International Nuclear Information System

INIS

ETDE

Energy Technology Data Exchange

INIS/ETDE MANUAL FOR SUBJECT ANALYSIS

International Atomic Energy Agency

IAEA-INIS/ETDE Joint Reference Series
IAEA-INIS/ETDE-03 (2012/08)

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MANUAL FOR SUBJECT ANALYSIS

by

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PREFACE

This document is one in a series of publications known as the **ETDE/INIS Joint Reference Series.** It is also a part of the **ETDE Procedures Manual**. Manual for Subject Analysis presents the rules, guidelines and procedures to be adopted by centres submitting input to the **International Nuclear Information System (INIS)** or the **Energy Technology Data Exchange (ETDE)**. It is a manual for the **subject analysis** part of input preparation, meaning the **selection**, **subject classification, abstracting** and **subject indexing** of relevant publications. It is to be used in conjunction with the Thesauruses, Subject Categories documents and the documents providing guidelines for the preparation of abstracts.

The INIS Liaison Officers, including those involved in ETDE, welcomed at their 22nd Consultative Meeting in April 1994 the Secretariat's plan to produce jointly with the ETDE Operating Agent a manual for subject analysis to replace the existing *INIS: Manual for Indexing, IAEA-INIS-12(Rev.2) (1974)*. The 2012 revision includes minor corrections in the Examples. This Subject Analysis Manual, the result of one year's cooperative work between INIS and ETDE, is another milestone in the cooperation and efforts toward compatibility between the two systems.

The concept and structure of the new manual are intended to describe in a logical and efficient sequence all the steps comprising the subject analysis of documents to be reported to INIS or ETDE. The manual includes chapters on preparatory analysis, subject classification, abstracting and subject indexing, as well as rules, guidelines, procedures, examples and a special chapter on Guidelines and Examples for Subject Analysis in Particular Subject Fields. Although Chapter 5 on Subject Indexing is based on the previous version of the manual, substantial changes in input preparation have been introduced since its publication in 1974. The major changes related to subject analysis and reflected in the new manual concern:

- inclusion of abstracts (1974)
- data flagging (1978 and 1987)
- discontinuation of "linked" groups of descriptors (1982)
- terminology for metals and alloys (1983)
- changes in INIS subject scope and categorization scheme (1992, 1997)
- new procedure for proposed terms (1994)
- discontinuation of M/Q(main heading/qualifier) labeling (1997)
- adoption of a common INIS/ETDE categorization scheme (1999/2000)
- introduction of 4 new subject categories (2010)

Several experts contributed to the completion of this manual. The authors wish to acknowledge the valuable contributions and suggestions made by the subject specialists of the INIS Section, the ETDE Operating Agent and staff, as well as the inputting centres of some Member States. Special thanks to Kristina Epperson for her excellent work in the preparation of the text, Marion Stratford for proofreading and Shelley Vickroy for technical editing.

The present *Manual for Subject Analysis* is the result of the continued development of INIS and ETDE in response to changing user needs in information retrieval. Any comments, identification of errors, as well as suggestions for improvements to this edition, are welcome and should be addressed to:

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1. Introduction to Subject Analysis

Each record of a bibliographic database consists essentially of a bibliographic description and a subject description. Bibliographic description is the descriptive cataloguing of the piece of literature (or its physical description) used to identify and locate the piece of literature. A piece of literature may be a book, a chapter in a book, an article in a journal, the text of a paper presented at a conference, a technical report, a thesis, a patent, a moving-picture film, a computer program (computer code), etc. - in fact any piece of recorded information. Subject description, usually including an abstract, is the means for identifying the information content of a document so that database users can identify relevant records in the database that cite literature containing information in a particular subject area.

The purpose of the present document is to explain the tools for subject analysis that are at the disposal of the specialist indexer preparing input to the **International Nuclear Information System (INIS)** and **Energy Technology Data Exchange (ETDE)** databases, to establish the rules to be used in subject analysis, and to give general suggestions and guidance in the selection of appropriate subject categories and descriptors. It should always be remembered that subject analysis is not an end in itself. Its sole purpose is to facilitate the retrieval of documents relevant to a particular query. Searches can of course be based on bibliographic characteristics such as a particular publication year or author, on the information content of the piece of literature represented for example by the descriptors, or on a combination of the two.

The present document is not intended as a reference work on the theory or practice of subject analysis. There are many such references to be found in specialized literature that the indexer may wish to consult[1].

1.1 Information Retrieval

Information systems must enable **searching**, **selecting**, **locating** and **accessing** of relevant publications from several million references. The purpose of large information systems such as INIS and ETDE is to facilitate information retrieval in an efficient and economic way. Several products and services in electronic, optical and printed form are offered, thus enabling information retrieval both electronically and manually[2]. The INIS and ETDE bibliographic databases and their records are therefore designed to fulfill a variety of search requirements:

- For **online searching**, controlled terms (descriptors), free text words, or a combination of both can be used in retrieval queries[3]. This means that **subject indexing** with controlled terminology and **free text** (e.g. in the **abstract**) are needed.

- To **select** the relevant references from a search result, the **abstract**, **title** and **descriptors** are very helpful elements[4].

- For **locating** the selected relevant pieces of literature, the user needs precise and complete

[1] See for example: "Indexing and Abstracting in Theory and Practice" by F.W. Lancaster, University of Illinois, 1998 (Second Edition)
[2] INIS Periodic Report 1994.
ETDE Annual Report 1994.
[3] INIS Subject Search Study, Vienna, 1995.
[4] INIS User Needs Study, Vienna, September 1994

bibliographic data; thus **descriptive cataloguing** is necessary.

- The final **access** to the full text of a publication is usually done via scientific libraries. Some hosts (e.g., Knight-Ridder, STN) offer in addition to the bibliographic files the possibility of "online ordering" to speed up the acquisition procedure.

The International Nuclear Information System and the Energy Technology Data Exchange have always offered a full text delivery service for non-conventional literature (NCL) based on microfiche technology. Since 1997, CD-ROM technology replaced the microfiche technology, thus facilitating and accelerating the access to full text NCL publications. In addition, INIS database on Internet offers free on-line access to the full text of some of the IAEA's publications.

The example on the following pages illustrates the design of an INIS/ETDE record retrieved from the INIS database on Internet and on CD-ROM. The first part of a record represents the bibliographic description identifying the referenced piece of literature (title, authors, source), while the abstract, descriptors, including indexer assigned descriptors (DEI) and computer assigned descriptors (DEC), and categorization codes are the result of subject analysis.

Title: Radiation - it's not the mother of all hazards

Author(s): O'Donovan, E. (Defence Science and Technology Organisation, Maribyrnong, VIC (Australia). Aeronautical and Maritime Research Laboratory)

Source:

TYPE Journal Article
JR Radiation Protection in Australia
IS ISSN 0729-7963; CODEN RPAUDH
(Mar 1999) v. 16(1) p. 26-31
AV 8 refs., 2 tabs., 1 fig

Abstract: The public, the media, and even many in the technically educated community, have an inordinate dread of things radioactive. Any radioactive material or contamination in the environment, even in trivial amounts, can be seen and feared as a human and environmental catastrophe. And yet other, significant hazards and risks that are encountered in life, are either accepted resignedly or are confidently tackled with sensible protection strategies. Australian Radiation Protection Society (ARPS) should develop and undertake deliberate strategies of its own, to foster protection of the population not only from genuine radiation hazards, but also, via an education campaign, from exaggerated perceptions of risk. Data on relative risks of some common life hazards are presented and compared to risks from a variety of radiation-related activities and scenarios. The comparison is not reflected in the public perspective. ARPS should firstly convince its own membership that radiation risk management is a mature and successful technology. Then ARPS should break out from its relatively closeted practices and address a deliberate program to educate the public, and combat the sensation-mongering media, concerning their eccentric attitudes to this class of hazard

Descriptor(s):

DEI accidents; attitudes; death; education; health hazards; ionizing radiations; public anxiety; public information; risk assessment
DEC hazards; information; radiations

Year: 1999
Language: English
Country: Australia
Subject: Social Impact of Nuclear Science and Technology
F1400; C1000
Reference
Number: 30034007
Volume/Issue: 3031

TI: Radiation - it's not the mother of all hazards
AU: O'Donovan,-E. (Defence Science and Technology Organisation, Maribyrnong, VIC (Australia). Aeronautical and Maritime Research Laboratory
SO: Radiation-Protection-in-Australia (Mar 1999) v. 16(1) p. 26-31
NT: 8 refs., 2 tabs., 1 fig.
PY: 1999
LA: English
CI: Australia
PT: J (Journal-Article)
AB: The public, the media, and even many in the technically educated community, have an inordinate dread of things radioactive. Any radioactive material or contamination in the environment, even in trivial amounts, can be seen and feared as a human and environmental catastrophe. And yet other, significant hazards and risks that are encountered in life, are either accepted resignedly or are confidently tackled with sensible protection strategies. Australian Radiation Protection Society (ARPS) should develop and undertake deliberate strategies of its own, to foster protection of the population not only from genuine radiation hazards, but also, via an education campaign, from exaggerated perceptions of risk. Data on relative risks of some common life hazards are presented and compared to risks from a variety of radiation-related activities and scenarios. The comparison is not reflected in the public perspective. ARPS should firstly convince its own membership that radiation risk management is a mature and successful technology. Then ARPS should break out from its relatively closeted practices and address a deliberate program to educate the public, and combat the sensation-mongering media, concerning their eccentric attitudes to this class of hazard
DEI: accidents-; attitudes-; death-; education-; health-hazards; ionizing-radiations; public-anxiety; public-information; risk-assessment
DEC: hazards-; information-; radiations-
IS: ISSN 0729-7963 CODEN RPAUDH
CC: F1400; C1000
C1: F1400
CD: Social-Impact-of-Nuclear-Science-and-Technology; EFFECTS-AND-VARIOUS-ASPECTS-OF-EXTERNAL-IRRADIATION-IN-BIOLOGY
UD: 3031
AN: 30-034007

1.2 Steps Comprising Subject Analysis

Subject analysis should be carried out whenever possible by subject specialists with a good technical knowledge of the subject matter and a familiarity with INIS and ETDE subject analysis tools: descriptions of subject categories, the Thesaurus and this manual.

After selecting those pieces of literature that contain information relevant to the scope of the databases, **subject analysis for INIS and ETDE** includes the following steps:

- subject classification (categorization)
- abstracting
- subject indexing and data flagging

Each of the above steps is discussed in detail in subsequent sections of this manual. An introduction is given here to provide an overall view of the subject analysis practice used by the two systems.

- **Subject Classification (Categorization)**

Categorization is a type of classification scheme for the literature. Every record in the INIS and ETDE databases **must** be assigned to a specific subject category referred to as the **Primary Subject Category** of that record. The scope descriptions of each subject category for the INIS and ETDE systems are defined in the relevant documents[5]. In addition, depending on the subject content of the piece of literature, it may be necessary to assign one or more optional **Secondary Subject Categories**.

Records assigned to the same Primary Subject Category can be thought of as logically grouped together by subject. For retrieval, subject categories can be used to create rough subsets of the database, upon which finer retrieval can then be performed, or they can be used to exclude specific areas of the total subject scope.

Category assignment can usually be performed after a careful reading of the title and abstract. By considering the Table of Contents of the manual that defines the subject scope of each subject category, the indexer can at times identify one category that unequivocally covers the subject scope of the piece of literature. Sometimes, two or more categories might appear appropriate, at first glance. A check of the full definition of each of those categories, including their cross references, possibly assisted by hints from the subject index, should lead the indexer to the correct Primary Subject Category.

- **Abstracting**

An abstract is a clear and concise statement of the content of a piece of literature. In general, it should include the author's objective, methodology, results and conclusions.

The availability and quality of the abstract strongly influences the performance of a bibliographic database. While subject categories and descriptors form the basis for controlled-language retrieval queries, the free text of the title, title augmentation and especially the text of a high

5 Subject Categories and Scope Descriptions (ETDE/INIS)

quality abstract, are prerequisites for retrieval strategies combining free language and controlled terms. In addition, abstracts provide a helpful indication of the relevance of a retrieved record to the query, thus indicating whether the full text should be consulted.

- **Subject Indexing and Data Flagging**

The term "indexing" for the INIS and ETDE systems is defined as the action of choosing a set of descriptors from the controlled terminology of the INIS/ETDE Thesaurus to represent the information content of a piece of literature.

The meaningful information content of the document is extracted by a process of interpretation of the piece of literature, or *document interpretation*. The criterion to be used in determining what is meaningful information is based entirely on the requirement of the **user**, who wants only to be referred to those pieces of literature that actually convey useful, direct and real information on the process, material, condition, equipment or whatever topic is searched for.

In the process of document interpretation, the indexer should attempt to identify for each piece of literature the main concepts that usually constitute the essential reason for publishing the material. This process usually entails a careful reading of the title and abstract followed by a scan of the full text to find more detailed concepts, paying careful attention to the Contents, Introduction, Summary, Conclusions and to Graphs and Tables. Each of the main concepts identified must then be represented by descriptors chosen from the Thesaurus. Thus the indexer must assign only those descriptors that represent concepts **actually discussed in some detail** in the piece of literature and concepts on which some useful information can be obtained by reading the document.

There is no rule on the number of descriptors that should be assigned to a piece of literature. The average for INIS and ETDE is between 10 and 12 descriptors per item. Pieces of literature indexed with fewer than 4 descriptors are rare and their retrieval is difficult; with certain exceptions, items indexed with more than 20 descriptors are also rare and are frequently over-indexed, leading to excessive "noise" in retrieval. These ideas on document interpretation are discussed in more detail in Section 5.3.1.

The next step is to assess the presence of **useful numerical data** in the document. A substantial proportion of the literature reported to INIS and ETDE contains useful numerical data, presented either explicitly as single numerical values or tables of numerical data, or implicitly as in a graph. Database users are frequently interested in whether a document that clearly discusses the topic of interest also contains numerical data on the subject.

Assessing the usefulness of numerical data is a subjective process, but not more so than the selection of concepts to be indexed. The numerical data must be presented in such a way as to be usable in another experiment, test or evaluation. In particular, if the indexer considered the numerical data contained in the document to be useful, the subject of the data would have been identified by including appropriate descriptors in the set chosen during the indexing process.

