller R & D programme and fewer uncertainties. The process is also more flexible and has greater potential for development (See Annex A). However, development work is required to adapt AVM for UK wastes and UK product specifications. Disadvantages of AVM compared with HARVEST (melter lifetime and activity containment within the plant can, in BNFL's view, be overcome).

The work which the UKAEA did in the development of HARVEST will not be wasted. Much of that experience is directly relevant to the use of AVM technology. The product specification is unlikely to be changed. All the glass technology work done by the AEA will be applicable to the AVM commercial process. Much of the engineering experience in handling mixtures of highly active waste and glass making materials at high temperatures will also be relevant, although it may be prudent for the actual engineering of the plant to be carried out in co-operation with SGN. Above all, the confidence which BNFL can now place in the glassification process would not have been possible had it not been for the parallel development which the AEA undertook on HARVEST.

BNFL will not have to pay the CEA for the use of the AVM process. Under their 1973 Agreement each had access to the other's technology. BNFL will have to negotiate with SGN for engineering design and other services for the construction of the plant. The choice of AVM, however, offers the possibility of overall financial savings to BNFL of the order of £120 - £180m. (It is important that this large saving to BNFL is not made public since the French might use this as an excuse to seek payment for the use of their technology.) This saving would result mainly from the earlier commissioning of an AVM plant which would reduce the number of new storage tanks for highly active wastes. BNFL also expect unit costs of vitrification to be no higher for a process based on HARVEST and possibly lower. They say that the CEGB, who will be contributing to the financing of the plant, are aware of the Company's choice and are content with it.

DOE have responsibility for radioactive waste management policy and contribute financially to the HARVEST R & D programme. They have been assured by BNFL that waste management aspects will be unaffected by the choice of AVM but officials wish to examine this matter in detail and have requested full information, which will be submitted to Ministers when available. This is dependant on BNFL releasing to Government Departments details of AVM technology obtained under the Reprocessing Agreement.

Apart from the DOE's consideration of the waste management aspects of BNFL's choice the proposed plant will require a nuclear site licence before it can be operated. While BNFL are confident that the NII's site licensing criteria can be met, the Inspectorate will need to be fully satisfied that such a plant can be safely built and operated and the glassified product safely stored and transported before a licence will be issued.

I am copying this letter to the Private Secretary to the Secretary of State for the Environment.

Yours sincerely,

G S DART
Private Secretary

Geoff Dart

ANNEX A

REASONS FOR THE SELECTION OF AVM

1 Detailed comparison of the two processes shows that the AVM process promises significant advantages over HARVEST in several key areas:

Throughput

a) A single AVM line has a capacity equivalent to 1500t pa of Magnox fuel or 600t pa of oxide fuel and is equivalent to two twin furnace or three single furnace HARVEST lines.

Off-Gases

b) The bulk of the material entrained in the off-gases from the AVM plant is soluble and development for AVM has shown that it is possible to reduce ruthenium volatility.

Potential for Development

c) The potential for the further development of HARVEST is limited although there are various parameters such as the use of dry feeds which remain to be explored. In the case of AVM, the calciner can be improved and longer life-time, higher throughput melters are under development. Design studies by the French for a vitrification plant for Cap de la Hague have indicated that the line throughput could be doubled.

Flexibility

d) The separation of the calcination from the melting and pouring stages provides more scope for the optimisation of the various process parameters. The size of the ultimate glass product containers for AVM can be varied without any major impact on the basic glass making process.

Product Quality Assurance

e) It would be easier to sample glass from AVM if this were necessary.

Process Stability

f) Automatic process control should be more readily applied to AVM as it is a continuous process.

Volume of Product

g) The AVM process gives better utilisation of ultimate glass product container volume.

2 Against these advantages of AVM there needs to be set those areas where HARVEST has advantages:-

Melter lifetime

a) The AVM melter has a nominal life of only 1500h and two melter vessels have failed prematurely in service; the HARVEST vessel is protected against failure by the use of a new vessel in each run which becomes the ultimate glass product container and by the use of a lower process temperature.

Activity Containment

b) Any over-pressurisation in the AVM calciner may result in activity being blown past the seals.

Expertise

c) At present the UK expertise is related to the HARVEST process. However, the product of the two plants is similar and existing glass technology is immediately transferable to the AVM Commercial process. ~~AVM~~. Engineering design studies have been largely related to plant concepts rather than detail and much of this experience will be relevant to either process. The only area of expertise which is not immediately applicable is that obtained from operating the Harwell large scale pilot plant.

CONCLUSION

3 The advantages of AVM are outlined at paragraph 2. BNFL have carefully considered the two potential weaknesses identified at 2(a) and (b) and concluded that these can be eliminated at the design stage. The French Company have also carried out a final run using simulated Windscale Magnox wastes. BNFL consider that both calcination and vitrification were successfully accomplished.

4 Accordingly BNFL judge the overall balance of advantage to lie with the AVM process. They have therfore entered into negotiations with SGN, the majority owned engineering design subsidiary of COGEMA for the design and engineering work for a production plant for Windscale to be done by a combined BNFL - SGN team.

September 1980