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OPERATED BY UNION CARBIDE CORPORATION FOR THE DEPARTMENT OF ENERGY

NUREG/CR-0664  
ORNL/NUREG/NSIC-157

ANALYTICAL TECHNIQUES FOR STRESS ANALYSIS  
OF THE NUCLEAR STEAM-SUPPLY SYSTEM  
A BIBLIOGRAPHY

Fred A. Heddleton

Prepared for the U.S. Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research  
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282 241

## CONTENTS

	<u>Page</u>
FOREWORD.....	v
METHOD OF INDEXING DOCUMENTS.....	vii
ABSTRACT.....	ix
INTRODUCTION.....	ix
BIBLIOGRAPHY.....	1
KEYWORD INDEX.....	139
AUTHOR INDEX.....	151
PERMUTED-TITLE INDEX.....	159

## FOREWORD

The Nuclear Safety Information Center (NSIC), which was established in March 1963 at Oak Ridge National Laboratory, is principally supported by the U.S. Nuclear Regulatory Commission's Office of Nuclear Regulatory Research. Support is also provided by the Division of Reactor Research and Technology of the Department of Energy. NSIC is a focal point for the collection, storage, evaluation, and dissemination of safety information to aid those concerned with the analysis, design, and operation of nuclear facilities. Although the most widely known product of NSIC is the technical progress review *Nuclear Safety*, the Center prepares reports and bibliographies as listed on the inside covers of this document. The Center has also developed a system of keywords to index the information which it catalogs. The title, author, installation, abstract, and keywords for each document reviewed are recorded at the central computing facility in Oak Ridge. The references are cataloged according to the following categories:

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5. Heat Transfer and Thermal Hydraulics
6. Reactor Transients, Kinetics, and Stability
7. Fission Product Release, Transport, and Removal
8. Sources of Energy Release under Accident Conditions
9. Nuclear Instrumentation, Control, and Safety Systems
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15. Environmental Surveys, Monitoring, and Radiation Dose Measurements (inactive September 1973)
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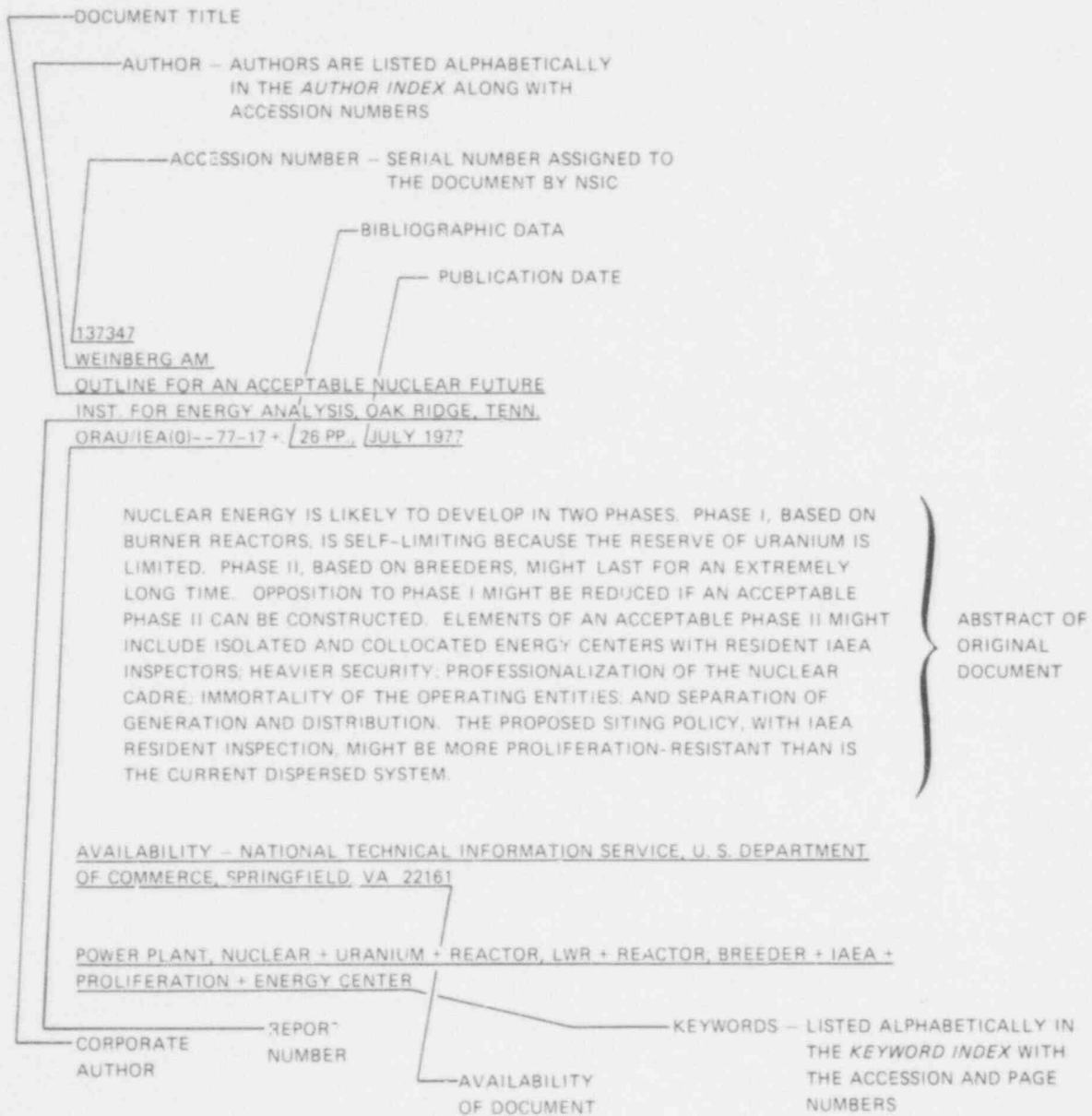
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282 244