If the indexer decides that the numerical data could be useful, the document should be "data flagged" by performing two operations: 1) add one or more of the narrower terms of the descriptor **NUMERICAL DATA** to the already chosen set of descriptors and 2) include the Literary Indicator "N" in the appropriate place of Tag 008 (equivalent to circling N in the Header

of the Worksheet). Details of the procedure are given in Section 2.3 of this manual, where other literary indicators used to highlight certain characteristics of a piece of literature are also described and with which the indexers should be familiar because they are related to subject analysis.

2. Preparatory Analysis

Some aspects of input preparation require close collaboration between descriptive cataloguer and subject specialist. (While in most inputting centres the descriptive cataloguing of literature is usually done by cataloguers, subject analysis should be performed by specialists having scientific knowledge in the subject field they are required to analyse.) These areas of dual responsibility should be given close attention by the subject specialist, who should assist the descriptive cataloguer in:

- selecting those pieces of published literature **relevant to the database scope**[6,7] and checking whether the information content of a piece of literature makes its entry into the database worthwhile;

- deciding whether the publication consists of parts dealing with sufficiently different topics so that a **subdivision** should be made **at the bibliographic level** and each part treated as a separate piece of literature;

- selecting the appropriate **literary indicator** at Tag 008 in the header of the record, if one is applicable. This indicator can be used as a search element complementary to the descriptors.

The use of literary indicators and rules for subdivision at the bibliographic level are described in detail in other guides[6]. It is recommended that indexers familiarize themselves with this aspect of descriptive cataloguing.

The indexer should also note that Tag 620, "Title Augmentation", is part of subject analysis. Responsibility for entering information at that Tag lies entirely with the indexer and not with the descriptive cataloguer. Title augmentation is optional and the decision on whether to provide it is left to the individual Reporting Centres. What should be provided in the title augmentation tag is discussed in Chapter 4 of this document.

2.1 Selection of Literature Relevant to the Database Scope

All the literature published worldwide on the peaceful applications of **nuclear science and technology** should be included in the INIS database. All literature dealing with any type of **energy-related scientific and technical information** should be included in the ETDE database. According to membership arrangements, members are responsible for the collection and selection of literature **published within its national boundaries** (or organizational confines if an international body) that is relevant to the scope of the INIS and ETDE databases.

The major subject areas covered by the INIS database are:

Nuclear Engineering and Technology

- Fission Reactors, Nuclear Power Plants and Fusion Technology
- All Aspects of Nuclear Engineering and Instrumentation
- Nuclear Fuel Cycle

[6] INIS:Guide to Bibliographic Description, IAEA-INIS-1(Rev.8)

- Radioactive Waste Management
- Isotope Production and Applications
- Nuclear Safety and Radiation Protection

Sciences Relevant to Nuclear Research and Applications

- Physics: Elementary Particles and Fields, Nuclear Physics, Atomic and Molecular Physics, Plasma Physics and Fusion, Physics of Condensed Matter, General Physics
- Chemistry: Chemical and Isotopic Analysis, Inorganic, Organic and Physical Chemistry, Radiochemistry and Nuclear Chemistry, Radiation Chemistry, Fission Fuels
- Materials such as Metals and Alloys, Ceramics and Cermets
- Environmental and Life Sciences: Effects of Radiation and Radioisotopes in Biology, Applied Life Sciences, Health, Radiation Protection and Environment, Radiology and Nuclear Medicine
- Earth Sciences relevant to Nuclear Activities

Other Aspects of Nuclear Energy

- Economics and Sociology
- Legal Aspects
- Safeguards
- Nuclear Documentation
- Mathematical Methods and Computer Codes

Economic and Environmental Aspects of Nonnuclear Energy Sources (since 1992)

In addition to the above topics, the ETDE database includes the following information:

Energy Sources (scientific, technical, economic and policy aspects)

- Coal, Lignite, and Peat
- Petroleum
- Natural Gas
- Oil Shales and Tar Sands
- Hydrogen
- Biomass Fuels
- Synthetic Fuels
- Hydro Energy
- Solar Energy
- Geothermal Energy
- Tidal and Wave Power
- Wind Energy

Energy Production and Utilization

- Fossil-Fuelled Power Plants
- Power Transmission and Distribution

- Energy Storage
- Direct Energy Conversion
- Energy Conservation, Consumption, and Utilization
- Advanced Propulsion Systems

Nonnuclear Energy-Related Sciences

- Materials
- Engineering and Instrumentation
- Chemistry
- Physics
- Environmental Sciences/Geoscience

Within their scope the databases include all types of published material, irrespective of the form in which it appears - printed, electronic or optical media. The final decision on the selection of a piece of literature depends on whether it falls within the INIS or ETDE scope.

Rule:	**Select only those pieces of literature for inputting to which you can assign at least one appropriate subject category code from the latest revisions of *INIS/ETDE Subject Categories and Scope Descriptions***

In addition, it should be determined whether the information value of the piece of literature makes its entry into the database worthwhile. Non-scientific-technical publications, such as newspapers, newsletters or purely administrative matter concerning, for example, conferences or training courses, should usually be excluded.

2.2 Bibliographic Subdivision

Publications may consist of subunits such as chapters of a book, or an annual report, or individual conference papers in conference proceedings. For these publications the subject specialist must decide whether bibliographic subdivision should be made and whether all or only some of the items should be analysed separately. Note that, in either case, if the publication is "nonconventional" literature and a microfiche must be produced, a separate record for the entire publication must be supplied as a "lead" record in addition to the "analytic" records for the various subunits. The bibliographic rules for this procedure are given in the appropriate reference manuals[6].

Note: For the "lead" record, the descriptor **LEADING ABSTRACT** must be assigned.

2.3 Literary Indicators

The use of some literary indicators (Tag 008) that are assigned by a descriptive cataloguer requires that additional information be included in other fields and/or that specific subject descriptors (Tag 800) be used. If the following literary indicators are assigned the **subject specialist must provide additional information**.

[6] INIS:Guide to Bibliographic Description, IAEA-INIS-1(Rev.8)

E: Short Communication

The subject specialist must normally submit an abstract for each record because of the importance of the abstract in information retrieval for end users. In certain situations, however, a record may be submitted without an abstract. **The literary indicator E is assigned if no abstract is provided**. If the length of the full text of the publication is less than the maximum permitted length for the abstract (5000 characters), and if there are no copyright restrictions, it is recommended to enter in Tag 860 the full text (in English), following the wording **Full text**.

K: Conference

Assign K whenever the publication represents the proceedings of a conference or other kind of meeting or if it is a paper presented at such a meeting.

The subject descriptor **MEETINGS** is entered in the lead record for conference proceedings for which analytics are submitted.

N: Numerical Data

Assign N whenever the publication contains useful numerical data. The data could be presented as single numerical values, tables of numerical values, or in graphical form.

At least one of the following subject descriptors must be assigned when this literary indicator is used: **COMPILED DATA, EVALUATED DATA, EXPERIMENTAL DATA, FINANCIAL DATA, NUMERICAL DATA, STATISTICAL DATA, THEORETICAL DATA**.

For more details see Section 5.3.3.

Q: Legislative Material

Assign Q whenever the publication is a law, statute, regulation, or other governmental or parliamentary instrument. **This literary indicator *should not* be assigned to publications that treat legislation as subject matter.**

The subject descriptor **LEGISLATIVE TEXT** must be assigned when this literary indicator is used.

V: Computer Program Description

Assign V whenever the publication is a description of a computer program, code, user manual, other software or program documentation necessary to run the program. For example, assign V to program documentation such as a users' program maintenance manual, but not to a report describing an application or the users' experience.

If the title does not contain the program name, the program name must be entered in Tag 620 (Title Augmentation).

The subject descriptor **COMPUTER PROGRAM DOCUMENTATION** must be assigned when this literary indicator is used.

W: Standard or Specification

Assign W whenever the publication is a standard or a specification. Use is not restricted to official publications of national or international standardization organizations.

The subject descriptor **STANDARDS DOCUMENT** must be assigned when this literary indicator is used.

Y: Progress Report

Assign Y whenever the publication is a progress report.

The subject descriptor **PROGRESS REPORT** must be assigned when this literary indicator is used.

Note: Progress reports are reports issued to inform people about research beingconducted or recently completed by an organization or one of its components. The activities described may relate to one or more projects. Progress reports are usually issued at intervals throughout the life of the project with a final report being issued after the project is completed. The reports may be called "progress" or "status" reports. They usually indicate the time period covered and contain information updates, although they may not include the history or objectives of the research and often need to be used in conjunction with other reports in the series. All progress reports, irrespective of their frequency of publication, must be treated in one of the three following ways:

i) subdivide bibliographically those progress reports of particular interest, whose various parts deal with sufficiently distinct subjects and whose information content seems to warrant the considerable additional work required by a very detailed bibliographic subdivision. Each part should be reported as a separate piece of literature and identified by the literary indicator Y, and each part should be indexed in depth and assigned to its appropriate primary and, if necessary, secondary subject categories, as would be done for any other reported piece of literature;

ii) report as one piece of literature those progress reports of particular interest, whose information content is of note but deals with only one particular subject. Such a progress report should be indexed in depth and assigned to its appropriate primary and, if necessary, secondary subject categories;

iii) report as one piece of literature with no subdivision those progress reports of lesser interest, where bibliographic subdivision, though possible, does not seem warranted by the scarce amount of information given in the different parts. In this case, to avoid "noise" in retrieval due to false co-ordination of specific descriptors, indexing should be kept at a **general level**, merely indicating the general areas with which the progress report deals. For the INIS database, the report should be assigned to subject category S99, which is specifically intended for progress reports covering several scientific disciplines where bibliographic subdivision is not warranted.

Z: Bibliography

Assign Z whenever the publication is a bibliography, such as a list of citations (with or

without abstracts) covering a specific field of knowledge, or the publications of a specific organization.

The descriptor **BIBLIOGRAPHIES** must be assigned when this literary indicator is used.

3. Subject Classification (Categorization)

Subject classification or categorization means the assignment of subject category codes to a piece of literature as defined in a subject classification scheme. Complementary to natural language in title and abstract, categorization and descriptor indexing describe the content of a piece of literature with controlled codes and controlled terminology. Categorization of information by subject content is an important tool in identifying information for retrieval, and subject categories are used to define subject areas. Subject categories do not provide the level of specificity that can be attained with subject indexing, but are meant to complement subject indexing.

There are several purposes of subject classification:

- **Checking of relevance to the database scope**

  If a specific and appropriate subject category can be assigned to a piece of literature that contains worthwhile information, this piece should be selected and reported to the database (see Section 2.1).

- **Defining the subject area(s)**

  The subject categories assigned define the **specific** subject areas covered by the database and help extracting statistical information on the structure and content of the database.

- **Retrieval tool**

  Subject categories provide a powerful tool both for increasing the relevance of retrieval and for simplifying the search strategy needed to retrieve a specific concept or to exclude other areas.

- **Other applications**

  Subject categories may be used for cataloguing publications in a special library or for subject classification of factual information, such as for a Research-In-Progress database.

3.1 Subject Categories and Scope Descriptions

Since the beginning of the year 2000, INIS and ETDE implemented a common subject categorization scheme[5] which contains the following 45 categories:

S01 COAL, LIGNITE, AND PEAT
S02 PETROLEUM
S03 NATURAL GAS
S04 OIL SHALES AND TAR SANDS
S07 ISOTOPES AND RADIATION SOURCES
S08 HYDROGEN
S09 BIOMASS FUELS
S10 SYNTHETIC FUELS
S11 NUCLEAR FUEL CYCLE AND FUEL MATERIALS
S12 MANAGEMENT OF RADIOACTIVE WASTES, AND NON-RADIOACTIVE WASTES FROM NUCLEAR FACILITIES
S13 HYDRO ENERGY
S14 SOLAR ENERGY
S15 GEOTHERMAL ENERGY
S16 TIDAL AND WAVE POWER
S17 WIND ENERGY
S20 FOSSIL-FUELED POWER PLANTS
S21 SPECIFIC NUCLEAR REACTORS AND ASSOCIATED PLANTS
S22 GENERAL STUDIES OF NUCLEAR REACTORS
S24 POWER TRANSMISSION AND DISTRIBUTION
S25 ENERGY STORAGE
S29 ENERGY PLANNING, POLICY AND ECONOMY
S30 DIRECT ENERGY CONVERSION
*S32** *ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION*
*S33** *ADVANCED PROPULSION SYSTEMS*
S36 MATERIALS SCIENCE
S37 INORGANIC, ORGANIC, PHYSICAL AND ANALYTICAL CHEMISTRY
S38 RADIATION CHEMISTRY, RADIOCHEMISTRY AND NUCLEAR CHEMISTRY
S42 ENGINEERING
S43 PARTICLE ACCELERATORS
S46 INSTRUMENTATION RELATED TO NUCLEAR SCIENCE AND TECHNOLOGY
*S47** *OTHER INSTRUMENTATION*
S54 ENVIRONMENTAL SCIENCES
S58 GEOSCIENCES
S60 APPLIED LIFE SCIENCES
S61 RADIATION PROTECTION AND DOSIMETRY
S62 RADIOLOGY AND NUCLEAR MEDICINE
S63 RADIATION, THERMAL, AND OTHER ENVIRONMENTAL POLLUTANT EFFECTS ON LIVING ORGANISMS AND BIOLOGICAL MATERIALS
S70 PLASMA PHYSICS AND FUSION TECHNOLOGY
S71 CLASSICAL AND QUANTUM MECHANICS, GENERAL PHYSICS
S72 PHYSICS OF ELEMENTARY PARTICLES AND FIELDS
S73 NUCLEAR PHYSICS AND RADIATION PHYSICS
S74 ATOMIC AND MOLECULAR PHYSICS
S75 CONDENSED MATTER PHYSICS, SUPERCONDUCTIVITY AND SUPERFLUIDITY
S77 NANOSCIENCE AND NANOTECHNOLOGY
S79 ASTROPHYSICS, COSMOLOGY AND ASTRONOMY
S96 KNOWLEDGE MANAGEMENT AND PRESERVATION
S97 MATHEMATICAL METHODS AND COMPUTING
S98 NUCLEAR DISARMAMENT, SAFEGUARDS AND PHYSICAL PROTECTION
S99 GENERAL AND MISCELLANEOUS

The categories marked with asterisks and printed in italics (S32, S33, S47) are for ETDE only.

