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EDB

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Guide to Abstracting and Indexing

December 1980

U. S. DEPARTMENT OF ENERGY
TECHNICAL INFORMATION CENTER

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ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center, as the national information center for the Department of Energy, manages, publishes, and disseminates scientific, technical, and practical energy information acquired from worldwide sources. It builds and maintains energy information data bases used to prepare abstracting journals, bibliographies, and literature searches. The data bases are also searchable via the Department's on-line retrieval system, DOE/RECON. This information is provided to DOE program offices and contractors; scientists; engineers; educational, commercial, and industrial communities; and the general public. The Technical Information Center conducts an active announcement and marketing program. It establishes policy and administers control of an inventory and registry for DOE publications. The Center also develops and evaluates new and effective information systems and services as required by scientific and technical management within the Department of Energy.

UNITED STATES DEPARTMENT OF ENERGY

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ABOUT THE *EDB GUIDE TO ABSTRACTING AND INDEXING*

Two of the more significant components of the document records stored are abstracts and subject indexing. Thus, it is important that consistency and uniformity be achieved in these areas. This Guide contains the guidelines used in abstract writing and editing and in subject indexing information for the TIC data bases and publications. The associated acquisition, subject categorization, and retrieval functions are also addressed.

TIC Data Bases

Four major data bases are being created and maintained at TIC: the Energy Information Data Base (EDB) containing scientific and technical information covering all areas of energy as well as quasi-technical information in the area of energy policy and management; the General and Practical Information Data Base (GAP) containing mass-distribution information on energy, "how-to" information for homeowners and small businesses, and general energy information; the Research in Progress Data Base (RIP), which includes current DOE and other federal environmental research and development programs in the field of energy; and the Issues and Policy Summaries Data Base (IPS), which provides access to public statements on energy by DOE officials, the White House, members of Congress, and others. Several classified or limited-access data bases are also maintained at TIC. The data bases are searchable by the DOE/RECON system in the case of the unclassified files or by specialized search routines for the classified files.

Current Awareness Publications

The current awareness needs of the Department are provided by several abstract journals produced at TIC: *Energy Research Abstracts (ERA); Energy Abstracts for Policy Analysis (EAPA);* and *Issues and Policy Summaries (IPS).* In addition, TIC produces several abstract journals in the EDB Update Series: *Geothermal Energy Update; Fusion Energy Update; Fossil Energy Update; Solar Energy Update;* and *Energy Conservation Update.* Other abstract journals are produced containing classified or limited-access information.

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ABSTRACT

The principles employed at the Technical Information Center (TIC) in abstracting and object indexing information for its data bases and abstract journals are described. This Guide also includes information on the mission and responsibilities of TIC, the data bases and abstract journals maintained and produced, the associated acquisition, subject categorization, retrieval functions, and other information processing activities.

ABSTRACTING

DEFINITION OF AN ABSTRACT

An abstract is a clear and concise statement of the content of an original document. In general it should include the purpose, methodology, results, and conclusions of the author without added interpretation or criticism by the abstractor. The ideal abstract should contain sufficient information to permit complete and thorough indexing.

TYPES OF ABSTRACTS

Because of the wide diversity of document types and the time and space limitations imposed upon abstract preparation, distinction is made between two types of abstracts, the *indicative abstract* and the *informative abstract.*

The *informative abstract* is the type most often chosen and is appropriate for most journal articles, topical reports, theses, patents, etc. As the name implies, this type abstract elucidates the methods, results, and conclusions of the original document.

The *indicative abstract* is appropriate for types of literature for which the content can at most be indicated. For example, an informative abstract for a long progress report covering many research projects would be much too lengthy. At most only an abstract that notes briefly each topic or study included is possible. An abstract for a review or bibliography can do little more than note its scope and number of references.

ANALYTICS

Some documents are so large and diverse in content that a single abstract and indexing treatment is not feasible. Such items as books, annual progress reports, conference proceedings, etc., may be of this nature. In this case an informative abstract is prepared for each paper (section, chapter) of the item, and a brief, indicative abstract is prepared for the overall document. Such a treatment is called preparing "analytics" for the document. The brief, indicative abstract is called the "lead" or "leading" abstract and must include the

statement: "Separate abstracts were prepared for _____ papers (sections, chapters) in this report (book, etc.)." This statement may be sufficient in itself as the lead abstract for the document.

In some cases only selected parts of a document may have separate abstracts. Then the lead abstract should reflect the topics not included in the individual analytics.

See the section Rules and Examples in the SUBJECT INDEXING portion of this Guide for information on the indexing of analytics.

ABSTRACT EDITING

Most journal articles and topical reports include abstracts prepared by authors or editors. Also, many abstracts are received from other sources on computer tape. The abstractor should read *all* abstracts critically. He should not change acceptable forms merely for reasons of preference or brevity, but he should change nonstandard, incorrect, or ambiguous forms. He should be especially watchful for symbols that are not on the font. Introductions of papers are seldom good material for abstracts.

ACQUISITION

The Technical Information Center (TIC) receives many reports as a result of Standard Distribution from DOE contractors. Additional information is obtained from journals and other periodicals by subscription or exchange. These publications are examined and evaluated for items for inclusion in the DOE data base. Many items are obtained as a result of scanning by cooperating organizations. Some of this information is received on computer tapes.

In addition to this almost automatic receipt of material, there is the necessity to locate additional suitable information from other sources. Potential sources that must not be overlooked during the abstracting activity are book review sections of scientific periodicals, lists of reports, and bibliographies. Documents that appear suitable for inclusion in the data base should be requested through the Bibliographic Support Section of the Technical Services Branch.

ELEMENTS OF ABSTRACTS

Subject and Scope

State the extent of the work reported in qualitative and/or quantitative terms. For example, the terms "brief" or "exhaustive" may be used to characterize the original. The time period covered and/or the number of references reviewed serve to characterize or describe the work.

Method

Describe the techniques, apparatus, or means employed. If the method is original or the application unusual, details should be included.

Results

State the most significant findings or the outcome of applying the method named. The most significant quantitative data should be provided.

Conclusions

State the most significant conclusions or interpretations of the results. Care should be taken that this abbreviated statement does not imply concepts or conclusions broader than those supported in the original.

ABSTRACT CREDIT LINES

The use of abstract credit lines has been discontinued for *all* abstracts except those prepared by in-house abstractors, in which case the abstractor will place his initials (in parentheses and closed up with no periods) after the abstract.

EDITORIAL MARKINGS

The keyboard operator is not technically trained and should not be expected to second guess the abstractor about what is meant. All writing should be legible and not "crammed in." Standard editorial markings should be used to identify changes and unusual characters in abstracts, and deleted material should be clearly marked. A line should be drawn from the ending to the beginning of text.

Abstractors submitting handwritten manuscript should be especially careful that the text is legible and all symbols marked. If an author abstract is marked up so that it is illegible or could be misinterpreted, it should be rewritten. A list of the proofreader's symbols is shown below:

TIC PROOFREADER'S SYMBOLS

Mark	Meaning	Mark in proof
	Delete	A check of the rules showed that
	Delete and close up	the radioactive salt indicated
	Close up; no space	Take your coat of f
	Insert space	people with hobbies
	Close up and insert space	That was not the case
	Paragraph	was accepted. The second point raised
	Indent 6 units; em space	a, 420
	Move to left	But it is not true
	Move to right	John Jones Joe Doakes
	Move up	This time I owe you
	Move down	Not at this time
	Insert additional information	the best life
	Insert comma	prunes, peaches and plums
	Insert apostrophe	the dogs collar
	Insert quotes	a squealer was installed
	Insert period	until the end From the first
	Insert en dash	a water-sulfuric acid wash
	Insert em dash	Fig. 2.1–The findings of
	line break	many people came for jobs
or	Transpose	good quality, of and standard
	Align	guinea pigs dogs mice
	Let it stand; restore words crossed out	That was not the case
	Underline	The Toxicology of Uranium
	Set in capitals	who is mr. Harris?
	Set in italic	the nth term
	Lower-case letter	this Program is carried on
	Indicate subscript	H_2SO_4
	Indicate superscript	^{12}C
	Center this information	Per cent of
	Retain hyphen	He received more than two- thirds of the votes cast.

FONT

Abstracts must be written using only the following characters:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

a b c d e f g h i j k l m n o p q r s t u v w x y z

1 2 3 4 5 6 7 8 9 0 . : ; , / ♀ = + – → $ % ∫ ∫ *

> < [ ] ( ) —— (underline) '(quote, apostrophe)

α β Δ Σ π Ξ ω γ ν Λ Ω μ

superscript: ^{1} ^{2} ^{3} ^{4} ^{5} ^{6} ^{7} ^{8} ^{9} ^{0} $^{+}$ $^{-}$

subscript: $_{1}$ $_{2}$ $_{3}$ $_{4}$ $_{5}$ $_{6}$ $_{7}$ $_{8}$ $_{9}$ $_{0}$

NOTE: The vertical bar symbol is not available on the fonts of TIC's input terminals or the printer but is included on tapes received by TIC. Our printer, when listing these tapes, prints out "vertical bar." Tapes of the abstract journals sent to GPO for photocomposition have stop codes that instruct the GPO computer to convert "vertical bar" to the appropriate symbol.

SUMMARY OF BASIC RULES

Rules governing syntax, format, and organization are of paramount importance in abstract preparation. These rules help the abstractor conserve words, choose the right words, and use them in the most economical and meaningful manner. Some basic rules to follow in writing abstracts are given below:

1. TIC-prepared abstracts should be written in the third person. However, author abstracts or abstracts on tape should not be changed.
2. Avoid changing verb tenses or voice unnecessarily.
3. Use complete sentences. Avoid redundancy.
4. Avoid split infinitives.
5. Avoid unnecessarily long abstracts. Remember that the abstract should not take the place of the original paper. The limit is 1950 characters, including spaces between words or symbols.
6. Do not repeat the title of the original document in the body of the abstract.
7. Emphasize what is novel about the information in the original document.
8. If possible include all information needed to subject index the document.
9. State the number of illustrations and tables in the document, e.g., 10 drawings, 7 tables.
10. Mention bibliographies or lists of references of unusual size or character, e.g., 100 references.
11. Use only those abbreviations and symbols approved by the Technical Information Center (see Abbreviations List). Spell out all abbreviations and symbols not appearing on the list.
12. Define unusual terms and abbreviations the first time they appear.
13. Do not cite footnotes, equations, examples, illustrations, or references to other works unless essential to the author's meaning.
14. Say "Data are," not "Data is."
15. *Webster's Third New International Dictionary (Unabridged)* is used as authority for all spellings. In the case of alternate spellings, the first form given should be used.
16. Use only the characters in the font. If author abstracts contain characters not in the font, these characters must be written out.

ABBREVIATIONS LIST

about	ca
absolute	abs
absolute ampere	abamp
acceleration due to gravity	g
against	vs
alternating current	ac
American Wire Gauge	AWG
ampere	A
ampere-hour	Ah
amplitude modulation	AM
and others	et al.
angstrom unit	A (2000 A)
ante meridian	a.m.
antilogarithm	antilog
aqueous	aq
astronomical units	AU
atmosphere	atm (unit)
atomic mass unit	amu
atomic number	Z
atomic percent	at. %
atomic units	au
atomic weight	A
audio frequency	af
bar	spell out
barn	b
barrel	bbl
billion electron volts	GeV
billion years	By
Birmingham Wire Gauge	BWG
board foot	bd ft
body-centered cubic	bcc
Bohr magneton	spell out
boiling point	bp
brake horsepower	bhp
brake horsepower-hour	bhp-hr
Brinell hardness number	Bhn
British thermal unit	Btu
bushel	bu
calorie (gram)	cal
candlepower	cp
cent (unit of reactivity)	spell out
center-of-mass	cm
center-of-mass system	cms
centimeter	cm
chemically pure	cp
circular mils	cir mils
cologarithm	colog
compare	cf
continuous wave	c-w
cosine of the amplitude (an elliptic function)	cn
cotangent	cot
coulomb	C
counts per minute	cpm
cubic centimeter (liquid)	cc
cubic centimeter (solid)	cm^3
cubic feet per minute	cfm
cubic feet per second	cfs
cubic foot (feet)	ft^3
cubic inch	$in.^3$
cubic meter	m^3
cubic micron	μ^3
cubic millimeter	mm^3
cubic yard	yd^3
curie	Ci
cycles per second	Hz
day	d
dead-weight tons	dwt
decibel	db
degree (angle and temp.)	°
degree Baumé	Be
degree (Celsius) centigrade	C
degree Fahrenheit	F
degree Kelvin	K
degree Rankine	R
degree Réaumur	Re
deoxyribonucleic acid	DNA
deuteron	d
diameter	dia
diamond pyramid hardness	dph
differential inhour	dih
direct current	dc
disintegrations per minute	dpm
disintegrations per second	dps
dollar	$
dozen	doz
dram	dr
electric dipole, quadrupole, etc.	E1, E2, etc.
electrocardiogram	ECG
electromotive force	emf
electron masses	spell out
electron nuclear double resonance	ENDOR
electron paramagnetic resonance	EPR
electron spin	

cosecant	cosec
cosine	cos
electrostatic unit	esu
entropy unit	eu
equivalent	equiv
exponent	exp
extensive air showers	EAS
extremely high frequency	ehf
extremely low frequency	elf
face-centered cubic	fcc
farad	F
feet per minute	fpm
feet per second	fps
fermi (= 10^{-13} cm)	F
figure	fig
foot (feet)	ft
foot-candle	ft-c
foot-lambert	ft-L
foot-pound	ft-lb
foot-pound-second (system)	fps (system)
for example	e.g.
formal (solutions)	F (0.5 F)
freezing point	fp
frequency	freq
frequency, extremely high	ehf
frequency, extremely low	elf
frequency, high	hf
frequency, low	lf
frequency, modulated (-tion)	FM
frequency, ultrahigh	uhf
frequency, very high	vhf
frequency, very low	vlf
full width at half maximum	fwhm
gallon	gal
gallons per minute	gpm
gallons per second	gps
gauss	G
Geiger-Mueller	G-M
grain	spell out
gram	g
gram-calorie	g-cal
grams per liter	g/l
gravity, acceleration of	g
half-value layer	HVL
height equivalent to a theoretical plate	HETP
resonance	ESR
electron volts	eV
hexagonal close-packed	hcp
high efficiency particulate air	HEPA
high frequency	hf
high voltage	h-v
horsepower	hp
horsepower-hour	hp-hr
hour(s)	h
hyperbolic cosine	cosh
hyperbolic sine	sinh
hyperbolic tangent	tanh
hyperfine structure	hfs
in the place cited	loc. cit.
in the same place	ibid.
in the work cited	op. cit.
inch	in.
inch-pound	in.-lb
inches per second	ips
inductance	L
infrared	ir
inside diameter	ID
joule	J
kilobar	kbar
kilocalorie	kcal
kilohertz	kHz
kilovolt peak	kVp
kilowatt-hour	kWh
lambert	L
latitude	lat
lethal dose (subscript for percent)	LD_{50}
light velocity	c
linear energy transfer	LET
liter	spell out, except in combinations of units (g/l)
local mean time	LMT
local thermodynamic equilibrium	LTE
logarithm (common)	log
logarithm (natural)	ln
longitude	long.
low frequency	lf
Lyman alpha	Ly-α
magnetic dipole, quadrupole, etc.	M1, M2, etc.
magnetofluiddynamics	MFD
magnetogasdynamics	MGD
magnetohydrodynamics	MHD
maximum (-a)	max

height of transfer unit	HTU
henry	H
hertz	Hz
mean free path	mfp
megahertz	MHz
megawatt (electrical)	MW(e)
megawatt (thermal)	MW(t)
megawatt days per adjacent ton	MWd/at.
megawatt days per central ton	MWd/ct
megawatt days per ton	MWd/t
melting point	mp
meta- (in organic compounds)	m-
metal oxide semiconductor	MOS
meter	m
meters water equivalent	mwe
mho	spell out
micron	μ
mile	spell out
miles per hour	mph
millimeters of mercury	mm Hg
million	spell out, except as prefix
million electron volts	MeV
million gallons per day	Mgd
million years	My
minimum (-a)	min
minute (angular)	spell out
minute (time)	min
molar (with number only)	M (0.5M)
mole	spell out
molecular weight	mol wt
month	spell out
neutron(s)	n
neutron flux unit	nvt
neutrons per square centimeter per second	$n/cm^2/sec$
normal (solutions) (with number only)	N (0.5N)
nuclear magnetic resonance	NMR
nuclear magnetons	nm
nucleon(s)	N
number	no.
Nusselt number	Nu
oersted	Oe
ohm	Ω
ohm-centimeter	Ω-cm
maximum permissible concentration	MPC
maxwell	Mx
ounce	oz
outside diameter	OD
para- (in organic compounds)	p-
parsec (19.2 T miles)	pc
parts per billion	ppB
parts per million	ppM
percent (with numbers, wt, vol, mole, or at., only)	%
Planck's constant	h
Planck's constant ($h/2\pi$)	$h/2\pi$
poises	spell out
polar cap absorption	PCA
potential	spell out
potential difference	spell out
pound	lb
pound centigrade unit	PCU
pound-foot	ft-lb
pounds-inch	in.-lb
pounds per cubic foot	lb/ft^3
pounds per square foot	psf
pounds per square inch	psi
pounds per square inch, absolute	psia
pounds per square inch, gage	psig
power factor	spell out
Prandtl number	Pr
proton(s)	p
pulse(s) per second	pps
pulsed wave	p-w
radian	spell out
radiation absorbed dose	rad
radio-frequency	rf
random phase approximation	RPA
rayleigh	spell out
reactive kilovolt-ampere	kvar
reactive volt-ampere	var
references	spell out
relative biological effectiveness	RBE
revolutions per minute	rpm
revolutions per second	rps
Reynolds number	Re
ribonucleic acid	RNA
Rockwell hardness number	RHN
rod	spell out

one pion exchange (model)	OPE
ortho- (in organic compounds)	o-
root mean square	rms
rutherford	Rd
rydberg	Ry
secant	sec
second (angular)	spell out
second (time)	s
shaft horsepower	shp
shake	spell out
sine	sin
sine of the amplitude (an elliptic function)	sn
solar mass	spell out
specific activity	sp act.
specific gravity	sp gr
specific heat	sp ht
specific volume	sp vol
square centimeter	cm^2
square foot	ft^2
square inch	$in.^2$
square kilometer	km^2
square meter	m^2
square micron	μ^2
square millimeter	mm^2
square root of mean square	rms
standard cubic feet per min	scfm
standard temperature and pressure	STP
steradians	sr
symmetrical (in organic compounds)	sym- or s-
tangent	tan
tertiary (in organic compounds)	tert-
roentgen	R
roentgen equivalent man	Rem
roentgen equivalent physical	Rep
tesla	T
that is	i.e.
thousand pounds	kip
thousand ton(s)	kt
ton	spell out
tons per square inch	tsi
Torricelli	torr
townsend	Td
triton(s)	t
ultra high frequency	uhf
ultra high vacuum	uhv
ultraviolet	uv
United States Pharmacopeia	USP
universal time	UT
versed sine	vers
versus	vs
very high frequency	vhf
very low frequency	vlf
Vickers hardness number	VHN
volt	V
volt-ampere	VA
volt-coulomb	spell out
volume percent	vol %
watt	W
watthour	Wh
weber	Wb
week (-ly)	spell out
weight	wt
weight percent	wt %
yard	yd
year	y

The following quantities may be used with any of the preceding abbreviations or symbols:

Quantity	Prefix	Symbol	Quantity	Prefix	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10^{6}	mega	M	10^{-9}	nano	n
10^{3}	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10^{1}	deca	da	10^{-18}	atto	a

CONVERSION TABLE

To Convert From	To	Multiply By
Atmospheres	Pounds/inch^2	14.7
Calories (mean)	Btu (mean)	0.00397
Calories/gram-°C	Btu/pound-°F	1.0
Calories/sec-cm-°C	Btu/hr-ft-°F	241.8
Calories/sec-cm^2	Btu/hr-ft^2	1.32×10^4
Calories/sec-cm^2-°C	Btu/hr-ft^2-°F	7370
Centimeters	Feet	0.03281
	Inches	0.3937
Cubic centimeters	Cubic feet	3.531×10^{-5}
	Cubic inches	0.06103
Grams	Pounds	0.002205
Grams/cm^3	Pounds/ft^3	62.43
Grams/cm^2	psi	0.01422
Kilograms	Pounds	2.205
Kilograms/cm^2	Atmospheres	0.9678
	Pounds/ft^2	2048
	Pounds/inch^2	14.22
Kilograms/mm^2	Pounds/inch^2	1422.32
Kilowatts	Btu/sec	0.948
Liters	Cubic feet	0.0353
Meters	Inches	39.37
Millimeters of mercury	Atmospheres	0.001316
Square centimeters	Square feet	0.001076
	Square inches	0.155
Torr	mm of Hg	1.0
	Atmospheres	0.001316
Watts/cm-°C	Btu/hr-ft-°F	57.8
Watt-seconds	Btu	0.000948
Watts/cm^2	Btu/hr-ft^2	3170
Watts/cm^2-°C	Btu/hr-ft^2-°F	1760
Centimeters/sec	Feet/sec	0.03281
Meters/sec	Feet/sec	3.281

GREEK ALPHABET

Greek letter	Greek name	English equivalent	Greek letter	Greek name	English equivalent
A α	Alpha	(a)	N ν	Nu	(n)
B β	Beta	(b)	Ξ ξ	Xi	(x)
Γ γ	Gamma	(g, n)	O o	Omicron	(o)
Δ δ	Delta	(d)	Π π	Pi	(p)
E ϵ	Epsilon	(e)	P ρ	Rho	(r, rh)
Z ζ	Zeta	(z)	Σ σ ς	Sigma	(s)
H η	Eta	($\bar{e}$)	T τ	Tau	(t)
Θ θ	Theta	(th)	Υ υ	Upsilon	(y, u)
I ι	Iota	(i)	Φ ϕ	Phi	(ph)
K κ	Kappa	(k)	X χ	Chi	(ch)
Λ λ	Lambda	(l)	Ψ ψ	Psi	(ps)
M μ	Mu	(m)	Ω ω	Omega	($\bar{o}$)

SUBJECT INDEXING

INTRODUCTION

Indexing of information for the Energy Information Data Base (EDB) consists of translating the subject content of scientific and technical literature into standardized terminology for computer storage and subsequent retrieval. The standardized terminology consists of the subject indexing terms, called descriptors, contained in the *EDB Subject Thesaurus*, i.e., the latest revision of DOE/TIC-7000, and indexing is divided into the two logically related concepts of descriptor selection and descriptor indexing as described below.

Although the indexing of information for the EDB is intended primarily to facilitate computer storage and retrieval to serve the information needs of the Department of Energy and its contractors, the data base with its stored document citation and indexing terms is used to computer generate the abstract journals produced by TIC, notably *Energy Research Abstracts (ERA)* and *Energy Abstracts for Policy Analysis (EAPA),* and special energy update series and bibliographies. Also, the U. S.-published information on nuclear science and technology processed into EDB on a regular basis is used in the publication of *INIS Atomindex* since TIC represents the United States as a member state of the IAEA's International Nuclear Information System. The coal portion is used in the publication *Coal Abstracts* from the International Energy Agency (IEA). The subject descriptors along with the document titles are used in constructing printed indexes for the abstract journals.

DESCRIPTOR INDEXING

The retrievability of information depends in the final analysis on the selection of an optimum set of descriptors to reflect the subject content of the item indexed. Information not indexed cannot be retrieved. Also to be avoided is indexing when no useful information is present. Users are thereby given false leads, which tends to degrade their confidence in the indexing. In other words, the indexer's primary and most difficult task is to select a necessary and sufficient set of descriptors that reflects adequately the subject content of the item indexed. This is not to say, however, that the selection of a choice set of descriptors to index a complex idea is without its subjective influences, but experienced indexers will generally achieve the same result, if by somewhat different paths.

In essence, descriptor indexing entails representing the total information content of a document in terms of descriptors, i.e., providing the most specific descriptors and all the necessary descriptors that indicate the material or system being studied; the properties, characteristics, or action being determined; the relevant ambient conditions; and the measurement techniques or calculational methods used. It should be emphasized that the *total information content* of an item is indexed and not merely those aspects that are within the subject scope of the data base. The indexer should be aware that his primary intent is to ensure that all the concepts embodied in a document are indexed and that the pitfalls implicit in "word indexing" should be avoided. In other words, the indexer should not use merely the descriptor GAMMA RADIATION when the concept being indexed is PHOTONUCLEAR REACTIONS. The indexer should use the subject thesaurus as a checklist so that the most specific descriptors and all pertinent descriptors are

assigned. The proper semantic interpretation of descriptors can be determined in this way. It goes without saying that such a practice would prove beneficial for users of the data base.

Thesaurus

DOE/TIC-7000 is used as the authority for all TIC-generated indexes. This controlled vocabulary of subject indexing terms (descriptors) is necessary to ensure precision and compatibility in the indexing and retrieval of documents covering the wide range of energy topics discussed in this manual. The controlled vocabulary is a dynamic one, constantly being revised and enlarged to reflect new concepts as they occur.

Each descriptor in the thesaurus has an associated "word block" consisting of alternative (synonymous) terms, broader terms, narrower terms, related terms, and definition and/or scope note.

An example of a word block is:

ELECTRIC CABLES
- UF Cables (Electric)
- BT1 Cables
- BT1 Conductor Devices
  - BT2 Electrical Equipment
    - BT3 Equipment
- NT1 Coaxial Cables
- NT1 Cryogenic Cables
- NT1 Oil-Filled Cables
- NT1 Superconducting Cables
- RT Power Transmission Lines

Inspection of the NT (narrower term) descriptors in the work block ensures that the most specific descriptor is being assigned. The RT (related term) descriptors will often indicate related concepts that should be included in the list of descriptors used for indexing an item. The thesaurus is also consulted to ensure the correct semantic interpretation of a descriptor, i.e., to determine if the descriptor has a restricted meaning as indicated by its definition or scope note.

The continuing progress of science and technology requires that new terms, or changes in old terms, be added to the thesaurus to keep up with this progress. If there is no descriptor or set of descriptors that adequately describes a significant concept, a new descriptor or set of descriptors should be requested. Ordinarily the descriptor should be the most commonly used term for the concept, material, apparatus, etc. Adequate cross references should be introduced when alternate terms for the same concept are found in the literature. Sometimes a new concept can be adequately covered by already existing terms with only the addition of supplementary cross references.

If there are descriptors already in the thesaurus to index a given concept but the terms used in combination might logically express another concept, or if the word block or definition prohibits use for the new concept, then a new descriptor should be considered. In many instances the level of specificity of descriptors will be governed by their frequency of usage, e.g., URANIUM TETRAFLUORIDE, URANIUM HEXAFLUORIDE, CARBON DIOXIDE, CARBON MONOXIDE, but PLUTONIUM FLUORIDES, AMERICIUM OXIDES.

When a concept is one that will have a high usage and in the printed index another level of specificity is desired, a precoordinated term should be requested, e.g., COAL GASIFICATION, HYDROGEN PRODUCTION, SILICON SOLAR CELLS, HYDROGEN EMBRITTLEMENT. These examples illustrate the usefulness of precoordination to allow, with pairing, a still greater amount of specificity in retrieval.

If, after careful consideration, the indexer has determined that a new descriptor or set of descriptors is needed to index a given concept, he will submit the proposed term or terms, along with all necessary hierarchical structure, associated cross references, and definition or limiting statement, to the thesaurus specialist for approval.

Some Descriptor Definitions

Some descriptors in the thesaurus are close in meaning and/or connotation, leading to problems in indexing and to scattering of information. Such terms as BENCHMARKS vs. STANDARDS,

CERTIFICATION vs. VALIDATION, etc., are of this nature. Other descriptors refer to ambient conditions and thereby need limits set on the validity of such terms. Such descriptors as HIGH PRESSURE, HIGH VACUUM, LOW TEMPERATURE, etc., fall in this category. The following definitions and tables will aid the indexer in selecting the most appropriate descriptor to use in a particular case.

DESCRIPTOR DEFINITIONS

APPRAISAL—The valuation of a material, mechanism, or property by the estimate of an authorized person or group.

BENCHMARKS—Points of reference, or standards, from which comparative measurements or evaluations of any sort may be made.

CERTIFICATION—Authoritative attestation as meeting a standard.

COMPLIANCE—Conformity in fulfilling formal or official requirements.

EFFICIENCY—Degree of production of the desired effect.

EVALUATION—Subjection to critical judgement or interpretation.

INSPECTION—Critical examination, usually to determine if established standards are met.

PERFORMANCE—The manner in which a mechanism performs under normal operating conditions.

PERFORMANCE TESTING—Subjection of a mechanism to test conditions to determine performance characteristics.

QUALITY CONTROL—Those functions designed to ensure adequate quality, i.e., the meeting of established standards in processes or manufactured goods.

RELIABILITY—Extent to which an experiment, procedure, or mechanism gives the same result on successive trials.

SPECIFICATIONS—Organized listing of basic requirements to be met by a material, process, or mechanism.

STANDARDS—Criteria established by authority to define the level or degree of quality that is proper or adequate for a material, process, or mechanism.

TESTING—Subjection of a mechanism or material to specific or planned procedures calculated to reveal any deficiencies.

VALIDATION—Act of testing for compliance with a standard.

Splitting

Computer coordination of the descriptors assigned to a document offers many possibilities of false coordination, making concepts appear to be indexed that are not embodied in the document. One mechanism used in indexing documents to reduce the likelihood of false coordination is "splitting." Numerical prefixes are assigned to certain descriptors of a set (see the Subject Indexing example). Descriptors bearing the same prefix are assigned to index the same concept and can therefore be coordinated. Descriptors having different prefixes are not indexing the same concept and cannot be coordinated. Descriptors having no prefix are said to be in the "zero split" and can be coordinated with any other descriptors of the set. "Zero split" descriptors define concepts common to the total information content of the document being indexed. No split indicators are required for documents not split.

Documents dealing with two or more separate topics, such as project reports, are prime candidates for splitting. Also, documents treating several alloys, organic compounds, nuclear reactions, and similar systems often require splitting to prevent false coordination of the constituents.

Flagging

Subject indexing as practiced at TIC utilizes the descriptors that are assigned to reflect the total information content of a document as a weighting method to increase the relevancy of retrieved information and to ensure meaningful index points in the printed indexes. This concept involves flagging some of the descriptors of a set to form pairs that represent the principal ideas and concepts embedded in the analyzed document. Each pair, the *Main Term* (M) and the *Qualifying Term* (Q), is somewhat analogous to the main heading—subheading or subject heading—modifier pairs of conventional card files or printed subject indexes.

Since consistency and uniformity are the attributes of good subject indexing, some definite, but general, rules must be followed in flagging descriptors to ensure these essential characteristics.

In general, the M terms are chosen from among the descriptors required to express the material or system investigated, and the Q terms are chosen from among the descriptors indicating the properties, characteristics, processes, or action determined.

Special care must be exercised in the use of descriptors for processes. The fact that something is being analyzed may very well dictate the use of the descriptor ACTIVATION ANALYSIS (Q), but ACTIVATION ANALYSIS (M) should be used only if some basic information about activation analysis in general is present or if a review or compilation of information on the activation analysis of a large number of materials is given.

Information is subject indexed using terms that most specifically describe it, not terms that describe its use. For example, information on the casting of uranium for HFIR fuel elements is indexed using the descriptor URANIUM and not FUEL ELEMENTS or HFIR REACTOR, unless the process is peculiar to fuel elements or to the HFIR.

To identify descriptors as main headings and qualifiers, the following flagging mechanisms have been developed to designate descriptor pairs for increasing precision of information retrieval and also to accommodate the use of title augmentation (see below) in constructing printed indexes of computer-generated publications.

Subject descriptors are designated M, A, or T, with qualifier descriptors, Q. If designated M, both the title and the title augmentation will be listed following the subject heading in the printed index. If only the augmentation (A) or title (T) is to be listed for a given subject entry, the subject descriptor is designated by A or T. So that appropriate subject terms and qualifiers may be paired, a numerical suffix is added. Thus M1 and Q1 constitute a pair, A2 and Q2 a second pair, and T3 and Q3 a third pair. A given descriptor may serve as both an M and a Q. Also, a given M may be used to form more than one pair by placing the same Q indicator on more than one descriptor. For example, M1 may be paired with three descriptors marked Q1. Headings made up of a single descriptor, having no qualifier, are designated by using M, A, or T with no numeral.

The following rules must be applied in flagging descriptors:

1. A descriptor can have only one M flag.
2. All Q flags must have numbers to tie them to their respective M flags.
3. All M flags must have numbers to tie them to their respective Q flags. Note that rules 2 and 3 apply even if the item has only one M/Q pair.
4. M flags *must not* be numbered if the descriptor is to be used as a main heading with no qualifier.
5. For documents containing splits, both descriptors of each M/Q pair must be in the same split. Of course, one or both descriptors of the flagged pair can be in the zero split, since the descriptors of the zero split are common to all numbered splits.
6. Two different descriptors *must not* have the same numerical suffix.

Data Tags

A fifth flag, D, is used to indicate the presence of numerical data in an item indexed and to computer generate inverted-file-type data indexes. Detailed rules for the use of the D flags, called data tags, and a discussion of the numerical data indexes are given in the appendices.

Augmentation

The title augmentation capability is provided to allow the presentation, computer storage, and retrieval of significant information that is not evident when a descriptor pair and the document title are combined into a subject entry. Augmentation may be in the form of numerical ranges, chemical formulas, reaction designations or products, code names, trade names, etc. The single limitation is the 120-character set of the print chain. Any information added as "free language" in the augmentation must be covered by appropriate descriptors.

A second use of the augmentation capability is title replacement. Some titles carry no information when combined with a given descriptor pair and, therefore, would only inconvenience an index user. Title replacement with significant augmentation performs a real service in such cases. However, even though the title may say only "Quarterly Progress Report," this may be a significant piece of information.

For a patent document the term "Patent" is the first word in the augmentation. Also, for documents discussing specific computer programs in detail, the name of the program is included in the augmentation if it is not mentioned in the document title.

Rules and Examples

For items dealing with computer codes, the general descriptor COMPUTER CODES and a more specific descriptor, e.g., M CODES, are both assigned, appropriately flagged to display the pairing COMPUTER CODES/M CODES in the subject index.

For conference proceedings for which analytics are prepared, the descriptors assigned to the lead abstract should reflect the broad subject scope of the conference. In addition, the descriptor MEETINGS should be assigned. This descriptor should be flagged both as an M term, without a numerical suffix, and as a Q term to be paired with a descriptor reflecting the conference's scope, e.g., SOLAR POWER PLANTS/MEETINGS.

For all documents for which analytics are prepared, the lead abstract must be assigned the descriptor LEADING ABSTRACT, always unflagged. Of course other descriptors, such as MEETINGS or descriptors reflecting the subject scope of the document, may be assigned. In some instances analytics may be prepared only for selected papers of the document, in which case the indexing of the lead abstract should reflect the topics included in the document but not covered in the papers abstracted and indexed separately.

Experience has shown that subject indexing principles can be summarized into the following rules. The M/Q pair will usually be acceptable if the Q term:

1. Is a direct property or quality of M or can imply an intrinsic property or quality of M.

Examples:

ALLOY-TZM/THERMAL CONDUCTIVITY
ASPERGILLUS/RADIOSENSITIVITY
URANIUM DIOXIDE/PHASE DIAGRAMS
CONCRETES/PHOTON TRANSPORT
STAINLESS STEELS/MECHANICAL PROPERTIES

2. Is a component part of M or a closely related accessory to M.

Examples:

ELECTRIC BATTERIES/CATHODES
MECHANICAL HEART/RADIOISOTOPE BATTERIES
BWR TYPE REACTORS/BUILDINGS
ACCELERATORS/IRRADIATION DEVICES

(An exception to this rule is that one does not use a material name as the Q term; LMFBR REACTORS/COOLANTS but not LMFBR REACTORS/SODIUM.)