METHOD OF INDEXING DOCUMENTS



282 245



ANALYTICAL TECHNIQUES FOR STRESS ANALYSIS OF THE  
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Engineering Technology Division

ABSTRACT

This report contains 586 abstracts from the Nuclear Safety Information Center (NSIC) computer file dated 1975 through 1978 covering analytical techniques used for stress analysis of the nuclear steam supply system of nuclear power plants — including the determination of design load of structures, systems, and components. The abstracts are listed in reverse chronological order, with all abstracts relating to licensing materials in a separate group. Keyword, author, and permuted-title indexes are included for the convenience of the user.

INTRODUCTION

The techniques (or art) of stress analysis have changed drastically in the last few years with the advent of computers and the development of methodologies capable of adaptability to the advantages of computer solutions. Some of the new methods are finite elements, bounding techniques for approximate solutions, finite differences, and shell analysis. Finite-element methods are, by far, used most frequently.

The computer files of the Nuclear Safety Information Center (NSIC) contain a large number of abstracts concerning analytical techniques used for stress analysis of the nuclear steam supply system (NSSS) of nuclear power plants. Since these abstracts would be of value to designers of NSSS structures, systems, and components, this compilation has been undertaken.

Three keywords were used in searching the computer files for the relevant abstracts: STRESS ANALYSIS, ANALYTICAL MODEL, and ANALYTICAL TECHNIQUE. About 2000 abstracts restricted to 1975, 1976, 1977, and 1978 were selected by the computer, each abstract having one or more of the

three keywords. After screening, the final number of abstracts appropriately related to stress analysis of the NSSS was 586, and these are included in this bibliography.

Some of the subjects covered by the 586 abstracts are:

Earthquake-induced loading needed for stress analysis

Vibration loads

Tornado-induced and/or missile impact loads on the primary system

Loads on the containment structure and/or compartment due to accidents

Cracking, fatigue, and creep analysis relative to design

Piping system design

Structural analysis

Cladding behavior relative to design

Pressure vessels

Fuel melting as it applies to loading structures

Some heat transfer problems

Subjects not covered by this bibliography are:

Reactor physics, or nuclear characteristics

Reactor transients

Accident analysis, such as the analysis of a loss-of-coolant accident

Reliability analysis

Fluid flow except for induced loading of structures and components

Control systems

Security systems

Noise or acoustic analysis

Concrete design

Nuclear fuels

Microstructural material properties

Also, abstracts of progress reports are not included.

The abstracts in the bibliography are listed in reverse chronological order by accession numbers in reverse numerical order — 1978 articles near the beginning and 1975 articles near the end. Abstracts of licensing materials [e.g., reports by utility staff members, answers to Nuclear Regulatory Commission (NRC) questions, NRC documents, and reports by NSSS manufacturers, all of which relate to one or another specific nuclear

power plant] are combined together in a group and listed separately from all other abstracts. Thus, the abstracts are organized in two groups - one group for licensing materials and the other for all other abstracts.

More detailed information than that provided in the abstract is available in the actual document. Availability and price of the document are usually given at the end of the abstract.

The greatest use of this document is expected to be realized through the three indexes that are provided (keyword, author, and permuted-title), all of which list accession numbers of the relevant abstracts.

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