The numbering of categories was chosen from 1 to 99 in order to keep, at the extent possible, similarity with the previous ETDE numeric category codes.

The scope descriptions of the common categories are given separate for INIS and ETDE to take into account the different coverage interests of the two systems.

3.1.1 INIS Subject Categories

The INIS Subject Categories are defined in the relevant INIS/ETDE reference series document[6], which also represents the description of the INIS scope. Together with the rules outlined in this chapter, this document is the basic tool to be used by inputting centres for subject classification. The scope and subject categories are reviewed, modified or redefined from time to time to ensure consistency and comprehensiveness of coverage in relation to the IAEA's mission and to the Member States' areas of common interest.

The scope of INIS includes the scopes of all categories. With most of the categories cross references are provided to other categories. Cross references should be of assistance in finding the appropriate category; in fact, by indicating topics that are excluded from the category in question, cross references help to clarify and define the scope of the category to which they are appended.

3.1.2 ETDE Subject Categories

The ETDE Subject Categories are defined in the INIS/ETDE Subject Category and Scope Descriptions. This publication is the basic tool for subject classification to be used by the inputting centres of ETDE Member States. The scope and subject categories are modified from time to time as the various subject areas develop and Member States' interests change.

The subject categories used by ETDE fall into four broad areas: energy sources, energy utilization, supporting basic science and technology, and miscellaneous.

Because of the multifaceted character of the ETDE database, ETDE subject categories are not necessarily mutually exclusive. Many times a concept falls into only one category. For instance, the design of wind turbines is assigned category S17 WIND ENERGY. At other times, two or even more categories are appropriate for one concept; for example, a document on the corrosion properties of various metals used in storing hydrogen as hydrides for fuel in motor vehicles, would be assigned the categories S36 MATERIALS, S08 HYDROGEN, S33 ADVANCED PROPULSION SYSTEMS.

3.2 Assignment of Primary and Secondary Subject Categories

Subject classifiers are expected to be subject specialists who identify the significant topics of each piece of literature and report the item to the database if it contains information that falls within its subject scope.

Rule:	**Each piece of literature processed for the database must be assigned at least one subject category (in Tag 008).**

The main topic of the document is the basis for determining the **primary subject category**. This primary category should be the one for which the scope description encompasses the primary topic discussed in the piece of literature. If there are other significant topics discussed in detail, the rules permit the assignment of one or more **secondary subject categories**. (The order in which secondary categories are assigned is irrelevant.) Secondary categories may also be assigned to indicate the application or intended use of the information contained in the piece of literature. Although their number is not limited, **more than two secondary categories should rarely be needed**.

3.3 Particular Categorization Aspects

- Studies of superconductors are generally categorized in S36 (Materials Science) together with other physical properties of materials. General physics-related studies of superconductivity and its applications should be categorized in S75 (Condensed Matter Physics, Superconductivity and Superfluidity).

Example 1:

Title: Low-temperature scanning tunneling spectroscopy studies of a high-T_c superconductor.

Abstract: The scanning tunneling microscope (STM), invented and developed by Binnig and Rohrer in Zurich, is a powerful and proven tool for the study of the surface density of states. The spectrum of surface-state density is given by the measurement of conductance, dI/dV, versus tip-sample voltage. STM allows observation of the surface topography Z(x,y), and also study of the energy spectroscopy, i.e., the electronic density of states of a high T_c superconductor, which is important to understand the microscopic mechanism responsible for superconductivity. **The authors have used a low temperature scanning tunneling microscope (LTSTM) to study and map the electronic density of states in the superconducting phase of $Bi_2Sr_2CaCu_2O_8$**, and performed the mapping of the tunneling conductance G(V,x,y) with 5 angstrom resolution on cleaved ab-planes of $Bi_2Sr_2CaCu_2O_8$ crystals (90 K T_c). The main contributions are the mapping of the tunneling conductance and superconducting energy gap, with an improved spatial resolution of 5 angstrom, and the consequent discovery of evidence for an internal proximity effect in the layered superconductor Bi_{2212}.

Primary category: S36 Materials Science

Example 2:

Title: Flux pinning and critical current in layered type-II superconductors in parallel magnetic fields.

Abstract: We have shown, within the Ginzburg-Landau theory, that **the interaction between vortices and normal-metal layers in high-T_c superconductor-normal-metal superlattices can cause high critical-current densities j_c**. The interaction is primarily magnetic, except at very low temperatures T, where the core interaction is dominant. For a lattice of vortices commensurate with an array of normal-metal layers in a parallel magnetic field H, strong magnetic pinning is obtained, with a nonmonotonic critical-current dependence on H, and with j_c of the order of 10^7-10^8 A/cm^2.

Primary category: S75 (Condensed Matter Physics, Superconductivity and Superfluidity)

Example 3:

Title: Application of high temperature superconductors to high-gradient magnetic separation.
Abstract: High Gradient Magnetic Separation (HGMS) is a powerful technique which can be used to separate widely dispersed contaminants from a host material. This technology can separate magnetic solids from other solids, liquids or gases. As the name implies HGMS uses large magnetic fields gradients to separate ferromagnetic and paramagnetic particles. HGMS separators usually consist of a high-field solenoid magnet, the bore of which contains a fine-structured, ferromagnetic matrix material. The matrix material locally distorts the magnetic field and creates large field gradients in the vicinity of the matrix elements. These elements then become trapping sites for magnetic particles and are the basis for the magnetic separate. In this paper the authors discuss **the design and construction of a prototype HGMS unit using a magnet made with high temperature superconductors (HTS)**. The prototype consists of an outer vacuum vessel which contains the HTS solenoid magnetic. The magnet is surrounded by a thermal radiation shield and multilayer insulation (MLI) blankets. The magnet, thermal shield and current leads all operate in a vacuum and are cooled by a cryocooler. High temperature superconducting current leads are used to reduce the heat leak from the ambient environment to the HTS magnet.

Primary category: S75 (Condensed Matter Physics, Superconductivity and Superfluidity)

- Category S54 (Environmental Sciences) should not be confused with S37 (Inorganic, Organic, Physical and Analytical Chemistry). If the studies are mainly about monitoring of radioactive material transport in which analysis is mentioned only as a tool, they should be categorized in S54. On the other hand, if the main stress is on the analysis method used for studying radioactivity transport, then S37 should be used.

Example 4:

Title: The calculation of a sample-specific quantitative calibration.

Abstract: Specific radioactivity analyses are routinely executed by means of gamma spectroscopy systems that are calibrated with standard acid aqueous solutions. The samples (e.g. fly ash, grass or soil samples) differ from this matrix composition and can result in misinterpretation of more than 500% if not corrected. It therefore is necessary to adjust the specific radioactivity of a sample for the matrix in which it occurs. The computer program DENSITY has been developed by which the adjustment for the differences of specific density and chemical composition of the calibration source and the sample can be calculated. **By means of Monte Carlo techniques the gamma radiation detection is simulated.** From the experimental results it appears that the standard deviation of the specific radioactivity is maximal 10%.

Primary category: S37 (Inorganic, Organic, Physical and Analytical Chemistry)
Secondary category: S54 (Environmental Sciences)

Example 5:

Title: Activity concentration of ^{226}Ra and ^{238}U in various soils.

Abstract: The distribution of ^{226}Ra and ^{238}U in various soils has been studied. Supposing that radioactive equilibrium were in existence, the average activities of ^{226}Ra and ^{238}U would show a nearly 1:1 correlation. As weathering affects radioactive equilibrium in surface soil, radioactive equilibrium was not in existence. Therefore, four kinds of soil were selected from different weathering conditions, viz. river bed soil, paddy field soil, field soil and uncropped soil. The ^{226}Ra/^{238}U ratio of various soils lies in the range of 1.63 to 2.41. The activity concentrations of ^{226}Ra were greater than ^{238}U in various soils. The ratio ^{226}Ra/^{238}U can be shown to be a quantitative index of weathering. Phosphatic manure contains ^{238}U and its daughter isotopes in concentrations far exceeding the average abundance in the earth's crust. But the cultivated soils (paddy field soil, field soil) are not affected by fertilizers in Kamisaibara.

Primary category: S54 (Environmental Sciences)

- Use of the category **S54** in INIS is limited to radioactivity monitoring in general, and to chemical or thermal pollution monitoring due to **nuclear facilities**. In ETDE this category is used for chemical and thermal pollution regardless of source, and especially if the source is not clearly determined.

- Category S12 should be used for the management of all types of radioactive wastes and for **non-radioactive wastes generated by nuclear facilities only**

- Collisions (interactions) of elementary particles are categorized in **S72**. Collisions or interactions of these particles within the atomic nucleus are categorized in **S73**. Collisions at atomic and molecular levels are categorized in **S74**. Collisions in plasmas are categorized in **S70.** Use of these collisions in structural studies of condensed matter is categorized in **S75**.

- Documents on the development of lasers without reference to nuclear applications are **out** of INIS scope. Studies of atomic and molecular processes occurring in lasers are categorized in the **S74.** In ETDE **S42** includes Lasers and Masers and is intended for research and development information only. Emphasis is on high-power lasers. Other

categories are provided for laser applications, such as isotope separation and fusion plasma production and heating. Routine uses of lasers are not within the scope of the ETDE database.

4. Abstracting and Title Augmentation

4.1 Abstracting

In addition to the bibliographic and subject description (subject categories and descriptors), **each input item should contain an English abstract (Tag 860)**. Abstracts in other languages are optional. If an author abstract is present, it should be checked and edited, if necessary, by a subject specialist before being submitted with the input. If no abstract is available from the source, it is the task of the inputting centre to submit one, preferably written by a subject specialist. For extensive instruction on submitting abstracts the reader is referred to the appropriate references[7].

Abstracts can be of two different types: informative and indicative. As the words imply, the former provides factual information whereas the latter should indicate the content of the document.

An **informative abstract** is required for most document types (e.g., **journal articles**, **patents**, **theses**, **technical reports** and **conference papers**) but the exact information to be included in each case varies somewhat because of the different nature of the documents themselves. **Journal articles** are usually devoted to a single topic and lend themselves well to informative abstracts. In the case of **patents,** a specification of the machine or apparatus, its organization and/or operation should be included, and what is new about the patented material or process should also be stressed; before writing such abstracts it is necessary to understand why the patent is important. In the case of a patented product, the method of manufacture should be included. In the case of a chemical compound, its chemical identity and possible use should be described. In the case of mixtures, quantitative information about their components is required. Informative abstracts are also needed for **theses/dissertations.** As these tend to be esoteric and specialized, the task of writing a good abstract can be difficult. When a **technical report** states final conclusions, an informative abstract is required. International conference proceedings contain **invited and contributed papers** that are often detailed, specific and quantitative enough to warrant writing an informative abstract.

A well written informative abstract should clearly state which research was conducted, why, how, what its findings were, under which restrictions the findings apply, and what can be concluded from the findings. More specifically, informative abstracts on technical or scientific work should contain the following elements of information:

- a description of the topic;
- a statement on purpose and scope;
- a description of the methodology: experimental (on measuring and/or methods of analysis) or theoretical (on models or approximations, methods of calculation, e.g., analytical or computational);
- a statement on the results;
- conclusions that can be drawn from these results;
- an explanation of why this work is relevant for the database, if this is not clear from the rest of the abstract.

[7] INIS:Instructions for Submitting Abstracts, IAEA-INIS-INIS-4(Rev.2).

When including numerical data in an informative abstract, the proper units of physical quantities should be specified. Also, error bars are vital information without which experimental findings are meaningless. It is necessary to describe techniques only when they are part of the reason for the work. When, from the general description of the topic, workers in the field would tacitly assume certain techniques are used, no further description on techniques is needed.

An **indicative abstract** may highlight part of the document, while an informative abstract should be comprehensive. Unlike the informative abstract, the indicative abstract gives general information about the document, rather than on the work described in the document, and can be less quantitative than the informative abstract. Indicative abstracts are suitable for **surveys** (i.e. fairly short overviews; indicate "brief" and/or "survey, on a popularizing level" if appropriate for this type of document), **reviews** (critical analyses of the state of the art, comprehensive and written for insiders; indicate "review", "exhaustive", "comprehensive", as well as a delineation of coverage), **bibliographies** (indicate standard and scope), and **monographs** (indicate scope, describe the level of audience, and include the table of contents in a condensed form indicating basic concepts and level of depth).

Guidelines for Abstract Preparation

- **Submit an informative abstract whenever possible.**
- **Emphasize what is novel about the information in the original document.**
- **Do not repeat the title of the original document in the body of the abstract.**
- **Do not exceed 6000 characters (900-1200 words) in length, including spaces and symbols.**
- **Information on the number of references, figures, tables or other illustrative materials such as charts, maps, plans and illustrations should be included in Tag 610 for "General notes".**

Finally, a note on nomenclature. Non-standard or unfamiliar nomenclature and proprietary names should be avoided. It is vital to explain or fully write out new acronyms and abbreviations as they occur so that they can be readily and easily accessed from the database. When using mathematical symbols, always supply their definition, especially for dependent variables. Chemical compounds, hormones and enzymes may be abbreviated only after they have been introduced into the abstract in full.

The abstract may be followed by parentheses containing the name(s) or initial(s) of the person(s) who wrote the abstract. If the original abstract has been changed this may be indicated by: **author/indexer's name or acronym.**

4.2 Title Augmentation

This is another subject analysis option which improves the free language basis for retrieval purposes and also can be useful to quickly determine relevance. On the basis of the title and the abstract the user should decide whether there is sufficient indication that the document will be of interest to warrant obtaining the full text. There are cases where poor titles convey little or no

information on the contents of the document and at times may even convey misleading information. Furthermore, certain types of documents, in particular institutional reports such as progress reports, often have brief standardized titles that do not reflect the actual subject content of the report.

In these instances, to assist the user in quickly deciding whether to read the abstract or the full text, the indexer may wish to provide some **additional information** to augment the title. This may be done by entering the information at Tag 620, "Title Augmentation". This is an optional tag and a decision on its use is left to individual Reporting Centres. Responsibility for entering information at Tag 620 lies entirely with the indexer and not with the descriptive cataloguer.