3. Is an action, operation, or process on, directed at, applied to, or being done for M.

Examples:

TANTALUM/OXIDATION
RUBIDIUM/ION EXCHANGE CHROMATOGRAPHY
URANIUM/FABRICATION
BEETLES/RADIOSTERILIZATION
BIRDS/INJURIES
DYE LASERS/REVIEWS
TFR TOKAMAK/DATA PROCESSING
BONE TISSUES/RADIOISOTOPE SCANNING
THERMALIZATION/COMPUTER CALCULATIONS
CALCIUM/ACTIVATION ANALYSIS
BWR TYPE REACTORS/PLUTONIUM RECYCLE

4. Is an action by, or an involvement, interaction, or performance of M.

Examples:

CADMIUM/DIFFUSION
ALGAE/RADIONUCLIDE KINETICS
IRON/CORROSION
BACTERIOPHAGES/BIOLOGICAL REPAIR
CADMIUM 110/PROTON REACTIONS
BONE FRACTURES/HEALING
IRRADIATION PLANTS/EFFICIENCY
ECCS/RELIABILITY
STRONTIUM/METABOLISM
SEEDS/GERMINATION
VIRUSES/BIOLOGICAL EFFECTS
INSECTS/REPRODUCTION
CARBON STEELS/PHASE TRANSFORMATIONS
CARBONIC ANHYDRASE/PHOTOCHEMISTRY
URANIUM DIOXIDE/PHYSICAL RADIATION EFFECTS

5. Is something happening or occurring in M or describes an aspect of something happening or occurring in M.

Examples:

AIR/CHARGED-PARTICLE TRANSPORT
BIOSPHERE/RADIONUCLIDE MIGRATION
BERYLLIUM/CRACKS
IONOSPHERE/ELECTRIC CURRENTS

Rule 5 can be applied only in cases for which the resulting M/Q pair is unambiguous. With the example given, it is clear that charged-particle transport is occurring *in* air. Do not use Rule 5 for a case such as CADMIUM/DIFFUSION when the diffusion of something is occurring in cadmium.

Some rules can also be given for *incorrect* M/Q combinations.

The M/Q pair is *not correct* if the Q term:

A. Indicates the state, shape, or use of M.

Examples:

SODIUM/LIQUIDS
SODIUM/LIQUID METALS
NIOBIUM/MONOCRYSTALS
TUNGSTEN/COMPOSITE MATERIALS

CADMIUM OXIDES/FERROELECTRIC MATERIALS
TRANSITION ELEMENTS/CATALYSTS
URANIUM OXIDES/SPHERES
URANIUM OXIDES/PELLETS
CONTROL SYSTEMS/[used for] ENERGY CONSERVATION
TUNGSTEN CARBIDES/ABRASIVES

B. Is something *induced by* M.

Examples:

ION BEAMS/SPUTTERING
GAMMA RADIATION/ RADIOLYSIS

There are few exceptions to the foregoing general rules.

Some specific indexing rules can also be associated with types of documents.

The descriptor STANDARDS should be used as a qualifier only on actual standards (ASME, ASTM, etc.), not on articles about standards. It should always be used as one of the Q terms assigned to an actual standard.

The descriptor BIBLIOGRAPHIES should always be used as one of the Q terms assigned to an actual bibliography.

MEETINGS is always used as a Q term in indexing the leading abstract of a conference or symposium.

COMPUTER CODES is always used as the M term for documents describing computer programs in detail, with the appropriate alphabetical code descriptor, e.g., A CODES or NUMBER CODES, as Q term.

Input Manuscript Examples

Investigation of the structure of grain boundaries in molybdenum and its alloys with zirconium and rhenium by the internal friction method. Bokshtein, S. Z.; Bronfin, M. B.; Kishkin, S. T.; Marischev, V. A. pp 27–34 of Diffusion of Processes, Structure, and Properties of Metals. New York; Consultants Bureau Enterprises, Inc., 1965.

Values obtained for internal friction showed that boundary relaxation increased at different temperatures in different materials (Mo–Re alloy, 700°C; Mo, 600°C; and Mo–Zr alloy, 600°C). This indicated that the mechanism of boundary relaxation is related to the migration of impurities, which penetrate this intercrystalline zone as a result of temperature and cyclic stress. This explains the relatively low value found for the activation energy of the boundary internal friction.

9786 (ORO–4856-26, pp 421-422) $^{12}C(^{14}N,^{13}C)^{13}N(2.37,1/2^+)$ and $^{12}C(^{10}B,^{9}Be)^{13}N$ $(2.37,1/2^+)$ reactions and the structure of the 2.37 MeV state in ^{13}N. Nair, K. G.; Hamm, M.; Towsley, C.; Nagatani, K. (Texas A and M Univ., College Station). 1975.

From 2nd international conference on clustering phenomena in nuclei; College Park, Maryland, USA (21 Apr 1975).

In Clustering phenomena in nuclei: II.

Heavy ion induced proton transfer reactions are used to populate low-lying levels in ^{13}N. Angular distributions to the 2.37 MeV state in ^{13}N show anomalies which perhaps may be due to possible collective components in this previously assumed pure single particle 2s/sub ½/ orbit.

DESCRIPTOR INDEXING EXAMPLE

EDB [X] ALD [ ] GAP [ ]
ERA [ ] INS [ ]
EPA [ ] RIP [ ]
WDA [ ]

CATEGORIES
1. 360102
2.
3.
4.
5.

AUGMENTATION:
Impurity migration, temperature dependence

SPLIT	DESCRIPTORS	FLAGS
	internal friction	
	grain boundaries	
	high temperature ←	used because of temperatures indicated
	impurities	
	diffusion ←	used for "migration"
	crystal lattices ←	used for "intercrystalline"
	temperature dependence	used in combination with "GRAIN BOUNDARIES" to express "boundary relaxation"
	relaxation ←	split to prevent any possible false combination
1	molybdenum alloys ←	
1	rhenium alloys	
2	molybdenum	
3	zirconium alloys	
3	molybdenum alloys	

SUBJECT INDEXING EXAMPLE

EDB [X] ALD [ ] GAP [ ]
ERA [X] INS [ ]
EPA [ ] RIP [ ]
WDA [ ]

CATEGORIES

1. 651325
2.
3.
4.
5.

AUGMENTATION:
Angular distributions

SPLIT	DESCRIPTORS	FLAGS
	nitrogen 13	T4,D
1	carbon 12 target	M1,D
1	nitrogen 14 reactions	Q1,M2,D
1	carbon 13	
1	boron 10 reactions	Q1,M3,D
1	beryllium 9	
1	angular distribution	D
1	one-nucleon transfer reactions	Q2,Q3,D
1	stripping	
2	nuclear structure	Q4,D
2	energy levels	D
2	excitation	
2	MeV range 01-10	
2	collective models	
	experimental data	D

SAMPLE INDEX PAGE FROM *ERA*

SUBJECT INDEX

The subject index is based on the use of subject descriptors selected from a controlled thesaurus of terms. Subject descriptors and qualifiers (subheadings) are selected and presented in the following format:

SUBJECT DESCRIPTOR/QUALIFIER
Title, (supplementary information), citation number, (report number)

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processes applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept (e.g., Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed.

A

ABANDONED SITES/DECOMMISSIONING
Soil surface decontamination and revegetation progress, 5:27577 (RHO-SA–167)

ABANDONED SITES/DECONTAMINATION
Soil surface decontamination and revegetation progress, 5:27577 (RHO-SA–167)

ABANDONED SITES/REVEGETATION
Methods and costs for soil removal, 5:27725 (RHO-SA–169)

ACCELERATOR FACILITIES/RESEARCH PROGRAMS
Accelerator technology program. Progress report, April-December 1978, 5:27629 (LA–8350-PR)

ACCELERATORS
See also FERMILAB ACCELERATOR
HEAVY ION ACCELERATORS
LINEAR ACCELERATORS
STORAGE RINGS
VAN DE GRAAFF ACCELERATORS
ZGS

ACCELERATORS/ENVIRONMENTAL EFFECTS
Radiological environmental impact of high-energy accelerators, 5:27625

ACCELERATORS/RADIATION HAZARDS
Radiological environmental impact of high-energy accelerators, 5:27625

ACCIDENTS
See also RADIATION ACCIDENTS
REACTOR ACCIDENTS

ACCIDENTS/REVIEWS
Operational accidents and radiation exposures at ERDA facilities, 1975-1977, 5:27012 (DOE/EV–0080)

ACENAPHTHENE/METABOLISM
Dosimetric and metabolic studies with solvent refined coal (SRC) (Rats), 5:27942 (PNL–3300(Pt.1))

ACENAPHTHENE/SPIN-LATTICE RELAXATION
Carbon-13 spin-lattice relaxation in condensed aromatic compounds, 5:27564

ACENAPHTHENE/TISSUE DISTRIBUTION
Dosimetric and metabolic studies with solvent refined coal (SRC) (Rats), 5:27942 (PNL–3300(Pt.1))

ACES
See QUARKS

ACETIC ACID/ELECTRON SPIN RESONANCE
ESR study of an α-bromofluoro π-radical: Determination of the relative signs of the hyperfine and quadrupole couplings, 5:27569

ACETIC ACID/RADIOLYSIS
ESR study of an α-bromofluoro π-radical: Determination of the relative signs of the hyperfine and quadrupole couplings, 5: 27569

ACID ELECTROLYTE FUEL CELLS/ELECTROCATALYSTS
Fuel cell applied research: electrocatalysis and materials. Quarterly report, January 1-March 31, 1979, 5:27295 (BNL–51144)

ACID ELECTROLYTE FUEL CELLS/ELECTROCHEMISTRY
Fuel cell applied research: electrocatalysis and materials. Quarterly report, April 1-June 30, 1979, 5:27296 (BNL–51158)
Fuel cell applied research: electrocatalysis and materials. Quarterly report, January 1-March 31, 1979, 5:27295 (BNL–51144)

ACID ELECTROLYTE FUEL CELLS/POISONING
Advanced Technology Fuel Cell Program. Annual report, 5:27297 (EPRI-EM–1328)

ACID ELECTROLYTE FUEL CELLS/RESEARCH PROGRAMS
Fuel cell applied research: electrocatalysis and materials. Quarterly report, April 1-June 30, 1979, 5: 27296 (BNL–51158)
Fuel cell applied research: electrocatalysis and materials. Quarterly report, January 1-March 31, 1979, 5:27295 (BNL–51144)

ACID MINE DRAINAGE/BIBLIOGRAPHIES
Bibliography of selected references on the effects of coal mine pollutants on aquatic ecosystems, 5:27736 (ANL/EMR–5)

ACID MINE DRAINAGE/TOXICITY
Bibliography of selected references on the effects of coal mine pollutants on aquatic ecosystems, 5:27736 (ANL/EMR–5)

ACID RAIN/ENVIRONMENTAL EFFECTS
Effect of acidity on microbial processes in a forest soil, 5:27920 (BNL–27848)

ACID RAIN/ENVIRONMENTAL TRANSPORT
Temporal and spatial trends in the chemistry of acidified lakes under ice cover, 5:27728 (BNL–27850)

ACIDITY
See PH VALUE

ACIDS (INORGANIC)
See INORGANIC ACIDS

ACIDS (ORGANIC)
See ORGANIC ACIDS

ACRYLIC ACID ESTERS/CHEMICAL RADIATION EFFECTS
Radiation-hardenable diluents for radiation-hardenable compositions (Patent), 5:27570

ACTINIDES/COST
Actinide partitioning-transmutation program. V. Preconceptual designs and costs of partitioning facilities and shipping casks, Appendix 4. Final report, 5:26955 (ORNL/Sub–79/31056/1/A4)

ACTINIDES/PARTITION
Actinide partitioning-transmutation program. V. Preconceptual designs and costs of partitioning facilities and shipping casks,

CATEGORIZATION

Categorization of information by subject content is an important tool in identifying information for retrieval. However, unlike subject indexing which is used to describe the information, categories may also be used to indicate the purpose of the information.

The 40 first-level and 294 second-level subject category areas used in the storage, retrieval, and manipulation of bibliographic information entered into EDB are shown below, arranged both alphabetically and numerically. These categories may be classified into four general types: (1) those representing energy sources, e.g., COAL AND COAL PRODUCTS and SOLAR ENERGY; (2) those representing energy utilization and management, e.g., ELECTRIC POWER ENGINEERING and ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION; (3) those representing energy conversion and storage, e.g., ENERGY CONVERSION and ENERGY STORAGE; and (4) those accommodating the basic information developed in support of energy production, conversion, and utilization, e.g., PHYSICAL RESEARCH and CHEMISTRY.

The category names correspond, as shown on the category list, to six-digit category code numbers. The use of numbers in lieu of names facilitates computer processing and retrieval. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers. The first two numbers designate the broadest or most general level of specificity. The remaining four digits are used to structure two additional levels of specificity (or subcategorization). Thus, in the category 010406, 010000 designates COAL AND COAL PRODUCTS, 010400 designates PROCESSING of coal and coal products, and 010406 designates PYROLYSIS AND CRACKING, specific methods of processing coal and coal products. Similarly, the category number 360102 designates STRUCTURE AND PHASE STUDIES of METALS AND ALLOYS in the MATERIALS (360000) category.

A document is assigned as many categories as necessary to identify its subject content completely. A document covering a broad area, such as an annual progress report or a conference proceedings, may touch on several subject areas or a given topic might logically belong in two or more categories. For example, a document on drying grain using solar heating might be assigned only the category 140905, SOLAR ENERGY—Solar Thermal Utilization, Agricultural and Industrial Process Heat, while a document on growing and harvesting crops and converting the plant material to an alcohol fuel would be assigned the categories 140504, SOLAR ENERGY—Solar Energy Conversion, Biomass Production and Conversion, and 090222, OTHER SYNTHETIC AND NATURAL FUELS—Alcohol Fuels, Preparation from Wastes or Biomass. A document on the properties of various metals in storing hydrogen as hydrides in automobiles would be assigned the categories 080201, HYDROGEN—Storage, Chemisorption; 330800, ADVANCED AUTOMOTIVE PROPULSION SYSTEMS—Alternative Fuels; and 360105, MATERIALS—Metals and Alloys, Corrosion and Erosion. Information on electrodes for secondary chemical batteries might need the category 250903, ENERGY STORAGE—Batteries, Materials, Components, and Auxiliaries. A paper on the design of a complex using a pressurized water reactor for production of hydrogen by coal gasification would need the four categories 210900, NUCLEAR POWER PLANTS—Process Heat Reactors; 210200, NUCLEAR POWER PLANTS—Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled; 010404, COAL AND COAL PRODUCTS—Processing, Gasification; and 080107, HYDROGEN—Production, Coal Gasification.

As mentioned earlier, categories are used to indicate the purpose of a particular study as well as to specify the subject content of a document. A paper reporting the corrosive effects of chloride solutions on

three Inconel alloys for possible application in geothermal engineering is assigned the category 360105, MATERIALS—Metals and Alloys, Corrosion and Erosion, and also the category 150903, GEOTHERMAL ENERGY—Geothermal Engineering, Corrosion, Scaling, and Materials Development.

A document reporting carcinogenic effects on man of various polyaromatic hydrocarbons for use in evaluating hazards in oil shale retorting is assigned both categories 560306, BIOMEDICAL SCIENCES, APPLIED STUDIES—Chemicals Metabolism and Toxicity, Man, and 040700, OIL SHALES AND TAR SANDS—Health and Safety.

Subject categories do not achieve the level of specificity that can be attained with subject indexing but are meant to complement subject indexing. That is, the categories can be used along with subject indexing in representing the total information content and purpose of a document.

Subject categories can also provide a powerful tool both in increasing the relevancy of retrieval and in simplifying the search strategy needed to retrieve a specific concept. The use of categories to increase precision of retrieval is discussed in detail in the section on INFORMATION RETRIEVAL.

For computer retrieval all categories may be treated equally or may be weighted in favor of the first category assigned. The order of category assignment will determine where a citation appears in publications such as *Energy Research Abstracts,* bibliographies, and updates. For inclusion in *Energy Abstracts for Policy Analysis,* documents must be assigned an ENERGY PLANNING AND POLICY (290000) category in addition to other appropriate categories.

Some specific examples of category assignment are given below. Other categorization information pertinent to specific subject areas is included in the section on SECTION INDEXING PATTERNS. Detailed scope notes that describe the type of information to be found under each subcategory are included in DOE/TIC-4584, *Energy Information Data Base Subject Categories.*

Superconductivity

Papers on superconducting materials are assigned appropriate MATERIALS categories and the category 656102, PHYSICS RESEARCH—Superconductivity, Acoustic, Electric, Magnetic, Optical, and Thermal Phenomena.

Energy Sources

For publications comparing various energy sources and category 290400, ENERGY PLANNING AND POLICY—Natural Resources, is used in addition to specific energy source categories if there is enough information present. A paper on cost-benefit comparisons of fossil-fueled and nuclear power plants would be first assigned the category 296001, ENERGY PLANNING AND POLICY—Electric Power Generation, and then to categories 200106, ELECTRIC POWER ENGINEERING—Power Plants and Power Generation, Economics, and 210800, NUCLEAR POWER PLANTS—Economics.

Nonradioactive Wastes

A paper evaluating processes for the removal of SO_2 from flue gas from petroleum and coal-fired power plants and equipment for monitoring the results of the processes requires the categories 200202, ELECTRIC POWER ENGINEERING—Environmental Aspects, Noxious Gas and Particulate Abatement and Control; 010800, COAL AND COAL PRODUCTS—Waste Management; 020800, PETROLEUM—Waste Management; and 500200, ENVIRONMENTAL SCIENCES, ATMOSPHERIC—Chemicals Monitoring and Transport.

Use Selectors

Index forms bear a number of boxes at the top that are checked by the indexer to designate the intended uses of a document record. The use selectors designate the final data base residence of the record and, in some cases, the announcement publication: EDB (Energy Data Base); ERA *(Energy Research Abstracts)*; EPA *(Energy Abstracts for Policy Analysis)*; WDA *(Abstracts of Weapon Data Reports)*; ALD *(Abstracts of Limited Distribution Reports)*; INS (INIS, the International Nuclear Information System); RIP (the Research in Progress file); and GAP (the General and Practical Information file).

SUBJECT CATEGORIES (ALPHABETICAL LISTING)

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

5530 Agriculture and Food Technology
0902 Alcohol Fuels
3308 Alternative Fuels–Automotive
4001 Analytical and Separations Chemistry
0309 Artificial Stimulation, Plowshare, etc.–Natural Gas
5302 Assessment of Energy Technologies
6401 Astrophysics and Cosmology
6402 Atmospheric Physics
6403 Atomic, Molecular, and Chemical Physics
4303 Auxiliaries and Components–Accelerators
1701 Availability (Climatology)–Wind
5001 Basic Studies–Environmental
5101 Basic Studies–Environmental
5201 Basic Studies–Environmental
2509 Batteries–Energy Storage
4302 Beam Dynamics, Field Calculations, and Ion Optics–Accelerators
5501 Behavioral Biology
5502 Biochemistry

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

55 BIOMEDICAL SCIENCES, BASIC STUDIES

3201 Buildings–Energy Conservation
0105 By-Products–Coal
0506 By-Products–Nuclear Fuel
0603 By-Products–Fusion Fuels
0807 By-Products–Hydrogen
1507 By-Products–Geothermal
2504 Capacitor Banks
3602 Ceramics, Cermets, and Refractories
2508 Chemical–Energy Storage
4501 Chemical–Explosives
5603 Chemicals Metabolism and Toxicity
5002 Chemicals Monitoring and Transport
5102 Chemicals Monitoring and Transport
5202 Chemicals Monitoring and Transport

40 CHEMISTRY

9905 Civilian Defense

01 COAL AND COAL PRODUCTS

0140 Combustion–Coal
0250 Combustion–Petroleum
0340 Combustion–Natural Gas
4210 Combustion Systems
4008 Combustion, Pyrolysis, and High-Temperature Chemistry
6590 Communication, Education, History, and Philosophy
2202 Components and Accessories–Nuclear Reactors
3603 Composite Materials
2502 Compressed Gas–Energy Storage
2910 Conservation–Energy Policy
2980 Consumption and Utilization–Energy Policy
2204 Control Systems–Nuclear Reactors
5503 Cytology
4301 Design, Development, and Operation–Accelerators
1510 Direct Energy Utilization–Geothermal
0406 Direct Uses and By-Products–Oil Shale
0203 Drilling and Production–Petroleum
0403 Drilling, Fracturing, and Mining–Oil Shale
0303 Drilling, Production, and Processing–Natural Gas
1505 Economic and Financial Aspects–Geothermal Energy
1403 Economics–Solar Energy
1604 Economics–Tidal Power
1704 Economics–Wind Energy
2108 Economics–Nuclear Power Plants
1305 Economics and Management–Hydro Power
2902 Economics and Sociology–Energy Policy
3209 Education and Public Relations–Energy Conservation
3002 EHD Generators
2960 Electric Power–Policy

20 ELECTRIC POWER ENGINEERING

3303 Electric-Powered Systems–Automotive
4004 Electrochemistry
3008 Electromechanical Converters
4208 Electronic Circuits and Devices
3307 Emission Control–Automotive
2901 Energy Analysis and Modeling

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

30 ENERGY CONVERSION

29 ENERGY PLANNING AND POLICY

25 ENERGY STORAGE

42 ENGINEERING

0505 Enrichment–Nuclear Fuels
2903 Environment, Health, and Safety–Policy
0109 Environmental Aspects–Coal
0209 Environmental Aspects–Petroleum
0410 Environmental Aspects–Oil Shale
0530 Environmental Aspects–Nuclear Fuels
0609 Environmental Aspects–Fusion Fuels
0809 Environmental Aspects–Hydrogen Fuel
1306 Environmental Aspects–Hydro Power
1605 Environmental Aspects–Tidal Power
1705 Environmental Aspects–Wind Power
2002 Environmental Aspects–Electric Power
2205 Environmental Aspects–Nuclear Power Plants
1506 Environmental Aspects and Waste Disposal–Geothermal Energy
0308 Environmental Effects–Natural Gas
5303 Environmental Impact Statements

52 ENVIRONMENTAL SCIENCES, AQUATIC

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

1404 Environmental, Legal, and Institutional Aspects–Solar Energy

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

0502 Exploration–Oil Shale
4503 Explosion Detection

45 EXPLOSIONS AND EXPLOSIVES

3302 External Combustion Engines
4202 Facilities and Equipment–Engineering
0504 Feed Processing–Nuclear Fuels
6404 Fluid Physics
3305 Flywheel Propulsion
2505 Flywheels–Energy Storage
2940 Fossil Fuels–Policy
3005 Fuel Cells
2203 Fuel Elements–Nuclear
0507 Fuels Production and Properties–Nuclear

70 FUSION ENERGY

06 FUSION FUELS

7002 Fusion Power Plant Technology
0906 Gaseous Waste Fuels

99 GENERAL AND MISCELLANEOUS

4201 General Engineering
5504 Genetics
5804 Geochemistry
0202 Geology and Exploration–Petroleum
0302 Geology and Exploration–Natural Gas
5801 Geology and Hydrology
1502 Geology, Hydrology, and Geothermal Systems
5802 Geophysics

58 GEOSCIENCES

1520 Geothermal Data and Theory

15 GEOTHERMAL ENERGY

1509 Geothermal Engineering
1503 Geothermal Exploration and Exploration Technology
1508 Geothermal Power Plants

57 HEALTH AND SAFETY

0160 Health and Safety–Coal
0206 Health and Safety–Petroleum
0305 Health and Safety–Natural Gas
0407 Health and Safety–Oil Shale
0540 Health and Safety–Nuclear Fuels
0605 Health and Safety–Fusion Fuels
1420 Heat Storage–Solar
4204 Heat Transfer and Fluid Flow
6450 High Energy Physics
3304 Hybrid Systems–Automotive

13 HYDRO ENERGY

0901 Hydrocarbon Fuels

08 HYDROGEN

2950 Hydrogen and Synthetic Fuels–Policy
0806 Industrial and Commercial Use–Hydrogen
3203 Industry and Agriculture–Energy Conservation
9903 Information Handling
4002 Inorganic and Physical Chemistry
0903 Inorganic Hydrogen Compound Fuels

44 INSTRUMENTATION

3301 Internal Combustion Engines

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

0703 Isotopic Power Supplies
4203 Lasers
9904 Law
1504 Legal and Institutional Aspects–Solar
2507 Liquefied Gas–Energy Storage
0905 Liquid Waste Fuels
2501 Magnetic–Energy Storage
9901 Management
4230 Marine Engineering
0150 Marketing and Economics–Coal
0207 Marketing and Economics–Petroleum
0306 Marketing and Economics–Natural Gas
0408 Marketing and Economics–Nuclear Fuels
0510 Marketing and Economics–Fusion Fuels
0804 Marketing and Economics–Hydrogen

36 MATERIALS

4205 Materials Testing
6580 Mathematical Physics
9902 Mathematics and Computers
6550 Medical Physics
5506 Medicine
5505 Metabolism
3601 Metals and Alloys
3001 MHD Generators
5507 Microbiology
5803 Mineralogy, Petrology, and Rock Mechanics
0120 Mining–Coal
0503 Mining–Nuclear Fuels
4403 Miscellaneous Instruments
5508 Morphology
3206 Municipalities and Community Systems–Energy Conservation

03 NATURAL GAS

2904 Natural Resources–Policy
4502 Nuclear–Explosives
2906 Nuclear Energy–Policy

05 NUCLEAR FUELS

6510 Nuclear Physics

21 NUCLEAR POWER PLANTS

22 NUCLEAR REACTOR TECHNOLOGY

1408 Ocean Thermal Gradient Power Plants
5805 Oceanography
0404 Oil Production, Recovery, and Refining–Oil Shale

04 OIL SHALES AND TAR SANDS

4003 Organic Chemistry
5604 Other Environmental Pollutant Effects
3606 Other Materials

09 OTHER SYNTHETIC AND NATURAL FUELS

43 PARTICLE ACCELERATORS

5509 Pathology

02 PETROLEUM

4005 Photochemistry
1406 Photovoltaic Power Plants
0701 Physical Isotope Separation

64 PHYSICS RESEARCH

65 PHYSICS RESEARCH (CONT.)

5510 Physiological Systems
1303 Plant Design and Operation–Hydroelectric
7001 Plasma Research
2207 Plutonium and Isotope Production Reactors
0210 Policy, Legislation, and Regulation–Petroleum
0310 Policy, Legislation, and Regulation–Natural Gas
2930 Policy, Legislation, and Regulation
4240 Pollution Control Equipment
3604 Polymers and Plastics
1307 Power Conversion Systems–Hydro
4250 Power Cycles
2001 Power Plants and Power Generation–Electric
2106 Power Reactors, Auxiliary, Mobile, Package, and Transportable
2105 Power Reactors, Breeding
2103 Power Reactors, Non-Breeding, Graphite Moderated
2101 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
2102 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
2104 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
2003 Power Transmission and Distribution–Electric
2109 Process Heat Reactors
0104 Processing–Coal
0204 Processing–Petroleum

0602 Processing–Fusion Fuels
0801 Production–Hydrogen
0205 Products and By-Products–Petroleum
0304 Products and By-Products–Natural Gas
0106 Properties–Coal
0230 Properties–Petroleum
0330 Properties–Natural Gas
0608 Properties–Fusion Fuels
0808 Properties–Hydrogen
0405 Properties and Composition–Oil Shale
2208 Propulsion Reactors
5520 Public Health
2503 Pumped Hydro–Energy Storage
6540 Radiation and Shielding Physics
4006 Radiation Chemistry
5601 Radiation Effects–Biological
4402 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
4401 Radiation Instrumentation
0702 Radiation Sources
5003 Radioactive Materials Monitoring and Transport–Atmospheric
5103 Radioactive Materials Monitoring and Transport–Terrestrial
5203 Radioactive Materials Monitoring and Transport–Aquatic
4007 Radiochemistry and Nuclear Chemistry
2209 Reactor Safety
2107 Regulation and Licensing–Nuclear Power Plants
0170 Regulations–Coal
0420 Regulations–Oil Shale
0550 Regulations–Nuclear Fuels
1603 Regulations–Tidal Power
1703 Regulations–Wind Energy
5006 Regulations–Environmental Atmospheric
5106 Regulations–Environmental Terrestrial
5206 Regulations–Environmental Aquatic
1304 Regulations and Licensing–Hydro Power
0606 Regulations and Policy–Fusion Fuels
2905 Research, Development, Demonstration, and Commercialization–Policy
2206 Research, Test, and Experimental Reactors
0201 Reserves–Petroleum
0301 Reserves–Natural Gas
0501 Reserves–Nuclear Fuels
0110 Reserves and Exploration–Coal
0401 Reserves and Exploration–Oil Shale
1501 Resource Status and Assessment–Geothermal
1301 Resources and Availability–Hydro Power
1401 Resources and Availability–Solar Energy
0805 Safety–Hydrogen
4206 Safety Engineering
0402 Site Geology and Hydrology–Oil Shale
1302 Site Geology and Meteorology–Hydro Power
5005 Site Resource and Use Studies
5105 Site Resource and Use Studies
5205 Site Resource and Use Studies
5301 Social and Economic Studies
1410 Solar Collectors and Concentrators

14 SOLAR ENERGY

1405 Solar Energy Conversion
1409 Solar Radiation Utilization
1407 Solar Thermal Power Plants
6560 Solid State Physics
0904 Solid Waste Fuels
0601 Sources–Fusion Fuels
0508 Spent Fuels Reprocessing–Nuclear
0240 Storage–Petroleum
0350 Storage–Natural Gas
0802 Storage–Hydrogen
4304 Storage Rings–Particle Accelerators
2920 Supply, Demand, and Forecasting–Energy
6570 Theoretical Physics
2201 Theory and Calculation–Nuclear Reactors
2506 Thermal–Energy Storage
5602 Thermal Effects–Biological
5004 Thermal Effluents Monitoring and Transport–Atmospheric
5104 Thermal Effluents Monitoring and Transport–Terrestrial
5204 Thermal Effluents Monitoring and Transport–Aquatic
3004 Thermionic Converters
3003 Thermoelectric Generators

16 TIDAL POWER

1607 Tidal Power Plants
0803 Transport–Hydrogen
0130 Transport and Handling–Coal
0509 Transport and Storage–Nuclear Fuels
0604 Transport and Storage–Fusion Fuels
2907 Transport and Storage–Policy
0220 Transport, Pipelines, and Handling–Petroleum
0320 Transport, Pipelines, and Handling–Natural Gas
3202 Transportation–Energy Conservation
2990 Unconventional Sources and Power Generation–Energy Policy
4220 Underground Engineering
4207 Vacuum Engineering
3306 Vehicle Design Factors–Automotive
2908 Waste Heat Utilization
0108 Waste Management–Coal
0208 Waste Management–Petroleum
0307 Waste Management–Natural Gas
0520 Waste Management–Nuclear Fuels
0607 Waste Management–Fusion Fuels
4209 Waste Processing Plants and Equipment
0409 Waste Research and Management–Oil Shale
1608 Wave Energy Converters–Tidal
4404 Well Logging Instrumentation

17 WIND ENERGY

1706 Wind Energy Engineering

SUBJECT CATEGORIES (NUMERICAL LISTING)

01 COAL AND COAL PRODUCTS
- 04 Processing
- 05 By-Products
- 06 Properties
- 08 Waste Management
- 09 Environmental Aspects
- 10 Reserves and Exploration
- 20 Mining
- 30 Transport and Handling
- 40 Combustion
- 50 Marketing and Economics
- 60 Health and Safety
- 70 Regulations

02 PETROLEUM
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling and Production
- 04 Processing
- 05 Products and By-Products
- 06 Health and Safety
- 07 Marketing and Economics
- 08 Waste Management
- 09 Environmental Aspects
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Storage
- 50 Combustion

03 NATURAL GAS
- 01 Reserves
- 02 Geology and Exploration
- 03 Drilling, Production, and Processing
- 04 Products and By-Products
- 05 Health and Safety
- 06 Marketing and Economics
- 07 Waste Management
- 08 Environmental Effects
- 09 Artificial Stimulation, Plowshare, etc.
- 10 Policy, Legislation, and Regulation
- 20 Transport, Pipelines, and Handling
- 30 Properties
- 40 Combustion
- 50 Storage

04 OIL SHALES AND TAR SANDS
- 01 Reserves and Exploration
- 02 Site Geology and Hydrology
- 03 Drilling, Fracturing, and Mining
- 04 Oil Production, Recovery, and Refining
- 05 Properties and Composition
- 06 Direct Uses and By-Products
- 07 Health and Safety
- 08 Marketing and Economics
- 09 Waste Research and Management
- 10 Environmental Aspects
- 20 Regulations

05 NUCLEAR FUELS
- 01 Reserves
- 02 Exploration
- 03 Mining
- 04 Feed Processing
- 05 Enrichment
- 06 By-Products
- 07 Fuels Production and Properties
- 08 Spent Fuels Reprocessing
- 09 Transport and Storage
- 10 Marketing and Economics
- 20 Waste Management
- 30 Environmental Aspects
- 40 Health and Safety
- 50 Regulations

06 FUSION FUELS
- 01 Sources
- 02 Processing
- 03 By-Products
- 04 Transport and Storage
- 05 Health and Safety
- 06 Regulations and Policy
- 07 Waste Management
- 08 Properties
- 09 Environmental Aspects

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY
- 01 Physical Isotope Separation
- 02 Radiation Sources
- 03 Isotopic Power Supplies

08 HYDROGEN
- 01 Production
- 02 Storage
- 03 Transport
- 04 Marketing and Economics
- 05 Safety
- 06 Industrial and Commercial Use
- 07 By-Products
- 08 Properties
- 09 Environmental Aspects

09 OTHER SYNTHETIC AND NATURAL FUELS
- 01 Hydrocarbon Fuels
- 02 Alcohol Fuels
- 03 Inorganic Hydrogen Compound Fuels
- 04 Solid Waste Fuels
- 05 Liquid Waste Fuels
- 06 Gaseous Waste Fuels

13 HYDRO ENERGY
- 01 Resources and Availability
- 02 Site Geology and Meteorology
- 03 Plant Design and Operation
- 04 Regulations and Licensing
- 05 Economics and Management
- 06 Environmental Aspects
- 07 Power Conversion Systems

14 SOLAR ENERGY
- 01 Resources and Availability
- 03 Economics
- 04 Environmental, Legal, and Institutional Aspects
- 05 Solar Energy Conversion
- 06 Photovoltaic Power Plants
- 07 Solar Thermal Power Plants
- 08 Ocean Thermal Gradient Power Plants
- 09 Solar Radiation Utilization
- 10 Solar Collectors and Concentrators
- 20 Heat Storage

15 GEOTHERMAL ENERGY
- 01 Resource Status and Assessment
- 02 Geology, Hydrology, and Geothermal Systems
- 03 Geothermal Exploration and Exploration Technology
- 04 Legal and Institutional Aspects
- 05 Economic and Financial Aspects
- 06 Environmental Aspects and Waste Disposal

07 By-Products
08 Geothermal Power Plants
09 Geothermal Engineering
10 Direct Energy Utilization
20 Geothermal Data and Theory

16 TIDAL POWER
03 Regulations
04 Economics
05 Environmental Aspects
07 Tidal Power Plants
08 Wave Energy Converters

17 WIND ENERGY
01 Availability (Climatology)
03 Regulations
04 Economics
05 Environmental Aspects
06 Wind Energy Engineering

20 ELECTRIC POWER ENGINEERING
01 Power Plants and Power Generation
02 Environmental Aspects
03 Power Transmission and Distribution

21 NUCLEAR POWER PLANTS
01 Power Reactors, Non-Breeding, Light-Water Moderated, Boiling Water Cooled
02 Power Reactors, Non-Breeding, Light-Water Moderated, Non-Boiling Water Cooled
03 Power Reactors, Non-Breeding, Graphite Moderated
04 Power Reactors, Non-Breeding, Otherwise Moderated or Unmoderated
05 Power Reactors, Breeding
06 Power Reactors, Auxiliary, Mobile, Package, and Transportable
07 Regulation and Licensing
08 Economics
09 Process Heat Reactors

22 NUCLEAR REACTOR TECHNOLOGY
01 Theory and Calculation
02 Components and Accessories
03 Fuel Elements
04 Control Systems
05 Environmental Aspects
06 Research, Test, and Experimental Reactors
07 Plutonium and Isotope Production Reactors
08 Propulsion Reactors
09 Reactor Safety

25 ENERGY STORAGE
01 Magnetic
02 Compressed Gas
03 Pumped Hydro
04 Capacitor Banks
05 Flywheels
06 Thermal
07 Liquefied Gas
08 Chemical
09 Batteries

29 ENERGY PLANNING AND POLICY
01 Energy Analysis and Modeling
02 Economics and Sociology
03 Environment, Health, and Safety
04 Natural Resources
05 Research, Development, Demonstration, and Commercialization
06 Nuclear Energy
07 Transport and Storage
08 Waste Heat Utilization
10 Conservation
20 Supply, Demand, and Forecasting
30 Policy, Legislation, and Regulation
40 Fossil Fuels
50 Hydrogen and Synthetic Fuels
60 Electric Power
80 Consumption and Utilization
90 Unconventional Sources and Power Generation

30 ENERGY CONVERSION
01 MHD Generators
02 EHD Generators
03 Thermoelectric Generators
04 Thermionic Converters
05 Fuel Cells
08 Electromechanical Converters

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION
01 Buildings
02 Transportation
03 Industry and Agriculture
06 Municipalities and Community Systems
09 Education and Public Relations

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS
01 Internal Combustion Engines
02 External Combustion Engines
03 Electric-Powered Systems
04 Hybrid Systems
05 Flywheel Propulsion
06 Vehicle Design Factors
07 Emission Control
08 Alternative Fuels

36 MATERIALS
01 Metals and Alloys
02 Ceramics, Cermets, and Refractories
03 Composite Materials
04 Polymers and Plastics
06 Other Materials

