conversion of UNH to UO_3 and of UO_3 to UF_4. The applications of gas-solid contacting in fuel reprocessing and waste disposal are given much more perfunctory treatment.

"Corrosion and Materials of Construction in Chemical Processing of Reactor Fuels" is a good summary of the subject. However, this reviewer questions the statement that type 309 SCb stainless steel is the nearly unanimous choice as the material of construction for dissolvers, since Hanford uses 304-L exclusively.

"Filtration of Radioactive Particulates" is a brief and readable description of theory and U. K. practices.

"Review of Engineering Research for the Development of High Temperature Reactors" discusses three central station, recirculating, helium-cooled power reactors—Dragon, HTGR, and the BBC-Krupp graphite pebble bed. It outlines the three reactor designs and the problem areas which they present but says little about the research and development being carried out to solve these problems.

"Parametric Survey of Critical Sizes" is an excellent summary of critical sizes of homogeneous, hydrogenous mixtures of uranium and plutonium. It is worth noting that some of the missing data for plutonium systems to which the author refers have been obtained subsequent to the cut-off date of the paper.

"The Particulate Material Formed by the Oxidation of Plutonium" presents an excellent discussion of the oxidation of plutonium and of radiological hazard to the lungs from plutonium oxide. It is the first comprehensive treatment of this subject.

"The Response of Containment Structures to Transient Pressures Caused by Nuclear Reactor Runaway" is a good review of the state-of-the-art of predicting reactor containment vessel response to transient pressures and shock loading.

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About the Reviewer: Fred Albaugh, Fellow of the ANS, received his Ph.D. in chemistry from the University of Michigan. He worked on the Manhattan District plutonium chemistry program during the war; since 1947 he has been with the General Electric Company at Hanford.

At Hanford he has been involved in research and development on chemical processing, reactor technology and materials technology. He is presently Manager of the Reactor and Fuels Laboratory.

Operating Experience with Power Reactors.

Proceedings of a conference in Vienna in June 1963; International Atomic Energy Agency, Vienna, 1963. Two volumes, Volume I 526 pages, $10.00, Volume II 412 pages, $8.50. International Publications, Inc., 317 East 34th Street, New York, N.Y. 10016.

The purpose of the conference and a description of the material presented are summarized by the Foreword.

FOREWORD

"At the beginning of 1963 nuclear power plants produced some 3,500,000 kW of electrical power to different distribution grids around the world. Much significant operating experience has been gained with these reactors, but this experience is often not collected in such a way as to make it easily available.

"The International Atomic Energy Agency convened a Conference on Operating Experience with Power Reactors in Vienna from 4 - 8 June 1963 which was attended by 240 participants representing 27 of the Agency's Member States and six international organizations. At the Conference, 42 papers giving detailed experience with more than 20 nuclear power stations were discussed. Although similar meetings on a national or regional scale have been held earlier in various countries, this is the first arranged by the Agency on a world-wide basis. Some of the detailed material may have been given earlier but for the most part it represents new and recently acquired experience, and for the first time it has been possible to compile in one place such extensive material on the operating experience with power reactors.

"The Conference discussed the experience gained both generally in the context of national and international nuclear power development programmes, and more specifically in the detailed operating experience with different power reactor stations. In addition, various plant components, fuel cycles, staffing of nuclear plants and licensing of such staff were treated.

"It is hoped that these Proceedings will be of interest not only to nuclear plant designers and operators who daily encounter problems similar to those discussed by the Conference, but also to those guiding the planning and implementation of power development programmes."

This reviewer believes that the hope expressed in the last paragraph of the Foreword has been met. The compilation of actual operating experience contained in these volumes has already been

of assistance in answering questions which arise daily in the power reactor field.

The papers are printed in their language of origin when this is one of the four official UN languages: English, French, Russian or Spanish. Those who read only English do not obtain full benefit from the extensive information developed in France, Belgium and Russia (Italian papers are in English). Abstracts are provided in all four languages and allow one to determine which papers contain enough pertinent information to justify a complete translation. The discussion sessions on each paper are in English. The panel discussion at the completion of the conference (pp. 377-396, Vol. II) contains piquant comments on the direction of future efforts in the various countries.

The frank discussion of problems encountered and solutions attained (or attempted) is very refreshing and far more useful than the optimisitc platitudes often found in published articles on power reactors. There are still problems to be overcome and it is helpful to find that other groups have similar problems—and often solutions. An exception to the generally factual presentations appears on page 30, Volume I ". . . there never has been an instance of failure of a control rod to insert on scram signal . . . This is a unique advantage . . . which few others can match." The statement of reliability is reassuring but the reviewer doubts the uniqueness of this advantage. The excellent reliability exhibited by safety rods in all types of reactors attests to the importance reactor builders and operators place on reactor safety and to the competence of control device designers.

A very encouraging aspect of the reactor experience is the case of maintenance described by several of the authors. The questions of accessibility and maintainability of components exposed to high radiation fields has been a major concern. The papers show that maintenance has not been a severe problem, e.g., p. 30, Volume I ". . . turbine overhaul was accomplished in approximately the same time that would have been required on a conventional turbine and without significant radiation exposure. . . "

To counteract the optimistic reports on reactor behavior are many complaints concerning problems with "conventional" components, e.g., p. 304, Volume I "The difficulties we have had were primarily with the 'classical' equipment." and p. 342, Volume I " . . . it is interesting to note that the operational reliability of a nuclear power plant may be limited to a large extent by conventional equipment and engineering problems." A further complaint and a solution is voiced in the closing panel discussion, p. 378, Volume II: "There remains now the problem of conventional equipment. . . . If conventional equipment is tested with the same thoroughness as the nuclear components, quite obviously it will give no more trouble than these more novel items."

The papers on staffing and training for nuclear power plants are quite informative and will assist anyone faced with these problems. Again the overall impression is favorable. Nuclear plants can be staffed with proficient, well trained personnel without major difficulties. The utilities will find the requirements imposed by various regulatory bodies rather onerous but not prohibitive. As more nuclear plants are put on the line the training requirements will become standardized and an increasing pool of trained personnel will ease the staffing problems.

These volumes present information useful to reactor designers and operators and helpful, as well as reassuring, to utilities considering the addition of nuclear plants to their systems.

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About the Reviewer: James E. Owens is a group leader on the sodium reactor experiment at Atomics International. He was previously the field superintendent on the Hallam Nuclear Power Facility where he was responsible for construction surveillance, plant testing and initial operation. Previous experience was obtained on the AI Sodium Reactor Experiment, on the reactor on the SSN Nautilus and in instrumentation and control work at the Oak Ridge National Laboratory.