Title augmentation may be in the form of descriptors or free language text such as single words, phrases or sentences, formulas, nuclear reactions. The use of established abbreviations is encouraged, such as the symbols for element names. Any character within the full Character Set may be used in title augmentation. The information entered at Tag 620 is printed in parentheses immediately following the title and therefore should be clearly supplementary to the title without any duplication.

Rule:	**The title augmentation should indicate in a concise and abbreviated form the essential topic discussed in the piece of literature to which no reference is made in the title.**

Other examples of information useful as title augmentation are names of computer programs, explanations of less established or homonymous abbreviations or acronyms, types of radiation, exact temperatures or bombarding energies.

5. Subject Indexing

5.1 Co-ordinate Indexing

The type of indexing used in preparing INIS and ETDE records is called co-ordinate indexing. This technique involves the concurrent assignment of a set of descriptors to indicate the subject content of a piece of literature.

A word of clarification: the controlled terminology of the Thesaurus (the descriptors) consists of both simple terms (one word only) and compound terms (two or more words). The descriptors consisting of compound terms are sometimes referred to as being *pre-coordinated*, meaning that single words are co-ordinated before use, to form the complete descriptor. This should not be confused with the process of co-ordinate indexing.

The totality of the descriptors representing the information contained in the piece of literature is its set of "co-ordinated" descriptors. The process by which a set of descriptors is arrived at is frequently referred to as "post-coordination". At the time of retrieval, the searcher "post-coordinates" a number of descriptors to define the area of subject interest and the system searches for those items in the database in which the same co-ordination of descriptors is found. Co-ordinate indexing is fundamentally different from a classification system in which each piece of literature is assigned to one "class" of an established system. In a classification system all pieces of literature dealing with generally the same area are put into the same class or "pigeon hole", whereas in co-ordinate indexing any combination of descriptors is theoretically possible.

5.2 The Thesaurus and its Structure

The basic tools for subject indexing are the controlled vocabulary maintained in the Thesaurus[8] and the rules for its application as outlined in the following sections of this manual.

What is a Thesaurus?

> *"A thesaurus is a terminological control device used in translating from the natural language of documents, indexers or users into a more constrained system language. It is a controlled and dynamic vocabulary of semantically and generically related terms which covers a specific domain of knowledge".*

This definition has been adopted by UNESCO[9] and applies to the ETDE and INIS Thesauri. A thesaurus serves as a tool in subject indexing for information retrieval. Descriptors, or controlled terms, chosen from a thesaurus should clearly indicate the information content of a piece of literature. For this reason, their meaning must be well defined and unambiguous. Where there might be some ambiguity, controlled terms are defined implicitly by the structure of the terminology. Furthermore, although natural language contains a variety of synonyms and near-synonyms, the controlled terminology of a thesaurus should not contain any because efficient information retrieval requires that concepts be represented unambiguously. Synonyms or "quasi-synonyms" of controlled terms may be included in a thesaurus but their use as controlled terms

[8] ETDE/INIS:Thesaurus

[9] Guidelines for the Establishment and Development of Monolingual Thesauri", UNESCO, SC/W/255, Paris, September 1973

should be forbidden.

The structure of the terminology is based on the interrelationships between terms. These interrelationships are of three types: preferential, hierarchical and affinitive.

Preferential indicators (or cross references) identify the preferred choice in cases of semantic ambiguity (USE, USED FOR, SEE and SEEN FOR references) or when less precision is required (e.g. micropulsations USE **PULSATIONS**).

Hierarchical indicators identify the semantic relationship existing between descriptors on different specificity levels in the same hierarchy of concepts (broader and narrower terms).

Affinitive indicators identify the semantic relationship existing between descriptors which are usually on the same specificity level but in any case do not belong to the same hierarchy of concepts (related terms).

The structured alphabetical lists comprising the Thesaurus contains two types of terms: **accepted terms** (descriptors) and **forbidden terms** (non-descriptors). There are, for example, 19,007 descriptors and 6,676 non-descriptors in the INIS Thesaurus (Revision 38, 1999) and 20,709 descriptors and 7,388 non-descriptors in the ETDE Thesaurus (1997).

The terms in the Thesaurus are listed alphabetically, and with each alphabetic entry a "wordblock" is given containing all the terms associated with that particular entry.

The dates given after the descriptors indicate when the term was introduced into the Thesaurus.

Example:

Relationships	Wordblock	Cross references
preferential	HEAT TRANSFER UF *exchange (heat)* UF *heat transmission* UF *transfer (heat)* UF *transmission (heat)* UF+ *heat losses* SF *heat dissipation*	***exchange (heat)*** USE heat transfer ***heat transmission*** USE heat transfer ***transfer (heat)*** USE heat transfer ***transmission (heat)*** USE heat transfer ***heat losses*** USE energy losses AND heat transfer ***heat dissipation*** (Prior to 1985 THERMAL DIFFUSION was used for this concept.) SEE cooling OR energy losses OR heat transfer OR thermal diffusivity
hierarchical	BT1 energy transfer **NT1** convection **NT2** forced convection **NT2** natural convection **NT2** thermosyphon effect **NT1** radiant heat transfer **NT1** thermal conduction	FORCED CONVECTION (Heat transfer by forced convection.) BT1 convection BT2 heat transfer BT3 energy transfer
affinitive	*RT* ablation *RT* boilers *RT* coolant loops *RT* working fluids	COOLANT LOOPS (For reactors use REACTOR COOLING SYSTEMS or IN PILE LOOPS.) UF *loops (coolant)* RT bypasses RT circulating systems RT closed-cycle cooling systems RT cooling RT cooling systems RT heat transfer

Note: some wordblocks are only partly reproduced

The symbols or abbreviations used in the Thesaurus to indicate the various relationships between cross-referenced descriptors are listed below.

Relationship	**Symbol**	**Cross reference**
hierarchical	BT	Broader Term (level 1,2, etc.)
hierarchical	NT	Narrower Term (level 1,2, etc.)
affinitive	RT	Related Term
preferential	UF	used for ..., reciprocally USE...
preferential	UF+	used for ... plus, reciprocally USE ... AND ... (if more than one descriptor should be used)
preferential	SF	seen for ..., reciprocally SEE ... OR ... (if more than one descriptor should be considered)

Terms in natural language sometimes have several meanings or take on different connotations when used in different fields of science or technology. For the purpose of indexing, only one meaning can be accepted. Each descriptor should be univocal; in the case of a "general" descriptor with a broad meaning, its exact usage is clarified by the other descriptors assigned to the document. The vast majority of descriptors in the Thesaurus do not present this difficulty, as there is no ambiguity in their meaning. For those descriptors where ambiguity could exist, language control is exercised; that is, **semantic definition is provided by the Thesaurus** in the following ways:

- The descriptor is placed in its correct semantic context by all the terms that are associated with it in its wordblock, that is, the definition of the descriptor is provided by the association with its forbidden, broader, narrower and related terms.

- For a few descriptors where there could still exist a possibility of ambiguity, a scope note provides the exact meaning which is intended.

It should be noted that in the above manner, precise definitions are also provided for all abbreviations used as descriptors. Most of the accepted abbreviations refer either to organic compounds or to specific reactor names. The full name is entered as a forbidden term and referred to the accepted abbreviation. Consequently, the UF cross reference that spells out fully the meaning of the abbreviation appears in the wordblock for the abbreviation.

Examples:

1) The sentences "The conductivity of the **solution** was measured at different temperatures" and "The **solution** of the differential equation was derived by means of computer calculations" each contain the word **"solution"**. But the descriptor **SOLUTIONS** is relevant in the first instance only. This can be seen from the Thesaurus where the wordblock for **SOLUTIONS** has a scope note

SOLUTIONS
(For mathematical solutions see **ANALYTICAL SOLUTION** or **NUMERICAL SOLUTION**.)
BT1 homogeneous mixtures
BT2 mixtures
BT3 dispersions
NT1 aqueous solutions
NT1 hypertonic solutions
NT1 isotonic solutions

2) The wordblock **SOLUBLE POISONS**

BT1 nuclear poisons
BT2 reactor materials
BT3 materials
RT fluid poison control
RT poisoning
RT scram

semantically defines poisons not as a toxic substance dangerous to man (**HAZARDOUS MATERIALS** or the narrower term **TOXIC MATERIALS** should be used in this case), but as nuclear poisons involving neutron absorption in reactors as indicated by the broader term **NUCLEAR POISONS** and the related term **SCRAM**, which is connected with reactor shutdown.

Although descriptors that could be ambiguous usually have their intended meaning uniquely defined by the associated terms in the wordblock, the indexer will find that in very many instances homonyms appear in the Thesaurus as forbidden terms accompanied by different qualifiers in parentheses, each referring to different descriptors that more clearly identify the different meanings.

Examples:

---

flux (cosmic ray)
USE cosmic ray flux

flux (magnetic)
USE magnetic flux

flux (metallurgy)
USE metallurgical flux

flux (neutron)
USE neutron flux

flux (radiation)
USE radiation flux

flux cored arc welding
USE arc welding

FLUX DENSITY Jul 75
(Coordinate with descriptors for the flux considered, e.g. **MAGNETIC FLUX**, **NEUTRON FLUX**, etc.)
UF *density (flux)*
UF+ *neutron density flux*
RT magnetic flux
RT poynting theorem
RT radiation flux

flux jumps
USE magnetic flux

flux pinning
USE magnetic flux

FLUX PUMPS *Aug 75*
(A cryogenic dc generator.)
BT1 electric generators
BT2 electrical equipment
BT3 equipment
RT superconducting devices

FLUX QUANTIZATION
Oct 75
RT magnetic flux
RT superconductivity

flux surfaces
USE magnetic surfaces

FLUX SYNTHESIS *Jul 75*
RT neutron diffusion equation
RT neutron flux

A list comprising all deletions and additions made to the Thesaurus in the preceding month is produced and distributed to inputting centres on a monthly basis to ensure that changes in terminology are adopted promptly. A new edition of the INIS Thesaurus is published every year. The ETDE Thesaurus is published every other year.

5.3 General Indexing Rules and Procedures

Subject indexing means analyzing the information content of a piece of literature and expressing the meaningful information content in the language of the database using the controlled vocabulary of the Thesaurus.

The understanding of the scientific technical content of a piece of literature is the basic prerequisite for subject indexing. That means the indexer should be a subject specialist in the subject area of the publications to be indexed and, at the same time, familiar with the Thesaurus and subject indexing rules. The task of the indexer preparing input is to select a set of descriptors that indicate the subject content of the piece of literature. During the course of descriptor

selection it should be clearly remembered that the process of co-ordinate indexing is aimed at producing a set of descriptors that are particularly suited for searches by computer, where the concept coordination performed during indexing can be reproduced in queries by Boolean combinations of descriptors (as well as other data elements).

The purpose of subject indexing is to enable useful retrieval. To achieve this aim and to assure consistency of the database, the following rules and guidelines should be respected.

5.3.1 The Document Interpretation Rule

The interpretation of a piece of literature is the process whereby the indexer selects the meaningful information content from the document. The criterion to be used in determining what is meaningful information is a very simple one and should always be applied. It is based entirely on the requirement of the **user,** who only wants to be referred to pieces of literature that actually convey useful, direct and real information on the process, material, equipment or whatever topic is searched for.

In retrieval experience it soon becomes apparent that the user is searching for documents dealing with a topic that can be adequately defined by one, or the combination of two, or maybe three important ideas. In preparing the search query, the retriever attempts to represent each of the main ideas by one or more descriptors and co-ordinates these groups to identify the required documents. The indexer should attempt to identify for each piece of literature, from the user's point of view, the one, two or three ideas that constitute the essential reason for publishing the material. Each of these ideas must be represented by concepts that can be defined by means of descriptors chosen from the Thesaurus. It follows therefore that only those descriptors that represent **concepts actually discussed in some detail** and on which some useful information can be obtained by reading the document, must be assigned. Hence we may state the following rule:

Rule:	**Choose such information items for indexing as you would yourself expect to find in the piece of literature if you were the user searching for that information.**

The selection of the appropriate descriptors, carried out with the aid of the Thesaurus, can be considered a fairly straightforward process once the concepts representing the meaningful information content of the piece of literature have been chosen.

To exercise this choice according to the rule given above, it will be useful to adopt the following procedure: if a descriptor suggests itself, possibly because it is actually mentioned in the document, but there is some doubt about assigning it, the indexer should imagine how a user who is interested in meaningful information on the topic would answer the question: "To obtain information on this topic, would the present document be a useful reference?". Only if the answer is "yes", should the descriptor be assigned.

Example: In the sentence "For liquid-level indication a NaI-scintillation counter was used", the descriptors **SODIUM IODIDES** (NaI) and **NAI DETECTORS** should be ignored because it is unlikely that the type of counter used is of great interest; however, in the phrase: "Efficiency of large-scale sodium iodide scintillation counters", the descriptor **NAI DETECTORS** should be assigned because most likely the counter itself is the concept being discussed.

The most common procedure is to start by indexing the concepts contained in the title and abstract of a piece of literature and then to scan the full text to find information items missing from the abstract or requiring more precision.

Example: If a sentence in the abstract reads "The fast neutron cross sections of some heavy nuclei were measured", the indexer may expect to find the individual nuclei in the full text.

Sometimes there is a tendency to index too many information items from a document. To avoid such "over-indexing" the above procedure is suggested. The value of the procedure, however, is entirely dependent on the quality of the abstract which is itself not always reliable or simply may not contain all the significant information (e.g., elements, compounds, nuclear targets). **It is therefore imperative to scan the full text and to avoid over-indexing by a strict application of the interpretation rule given before.**

Ignoring superfluous indications, i.e. avoiding over-indexing, will help to prevent the retrieval of irrelevant documents. Examples of **superfluous information** items are:

> "This effect was discovered by a team of the ORNL."
>
> "These irradiation experiments were conducted in the Materials Testing Reactor."
>
> "The resonance capture was not examined."
>
> "The physiological phenomena described are similar to processes in electronic computers."

These statements do not refer to facts that increase scientific knowledge. The effect referred to might equally well have been discovered by another team and the irradiation conducted in another reactor. **Something that was *not* examined should *not* be indexed** (it would be a different matter had this example read: "no resonance capture was observed"). The last of the four examples does not refer to facts, but merely provides an aid to comprehension.