40 CHEMISTRY
01 Analytical and Separations Chemistry
02 Inorganic and Physical Chemistry
03 Organic Chemistry
04 Electrochemistry
05 Photochemistry
06 Radiation Chemistry
07 Radiochemistry and Nuclear Chemistry
08 Combustion Chemistry

42 ENGINEERING
01 General Engineering
02 Facilities and Equipment
03 Lasers
04 Heat Transfer and Fluid Flow
05 Materials Testing
06 Safety Engineering
07 Vacuum Engineering
08 Electronic Circuits and Devices
09 Waste Processing Plants and Equipment
10 Combustion Systems
20 Underground Engineering
30 Marine Engineering
40 Pollution Control Equipment
50 Power Cycles

43 PARTICLE ACCELERATORS
01 Design, Development, and Operation
02 Beam Dynamics, Field Calculations, and Ion Optics
03 Auxiliaries and Components
04 Storage Rings

44 INSTRUMENTATION
01 Radiation Instrumentation
02 Radiation Effects on Instrument Components, Instruments, or Electronic Systems
03 Miscellaneous Instruments
04 Well Logging Instrumentation

45 EXPLOSIONS AND EXPLOSIVES
01 Chemical
02 Nuclear
03 Explosion Detection

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC
01 Basic Studies
02 Chemicals Monitoring and Transport
03 Radioactive Materials Monitoring and Transport
04 Thermal Effluents Monitoring and Transport
05 Site Resource and Use Studies
06 Regulations

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL
01 Basic Studies

02 Chemicals Monitoring and Transport
03 Radioactive Materials Monitoring and Transport
04 Thermal Effluents Monitoring and Transport
05 Site Resource and Use Studies
06 Regulations

52 ENVIRONMENTAL SCIENCES, AQUATIC

01 Basic Studies
02 Chemicals Monitoring and Transport
03 Radioactive Materials Monitoring and Transport
04 Thermal Effluents Monitoring and Transport
05 Site Resource and Use Studies
06 Regulations

53 ENVIRONMENTAL–SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

01 Social and Economic Studies
02 Assessment of Energy Technologies
03 Environmental Impact Statements

55 BIOMEDICAL SCIENCES, BASIC STUDIES

01 Behavioral Biology
02 Biochemistry
03 Cytology
04 Genetics
05 Metabolism
06 Medicine
07 Microbiology
08 Morphology
09 Pathology
10 Physiological Systems
20 Public Health
30 Agriculture and Food Technology

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

01 Radiation Effects
02 Thermal Effects
03 Chemicals Metabolism and Toxicity
04 Other Environmental Pollutant Effects

57 HEALTH AND SAFETY

58 GEOSCIENCES

01 Geology and Hydrology
02 Geophysics
03 Mineralogy, Petrology, and Rock Mechanics
04 Geochemistry
05 Oceanography

64 PHYSICS RESEARCH

01 Astrophysics and Cosmology
02 Atmospheric Physics
03 Atomic, Molecular, and Chemical Physics
04 Fluid Physics
50 High Energy Physics

65 PHYSICS RESEARCH (CONT.)

10 Nuclear Physics
40 Radiation and Shielding Physics
50 Medical Physics
60 Solid State Physics
70 Theoretical Physics
80 Mathematical Physics
90 Communication, Education, History, and Philosophy

70 FUSION ENERGY

01 Plasma Research
02 Fusion Power Plant Technology

99 GENERAL AND MISCELLANEOUS

01 Management
02 Mathematics and Computers
03 Information Handling
04 Law
05 Civilian Defense

Descriptor Definition Chart

Descriptor to use	PRESSURE					
	torr	atm	bar	kilobar	psi	mmHg
ULTRAHIGH VACUUM	10^{-8} or less	1.3×10^{-11} or less	1.33×10^{-11} or less	1.33×10^{-14} or less	1.9×10^{-10} or less	10^{-8} or less
HIGH VACUUM	10^{-8} to 10^{-3}	1.3×10^{-11} to 1.3×10^{-6}	1.33×10^{-11} to 1.33×10^{-6}	1.33×10^{-14} to 1.33×10^{-9}	1.9×10^{-10} to 1.9×10^{-5}	10^{-8} to 10^{-3}
MEDIUM VACUUM	10^{-3} to 1	1.3×10^{-6} to 1.3×10^{-3}	1.33×10^{-6} to 1.33×10^{-3}	1.33×10^{-9} to 1.33×10^{-6}	1.9×10^{-5} to 1.9×10^{-2}	10^{-3} to 1
LOW PRESSURE	1 to 760	1.3×10^{-3} to 1	1.3×10^{-3} to 1.01	1.33×10^{-6} to 1.01×10^{-3}	1.9×10^{-2} to 14.7	1 to 760
MEDIUM PRESSURE	760 to 7.6×10^{4}	1 to 100	1.01 to 101	1.01×10^{-3} to 0.101	14.7 to 1.47×10^{3}	760 to 7.6×10^{4}
HIGH PRESSURE	7.6×10^{4} to 7.6×10^{5}	100 to 1000	101 to 1013	0.101 to 1.013	1.47×10^{3} to 1.47×10^{4}	7.6×10^{4} to 7.6×10^{5}
VERY HIGH PRESSURE	Above 7.6×10^{5}	Above 1000	Above 1013	Above 1.013	Above 1.47×10^{4}	Above 7.6×10^{5}

Descriptor to use	TEMPERATURE		
	°K	°C	°F
ULTRALOW TEMPERATURE	(0 to 13)	(−273 to −260)	(−459 to −436)
VERY LOW TEMPERATURE	(13 to 65)	(−260 to −208)	(−436 to −342)
LOW TEMPERATURE	(65 to 273)	(−208 to 0)	(−342 to 32)
MEDIUM TEMPERATURE	(273 to 400)	(0 to 127)	(32 to 260)
HIGH TEMPERATURE	(400 to 1000)	(127 to 727)	(260 to 1340)
VERY HIGH TEMPERATURE	(1000 to 4000)	(727 to 3727)	(1340 to 6701)
ULTRAHIGH TEMPERATURE	(4000 and above)	(3727 and above)	(6701 and above)

SECTION INDEXING PATTERNS

INTRODUCTION

Each major area of subject interest has been found to benefit from varying degrees of indexing standardization and special indexing procedures. These variations in indexing patterns are detailed below by subject.

COAL AND COAL PRODUCTS

Terminology used in indexing coal information can be categorized as properties, production, preparation, processing, and utilization terms. The descriptor COAL, or a narrower term based chiefly on coal rank, ANTHRACITE, BROWN COAL, LIGNITE, etc., may be necessary.

Coal mining may be indexed using that term plus specific terms to describe the type of mining or the equipment used such as SURFACE MINING, LONGWALL MINING, DRILL BITS, CONVEYORS, etc. Such terms as GROUND SUBSIDENCE, ROCK MECHANICS, VENTILATION, and ROOF BOLTS are also used. The descriptor COAL PREPARATION and such specific descriptors as GRINDING, SORTING, FRAGMENTATION, WASHING, etc., are used to convey this concept. The precoordinated terms COAL GASIFICATION and COAL LIQUEFACTION were introduced to identify more specifically this information.

FLUIDIZED-BED COMBUSTION, BY-PRODUCTS, CHARS, FLY ASH, FLUE GAS, PROCESS DEVELOPMENT UNITS, DEMONSTRATION PLANTS, DESULFURIZATION, HOT GAS CLEANUP, and PETROLOGY are some additional descriptors used to index information on coal.

COAL GASIFICATION, COAL LIQUEFACTION, or a specific process name may be used as an M. Examples include: COAL GASIFICATION/CHEMICAL REACTION KINETICS; HYGAS PROCESS/PILOT PLANTS; BI-GAS PROCESS/ECONOMICS; COAL LIQUEFACTION/ENVIRONMENTAL EFFECTS; SRC-II PROCESS/MANAGEMENT.

Example:

TITLE: Evaluation of Nickel as a Catalyst for Coal Gasification Using Steam.
COAL GASIFICATION:T1
CATALYSTS:Q1
NICKEL:T2
CATALYTIC EFFECTS:Q2
HIGH BTU GAS
BENCH-SCALE EXPERIMENTS
PRODUCTION
STEAM
COMPARATIVE EVALUATIONS

COAL PASTES/GASIFICATION or LIGNITE/LIQUEFACTION, etc., are *not* used. For other processes applied to coal or coal products, the specific material (COKE, ANTHRACITE, COAL LIQUIDS,

etc.) is used as the M with the process as Q. Examples include: COKE/BRIQUETTING; COAL GAS/CHEMICAL ANALYSIS; LIGNITE/COMBUSTION; BITUMINOUS COAL/DESULFURIZATION; ANTHRACITE/PETROLOGY; or BROWN COAL/GRINDING. M/Q pairs of the type COAL FINES/HYDROGENATION or COAL PREPARATION/CLEANING are *not* used. For purification of coal or coal products, the descriptor COAL (or a more specific term) is paired with DESULFURIZATION, DENITRIFICATION, other specific descriptors, or PURIFICATION as Q's. Descriptors for the specific materials removed are used as M's with the specific separation method or REMOVAL as Q's.

Example:

TITLE: Cyclic Countercurrent Washing of Flue Gases Containing SO_2.
FLUE GAS:T1
WASHING:Q1
SULFUR DIOXIDE:T2
REMOVAL:Q2
CALCIUM CARBONATES
CALCIUM SULFATES
CALCIUM SULFIDES
COUNTER CURRENT
DESULFURIZATION

The term CATALYSTS or the name of a specific material used as a catalyst may be paired with such Q's as CHEMICAL PREPARATION, POISONING, REGENERATION, etc., and the specific material may be paired with the Q, CATALYTIC EFFECTS.

The preparation of methane from carbon monoxide is indexed as CARBON MONOXIDE/METHANATION *not* CARBON MONOXIDE/HYDROGENATION, although the reaction is between carbon monoxide and hydrogen.

For indexing of coal mining, the most specific descriptor, COAL MINING, UNDERGROUND MINING, SURFACE MINING, LONGWALL MINING, etc., should be used as the M. Examples are: COAL MINING/ECONOMICS; SURFACE MINING/LAND RECLAMATION; LONGWALL MINING/MINING EQUIPMENT. The feasibility of hydraulic transportation in underground coal mines is indexed using the descriptor pairs COAL/HYDRAULIC TRANSPORT and COAL MINES/MATERIALS HANDLING and the descriptors MINING EQUIPMENT, SAFETY, SLURRIES, UNDERGROUND MINING.

Papers relating to power plants must always be indexed *and* also categorized under the power plants. Examples are: COMBINED-CYCLE POWER PLANTS/GAS TURBINES; GAS TURBINES/EROSION; CHARS/FLUIDIZED-BED COMBUSTION; FOSSIL-FUEL POWER PLANTS/FLUE GAS; FLUE GAS/DESULFURIZATION; SULFUR DIOXIDE/ADSORPTION.

Indexing for chemical analysis should follow the guides for the Analytical and Separations Chemistry category. The specific method of analysis is paired with the element, compound, or substance being determined (for example, SULFUR/X-RAY EMISSION ANALYSIS; VANADIUM/SPECTROPHOTOMETRY; NITROGEN/MASS SPECTROSCOPY), and CHEMICAL ANALYSIS or a narrower term is paired with the substance being analyzed (for example, COAL/CHEMICAL ANALYSIS; COAL GAS/ACTIVATION ANALYSIS; LIGNITE/RADIATION SCATTERING ANALYSIS).

A hierarchical pattern should result in some M/Q pairs, for example, COAL MINES/BLOWERS and BLOWERS/PERFORMANCE TESTING.

In general, descriptors that denote an action or property are not used as M's. COAL FINES or COAL PREPARATION, but *not* TRANSPORT, may be M's; COAL LIQUIDS, but not CORROSIVE EFFECTS. States of matter such as FUEL SLURRIES or MONOCRYSTALS are not used as Q's.

PETROLEUM AND NATURAL GAS

In indexing papers dealing with petroleum and natural gas, the most specific terms available are used. However, at times, in order to aid in retrieval, a more general class term is added to the list of descriptors. Specific examples are given. As exploration for and development of petroleum and natural gas deposits

often affect several areas of concern, attention must be given to the aspect of cross-categorization. ENVIRONMENTAL SCIENCES, ENGINEERING, and GEOSCIENCES are commonly involved.

Only the most general papers and those that cannot be categorized more specifically are put in the general category. Included are papers that deal with the petroleum or natural gas industry as a whole (yearbooks), international aspects, proposals for development, and some progress reports or conferences.

Examples:

TITLE: Petroleum Facts and Figures, 1971 Edition.
Augmentation: (Book)
PETROLEUM INDUSTRY:M1
DATA COMPILATION:Q1
PETROLEUM PRODUCTS
PETROLEUM REFINERIES

TITLE: Water Requirements and Use in the Minerals Industry in Montana.
WATER REQUIREMENTS: Q1,Q2
PETROLEUM INDUSTRY:T1
MINERALS INDUSTRY:T2
MONTANA:T3
WATER RESOURCES:Q3

This paper should be crossed to the category ENVIRONMENTAL SCIENCES, AQUATIC—Site Resource and Use Studies.

Reserves

In indexing reserves, proven or estimated, the location should be a prime index point.

Example:

TITLE: Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas in the United States as of December 31, 1975.
USA:T1
PETROLEUM DEPOSITS:Q1
NATURAL GAS DEPOSITS:Q1
RESERVES: Q2,Q3,Q4
DATA COMPILATION
PETROLEUM:T2
NATURAL GAS:T3
NATURAL GAS LIQUIDS:T4

In structuring a search on petroleum or natural gas deposits, the descriptors PETROLEUM DEPOSITS, NATURAL GAS DEPOSITS, RESERVES, and the categories 020100 and 030100 are selected and paired. For example, for a search of tne data base on petroleum reserves in the United States:

Select nc≠020100 (1)
Select reserves (2)
Select petroleum deposits (3)
Select USA (4)
Combine 1*(2 + 3)*4

If the search is not limited to the reserves category, items on well logging, reservoir characteristics, and site geology will litter the results.

Exploration

This category includes papers on both exploration techniques and petroleum geology. Geological terms indicate the property studied, e.g., STRATIGRAPHY; the geologic age, e.g., PERMIAN PERIOD; and such aspects as GEOLOGIC TRAPS, PETROLEUM GEOLOGY, METAMORPHISM, RESERVOIR PRESSURE, etc.

Example:

TITLE: Stratigraphy of Bjarni H-81 and Leif M-48 Labrador Shelf.
CONTINENTAL SHELF:T1
CANADA:T2
STRATIGRAPHY:Q1
PETROLEUM DEPOSITS:Q2

Exploration techniques include geophysical and geochemical surveys to define a potentially productive area and well logging to evaluate a particular formation. The descriptors GEOCHEMICAL SURVEYS, GEOPHYSICAL SURVEYS, and WELL LOGGING, or a more specific survey method or logging technique, are possible index points. If enough information on the method is given, the paper should be cross-categorized to 580203, GEOSCIENCE—Geophysical Survey Methods. Offshore surveys should include MARINE SURVEYS as a descriptor.

Example:

TITLE: Deconvolution Refinements Improve Offshore Seismic Resolution.
PETROLEUM DEPOSITS:T1
SEISMIC SURVEYS:T2,Q1
DATA PROCESSING:Q2
MARINE SURVEYS

The specific geophysical survey terms available include ELECTRICAL SURVEYS, ELECTROMAGNETIC SURVEYS, MAGNETOTELLURIC SURVEYS, GRAVITY SURVEYS, INFRARED SURVEYS, SELF-POTENTIAL SURVEYS, SEISMIC SURVEYS, TELLURIC SURVEYS, MAGNETIC SURVEYS, and RADIOMETRIC SURVEYS.

Well logging should be indexed by pairing such descriptors as NATURAL GAS DEPOSITS and PETROLEUM DEPOSITS with the specific well logging technique used.

Example:

TITLE: Analysis of Pulsed-Neutron Decay-Time Logs in Acidized Carbonate Formations.
OIL WELLS:T1
NEUTRON-NEUTRON LOGGING:T2,Q1
DATA ANALYSIS:Q2
CARBONATE ROCKS
PULSED NEUTRON TECHNIQUES

If sufficient information is present, papers on well logging should be cross-categorized to 440400, INSTRUMENTATION—Well Logging Instrumentation.

Drilling and Production

The primary emphasis is on enhanced-recovery techniques and improved drilling equipment. Such terms as OIL WELLS and NATURAL GAS WELLS should be paired with the descriptor for the specific stimulation technique, e.g., WATERFLOODING, GAS INJECTION, STEAM INJECTION, FLUID INJECTION, IN-SITU COMBUSTION, MISCIBLE-PHASE DISPLACEMENT, HYDROFRACTURING, EXPLOSIVE STIMULATION, MICROEMULSION FLOODING. The descriptors ENHANCED RECOVERY or WELL STIMULATION should also be used.

Example:

TITLE: Oil Recovery Method Using Overbased Waterflood Additive Containing Sulfonates Derived from Alkylation Reaction Products.
OIL WELLS:T1
WELL STIMULATION
WATERFLOODING:Q1
ENHANCED RECOVERY
ADDITIVES
BASES

PETROLEUM SULFONATES
DEMONSTRATION PROGRAMS
EVALUATION
MATERIALS

In indexing papers dealing with specific structures, techniques, or processes for special environments, this fact should be indicated. A paper dealing with the comparative evaluation of concrete or steel platforms for the North Sea would be indexed OFFSHORE PLATFORMS/MATERIALS, NORTH SEA/OFFSHORE PLATFORMS and the descriptors CONCRETE and STEELS or STAINLESS STEELS would be added. Possibly CORROSION, SEAWATER/CORROSIVE EFFECTS or STORMS, HURRICANES, WATER WAVES, DYNAMIC LOADS would also be applicable. The appropriate MATERIALS category should also be used.

Papers dealing with offshore drilling and production should always include as descriptor OFFSHORE OPERATIONS if the other terms selected do not indicate that the operation is offshore. If both offshore and onshore operations are considered in the same paper, the term ONSHORE SITES should also be used.

Processing

The primary processes of interest are desulfurization and demetallization. A paper on the removal of hydrogen sulfide from natural gas would be indexed NATURAL GAS/DESULFURIZATION and HYDROGEN SULFIDES/REMOVAL. The terms SULFUR/RECOVERY or SULFUR/REMOVAL are not used unless the process or technique for the recovery of sulfur is considered. For indexing purposes, hydrorefining is synonymous with desulfurization. DEMETALLIZATION is also a valid descriptor.

In indexing the removal of acid gases (H_2S, CO_2, etc.) from natural gas, it is necessary to index CARBON DIOXIDE/REMOVAL, but the sulfide removal is indexed using NATURAL GAS/DESULFURIZATION.

Dehydration of natural gas is indexed in a similar manner, NATURAL GAS/DEHYDRATION.

Products and By-Products

Papers on the liquefaction of natural gas are indexed using LIQUEFIED NATURAL GAS/PRODUCTION and *not* NATURAL GAS/LIQUEFACTION. Other products are indexed using the product paired with production processes, purification techniques, or property.

Waste Management

Management of wastes during the entire process from drilling through refining is covered. In indexing a paper on the use of the activated sludge process for the deactivation of refinery wastes the indexing would be PETROLEUM REFINERIES/WASTE PROCESSING and WASTE PROCESSING/ACTIVATED SLUDGE PROCESS. Additional descriptors might be LIQUID WASTES, WASTE WATER, and WATER POLLUTION CONTROL.

Reclamation of waste lubricating oils would be indexed LUBRICATING OILS/RECYCLING. Other descriptors might be WASTE OILS, MATERIALS RECOVERY, ENERGY CONSERVATION, DISTILLATION, DEMETALLIZATION, WASTE PROCESSING.

Environmental Effects

The primary emphasis is on the detection and control of oil spills. A paper on the evaluation of skimmers for the removal of oil spills would be indexed OIL SPILLS/REMOVAL, SKIMMERS/PERFORMANCE TESTING, and the descriptors COMPARATIVE EVALUATIONS, WATER WAVES, COASTAL WATERS would be used.

Example:

TITLE: Biodegradation of Oil Spills.
OIL SPILLS:T1
BIODEGRADATION:Q1

CONTROL
ENVIRONMENTAL EFFECTS
MICROORGANISMS
MONITORING
CLEANING
REMOVAL
WATER POLLUTION

Other descriptors used for papers on spill control and cleanup include: OIL POLLUTION CONTAINMENT, OIL RETENTION BOOMS, ROTATING DISK REMOVAL SYSTEMS, etc.

Transport, Pipelines, Handling and Storage

When the method of transport is not given in the title, the method is used to augment the title and is added as a descriptor, such as TANKER SHIPS and MARITIME TRANSPORT. General papers on the design, development, etc., of transport and storage facilities or those papers which have a general application should be cross-categorized to ENGINEERING—Transport and Storage Facilities. Both STORAGE FACILITIES and TERMINAL FACILITIES have been introduced as descriptors.

A major problem in the transport of natural gas is the formation of gas hydrates in the pipelines. Material on this subject is indexed using the descriptor GAS HYDRATES. Some common index pairs are PIPELINES/GAS HYDRATES, GAS HYDRATES/INHIBITION.

OIL SHALES AND TAR SANDS

In indexing oil shale literature, subject descriptors reflect the compounds, minerals, and materials associated with the industry. As significant and distinctive processes are introduced, they are also used as subject descriptors. Qualifying descriptors are usually processing terms, properties, and reactions. Titles are augmented with specific data and/or concise, descriptive statements.

Frequently used subject descriptors are: SHALE OIL, OIL SHALES, SHALE TAR, SHALE TAR OILS, SPENT SHALES, OIL SANDS, BITUMENS, BITUMINOUS MATERIALS, NAHCOLITE, DAWSONITE, GREEN RIVER FORMATION, etc.

The descriptor OIL SHALES is used for bituminous shales, kerosene shale, bitumen-containing shales, kerogen shales, and for oil-shale-denoting terms used in certain locales, such as kukersite (Estonia) and tasmanite (Tasmania). TORBANITE, an oil-yielding rock having characteristics intermediate between oil shale and coal, is a descriptor. BLACK SHALES, which sometimes do and sometimes do not yield oil, is also a descriptor. The term OIL SANDS is used to describe finely divided rocks that are actually impregnated with oil, such as tar sands, bituminous sands, bitumen-containing sands, asphaltic sands, etc. The descriptor BITUMINOUS MATERIALS is used to describe those materials which have no specific descriptor and which cannot be accurately described by OIL SHALES, OIL SANDS, COAL, LIGNITE, TORBANITE, etc. For bituminous schists and pyroschists the descriptors BITUMINOUS MATERIALS and SCHISTS are used.

Qualifying terms such as MINING, RETORTING, IN-SITU RETORTING, STRUCTURAL CHEMICAL ANALYSIS, WASTE DISPOSAL, etc., are used as applicable. Process headings, such as GAS COMBUSTION PROCESS, PARAHO PROCESS, and PETROSIX PROCESS, are used as qualifying terms and also stand alone as main headings. The term PROCESSING (or IN-SITU PROCESSING) is used to denote the study of several stages in the treatment of oil shales or sands. Its use should be limited to survey papers, whenever possible. Typical examples of possible M/Q pairs are OIL SHALES/IN-SITU RETORTING, OIL SANDS/GEOCHEMISTRY, SHALE OIL/REFINING, SHALE TAR OILS/STRUCTURAL CHEMICAL ANALYSIS, and BITUMENS/HYDROCRACKING.

The following examples are presented according to category; in some cases cross-categorization is desirable.

General, Survey

TITLE: Present Trends in Estonian–Russian Work on Oil Shale.
Augmentation: (Emphasis placed on processing)
OIL SHALES:M1
PROCESSING:Q1
USSR:M2
OIL SHALE INDUSTRY:Q2

TITLE: Bibliography on Oil Sand Research.
OIL SANDS:T1
RESEARCH PROGRAMS
OIL SAND INDUSTRY
REVIEWS
BIBLIOGRAPHIE S:Q1

Reserves and Exploration

TITLE: Bituminous Rocks and Their Utilization.
Augmentation: (General survey of world resources)
BITUMINOUS MATERIALS:M1
RESERVES:Q1
GLOBAL ASPECTS
REVIEWS

TITLE: Alaskan Oil Shales.
OIL SHALES:T1,Q2
RESERVES:Q1
ALASKA:T2

TITLE: Progress Report on Bureau of Mines–AEC Corehole, Rio Blanco County, Colo.
OIL SHALES:T1
DRILL CORES:Q1,Q2
PICEANCE CREEK BASIN:T2
RESEARCH PROGRESS
OIL SHALE DEPOSITS:Q2

Site Geology

TITLE: Geology of Oil Shale Resources of the Green River Formation.
OIL SHALES:T1
GEOLOGY:Q1,Q2
GREEN RIVER FORMATION:T2

TITLE: Genesis of Carbonates in Mahogany Zone Oil Shales.
OIL SHALES:T1
GEOCHEMISTRY:Q1,Q2
CARBONATES:T3
ORIGIN:Q3
MAHOGANY ZONE:T2

Other appropriate qualifying terms might be STRATIGRAPHY, LITHOLOGY, GEOMORPHOLOGY, MINERALOGY, and PETROLOGY.

Site Hydrology

TITLE: Artesian Aquifer, New Fork Tongue of the Wasatch Formation, North Green River Basin.
WASATCH FORMATION:T1
AQUIFERS:T,Q1

TITLE: Present and Estimated Future Depletions in the Colorado Basin Chargeable to Colorado.
GREEN RIVER FORMATION:T1
COLORADO RIVER BASIN:T2
WATER RESOURCES:T3,Q1,Q2
WATER REQUIREMENTS
AVAILABILITY:Q3

Drilling, Fracturing, and Mining

TITLE: Argument for Strip-Mining Colorado Oil Shales.
OIL SHALE MINING:T1,Q2
SURFACE MINING:Q1
COLORADO:T2

TITLE: The Fracturing of Oil Shale with Electricity.
OIL SHALES:T1
FRACTURING:Q1
ELECTROCARBONIZATION:Q1

Some other appropriate descriptors might be UNDERGROUND MINING, BOREHOLES, ROCK MECHANICS, ROCK DRILLING, GROUND MOTION, CUTTING TOOLS, CHEMICAL EXPLOSIONS. Studies on nuclear explosions in mining require the use of the descriptor NUCLEAR EXPLOSIONS or a descriptor for the specific event, e.g., RIO BLANCO EVENT, as M terms. (These studies should usually be crossed to the in-situ processing category and to the category for peaceful applications of nuclear explosions.)

Oil Production, Recovery, and Refining

Process descriptors include GAS COMBUSTION PROCESS, HOLZHEIMER PROCESS, LURGI-RUHRGAS PROCESS, PARAHO PROCESS, STEAM SOAK PROCESS, TOSCO PROCESS, UNION OIL PROCESS, GARRETT PROCESS, MODIFIED IN-SITU PROCESSES, and RISE.

In-Situ Methods, True and Modified

TITLE: Potential for In-Situ Retorting of Oil Shale in the Piceance Creek Basin.
OIL SHALES:T1
IN-SITU RETORTING:Q1
PICEANCE CREEK BASIN

TITLE: Rubble In-Situ Extraction (RISE): A Proposed Program for Recovery of Oil from Oil Shale.
RISE:T1
PLANNING:Q1
OIL SHALES:T2
UNDERGROUND MINING
IN-SITU RETORTING:Q2
DEMONSTRATION PROGRAMS
OIL SHALE MINING:T

Surface Methods

TITLE: Gas Combustion Retorting Performance in a Large Demonstration Retort.
OIL SHALES:T1
GAS COMBUSTION PROCESS:T2,Q1
RETORTS:T3
PERFORMANCE TESTING:Q2,Q3

TITLE: Tetralin Extraction of Jordan Oil Shale with Ultrasonic Irradiation.
Augmentation: (Kinetics of dissolution of decarbonated oil shale)
OIL SHALES:M1
SOLVENT EXTRACTION:Q1
TETRALIN:M2
SOLVENT PROPERTIES:Q2
ULTRASONIC WAVES:M3
USES:Q3
KINETICS

Refining

TITLE: Catalytic Cracking of Shale Oil over a Zeolite Catalyst.
SHALE OIL:T1
CATALYTIC CRACKING:Q1
ZEOLITES:T2
CATALYTIC EFFECTS:Q2

TITLE: Hydrocracking of Synthetic Oils.
SYNTHETIC PETROLEUM:T1
HYDROCRACKING: Q1,Q2
SHALE OIL:T2
NAPHTHA:T3
PRODUCTION:Q3,Q4,Q5,Q6,Q7,Q8
COKE:T4
METHANE:T5
ETHANE:T6
PROPANE:T7
BUTANE:T8

Purification

TITLE: Gas Chromatographic Separation of Sulfur and Nitrogen Compounds from Athabasca Bitumin.
BITUMINS:T1
DESULFURIZATION:Q1
DENITRIFICATION:Q1
SULFUR:T2
NITROGEN:T3
REMOVAL:Q2,Q3
ATHABASCA DEPOSIT
GAS CHROMATOGRAPHY

Properties and Composition

TITLE: Tri- and Tetraterpenoid Hydrocarbons in the Messel Oil Shale.
Augmentation: (Perhydrolycopene and analogs, series of 4-methylsteranes, pentacyclic triterpanes, and triterpenes detected by gas chromatography)
OIL SHALES:M1
CHEMICAL COMPOSITION:Q1
HYDROCARBONS:M2
TERPENES:M3
GAS CHROMATOGRAPHY:Q2,Q3
MASS SPECTROSCOPY:Q2,Q3

TITLE: Heat Contents of Some Green River Oil Shales.
Augmentation: (Burned, spent, and raw)
OIL SHALES:M1
SPENT SHALES:M2
CALORIFIC VALUE:Q1,Q2
GREEN RIVER FORMATION

TITLE: A Rapid Method for Estimating Oil Yields of Oil Shales by Broad-Line NMR Spectrometry.
Augmentation: (Comparison of Organic carbon (combustion), Fischer assay, and NMR methods)
OIL SHALES:M1
OIL YIELDS:Q1
COMPARATIVE EVALUATIONS
MEASURING METHODS
NUCLEAR MAGNETIC RESONANCE
COMBUSTION
FISCHER ASSAY

TITLE: The Infrared Spectrum of Dawsonite.
Augmentation: (Comparison of spectra of three natural and one synthetic samples)
DAWSONITE:M1
INFRARED SPECTRA:Q1

Uses and By-Products

TITLE: Extracting Aluminum Compounds from Dawsonite and Dawsonite Oil Shale.
Augmentation: (Leaching using hot water, aqueous NaOH, or sulfuric acid with and without heating to 400–1000°F)
DAWSONITE:M1
LEACHING:Q1,Q3
ALUMINIUM OXIDES:M2
SOLVENT EXTRACTION:Q2
OIL SHALES:M3
WATER
SODIUM HYDROXIDES
SULFURIC ACID
HEATING
HIGH TEMPERATURE
MEDIUM TEMPERATURE

TITLE: Shale Oils and Ichthyols; Thiophene Derivatives.
OIL SHALES:T1
BY-PRODUCTS:Q1
ICHTHAMMOL:T2
CHEMICAL PREPARATION:Q2
SHALE OIL:T3
SULFONATION:Q3

Health and Safety

TITLE: Carcinogenic Qualities of Oil Shale Products and Possibilities of Prophylaxis of Cancer.
Augmentation: (Carcinogenicity of substances produced during thermal processing)
SHALE TAR:M1
SHALE OIL:M2
CARCINOGENESIS:Q1,Q2

TITLE: Toxicological Characteristics of Bituminous Shale and Hygienic Working Conditions During Its Use.

Augmentation: (Results of observations of exposed workers and experiments on laboratory animals)

OIL SHALES:M1
TOXICITY:Q1
PERSONNEL:M2
HEALTH HAZARDS:Q2
WORKING CONDITIONS
LABORATORY ANIMALS

TITLE: Carcinogenicity of Oil Shale Soot.

SOOT:T1
CARCINOGENESIS:Q1
OIL SHALES

Marketing and Economics

TITLE: Comparative Study of Oil Shale, Tar Sands, and Coal as Sources of OIL.

Augmentation: (Technology, raw material characteristics and cost; economics of synthetic fuel production)

OIL SHALES:M1
OIL SANDS:M2
COAL LIQUEFACTION:M3
ECONOMICS:Q1,Q2,Q3
SYNTHETIC PETROLEUM
COST
ENERGY SOURCE DEVELOPMENT
RAW MATERIALS

TITLE: Economic Analysis of Oil Shale Operations Featuring Gas Combustion Retorting.

OIL SHALE INDUSTRY:T1
GAS COMBUSTION PROCESS:T2
ECONOMICS:Q1,Q2

Waste Research and Management

TITLE: Water Requirements for Stabilization of Spent Shale.

Augmentation: (Hypothetical 250,000 bpd industry in Piceance Basin)

OIL SHALE INDUSTRY:M1
WATER REQUIREMENTS:Q1
SPENT SHALES:M2
REVEGETATION:Q2
PICEANCE CREEK BASIN

TITLE: Method of Recleaning Waste Water from Oil-Shale Processing.

Augmentation: (Treatment with lime, activated C, anion and cation exchange resins)

WASTE WATER:M1
OIL SHALE PROCESSING PLANTS:M2
WASTE PROCESSING:Q1,Q2
CARBONATES:M3
AMMONIA:M4
ORGANIC COMPOUNDS:M5
SODIUM CHLORIDES:M6
REMOVAL:Q3,Q4,Q5,Q6
ION EXCHANGE MATERIALS
ACTIVATED CARBON
CALCIUM OXIDES

TITLE: Water Pollution Potential of Spent Shale Residues from Above-Ground Retorting.
Augmentation: (Percolation experiments)
SURFACE WATERS:M1
GROUND WATER:M2
WATER POLLUTION:Q1,Q2
SPENT SHALES:M3
CALCIUM COMPOUNDS:M4
MAGNESIUM COMPOUNDS:M5
SODIUM COMPOUNDS:M6
LEACHING:Q3,Q4,Q5,Q6

Environmental Aspects

TITLE: Migratory Water Fowl and the Syncrude Tar Sands Lease: A Report.
Augmentation: (In-depth study)
OIL SAND INDUSTRY:M1
ENVIRONMENTAL EFFECTS:Q1
ALBERTA:M2
ECOSYSTEMS:Q2
BIRDS:M3
POPULATION DYNAMICS:Q3

TITLE: Beaver Creek: An Ecological Baseline Survey.
OIL SAND INDUSTRY:T1
ENVIRONMENTAL IMPACTS:Q1
ALBERTA:T2
AQUATIC ECOSYSTEMS:Q2

Regulations

TITLE: Energy Fuel Mineral Resources of the Public Lands. Vol. V: Legal Study of Oil Shale on Public Lands, Interim Report.
OIL SHALE INDUSTRY:T1
LEGAL ASPECTS:Q1
PUBLIC LANDS

NUCLEAR FUELS

Information on nuclear fuels is indexed using subject terms naming elements, isotopes, materials, and compounds. The qualifiers are chosen to reflect attributes or qualities and procedures.

Reserves and Exploration

Papers on the evaluation or estimation of uranium or thorium reserves are always indexed with the location as an index point, e.g., USA/URANIUM RESERVES. Terms reflecting the property studied, such as STRATIGRAPHY or LITHOLOGY, are paired with URANIUM DEPOSITS, e.g., URANIUM DEPOSITS/METAMORPHISM. Exploration terms such as GEOCHEMICAL SURVEYS, WELL LOGGING, and EXPLORATION are available for papers on prospecting for uranium. The pattern is GEORGIA/GEOPHYSICAL SURVEYS; URANIUM DEPOSITS/EXPLORATION.

Differentiation is made among the terms URANIUM, URANIUM ORES, URANIUM DEPOSITS, and URANIUM RESERVES. The descriptor URANIUM is used for papers dealing with the chemical and physical properties of the element. For papers dealing with mineralogy, petrology, or composition, the descriptor URANIUM ORES is used. URANIUM DEPOSITS is used in dealing with prospecting, exploration, and geological parameters. For papers evaluating or estimating the amount of uranium in a given deposit, the descriptor URANIUM RESERVES is used. URANIUM MINERALS and descriptors for specific uranium minerals are also used.

Enrichment

The standard indexing pattern for uranium enrichment is URANIUM ISOTOPES/GASEOUS DIFFUSION PROCESS. If isotopes are named, the pattern is URANIUM 235/SEPARATION NOZZLE METHOD. Papers dealing with the process itself or with components of the system are categorized here.

Example:

TITLE: Process for Producing a Porous Diffusion Membrane.
GASEOUS DIFFUSION PROCESS:T1
MEMBRANES:T2,Q1
FABRICATION:Q2
TEFLON:T3
EXTRUSION:Q3
COLD PRESSING
MEDIUM TEMPERATURE
POROSITY
VISCOSITY

Fuels Production and Properties

Production, fabrication, and properties of fuels are dealt with.

