## SUMMARY

### Background

South Australia has been proposed as a possible site for an uranium enrichment industry which would require a source of hydrogen fluoride for the production of uranium hexafluoride. The South Australian Mines Department requested a study of methods available for producing hydrogen fluoride.

### Summary of Work Done

The costs of producing hydrogen fluorides by 5 alternative methods have been estimated. The methods are:

1. Treatment of imported acid-grade fluorspar in existing HF plants.
2. Beneficiation of Australian fluorite to acid-grade and treatment in existing HF plants.
3. Production of HF by pyrohydrolysis of fluorite ore.
4. Production of HF by aluminium sulphate leaching of fluorite ore.
5. Production of HF by roasting ammonium sulphate with fluorite ore.

The cost of production by the above methods are estimated as follows (on the basis of delivery of HF to Port Pirie):

| Method | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Cost $/t HF | 820 | 910 | 333 | 787 | 848 |

### Conclusions and Recommendations

The most attractive method for producing anhydrous hydrogen fluoride is the pyrohydrolysis process which could produce HF at less than half the existing price. However, the process is not proven commercially and requires experimental verification.

It is recommended that a programme of experimental work be undertaken to acquire better knowledge of the pyrohydrolysis process. Aspects to be studied should include the limiting temperature to avoid fusion during roasting, the optimum quantities and type of silica to be added to react with the calcium, the optimum ratio of steam required, and methods for recovery of HF from the reaction gases.