If a document deals with different topics not all of which are within the subject scope as defined by the relevant publications[6,7], only those within scope should be indexed specifically; the remaining topics should be indexed at a general level.

Some pieces of literature contain **implicit information**. For example:

"The reaction is enhanced by the presence of platinum" contains the concept **CATALYSIS**.

"The long-half-life carbon isotope" refers to **CARBON 14**.

"A computer code was developed" is a clumsy expression for **PROGRAMMING**.

If a document deals with "photometric determination of zirconium with pyridylazonaphtol", the concept **ZIRCONIUM COMPLEXES** formation is implicit.

5.3.2 The Specificity Rule

In general retrieval experience, the more specific the retrieval terms, the higher the relevancy of

the documents retrieved. As a result of the "up-posting" procedure, for every descriptor assigned to a piece of literature all of its associated broader terms are automatically assigned as well. For example, if the descriptor **NUCLEAR POWER PLANTS** is assigned by the indexer, the "up-posting" program automatically assigns its broader terms **NUCLEAR FACILITIES** (BT1), **THERMAL POWER PLANTS** (BT1) and **POWER PLANTS** (BT2) (see also the **CT** paragraph listing the indexer-assigned descriptors and the computer-assigned descriptors in the sample record given in Section 1.1). In retrieval this permits a high recall to be achieved by a query formulation comprising fairly general (broad) retrieval terms. However, when high relevancy on very specific topics is required, the retriever should formulate the query with the use of very specific descriptors. Hence we may state:

Rule: **Always use the most specific appropriate descriptor.**

Examples:

If appropriate **use**	**not** the more general
INELASTIC SCATTERING	**SCATTERING**
HEAVY ION ACCELERATORS	**ACCELERATORS**
COUNTING CIRCUITS	**ELECTRONIC CIRCUITS**
MANGANESE BASE ALLOYS	**MANGANESE ALLOYS**

To find the most specific appropriate descriptor, the indexer should make it a practice to check the wordblock of the descriptor being considered to see if any of the narrower terms associated with it are appropriate.

Sometimes a very specific concept is discussed in a piece of literature, but no descriptor is found in the Thesaurus at the level of specificity. If the specific concept appears to be important in the field of nuclear or energy science and technology and is judged to have a sufficiently high probability of being useful in retrieval, it should be proposed as a new descriptor, as described in Section 5.3.4. If it is not an important concept in nuclear or energy science and technology, the concept should be indexed with a descriptor at the lowest hierarchical level found in the Thesaurus.

As explained before, the Specificity Rule requires the indexer to choose the most specific appropriate descriptors, meaning the descriptors at the level of specificity **actually** treated in the piece of literature. There are some cases when documents treat the same hierarchy of concepts in detail but at different levels of specificity. For example, a paper may discuss in depth information relevant to pressurized water-cooled and moderated types of reactors as a group and may then go on to discuss specific details of the **BIBLIS-2 REACTOR**, which is of this type. The two descriptors, **PWR TYPE REACTORS** and **BIBLIS-2 REACTOR**, should both be assigned by the indexer in this case, although the former is a broader term of the latter and would have been automatically added to the record by the up-posting programs. As the computer programs also delete double appearances of any descriptor, the broader term will be deleted from the list of computer-added descriptors and will appear only among the indexer-assigned

descriptors. Since indexer-assigned and computer-added descriptors are independently searchable on the database, if so desired, the record will indicate that the topic is discussed in the piece of literature at two distinct levels of specificity.

Cases also arise where a document treats several specific concepts, all of which belong to the same class but for only some of which specific descriptors exist. The indexer should include in the set of descriptors not only the specific ones available but also their next broader term that identifies the class, in order to cover the specific concepts of the class for which descriptors are not available. For example, if a paper discusses the compounds heptane, octane, nonane and decane, the descriptors **HEPTANE**, **OCTANE** and **DECANE** should be used as well as their broader term **ALKANES**, which would then cover the concept *nonane* that is not represented by a specific descriptor. The broader term **ALKANES** will not appear in the computer-added descriptors. Alternatively, of course, a new descriptor may be proposed. For instance, if a paper discusses "half-lives of neutron-deficient Er isotopes with A=144-148", the existing descriptors **ERBIUM 145**, **ERBIUM 146**, **ERBIUM 147** and **ERBIUM 148** would be assigned, and the new descriptor *ERBIUM 144* would be proposed and assigned, since this paper apparently gives the first data on the new isotope Er-144.

Except for such cases as described in the above two paragraphs, we may state:

Rule: **Do not assign a descriptor and one of its broader terms to the same item.**

5.3.3 Procedures for Indexing and Data Flagging

There are many ways of arriving at an optimal set of descriptors for a given piece of literature. Some procedures can be suggested, but each indexer will gradually evolve a personal technique.

The indexer should first try to identify the main ideas that constitute the essential reason for publishing the material. In setting out to index these ideas it is suggested that a **working list of information items** be first drawn up. While reading the title and abstract and scanning the full text of the document, the indexer should list those items that represent meaningful information. This should be done by a strict and repeated application of the document interpretation rule and other guidelines, as given above. Once again, the indexer is warned that overindexing burdens the system with descriptors relating to only marginal items in the document, which then results in the retrieval of documents that convey little or no information to the user.

Once the list of information items has been drawn up, it must be "translated" into descriptors. Many will be self-evident, but some will require a search of the Thesaurus because no descriptor exactly matches the information item. Even for those descriptors that immediately suggest themselves, the indexer is encouraged to **check the Thesaurus to ensure correct semantic interpretation** of the word and correct spelling of the particular form of the word adopted. In addition, the **wordblock** for that descriptor should be examined to see if there is a more specific descriptor among its narrower terms that is appropriate.

For information items where no descriptor immediately suggests itself, the indexer will have to conduct a "search" of the Thesaurus and consult numerous wordblocks for a variety of descriptors. The entry points will obviously be descriptors related in some way to the information item being indexed. The indexer should, in each of these wordblocks, consult the

list of related terms that form a network of pathways along which searches for the appropriate descriptors can be made, that is the related terms will suggest other descriptors that may be worth considering and those, in turn, will point to related terms of interest. The search can therefore spread from some entry points into all related areas by considering the terms associated with the descriptors used as entry points. By following the connections between these interrelated terms, the indexer should be led to the most appropriate descriptor(s). If an appropriate descriptor has still not been found, a new descriptor may be proposed (described in Section 5.3.4).

To summarize, the following list of suggested procedures may be given:

- **Carefully read the title and abstract and scan the body of the piece of literature.**

- **Identify the concept(s) about which the piece of literature contains useful information.**

- **"Translate" the concepts into descriptors.**

- **Check each descriptor to make sure that:**

  - the descriptors represent as precisely as possible the major concept(s);

  - the definition matches the use;

  - the selected descriptor is the most specific appropriate choice.

- **Propose for inclusion in the Thesaurus any new descriptors necessary to index the document properly.**

- **If part of a document is within the database scope and part is not, index the latter portion generally.**

- **Avoid overindexing. Do not add a descriptor merely because it appears as a term in the title and abstract.**

- **Cross check whether additional indexing is needed in relation to literary indicators as described in Section 2.3.**

- **Special emphasis should be placed on the indexing of DATA. If the document contains *useful numerical data,* assign an appropriate narrower term from the DATA wordblock:**
  DATA
  (For data flagging always use a more specific term.)
  BT1 information

NT1 numerical data
NT2 compiled data
NT2 evaluated data
NT2 experimental data
NT2 financial data
NT2 statistical data
NT2 theoretical data
RT cinda
RT comparative evaluations
RT data covariances
RT data processing
RT information needs

What are ***useful numerical data?***

Numerical data are numbers referring to physical quantities such as densities, melting points, cross sections, spectral shifts; statistical and probability data; or numbers of occurrences of certain events such as failures of pieces of equipment or deaths of animals used for experiments; coefficients or parameters such as the rate constant of a particular chemical reaction; or financial data. These data usually have recognizable error limits. Very often such limits (accuracy, precision, covariance) are given explicitly. Often, however, they may be omitted and/or left to the reader's estimation. Numerical data may also be implicitly reported in the form of a graph, whereby points on the graph still have error limits.

In theoretical calculations often it is not possible to indicate error limits where none are mentioned. Mathematical equations from which numerical data might be derived and formulas in theoretical papers from which numerical data could possibly be calculated should **not** be considered numerical data. Information presented in graphical form without a useful scale, for example a scale given in arbitrary units or not readable to any useful accuracy, should **not** be considered useful data.

How can one assess the usefulness of any numerical data? The following questions give some guidance on what is essentially a subjective judgment:

- **Are the data within the subject scope of the database?** An item of literature may be within the scope of the INIS database because a nuclear technique, such as a tracer study, has been used to obtain numerical data about some material or phenomenon not within scope.

- **Are the data the result or product of the study, research or experiment reported in the item being indexed and not a starting condition?** Data compilations are, of course, "products of study", even though the data come from other sources. Note, however, that numerical parameters that define a particular experiment, state or hypothesis, or provide a numerical description of some instrument, equipment or facility used to perform such tasks, should not be considered useful numerical data.

- **Are the data of such a type or quality that they might be usable in another experiment, test or evaluation?** If the data just illustrate or strengthen a point that the author is making, they should not be considered useful numerical data.

If the answers to these questions are all positive, the item should probably be indexed with the appropriate narrower term from the **DATA** wordblock.

Indexing examples:

Example 1:

Title: The contribution of food irradiation to food safety and food security.

Abstract: One of the objectives of the World Health Organization **(WHO)** is to assist efforts throughout the world to provide **safe** and nutritious food supplies. However, the safety and nutritional quality, as well as the mere availability of our food, is constantly threatened by contamination, infestation and deterioration. The most recent addition to the list of **food preserving methods** is irradiation, i.e., processing of food to carefully measured amounts of **ionizing radiation.** The paper will highlight the contribution this technology is expected to make with regard to the prevention of **foodborne diseases** and food losses. (orig.)

Descriptors:

FOOD; FOOD PROCESSING; RADICIDATION; RADURIZATION; IRRADIATION PROCEDURES; IONIZING RADIATIONS

Explanation of descriptors assigned:

FOOD PROCESSING and **IRRADIATION PROCEDURES** describe the major concepts. **FOOD** is also assigned because many searchers could co-ordinate it with another concept in searching.

RADICIDATION (the use of irradiation to destroy microorganisms in food that are detrimental to health) and **RADURIZATION** (the use of irradiation to prolong shelf life of food) are the precise descriptors needed to describe the purposes of the irradiation.

IONIZING RADIATIONS specify the type of radiation (ionizing, as opposed to sunlight or electromagnetic radiation, etc., which do not produce ionization) used for food processing.
Explanation of why certain descriptors are not assigned:

The food is intended for **HUMAN POPULATIONS**, but that is peripheral to the main topic and would be overindexing.

INFECTIOUS DISEASES and **PATHOGENS** can be inferred from "foodborne diseases" but are peripheral, and in accordance with the Document Interpretation Rule, are not assigned.

RADIOPRESERVATION is not the most specific descriptor. **RADICIDATION** and **RADURIZATION** are used here.

SAFETY does not add to the description of the subject content of this document and would be overindexing.

WHO is the sponsoring organization. The use of this term does not aid in the description of the content of the paper.

Example 2:

Title: Radio-carbon dating.

Abstract: A brief and general discussion on the principle of **radiocarbon dating** is given. This is meant to stimulate the appreciation of radiocarbon and **other dating** techniques in Indonesia which is rich in **fossil** and other interesting **rock sediments** for dating studies. **NBS calibration standards** for **decay** are available for dating studies on various samples.

Descriptors:

CALIBRATION STANDARDS; CARBON 14; FOSSILS; ISOTOPE DATING; SEDIMENTARY ROCKS

Explanation of descriptors assigned:

CALIBRATION STANDARDS is useful but one cannot tell from the abstract how significant it is for this document.

CARBON 14 is implied because it is the radioactive carbon isotope used in **carbon dating.**

FOSSILS and **SEDIMENTARY ROCKS** describe the objects being dated.

ISOTOPE DATING is the closest term to carbon dating in the Thesaurus: it is an NT to **AGE ESTIMATION** and describes the main concept.

Explanation of why certain descriptors are not assigned:

INDONESIA is not relevant to the subject discussed.

CARBON 12 is the stable isotope to which carbon 14 is compared, but persons interested in carbon 12 itself would not want this document.

DECAY is much too broad; **BETA-MINUS DECAY** might be considered.

SAMPLE PREPARATION does not appear to be useful and should not be used as a descriptor unless a substantial portion of the full text document is devoted to preparing a sample for dating.

US NBS does not appear to be useful and should not be used as a descriptor unless a substantial portion of the document is devoted to a discussion of the US NBS.

Example 3:

Title: Gas emission limits the output of high-output retreating faces.

Abstract: The article describes the limits of current **ventilation** and working practice, which affect the control of gas emission in the **retreating faces** in Great Britain. Special emphasis is placed on the need to take into account advance calculation of gas emission during operational planning to ensure that **methane** control is regarded as one of the main components of the working method. The mining **engineers** must be prepared to experiment with new methods of methane drainage and innovative layouts to improve productivity and make better use of the capital investment in modern collieries.

Descriptors:

BLACK COAL; COAL MINING; DESORPTION; LONGWALL MINING; METHANE; RETREAT MINING; VENTILATION

Explanation of descriptors assigned:

The particular kind of mining considered is specified by **LONGWALL MINING, RETREAT MINING** (an ETDE-only descriptor), and **COAL MINING**, along with the exact descriptor for what is being mined, i.e. **BLACK COAL**.

METHANE specifies the special problem for which **VENTILATION** is needed, which is the point of the paper.

DESORPTION, although not referred to specifically in the abstract, was an important concept in the paper.

Explanation of why certain descriptors are not assigned:

Although **ENGINEERS** are involved, nothing is said about them in the document.

While improved control of methane gas may help boost productivity, no information on the mine **PRODUCTIVITY** is given.

UNDERGROUND MINING is not assigned because it will be added during up-posting, and is implicit in the subject category as well.

UNITED KINGDOM (for Great Britain) is not assigned unless there is something special about gas emission in the retreating faces in Great Britain.

Example 4:

Title: Computer system aids energy savings at BS Llanwern.