Examples:

TITLE: Method of Production of Granulates of Ceramic Nuclear Fuels.
URANIUM DIOXIDE:T1
PRODUCTION:Q1,Q2
NUCLEAR FUELS:T2
BINDERS
CERAMICS
GRAIN SIZE
CHLORINATED ALIPHATIC HYDROCARBONS
METHACRYLATES
PHTHALATES
SPRAY DRYING

TITLE: Techniques for Quality Inspection of Coated Fuel Particles.
COATED FUEL PARTICLES:T1
QUALITY CONTROL:Q1
DENSITY
INSPECTION
METALLOGRAPHY
PYROLYTIC CARBON
SILICON CARBIDES

Cross-categorization to the specific materials category is always added.

Waste Management

For documents treating radioactive waste processing, storage, or disposal, the subject descriptors used include RADIOACTIVE WASTES, LOW-LEVEL RADIOACTIVE WASTES, INTERMEDIATE-LEVEL RADIOACTIVE WASTES, HIGH-LEVEL RADIOACTIVE WASTES, RADIOACTIVE WASTE PROCESSING, RADIOACTIVE WASTE STORAGE, RADIOACTIVE WASTE DISPOSAL, descriptors for the elements recovered, etc. Descriptors describing the method of processing, the separation process used, the type of storage, etc., or the type of waste are used as qualifiers. Processing of wastes by solidification is indexed RADIOACTIVE WASTE PROCESSING/SOLIDIFICATION. Specific methods of solidification such as VITRIFICATION or CALCINATION are used as descriptors. Storage of radioactive waste is indexed using the descriptors RADIOACTIVE WASTE STORAGE with qualifiers such as SALT

DEPOSITS, UNDERGROUND STORAGE, MARINE DISPOSAL. The term RADIOACTIVE WASTE DISPOSAL indicates the final or ultimate emplacement of wastes with no provision made for retrieval of the wastes.

Reprocessing

In indexing information on reactor fuel reprocessing, the subject descriptor SPENT FUEL ELEMENTS is used if head-end reprocessing such as decladding, cutting, etc., is considered. The subject descriptor SPENT FUELS is used if the actual separation processes for the fuel materials, fission products, etc., are the topics. The qualifier REPROCESSING is used with both these subject terms if no more specific qualifier is appropriate. Descriptors for specific processes such as PUREX PROCESS are available as well as descriptors for some specific plants.

Example:

TITLE: In-line Monitors for Process Control of the Hanford Purex Plant.
FUEL REPROCESSING PLANTS:T1
ON-LINE MEASUREMENT SYSTEMS:Q1
PUREX PROCESS:T2
ON-LINE CONTROL SYSTEMS:Q2

Accountability and Safeguards

For indexing and retrieval of this type of information the descriptors available include: NUCLEAR MATERIALS MANAGEMENT, ACCOUNTING, SAFEGUARDS, INSPECTION, MATERIAL UNACCOUNTED FOR, NUCLEAR MATERIALS DIVERSION, PHYSICAL PROTECTION DEVICES, SAFEGUARD REGULATIONS, and NUCLEAR MATERIALS POSSESSION.

Example:

TITLE: Safeguards Implementation Practices for a Model Mixed Oxide Recycle Fuel Fabrication Facility.
MIXED OXIDE FUEL FABRICATION PLANTS:T1
IAEA SAFEGUARDS:T2,Q1
NONDESTRUCTIVE ANALYSIS:Q2
PLUTONIUM
INSPECTION
INVENTORIES
SAMPLING
PLUTONIUM RECYCLE

FUSION FUELS

This category includes all information on fusion fuels except plasma physics research and fuel behavior in a device or power plant which is categorized to FUSION ENERGY.

ISOTOPE AND RADIATION SOURCE TECHNOLOGY

This category includes information on the design, fabrication, testing, and uses of radiation and isotopic power sources, equipment and methods for heavy water production, and physical isotope separation (except uranium isotopes, which are categorized to NUCLEAR FUELS).

Physical Isotope Separation

Subject descriptors identify the specific isotopes being separated. Qualifier descriptors specify the processes involved. If the process is novel or of general applicability, it may be used as a subject descriptor.

Examples:

TITLE: Plasma Centrifuge for Isotopic Separation of Krypton.
KRYPTON ISOTOPES:T1
ISOTOPE SEPARATION:Q1

ULTRACENTRIFUGES:T2
OPERATION:Q2

TITLE: Production of Heavy Water by Photodesorption.
HEAVY WATER:T1
PRODUCTION:Q1
LASER ISOTOPE SEPARATION:T2
FEASIBILITY STUDIES:Q2
COST
DESORPTION
DEUTERIUM

Radiation Sources

A list of specific types of radiation sources may be found under the general descriptor RADIATION SOURCES in TID-7000. Subject descriptors are chosen from this list. Also, the specific isotope used as a source or the general descriptor itself may be more pertinent. Qualifier descriptors are chosen reflecting the design, testing, fabrication, performance, and uses of radiation sources.

Examples:

TITLE: Preparation of Microspherical Alpha Radiation Sources.
ALPHA SOURCES:T1
FABRICATION:Q1
MICROSPHERES
GLASS
PERFORMANCE

TITLE: Assessment of the Potentially Beneficial Uses of ^{85}Kr.
KRYPTON 85:T1
USES:Q1
TECHNOLOGY ASSESSMENT
RADIATION SOURCES

Isotopic Heat Sources

Pertinent subject descriptors include RADIOISOTOPE HEAT SOURCES and descriptors for the specific isotopes involved with qualifier descriptors chosen to reflect the design, fabrication, performance, testing, and uses of isotopic heat sources.

Examples:

TITLE: Analysis of Carbon Monoxide Production in Multihundred-Watt Heat Sources.
RADIOISOTOPE HEAT SOURCES:T
CARBON MONOXIDE:T1
PRODUCTION:Q1
STORAGE
ISOTOPE RATIO
TEMPERATURE DEPENDENCE
STOICHIOMETRY

TITLE: Savannah River Laboratory Monthly Report: ^{238}Pu Fuel Form Processes.
PLUTONIUM 238:T1
RADIOISOTOPE HEAT SOURCES:T2, Q1
PLUTONIUM DIOXIDE
SAVANNAH RIVER PLANT
RESEARCH PROGRAMS:Q2
FUELS

TITLE: Cold Regions Isotope Applications.
RADIOISOTOPE HEAT SOURCES:T1,Q2
ARCTIC REGIONS:T2

USES:Q1
HEATERS
STERILIZATION
TECHNOLOGY ASSESSMENT
THERMOELECTRIC GENERATORS

HYDROGEN

The main industrial processes (steam reformer processes, thermochemical processes, steam-iron processes, electrolysis) for producing hydrogen have been introduced as descriptors. The descriptor HYDROGEN PRODUCTION is used as the index point with the specific process as the qualifier.

Example:

TITLE: Hydrogen Production from Water Using Nuclear Heat.
HYDROGEN PRODUCTION:T1
THERMOCHEMICAL PROCESSES:Q1
PROCESS HEAT REACTORS
WATER
IRON CHLORIDES

For those processes for which there are no specific descriptors, the title is augmented to indicate the process used. If applicable, a general term such as PYROLYSIS is used as the qualifier.

The descriptor HYDROGEN STORAGE has been introduced for indexing material on the storage of hydrogen. Qualifiers designate the vessels used or, in the case of storage by chemisorption, the metal hydride (an exception to the general rule that compounds should not be used as Q's). Papers on hydrogen stored as a metal hydride should also be categorized to MATERIALS—Metals and Alloys, Corrosion.

Example:

TITLE: Application of Metal Hydrides to Ground Transport.
HYDROGEN STORAGE:T1,Q2
IRON HYDRIDES:Q1
TITANIUM HYDRIDES:Q1
AUTOMOBILES:T2
IRON ALLOYS:T3
TITANIUM ALLOYS:T4
SORPTIVE PROPERTIES:Q3,Q4
INTERMETALLIC COMPOUNDS
CHEMISORPTION

Material on the use of hydrogen as a fuel is indexed using the descriptor HYDROGEN FUELS.

Example:

TITLE: Liquid Hydrogen as an Automotive Fuel.
AUTOMOBILES:T1
HYDROGEN FUELS:Q1
HYDROGEN STORAGE:T2,Q1
DEWARS:Q2
INTERNAL COMBUSTION ENGINES
ECONOMICS
AUTOMOTIVE FUELS

If the performance of hydrogen as a fuel is studied, then an additional index point would be HYDROGEN FUELS/PERFORMANCE. Papers on the use of hydrogen as an automotive fuel are cross-categorized to 330800, ADVANCED AUTOMOTIVE PROPULSION SYSTEMS—Alternative Fuels.

Publications concerned with the transport of hydrogen are indexed using the descriptor pair HYDROGEN/TRANSPORT or more specific terms for qualifiers such as RAIL TRANSPORT, MARITIME TRANSPORT, etc.

One of the major problems in the handling and storage of hydrogen is the embrittlement of materials. The descriptor HYDROGEN EMBRITTLEMENT was added in 1980. Earlier papers were indexed using the descriptor pairs HYDROGEN/METALLURGICAL EFFECTS and (Material)/EMBRITTLEMENT.

OTHER SYNTHETIC AND NATURAL FUELS

Information on synthetic fuels is indexed using standard terms for the synthetic fuels and their feedstocks. Terms reflecting properties, processes, and reactions would be used as qualifiers. Typical examples are ETHANOL/PHASE STUDIES, METHANE/COMBUSTION, and HYDRAZINE/SYNTHESIS. Named or patented processes are introduced as descriptors as needed, e.g., PUROX PYROLYSIS PROCESS, BIOGAS PROCESS.

Hydrocarbon Fuels

Synthetic hydrocarbon fuels prepared from petroleum, coal, urban wastes, or biomass feedstocks are indexed using descriptors reflecting the fuel produced, the process used, named or patented processes, and other qualifying descriptors as needed. Examples of possible descriptor pairs are WOOD/GASIFICATION; SNG PLANTS/ENERGY BALANCE; MUNICIPAL WASTES/PYROLYSIS.

Example:

TITLE: Economics of Pyrolysis of Agricultural Wastes.
AGRICULTURAL WASTES:T1
FUEL GAS:T2
PYROLYSIS:Q1
SYNTHESIS:Q2
ECONOMICS
COMPARATIVE EVALUATIONS
HIGH TEMPERATURE
INVENTORIES

The production of methane by anaerobic digestion is indexed to reflect the biological origin.

Example:

TITLE: Economic Assessment of Fuel Gas from Water Hyacinths.
WATER HYACINTHS:T1
ANAEROBIC DIGESTION:Q1
BIOMASS PLANTATIONS:T2
FEASIBILITY STUDIES:Q2
METHANE:T3
BIOSYNTHESIS:Q3
ECONOMICS
SOLAR ENERGY CONVERSION

Interest in the biological conversion of biomass into hydrocarbon fuels has led to the necessity of indexing the methanogenic bacteria involved.

Example:

TITLE: Mechanism of the Dissimilation of Volatile Organic Acids by Methanogenic Enrichments.
METHANE:T1
BIOSYNTHESIS:Q1
METHANOGENIC BACTERIA:T2
BIOCHEMICAL REACTION KINETICS:Q2
ANAEROBIC DIGESTION:T3,Q4
REACTION INTERMEDIATES:Q3
CARBOXYLIC ACID ESTERS:T4
ACETIC ACID

HYDROGEN
BUTYRIC ACID
PROPIONIC ACID

The prime category is 550700, BIOMEDICAL SCIENCES, BASIC STUDIES—Microbiology, with a cross category of 090122, SYNTHETIC FUELS—Production from Wastes and Biomass.

Alcohol Fuels

The physical and chemical properties of the alcohols and their production are indexed, for the most part, in the usual manner (see CHEMISTRY). For example, a paper on the thermodynamic properties of methanol is indexed METHANOL/THERMODYNAMIC PROPERTIES, and the solubility of ethanol in water is indexed ETHANOL/SOLUBILITY. The production of ethanol by the fermentation of glucose obtained by hydrolysis of cellulose should be indexed ETHANOL/BIOSYNTHESIS; GLUCOSE/FERMENTATION; and CELLULOSE/HYDROLYSIS. The descriptor pair ETHANOL/PRODUCTION is reserved for the industrial production; ETHANOL/SYNTHESIS would be used, e.g., for a patent claiming a new energy-conservation technique. A paper dealing with the production of methanol by wood gasification is indexed METHANOL/PRODUCTION or METHANOL/SYNTHESIS, depending on whether or not the process is an industrial process. The descriptor pair WOOD/GASIFICATION is also used.

In order to deal with the complexities and ambiguities resulting when indexing papers on the use of methanol and ethanol as fuels either in automotive engines or in other ways, three terms—METHANOL FUELS, ETHANOL FUELS, and GASOHOL—have been introduced and the restriction placed on the term ALCOHOL FUELS removed.

METHANOL FUELS and ETHANOL FUELS are used as index terms when the pure alcohols or their blends with water are investigated as fuels.

Example:

TITLE: Performance and NO_x Emissions of Spark-Ignited Combustion Engines using Methanol-Fueled Engines.

METHANOL FUELS:T1
EXHAUST GASES:Q1
COMBUSTION PROPERTIES:Q1
NITROGEN OXIDES
SPARK IGNITION ENGINES

This paper is categorized to 330800, ALTERNATIVE FUELS, and 090210, ALCOHOL FUELS—Properties.

If a specific alcohol is not considered or if an alcohol other than methanol or ethanol is investigated, the index term ALCOHOL FUELS is used.

Example:

TITLE: Comparison of Projected Electric-Utility Peaking-Gas-Turbine Energy Requirements to Potential Alcohol Fuels Availability: 1980-2000.

ALCOHOL FUELS:T1,Q3
AVAILABILITY:Q1
PEAKING POWER PLANTS:T2
GAS TURBINES:T3,Q2
FORECASTING
COMPARATIVE EVALUATIONS
FEASIBILITY STUDIES

Categories are 090210, ALCOHOL FUELS—Properties, and 200108, ELECTRIC POWER ENGINEERING—Fuels.

The descriptor GASOHOL is used for alcohol–gasoline blends. The specific alcohol used in the blend must be identified.

Examples:

TITLE: Ethanol–Gasoline Blend as an Automotive Fuel.
GASOHOL:T1
ETHANOL
PERFORMANCE:Q1

TITLE: Comparative Studies of Exhaust Emissions from Automobiles Operating on Gasoline, Methanol, and a Gasoline–Methanol Blend.
GASOLINE:T1
EXHAUST GASES: Q1,Q2,Q3
METHANOL FUELS:T2
GASOHOL:T3
COMPARATIVE EVALUATIONS

Categories are 330800, ALTERNATIVE FUELS, and 090210, ALCOHOL FUELS—Properties.

A paper entitled "Alternative Fuel Sources: the Coal–Methanol Route," which discusses pathways and procedures for the production of methanol from coal and its potential as an automotive fuel in the institutional framework of South Africa, is indexed SOUTH AFRICA/METHANOL FUELS; METHANOL/PRODUCTION; COAL GASIFICATION, COAL LIQUEFACTION, and other descriptors. This paper would be categorized to 090221, ALCOHOL FUELS—Preparation, Chemical Synthesis; 010404, COAL AND COAL PRODUCTS—Processing, Gasification; 010405, COAL AND COAL PRODUCTS—Processing, Liquefaction; and 294001, ENERGY PLANNING AND POLICY—Fossil Fuels, Coal. Note that the paper is not categorized to 330800, ADVANCED AUTOMOTIVE PROPULSION SYSTEMS—Alternative Fuels, because its behavior as an automotive fuel is not discussed; it is assumed in the paper that this categorization is satisfactory.

Intensive worldwide studies on the production of ethanol from wood has led to the selection of articles dealing with the hydrolysis of cellulose and hemicellulose, delignification of wood, and hydrolysis of lignin. Papers dealing with these subjects might have such descriptor pairs as CELLULOSE/ENZYMATIC HYDROLYSIS; WOOD/DELIGNIFICATION; THERMOACTINOMYCES/SCREENING; PELLICULARIA/CELLULOLYTIC ACTIVITY. If the emphasis is on the fungi or bacteria, the prime category is 550700, BIOMEDICAL SCIENCES, BASIC STUDIES—Microbiology, with a cross category 090222, OTHER SYNTHETIC AND NATURAL FUELS—Alcohol Fuels, Preparation from Wastes or Biomass.

HYDROELECTRIC POWER

Information in this category includes all technical aspects of hydroelectric power generation, e.g., construction of dams, water reservoirs, power plants, and components, as well as studies of the availability of water resources, site selection, regulations and licensing, economics and management, and environmental aspects. Such descriptors as HYDROELECTRIC POWER PLANTS, TURBOGENERATORS, WATER RESERVOIRS, HYDROELECTRIC POWER, and PENSTOCKS are normally assigned as subject terms with such descriptors as DESIGN, PERFORMANCE, TESTING, CONSTRUCTION, EFFICIENCY, ENVIRONMENTAL EFFECTS, etc., used as qualifiers. Title augmentation may be provided when desired.

Examples:

TITLE: Complementary Use of Hydro and Thermal Power.
HYDROELECTRIC POWER PLANTS:T1
THERMAL POWER PLANTS:T2
USES
OPERATION:Q1,Q2
SIMULATION
POWER DEMAND

TITLE: Hydroelectric Generation of Power.
HYDROELECTRIC POWER PLANTS:T1
SPECIFICATIONS:Q1

WATER RESERVOIRS
TURBOGENERATORS

TITLE: Problems in Licensing Hydroelectric Projects.
HYDROELECTRIC POWER PLANTS:T1
LICENSING:Q1
CHARGES
COMPARATIVE EVALUATIONS

TITLE: Intake System Assessment for Central Columbia River.
HYDROELECTRIC POWER PLANTS:T1
ENVIRONMENTAL EFFECTS
INTAKE STRUCTURES:T2,Q1
PIPES
COLUMBIA RIVER
PERFORMANCE:Q2

SOLAR ENERGY

This category includes information on all aspects of solar energy that might contribute to the total energy budget. Direct thermal applications include space heating and air conditioning, water heating, drying and curing, and process heat. Solar electric conversion includes photovoltaic conversion, ocean thermal energy conversion, and other solar thermal–electric conversion methods. Biomass production and conversion, solar energy resources, economic aspects, environmental aspects, and heat storage systems are also included.

For direct thermal applications, descriptors are available such as SOLAR HEATING SYSTEMS, PASSIVE SOLAR HEATING SYSTEMS, SOLAR SPACE HEATING, TROMBE WALLS, SOLAR-ASSISTED HEAT PUMPS, SOLAR AIR CONDITIONERS, SOLAR COOLING SYSTEMS, SOLAR WATER HEATERS, SOLAR DRYERS, SOLAR DRYING, SOLAR COOKERS, SOLAR COOKING, and SOLAR STILLS. Examples of the use of these descriptors are:

TITLE: Solar Assisted Heat Pumps in a Commercial Building.
OFFICE BUILDINGS:T1
SOLAR SPACE HEATING:Q1
SOLAR-ASSISTED HEAT PUMPS:T2
DESIGN:Q2

Title: Testing of Solar Fruit Drying Installations.
SOLAR DRYERS:T1
PERFORMANCE TESTING:Q1
FRUITS:T2
SOLAR DRYING:Q2

TITLE: Solar Domestic Water Heaters for Apartment Buildings.
APARTMENT BUILDINGS:T1
SOLAR WATER HEATING:Q1
SOLAR WATER HEATERS:T2
DESIGN:Q2
PERFORMANCE:Q2
COST

Title: Solar Energy for Industrial Process Steam.
TEXTILE INDUSTRY:T1
SOLAR PROCESS HEAT:T,Q1
FEASIBILITY STUDIES
PARABOLIC TROUGH COLLECTORS

TEXTILES
DESIGN
STEAM GENERATORS
BLEACHING

For solar electric conversion, terms are available such as PHOTOVOLTAIC CONVERSION, SILICON SOLAR CELLS, PHOTOVOLTAIC POWER PLANTS, OCEAN THERMAL POWER PLANTS, and TOWER FOCUS POWER PLANTS. Examples of the use of these terms follow.

TITLE: Chemical Vapor Deposition Growth. Silicon Sheet Growth Development for Task 2: Large Area Silicon Sheet of the Low Cost Silicon Solar Array Project.
SILICON:T1
CHEMICAL VAPOR DEPOSITION:Q1
SILICON SOLAR CELLS:T2
FABRICATION:Q2
CRYSTAL GROWTH
SHEETS

TITLE: Performance of Low Cost Solar Reflectors for Transferring Sunlight to a Distant Collector.
TOWER FOCUS POWER PLANTS:T1
HELIOSTATS:T2,Q1
PERFORMANCE:Q2,Q3
SOLAR REFLECTORS:T3
COST

TITLE: Microwave Power Transmission System for Space Satellite Power.
ORBITAL SOLAR POWER PLANTS:T1
MICROWAVE POWER TRANSMISSION:T,Q1
POWER RANGE 1-10 GW
RECTENNAS
ANTENNAS
KLYSTRONS

TITLE: Design of Heat Pipe Central Solar Receiver Gas Turbine Cycle.
TOWER FOCUS POWER PLANTS:T1
DESIGN:Q2
CENTRAL RECEIVERS:T2,Q1
HEAT PIPES
BRAYTON CYCLE POWER SYSTEMS
GAS TURBINES
POWER RANGE 1-10 MW

TITLE: Optimal Geometric Parameters of Cavity Solar Collectors with Selective Radiation-Absorption Properties.
CAVITY RECEIVERS:T1
OPTIMIZATION:Q1
SPECTRALLY SELECTIVE SURFACES
CALCULATION METHODS
DESIGN
GEOMETRY

TITLE: 194-KW Solar Photovoltaic Flat Panel Power System for Beverly High School, Beverly, Massachusetts.
SCHOOL BUILDINGS:T1
PHOTOVOLTAIC POWER SUPPLIES:T2,Q1
DESIGN:Q2
ECONOMICS

PERFORMANCE:Q2
MASSACHUSETTS
POWER RANGE 100-1000 KW

Indexing patterns for properties, production, harvesting, bioconversion, thermochemical conversion and direct burning of biomass and biomass wastes follow standard indexing procedures. Typical examples are BIOMASS/FERMENTATION, SEAWEEDS/CULTIVATION, and METHANE/BIOSYNTHESIS. The most specific descriptor for the biomass or biomass waste, as well as the conversion process, should be used. For example, SEWAGE/ANAEROBIC DIGESTION, WOOD WASTES/ENZYMATIC HYDROLYSIS, AGRICULTURAL WASTES/HYDROGENATION, and HYDROGEN PRODUCTION/BIOSYNTHESIS.

Examples:

TITLE: Conversion of Biomass Materials into Gaseous Products.
MANURES:T1
PYROLYSIS:Q1
INTERMEDIATE BTU GAS:T2
PRODUCTION:Q2
BENCH-SCALE EXPERIMENTS
CHARS
COMBUSTION
FURNACES
DESIGN

TITLE: Silvicultural Biomass Farms: Land Suitability and Availability.
TREES:T1
CULTIVATION:Q1
BIOMASS PLANTATIONS:T2
LAND USE:Q2
YIELDS
AVAILABILITY
TABLES
USA
FORESTS
RECOMMENDATIONS

TITLE: Ocean Food and Energy Farm Project: Dispersion and Sinking Studies for Oceanic Upwelling.
SEAWEEDS:T1
CULTIVATION:Q1
SEAWATER:T2
UPWELLING:Q2
PUMPS
PERFORMANCE TESTING
PLUMES

TITLE: Gas Production from Microalgae.
ALGAE:T1
PRODUCTION:Q1
ANAEROBIC DIGESTION:Q1
METHANE:T2
BIOSYNTHESIS:Q2,Q3,Q4
AMMONIA:T3
HYDROGEN PRODUCTION:T4
COST
FEASIBILITY STUDIES
COMPARATIVE EVALUATIONS

The various types of solar collectors can be described with terms such as FLAT PLATE COLLECTORS, SOLAR PONDS, CONCENTRATING COLLECTORS, TOWER FOCUS COLLECTORS, etc. The term SOLAR AIR HEATERS should always be used when the heat transfer fluid for the collector is air. Associated terms such as SOLAR ABSORBERS, SPECTRALLY SELECTIVE SURFACES, COVERINGS, ANTIREFLECTION COATINGS, SOLAR TRACKING, HELIOSTATS, HONEYCOMB STRUCTURES, etc., are available.

Examples:

TITLE: Reflectance and Emittance of Spectrally Selective Titanium and Zirconium Nitrides.
TITANIUM NITRIDES:T1
ZIRCONIUM NITRIDES:T2
REFLECTIVITY:Q1,Q2
EMISSIVITY:Q1,Q2
SPECTRALLY SELECTIVE SURFACES:T3
MEASURING METHODS
PERFORMANCE
OPTICAL PROPERTIES:Q3
FABRICATION

TITLE: Heat Removal Factor for a Flat Plate Solar Collector with a Serpentine Tube.
FLAT PLATE COLLECTORS:T1
HEAT TRANSFER:Q1
TUBES
PERFORMANCE
EQUATIONS
CALCULATION METHODS

Descriptors available for use with information on heat storage include THERMAL ENERGY STORAGE EQUIPMENT, THERMOCHEMICAL HEAT STORAGE, SENSIBLE HEAT STORAGE, LATENT HEAT STORAGE, and ROCK BEDS. An example of indexing this type of information follows.

TITLE: Hydration–Dehydration Cycling of $MgO–Mg(OH)_2$ for Application to Solar Heat Storage Systems.
THERMOCHEMICAL HEAT STORAGE:T,Q1,Q2,Q4
MAGNESIUM OXIDES:T1
MAGNESIUM HYDROXIDES:T2
SOLAR HEATING SYSTEMS:T4
THERMOCHEMICAL PROCESSES
THERMAL ENERGY STORAGE EQUIPMENT:T3
HYDRATION
DEHYDRATION
FEASIBILITY STUDIES:Q3
DESIGN
OPERATION

Descriptors such as INSOLATION, SOLAR FLUX, and SOLAR RADIATION are used for indexing information on solar resources and availability.

Examples:

TITLE: Comparison of Predicted Solar Insolation with Measured Values at San Diego, California.
CALIFORNIA:T1
INSOLATION:Q1,T2
CALCULATION METHODS:Q2

TITLE: Pyranometer for the Measurement of Solar Radiation.
PYRANOMETERS:T1
DESIGN:Q1

SOLAR FLUX:T2
MEASURING INSTRUMENTS:Q2

Economic, legal, and environmental aspects are indexed using Q terms such as ECONOMICS, COST, LIFE-CYCLE COST, ENVIRONMENTAL EFFECTS, ENVIRONMENTAL IMPACTS, and LEGAL ASPECTS in coordination with the appropriate M term.

Descriptors such as SOLAR ENERGY, SOLAR ENERGY CONVERSION, PHOTOVOLTAIC CONVERSION, etc., are reserved as subject descriptors for information of a broad nature, e.g., where qualifiers such as REVIEWS, LECTURES, MEETINGS, or BIBLIOGRAPHIES are appropriate.

GEOTHERMAL ENERGY

General studies on the availability, exploration, development, or assessment of geothermal resources of a specified geographical area are indexed using subject descriptors for the country or area. Descriptors such as GEOTHERMAL ENERGY, GEOTHERMAL RESOURCES, or GEOTHERMAL EXPLORATION are used as qualifiers. Descriptors are provided for types of geothermal systems such as HOT-WATER SYSTEMS, VAPOR-DOMINATED SYSTEMS, MAGMA SYSTEMS, etc. Qualifiers may reflect the geological or geophysical characteristics of the system.

Examples:

TITLE: Geothermal Resources of Idaho.
IDAHO:T1
GEOTHERMAL RESOURCES:Q1
HOT-WATER SYSTEMS
HYDROLOGY
GEOLOGY

TITLE: Factors Affecting the Development of Known Geothermal Prospects.
GEOTHERMAL ENERGY:T1
TECHNOLOGY ASSESSMENT:Q1
SOCIO-ECONOMIC FACTORS
ENVIRONMENTAL EFFECTS
REGULATIONS

TITLE: Physical Modeling of Convection in Wet Geothermal Formations.
HYDROTHERMAL SYSTEMS:T1
CONVECTION:Q1
GROUND WATER
MASS TRANSFER
SIMULATION

TITLE: Heat and Mass Transfer Studies of the East Mesa Anomaly.
EAST MESA GEOTHERMAL FIELD:T1
CALIFORNIA
HEAT TRANSFER:Q1
MASS TRANSFER:Q1
MATHEMATICAL MODELS
CONVECTION
TWO-DIMENSIONAL CALCULATIONS

Descriptors are provided for major developed or undeveloped geothermal fields such as OTAKE GEOTHERMAL FIELD, GEYSERS GEOTHERMAL FIELD, etc. These are used as subject descriptors with meaningful qualifiers. Descriptors are also provided for exploration methods such as GEOPHYSICAL SURVEYS, GEOCHEMICAL SURVEYS, etc.

Examples:

TITLE: D.C. Resistivity Surveys of the Broadlands Geothermal Field.
NEW ZEALAND
BROADLANDS GEOTHERMAL FIELD:T1
HOT-WATER SYSTEMS
RESISTIVITY SURVEYS:Q1

TITLE: Chemical Composition of Principal Hot Springs in Nevada.
NEVADA:T1
HOT SPRINGS:T2,Q1
THERMAL WATERS:T3
CHEMICAL COMPOSITION:Q3
GEOCHEMISTRY:Q2

TITLE: Geophysical Methods in Geothermal Exploration.
GEOTHERMAL EXPLORATION:T1
GEOPHYSICAL SURVEYS:T2,Q1
MEASURING METHODS:Q2

TITLE: Faulting in Geothermal Areas.
GEOTHERMAL FIELDS:T1
GEOLOGICAL FAULTS:Q1

Information on the design, performance, operation, and components of geothermal power plants is indexed using the subject descriptor GEOTHERMAL POWER PLANTS with appropriate descriptors as qualifiers. Descriptors are also assigned for the geothermal field and geographical area. The descriptors for energy conversion systems (BINARY-FLUID SYSTEMS, FLASHED STEAM SYSTEMS, etc.) are flagged as subject headings and also as qualifiers under GEOTHERMAL ENERGY CONVERSION.

Examples:

TITLE: Direct-Contact Heat Exchangers in Geothermal Power Plants.
GEOTHERMAL POWER PLANTS:T1
DESIGN:Q2
DIRECT CONTACT HEAT EXCHANGERS:T2,Q1

TITLE: Thermodynamics of Binary Cycles for Geothermal Power Generation.
GEOTHERMAL ENERGY CONVERSION:T1
BINARY-FLUID SYSTEMS:T2,Q1
THERMODYNAMICS:Q2
2-METHYL PROPANE

TITLE: Operational Experience at the Geysers.
CALIFORNIA
GEYSERS GEOTHERMAL FIELD:T1
GEOTHERMAL POWER PLANTS:T2,Q1
OPERATION:Q2

Information on reservoir stimulation and extraction technology should be indexed to the type of geothermal systems. Some examples of subject heading/qualifier pairs are:

HOT-DRY-ROCK SYSTEMS/HYDRAULIC FRACTURING
GEOTHERMAL SYSTEMS/EXPLOSIVE STIMULATION
HOT-DRY-ROCK SYSTEMS/HEAT EXTRACTION

Descriptors are provided for indexing information on geothermal wells and drilling technology, e.g., WELL DRILLING, WELL CASINGS, ROTARY DRILLS, GEOTHERMAL WELLS, etc. The indexing for these and other engineering aspects of geothermal energy development should follow the indexing guideline of the *ENGINEERING* categories.

Examples:

TITLE: Completion Techniques for Geothermal–Geopressured Systems.
GEOPRESSURED SYSTEMS:T1
GEOTHERMAL WELLS:T2,Q1
WELL COMPLETION:Q2
PRESSURE DEPENDENCE
FLOW RATE
WELL CASINGS
CONTROL

TITLE: Silica Precipitation and Scaling in Dynamic Geothermal Systems.
GEOTHERMAL FLUIDS:T1
SCALE CONTROL:Q1
BRINES
SILICA:T2
PRECIPITATION:Q2
SCALING:Q3
HEAT EXCHANGERS:T3
TEST FACILITIES

TITLE: Nonlinear Effects in Two-Phase Flow to Wells in Geothermal Reservoirs.
GEOTHERMAL WELLS:T1
TWO-PHASE FLOW:Q1
PERMEABILITY
POROSITY
NONLINEAR PROBLEMS

Other studies basic to geothermal energy development include thermodynamic and physical properties of geothermal solutions and minerals; rock-fluid interactions; geothermometry, etc. Some indexing examples for these studies are given below.

TITLE: Thermodynamic Properties of Minerals of the Epidote Group.
EPIDOTES:T1
THERMODYNAMIC PROPERTIES:Q1
SPECIFIC HEAT
ENTROPY
ENTHALPY
FORMATION FREE ENERGY
TEMPERATURE DEPENDENCE

TITLE: Partial Molal Volumes of Aqueous Chloride Solutions at High Temperatures and Pressures.
Augmentation: (200°C to 700°C, 500 to 1500 kg/cm^2)
SODIUM CHLORIDES:M1
AQUEOUS SOLUTIONS
PARTIAL MOLAL VOLUME:Q1
HIGH TEMPERATURE
HIGH PRESSURE

TITLE: Hydrothermal Synthesis of Montmorillonite Group Minerals from Kaolinite and Quartz.
MONTMORILLONITE:T1
KAOLINITE:T2
QUARTZ:T3
HYDROTHERMAL ALTERATION:Q2,Q3
HYDROTHERMAL SYNTHESIS:Q1

TIDAL POWER

Indexing of tidal power information should follow the general rules established for subject indexing. Descriptors used as "T" terms will usually be the names of power plants, energy conversion devices, or pieces of equipment. Some examples are TIDAL POWER PLANTS, RANCE POWER PLANT, WAVE ENERGY CONVERTERS, and TURBOGENERATORS. "Q" terms are usually such descriptors as DESIGN, CONSTRUCTION, PERFORMANCE, etc.

WIND ENERGY

Most wind energy items indexed refer to the actual wind turbines. The thesaurus term WIND TURBINES has narrower terms such as VERTICAL AXIS TURBINES, DARRIEUS ROTORS, and SAVONIUS ROTORS to provide more specific search areas. The term WIND POWER PLANTS is used to indicate a wind electric-generating system which will be connected to a utility grid and not for isolated or independent electrical systems. When the turbine power output is known, it is indicated in the descriptors, e.g., POWER RANGE 100-1000 KW. The T and Q indexing combination of WIND and MONITORING is used when meteorological data for a specific site or sites are expressed in ft/sec or km/hr at a specified time or averaged over a period of time. The T and Q indexing combination of WIND POWER and AVAILABILITY is used when data for a specific site or sites are expressed as power density in watts/square meter.

ELECTRIC POWER ENGINEERING

This category includes information on the nonroutine aspects of electric power generation and transmission, e.g., nonnuclear power plants, EHV and UHV ac transmission systems, dc transmission systems, superconducting and cryogenic generating and transmission systems, utilization of solid wastes as fuel for thermal power plants, new cooling system technology, and environmental aspects of power generation.

Subject descriptors include such terms as FOSSIL-FUEL POWER PLANTS, EHV AC SYSTEMS, GAS TURBINES, SUPERCONDUCTING CABLES, MECHANICAL DRAFT COOLING TOWERS, MUNICIPAL WASTES, etc. Descriptors such as EFFICIENCY, DESIGN, PERFORMANCE, TESTING, ENVIRONMENTAL IMPACTS, etc., are used as qualifiers.

Power Plants and Power Generation

Examples:

TITLE: Design Optimization of Fossil-Fueled Power Plants.
FOSSIL-FUEL POWER PLANTS:T1
DESIGN:Q1
OPTIMIZATION
ECONOMICS
PERFORMANCE

TITLE: Problem of Accuracy in the Automatic Calculation of Performance Characteristics of a Generating Unit.
FOSSIL-FUEL POWER PLANTS:T1
ECONOMICS
PERFORMANCE:Q1
COMPUTER CALCULATIONS
DESIGN
ACCURACY

TITLE: Operating and Maintenance Problems in Multifuel Firing.
FOSSIL-FUEL POWER PLANTS:T1
MAINTENANCE:Q1
OPERATION:Q1
FUEL OILS
COAL
NATURAL GAS
COST

Examples of indexing information on nuclear power plants may be found under the category REACTOR TECHNOLOGY.

Cooling and Heat Transfer Equipment and Systems

Information on cooling towers, cooling water intake structures, cooling ponds, water coolers, closed-cycle cooling systems, etc., is included here.