Abstract: British Steel Llanwern has installed a comprehensive, **centralized energy monitoring and control system** to **optimize energy use**. Initial results show significant savings, particularly on gas consumption.

Descriptors:

COMPUTERIZED CONTROL SYSTEMS; ENERGY MANAGEMENT SYSTEMS; METAL INDUSTRY; OPTIMIZATION;

STEELS

Explanation of descriptors assigned:

The paper discusses a computerized energy monitoring and control system (**COMPUTERIZED CONTROL SYSTEMS**; **ENERGY MANAGEMENT SYSTEMS**) used at a steel plant (**METAL INDUSTRY**; **STEELS**). The purpose is **OPTIMIZATION** of energy use.

Explanation of why certain descriptors are not assigned:

DATA ACQUISITION, although no doubt performed, does not appear useful and should not be assigned unless a substantial portion of the full text document is devoted to data acquisition.

Although **ENERGY CONSERVATION** is the goal of the work, this document focuses more specifically on the energy management system.

Example 5:

Title: Optimization of operating conditions in tunnel drying of food.

Abstract: A **food drying process** in a tunnel **dryer** was modeled from **Keey's drying model** and experimental drying curve, and **optimized** in operating conditions consisting of inlet air temperature, air recycle ratio and **air flow rate**. **Radish** was chosen as a typical food material to be dried, because it has the typical drying characteristics of food and quality indexes of ascorbic acid destruction and browning during drying. **Optimization** results of cocurrent and counter current tunnel drying showed **higher inlet air temperature**, lower recycle ratio and higher air flow rate with shorter total drying time. Compared with cocurrent operation counter current drying used **lower air temperature**, lower recycle ratio and lower air flow rate, and appeared to be more **efficient** in **energy usage**. Most of **consumed energy** was shown to be used for air heating and then escaped from the dryer in the form of exhaust air.

Descriptors:

AIR FLOW; DEHYDRATION; DRYERS; ENERGY CONSUMPTION; ENERGY EFFICIENCY; FLOW RATE; FOOD;

FOOD PROCESSING; MATHEMATICAL MODELS; OPTIMIZATION; RADISHES; TEMPERATURE DEPENDENCE

Explanation of descriptors assigned:

FOOD, FOOD PROCESSING and **DEHYDRATION**, along with **DRYERS, ENERGY EFFICIENCY** and **OPTIMIZATION** are the most important concepts.

AIR FLOW, FLOW RATE and **TEMPERATURE DEPENDENCE** are also important because they point out the parameters examined in the study.

MATHEMATICAL MODELS appears justified from the above abstract, but an examination of the full text is necessary to know for sure.

RADISHES specifies the particular food studied. Its **BT FOOD** was also assigned by the indexer because the method is applicable to many foods.

ENERGY CONSUMPTION must have been measured in order to be able to compare efficiency, but the latter concept (**ENERGY EFFICIENCY**) is more specific.

Explanation of why certain descriptors are not assigned:

ASCORBIC ACID is mentioned in passing in connection with changes that take place during drying, but it is not significant for this document.

ENERGY ANALYSIS is defined in the Thesaurus as an "analysis or methodology to discover how energy is used by economies," and thus is not correct for this document.

OPERATION, while not wrong, is very general; **DEHYDRATION, DRYERS** and **ENERGY EFFICIENCY** carry the meaning better here.

Although the full text must be consulted to know exactly what "lower recycle rates" means in this case, **RECYCLING** would probably be misleading because of its connotation of the re-use of materials.

Example 6:

Title: Life-cycle analysis of renewable energy systems.

Abstract: An implementation of **life-cycle analysis** (LCA) for energy systems is presented and applied to two renewable energy systems (**wind turbine** and building-integrated **photovoltaic modules**) and compared with **coal plants**.

Descriptors:

COMPARATIVE EVALUATIONS; COST BENEFIT ANALYSIS; EXPERIMENTAL DATA; FOSSIL-FUEL POWER PLANTS; LIFE-CYCLE COST; PHOTOVOLTAIC POWER SUPPLIES; WIND TURBINES

Explanation of descriptors assigned:

LIFE-CYCLE COST is studied in the context of a **COST BENEFIT ANALYSIS** of **WIND TURBINES** and **PHOTOVOLTAIC POWER SUPPLIES,** and results are compared with those for a coal-fired power plant (**FOSSIL-FUEL POWER PLANTS**, **COMPARATIVE EVALUATIONS**). Useful numerical data were obtained and presented (**EXPERIMENTAL DATA**).

Explanation of why certain descriptors are not assigned:

The photovoltaic modules are building integrated, but **BUILDINGS** as such are not discussed. The fact that these are **MODULAR STRUCTURES** is not significant, and further, is implied in the descriptor **PHOTOVOLTAIC POWER SUPPLIES.**

The concept of **WIND POWER** and the process of **PHOTOVOLTAIC CONVERSION** are not discussed here; the attention is on devices employing these in a useful way.

PHOTOVOLTAIC CELLS were of course employed, but are not themselves the object of study. The descriptor assigned above (**PHOTOVOLTAIC POWER SUPPLIES**) is preferable, as can be seen from its definition: Solar cells or arrays with associated circuitry for small-scale or dispersed applications.

5.3.4 The Proposal Rule

When an indexer comes across an entirely new concept that has no representative descriptor in the Thesaurus, or when some concept of sufficient importance cannot clearly or specifically be indexed using present terminology, a new term should be proposed. We may therefore state:

Rule:	**If no suitable descriptor exists in the Thesaurus for the retrieval of a useful concept, propose a new one.**

An immediate word of warning should be given here. **The essential purpose of the Thesaurus is to provide language control for indexing and retrieval**. An excessive proliferation of proposals for new terminology could undermine this purpose if they were to be accepted for inclusion in the Thesaurus. The indexer is therefore asked to exercise restraint in proposing new terminology and to propose a new descriptor only in the last resort and after an exhaustive attempt to express the concept in question by the use of existing terminology.

As there is no assurance that the proposed new descriptor and any suggested associated terms will be accepted, the indexer should attempt to index the concept as closely as possible using more general terms already in the Thesaurus while also listing the new proposed term. The more general terms used would normally be the broader terms suggested for the new descriptor.

Proposals for new descriptors or modifications to present terminology are carefully evaluated by the Subject Control Unit of the IAEA's INIS Secretariat and by staff of the Operating Agent of the ETDE. The relations that the indexer is **required** to provide are:

- a brief definition of the proposed term or description of its intended meaning;
- suggestions for its associated terms, usually its broader terms and related terms.

Although there are cases of proposed descriptors that do not belong to any existing hierarchy and for which no suggested narrower or broader terms may be offered, it is difficult to imagine any concept proposed as a descriptor for the Thesaurus that is not related to some existing descriptors. Hence at least related terms should always be indicated.

All centres are obliged to provide the necessary information for **each** of the proposed new descriptors. Those centres preparing input on electronic media may use the INIS Worksheet for this purpose, giving on page 1 only the TRN for the piece of literature for which the new descriptors are being proposed. They may use the space both in Tag 800 and Tag 810 to give the required information. ETDE members may use the ETDE Thesaurus Term Form[10]. Alternatively the necessary information can be provided by letter, with the TRN for each proposed descriptor always identified. Once again, it is emphasized that while the proposed new descriptors must appear in Tag 810, the required information (i.e. definition and suggested associated terms) **must not** appear on input magnetic tapes but **must** be provided **in writing** in an accompanying copy of the INIS Worksheet or in a letter.

[10] Energy Technology Data Exchange: Procedures Manual, Sec. 1, Par. 3.3.2

Note: **From the start of INIS *Atomindex* Volume 26 (1995) the electronic INIS output products include a new tag (811) that contains terms proposed by INIS inputting centres but not yet included in the Thesaurus. Likewise, tag 811 on output files was implemented by ETDE in 1996.**

An indexer who wishes to propose modifications to existing terminology independent of any specific piece of literature may do so simply by letter. Suggestions and comments, say on hierarchical relationship, are welcomed and will be considered for incorporation into future editions of the Thesaurus.

5.4 Specific Indexing Rules

5.4.1 Elements and Isotopes

An element can be indexed by (i) element name, (ii) element name with its mass number and (iii) element name with the term **ISOTOPES**. For example:

EUROPIUM, EUROPIUM 144, EUROPIUM ISOTOPES

Depending on the subject of the document, any of these descriptors can be used for indexing. For example, when chemical properties of an element are discussed, only the element name should be used because chemical properties are largely independent of mass number. If the subject is related to nuclear properties, the element name with mass number should be indexed.

5.4.2 Inorganic Compounds and Complexes

Compounds: All element names along with the term **COMPOUNDS** or **COMPLEXES** can be indexed. Most of the anions and some of the compounds relevant to INIS and ETDE are available in the Thesaurus. If available, the specific name for the compound should be indexed and this will automatically get up-posted to the broader term or more general descriptor (e.g., carbon sulfide should be indexed by the most specific descriptor **CARBON SULFIDES**). The broader terms of its wordblock, **CARBON COMPOUNDS** and **SULFIDES**, will be added by the computer.

In the absence of a specific term the compound should be indexed by (**cation name**) **COMPOUNDS** and the appropriate descriptor for the anion (e.g., sodium oxalate should be indexed by **SODIUM COMPOUNDS** and **OXALATES**). If a more specific descriptor for an anion is not available, it should be indexed by (**anion name**) **COMPOUNDS**, (e.g., aluminium kryptonate should be indexed by **ALUMINIUM COMPOUNDS** and **KRYPTON COMPOUNDS**).

Salts: Double salts are indexed as independent salts (e.g., sodium calcium sulfate should be indexed by **SODIUM SULFATES** and **CALCIUM SULFATES**). If a more specific term for individual salts is not available, they should be indexed by (**element name**) **COMPOUNDS.**
Complexes: A complex is indexed by splitting it into two parts: (**cation name**) **COMPOUNDS** and the name of its complexing agent (e.g., sodium ferricyanide is indexed by **SODIUM COMPOUNDS** and **FERRICYANIDES**). If the precise name for the complexing agent is not available, it should be indexed by using the descriptor (**element name**) **COMPLEXES** (e.g.,

sodium platinocyanide is indexed by **SODIUM COMPOUNDS, PLATINUM COMPLEXES** and **CYANIDES**).

5.4.3 Ions and Allotropes

Solutions: Ions in solution are indexed by (**element name**) **COMPOUNDS** and as **CATIONS** or **ANIONS,** depending on their charge. For example, thorium ion is indexed by **THORIUM COMPOUNDS** and **CATIONS**, and fluoride ion by **FLUORIDES** and **ANIONS.**

Gases: Ions in gases are indexed by (**element name**) **IONS** (e.g., **EUROPIUM IONS, POTASSIUM IONS**).

Beams: Ions in beams are indexed by their specific name (e.g., **CARBON 12 BEAMS, NEON 20 BEAMS**). If a precise descriptor is not available, (**isotope name**) and **ION BEAMS** should be used.

Allotropes: These should be considered only when the document is related to allotropy of an element. For many relevant allotropes a specific descriptor is available in the Thesaurus (e.g. **PLUTONIUM-ALPHA**). If a specific descriptor is not available, the allotrope should be indexed by (**element name**) and **ALLOTROPY.**

5.4.4 Alloys

Specific names, usually including the chemical symbols and percentages of the constituent elements of most of the alloys relevant to nuclear industry, are available in the Thesaurus. For example, **ALLOY-NI60CR14CO10TI5MO4W4AL3** denotes an alloy consisting of **60**% Nickel (**NI**), **14**% Chromium (**CR**), **10**% Cobalt (**CO**), **5**% Titanium (**TI**), **4**% Molybdenum (**MO**), **4**% Tungsten (**W**) and **3**% Aluminum (**AL**).

In cases where specific names are not available in the Thesaurus, the following guidelines should be used for indexing:

- Use the descriptor (**name of the metallic element**) **ALLOYS** for all the important constituent metallic elements of the alloy. Compound formation of the alloy should be indexed with the additional descriptor **INTERMETALLIC COMPOUNDS.**

- Small additions of metals, semimetals or non-metals should be indexed by (**element name**) **ADDITIONS** if they are of importance to the document (e.g., titanium additions on stainless steel should be indexed by **TITANIUM ADDITIONS** and **STAINLESS STEELS**). For non-metallic components of an alloy when the type of compound formed is not apparent, a similar descriptor should be used (e.g. **NITROGEN ADDITIONS**). If the compound formed is known, its precise name should be indexed, if available in the Thesaurus.

5.4.5 Organic Compounds

Specific terms for most of the relevant organic compounds are available in the INIS and ETDE Thesauruses. Some of the important compounds better known by their acronyms are entered in

abbreviated form (e.g. **TBP** for tributyl phosphate). If the precise name of the compound is not available, it can be indexed according to its application in the given document as follows:

- The chemical group to which the compound belongs (e.g., **HETEROCYCLIC COMPOUNDS, NUCLEIC ACIDS**).

- The relevant functional group of the compound that is involved in the reaction (e.g., **HYDROXY COMPOUNDS, NITRO COMPOUNDS**).

- According to the molecular composition of the compound (e.g., **ORGANIC SULFUR COMPOUNDS, ORGANIC OXYGEN COMPOUNDS**). When indexing aliphatic derivatives of aromatic compounds both parts should be indexed (e.g., dimethyl phenylanthracene should be indexed by **CONDENSED AROMATICS** and **HYDROCARBONS**).

- Derivatives of organic acids are salts or esters and should be indexed accordingly (e.g., sodium oxalate should be indexed by **SODIUM COMPOUNDS** and **OXALATES**), whereas butylacetate is indexed by **ACETIC ACID ESTERS**.

5.4.6 Nuclear Reactions

- All nuclear reactions are indexed with **NUCLEAR REACTIONS** or one of the more specific reactions listed as narrower terms under **NUCLEAR REACTIONS** (e.g. **ALPHA REACTIONS**) as well as the type or mechanism of the reaction if it is appropriate (e.g. **KNOCK-OUT REACTIONS**).