Examples:

TITLE: Effects of External Fouling on Dry Cooling Tower Performance.
COOLING TOWERS:T1
FOULING
PERFORMANCE:Q1
THERMAL POWER PLANTS
THERMAL POLLUTION
HEAT TRANSFER
PRESSURE DROP

TITLE: New Design Concepts in Cooling Water Intake Systems.
THERMAL POWER PLANTS:T1
INTAKE STRUCTURES:T2,Q1
DESIGN:Q2
OPERATION
ENVIRONMENTAL IMPACTS
COOLING SYSTEMS

Power Cycles

Examples:

TITLE: Flux Compression Topping Stage for Fossil-Fuel Power Plants.
FOSSIL-FUEL POWER PLANTS:T1
TOPPING CYCLES:T2,Q1
PERFORMANCE:Q2
THERMAL EFFICIENCY
HEAT RECOVERY

TITLE: Smooth and Highly Responsive Gas Turbine Temperature Control in Combined Cycle Electric Power Plant.
COMBINED-CYCLE POWER PLANTS:T1
GAS TURBINES:T2,Q1
TEMPERATURE CONTROL:Q2
COMBUSTORS
DESIGN

Waste-Fueled Systems

Information on power plants designed to use solid wastes as fuel is categorized here.

Example:

TITLE: Handling of Solid Municipal Wastes for Thermal Power Plants.
THERMAL POWER PLANTS:T1
BOILER FUEL:Q1
MATERIALS HANDLING:Q2
PERFORMANCE
MUNICIPAL WASTES:T2

Components

Power plant components are ordinarily indexed to the specific component.

Examples:

TITLE: Steam Turbines for Electric Utility Plants.
FOSSIL-FUEL POWER PLANTS
PERFORMANCE:Q1
STEAM TURBINES:T1
PUBLIC UTILITIES

TITLE: Multiple Boiler Steam Generating System.
BOILERS:T1
HEAT TRANSFER
STEAM TURBINES
PERFORMANCE:Q1
PRESSURE DEPENDENCE

TITLE: Possible Efficiency Improvements in Steam and Gas Turbines.
STEAM TURBINES:T1
GAS TURBINES:T2
EFFICIENCY:Q1,Q2
FOSSIL-FUEL POWER PLANTS

Power plant cooling systems are categorized to 200101, ELECTRIC POWER ENGINEERING—Cooling and Heat Transfer Equipment and Systems.

Waste Heat Utilization

Examples:

TITLE: Analysis of Potential Implementation Levels for Waste Heat Utilization in the Electric Power Industry.
THERMAL POWER PLANTS:T1
WASTE HEAT UTILIZATION:T2,Q1
IMPLEMENTATION:Q2
LAND USE
URBAN AREAS
ENERGY CONSERVATION
PRODUCTION
FEASIBILITY STUDIES

TITLE: Waste Heat Recovery: The Steam Turbine in Combined Cycle Operation.
WASTE HEAT
COMBINED-CYCLE POWER PLANTS:T1
STEAM TURBINES:T2,Q1
WASTE HEAT BOILERS:T3,Q1

GAS TURBINES
FEASIBILITY STUDIES
FUEL CONSUMPTION
HEAT RECOVERY EQUIPMENT
WASTE HEAT UTILIZATION:Q3
THERMAL EFFICIENCY:Q2

Economics

Information on the economics of thermal power plants is indexed by pairing the subject descriptor, e.g., FOSSIL-FUEL POWER PLANTS, with an appropriate qualifier descriptor, e.g., COST, CHARGES, COST BENEFIT ANALYSIS, COMPARATIVE EVALUATIONS, ECONOMICS, SOCIO-ECONOMIC FACTORS, etc.

Examples:

TITLE: Economic Comparison of Thermal Power Plants with Pumped Storage Generating Stations.
THERMAL POWER PLANTS:T1
PUMPED STORAGE POWER PLANTS:T2
COMPARATIVE EVALUATIONS
ECONOMICS:Q1,Q2
SOCIO-ECONOMIC FACTORS

TITLE: CONCEPT: A Computer Code for the Conceptual Cost Estimate of Steam Electric Power Plants.
FOSSIL-FUEL POWER PLANTS:T1
COMPUTER CODES:T2
C CODES:Q2
COST:Q1
FORECASTING
PERFORMANCE

Off-Peak Energy Storage

Information on the effectiveness of equipment and methods for off-peak energy storage for load management in electric utilities is categorized here.

Examples:

TITLE: Technical and Economic Feasibility Studies of Methods for Off-Peak Energy Storage for Thermal Power Plants.
THERMAL POWER PLANTS:T1
OFF-PEAK ENERGY STORAGE:T2,Q1
FEASIBILITY STUDIES:Q2
ECONOMICS

TITLE: Factors to Be Considered in the Implementation of a Central Storage Facility for Power Plants.
FOSSIL-FUEL POWER PLANTS:T1
PLANNING:Q2
OFF-PEAK ENERGY STORAGE:T2,Q1
ECONOMICS
SITE SELECTION
ENVIRONMENTAL IMPACTS

Fuels

Information relating to fuel preparation or plant conversion from one fuel to another is included here.

Examples:

TITLE: Evaluation of Plant Biomass as a Fuel for Electric Power Generation.
THERMAL POWER PLANTS:T1
BIOMASS:T2
POWER GENERATION
ECONOMICS
FEASIBILITY STUDIES
USES:Q2
LOW BTU GAS:T3
BOILER FUEL:Q1
PRODUCTION:Q3

TITLE: Principal Aspects of Converting Steam Generators Back to Coal Firing.
FOSSIL-FUEL POWER PLANTS:T1
STEAM GENERATORS:T2,Q1
RETROFITTING:Q2
COAL
COST
FUEL OILS

Environmental Aspects

This category includes information on the effects of thermal power plants on the environment as well as information dealing with equipment and methods for removing noxious gases and particulates from flue gases.

Examples:

TITLE: Design of Equipment for Desulfurizing Flue Gases from Coal-Fired Power Plants.
FOSSIL-FUEL POWER PLANTS:T1
POLLUTION CONTROL EQUIPMENT:T2,Q1
DESIGN:Q2
FLUE GAS:T3
DESULFURIZATION:Q3

TITLE: Ultimate Disposal of Flyash and Other Solids from Electric Power Generation.
FOSSIL-FUEL POWER PLANTS:T1
SOLID WASTES:T2,Q1
FLY ASH:T3,Q1
WASTE DISPOSAL:Q2,Q3
COAL
POLLUTION CONTROL EQUIPMENT

TITLE: Temperature Distribution in the Vicinity of Heated Discharges from Power Plants.
THERMAL POWER PLANTS:T1
THERMAL EFFLUENTS:Q1
TEMPERATURE DISTRIBUTION:Q2
MISSISSIPPI RIVER:T2
OPERATION

Power Transmission and Distribution

Information on EHV and UHV ac transmission systems, dc transmission systems, and superconducting and cryogenic transmission systems, as well as environmental effects of power transmission, is included here.

Examples:

TITLE: Design of Double Helix Conductors for Superconducting AC Power Transmission.
HVAC SYSTEMS:T1
SUPERCONDUCTING CABLES:T2,Q1
DESIGN:Q2
NIOBIUM ALLOYS
TIN ALLOYS
ELECTRIC CURRENTS

TITLE: 550 kV and 765 kV High Pressure Oil-Filled Pipe Cable System.
EHV AC SYSTEMS:T1
OIL-FILLED CABLES:T2,Q1
PERFORMANCE TESTING:Q2
TEMPERATURE DEPENDENCE
DIELECTRIC PROPERTIES

TITLE: Environmental Considerations of Bulk AC and DC Electrical Energy Transmission Systems.
AC SYSTEMS:T1
DC SYSTEMS:T2
UNDERGROUND POWER TRANSMISSION
ENVIRONMENTAL IMPACTS:Q1,Q2
ELECTRIC CABLES
DESIGN

REACTOR TECHNOLOGY

Reactor descriptors may be divided into three types:

1. Descriptors for specific reactors, e.g., IRT REACTOR, SAXTON REACTOR
2. Descriptors for reactors with common physics or engineering characteristics, e.g., FAST REACTORS, ORGANIC COOLED REACTORS, PWR TYPE REACTORS
3. Descriptors for reactors having a common purpose, e.g., POWER REACTORS, SPACE PROPULSION REACTORS

When indexing information on specific reactors, type (1) subject descriptors are used. If a descriptor naming a specific reactor does not appear in the thesaurus, a request should be submitted to the thesaurus specialist. The request should bear the name of the reactor and enough information about the reactor to allow complete cross referencing, e.g., type of coolant and moderator, reactor purpose. *In general, additional reactor descriptors are not required when indexing information on specific reactors.*

Example:

TITLE: Fuel Densification Effects on LOCA Heat Transfer in Turkey Point Station, Unit 3.
TURKEY POINT-3 REACTOR:T1
FUEL DENSIFICATION:Q1
LOSS OF COOLANT:Q1
HEAT TRANSFER

When indexing information on classes or types of reactors, subject descriptors of types (2) or (3) are used. While all type (2) or (3) descriptors applicable to a given document must be included in the total descriptor input, all are not necessarily subject descriptors. For example, a heavy-water-moderated organic-cooled power reactor requires the descriptors HEAVY WATER MODERATED REACTORS, ORGANIC COOLED REACTORS, and POWER REACTORS, but one of these might be sufficient as a subject descriptor. Additional examples are: BWR TYPE REACTORS will often be a sufficient subject descriptor for boiling light water-cooled and moderated reactors as will HTGR TYPE REACTORS for high temperature gas-cooled graphite-moderated reactors.

The qualifier for a reactor subject descriptor should usually be either a component, e.g., CONTROL ELEMENTS, STEAM GENERATORS, or a characteristic of operation, e.g., ECONOMICS, FUEL CYCLE,

REACTIVITY, REACTOR START-UP, SCRAM. If type (2) or (3) subject descriptors are paired with a qualifier naming a component, the qualifying descriptor should also be used as a subject descriptor.

Example:

TITLE: Effects of Turbulent Gas Flow on Heat Transfer from HTR Fuel Elements.
HTGR TYPE REACTORS:T1
FUEL ELEMENTS:T2,Q1
HEAT TRANSFER:Q2
GAS FLOW
TURBULENT FLOW

Subject descriptors naming materials in reactor components are included when information is present that is peculiar to the material.

Example:

TITLE: pH Effects on Corrosion of Stainless Steel in PWR Primary Circuits.
PWR TYPE REACTORS:T1
PRIMARY COOLANT CIRCUITS:T2,Q1
CORROSION:Q2,Q3
STAINLESS STEELS:T3
WATER CHEMISTRY
PH VALUE

TITLE: Measurement of the Fission Ratios of ^{235}U and ^{238}Pu in the Central Zone of a Fast Reactor.
FAST REACTORS:T1
REACTOR KINETICS:Q1
PLUTONIUM 238:T2
URANIUM 235:T3
FISSION RATIO:Q2,Q3

Title augmentation is especially important when indexing materials in reactor components. For example, (PuO_2–UO_2) should be used as augmentation for mixed-oxide fuels if the title is not specific. Other alloy or compound designations should be used as augmentation when appropriate. Refer to the CHEMISTRY and MATERIALS sections of this Guide for proper procedures for indexing materials or compounds.

ENERGY STORAGE

Information on equipment and methods used to store energy is indexed using such subject descriptors as THERMAL ENERGY STORAGE EQUIPMENT, COMPRESSED AIR ENERGY STORAGE, FLYWHEELS, BATTERIES, and PUMPED STORAGE POWER PLANTS. Qualifier descriptors are chosen to denote some attribute, characteristic, or component of the subject descriptor, e.g., DESIGN, PERFORMANCE, OPERATION, HYDRAULIC TURBINES, PLANNING, etc.

Examples:

TITLE: Method of Storing and Releasing Thermal Energy.
THERMAL ENERGY STORAGE EQUIPMENT:T1
HEAT RECOVERY
DESIGN:Q1
HYDROXIDES

TITLE: Cellulose Separator for Nickel–Zinc Alkaline Storage Battery.
Augmentation: (6-cell, 80-Ah battery)
NICKEL-ZINC BATTERIES:M1
ELECTRODES
BATTERY SEPARATORS:Q1

DESIGN
POTASSIUM HYDROXIDES

TITLE: Fiber Composite Flywheel Program.
FLYWHEEL ENERGY STORAGE:T1
COMPOSITE MATERIALS
RESEARCH PROGRAMS:Q1
DESIGN
TESTING
STRESSES

TITLE: Pumped Storage Site Selection: Engineering and Environmental Considerations.
PUMPED STORAGE POWER PLANTS:T1
ENGINEERING
ENVIRONMENTAL IMPACTS:Q1
SITE SELECTION:Q1
OPTIMIZATION
ECONOMICS

BATTERIES

Interest is concentrated on secondary batteries of sufficient energy to be useful for vehicle propulsion or load-leveling or that show promise for future development to meet such needs. Indexing patterns are straightforward. The most specific descriptor available for the battery considered is used as a subject descriptor; the qualifier is the aspect considered, e.g., design, performance, some component or auxiliary. The battery type is also used as a qualifier for the application, if one is addressed. These principles are illustrated below:

LEAD-ACID BATTERIES/CATHODES
AUTOMOBILES/LEAD-ACID BATTERIES
SODIUM-SULFUR BATTERIES/DESIGN
ELECTRIC-POWERED VEHICLES/SODIUM-SULFUR BATTERIES

If the battery is used as the power source for a car, the descriptor ELECTRIC-POWERED VEHICLES is used as the subject descriptor, not AUTOMOBILES; AUTOMOBILES is used as the subject descriptor if the car has an internal combustion engine. ELECTRIC-POWERED VEHICLES (or HYBRID ELECTRIC-POWERED VEHICLES) and OFF-PEAK ENERGY STORAGE are the most common applications.

Papers describing work of general application may implicitly require several index points; for instance, "Development of Improved Cadmium Battery Anode" without a qualification as to the specific battery involved requires the following three subject-qualifier pairs:

NICKEL-CADMIUM BATTERIES/ANODES
SILVER-CADMIUM BATTERIES/ANODES
METAL-METAL OXIDE BATTERIES/ANODES

The descriptor CADMIUM is also assigned. This procedure is necessary to enable retrieval of this paper by someone interested in batteries with Cd anodes and cathodes of some element other than Ag or Ni.

If no specific battery type can be determined (or if the paper is extremely general), the subject descriptor ELECTRIC BATTERIES is used; the qualifier is the aspect studied, e.g., ELECTRIC BATTERIES/PERFORMANCE TESTING. However, if that aspect is peculiar to batteries, it may be used as the subject descriptor, e.g., BATTERY SEPARATORS/FABRICATION. If the separator is for a specific battery, the indexing is LITHIUM-SULFUR BATTERIES/BATTERY SEPARATORS, and BATTERY SEPARATORS is *not* used as a subject descriptor.

Patents require the use of the word "Patent" in the augmentation. Generally, papers on electric-powered vehicles should be cross-categorized to 330300, ADVANCED AUTOMOTIVE PROPULSION SYSTEMS–Electric-Powered Systems.

ENERGY PLANNING AND POLICY

This category embraces all phases of energy information but is intended to reference primarily the nontechnical or quasi-technical literature relating directly or indirectly to energy policy or planning or that is useful for policy analysis or energy analysis. Programmatic, institutional, and socioeconomic aspects of energy development or conservation programs are emphasized. Many reports (especially DOE-sponsored reports) or journal articles include this type of information along with technical information. In this event the prime category assigned to the item will reflect the technical aspect, with a secondary category (subcategory) selected from ENERGY PLANNING AND POLICY.

In many instances items selected for the ENERGY PLANNING AND POLICY category will require the assignment of two or more subcategories. Care should be exercised in selecting the first subcategory assigned to an item since it will determine the location of the item in TIC's monthly abstract journal, *Energy Abstracts for Policy Analysis (EAPA).* Only those items assigned at least one subcategory from ENERGY PLANNING AND POLICY will be selected for *EAPA*.

The scope notes appearing in DOE/TIC-4584, *Energy Information Data Base: Energy Categories* will be helpful in selecting items for ENERGY PLANNING AND POLICY, assigning appropriate subcategories, and explaining overlap with other EDB categories and subcategories. Some examples of proper category assignment are given below.

A paper entitled "Environmental Impacts of Increased Coal Use" should be assigned a prime category 294001, FOSSIL FUELS—COAL, then 290300, ENVIRONMENT, HEALTH, AND SAFETY.

A paper entitled "Evaluation of the Natural Gas Policy Act of 1978" should be categorized first to 294003, FOSSIL FUELS—NATURAL GAS, then to 293000, POLICY, LEGISLATION, and REGULATION.

The paper "ELECTRIC1 • Model for Forecasting Electric Power Demand" should be categorized first to 296000, ELECTRIC POWER, then to 290100, ENERGY ANALYSIS AND MODELING, and then to 292000, SUPPLY, DEMAND, AND FORECASTING.

The paper "Economic Analysis of a District-Heating System for Minneapolis" should be categorized first to 290800, WASTE HEAT UTILIZATION, then to 290200, ECONOMICS AND SOCIOLOGY.

The paper "Impacts of Solar Heating Options upon Electric Power Systems" should be categorized first to 299001, UNCONVENTIONAL SOURCES AND POWER GENERATION—SOLAR, then to 296000, ELECTRIC POWER.

Subject indexing in the category ENERGY PLANNING AND POLICY should, in general, differ little from the indexing principles elucidated elsewhere in this Guide for other categories and in the section SUBJECT INDEXING—DESCRIPTOR INDEXING; however, a few exceptions should be noted, namely:

1. ENERGY POLICY: Since most of the papers on energy policy concern U.S.A. policy, do *not* use the descriptor pair USA/ENERGY POLICY, just ENERGY POLICY as a main descriptor. When indexing the energy policy of another country, *do* use a descriptor pair of the form, e.g., CANADA/ENERGY POLICY.
2. ENERGY MANAGEMENT: This descriptor connotes auditing, monitoring, or controlling energy flow usually in association with energy conservation. Do *not* use this descriptor to index such concepts as management of the nation's energy supplies, managing the synthetic fuels industry, etc.
3. ELECTRICITY: *Never* use this descriptor to index information in this category. Such terms as ELECTRIC POWER, POWER DEMAND, POWER GENERATION, etc., are always preferable.
4. ELECTRIC POWER INDUSTRY: This descriptor is used rarely and then only for a paper that includes the electrical equipment manufacturer in association with the rest of the industry. For a paper on, e.g., the electric utility industry, the descriptor ELECTRIC UTILITIES should be used.
5. GOVERNMENT POLICIES: Rarely, if ever, should this term be used as a main descriptor. Use it only as a qualifier, e.g., in the descriptor pair NATURAL GAS INDUSTRY/GOVERNMENT POLICIES.

As coverage in the socioeconomic or "soft-science" areas of energy development has increased, hundreds of terms have been added to the *EDB Subject Thesaurus* to reflect the broadened scope. The indexer is urged to be alert constantly to the need for adding descriptors, changing or reinforcing the thesaurus structure, etc., so that new concepts in the field, or concepts not previously encountered, may be adequately indexed.

ENERGY CONVERSION

MHD and EHD Generators

There are basically three MHD cycles for large-scale power generation, i.e., open-cycle, closed-cycle, and liquid-metal. Therefore, one of those cycles will ordinarily be indexed, except when indexing specific MHD facilities for which descriptors are provided, e.g., MHD GENERATOR U-25, MHD GENERATOR ETF.

Appropriate qualifying descriptors should be assigned to reflect the emphasis of the paper or report, e.g., specific components, characteristics, or such qualifiers as DESIGN, PERFORMANCE, EFFICIENCY, etc. Also, specific components should be indexed. In those cases where the type of cycle is not specified, the subject descriptor MHD GENERATORS or COAL-FIRED MHD GENERATORS should be used. Papers on open-cycle coal-fired MHD generators should be indexed using both COAL-FIRED MHD GENERATORS and OPEN-CYCLE MHD GENERATORS.

The descriptor MHD CHANNELS is available for indexing papers dealing exclusively with design, fabrication, performance, etc., of MHD channels or ducts.

Papers on complete MHD power plants, i.e., the MHD generator and all associated equipment necessary for the conversion and transmission of electric power, should be indexed using the descriptor for the facility when provided in the thesaurus or the descriptor MHD POWER PLANTS. Descriptors for various power outputs, e.g., POWER RANGE 10–100 W, should be assigned (when known) in the descriptor string.

MHD theory applicable to MHD generators is indexed using appropriate descriptors, e.g., MAGNETOHYDRODYNAMICS/COUETTE FLOW.

The following are examples of indexing for MHD and EHD generators and power plants:

TITLE: Optimization of a 10-MW Open-Cycle MHD Power Plant.
OPEN-CYCLE MHD GENERATORS:T1
MHD POWER PLANTS:T2
OPTIMIZATION:Q1,Q2
POWER RANGE 10–100 MW
MATHEMATICAL MODELS

TITLE: Feasibility Studies of Coal-Burning MHD Generators.
COAL-FIRED MHD GENERATORS:T1
COST
FEASIBILITY STUDIES:Q1
POWER RANGE 1–10 MW

TITLE: Effects of Geometry and Loss Mechanisms on the Performance of Liquid-Metal MHD Generators.
LIQUID-METAL MHD GENERATORS:T1
PERFORMANCE:Q1
GEOMETRY
LOSSES

TITLE: Boundary Layer Cooling Effect on Semi-Hot Wall Type MHD Channels.
MHD CHANNELS:T1
COOLING:Q1
BOUNDARY LAYERS
HEAT TRANSFER
NUMERICAL SOLUTION

TITLE: Design of a Combustion Chamber for a Coal-Fired MHD Generator.
COAL-FIRED MHD GENERATORS:T1
COMBUSTION CHAMBERS:T2,Q1
DESIGN:Q2
POWER RANGE 100-1000W

TITLE: Electrogasdynamic Generation Using Solid-Gas Suspension in Turbulent Pipe Flow.
EHD GENERATORS:T1
CHARGE TRANSPORT
SUSPENSIONS
TURBULENT FLOW:Q1
REYNOLDS NUMBER

TITLE: Experimental Investigation of Pulsating Modes of Combustion in the Combustion Chambers of the U-25 Plant.
COMBUSTION CHAMBERS:T1,Q2
MHD GENERATOR U-25:T2
COMBUSTION INSTABILITY:Q1
COMBUSTION WAVES
MEASURING METHODS
NOZZLES
OSCILLATIONS
PERFORMANCE TESTING
STABILIZATION

TITLE: Application of Acoustic Cleaning of Convective Heating Surfaces of the Steam Generators in the U-25 Plant.
MHD GENERATORS U-25:T1
STEAM GENERATORS:T2,Q1
SURFACE CLEANING:Q2
SHOCK WAVES
SOUND WAVES

For each of the above examples, other useful descriptors based on the abstract and text should be included.

Fuel Cells

The proper fuel cell descriptor is assigned according to the fuel used, such as HYDROGEN FUEL CELLS, HYDRAZINE FUEL CELLS, etc. Also, a descriptor is assigned for the oxidizer, i.e., OXYGEN, AIR, HYDROGEN PEROXIDE, etc.

The descriptors HIGH-TEMPERATURE FUEL CELLS, REGENERATIVE FUEL CELLS, and ACID ELECTROLYTE FUEL CELLS are assigned when applicable. These fuel cell descriptors are flagged as subject headings in addition to the fuel cell headings that designate the fuel used. Qualifiers for fuel cell headings are assigned to reflect the emphasis of the paper and may include specific components, characteristics, or such terms as DESIGN, PERFORMANCE TESTING, etc. Also, the specific components should be indexed. Fuel cells for specific applications are indexed using subject descriptors for the application and fuel cell descriptors as qualifiers. When the power rating is given and it is not in the title, it is included in the augmentation.

Examples:

TITLE: Regenerative Hydrogen-Oxygen Fuel Cells.
(2 kW rating)
Augmentation: (2 kW)
REGENERATIVE FUEL CELLS:M1
HYDROGEN FUEL CELLS:M2
OXYGEN
DESIGN:Q1,Q2

TITLE: Vehicles Powered by Hydrocarbon Fuel Cells.
(hydrocarbon-air fuel cells with phosphoric acid electrolyte)
ELECTRIC-POWERED VEHICLES:T1
HYDROCARBON FUEL CELLS:T2,Q1

AIR
ACID ELECTROLYTE FUEL CELLS:T3
PHOSPHORIC ACID
PERFORMANCE TESTING:Q2,Q3

TITLE: Modified Partial Oxidation of Hydrocarbons for Use in Acid Fuel Cells.
HYDROCARBON FUEL CELLS:T1
ACID ELECTROLYTE FUEL CELLS:T2
HYDROGEN GENERATORS:T3,Q1,Q2
PARTIAL OXIDATION PROCESSES:Q3
PHOSPHORIC ACID
DESIGN
EFFICIENCY

ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

Information on equipment and methods designed to increase the efficiency of energy utilization in community systems, buildings, consumer products, and processing of wastes for energy or product recovery is included, as well as information on industrial energy conservation, e.g., waste energy reduction, increasing industrial process efficiency, materials optimization, increasing agricultural and food processing efficiency, energy conservation in transportation systems, and waste heat utilization.

Buildings

Subject descriptors include APARTMENT BUILDINGS, COMMERCIAL BUILDINGS, HOSPITALS, HOUSES, GREENHOUSES, MOBILE HOMES, SCHOOL BUILDINGS, etc. Qualifiers may be chosen from such descriptors as AIR CONDITIONING, ENERGY CONSERVATION, SPACE HEATING, TEMPERATURE CONTROL, etc.

Examples:

TITLE: Cost-Effective Methods to Reduce the Heating and Cooling Energy Requirements of Existing Single Family Residences.
HOUSES:T1
AIR CONDITIONING:T2,Q1
SPACE HEATING:T3,Q1
ENERGY CONSUMPTION:Q2,Q3
CONSUMPTION RATES
COST

TITLE: Energy Consumption in Residential Gas and Electric Appliances.
HOUSES:T1
ENERGY CONSUMPTION:Q2,Q3
MATHEMATICAL MODELS
NATURAL GAS
ELECTRIC POWER
ELECTRIC APPLIANCES:T2,Q1
GAS APPLIANCES:T3,Q1

Transportation

Information on measures for conservation of energy in transportation systems is indexed using such subject descriptors as CARPOOLING, TRANSPORTATION SYSTEMS, AUTOMOBILES, TRAINS, AIRCRAFT, BUSES, TRUCKS, etc. Qualifiers normally include such descriptors as FUEL CONSUMPTION, FUEL ECONOMY, ENERGY CONSERVATION, etc.

Examples:

TITLE: Transportation Energy Conservation Data Book.
TRANSPORTATION SYSTEMS:T1
ENERGY CONSERVATION:Q1
DATA COMPILATION
ECONOMICS
BIBLIOGRAPHIES

TITLE: Carpooling Incentives and Opportunities.
CARPOOLING:T1
SOCIO-ECONOMIC FACTORS:Q1
URBAN AREAS
RECOMMENDATIONS
FINANCIAL INCENTIVES:Q1

TITLE: Factors Influencing Vehicle Fuel Economy of Conventional Autos.
AUTOMOBILES:T1
FUEL ECONOMY:Q1
FUEL CONSUMPTION
EXHAUST GASES
AIR POLLUTION CONTROL

Industry

Information on waste energy reduction; methods for increasing industrial process efficiency; evaluation of alternative energy sources or fuel substitution; materials optimization for reducing energy consumption; design, maintenance, optimization, or replacement of industrial equipment and processes to achieve energy savings; waste heat recovery and utilization; and industrial and agricultural waste processing for product recovery and information on recycling of wastes to recover valuable resources is indexed using the most specific subject descriptors available, e.g., INDUSTRIAL PLANTS, DRYERS, BLAST FURNACES, THERMAL INSULATION, etc. Care should be taken in selecting qualifier descriptors so that unnatural combinations with subject descriptors may be avoided. Such qualifiers as ENERGY CONSERVATION, THERMAL INSULATION, ENERGY DEMAND, ENERGY BALANCE, HEAT RECOVERY, etc., are commonly used.

Examples:

TITLE: Industrial Thermal Insulation: An Assessment.
INDUSTRIAL PLANTS:T1
OPTIMIZATION
THERMAL INSULATION:T2,Q1
ENERGY CONSERVATION
TECHNOLOGY ASSESSMENT:Q2

TITLE: Survey of Industrial Dryers for Solids.
DRYERS:T1
ENERGY DEMAND:Q1
SOLIDS:T2
INDUSTRIAL PLANTS
TECHNOLOGY ASSESSMENT
DRYING:Q2

TITLE: Optimization of Fuel Injection into the Blast Furnace.
BLAST FURNACES:T1
OPTIMIZATION:Q2
FUEL INJECTION SYSTEMS:T2,Q1
ATOMIZATION
FUEL OILS

TITLE: Feasibility of Using Power Plant Reject Heat for Urban Food and Methane Production.
THERMAL POWER PLANTS:T1
WASTE HEAT UTILIZATION:T2
FOOD:T3
METHANE:T4
ENERGY CONSERVATION
PRODUCTION:Q3,Q4
FEASIBILITY STUDIES:Q2
THERMAL EFFLUENTS
WASTE HEAT:Q1
URBAN AREAS

TITLE: Recovery of Metals and Glass from Incinerated Industrial Wastes.
METALS:T1
GLASS:T2
MATERIALS RECOVERY:Q1,Q2
RECYCLING:Q3
INDUSTRIAL WASTES:T3
COMBUSTION
INCINERATORS

Municipalities and Community Systems

Information on energy conservation services; public services, e.g., design, operation, and maintenance of street lighting systems, roads and streets, and recreational facilities; public utilities, e.g., power distribution systems, water treatment plants, sewer systems, etc.; and more energy-efficient methods for commercial and municipal waste and sewage processing or recycling to recover valuable resources is indexed using the most specific subject descriptors available, e.g., MUNICIPAL WASTES, SEWAGE, WOOD WASTES, etc., and qualifier descriptors such as MATERIALS RECOVERY, RECYCLING, WASTE PROCESSING, etc.

Examples:

TITLE: Municipal Solid Waste Classification Systems.
MUNICIPAL WASTES:T1
SOLID WASTES:T2
CLASSIFICATION:Q1,Q2
WASTE PROCESSING
CHEMICAL COMPOSITION
PHYSICAL PROPERTIES

TITLE: Recycling of Plastic Wastes from Urban Refuse.
MUNICIPAL WASTES:T1
RECYCLING:Q1
MATERIALS RECOVERY:Q2
PLASTICS:T2
WASTE PROCESSING

TITLE: Economics of Resource Recovery from Raw Urban Refuse.
MUNICIPAL WASTES:T1
WASTE PROCESSING
RECYCLING:Q1
MATERIALS RECOVERY
ECONOMICS:Q2
WASTE PROCESSING PLANTS
URBAN AREAS
RESOURCE RECOVERY FACILITIES:T2

TITLE: Design of Street Lighting Systems for Energy Conservation.
URBAN AREAS
LIGHTING SYSTEMS:T1,Q2
ENERGY CONSERVATION
DESIGN:Q1
ROADS:T2

The descriptors ENERGY CONSUMPTION, ENERGY CONSERVATION, ENERGY DEMAND, etc., may be used as subject descriptors with or without qualifiers on papers of a broad, general nature, bibliographies, data compilations, etc.

Education and Public Relations

Information on consumer motivation and behavior, school curricula, educational tools, results of public opinion polls, training aids, etc., that deal with energy conservation and consumption is included.

Example:

TITLE: A Qualitative Study of Public Attitudes Toward Consumer Protection and Energy Conservation.
ENERGY CONSERVATION:T1
PUBLIC RELATIONS:Q1,Q2
CONSUMER PROTECTION:T2
EDUCATION

ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

Information is included here on advanced automotive propulsion systems for automobiles, trains, buses, ships, aircraft, etc. Equipment and methods for reduction of noxious gas and particulate emissions, development of more efficient power cycles, and studies of alternative fuels are also included. Subject descriptors include such terms as BUSES, AUTOMOBILES, TRAINS, INTERNAL COMBUSTION ENGINES, GAS TURBINES, etc., with terms such as DESIGN, PERFORMANCE, POLLUTION CONTROL EQUIPMENT, etc., used as qualifiers.

Internal Combustion Engines

Examples:

TITLE: Automotive Gas Turbine Ceramic Regenerator Design and Reliability Program. Progress Report.
AUTOMOBILES:T1
GAS TURBINES:T2,Q1
REGENERATORS:T3,Q2
DESIGN:Q3
RELIABILITY:Q3
RESEARCH PROGRAMS
CERAMICS
STIRLING ENGINES

TITLE: Stratified Combustion Type Internal Combustion Engine with Pre-Combustion Chamber.
STRATIFIED CHARGE ENGINES:T1
COMBUSTION CHAMBERS
DESIGN:Q1
FUEL-AIR RATIO

External Combustion Engines

Example:

TITLE: Water Base Reciprocating Rankine System Program.
RANKINE CYCLE ENGINES:T1
PERFORMANCE TESTING:Q1
FUEL ECONOMY
DYNAMOMETERS
STEAM
EXHAUST GASES

Electric-Powered Systems

Examples:

TITLE: Comparative Measurements of Different Electric Drives for an Experimental Motor Vehicle.
ELECTRIC-POWERED VEHICLES:T1
COMPARATIVE EVALUATIONS:Q2
ELECTRIC MOTORS:T2,Q1
PROPULSION
FUEL CONSUMPTION

TITLE: The Resurgence of the Electric Vehicle.
ELECTRIC-POWERED VEHICLES:T1
ELECTRIC BATTERIES
REVIEWS:Q1
RESEARCH PROGRAMS

Hybrid Systems

Examples:

TITLE: Battery-Flywheel Hybrid Electric Power System for Near-Term Application. System Design.
HYBRID ELECTRIC-POWERED VEHICLES:T1
ELECTRIC BATTERIES
FLYWHEELS:T2
DESIGN:Q1,Q2
MATHEMATICAL MODELS
PERFORMANCE
MECHANICAL TRANSMISSIONS

TITLE: Improved Fuel Economy in Automobiles by Use of a Flywheel Energy Management System.
AUTOMOBILES:T1
FLYWHEELS:T2
FUEL ECONOMY:Q1
INTERNAL COMBUSTION ENGINES:T3
MECHANICAL TRANSMISSIONS
GASOLINE
PERFORMANCE:Q2,Q3

Flywheel Propulsion

Examples:

TITLE: Flywheel Power for an Energy Economic Personal Vehicle.
FLYWHEEL ENERGY STORAGE:T1,Q2
FLYWHEELS
AUTOMOBILES:T2
FUEL ECONOMY
PERFORMANCE

MECHANICAL TRANSMISSIONS
FEASIBILITY STUDIES:Q1

TITLE: Fabrication of Variable-Inertia Flywheels for Automobiles.
AUTOMOBILES:T1
FLYWHEELS:T2,Q1
FLYWHEEL ENERGY STORAGE
FABRICATION:Q2
MOMENT OF INERTIA

Vehicle Design Factors

Information on the design of engine systems, body and chassis, power trains, transmissions, etc., is indexed using subject descriptors for the particular vehicle and/or component and appropriate qualifiers.

Examples:

TITLE: Ford/ERDA Continuously Variable Transmission. Progress Report.
AUTOMOBILES:T1
MECHANICAL TRANSMISSIONS:T2,Q1
RESEARCH PROGRAMS
DESIGN:Q2
FUEL ECONOMY

TITLE: Fuel Control System for Gas Turbine Engines.
FUEL SYSTEMS:T1,Q2
GAS TURBINES:T2
CONTROL SYSTEMS:Q1
DESIGN
PUMPS

Emission Control

Examples:

TITLE: Catalytic Converters for Exhaust Emission Control for Internal Combustion Engines.
INTERNAL COMBUSTION ENGINES:T1
EXHAUST GASES
AIR POLLUTION CONTROL
CATALYTIC CONVERTERS:T2,Q1
GASOLINE
PERFORMANCE:Q2

TITLE: Antipollution Device.
AUTOMOBILES:T1
POLLUTION CONTROL EQUIPMENT:T2,Q1
DESIGN:Q2
FUEL SYSTEMS
EXHAUST GASES
AIR POLLUTION CONTROL

Alternative Fuels

Subject descriptors include such terms as AUTOMOTIVE FUELS, HYDROGEN FUELS, DIESEL FUELS, GASOLINE, NATURAL GAS, METHANE, METHANOL FUELS, ETHANOL FUELS, etc.

Examples:

TITLE: Performance Characteristics of Alternate Fuels for Internal Combustion Engines.
VEHICLES
AUTOMOTIVE FUELS:T1,Q4

NATURAL GAS:T2
METHANE:T3
PERFORMANCE:Q1
INTERNAL COMBUSTION ENGINES:T4
COMPARATIVE EVALUATIONS:Q2,Q3

TITLE: Survey of Contemporary U. S. Projects on Hydrogen-Fueled Internal Combustion Engines.
INTERNAL COMBUSTION ENGINES:T1
AUTOMOTIVE FUELS
HYDROGEN FUELS:T2,Q1
REVIEWS:Q2

MATERIALS

Information on specific materials or types of materials is indexed using the most specific descriptors available for the material as the subject descriptor. The qualifier term should convey the particular property, process, or phenomenon being studied. The composition of alloys, cermets, ceramics, composites, and dispersions, when known and when not included in the title, is included as title augmentation using chemical symbols and formulas. Radiation effects are indexed using subject descriptors that define the material irradiated. The qualifier PHYSICAL RADIATION EFFECTS is paired with the subject descriptors. Descriptors naming radiations or particles inducing the effects are not used as subject descriptors. The type of radiation is indicated in the augmentation, if it is not contained in the title.