- If applicable, the specific reaction must be indicated by using a descriptor of the type (**ion**) or (**particle**) **REACTIONS** that identifies the incident ion or particle (e.g., **NEON 20 REACTIONS** or **PROTON REACTIONS**). Such descriptors have been introduced for the most common ions used as incident ion beams but not for all. If the appropriate descriptor does not exist, the reaction should be indexed by co-ordination of the isotope descriptor and **HEAVY ION REACTIONS.** For example, a reaction involving tantalum 181 as projectile will be indexed by the co-ordination of **TANTALUM 181** and **HEAVY ION REACTIONS.** A new descriptor may be proposed, if necessary.

- If the reaction is caused by incoming photons it should be indexed by the descriptor **PHOTONUCLEAR REACTIONS** or, if appropriate, the more specific term **PHOTOFISSION.**

- The target must be identified by using a descriptor of the type (**isotope**) **TARGET** (e.g. **IRON 54 TARGET**). Descriptors of the type (**isotope**) **TARGET** may be proposed for inclusion into the Thesaurus as their need arises for indexing the literature.

- The reaction products (residual nuclei or outgoing particles) resulting from a nuclear reaction should be indexed simply by naming the product isotope(s) and the outgoing particle(s).

- If the incident particles or the targets are polarized, the descriptors **POLARIZED BEAMS** or **POLARIZED TARGETS** should be assigned together with the descriptors

chosen for the incident ion or particle and the target, as above. If the polarization of the reaction products is studied, the descriptor **POLARIZED PRODUCTS** should be assigned together with the descriptors chosen for the reaction products (as above).

Examples:

The reaction $^{14}N(\gamma,\alpha)^{10}B$ should be indexed

PHOTONUCLEAR REACTIONS
NITROGEN 14 TARGET
ALPHA PARTICLES
BORON 10

Note: The above reaction can also be written $\gamma + N^{14} \rightarrow \alpha + B^{10}$

The reaction $^{3}He(d,p)^{4}He$ at 430 keV where the incident beam and the target are polarized, should be indexed

DEUTERON REACTIONS
POLARIZED BEAMS
HELIUM 3 TARGET
POLARIZED TARGETS
PROTONS
HELIUM 4
KEV RANGE 100-1000

The alpha pickup reaction $^{92}Zr(^{3}He,^{7}Be)^{88}Sr$ should be indexed

ALPHA-TRANSFER REACTIONS
PICKUP REACTIONS
HELIUM 3 REACTIONS
ZIRCONIUM 92 TARGET
BERYLLIUM 7
STRONTIUM 88

5.4.7 Particle Interactions

- All particle interactions are indexed by using one of the narrower terms listed in the wordblock for **PARTICLE INTERACTIONS.** The descriptor chosen should identify as specifically as possible the particles involved in the interaction (e.g. **PION PLUS-NEUTRON INTERACTIONS**). Note that photon-particle interactions are also included.

Note: The descriptor **COLLISIONS** and its narrower terms should be used only for low-energy collisions at the atomic and molecular level.

- If applicable, a descriptor for the type of interaction should be used. For example:

CHARGE-EXCHANGE INTERACTIONS, ELECTROPRODUCTION, WEAK INTERACTIONS,

- Antiparticles for which specific descriptors do not exist are indexed by using the appropriate "particle" and "antiparticle" descriptors (e.g., the antisigma minus particle (Σ^-) is indexed by **SIGMA MINUS PARTICLES** and **ANTISIGMA PARTICLES**).

- Final state particles resulting from the interaction should be indexed by naming the product particles. If intermediate state particles are discussed and the discussion forms an essential part of the document, they should be indexed by naming the intermediate particles.

- The energy range of the incident particle, if known, should be indexed.

- Properties or characteristics of the interaction, if known, should be indexed. For example:

  TOTAL CROSS SECTIONS, MULTIPLICITY, ANGULAR DISTRIBUTION, SPIN ORIENTATION

- If properties of immediate or final state particles are determined from the interaction (e.g., **SPIN, PARITY, MASS, LIFETIME**), these should be indexed.

- If the incident particles or the target particles are polarized or the polarization of the product particles is studied, the descriptors **POLARIZED BEAMS, POLARIZED TARGETS** or **POLARIZED PRODUCTS** should be used.

Examples:

The interaction $\bar{\nu}_\mu + p \rightarrow p + \pi^- + \mu^+$ should be indexed

ANTINEUTRINO-PROTON INTERACTIONS
MUON ANTINEUTRINOS
WEAK INTERACTIONS
PROTONS
PIONS MINUS
MUONS PLUS

The interaction $\pi^- + p$ $\nearrow$ $\searrow$ $\pi^- + p + \pi^0$ / $\pi^- + \pi^+ + n$

which has two different sets of products should be indexed

PION MINUS-PROTON INTERACTIONS
PARTICLE PRODUCTION
PIONS MINUS
PROTONS
PIONS NEUTRAL
PIONS PLUS
NEUTRONS

5.4.8 Reactor Names

Individual nuclear reactors should be indexed by their **proper names** as given in the Thesaurus; more general terms for reactor types are added automatically by the up-posting procedure. A specific reactor name should **not** be used in indexing when mention of it is made only as a radiation source or other form of research tool or incidental accessory. Nor should it be used if the study or research work discussed in the document had its origins in previous work connected with that specific reactor, or if the results of the work discussed in the document might perhaps in the future be applied to that reactor. Bearing in mind the document interpretation rule, the name of the reactor should only be used in indexing if the document actually contains useful information about the reactor itself.

If individual reactor names cannot be identified from the piece of literature, the nearest more generic descriptor indicating the reactor type should be used (preference should be given to specific descriptors such as **POOL TYPE REACTORS, MAGNOX TYPE REACTORS**). If a reactor type cannot be identified, **REACTORS** should be used.

When the name of a new reactor is proposed for inclusion in the Thesaurus, the fully spelled out version of the name must be cross referenced as a forbidden term if the new descriptor is entered as an abbreviation. For any new reactor, the proposed term must indicate the following properties: purpose, fuel, coolant, moderator and neutron energy essential for the maintenance of criticality.

5.4.9 Geographic Designations

Geographic designations are usually indexed by the names of the countries (or states for the USA) to which they belong. Thus Bombay is indexed as **INDIA**, and Chicago as **ILLINOIS**. Sometimes the descriptors are more specific, for example, **WESTERN AUSTRALIA** and **NORTHERN TERRITORY** as narrower terms to **AUSTRALIA**, or **NORTHWEST TERRITORIES** as narrower term to **CANADA**.

The same principle is valid for **SEAS** if no specific descriptor is available, for example, Gulf of Genoa is indexed by **MEDITERRANEAN SEA**.

Geographic designation should be used if the location of measurement (e.g., fallout, or radioactive wastes) is indicated and of relevance, or in cases where geographical, topographical, climatic or other local conditions have significant influence on the effect of phenomenon described. Geographic designations are also used for documents discussing energy policy or economics.

5.4.10 Computer Codes

Computer codes are indexed by the initial letter of their code designation, as given in the document, and the word **CODES**; for example, the computer code ATHENA (Advanced Thermal Hydraulic Energy Network Analyzer) is indexed by **A CODES**, and the computer code BBUNS (Beam Break-Up Numerical Simulator) is indexed by **B CODES**. If the initial "letter" is a number, for example, 1DFEMWATER (1-Dimensional Finite Element Model of WATER), the code is indexed by **NUMBER CODES**. If the name of the code does not appear in the title,

it should be given as title augmentation.

6. Guidelines and Examples for Subject Analysis in Particular Subject Fields

The following sections give guidance, by way of rules and examples, for indexing information in particular subject fields. In each example, a specific concept or topic is stated in the nature of a title, the primary and secondary subject categories are given, and this is followed by the indexing sample. For detailed information on scope and categorization of items dealing with these topics, the indexer is referred to the latest revision of the relevant reference series[6,7].

6.1 Materials

Certain materials have important applications in nuclear science and engineering and in energy technologies. Scientific and technical studies of such materials are considered to be within scope of the INIS or Energy databases, even when the studies are not directed towards their use in nuclear or energy applications. Examples of such materials are photoelectric materials that would have applications in solar cells, and uranium alloys or alloys of other elements of direct use in nuclear technology. Complete listings of elements considered within scope are given in the relevant reference series[6,7].

Any material, regardless of whether metal, ceramic, composite, etc., is considered to be within scope when it is the object of, or adjunct to, a study that deals primarily with nuclear or energy science and technology. Such materials are relevant for the database because of their association with a study that is itself within scope, that is **the study would not have been selected on the basis of the materials alone**. For example, aluminium alloys, are, in general, not considered to be within scope, but an article that deals with aluminium alloys used as a material for reactor fuel cladding or for heat exchangers in heat pumps, would be indexed to those alloys as specifically as possible.

6.1.1 Metals and Alloys

The elemental name is available as a descriptor for every metal. In addition, the name of each metallic element in combination with the word alloys is also a descriptor, for example, **URANIUM ALLOYS, COPPER ALLOYS**. In some cases, elemental names have been used to provide descriptors for important base alloys. Examples are **CHROMIUM BASE ALLOYS, NICKEL BASE ALLOYS**. Specific alloy names that are often used in the literature of nuclear or energy technologies are available in the Thesaurus. The indexer may therefore find available for use such names as **HAYNES STELLITE NO 21, NIMONIC, RENE 95**.

Example 1:

Title: **Casting process for preparing an aluminium base alloy (0.4% by weight of silicon) fin material for heat exchangers.**

Primary category: **S36**

Descriptors: **ALUMINIUM BASE ALLOYS; CASTING; FINS; HEAT EXCHANGERS; SILICON ADDITIONS**

Example 2:

Title: **Method of making a sodium-sulfur battery electrode.**

Primary category: **ETDE S25; INIS out of scope**

Descriptors: **SODIUM-SULFUR BATTERIES; CATHODES; FABRICATION; GRAPHITE; STEELS**

Example 3:

Title: **Model for radiation-induced Zircaloy cladding creep degradation under spent fuel disposal conditions at the Yucca site.**

Primary category: **S36**

Descriptors: **ZIRCALOY; CREEP; FUEL CANS; PHYSICAL RADIATION EFFECTS; SPENT FUELS; UNDERGROUND DISPOSAL; YUCCA MOUNTAIN; MATHEMATICAL MODELS**

Example 4:

Title: **Standard enthalpies of formation of La-Ru alloys by direct synthesis calorimetry at 1473 K; comparison of results with predicted values of published models.**

Primary category: **S36**

Descriptors: **LANTHANUM ALLOYS; RUTHENIUM ALLOYS; FORMATION FREE ENTHALPY; CALORIMETRY; TEMPERATURE RANGE 1000-4000 K; MATHEMATICAL MODELS; EXPERIMENTAL DATA; COMPARATIVE EVALUATIONS**

6.1.2 Ceramics, Cermets and Refractories

Ceramics and refractory materials of importance in nuclear and energy technologies are often compounds in the form of borides, carbides, hydrides, nitrides, silicides or oxides. Cermets may be refractory metals in combination with these ceramics. In the case of mixtures, each component is indexed as specifically as possible to facilitate retrieval by co-ordination of descriptors.

Selection of descriptors for compounds that are ceramic materials follows the rules given before for Inorganic Compounds and Complexes.

Example 1:

Title: **Plasma spray deposition of SiC powder on graphite substrates to obtain a dense-body hard ceramic.**

Primary category: **S36**

Descriptors: **SILICON CARBIDES; PLASMA ARC SPRAYING; POWDERS; DEPOSITION; GRAPHITE; SUBSTRATES; DENSITY; HARDNESS**

Example 2:

Title: **Flexural strength, inelastic fracture and microstructure of whisker-reinforced silicon nitride composites at 1400 C.**

Primary category: **S36**

Descriptors: **SILICON NITRIDES; FLEXURAL STRENGTH; MICROSTRUCTURE; FRACTURE PROPERTIES; WHISKERS; COMPOSITE MATERIALS; REINFORCED MATERIALS; TEMPERATURE RANGE 1000-4000 K**

Example 3:
Title: **Thermal conductivity of boron carbide after fast-neutron irradiation to a burn-up of 12% total boron; measurements up to 2000 C.**

Primary category: **S36**

Descriptors: **BORON CARBIDES; THERMAL CONDUCTIVITY; BURNUP; FAST NEUTRONS; PHYSICAL RADIATION EFFECTS; TEMPERATURE DEPENDENCE; TEMPERATURE RANGE 0273-0400 K; TEMPERATURE RANGE 0400-1000 K; EXPERIMENTAL DATA**

6.1.3 Other Materials

Materials such as plastics, rubber, wood and concrete are indexed by specific descriptors when available in the Thesaurus. The indexer should refer to a generic descriptor to determine which narrower terms may be used. For example, under **PLASTICS** it will be found that **LUCITE, POLYSTYRENE, TEFLON** and the names of other frequently indexed plastics, are present as descriptors. Also, it will be found that the descriptor **CONCRETE-PLASTIC COMPOSITES** exists by looking at the wordblock under **COMPOSITE MATERIALS.**

Example 1:

Title: **Preparation of Cd-Te thin films by evaporation onto glass substrates at 200 C.**

Primary category: **S36**

Descriptors: **CADMIUM TELLURIDES; DEPOSITION; EVAPORATION; GLASS; SUBSTRATES; THIN FILMS; TEMPERATURE RANGE 0400-1000 K; SAMPLE PREPARATION**

Example 2:

Title: **Shear strength characteristics of concrete beams reinforced with aramid fibers and effects of processing on shear resistance.**

Primary category: **S36**

Descriptors: **REINFORCED CONCRETE; SHEAR PROPERTIES; STRUCTURAL BEAMS; ARAMIDS; FIBERS; PRESTRESSED CONCRETE**

Example 3:

Title: **Effect of thermal aging on the morphology and insulation performance of cross-linked polyethylene.**

Primary category: **S36**

Descriptors: **POLYETHYLENES; MORPHOLOGICAL CHANGES; HEAT TREATMENTS; AGING; THERMAL INSULATION; PERFORMANCE**

6.2 Environmental and Earth Sciences

This section deals with the indexing of information concerned with environmental problems and issues associated with nuclear technologies and nonnuclear energy production and use. Examples of some major concerns are release and transport of radioisotopes through atmospheric, terrestrial and aquatic pathways; siting of nuclear or fossil-fuel power plants; disposal of radioactive and chemical wastes and their possible escape into the environment; ecological consequences of thermal effluents; and global effects of emissions from energy production facilities.

6.2.1 Basic Studies

Basic scientific investigations, models or data compilation that could be relevant to environmental aspects of nuclear or nonnuclear energy activities are within scope of the INIS and ETDE databases. This is an area in which judgement and experience must be exercised to balance the selection of information to be indexed; one should not go too far afield, and yet should not overlook items of basic research that might have direct application to technical projects in the fields of interest.

Example 1:

Title: **A mathematical model (PORFLO-3) for fluid flow, heat and mass transport in variably saturated geologic media.**

Primary category: **ETDE S54; INIS out of scope**

Descriptors: **GEOLOGICAL STRUCTURES ; FLUID FLOW; HEAT TRANSFER; MATHEMATICAL MODELS; POROSITY; P CODES; MASS TRANSFER; ENVIRONMENTAL TRANSPORT; WATER SATURATION**

Example 2:

Title: **Turnover and properties of organic matter in soils: an international global soils database in biogeochemical cycles.**

Primary category: **ETDE S54; INIS out of scope**

Descriptors: **SOILS; DATA COMPILATION; ORGANIC MATTER; CARBON CYCLE; BIOCHEMISTRY; GEOCHEMISTRY; GLOBAL ASPECTS; INTERNATIONAL COOPERATION**

Example 3:

Title: **Use of krypton-81 and iodine-129 as tracers to investigate vertical mixing processes in seawater.**

Primary category: **S58**

Descriptors**: SEAWATER; MIXING; TRACER TECHNIQUES; KRYPTON 81; IODINE 129; DEPTH; OCEANOGRAPHY**

6.2.2 Chemicals Monitoring and Transport

Chemicals that are used in or are byproducts of nuclear and nonnuclear energy industry have become factors of major environmental concern. The transport, interaction, characterization and monitoring of these chemicals in the terrestrial, aquatic and atmospheric environments are subjects that should be selected and indexed for the database **(for the INIS database if they originate from nuclear facilities only)**. Specific descriptors are available for many of the substances of importance, for example, **SULFUR DIOXIDE, OZONE, POLYCHLORINATED BIPHENYLS**. The same general rules for selecting descriptors for chemical names that appear in Section 5.4 apply here.

For co-ordination with the environmental contaminants or materials, descriptors are available for many specific terrestrial, aquatic and atmospheric attributes, as well as for the interactions being studied. Some examples are: **SOILS, LAKES, GROUND WATER, ATMOSPHERIC PRECIPITATIONS, ECOLOGICAL CONCENTRATION, ENVIRONMENTAL TRANSPORT, SULFUR CYCLE**. Other examples will be found in the indexing samples given below.

Example 1:

Title: **Measurement of methane emissions from surface coal mines using FTIR spectroscopy.**

Primary category: **S01**

Descriptors: **COAL MINES; METHANE; EMISSION; INFRARED SPECTRA; FOURIER TRANSFORMATION; AIR POLLUTION MONITORING; SURFACE MINING**

Example 2:

Title: **Importance of organic material and methylating bacteria levels on mercury content of fish in reservoir water bodies.**

Primary category: **ETDE S54; INIS out of scope**

Descriptors: **WATER RESERVOIRS; WATER POLLUTION; MERCURY; ECOLOGICAL CONCENTRATION; ENVIRONMENTAL TRANSPORT; ORGANIC MATTER; METHYLATION; FISHES; BACTERIA**

Example 3:

Title: **Use of continuous emission monitoring systems (CEM) for compliance with regulatory requirements for release of sulfur dioxide and nitrogen oxides from fossil-fuel power plants.**

Primary category: **ETDE S20; INIS out of scope**

Secondary category: **S54**

Descriptors: **FOSSIL-FUEL POWER PLANTS; AIR POLLUTION MONITORING; POLLUTION REGULATIONS; COMPLIANCE; SULFUR OXIDES; NITROGEN OXIDES**

6.2.3 Radioactive Materials Monitoring and Transport

Radioactive isotopes that are used in or become byproducts of nuclear industry are the main focus of this segment of the database. Terrestrial, atmospheric and aquatic studies that deal with levels, interaction and transport of, for example, plutonium, krypton, iodine or strontium radioisotopes, should be selected and indexed. The same guidelines given in Section 5.4 apply to the selection of descriptors for the isotopes involved.

Examples of specific descriptors that may indicate or describe environmental/ecological transport and interactions are: **RADIONUCLIDE MIGRATION, BUILDUP, FOOD CHAINS, UPTAKE.**

Example 1:

Title: **Distribution of plutonium-239 and cesium-137 nuclides in sediments as a function of geochemical composition.**

Primary category: **S54**

Descriptors: **PLUTONIUM 239; CESIUM 137; RADIONUCLIDE MIGRATION ; AQUATIC ECOSYSTEMS; SEDIMENTS; GEOCHEMISTRY; CHEMICAL COMPOSITION**

Example 2:

Title: **Dispersion models and exposure pathways for radionuclide releases from nuclear power plant stacks.**

Primary category: **S54**

Secondary category: **S21**

Descriptors: **RADIONUCLIDE MIGRATION ; MATHEMATICAL MODELS; NUCLEAR POWER PLANTS; RADIOACTIVE EFFLUENTS; ENVIRONMENTAL TRANSPORT; RADIATION DOSES; STACK DISPOSAL**

6.2.4 Thermal Effluents Monitoring and Transport

Studies on the effects of heated effluents from nuclear and fossil-fuelled power plants are within scope of the ETDE database **(within the scope of the INIS database if generated by nuclear facilities only)**. Information selected for this section should deal with environmental aspects of thermal effluents in bodies of water, earth and the atmosphere. Included are studies of plume behaviour, hydrodynamics of heated effluent mixing with the receiving water, and modelling of thermal effects, such as increased sea surface temperature and global climate change. Measures for control and abatement are included in the ETDE subject scope but excluded from INIS.

Example 1:

Title: **Numerical advection-dispersion model of the dynamic temperature regime in surface waters below nuclear power station discharge outlets.**

Primary category: **S54**

Descriptors: **NUCLEAR POWER PLANTS; THERMAL EFFLUENTS; MATHEMATICAL MODELS; NUMERICAL ANALYSIS; SURFACE WATERS; TEMPERATURE DISTRIBUTION; ADVECTION; FLUID FLOW; DYNAMICS; DIFFUSION**

Example 2:

Title: **Heat propagation from a radioactive waste repository.**

Primary category: **S54**

Descriptors: **RADIOACTIVE WASTE DISPOSAL; UNDERGROUND DISPOSAL; THERMAL POLLUTION; ENVIRONMENTAL EFFECTS; HIGH-LEVEL RADIOACTIVE WASTES; CONTAINERS; ROCKS; BENTONITE; BACKFILLING; HEAT FLUX**

Example 3:

Title: **Use of infrared thermal-image data from remote sensing to evaluate urban heat island environmental effects.**

Primary category: **ETDE S54; INIS out of scope**

Descriptors: **URBAN AREAS; THERMAL EFFLUENTS; THERMAL POLLUTION; REMOTE SENSING; DATA ANALYSIS; INFRARED THERMOGRAPHY; ENVIRONMENTAL EFFECTS**

6.2.5 Site Resources and Use Studies

Studies dealing with environmental concerns of site selection and resource use for any aspect of energy development are within the scope of both ETDE and INIS.

Example 1:

Title: **Geologic and hydrologic investigation of Yucca Mountain as an underground repository for high-level nuclear wastes.**

Primary category: **S12**

Secondary category: **S58; S11**

Descriptors: **YUCCA MOUNTAIN; RADIOACTIVE WASTE DISPOSAL; GEOLOGY; HYDROLOGY; SITE CHARACTERIZATION ; SITE SELECTION; HIGH-LEVEL RADIOACTIVE WASTES ; UNDERGROUND DISPOSAL**

Example 2:

Title: Government policy and planning for selection and reserving sites for wind turbine installation in the Netherlands.

Primary category: **ETDE S29**; **INIS out of scope**

Secondary categories: **ETDE S17**

Descriptors: **WIND POWER PLANTS; PLANNING; GOVERNMENT POLICIES; NETHERLANDS; WIND TURBINES; SITE SELECTION**

Example 3:

Title: **Hydro-power developments vs. protection of wetlands as natural habitats.**

Primary category: **S13**

Secondary category: **S54**

Descriptors: **WETLANDS; RESOURCE MANAGEMENT; HYDROELECTRIC POWER PLANTS; SITE SELECTION; HABITAT; ENVIRONMENTAL IMPACTS**

6.3 Economic and Social Aspects

In addition to the scientific and engineering literature associated with research and development

of energy technologies and with environmental aspects of these technologies, the economic and social factors related to these aspects are also within scope of both ETDE and INIS. Studies on choices and options in energy technology against consumer demands for energy in its various forms, cost comparisons, resource availability, energy source substitution, comparison of short- and long-term options, cost-effectiveness of pollution control measures, demand forecasting, efficiency studies, marketing analyses and effects of government policies are included.

The indexer in this area would assign to the pertinent power plant, reactor or other appropriate energy-source, descriptors such as **COST, ECONOMICS, COST BENEFIT ANALYSIS, COMPARATIVE EVALUATIONS, SOCIO-ECONOMIC FACTORS**.

6.3.1 Economic and Social Aspects of Nuclear Energy

Areas of interest include economic viability of nuclear energy in comparison to other energy sources; cost of nuclear power generation; economic consequences of fuel reprocessing and nuclear waste storage; energy demand forecasts; market trends and the role of nuclear power; the economic implications of nuclear accidents and radioactive contamination; new technologies for cost reduction and improved safety; and decommissioning costs.

Example 1:

Title: **Public attitudes toward use of nuclear power vs. increased use of fossil fuels resulting in increased carbon dioxide and other greenhouse gas emissions.**

Primary category: **S29**

Secondary category: **S21**

Descriptors: **NUCLEAR POWER; PUBLIC OPINION; CARBON DIOXIDE; GREENHOUSE GASES; FOSSIL FUELS; COMPARATIVE EVALUATIONS; CLIMATIC CHANGE**

Example 2:

Title: **Economic aspects of seawater desalination and power needs; evaluation of nuclear energy as a heat source.**

Primary category: **S21**

Secondary category: **ETDE S29**

Descriptors: **SEAWATER; DESALINATION; ECONOMIC ANALYSIS; NUCLEAR POWER**

Example 3:

Title: **Analysis of political, institutional, technical and economic factors affecting cost estimates of high-level radioactive waste disposal in geological repositories.**

Primary category: **S12**

Secondary category: **S29**

Descriptors: **RADIOACTIVE WASTE DISPOSAL; COST ESTIMATION; POLITICAL ASPECTS; HIGH-LEVEL RADIOACTIVE WASTES; SOCIO-ECONOMIC FACTORS; RADIOACTIVE WASTE STORAGE; GEOLOGIC STRUCTURES; UNDERGROUND DISPOSAL; COMPARATIVE EVALUATIONS**

Example 4:

Title: **Application of decision analysis techniques for the understanding of economic risks and uncertainties in various power reactor decommissioning scenarios.**

Primary category: **S21**

Secondary category: **S29**

Descriptors: **POWER REACTORS; REACTOR DECOMMISSIONING; ECONOMIC ANALYSIS; DECISION MAKING**

6.3.2 Economic and Social Aspects of Nonnuclear Energy

Under this topic are included studies on the economics of fossil fuels (coal, petroleum, oil shales), synthetic fuels (hydrogen, alcohol, synthetic petroleum and gas) and renewable energy sources (such as biomass, solar, hydro, wind, geothermal and tidal energy). Areas of interest include supply and demand, trade, comparative economic evaluations, effect of public opinion and marketing.

Example 1:

Title: **Policy analysis of substitution of diesel and fuel oils by natural gas in India in the transport and industry sectors.**

Primary category: **S02**

Secondary category: **S03; S29**

Descriptors: **INDIA; FUEL SUBSTITUTION; TRANSPORT; INDUSTRY; FUEL OILS; DIESEL FUELS; NATURAL GAS; ECONOMIC POLICY**

Example 2:

Title: **Econometric analysis of investment decisions for exploration, development and production of oil in the North Sea area of the United Kingdom continental shelf.**

Primary category: **S02**

Descriptors: **NORTH SEA; PETROLEUM INDUSTRY; INVESTMENT; ECONOMETRICS; DECISION MAKING; EXPLORATION; PRODUCTION; UNITED KINGDOM; CONTINENTAL SHELF**

Example 3:

Title: **Consumer attitudes toward use of solar energy for water heating in Western Australia.**

Primary category: **S14**

Descriptors: **SOLAR ENERGY; WESTERN AUSTRALIA; PUBLIC OPINION; SOLAR WATER HEATING**

Example 4:

Title: **Production cost of using geothermal energy for hydrogen production using a high temperature steam electrolysis process: comparison with use of direct electrical energy.**

Primary category: **S15**

Descriptors: **GEOTHERMAL PROCESS HEAT; HYDROGEN PRODUCTION; ELECTROLYSIS; COST BENEFIT ANALYSIS; COMPARATIVE EVALUATIONS; ELECTRIC POWER**

Example 5:

Title: **Increased use of corn as a feedstock for ethanol production: effect on U.S. farm income and balance of trade.**

Primary category: **S09**

Descriptors: **ETHANOL FUELS ; MAIZE; FARMS; INCOME; PRODUCTION ; USA; TRADE; ECONOMICS**

Example 6:

Title: **Comparative economic analyses conducted to establish the difference in supply cost of synthetic crude oil derived from in-situ processing and surface retorting from soil sand mining operations.**

Primary category: **S04**

Descriptors: **OIL SANDS; IN-SITU PROCESSING; RETORTING; COMPARATIVE EVALUATIONS; SYNTHETIC PETROLEUM; PRODUCTION; COST; ECONOMIC ANALYSIS**

Example 7:

Title: **Development of a mathematical model that simulates the performance of a combined wind/hydro/diesel plant with pumped storage.**

Primary category: **S25**

Secondary categories: **S02; S13; S17; S20**

Descriptors: **WIND POWER PLANTS; HYDROELECTRIC POWER PLANTS; DIESEL ENGINES; HYBRID SYSTEMS; ECONOMICS; PUMPED STORAGE; SIMULATION; MATHEMATICAL MODELS; PERFORMANCE; FOSSIL-FUEL POWER PLANTS**