These general rules are illustrated below for various types of materials.

Metals and Alloys

The indexing of information on metals and alloys is straightforward, i.e., subject descriptors that name the metal or the components of the alloy under consideration are selected and paired with qualifiers that delineate specific aspects being studied. These are followed by the title and any useful title augmentation.

Examples:

TITLE: Corrosion of Molybdenum and Tungsten in Liquid Sodium.
MOLYBDENUM:T1
TUNGSTEN:T2
CORROSION:Q1,Q2
SODIUM:T3
LIQUID METALS
CORROSIVE EFFECTS:Q3

TITLE: Incompatibility Between Zircaloy-2 and Inconel X-750 During Temperature Transients.
Augmentation: (1000 to 1200°C)
ZIRCALOY 2:M1
INCONEL X750:M2
COMPATIBILITY:Q1,Q2
VERY HIGH TEMPERATURE
TRANSIENTS

TITLE: Brittleness of Fe–Co–V Alloy.
Augmentation: (5 Co–10 Fe–V)
IRON ALLOYS:M1
COBALT ALLOYS:M2
VANADIUM BASE ALLOYS:M3
TERNARY ALLOY SYSTEMS
BRITTLENESS:Q1,Q3

Note that descriptors of the form (METAL) BASE ALLOYS are used when the composition of the main component exceeds 50%.

Example:

TITLE: Effect of Carbon on Recrystallization of Chromium–Nickel Steels after Rolling.
Augmentation: (0.11 to 0.13% C)
CHROMIUM–NICKEL STEELS:M1
RECRYSTALLIZATION:Q1
CARBON ADDITIONS
CARBON:M2
METALLURGICAL EFFECTS:Q2
ROLLING

Note that (Element) ADDITION descriptors are available to indicate amounts of metals or nonmetals that represent less than 1% of the composition. These "element addition" descriptors are never used as subject descriptors.

For information on superconducting properties of specific materials, the appropriate MATERIALS subcategory, e.g., 360104, MATERIALS—Metals and Alloys—Physical Properties, is used as the primary category with a secondary SUPERCONDUCTIVITY category, e.g., 656102, SUPERCONDUCTIVITY—Acoustic, Electric, Magnetic, Optical, and Thermal Phenomena.

Example:

TITLE: Flux Pinning and Critical Current Densities in Nb_3Sn.
NIOBIUM BASE ALLOYS:T1
TIN ALLOYS:T2
INTERMETALLIC COMPOUNDS
MAGNETIC FLUX:Q1,Q2
CRITICAL CURRENT:Q1,Q2
CURRENT DENSITY
SUPERCONDUCTIVITY
BINARY ALLOY SYSTEMS

Note that stoichiometric combinations are indicated by the descriptor INTERMETALLIC COMPOUNDS.

Deposition and coatings of metals are indexed using one of the "surface coating" descriptors as a qualifier paired with a descriptor identifying the material being applied. The substrate (base) material is indexed using one of the "coatings" descriptors as a qualifier.

Example:

TITLE: Electrodeposition of Wear-Resistant Coatings on Titanium Alloys.
Augmentation: (Cr and NiAl coatings; up to 800°C)
CHROMIUM:M1
NICKEL ALLOYS:M2
ALUMINIUM ALLOYS:M3
ELECTRODEPOSITION:Q1,Q2,Q3
TITANIUM BASE ALLOYS:M4
ELECTRODEPOSITED COATINGS:Q4
WEAR RESISTANCE
INTERMETALLIC COMPOUNDS
HIGH TEMPERATURE
PROTECTIVE COATINGS

Ceramics and Cermets

Information on ceramics (metal borides, carbides, hydrides, nitrides, and oxides) is indexed by pairing an appropriate qualifier, title, and title augmentation (if necessary) with the proper subject descriptor.

Examples:

TITLE: Hot Pressing of Mixed Uranium–Plutonium Nitrides.
URANIUM NITRIDES:T1
PLUTONIUM NITRIDES:T2
HOT PRESSING:Q1,Q2
BINARY MIXTURES

TITLE: Thermionic Emission of TiC–Nb Cermets.
TITANIUM CARBIDES:T1
NIOBIUM ALLOYS:T2
CERMETS
THERMIONIC EMISSION:Q1,Q2

Dispersions are indexed similarly.

TITLE: Mechanical Properties of Uranium Dioxide Dispersed in Aluminum.
URANIUM DIOXIDE:T1
ALUMINIUM.ALLOYS:T2
DISPERSIONS
MECHANICAL PROPERTIES:Q1,Q2

Other Materials

Information on other materials, e.g., graphite, rubber, plastics, wood, etc., is indexed using appropriate subject descriptors and qualifiers with title and/or title augmentation. Information on a system containing one or more of these materials is indexed using subject descriptors for the individual components, except where descriptors such as CONCRETE-PLASTIC COMPOSITES or WOOD-PLASTIC COMPOSITES are available.

Crystallographic, electric, electronic, and magnetic properties of materials of interest are indexed as indicated heretofore, except such qualifiers as CRYSTAL STRUCTURE, ELECTRONIC STRUCTURE, ELECTRIC CONDUCTIVITY, and MAGNETIC SUSCEPTIBILITY are used with the appropriate subject descriptors. If radiation effects are present, use the qualifier PHYSICAL RADIATION EFFECTS rather than a qualifier for the property or aspect affected; the latter should be indicated by title augmentation if it does not appear in the title.

Example:

TITLE: Hydrogen Defects in Proton-Bombarded KCl.
Augmentation: (Optical absorption bands)
POTASSIUM CHLORIDES:M1
PHYSICAL RADIATION EFFECTS:Q1
PROTONS
CRYSTAL DEFECTS
ABSORPTION SPECTRA

For studies of channeling or ion implantation, the qualifiers ION IMPLANTATION, ELECTRON CHANNELING, ION CHANNELING, and PROTON CHANNELING are paired with subject descriptors naming the materials. Descriptors naming the particles or ions implanted or channeled are *not* used as subject descriptors.

Example:

TITLE: Channeling Studies in Single Crystals of Calcium Fluoride.
Augmentation: (0.67- to 4.0-MeV He^+ and protons)
CALCIUM FLUORIDES:M1
MONOCRYSTALS
ION CHANNELING:Q1
PROTON CHANNELING:Q1
HELIUM IONS

MEV RANGE 01-10
KEV RANGE 100-1000

Nuclear magnetic resonance (NMR) or the Moessbauer effect (ME) studies are indexed using subject descriptors for both the material and the isotope displaying the NMR or ME. The qualifier descriptor for the material should indicate the particular property or aspect studied by means of these techniques.

Examples:

TITLE: ^{151}Eu and ^{57}Fe Moessbauer Studies of $EuCoO_3$.
Augmentation: (Electronic structure)
EUROPIUM OXIDES:T1
COBALT OXIDES:T2
EUROPIUM 151:M3
IRON 57:M4
MOESSBAUER EFFECT:Q3,Q4
ELECTRONIC STRUCTURE:Q1,Q2

TITLE: Boron-11 NMR in Crystalline Boron Oxide.
Augmentation: (Crystal structure)
BORON 11:M1
BORON OXIDES:T2
NUCLEAR MAGNETIC RESONANCE:Q1
CRYSTAL STRUCTURE:Q2

The descriptors MOESSBAUER EFFECT, MAGNETIC RESONANCE, and NUCLEAR MAGNETIC RESONANCE are used as subject descriptors only when broad subject matter, theories, or enhancement of technique is under consideration.

CHEMISTRY

Descriptors in chemistry usually name elements, isotopes, compounds, properties, processes, or reactions. Every combination of an element name and the terms COMPOUNDS and COMPLEXES is a descriptor. A large number of anions are descriptors. Based on their frequency of usage, these descriptors belong to two different groups as follows:

1. The more important anions, the full list of which is:

ARSENIDES	OXIDES
BORIDES	PERCHLORATES
BROMIDES	PEROXIDES
CARBIDES	PHOSPHATES
CARBONATES	PHOSPHIDES
CHLORIDES	SELENIDES
FLUORIDES	SILICATES
HALIDES	SILICIDES
HYDRIDES	SULFATES
HYDROXIDES	SULFIDES
IODIDES	TELLURIDES
NITRATES	TUNGSTATES
NITRIDES	URANATES

The combination of an element name and any one of the anions listed above is introduced as a new descriptor if proposed because it is needed to index a piece of literature. Most such inorganic compounds already have been introduced as descriptors.

2. Less important anions such as:

BROMATES
CYANIDES
PERMANGANATES
etc.

These anions have been introduced as descriptors but do not normally have any narrower terms. Specific inorganic compounds whose anionic parts would put them in a class defined by one of the above anions would normally not be introduced as descriptors; they should be indexed by coordination of the descriptor (CATION) COMPOUNDS and the appropriate anion, e.g., calcium nitrites is indexed as NITRITES and CALCIUM COMPOUNDS.

Some very specific inorganic compounds, which are particularly important in the field of energy, are represented in the thesaurus by specific descriptors.

Examples:

SULFUR DIOXIDE
URANIUM HEXAFLUORIDE
NITRIC OXIDE
PLUTONIUM DIOXIDE

However, not all inorganic anions appear in the thesaurus, only those judged to be particularly important in the field of energy. Therefore, if there is no specific anion in the thesaurus, the anion should be indexed by (ELEMENT) COMPOUNDS, and if the anion contains oxygen, it should be indexed by OXYGEN COMPOUNDS also, e.g.:

Potassium astatide, KAt: POTASSIUM COMPOUNDS and ASTATINE COMPOUNDS
Aluminium kryptonate: ALUMINIUM COMPOUNDS and KRYPTON COMPOUNDS
Sodium hyposulfite, $Na_2S_2O_4$: SODIUM COMPOUNDS and SULFUR COMPOUNDS and OXYGEN COMPOUNDS

Double salts or double oxides are indexed as though they were a mixture of separate compounds, e.g.:

Sodium calcium sulfate, $Na_2Ca(SO_4)_2$: SODIUM SULFATES and CALCIUM SULFATES
Lithium fluoroberyllate, Li_2BeF_4: LITHIUM FLUORIDES and BERYLLIUM FLUORIDES
Aluminium ferrate, otherwise called ferrialuminate, $FeAlO_3$: IRON OXIDES and ALUMINIUM OXIDES

In the indexing of double salts, these rules are still to be applied when a more specific descriptor is not available, e.g.:

Potassium calcium nitrite, $KCa(NO_2)_3$: POTASSIUM COMPOUNDS and CALCIUM COMPOUNDS and NITRITES
Ammonium sodium hyposulfite, $NH_4NaS_2O_4$: AMMONIUM COMPOUNDS and SODIUM COMPOUNDS and SULFUR COMPOUNDS and OXYGEN COMPOUNDS

Inorganic complexes should be decomposed into the parts of which they are formed, e.g.:

Sodium ferricyanide, $Na_3[Fe(CN)_6]$: SODIUM COMPOUNDS and FERRICYANIDES

If no specific descriptor for the anionic part of the complex is found in the thesaurus, this part must be indexed by using the descriptor (ELEMENT) COMPLEXES. This descriptor, however, must be used exclusively for the central atom of the complex and *not* for the ligand, e.g.:

Sodium platinocyanide, $Na_2[Pt(CN)_4]$: SODIUM COMPOUNDS and PLATINUM COMPLEXES and CYANIDES
Sodium thiosulfoaurate, $Na_2[Au(S_2O_3)_2]$: SODIUM COMPOUNDS and GOLD COMPLEXES and SULFUR COMPOUNDS and OXYGEN COMPOUNDS
Potassium cobaltinitrite, $K_3[Co(NO_2)_6]$: POTASSIUM COMPOUNDS and COBALT COMPLEXES and NITRITES

A considerable number of specific names of organic compounds have been introduced into the thesaurus because of their importance in energy production, conversion, storage, and utilization. Their presence should always be checked.

Examples:

METHANE
CARBON TETRACHLORIDE
ACETYLACETONE

ADENOSINE
METHYL IODIDE
etc.

Some organic compounds are represented by their common abbreviations, whereas their full names are cross referenced as forbidden terms.

Examples:

TBP
UF-tributyl phosphate
PVC
UF-poly(vinyl chloride)
ADP
UF-adenosine diphosphate

When no specific descriptor exists for an organic compound, the compound must be indexed using the more general descriptors defining its chemical composition.

When searching for these descriptors, the indexer should look for the appropriate group which identifies the chemical system in organic chemistry to which the compound belongs, e.g., HETEROCYCLIC COMPOUNDS, NUCLEIC ACIDS, etc.; the group which identifies the chemically important functional groups, e.g., HYDROXY COMPOUNDS, NITRO COMPOUNDS, etc.; or the group which identifies the molecular composition, e.g., ORGANIC SULFUR COMPOUNDS, ORGANIC OXYGEN COMPOUNDS, etc. Besides these purely chemical aspects, the indexer might also identify the descriptor which, for the particular compound in question, characterizes its practical application or classification in other nonchemical disciplines, e.g., DEVELOPERS, DRUGS, ADDITIVES, etc.

Examples:

DIFLUOROETHANAL: ALDEHYDES and ORGANIC FLUORINE COMPOUNDS
BENZOYL ACETONE: KETONES and AROMATICS
SODIUM ACETATE: SODIUM COMPOUNDS and ACETATES
TRICRESYL PHOSPHATE: PHOSPHORIC ACID ESTERS and AROMATICS
2-PHENYL-4,6-DISTYRYL-BENZOFURAN: BENZOFURANS and AROMATICS
4-METHOXY-7-IODO-8-HYDROXY-QUINOLINE SULFONIC ACID: SULFONIC ACIDS and QUINOLINES and HYDROXY COMPOUNDS and ORGANIC IODINE COMPOUNDS and ETHERS and REAGENTS
CHLOROBENZENE: CHLORINATED AROMATIC HYDROCARBONS
ETHYL IODIDE: IODINATED ALIPHATIC HYDROCARBONS

ORGANOMETALLIC COMPOUNDS is used for compounds where the metal atom is bonded directly to a carbon atom, e.g.:

PENTAETHYLANTIMONY: ANTIMONY COMPOUNDS and ORGANOMETALLIC COMPOUNDS
TRI-TOLYL GERMANIUM CHLORIDE: ORGANOMETALLIC COMPOUNDS and GERMANIUM CHLORIDES and AROMATICS

Such descriptors as ORGANIC MERCURY COMPOUNDS also exist.

When indexing organic acid derivatives, it is necessary to establish whether the compound has the character of a salt or an ester. Thus, for example, the salt sodium oxalate is indexed SODIUM COMPOUNDS and OXALATES while the ester butylacetate is indexed as ACETIC ACID ESTERS.

When indexing very complicated organic compounds, it is necessary to index only the parts or groups of the compounds that are of significance in the paper at hand.

For example, a document describes the radiation chemistry of thiols (-SH group), and various complicated aromatic, heterocyclic and alicyclic thiols were chosen as particular compounds for the experiment but the aromatic, heterocyclic and alicyclic parts of the thiols did not affect the reactions described. In this case only THIOLS need be indexed.

There are cases when the descriptors for specific simpler compounds also should be used to describe their derivatives. For example, if a paper discusses some metabolic studies with tyrosylmethylester, and the

tyrosine group plays a significant role in these processes, the compound may be indexed TYROSINE + ESTERS which entails use of the specific descriptor TYROSINE to describe its derivative. It is highly probable that a user interested in the role of the tyrosine group in such metabolic studies will be interested in this paper. To illustrate the contrary situation, consider the example of "radiolysis of ethylamine." To index this by ETHANE + AMINES (or even AMMONIA) would not be correct because the paper is completely irrelevant to the radiolysis of ethane, whose mechanism is quite different. No user interested in obtaining documents on the radiolysis of ethylamine will wish to receive documents on the radiolysis of ethane and vice versa. In the case of radiolysis of ethylamine the correct indexing will be AMINES together with RADIOLYSIS.

In deciding on M/Q pairs, subject descriptors in chemistry will usually name elements, isotopes, or compounds. The qualifier descriptors will generally designate properties, processes, and reactions.

Analytical and Separations Chemistry

Information on chemical analysis or separation is indexed using subject descriptors for elements and/or compounds. Descriptors for ions are not used. For example, information on the determination of Np(VI) is indexed using the subject descriptor NEPTUNIUM and a qualifier that expresses the specific method of chemical analysis used. Separations are indexed using subject descriptors for the elements being separated; these are then qualified using a descriptor that expresses the method of separation.

Analytical methods are indexed using subject descriptors for the elements being determined and the material analyzed; these are then qualified using descriptors that express the analytical method.

Examples:

TITLE: Uranyl Nitrate Separation from Plutonium Nitrate in Aqueous Solution Using Tributyl Phosphate.

URANIUM:T1
PLUTONIUM:T2
SOLVENT EXTRACTION:Q1,Q2
AQUEOUS SOLUTIONS
TBP
URANYL NITRATES
PLUTONIUM NITRATES
NITRIC ACID

TITLE: Optical Emission Spectrographic Method for the Determination of ^{240}Pu in Plutonium Materials.

PLUTONIUM 240:T1
EMISSION SPECTROSCOPY:Q1
PLUTONIUM OXIDES:T2
CHEMICAL ANALYSIS
QUANTITATIVE CHEMICAL ANALYSIS:Q2

TITLE: Activation Analysis for Mercury in Biological Samples.
Augmentation: (Neutron reactions)

MERCURY:T1
BIOLOGICAL MATERIALS:T2
ACTIVATION ANALYSIS:Q1,Q2
NEUTRON REACTIONS
QUANTITATIVE CHEMICAL ANALYSIS
TRACE AMOUNTS

Inorganic, Organic, and Physical Chemistry

Subject descriptors are paired with qualifying descriptors for specific properties or reactions. Information on isotope effects or isotopic exchange is indexed using subject descriptors for the isotopes involved. If the emphasis of the paper is on only the effect or the exchange, then the only subject descriptor is the isotope of interest.

Example:

TITLE: Deuterium Isotope Effects in Benzene.
DEUTERIUM:T1
ISOTOPE EFFECTS:Q1
BENZENE

However, if the isotope effect is used as a tool to study other properties, then the indexing would reflect this.

Example:

TITLE: Infrared Intensities of Crystalline NH_3 and ND_3.
DEUTERIUM:T1
ISOTOPE EFFECTS:Q1
AMMONIA:T2
INFRARED SPECTRA:Q2
POLYCRYSTALS
ISOTOPE ENRICHED MATERIALS

In indexing isotope separation, the descriptor ISOTOPE SEPARATION is used as a qualifier if the isotopes involved are of the same element; if the isotopes involved are of different elements, then the paper is indexed as separations of elements and would follow the pattern as in the section above. If possible, in indexing isotope separation, the qualifier expressing the specific method of separation is chosen. Qualifiers available include ISOTOPIC EXCHANGE, GASEOUS DIFFUSION PROCESS, LASER ISOTOPE SEPARATION, ULTRACENTRIFUGATION, HOT ATOM CHEMISTRY, etc.

Example:

TITLE: Photochemical Enrichment of ^{13}C and ^{18}O in Carbon Monoxide.
CARBON 13:T1
OXYGEN 18:T2
ISOTOPE SEPARATION:Q1,Q2
CARBON MONOXIDE
ISOTOPE ENRICHED MATERIALS
PHOTOCHEMISTRY
INFRARED RADIATION

Papers on physical chemistry are indexed as precisely as possible, choosing descriptors and qualifiers that indicate the emphasis and scope of the paper.

Example:

TITLE: Viscosity of Heavy Water at 250 to 700 atm in the 100 to 275°C Temperature Range.
HEAVY WATER:T1
VISCOSITY:Q1
HIGH PRESSURE
HIGH TEMPERATURE
MEDIUM TEMPERATURE

Photochemistry and Radiation Chemistry

For documents in these fields subject descriptors for compounds, elements, and radicals are commonly used. Qualifiers used with the subject terms include RADIATION CHEMISTRY, PHOTOCHEMISTRY, RADIOLYSIS, PHOTOLYSIS, G VALUE, CHEMICAL RADIATION EFFECTS, CHEMICAL REACTION YIELD, and ELECTRON SPIN RESONANCE. Descriptors for incident radiations are rarely used as index points but are included in the list of descriptors. The type of radiation is used as augmentation if it is not given in the title.

Examples:

TITLE: Initial Yields of Hydrogen Peroxide in γ Radiolysis of Aqueous Solutions of Benzene.
HYDROGEN PEROXIDES:T1
G VALUE:Q1
BENZENE:T2
RADIOLYSIS:Q2
GAMMA RADIATION
AQUEOUS SOLUTIONS

TITLE: Oxidation of Aliphatic Alcohols to Aldehydes in the Presence of Catalysts.
Augmentation: (gamma radiation)
ALCOHOLS:M1
CHEMICAL RADIATION EFFECTS:Q1
ALDEHYDES:M2
CHEMICAL REACTION YIELD:Q2
CADMIUM OXIDES:M3
CATALYTIC EFFECTS:Q3
GAMMA RADIATION
CATALYSTS

Radiochemistry and Nuclear Chemistry

In the area of hot atom chemistry, the subject descriptors are, in general, those for recoiling or hot isotopes and for compounds reacting with these isotopes or used to produce them. The qualifier HOT ATOM CHEMISTRY is used with both the isotope and compound subject descriptors.

Example:

TITLE: Effect of Nitric Oxide on Thermal Annealing of Recoils in Tris(acetylacetonate)cobalt(III).
COBALT 60:T1
COBALT COMPLEXES:T2
HOT ATOM CHEMISTRY:Q1-2
NITRIC OXIDE:T3
CHEMICAL REACTIONS:Q3
RECOILS

Information related to the preparation of labeled compounds is indexed using subject descriptors representing both the compound and the label. For compounds the most specific available subject descriptors are used with the qualifier LABELLING. Subject descriptors indicating the isotopes used as labels, e.g., TRITIUM, will be appropriately qualified with the descriptors ISOTOPIC EXCHANGE, CHEMICAL REACTION KINETICS, HOT ATOM CHEMISTRY, RADIOCHEMISTRY, etc.

Example:

TITLE: Tritium Incorporation at Specific Positions in Benzopyrene.
BENZOPYRENE:T1
LABELLING:Q1
TRITIUM:T2
ISOTOPIC EXCHANGE:Q2
TRITIUM COMPOUNDS

Documents on isotope production are indexed using subject descriptors for the isotopes and the qualifier ISOTOPE PRODUCTION. Other descriptors are chosen to indicate the emphasis of the paper.

Example:

TITLE: Separation of Carrier-Free ^{125}Sb from Metallic Tin Targets.
ANTIMONY 125:T1
ISOTOPE PRODUCTION:Q1
ANTIMONY:T2

SOLVENT EXTRACTION:Q2-3
TIN:T3
TBP
CARRIER-FREE ISOTOPES

Combustion Chemistry

Subject descriptors in the field of combustion are paired with such terms as COMBUSTION PRODUCTS, CHEMICAL REACTION YIELD, FLAMES, and TEMPERATURE EFFECTS.

Example:

TITLE: Measurement of NO_2 Concentration in Combustion of Acetylene in Air.
ACETYLENE:T1
COMBUSTION PRODUCTS:Q1
NITROGEN DIOXIDE:T2
CHEMICAL REACTION YIELD:Q2
FLAMES
AIR
QUANTITATIVE CHEMICAL ANALYSIS
FLUORESCENCE SPECTROSCOPY

ENGINEERING

Engineering information is indexed for the data base using subject descriptors for specific equipment, facilities, and processes. Such qualifiers as EFFICIENCY, DESIGN, HEAT TRANSFER, OPERATION, and PERFORMANCE are commonly used as are qualifiers designating parts or components of a facility, process, or piece of equipment. In some cases, but not all, these "parts or components" will also be used as subject descriptors.

Facilities and Equipment

Energy-related information on the design, construction, operation, and applied mechanics studies (stress, strain, motion, vibration, elasticity, deformation, etc.) of facilities and equipment including components of such facilities and equipment, e.g., pilot plants, laboratories, test facilities, etc., is indexed as follows:

TITLE: Relationship Between Various Pressure Vessel and Piping Codes.
PRESSURE VESSELS:T1
STANDARDS:Q1-2
SPECIFICATIONS
PIPES:T2
STRESSES
SAFETY
FRACTURE PROPERTIES

Cryogenic and Superconducting Equipment and Devices

Information on the design, fabrication, performance, and testing of superconducting equipment and devices, e.g., superconducting cables, magnets, generators, etc., or equipment and devices using superconductors or superconducting junctions as a component, e.g., superconducting quantum interference devices (SQUIDS), Josephson junctions, etc., and cryogenic equipment and devices when such equipment and devices are used in the production of low temperatures or in studies of superconductivity is indexed as follows:

TITLE: Performance of Helium Dilution Refrigerators for Cooling Large Superconducting Magnets.
HELIUM DILUTION REFRIGERATORS:T1
SUPERCONDUCTING MAGNETS:T2

HELIUM
COST
PERFORMANCE:Q1
ENERGY CONSUMPTION
COOLING:Q2

Protective Structures and Equipment

Information on structures and equipment designed primarily for equipment and personnel protection, e.g., blast and fallout shelters, shielding—except for accelerators and reactors—clean rooms, air filtration systems, fire protection systems, masks, and special clothing, is indexed as follows:

TITLE: Cost Estimates for Home Basement Fallout Shelters.
FALLOUT SHELTERS:T1
COST:Q1
BUILDINGS
RADIATION PROTECTION

Handling Equipment and Procedures

Information on design, construction, and operation of equipment and facilities for handling energy-related materials, e.g., remote-handling equipment, glove boxes, and hot cells, and nonreactor criticality studies is indexed as follows:

TITLE: Steel Glove Box Ventilation.
GLOVE BOXES:T1
STEELS
DESIGN
RADIOACTIVE MATERIALS
VENTILATION:Q1

TITLE: Radiological Design of Hot Laboratories.
HOT LABS:T1
DESIGN:Q1
RADIATION PROTECTION
PLUTONIUM
TRANSPLUTONIUM ELEMENTS

Shipping Containers

Information on the design, development, evaluation, safety analyses, and testing of radioactive materials shipping containers is indexed as follows:

TITLE: Radioactive Material Shipping Container Testing.
CASKS:T1
DESIGN
SAFETY
RADIOACTIVE MATERIALS:T2
TESTING:Q1
TRANSPORT:Q2

TITLE: Shipping Cask for Spent Nuclear Fuel Assemblies.
SPENT FUEL ELEMENTS:T1
SPENT FUEL CASKS:T2
URANIUM
STAINLESS STEELS
TRANSPORT:Q1
IMPACT TESTS:Q2

Transport and Storage Facilities

Information on the design, development, evaluation, and testing of tanks, pipelines, tanker vessels, and other containers and their auxiliary equipment for transport and storage of nonradioactive energy-related materials is indexed as follows:

TITLE: Fabrication of Storage Tanks for Cryogenic Fluids.
CRYOGENIC FLUIDS:T1
STORAGE:Q1
FABRICATION:Q2
TANKS:T2
STEELS
VALVES
PUMPS

Mining and Drilling Equipment and Facilities

Information on equipment and facilities for mining and drilling when no specific application is given, e.g., offshore platforms and drilling rigs, is indexed as follows:

TITLE: Construction of Offshore Platforms and Pipelines in Deep Water.
OFFSHORE PLATFORMS:T1
PIPELINES:T2
CONSTRUCTION:Q1-2
WELDING
SEAWATER

Lasers

Information on laser research and development (not applications) is indexed as follows:

TITLE: Microwave Waveguide Modulators for CO_2 Lasers.
CARBON DIOXIDE LASERS:T1
MICROWAVE RADIATION
MODULATION:Q1
WAVEGUIDES

TITLE: Electron Beam Excitation of Gas Lasers.
GAS LASERS:T1
ELECTRON BEAMS
EXCITATION:Q1
EFFICIENCY
MEASURING METHODS

Heat Transfer and Fluid Flow

Information on heat transfer and fluid flow studies (if nucleate boiling, boiling burnout, critical heat flux, two-phase flow, flow in rod bundles, or liquid metals is considered) is indexed as follows:

TITLE: Heat and Mass Transfer from Freely Falling Drops.
DROPLETS:T1
HEAT TRANSFER:Q1
MASS TRANSFER:Q1
MOTION
LIQUIDS
SHAPE
ACCELERATION

TITLE: Numerical Calculation of Two-Phase Flow in a Shock Tube.
TWO-PHASE FLOW:T1
WATER

STEAM
SHOCK TUBES
NUMERICAL SOLUTION:Q1
TWO-DIMENSIONAL EQUATIONS

Materials Testing

Information on destructive and nondestructive materials testing (if a direct application to energy research and development is indicated) is indexed as follows:

TITLE: Neutron Sources for Radiography and Gaging.
NEUTRON SOURCES:T1,Q2
NEUTRON RADIOGRAPHY:T2
REVIEWS:Q1
COST

TITLE: Apparatus for Carrying Out Ultrasonic Inspection of Pressure Vessels.
PRESSURE VESSELS:T1
ULTRASONIC TESTING:T2,Q1
REMOTE HANDLING EQUIPMENT
OPERATION
MATERIALS:Q2

Safety Engineering

Information on safety studies at energy research or production facilities is indexed as follows:

TITLE: High-Pressure Safety at the Lawrence Livermore Laboratory, an Energy Research Facility.
LAWRENCE LIVERMORE LABORATORY:T1
SAFETY ENGINEERING:T2,Q1
RESEARCH PROGRAMS:Q2
ACCIDENTS
PRESSURE VESSELS
HIGH PRESSURE

Vacuum Engineering

Information on ultrahigh (10^{-9} or greater) vacuum systems and equipment is indexed as follows:

TITLE: Apparatus for Detecting Leaks in Vacuum Systems.
VACUUM SYSTEMS:T1
LEAK TESTING:Q1
LEAK DETECTORS:T2
DESIGN:Q2

Electronic Circuits and Devices

Information on the design, development, performance, and testing of electronic circuits and devices is indexed as follows:

TITLE: High Current Capacity Electrical Connector.
CONNECTORS:T1
ELECTRICAL CURRENTS
CONFIGURATION
DESIGN:Q1
FABRICATION:Q1
STRESSES

Waste Processing Plants and Equipment

Information on facilities and equipment for collecting, sorting, or processing agricultural, industrial, or municipal wastes for conversion or recycle is indexed as follows:

TITLE: St. Louis Refuse Processing Plant: Equipment, Facility and Environmental Evaluations.
WASTE PROCESSING PLANTS:T1
DESIGN:Q1
EQUIPMENT
ENVIRONMENTAL EFFECTS:Q1
MUNICIPAL WASTES:T2
BOILER FUEL
WASTE PROCESSING:Q2
BOILERS

TITLE:Evaporative Concentration of Waste Sludges with Incinerator Exhaust Gases.
FLUIDIZED BED
SEWAGE SLUDGE:T1
INCINERATORS
DRYING:Q1
EVAPORATION
FLUE GAS:T2
HEAT RECOVERY:Q2
COMBUSTION

Combustion Systems

Information on the design and development of more efficient, less polluting combustion systems, such as boilers, furnaces, incinerators, etc., and their components, and the adaptation of existing designs to new fuels or fuel mixtures is indexed as follows:

TITLE: Stokers for Industrial Boilers: Assessment of Technical, Economic, and Environmental Factors.
STOKERS:T2,Q1
INDUSTRIAL PLANTS
BOILERS:T1
ECONOMICS:Q2
ENVIRONMENTAL EFFECTS:Q2
COAL

TITLE: Performance Prediction of Tangentially Fired Utility Boilers by Computer Model.
BOILERS:T1
PERFORMANCE:Q1
FOSSIL-FUEL POWER PLANTS
COMPUTER CALCULATIONS
INDUSTRIAL PLANTS

Underground Engineering

Information on equipment, facilities, and methods, including economic and feasibility studies, for construction of underground structures, e.g., cavities, drill holes, mine shafts, tunnels, etc., related to the production, storage, utilization, or conversion of energy and on the construction of tunnels for more efficient, less polluting underground power distribution systems and transportation systems, as well as the construction of underground cavities for storage and waste disposal, is indexed as follows:

TITLE: Thermal Analysis of Some Subterrene Penetrators.
SUBTERRENE PENETRATORS:T1
OPERATION:Q1
THERMAL ANALYSIS:Q1
ROCKS

MELTING
HEATERS

Marine Engineering

Information on the design, construction, operation, emplacement, auxiliary equipment, power supplies, and communication systems for offshore operations related to energy production, storage, conversion, or utilization is indexed as follows:

TITLE: Power Generation for Underwater Drilling Operations.
OFFSHORE OPERATIONS:T1
POWER GENERATION:T,Q1
UNDERWATER
DIRECT CURRENT
DRILLING FLUIDS
DRILLING EQUIPMENT

Pollution Control Equipment

Information on equipment and methods for controlling the emission of pollutants from industrial plants, e.g., sulfur oxides, carbon oxides, nitrogen oxides, fly ash, thermal effluents or any other pollutant of interest in the production, conversion, or utilization of energy is indexed as follows:

TITLE: Design of Equipment for Removing Nitrogen Oxides from Flue Gas.
POLLUTION CONTROL EQUIPMENT:T1
DESIGN:Q1
NITROGEN OXIDES:T2
FLUE GAS:T3
DENITRIFICATION:Q3
REMOVAL
INDUSTRIAL PLANTS
AIR POLLUTION ABATEMENT:Q2

Power Cycles

Information on the development, evaluation, analysis, and performance of more efficient thermodynamic cycles, e.g., Brayton, Rankine, Stirling, Carnot, etc., for the conversion of energy is indexed as follows:

TITLE: Simulation and Operation of an Organic Rankine Cycle Power System.
RANKINE CYCLE POWER SYSTEMS:T1
SIMULATION:Q1
OPERATION:Q1
WORKING FLUIDS
ORGANIC COMPOUNDS

TITLE: Stirling Cycle Engine: A New Look at an Old Idea.
STIRLING ENGINES:T1
ENERGY CONSERVATION
FUELS
TECHNOLOGY ASSESSMENT:Q1
OPERATION
EXHAUST GASES

TITLE: Design and Performance of a No-Single Failure Control System for the Mini-Brayton Power Conversion System.
BRAYTON CYCLE POWER SYSTEMS:T1
CONTROL SYSTEMS:T2,Q1
DESIGN:Q2

PERFORMANCE TESTING:Q2
RELIABILITY

PARTICLE ACCELERATORS

In the field of accelerator technology information concerned with (a) some attribute or characteristic of an accelerator, e.g., betatron oscillations, orbit stability, operation, (b) accelerator components or auxiliary equipment, e.g., electromagnets, drift tubes, targets, and (c) applications of an accelerator, e.g., radiotherapy, industrial radiography, is encountered. These aspects are related to (a) a specific accelerator, e.g., Serpukhov Synchrotron, (b) types of accelerators, e.g., cyclotrons, or (c) all accelerators, i.e., no specific accelerator or accelerator type is specified.

In subject indexing information on specific accelerators or storage rings, a subject descriptor for the specific accelerator or storage ring is selected. A descriptor for the specific feature of the accelerator being studied is used as a qualifier. If the information on the accelerator characteristic or component is applicable only to the specific accelerator, no additional subject indexing is needed. However, if the application is new or novel, or if there is an appreciable amount of information given on the application, it should also be indexed.

Examples:

TITLE: Performance of Moderate Intensity Neutron Source and Accelerator for Use in Neutron Radiotherapy.

ACCELERATORS:T1
NEUTRON SOURCES:T2,Q3
RADIOTHERAPY:T3,Q4
NEOPLASMS:T4
PERFORMANCE:Q1-2
USES
DUOPLASMATRONS
FAST NEUTRONS
ENERGY LEVELS

TITLE: Uses of Linear Accelerators in Industrial Radiography.

INDUSTRIAL RADIOGRAPHY:T
LINEAR ACCELERATORS:T1
USES:Q1

In subject indexing information on types or classes of accelerators, a subject descriptor for the accelerator type is used and qualified with a descriptor that expresses the attribute, characteristic, component, etc. In addition, this information should also be indexed using subject descriptors for the attribute, characteristic, component, etc., with appropriate qualifiers.

Examples:

TITLE: General Ion-Optical Correction Equipment.

LINEAR ACCELERATORS:T1
BEAM BENDING MAGNETS:T2,Q1
DESIGN:Q2
MAGNETIC FIELDS
MULTIPOLES

TITLE: Initial Experience in Ion Production Using an Ultrahigh Power Density Method.

CYCLOTRONS:T1
PENNING ION SOURCES:T2,Q1
MODIFICATIONS:Q2
IONS
ELECTRON DENSITY
POWER RANGE 100-1000 KW

In subject indexing information applicable to all types of accelerators or where no specific accelerator or accelerator type is mentioned, only a subject descriptor for the attribute or component is used with an appropriate qualifier.

Example:

TITLE: High-Intensity Source of Heavy Negative Ions.
ION SOURCES:T1
PERFORMANCE:Q1
HEAVY IONS
FABRICATION
CONTAMINATION

In indexing papers dealing with characteristics peculiar to accelerators such as BETATRON OSCILLATIONS, BEAM DYNAMICS, etc., in which no specific accelerator or accelerator type is mentioned, nothing is gained by subject indexing to ACCELERATORS. However, a component or auxiliary not used solely in the field of accelerator technology should be so indexed, the descriptor for the component being used as the qualifier.

INSTRUMENTATION

In the field of instrumentation technology most papers are concerned with (a) attributes or characteristics of an instrument, (b) components, auxiliary equipment, or attachments to instruments, or (c) applications of an instrument. In indexing the most specific subject descriptor is used for an instrument. The subject descriptor is then qualified using descriptors that describe the attribute, characteristic, component, auxiliary, or attachment. In addition, the qualifier descriptor for the component, auxiliary, attachment, or application is used as a subject descriptor with a qualifier descriptor that expresses the significant feature discussed. This general rule is illustrated below for the most frequently encountered types of instruments.

Radiation Detectors and Monitors

Information on radiation detectors or counters is indexed using a subject descriptor for the specific type of detector with the qualifier descriptor reflecting the significant feature discussed in the paper, e.g., fabrication, electronic circuits, pulse analyzers, energy resolution, etc. Descriptors for specific circuits or detector or circuit components are also used in addition to the type of detector in cases where significant information is given. A descriptor indicating the aspect of the component emphasized in the paper is used as the qualifier.

If the detector is intended for a specific type of radiation, the information is indexed using the appropriate radiation detection descriptor, e.g., ALPHA DETECTION, FISSION FRAGMENT DETECTION, etc., with the descriptor for the specific radiation detector or counter used as qualifier. Do *not* index information on a specific type of detector using the subject descriptor RADIATION DETECTION when the type of radiation is not specified. Instruments with the radiation type indicated in their name, e.g., GAMMA CAMERAS, need not have the radiation detection descriptor, e.g., GAMMA DETECTION.

If the detector was designed, calibrated, or evaluated for a particular application, the application is indexed using appropriate subject descriptors and qualifiers to reflect the specifics.

The above guidelines are illustrated in the examples below, the Subject/Qualifier pair being followed by the title, title augmentation, or both.

SOLID SCINTILLATION DETECTORS/PULSE ANALYZERS
PULSE ANALYZERS/RELIABILITY
LI-DRIFTED GE DETECTORS/SENSITIVITY
GAMMA DETECTION/LI-DRIFTED GE DETECTORS

Also, to illustrate the indexing of a particular application, the indexing below is for information on the performance of a G-M counter for monitoring tritium in air.

GEIGER-MUELLER COUNTERS/PERFORMANCE
AIR/RADIATION MONITORING
TRITIUM/RADIATION MONITORING

Radiation Dosemeters

The guidelines for radiation detectors and counters apply also to radiation dosemeters, except subject descriptors for the type NEUTRON DOSIMETRY are used instead of NEUTRON DETECTION. For example:

THERMOLUMINESCENT DOSEMETERS/CALIBRATION
NEUTRON DOSIMETRY/THERMOLUMINESCENT DOSEMETERS

In all cases the descriptor pair is followed by the title, title augmentation, or both as appropriate.

Nuclear Spectroscopic Instrumentation

The specific spectrometer descriptor, e.g., BETA SPECTROMETERS, is always used as a subject term with appropriate qualifier. Since nuclear spectrometers are classified according to radiation type, a subject descriptor for the radiation is unnecessary. The detector or other spectrometer component is also used as subject descriptors where significant information is given. Qualifier descriptors for such entries reflect the "significant information," since this may well not be included in the title.

Radiometric Instruments

Radiometric instruments are indexed using descriptors that describe the particular instrument, such as DENSIMETERS, MOISTURE GAGES, and THICKNESS GAGES. The qualifier descriptor is chosen to describe the principal aspect or subsystem of the gage discussed. Examples include, on the one hand, CALIBRATION, RESOLUTION, and PERFORMANCE and, on the other, COLLIMATORS and ELECTRONIC CIRCUITS. In the latter case, the subsystem descriptor is also used as a subject descriptor with an appropriate qualifier.

If the instrument is intended for a specific purpose, this is also indexed. The following examples illustrate the guidelines discussed.

DENSIMETERS/CALIBRATION
SOILS/DENSITY
MOISTURE GAGES/GAMMA SOURCES
GAMMA SOURCES/DESIGN

Radiation Effects on Instruments

Information dealing with radiation effects on instruments is indexed using subject descriptors for the instrument or component being affected. RADIATION EFFECTS (or appropriate narrower term, e.g., PHYSICAL RADIATION EFFECTS) is used as the qualifier. It should be noted that information on radiation effects is not indexed using subject descriptors for particles or radiations or types of effects, e.g., PHYSICAL RADIATION EFFECTS, unless the particular document has as its main subject the general concept of radiation effects.

Well Logging Instrumentation

Information on well logging instrumentation is indexed using the appropriate subject descriptor for the type of instrument, i.e., NEUTRON-GAMMA LOGGING, SP LOGGING, and the appropriate qualifier descriptor to reflect the emphasis of the paper. The qualifier descriptor WELL LOGGING EQUIPMENT should be used for papers on overall design or performance. Other qualifier descriptors may include such terms as DATA ANALYSIS and MEASURING METHODS and terms for specific components. The component or the general descriptor WELL LOGGING EQUIPMENT should also be indexed.

When the specific application of the instrumentation is discussed, i.e., oil wells, geothermal wells, the appropriate subject descriptor should be selected and the qualifier descriptor chosen to reflect the specific logging method.

Examples:

NEUTRON-NEUTRON LOGGING/NEUTRON SOURCES
NEUTRON SOURCES/DESIGN
RESISTIVITY LOGGING/DATA ANALYSIS
NATURAL GAS WELLS/INDUCTION LOGGING
INDUCTION LOGGING/WELL LOGGING EQUIPMENT
WELL LOGGING EQUIPMENT/PERFORMANCE

EXPLOSIONS AND EXPLOSIVES

Information on engineering applications, military applications, civil uses, and detection of nuclear explosions and preparation, performance, and properties of chemical explosives is included here. Also included is the use of chemical explosions for the simulation of nuclear explosions. Subject descriptors include such terms as NUCLEAR EXPLOSIONS, NUCLEAR EXPLOSIVES, NUCLEAR EXCAVATION, CHEMICAL EXPLOSIONS, CHEMICAL EXPLOSIVES, NUCLEAR EXPLOSION DETECTION, CONTAINED EXPLOSIONS, NUCLEAR WEAPONS, UNDERGROUND EXPLOSIONS, etc. Descriptors exist for some specific chemical explosives, e.g., DYNAMITE, PETN, and TNT, and should be used as subject descriptors when appropriate. Also, many specific nuclear explosions and nuclear explosion series are named, e.g., ALMENDRO EVENT, ARBOR PROJECT, and RULISON EVENT. Descriptors such as GROUND MOTION, SEISMIC EFFECTS, SEISMIC DETECTION, USES, etc., are normally used as qualifiers.

Examples:

TITLE: Analysis of Seismic Data from the Rio Blanco Explosion. Technical Report.
RIO BLANCO EVENT:T1
NATURAL GAS:T2
EXPLOSIVE STIMULATION:Q2
GROUND MOTION:Q1
SEISMIC WAVES

TITLE: Use of Nuclear Explosions in Underground Ore Recovery.
NUCLEAR EXPLOSIONS:T1
ORES:T2
GEOLOGIC DEPOSITS
USES:Q1
CRUSHING:Q2
ORE PROCESSING

TITLE: Equilibrium Water Vapor Pressure and Total Moisture Content Measurements on TATB.
TATB:T1
VAPOR PRESSURE:Q1
MOISTURE:Q1
EQUILIBRIUM
MEDIUM TEMPERATURE
PERMEABILITY

TITLE: Worldwide Detection Capability of a Prototype Network of Seismograph Stations.
NUCLEAR EXPLOSION DETECTION:T1
SEISMIC DETECTION:Q1
SEISMOGRAPHS:T2
PERFORMANCE:Q2

SEISMIC WAVES
MATHEMATICAL MODELS

TITLE: High Explosive Multiburst Phenomena.
Augmentation: (Simultaneous and nonsimultaneous detonations)
NUCLEAR EXPLOSIONS:M1
SIMULATION:Q1
ATMOSPHERIC EXPLOSIONS:M2
CHEMICAL EXPLOSIONS
SHOCK WAVES:Q2

TITLE: Computer Modeling of the Cabriolet Event.
CABRIOLET EVENT:T1
SEISMIC DETECTION:Q2
NUCLEAR EXPLOSION DETECTION:T2
COMPUTERIZED SIMULATION:Q1
CRATERING EXPLOSIONS
GROUND MOTION
MATHEMATICAL MODELS

TITLE: Ignition of Explosives by Detonation Cord.
CHEMICAL EXPLOSIVES:T1
DETONATORS:T2,Q1
INSTALLATION:Q2
COMPARATIVE EVALUATIONS:Q2
COAL MINING
DETONATIONS
IGNITION
RELIABILITY
SAFETY
UNDERGROUND MINING

TITLE: High-Temperature Shock Initiation of Explosives.
CHEMICAL EXPLOSIVES:T1
TNT:T2
DETONATIONS:Q1-2
SENSITIVITY:Q1-2
HIGH TEMPERATURE
MEDIUM TEMPERATURE
SHOCK WAVES
TEMPERATURE DEPENDENCE

ENVIRONMENTAL SCIENCES

This subject area is concerned with basic environmental-ecological studies, as well as studies of transport and diffusion of energy-related chemical and radioactive pollutants and thermal effluents in the atmospheric, aquatic, and terrestrial environments. Monitoring techniques are also covered. Subject descriptors are available to focus on the specific area of the environment involved, e.g., LAKES, TERRESTRIAL ECOSYSTEMS, EARTH ATMOSPHERE, URBAN AREAS, HANFORD RESERVATION. Other terms are used, as appropriate, that define the objects of the study. These may be either materials or other aspects, e.g., SULFUR DIOXIDE, FLY ASH, POLYCYCLIC AROMATIC HYDROCARBONS, ECOLOGY, FISHES, THERMAL EFFLUENTS. Descriptors that further delimit the nature of the study are also added, e.g., MONITORING, ENVIRONMENTAL TRANSPORT, MATHEMATICAL MODELS, POPULATION DYNAMICS.

Indexing and categorization in this subject area are illustrated by the following:

Example:

TITLE: CPS: A Continuous-Point-Source Computer Code for Plume Dispersion and Deposition Calculations.

PLUMES:T1
DEPOSITION
ENVIRONMENTAL TRANSPORT:Q1
COMPUTER CODES:T2
C CODES:Q2
DIFFUSION

The primary category for this paper should be 500200, ENVIRONMENTAL SCIENCES, ATMOSPHERIC—Chemicals Monitoring and Transport. Since the subject matter of the paper is applicable as well to the dispersal and deposition of radioactive aerosols, the category 500300, RADIOACTIVE MATERIALS MONITORING AND TRANSPORT, should also be added as secondary.

TITLE: Technology for the Control of Sulfur Oxides and Nitrogen Oxides in Japan.

SULFUR OXIDES:T1
NITROGEN OXIDES:T2
JAPAN:T3
AIR POLLUTION CONTROL:Q1-3

As before, this paper should be categorized to 500200.

TITLE: Mobility Distribution of ^{222}Rn Daughters in Laboratory Air.
Augmentation: (^{214}Bi, ^{214}Pb, ^{218}Po)

POLONIUM 218:T1
BISMUTH 214:T2
LEAD 214:T3
DIFFUSION:Q1-3
AIR:M4
RADIONUCLIDE MIGRATION:Q4

The appropriate category here is 500300.

TITLE: ^{90}Sr and ^{137}Cs in Raw Milk Collected in Japan from June 1967 through August 1970.

JAPAN:T1
FALLOUT DEPOSITS:Q1
CESIUM 137:T2
STRONTIUM 90:T3
RADIATION MONITORING:Q2-3
MILK:T4
RADIOACTIVITY:Q4

The category 510302, ENVIRONMENTAL SCIENCES, TERRESTRIAL—Radioactive Materials Monitoring and Transport, Terrestrial Ecosystems and Food Chains, should be assigned.

TITLE: Impact of Cooling Water on Lake Temperatures.
Augmentation: (Lake St. Croix, Minnesota)

THERMAL EFFLUENTS:M1
DISTRIBUTION:Q1
LAKES:M2
THERMAL POLLUTION:Q2
MINNESOTA

The appropriate category here is 520400, ENVIRONMENTAL SCIENCES, AQUATIC—Thermal Effluents Monitoring and Transport.

TITLE: Contamination of Groundwater by Heavy Metals from the Land Disposal of Fly Ash.
FLY ASH:T1
ENVIRONMENTAL EFFECTS:Q1
WASTE DISPOSAL:Q1
GROUND WATER:T2
WATER POLLUTION:Q2
METALS:T3
ENVIRONMENTAL TRANSPORT:Q3

(Also, index specific metals if given.)

The primary category 520200, ENVIRONMENTAL SCIENCES, AQUATIC—Chemicals Monitoring and Transport, should be assigned to this paper with 510200, ENVIRONMENTAL SCIENCES, TERRESTRIAL—Chemicals Monitoring and Transport, as secondary.

TITLE: A Four-Channel Portable Radiometer for Measuring Aerosol Opacity and Concentration of NO_2 and SO_2 Stack Plumes.
NITROGEN DIOXIDE:T1
SULFUR DIOXIDE:T2
MONITORING:Q1,Q2,Q4
AEROSOLS:T3
STACK DISPOSAL
PLUMES:T4
RADIOMETERS:T
OPACITY:Q3
SOLAR RADIATION

In this example the primary category should be 440300, INSTRUMENTATION—Miscellaneous Instruments, with a cross category to 500200.

TITLE: Atmospheric Diffusion in Mountainous Terrain.
EARTH ATMOSPHERE:T1
DIFFUSION:Q1
MOUNTAINS
TOPOGRAPHY

The category here should be 500100, ENVIRONMENTAL SCIENCES, ATMOSPHERIC—Basic Studies.

TITLE: Base-Line Ecology Studies in Cooling Pond of Proposed Fossil-Fuel Power Plant.
FOSSIL-FUEL POWER PLANTS
SITE SELECTION
COOLING PONDS:T1
BASE-LINE ECOLOGY:Q1

In the last example a category 520500, ENVIRONMENTAL SCIENCES, AQUATIC—Site Resource and Use Studies, should be assigned.

ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

The indexing of information relating to the broad social, economic, and environmental aspects of energy technologies and energy industry is illustrated by the following examples.

TITLE: Preliminary Report on the Agricultural Sector Impacts of Obtaining Ethanol from Grain.
SYNTHETIC FUELS INDUSTRY:T1
SOCIO-ECONOMIC FACTORS:Q2
AGRICULTURE:T2

ECONOMIC IMPACT:Q1,Q3
ETHANOL
ALCOHOL FUELS:T3
PRODUCTION:Q3
CEREALS
FERMENTATION

TITLE: Model for Rural Energy Development Impact Assessment.
RURAL AREAS:T1
ENERGY INDUSTRY:Q1,T2
ECONOMIC IMPACTS:Q2
ENERGY SOURCE DEVELOPMENT:T3
MATHEMATICAL MODELS

TITLE: Deepwater Port License Application: Volume 1. Final Environmental Impact Statement.
DEEP WATER OIL TERMINALS:T1
ENVIRONMENTAL IMPACT STATEMENTS:Q1
LICENSES
PETROLEUM
IMPORTS

BIOMEDICAL SCIENCES

The conventions for indexing in this subject field are best illustrated by examples. More general principles of indexing are covered elsewhere in this Guide.

Subject descriptors include those for animals, plants, microorganisms, biochemicals, biological systems and processes, organs, cells, biological effects, etc. While most of the descriptors for organisms are common names, some genus and species names are included for organisms more easily identified in this manner because of their common usage. Qualifier descriptors include those for properties, processes, effects, etc. The most specific descriptors available are used in every case. Title augmentation should be added when appropriate.

Examples are given below indicating various concepts to be indexed, tagged descriptor pairs for the printed indexes, and in some cases title augmentation. The descriptor strings are not exhaustive; in each case additional descriptors could be assigned to aid in computer searching.

Biomedical Sciences, Including Effects of Thermal and Chemical Pollution

This broad area includes biochemistry, genetics, metabolism, medicine, public health, agricultural and food technology, etc.

Examples:

TITLE: Trypsin-Induced ATPase Activity in Potato Mitochondria.
ATP-ASE:T1
SOLANUM TUBEROSUM:T2
TRYPSIN:T3
MITOCHONDRIA:T4
BIOCHEMISTRY:Q2,Q3,Q4
CHEMICAL ACTIVATION:Q1

In this case SOLANUM TUBEROSUM, the plant name, is used rather than the descriptor POTATOES, which is the preferred descriptor to be used in studies on the vegetable commodity. In each case the "Q" term is not highly precise, but BIOCHEMISTRY is the most specific descriptor available to qualify or delimit the main index term. The category assigned to this item should be 550200, BIOMEDICAL SCIENCES, BASIC STUDIES—Biochemistry.

TITLE: Lead Tolerance in Plantago Lanceolata and Cynodon Dactylon from a Roadside.
GRASS:T1
PLANTAIN:T2
LEAD:T3
TOLERANCE:Q1,Q2
BIOLOGICAL EFFECTS:Q3

In this case the indexer must request a new descriptor PLANTAIN, since usually the common name of a plant or animal is used in indexing. The category 560303, BIOMEDICAL SCIENCES, APPLIED STUDIES—Chemicals Metabolism and Toxicity Plants, should be assigned.

TITLE: Toxic Effects on Fuel Oils Discharged from Ships.
Augmentation: (Fish and brine shrimp)
FUEL OILS:M1
FISHES:T2
SHRIMP:T3
TOXICITY:Q1
INJURIES:Q2,Q3

In this case it is not apparent from the title alone that the animals studied were fishes and shrimp. Thus, the title must be augmented so that the index line in the printed index corresponding to the paired descriptors FUEL OILS and TOXICITY will be unambiguous.

FUEL OILS/TOXICITY
Title (Fish and brine shrimp)

The subcategories 560304, Chemicals Metabolism and Toxicity, Invertebrates, and 560305, Chemicals Metabolism and Toxicity, Vertebrates, would be assigned. Other appropriate cross categories include 020900, PETROLEUM—Environmental Aspects, and 520200, ENVIRONMENTAL SCIENCES, AQUATIC—Chemicals Monitoring and Transport.

TITLE: Turnover of Acetylcholine Receptors in Skeletal Muscle.
Augmentation: (Embryonic tissue cultures)
ACETYL CHOLINE:M1
MUSCLES:M2
METABOLISM:Q1,Q2

The category here would be 551000, BIOMEDICAL SCIENCES, BASIC STUDIES—Physiological Systems.

TITLE: Application of Cell-Analysis and Sorting Techniques to Disease Detection.
Augmentation: (Newcastle disease)
CELL FLOW SYSTEMS:M1
ANIMAL CELLS:M2
NEWCASTLE DISEASE:T3
DIAGNOSTIC USES:Q1
SORTING:Q2
DIAGNOSIS:Q3

Appropriate categories here would be BIOMEDICAL SCIENCES, BASIC STUDIES—Medicine (550600) and Cytology (550300).

TITLE: Maleyacetone cis-trans-Isomerase: Affinity Chromatography on Glutathione-Bound Sepharase Two-Substrate-Binding Sequence from Inhibition Patterns.
ISOMERASES:T1
ENZYME INHIBITORS:T2
GLUTATHIONE:T3
BIOCHEMICAL REACTION KINETICS:Q1,Q2
CHEMICAL BONDS

As in the first example the category 550200 would be assigned.

Radiation Effects on Biochemicals, Cells, Microorganisms, Plants, and Animals

Subject descriptors used in this field are those identifying biochemicals, cells, microorganisms, plants, animals, food classes, medical supplies, radiosensitizing and radioprotective substances, and processes and conditions induced by radiation. Qualifier descriptors designate specific radiation effects, factors that modify radiation effects, radiation quality and dosimetry, etc.

Examples:

TITLE: Influence of Ultrafast Repair Processes on the Yield of DNA Single-Strand Breaks in Escherichia Coli.

Augmentation: (Oxygen effects on x-ray effects)

DNA:M1
OXYGEN:T2
STRAND BREAKS:T3,Q1
RADIOSENSITIVITY EFFECTS:Q2
BIOLOGICAL REPAIR:Q3

The descriptor pair ESCHERICHIA COLI/GENETIC RADIATION EFFECTS would be used only if the information was peculiar to E. coli and was a prime topic of the publication. In every instance only the main topics of the paper are tagged for the printed index. In the above example the term E. coli would be important as augmentation had it not appeared in the title. Appropriate categories would be BIOMEDICAL SCIENCES, APPLIED STUDIES—Radiation Effects on Biochemicals in Microorganisms (560112) and Radiation Effects on Cells, Basic Studies (560131).

TITLE: Influence of γ Radiation on Lymphocytes.

Augmentation: (Chromosome aberrations and phytohemagglutinin effects)

PHYTOHEMAGGLUTININ:T1
LYMPHOCYTES:M2
CHROMOSOMAL ABERRATIONS:T3
RADIOSENSITIVITY EFFECTS:Q1
BIOLOGICAL RADIATION EFFECTS:Q2
RADIOINDUCTION:Q3

TITLE: Cell Cycle Dependence on Lethal Radiation Response in Mammalian Cells.

Augmentation: (LET, dose fractionation, x radiation, HeLa cells)

HELA CELLS:M1
CELL CYCLE:M2
OXYGEN:M3
BIOLOGICAL RADIATION EFFECTS:Q1
RADIOSENSITIVITY EFFECTS:Q2,Q3

The category for the above two examples would be 560121, BIOMEDICAL SCIENCES, APPLIED STUDIES—Radiation Effects on Cells, External Source.

TITLE: First Generation of Barley after Treatment with Radioprotectors and Gamma Rays.

Augmentation: (Cystamine and iron chlorides)

The subcategory here would be 560141, Radiation Effects on Plants, Basic Studies.

If no descriptor exists for a particular radioprotective substance or for the class of substances in which it logically belongs, the indexer must request a new term. The very broad term RADIOPROTECTIVE SUBSTANCES is reserved for indexing general treatments of the subject. When the subject descriptor used differs from the term used in the publication, the name used in the publication is included as augmentation if it is not already indicated by the title.

TITLE: Relative Biological Effectiveness of 14-MeV Neutrons and X Rays in Suppression of Humoral Immune Response.

Augmentation: (Mice)

FAST NEUTRONS:M1
HEMATOPOIETIC SYSTEM:T2

X RADIATION:M3
IMMUNE REACTIONS:M4
RBE:Q1,Q3
IMMUNOSUPPRESSION:Q2
RADIOSENSITIVITY:Q4

The subcategory would be 560152, Radiation Effects on Animals, Vertebrates.

TITLE: Thermal Enhancement of Radiosterilization.
Augmentation: (Bacteria, γ radiation)

RADIOSTERILIZATION:M1,Q4
BACTERIA:M3
TEMPERATURE EFFECTS:Q1
MEDICAL SUPPLIES:M4
HYPERTHERMIA:M2
RADIOSENSITIVITY EFFECTS:Q2
RADIOSENSITIVITY:Q3

The appropriate subcategory for this example is 560133, Radiation Effects on Microorganisms, Radiosterilization of Medical Supplies.

TITLE: Biological Effects of Small Doses of Radiation.
Augmentation: (Nagasaki survivors)

A-BOMB SURVIVORS:M1
MAN:T2
DIAL PAINTERS:T3
FETUSES:T4
RADIOTHERAPY:T5
FERTILITY:Q1
LOW DOSE IRRADIATION:Q2
DELAYED RADIATION EFFECTS:Q3
RADIATION DOSES:Q4
SIDE EFFECTS:Q5

This item would be assigned such subcategories as 560151, Radiation Effects on Animals, Man, and 560161, Radionuclide Effects—Internal Source, Man. The cross category 550603, BIOMEDICAL SCIENCES, BASIC STUDIES—Medicine, External Radiation in Therapy, would be assigned.

TITLE: Role of RNA-ase Kinetics in Radiochemistry of Microorganisms.
Augmentation: (Bacillus subtilis)

RNA-ASE:M1
BACILLUS SUBTILIS:T2
BIOLOGICAL RADIATION EFFECTS:Q1
RADIOSENSITIVITY:Q2

TITLE: Radiation Processing of Shrimp.
Augmentation: (Shelf life and taste)

SEAFOOD:M1
RADIOPRESERVATION:Q1
FLAVOR
STORAGE LIFE

The subcategory 560132 would be assigned to the above two examples. An appropriate cross category for the second example would be 070202, ISOTOPE AND RADIATION SOURCE TECHNOLOGY—Radiation Sources, Use in Food Processing.

TITLE: Use of X Radiation for Control of Screw Worm Flies by the Sterile Male Technique.
Augmentation: (Cochliomyia)

PEST CONTROL:M1
STERILE MALE TECHNIQUE:Q1
FLIES:M2
RADIOSTERILIZATION:Q2

The subcategory 560156, Radiation Effects on Animals, Pest Control, would be assigned.

Radionuclide Effects, Kinetics, and Toxicology

In addition to the subject descriptors and qualifiers used in indexing the preceding information, subject descriptors for radioisotopes and other toxic materials employed in nuclear technology are used in this category. These subject descriptors are qualified with descriptors that indicate uptake, metabolism, and effects.

Examples:

TITLE: Lung Cancer Among Miners.
Augmentation: (Radon daughter activity, Sweden)
LUNGS:M1
NEOPLASMS:M2
BIOLOGICAL RADIATION EFFECTS:Q1
RADIOINDUCTION:Q2
MINERS
RADIATION HAZARDS

The subcategory for this example would be 560161.

TITLE: Hematological Changes After Administration of Therapeutic Doses of Radioactive Iodine.
IODINE 131:T1
BLOOD CELLS:T2
LEUKEMIA:T3
RADIOTHERAPY:T4
SIDE EFFECTS:Q4
LEUKEMOGENESIS:Q1
DELAYED RADIATION EFFECTS:Q2
RADIOINDUCTION:Q3

The subcategory 560161 would be assigned with an appropriate cross category 550604, BIOMEDICAL SCIENCES, BASIC STUDIES—Medicine, Unsealed Radionuclides in Therapy.

TITLE: Toxicity to Blood Cells of ^{241}Am.
Augmentation: (Leukocyte recovery, α particles)
AMERICIUM 241:M1
LEUKOCYTES:M2
TOXICITY:Q1
BIOLOGICAL RADIATION EFFECTS:Q2

The appropriate subcategories for this example would be 560161 and 560171.

TITLE: Dynamics of ^{90}Sr in Bone Tissue in the Population of the Soviet Union.
STRONTIUM 90:T1
BONE TISSUES:T2
TEETH:T3
HUMAN POPULATIONS:T4
UPTAKE:Q1
RADIONUCLIDE KINETICS:Q2,Q3
RADIATION DOSES:Q4
USSR

TITLE: Californium Retention in Beagles During the First Year After Injection.
Augmentation: (Total-body and liver injection)
CALIFORNIUM 249:M1
CALIFORNIUM 252:M2
LIVER:M3
BEAGLES:M4
RETENTION:Q1,Q2
RADIONUCLIDE KINETICS:Q3,Q4

The subcategories for the last two examples would be 560171 and 560172, respectively.

Tracer Techniques

The most commonly needed terms for both subject descriptors and qualifiers are TRACER TECHNIQUES and those for isotopes and organisms, biological processes, etc. The subject descriptor TRACER TECHNIQUES is used only when the technique is of primary consideration, not as a collecting point for all references to all tracer applications.

Example:
TITLE: Effects of Tilling on Nitrogen Cycling in Cultivated Soils.
Augmentation: (^{15}N)
NITROGEN:M1
ECOLOGICAL CONCENTRATION:Q1
SOILS:M2
NITROGEN CYCLE:Q2
NITROGEN 15:T3
TRACER TECHNIQUES:Q3

The category here would be 553001, BIOMEDICAL SCIENCES, BASIC STUDIES—Agriculture and Food Technology.
Examples of likely subject/qualifier pairings are:
PHOTOSYNTHESIS/TRACER TECHNIQUES
TRACER TECHNIQUES/DOUBLE LABELLING
PHOSPHORUS 33/TRACER TECHNIQUES
GALLIUM 68/SCINTISCANNING
ADRENALINE/RADIOIMMUNOASSAY

HEALTH AND SAFETY

General health and safety studies are included in this category. Health and safety studies related to specific materials or facilities are included under categories for the materials or facilities, with a cross-category HEALTH AND SAFETY.

Examples:
TITLE: Radiation Safety Training Criteria for Industrial Radiography.
INDUSTRIAL RADIOGRAPHY:T1
OCCUPATIONAL SAFETY:Q1
RADIATION PROTECTION:T2
EDUCATION:Q2
MANUALS

TITLE: The Transport of Radioactive Materials.
RADIOACTIVE MATERIALS:T1
TRANSPORT REGULATIONS:Q1
ACCIDENTS
RADIATION SOURCES

RADIOACTIVE WASTES
SEALED SOURCES
SPENT FUELS

TITLE: Health Risks Associated with Land Application of Municipal Sludge.
RECYCLING:T1
SEWAGE SLUDGE:T2
HEALTH HAZARDS:Q1,Q2
BIOLOGICAL ACCUMULATION
FOOD CHAINS
METALS
PESTICIDES

In the third example above, the prime category is 510200, ENVIRONMENTAL SCIENCES, TERRESTRIAL–CHEMICALS MONITORING AND TRANSPORT, with HEALTH AND SAFETY as a secondary category. Another applicable secondary category is 560300, CHEMICALS METABOLISM AND TOXICITY.

GEOSCIENCES

This subject area is concerned with basic studies in the earth sciences, as well as more applied studies in energy-related fields such as Petroleum, Coal and Coal Products, Oil Shales and Tar Sands, and Geothermal Energy, from which articles may be cross-referenced. Material is indexed using the most specific descriptors available. A complete thesaurus of geologic terms is still being developed; therefore it may be necessary to introduce new descriptors as appropriate for the article being indexed. Studies are generally indexed to a specified geographical area using available subject descriptors for the region, state, or country. Title augmentation should be added when appropriate. Subject descriptors include those for geographical location, material, or phenomenon studied, e.g., VOLCANIC ROCKS, PACIFIC NORTHWEST REGION, EARTHQUAKES, SALT DEPOSITS. Qualifier descriptors include those for properties, processes, or techniques, e.g., LITHOLOGY, UPWELLING, WAVE PROPAGATION, PETROGENESIS, SEA-FLOOR SPREADING. Because research in the geosciences often crosses category boundaries, cross-categorization (and appropriate descriptors) is important. The conventions for indexing in this subject field are best illustrated by the examples below.

Geology and Hydrology

TITLE: Logs of Exploratory Holes in Tatum Dome (for Underground Explosion Detection).
MISSISSIPPI:T1
SALT DEPOSITS:T2,Q1
STRATIGRAPHY:Q2
LITHOLOGY:Q2

TITLE: Velocity Cross Sections near Tatum Dome
MISSISSIPPI:T1
STRATIGRAPHY:Q1

TITLE: Annotated Bibliography of the Columbia Plateau (Columbia River Basalt) and Adjacent Areas of Oregon.
OREGON:T1
STRATIGRAPHY:Q1
TECTONICS:Q1
HYDROLOGY:Q1
COLUMBIA RIVER
BASALT
UNDERGROUND STORAGE

RADIOACTIVE WASTE STORAGE
BIBLIOGRAPHIES
GEOLOGIC STRUCTURES
SEISMICITY

TITLE: Problems in Hydrology (Book in Russian).
HYDROLOGY:T1
REVIEWS:Q1

Seismology and Tectonics

TITLE: Frequency of Recent Earthquakes in the Northwest U.S.
PACIFIC NORTHWEST REGION:T1
SEISMICITY:Q1

TITLE: Present Status of Dilatancy Theory.
EARTHQUAKES:T1
FORECASTING:Q1

TITLE: Variations of Seismic Wave Velocities in the Earth's Crust.
SEISMIC WAVES:T1
VELOCITY:Q1
EARTH CRUST:T2
WAVE PROPAGATION:Q2
ATTENUATION
VARIATIONS

TITLE: Volcanic Zones of Central Priamur'ya.
SIBERIA:T1
VOLCANISM:Q1
GEOLOGIC STRATA
MAGMA
MESOZOIC ERA

TITLE: Dynamic Effects Accompanying Upwelling of Magmas.
MAGMA:T1
UPWELLING:Q1

TITLE: Improved Algorithm for Processing of Data from Magnetotelluric Surveys.
MAGNETOTELLURIC SURVEYS:T1
ALGORITHMS
DATA PROCESSING:Q1

Mineralogy, Petrology, and Rock Mechanics

TITLE: Large-Scale Test of Permeability and Thermal Conductivity of Granite.
GRANITES:T1
PERMEABILITY:Q1
THERMAL CONDUCTIVITY:Q1

TITLE: Creep Model for Salt.
SALT DEPOSITS:T1
CREEP:Q1
STRAIN RATE
MATHEMATICAL MODELS

TITLE: Sulfide Fabrics in Nickel Sulfide Ores from Kambalda, Australia.
WESTERN AUSTRALIA:T1
NICKEL ORES:T2,Q1
PYRRHOTITE:T3
MINERALOGY:Q2,Q3

TITLE: Mineralogy and Petrology of an Iron Formation near Ardua Lake, Quebec.
QUEBEC:T1
IRON ORES:T2,Q1
MINERALOGY:Q2
PETROLOGY:Q2

Geochemistry

TITLE: Radiochemical Studies of Deep-Sea Manganese Nodules.
PACIFIC OCEAN:T1
MANGANESE ORES:T2,Q1
ISOTOPE RATIO:Q2
MINERALOGY
PROTACTINIUM 231
THORIUM 230
RADIOCHEMICAL ANALYSIS
URANIUM

TITLE: Study of Oxidation Layers on Surfaces of Chalcopyrite by Use of Auger Electron Spectroscopy.
CHALCOPYRITE:T1
AUGER ELECTRON SPECTROSCOPY:Q1
OXIDATION:Q1
SURFACE PROPERTIES:Q1

TITLE: Geochemistry of Altered Volcanic Rocks at Matagami, Quebec.
QUEBEC:T1
VOLCANIC ROCKS:T2,Q1
GEOCHEMISTRY:Q2
PETROGENESIS:Q2

Oceanography

TITLE: Evolution of the Last Pacific Rise Between 3°S and 13°S Since the Middle Miocene.
PACIFIC OCEAN:T1
EARTH CRUST
PLATE TECTONICS
SEA-FLOOR SPREADING:Q1

TITLE: Instabilities of Zonal Equatorial Currents.
ATLANTIC OCEAN:T1
PACIFIC OCEAN:T2
WATER CURRENTS:Q1,Q2
EQUATOR
INSTABILITY
SHEAR
WATER WAVES

TITLE: Sea Bottom Scouring in the Canadian Beaufort Sea.
BEAUFORT SEA:T1
SEA BED:T2,Q1

SOIL MECHANICS:Q2
CONTINENTAL SHELF
OFFSHORE PLATFORMS
SEISMIC SURVEYS

TITLE: Wind and Wave Model for Hurricane Wave Spectra.
HURRICANES:T1
WAVE FORCES:Q1
LOUISIANA
COASTAL WATERS
WIND
MATHEMATICAL MODELS

ASTROPHYSICS AND COSMOLOGY

Cosmic Radiation

For information on cosmic radiation, descriptors are available for specific cosmic particles such as COSMIC PROTONS, COSMIC NEUTRONS, COSMIC PIONS, COSMIC MUONS, COSMIC NUCLEI, etc. These descriptors are always used as subject descriptors for particle-specific information. For information of a more general nature the descriptors PRIMARY COSMIC RADIATION, SECONDARY COSMIC RADIATION, COSMIC SHOWERS, COSMIC RADIATION, and EXTENSIVE AIR SHOWERS are available. Qualifiers used with these descriptors will reflect the specific aspect of interest, such as ENERGY SPECTRA, ACCELERATION, ORIGIN, DAILY VARIATIONS, etc.

Examples:

TITLE: Momentum Spectra and Charge Ratios of Muons.
Augmentation: (Sea level, 50 to 1000 GeV)
COSMIC MUONS: M1
LINEAR MOMENTUM:Q1
MINUS-PLUS RATIO:Q1
SEA LEVEL
GEV RANGE 10-100
GEV RANGE 100-1000

TITLE: Primary Cosmic Ray Spectrum from 10^{11} eV to 10^{18} eV.
PRIMARY COSMIC RADIATION:T1
ENERGY SPECTRA:Q1
GEV RANGE 100-1000
TEV RANGE
PEV RANGE

In indexing information on nuclear reactions or particle–particle interactions, where cosmic particles are used as incident particles, the descriptor for the cosmic particle is not used as a subject descriptor, but this term should be included as an unflagged descriptor. For guidelines on indexing this information, refer to portions of this guide on NUCLEAR PHYSICS or HIGH ENERGY PHYSICS.

Stars

Information on stellar phenomena is indexed using the descriptor STARS or descriptors for types or classes of stars, e.g., WHITE DWARF STARS, T TAURI STARS, SUPERNOVAE, etc. Descriptors such as STAR EVOLUTION, STELLAR ATMOSPHERES, and STAR CLUSTERS are also available. Qualifiers should reflect the specific phenomenon or property studied, e.g., CHEMICAL COMPOSITION, THERMONUCLEAR REACTIONS, EMISSION SPECTRA, etc.

Example:

TITLE: R-Process Nucleosynthesis in Supernova Envelopes.
SUPERNOVAE:T1
R PROCESS:Q1

Quasi-Stellar, Radio, Gamma, and X-Ray Sources

Indexing guidelines for information on these celestial phenomena parallel the guidelines for stellar phenomena, except that such descriptors as QUASARS, BLACK HOLES, COSMIC X-RAY SOURCES, etc., are used.

Example:

TITLE: Gravitational Redshifts of Some Quasi-Stellar Objects.
QUASARS:T1
REDSHIFT:Q1
EINSTEIN EFFECT

Solar Phenomena

Descriptors such as SOLAR CORONA, PHOTOSPHERE, CHROMOSPHERE, SUNSPOTS, SOLAR PROTONS, SOLAR WIND, etc., are available for indexing solar phenomena.

Example:

TITLE: Electron Densities in Solar Corona During Eclipse of March 7, 1970.
SOLAR CORONA:T1
ELECTRON DENSITY:Q1
ECLIPSE

The guidelines for indexing information on solar radiation parallel those for cosmic radiation.

Example:

TITLE: Upper Limits on the Solar Neutrino Flux.
SOLAR NEUTRINOS:T1
FLUX DENSITY:Q1
LIMITING VALUES

Galaxies

Information in this area is indexed using descriptors such as GALAXIES, MILKY WAY, MAGELLANIC CLOUDS, RADIO GALAXIES, etc.

Example:

TITLE: Neutral Hydrogen Distribution in Large Magellanic Cloud.
MAGELLANIC CLOUDS:T1
H1 REGIONS:T2,Q1
SPATIAL DISTRIBUTION:Q2

Cosmology

Theoretical information relating to cosmology and related topics is indexed using descriptors such as COSMOLOGY, COSMOLOGICAL MODELS, UNIVERSE, GRAVITATION, GENERAL RELATIVITY THEORY, etc. Qualifiers will reflect the specific aspect of interest. Note that highly specific descriptors, e.g., SCHWARZSCHILD METRIC, HUBBLE EFFECT, etc., need not have a qualifier.

Planetary Phenomena

Information on the planets, the moon, and planetary and lunar phenomena is indexed using descriptors for the individual planets with the qualifier term reflecting the specific aspect, property, or phenomenon studied.

Example:

TITLE: Electron Density in the Jovian Magnetosphere.
JUPITER PLANET:T1
PLANETARY MAGNETOSPHERES:Q1
ELECTRON DENSITY

ATMOSPHERIC PHYSICS

Auroral and Ionospheric Phenomena

For auroral phenomena such descriptors as AIRGLOW, AURORAE, AURORAL ZONES, POLAR REGIONS, etc., are available. For ionospheric phenomena the subject descriptor IONOSPHERE or the subject descriptor for one of its regions (D REGION, E REGION, or F REGION) is used depending upon the specificity indicated. Qualifier descriptors indicate the specific property or phenomenon studied.

Examples:

TITLE: Structure and Dynamics of Ionization and Luminosity During Auroral Events.
AURORAE:T1
IONIZATION:Q1
LUMINOSITY:Q1

TITLE: Latitudinal Evolution of the Ionospheric Electron Content.
Augmentation: (Diurnal variations; Faraday effect)
IONOSPHERE:M1
ELECTRON DENSITY:Q1
LATITUDE EFFECT
DAILY VARIATIONS
FARADAY EFFECT

TITLE: Evidence for Fe^+ in a Sporadic-E Layer.
SPORADIC E:T1
IONIC COMPOSITION:Q1
IRON IONS

Effects of Nuclear Detonations

For upper atmospheric effects from a nuclear explosion, the subject descriptor NUCLEAR EXPLOSIONS is used with appropriate qualifier descriptors together with a subject descriptor for the atmospheric layer involved and a qualifier descriptor for the specific effect, property, or phenomenon resulting from the explosion. The descriptor ATMOSPHERIC EXPLOSIONS is included among the unflagged descriptors.

Example:

TITLE: Ionospheric Disturbances Caused by Nuclear Explosions.
Augmentation: (China, Dec. 1968)
NUCLEAR EXPLOSIONS:T1
GRAVITY WAVES:Q1
ATMOSPHERIC EXPLOSIONS
IONOSPHERE:T2
DISTURBANCES
ELECTRON DENSITY:Q2
CHINA

Magnetospheric Phenomena

The term "magnetosphere" is used for that region in which the geomagnetic field strongly influences the dynamics of ionized gas or charged particles; practically speaking, it includes all phenomena occurring

beyond the ionospheric F2 layer (~200 km) out to the outer boundary of the geomagnetic field. Solar-wind interactions with the geomagnetic field are included here. Broad descriptors such as GEOMAGNETIC FIELD, MAGNETOSPHERE, RADIATION BELTS, SOLAR WIND, and SOLAR RADIATION are available, in addition to descriptors for areas within the magnetosphere, e.g., MAGNETOPAUSE, MAGNETOTAIL, and PLASMASPHERE. Qualifier descriptors indicate the particular property or phenomenon studied.

Examples:

TITLE: Plasma Flow in the Distant Geomagnetic Tail.
MAGNETOTAIL:T1
PLASMA DRIFT:Q1

TITLE: X Rays Associated with Energetic Electron Precipitation near the Trapping Boundary.
RADIATION BELTS:T1
ELECTRON PRECIPITATION:Q1
X RADIATION

TITLE: Response of the Magnetosphere to the Solar Wind.
MAGNETOSPHERE:T1
SOLAR WIND:T2,Q1
INTERACTIONS:Q2

ATOMIC, MOLECULAR, AND CHEMICAL PHYSICS

Information on specific collisions and beam interactions involving electrons, ions, atoms, or molecules is indexed using qualifying descriptors that indicate the classes of particles taking part in the collision, e.g., ELECTRON-ATOM COLLISIONS, ION–ATOM COLLISIONS, ATOM-MOLECULE COLLISIONS, ELECTRON–MOLECULE COLLISIONS, and subject descriptors that indicate the elements or materials involved in the collision. The subject descriptors ATOM-ATOM COLLISIONS, ION-ION COLLISIONS, MOLECULE-MOLECULE COLLISIONS, etc., are used for indexing theoretical information where the specific ions, atoms, or molecules are not mentioned or for indexing generally applicable experimental information. The descriptors ELECTRON-ATOM COLLISIONS, ELECTRON-ION COLLISIONS, and ELECTRON-MOLECULE COLLISIONS are, of course, exceptions to this rule. Note: In this category, when protons are the incident particle, use HYDROGEN IONS 1 PLUS, *not* PROTONS.

Examples:

TITLE: Cross Sections for the Production of Lyman-Alpha Radiation by Fast-Proton Impact on H_2.
Augmentation: (20 to 120 keV)
HYDROGEN IONS 1 PLUS:M1
HYDROGEN:M2
ION-MOLECULE COLLISIONS:Q1,Q2
EXCITATION
ELECTRON CAPTURE
LYMAN LINES
KEV RANGE 10-100
KEV RANGE 100-1000

TITLE: Excitation of Metastable States of N_2 by Electron Impact.
Augmentation: (0 to 40 eV)
NITROGEN:M1
METASTABLE STATES
ELECTRON-MOLECULE COLLISIONS:M2,Q1
EXCITATION:Q2
EV RANGE 01-10
EV RANGE 10-100

TITLE: Single-Charge Transfer Between He^{++} and He, Ne, and Ar: Observed Selection Rule for Exit Channels.

Augmentation: (0.2 to 10 keV)

HELIUM IONS:M1
HELIUM:M2
ARGON:M3
NEON:M4
ION-ATOM COLLISIONS:Q1,Q2,Q3,Q4
EV RANGE 100-1000
KEV RANGE 01-10
CHARGE EXCHANGE

The products of a collision are indexed *only* if the properties of the products are studied, if production is of primary concern, or if the product is new or unusual. Note: Qualifiers used with ELECTRON-MOLECULE COLLISIONS, ATOM-ATOM COLLISIONS, etc., indicate the collision phenomenon or aspect of interest, e.g., IONIZATION, DISSOCIATION, CHARGE EXCHANGE.

For indexing information on the collisions of electrons, ions, or atoms with solid materials, the qualifier descriptors ELECTRON COLLISIONS, ATOM COLLISIONS, MOLECULE COLLISIONS, or ION COLLISIONS are used with subject descriptors for the material and the qualifier descriptor COLLISIONS with the subject descriptor for the incoming particle. SPUTTERING is used as a qualifying term where appropriate.

Examples:

TITLE: Ejection Patterns in Sputtering of Copper by Argon Ions.

Augmentation: (1 to 5 keV)

COPPER:M1
SPUTTERING:Q1
ARGON IONS:M2
COLLISIONS:Q2
KEV RANGE 01-10
ANGULAR DISTRIBUTION

TITLE: Scattering of Cs Atoms by a Ta Surface.

Augmentation: (10 keV)

CESIUM:M1
COLLISIONS:Q1
TANTALUM:M2
ATOM COLLISIONS:Q2
KEV RANGE 10-100
ELASTIC SCATTERING
ANGULAR DISTRIBUTION
SURFACES

The subject descriptor COLLISIONS is used when indexing broad-scope or very general information on collisions; for example, "Charge-Exchange Collisions Involving Pseudocrossing of Potential-Energy Surfaces is indexed:

COLLISIONS:T1
CHARGE EXCHANGE:Q1

Information on mesic atoms and molecules is indexed using the subject descriptors MESIC ATOMS or MESIC MOLECULES or more specific descriptors such as KAONIC ATOMS or PIONIC ATOMS. The descriptors MUONIC ATOMS and MUONIC MOLECULES are also available. Subject descriptors for specific atoms or molecules are also used.

Example:

TITLE: Hyperfine Structure of Muonic Atoms of Thallium.

THALLIUM:T1

MUONIC ATOMS:T2,Q1
HYPERFINE STRUCTURE:Q2

Information on atomic or molecular properties of specific elements or compounds is indexed using appropriate subject descriptors for the element, ion, or compound with qualifiers indicating the specific property or aspect of interest, e.g., EMISSION SPECTRA, HYPERFINE STRUCTURE, AUGER EFFECT.

Examples:

TITLE: Observation of Double Electron Excitation in H_2 by Photoelectron Spectroscopy.
Augmentation: (Dissociative photoionization)
HYDROGEN:M1
EXCITATION:Q1
PHOTOIONIZATION
ENERGY-LEVEL TRANSITIONS

TITLE: Resonance Lines of Ce V and Ce VI.
CERIUM IONS:T1
EMISSION SPECTRA:Q1
MULTICHARGED IONS
ENERGY LEVELS

TITLE: Laser-Raman Spectrum of Solid Uranium Hexachloride.
URANIUM CHLORIDES:T1
RAMAN SPECTRA:Q1
LASER RADIATION

Theory and calculations concerning the structure and properties of atoms and molecules in general are indexed using the subject descriptors ATOMS and MOLECULES and qualifiers that indicate the particular property or aspect of structure considered. The subject descriptor ATOMIC MODELS is used for reasonably complete representations of the properties and structure of atoms or for hypothetical systems intended to represent atoms.

Examples:

TITLE: Calculation of Correlation Energy for a Many-Electron Atom in the Two-Body Approximation.
ATOMS:T1
ELECTRON CORRELATION:Q1
TWO-BODY PROBLEM

TITLE: General Theory of Spin-Coupled Wave Functions for Atoms and Molecules.
Augmentation: (Spatial symmetry of orbitals)
ATOMS:M1
MOLECULES:M2
WAVE FUNCTIONS:Q1,Q2
L-S COUPLING
SYMMETRY

TITLE: General Theory of the Extended Method of Calculation of Atomic Structures.
ATOMS:T1
ELECTRONIC STRUCTURE:Q1

Specific subject descriptors are available for particular atomic models, e.g., THOMAS-FERMI MODEL, specific atomic theories, e.g., BOHR THEORY, or calculational methods, e.g., SLATER METHOD, which may be used with or without qualifier descriptors, as appropriate.

Example:

TITLE: Evaluation of Approximations to Hartree-Fock Exchange.
HARTREE-FOCK METHOD:T

FLUID PHYSICS

Information on the dynamic and static properties of fluids is indexed using the most specific descriptors available to indicate the specific fluid or type of fluid investigated and the properties, characteristics, processes, or actions determined. Few guidelines can be given due to the diversity of information encountered in this subject area, but the following examples are illustrative of the general pattern:

Examples:

TITLE: Radial Temperature Distribution in a Glow Discharge.
GLOW DISCHARGES:T1
TEMPERATURE DISTRIBUTION:Q1

TITLE: Liquidlike Behavior of Fluidized Beds.
FLUIDIZED BEDS:T1
KINETICS:Q1

TITLE: Model for Density Variations at a Fluid Surface.
FLUIDS:T1
SURFACE PROPERTIES:Q1
DENSITY:Q1
MATHEMATICAL MODELS

Magnetohydrodynamics

Information on the flow of conducting fluids in magnetic or crossed electric and magnetic fields is indexed using the subject descriptors MAGNETOHYDRODYNAMICS or MAGNETOGASDYNAMICS as appropriate. Qualifier descriptors will reflect the specific aspect studied. Descriptors are also available for MAGNETOACOUSTIC WAVES and HYDROMAGNETIC WAVES. For broad-scope information, e.g., books, review articles, or conferences, the qualifiers REVIEWS and MEETINGS are appropriate.

Examples:

TITLE: Behavior of a Magnetohydrodynamic Boundary Layer at Low Magnetic Reynolds Number.
MAGNETOHYDRODYNAMICS:T1
BOUNDARY LAYERS:Q1
MAGNETIC REYNOLDS NUMBER

TITLE: Kinematic Formulation of Rotational Flow in Magnetogasdynamics.
MAGNETOGASDYNAMICS:T1
VORTEX FLOW:Q1
KINETIC EQUATIONS

Electrohydrodynamics

Information on the flow of nonconducting fluids in electric fields is indexed in the same manner as indicated above for MHD.

Example:

TITLE: Structure of EHD Shock Waves.
ELECTROHYDRODYNAMICS:T1
SHOCK WAVES:Q1
WAVE FORMS

Superfluidity

Since superfluidity has been found in phase II of liquid ^{4}He and in the A, Al, and B phases of ^{3}He, subject descriptors must reflect the specific phase studied. In the case of superfluidity in ^{4}He or in dilute solutions of ^{3}He in ^{4}He, the subject descriptor HELIUM II is used. Include "^{3}He–^{4}He solutions" in the augmentation if it is not indicated in the title. Qualifier descriptors will reflect the specific aspects studied.

Examples:

TITLE: Osmotic Pressure Waves in Liquid Helium Solutions.
Augmentation: (^{3}He–^{4}He solutions)
HELIUM II:M1
OSMOSIS:Q1
HELIUM 3
SOLUTIONS
PRESSURE GRADIENTS
WAVE PROPAGATION

TITLE: Density and Viscosity of ^{3}He-A and -B.
HELIUM 3 A:T1
HELIUM 3 B:T2
DENSITY:Q1,Q2
VISCOSITY:Q1,Q2

The descriptor SUPERFLUIDITY should be used as a qualifier for information on ^{3}He that does not specify the phase or for information on the possible superfluidity of other liquids.

Example:

TITLE: Evidence for a Superfluid Phase Transition in Helium 6.
Augmentation: (Fourth sound)
HELIUM 6:M1
SUPERFLUIDITY:Q1
PHASE TRANSFORMATIONS
FOURTH SOUND

Purely theoretical information that does not refer to specific liquids is indexed using the subject descriptor SUPERFLUIDITY and appropriate qualifier descriptors.

HIGH-ENERGY PHYSICS

The discovery and understanding of the basic symmetries and basic laws of structure of the material universe, which are the goals of high-energy physics, are pursued mainly through studies of the interactions and properties of the so-called "elementary particles" as well as theories and hypotheses that attempt to classify and explain the regularities of these interactions and properties. Descriptors are chosen to reflect the total information content. Guidelines for subject indexing are given below.

As a general rule, experimental and theoretical information is indexed by using subject descriptors for the specific particles, e.g., ETA-958 RESONANCES, types of particles, e.g., BARYONS, specific particle–particle interactions, e.g., PION PLUS-PROTON INTERACTIONS, or types of interactions, e.g., WEAK INTERACTIONS. Qualifying terms should reflect the significant features studied. In addition, specific models or theories investigated should also be indexed by use of appropriate subject descriptors. Guidelines for specific subject areas are illustrated below.

In indexing information on particle interactions, subject descriptors are used for the specific interaction or type of interaction, and qualifiers reflect the specific feature or property studied. If the interaction is used as a tool for investigating a particular theory or model or testing the predictions of a theory or model, subject descriptors should be included for the specific theory or model with qualifiers reflecting the significant aspects; for example,

PION MINUS-PROTON INTERACTIONS/BARYON-EXCHANGE MODELS
STRONG INTERACTIONS/GLUON MODEL
MULTIPERIPHERAL MODEL/INCLUSIVE INTERACTIONS
NEUTRINO–NUCLEON INTERACTIONS/DEEP INELASTIC SCATTERING
QUANTUM CHROMODYNAMICS/SELECTION RULES

Information on particle properties is indexed by using subject descriptors for specific particles or classes of particles and qualifiers for the specific property discussed, e.g.,

HADRONS/ELECTROMAGNETIC FORM FACTORS
F-1260 RESONANCES/ISOSPIN
PSI-3772 RESONANCES/LIFETIME
VECTOR MESONS/MASS SPECTRA

Information on the properties of specific particles or types of particles should *not* be indexed by using subject descriptors for the property, e.g., information on the isospin of N*resonances is indexed by using the subject descriptor N*RESONANCES, not ISOSPIN.

Information on the decay of particles is indexed by using subject descriptors for the specific particle or type of particle and the qualifying term DECAY or the specific type of decay discussed, e.g., LEPTONIC DECAY, WEAK HADRONIC DECAY, RADIATIVE DECAY. Only information of a very broad or general nature not dealing with specific particles is indexed by using the subject descriptor DECAY. Of course, descriptors are also used for significant models and theories.

Hypernuclei are indexed by using the subject descriptor for the specific nuclide and the qualifying term HYPERNUCLEI and, in addition, are indexed by using the subject descriptor HYPERNUCLEI and an appropriate qualifier reflecting the feature discussed in the paper; for example,

HELIUM 5/HYPERNUCLEI
HYPERNUCLEI/BINDING ENERGY

A significant number of the papers encountered in the field of particle physics are of a theoretical nature not dealing with specific particles or specific interactions. These papers discuss new mathematical techniques, models, and theories concerned with illuminating and extending the relationships between domains of particle phenomena. Such topics as current algebra, symmetry groups, quantum electrodynamics, quantum field theory, dispersion relations, Regge pole theory, etc., fall in this category. Information in these areas is indexed by using appropriate subject descriptors and qualifiers reflecting the aspect discussed. Note that highly specific descriptors need not have a qualifying term. Similarly, information of a very broad nature treating numerous aspects of a given subject need not have a qualifying term used with the subject descriptor (unless such descriptors as REVIEWS, LECTURES, MEETINGS, or BIBLIOGRAPHIES are appropriate).

NUCLEAR PHYSICS

Information in the field of nuclear physics is indexed by use of the most specific descriptors appropriate. Broad or generalized descriptors are used for indexing subject matter of a broad or general nature that is applicable to a wide range of situations. These guidelines are illustrated in the following examples.

A paper on the decay of carbon-14 is indexed:

CARBON 14:T1
BETA-MINUS DECAY:Q1

Studies on the β^- decay of nuclei in the sd shell would be indexed:

LIGHT NUCLEI:T1
BETA-MINUS DECAY:Q1

In the above examples, BETA-MINUS DECAY would *not* be flagged as a subject descriptor. This term *would* be used as the subject descriptor in the indexing of information on the theory of β^- decay, a compilation of data on many nuclei, or information of a similar broad nature.

Information on nuclear reactions, e.g., ^{91}Zr(p,n)^{91}Nb, is indexed by use of appropriate descriptors for the target nucleus, the reaction-inducing particle, the emitted particles, and the product nucleus. The qualifier for the target descriptor should be the specific "particle reaction" descriptor. The subject descriptor for the specific particle reaction, e.g., PROTON REACTIONS, should have a qualifier that indicates the type of reaction, e.g., CHARGE-EXCHANGE REACTIONS, STRIPPING, PICKUP REACTIONS, or CAPTURE. Information to be considered for inclusion in the augmentation includes the

complete reaction symbolism, the energy range of the bombarding particle, the type of measurement, or other reaction parameters. This does not mean that all of this information should be included in the augmentation if it is not present in the title. Descriptors for the product nucleus (or compound nucleus) are flagged as subject descriptors only if its properties are studied. Similarly, descriptors for the emitted particle(s) are rarely flagged. The nuclear reaction indexing pattern is illustrated below.

Example:

TITLE: Analysis of the Reaction $^{91}Zr(p,n)^{91}Nb$.
Augmentation: (4.0 to 6.0 MeV)
ZIRCONIUM 91 TARGET:M1
PROTON REACTIONS:M2,Q1
CHARGE-EXCHANGE REACTIONS:Q2
NEUTRONS
NIOBIUM 91
DIFFERENTIAL CROSS SECTIONS
MEV RANGE 01-10

Information on the measurement of total cross sections is indexed by use of TOTAL CROSS SECTIONS as the qualifier with a "particle reaction" subject descriptor. For example, a paper on the neutron total cross section of ^{15}N is indexed as follows.

NITROGEN 15 TARGET:T1
NEUTRON REACTIONS:T2,Q1
TOTAL CROSS SECTIONS:Q2

Authors frequently use the term "total cross section" when they mean (angle-) integrated cross section; e.g., "Total cross section for the $^{24}Mg(d,p)$ reaction at 25 MeV." Such a paper should be indexed with STRIPPING, not TOTAL CROSS SECTIONS, as the qualifying term for the subject descriptor DEUTERON REACTIONS.

The descriptor CROSS SECTIONS is used as a qualifier only when *compilations* of cross sections are being indexed. The use of this term as a subject descriptor would be proper only for the most general of papers.

The descriptor QUASI-ELASTIC SCATTERING is used for processes in which the projectile knocks a particle or cluster from the nucleus and also emerges itself.

TITLE: Quasi-Free Scattering of Polarized Protons from ^{40}Ca.
Augmentation: ($^{40}Ca(p,2p)^{39}K$, 200 MeV)
CALCIUM 40 TARGET:M1
PROTON REACTIONS:M2,Q1
QUASI-ELASTIC SCATTERING:Q2
POLARIZED BEAMS
PROTONS
POTASSIUM 39
ASYMMETRY
CROSS SECTIONS
ENERGY SPECTRA
MEV RANGE 100-1000

The descriptor QUASI-FREE REACTIONS includes the concept of a reaction between the projectile and the particle or cluster in the nucleus:

TITLE: Quasi-Free Contributions in the $^{6}Li(d,tp)^{4}He$ Reaction at $E_d = 0.465$ MeV.
LITHIUM 6 TARGET:T1
DEUTERON REACTIONS:T2,Q1
QUASI-FREE REACTIONS:Q2
PROTONS
TRITONS

HELIUM 4
KEV RANGE 100-1000

Heavy-ion-induced reactions are indexed similarly, as the following example for the $^{182}W(^{12}C,^{11}C)$ reaction illustrates.

TUNGSTEN 182 TARGET:T1
CARBON 12 REACTIONS:T2,Q1
CARBON 11
STRIPPING:Q2
ONE-NUCLEON TRANSFER REACTIONS
NEUTRON TRANSFER
TUNGSTEN 183

If the specific "particle reaction" descriptor is not available and does not warrant introduction, the descriptor HEAVY ION REACTIONS is used, and the specific isotope used as projectile is listed among the unflagged descriptors, as in the following example.

TITLE: Strongly Damped Collisions of $^{20}Ne + ^{63}Cu$
Augmentation: (165 MeV)
COPPER 63 TARGET:M1
NEON 20 REACTIONS:M2,Q1
DEEP INELASTIC HEAVY ION REACTIONS:Q2
ALPHA PARTICLES
GAMMA RADIATION
MAGNESIUM ISOTOPES
NITROGEN ISOTOPES
ANGULAR CORRELATION
MEV RANGE 100-1000
MULTIPLICITY
NUCLEAR REACTION KINETICS

For neutron-induced fission the descriptor NEUTRON REACTIONS is used.

TITLE: Fission Cross Sections of ^{235}U from 3 to 20 MeV.
URANIUM 235 TARGET:T1
NEUTRON REACTIONS:T2,Q1
FAST FISSION:Q2
MEV RANGE 01-10
MEV RANGE 10-100
CROSS SECTIONS

Fission induced by photons is indexed by use of the pattern
URANIUM 235 TARGET:T1
PHOTOFISSION:Q1

Spontaneous fission should be indexed by use of the subject descriptor for the nucleus with the qualifier term SPONTANEOUS FISSION.
CALIFORNIUM 252:T1
SPONTANEOUS FISSION:Q1

The use of SPONTANEOUS FISSION as a subject descriptor is reserved for extensive or general treatments of the subject.

Most elements in the periodic table have two or more naturally occurring isotopes. The nuclear properties of these elements are then an average of the nuclear properties of the individual isotopes. In some cases, however, only one isotope of an element is found in nature. The nuclear properties and reactions of these monoisotopic elements are characteristic of the single isotope, and thus the subject descriptor for that isotope should be used. For example, an author may talk about bombarding natural gold with neutrons, but the descriptor used should be GOLD 197 TARGET. The naturally occurring

monoisotopic elements are beryllium 9, fluorine 19, sodium 23, aluminum 27, phosphorus 31, scandium 45, manganese 55, cobalt 59, arsenic 75, yttrium 89, niobium 93, rhodium 103, iodine 127, cesium 133, praseodymium 141, terbium 159, holmium 165, thulium 169, tantalum 181, gold 197, bismuth 209, and thorium 232.

In a similar fashion, man-made elements, such as plutonium, should always have an isotope designation, if known.

Note that the "nuclear target" descriptors are available only for specific isotopes. If the target used in an experiment is the natural mixture of isotopes, the element description, e.g., CARBON, is used for indexing the reaction. In the rare case of a target with an unnatural mixture of isotopes, the descriptor used is of the form CARBON ISOTOPES, unless a more appropriate term such as DEPLETED URANIUM is available. If a multi-isotope target is used and data are exhibited for individual isotopes, target descriptors are used for the individual isotopes.

For energy-level information, the descriptor ENERGY LEVELS is used as a qualifier when a more specific descriptor, e.g., ROTATIONAL STATES or YRAST STATES, is not appropriate. The subject descriptor will be the term for the specific nucleus or type of nucleus studied. The descriptor ENERGY-LEVEL TRANSITIONS and its narrower terms (E2-TRANSITIONS, M1-TRANSITIONS, etc.) are also available as qualifiers. The descriptor EXCITED STATES is not regularly used in indexing papers that consider nuclear energy-level schemes.

Decay studies should be indexed with the decay type, e.g., ALPHA DECAY, as the qualifier. As indicated above, decay-type descriptors are used as subject descriptors only for theoretical or systematic studies. Decay products are not indexed unless their properties are studied.

The following example is illustrative of both the "energy level" and "decay" indexing patterns.

TITLE: Decay of 4.4-hr ^{105}Ru to Levels of ^{105}Rh.

01 RUTHENIUM 105:T1
01 BETA-MINUS DECAY:Q1
01 FT VALUE
01 GAMMA SPECTRA
01 K CAPTURE
02 RHODIUM 105:T2
02 ENERGY LEVELS:Q2
02 SPIN
02 PARITY
02 ENERGY-LEVEL TRANSITIONS
02 K CONVERSION

Note that the splitting procedure is used to prevent the possible false coordination of descriptors in information retrieval.

Information on static moments of nuclei is indexed by use of the term for the appropriate nuclide as subject descriptor and a qualifier indicating the specific property, e.g., MAGNETIC DIPOLE MOMENTS, QUADRUPOLE MOMENTS. The subject descriptors NUCLEAR ELECTRIC MOMENTS and NUCLEAR MAGNETIC MOMENTS are used for the indexing of information of a broad or general nature. As a general rule, information on ground-state properties of nuclei is indexed by use of a qualifier indicating the specific property, e.g., SPIN. Note the contrast to the rule for indexing information on properties of energy levels.

Few specific rules can be given for theoretical studies due to the diversity of the information and the abundance of descriptor types available. In general, the most specific descriptors should be used as subject descriptors and qualifiers. Information on nuclear models should be indexed by use of the most specific model descriptor. If a specific descriptor is not available and does not warrant introduction, use NUCLEAR MODELS along with title augmentation (if necessary). Routine use of models in data analysis does not require the use of the model descriptor as a subject descriptor. Terms such as NUCLEAR STRUCTURE are used only for information of a very broad nature. Owing to the large number of descriptors for theoretical concepts, NUCLEAR THEORY will only rarely be used as a subject descriptor. Note that highly specific subject descriptors need not have a qualifying term. Similarly, information of a very broad nature treating numerous aspects of a given subject need not have a qualifying term used with the subject descriptor (unless REVIEWS, LECTURES, MEETINGS, or BIBLIOGRAPHIES is appropriate).

The following examples illustrate the indexing of theoretical information.

TITLE: Pion Condensation in Isospin Symmetric Nuclear Matter.
NUCLEAR MATTER:T1
PION CONDENSATION:Q1
CURRENT ALGEBRA
HAMILTONIANS
ISOSPIN
LAGRANGIAN FUNCTION
PCAC THEORY

TITLE: Some Dynamical Aspects of the Fission Process.
FISSION:T1
NUCLEAR REACTION KINETICS:Q1
CORRELATIONS
FISSION BARRIER
RITZ METHOD

TITLE: Evaluation of Finite-Range Effects in Distorted-Wave Calculations of Stripping and Knock-Out Reactions.
KNOCK-OUT REACTIONS:T1
STRIPPING:T2
FINITE-RANGE INTERACTIONS:Q1,Q2
CROSS SECTIONS
DWBA
NUCLEAR REACTION KINETICS
PARTIAL WAVES

TITLE: Intrinsic State for the Interacting Boson Model.
INTERACTING BOSON MODEL:T1
EIGENSTATES:Q1
CREATION OPERATORS
HAMILTONIANS
SO GROUPS
SU-3 GROUPS

MEDICAL PHYSICS

Radiation Protection Standards

General studies involving recommendations and guides for radiation protection as well as more formalized standards are indexed here, including units and concepts or definitions for radiation dosimetry. Descriptors available include RADIATION PROTECTION, RADIATION HAZARDS, DOSIMETRY, RADIATION DOSE UNITS, SHIELDING, and SAFETY STANDARDS.

Example:

TITLE: Safety Standards for Installations Using Nonmedical X-Ray and Sealed Gamma-Ray Sources.
X-RAY EQUIPMENT:T1
GAMMA SOURCES:T2
RADIATION PROTECTION:T3
SAFETY STANDARDS:Q1,Q2,Q3

Radiation Source Calibration and Standardization

The subject descriptors RADIATION SOURCES, GAMMA SOURCES, PARTICLE SOURCES, ALPHA SOURCES, PROTON SOURCES, or X-RAY SOURCES are most commonly used. Qualifiers will usually be CALIBRATION or CALIBRATION STANDARDS.

Example:

TITLE: Calibration of Intense ^{60}Co Gamma Sources.
GAMMA SOURCES:T1
CALIBRATION:Q1
COBALT 60

Dosimetry

Information on the measurement or calculation of dose distributions in phantoms or tissue-equivalent media is included under this category. Descriptors are available for specific particle or radiation dosimetry, e.g., PROTON DOSIMETRY, X-RAY DOSIMETRY, PION DOSIMETRY, the type of dose distribution, e.g., SPATIAL DOSE DISTRIBUTIONS, DEPTH DOSE DISTRIBUTIONS, DOSE RATES, and the specific media in which the dose determination is made, e.g., PHANTOMS, TISSUE-EQUIVALENT MATERIALS, WATER.

Example:

TITLE: Dose Characteristics of 200-MeV Protons.
Augmentation: (Tissue-equivalent slab 30 cm thick)
PROTON DOSIMETRY:M1,Q2
SPATIAL DOSE DISTRIBUTIONS:Q1
TISSUE-EQUIVALENT MATERIALS:M2
MEV RANGE 100-1000
SLABS

RADIATION AND SHIELDING PHYSICS

Radiation Physics

Information on the passage of charged particles and ionizing radiation through materials not generally defined as shielding is included under this category along with basic transport theory. Neutron transport is included under the subcategory Neutron Interactions with Matter. When both gamma and neutron transport are discussed, categorize here and cross-categorize to 654003, RADIATION AND SHIELDING PHYSICS–Neutron Interactions with Matter.

In indexing this information, use subject descriptors naming the incident charged particle or radiation, e.g., ELECTRONS, PROTONS, or GAMMA RADIATION, and the medium of the interaction, e.g., AIR, ALUMINIUM, IRON OXIDES, POLYETHYLENES, or WATER. With subject descriptors for the specific particles or radiations, use qualifiers appropriate to the phenomenon being considered, e.g., ABSORPTION, ENERGY LOSSES, LET, RANGE, or STOPPING POWER; with subject descriptors for the materials use qualifiers such as CHARGED-PARTICLE TRANSPORT or PHOTON TRANSPORT and indicate the specific particle in the augmentation if it is not indicated in the title.

Examples:

TITLE: Energy Loss of 500-keV Electrons in Thin Silicon Crystals.
ELECTRONS:T1
ENERGY LOSSES:Q1
SILICON:T2
CHARGED-PARTICLE TRANSPORT:Q2
CRYSTALS
KEV RANGE 100-1000

TITLE: LET of 70-MeV Negative Pions Near End of Particle Tracks in Polyethylene.
PIONS MINUS:T1
LET:Q1
POLYETHYLENES:T2
CHARGED-PARTICLE TRANSPORT:Q2

PARTICLE TRACKS
MEV RANGE 10-100

TITLE: X-Ray Absorption Measurements on Aluminum Foils.
X RADIATION:T1
ABSORPTION:Q1
ALUMINIUM:T2
FOILS
PHOTON TRANSPORT:Q2

Shielding Calculations and Measurement

Shielding information is indexed in the same pattern as information on Radiation Physics in that subject descriptors for the specific particle or radiation are used with qualifiers such as DIFFUSION, TRANSMISSION, BUILDUP, and ATTENUATION, and subject descriptors for specific shielding materials, e.g., CONCRETES, are used with qualifiers such as CHARGED-PARTICLE TRANSPORT or PHOTON TRANSPORT. Again neutron shielding information is categorized to 654003, Neutron Interactions with Matter. The subject descriptor SHIELDING MATERIALS is used for information of a very broad nature or information treating numerous specific materials. Similarly the subject descriptor SHIELDING is used for indexing general theory or information of a similar broad nature.

Example:

TITLE: High-Energy Gamma-Ray Attenuation in Lead.
Augmentation: (1.25, 6, 8 MeV)
GAMMA RADIATION:M1
ATTENUATION:Q1
LEAD:M2
PHOTON TRANSPORT:Q2
MEV RANGE 01-10

Neutron Interactions with Matter

Information on neutron physics is indexed using the appropriate neutron descriptor. The qualifier should be the most specific descriptor available. Common qualifiers will be ABSORPTION, SLOWING DOWN, DIFFUSION, etc.

If a specific medium or configuration is involved, the appropriate term for the medium should be used as a subject descriptor with a qualifier such as NEUTRON FLUX, NEUTRON SPECTRA, NEUTRON TRANSPORT, etc. Information on neutron transport theory should be indexed using the subject descriptors NEUTRON TRANSPORT THEORY, NEUTRON DIFFUSION EQUATION, or NEUTRON SLOWING-DOWN THEORY, as appropriate.

Examples:

TITLE: Neutron Propagation in Water/Lead/Iron Laminates.
Augmentation: (5-10 MeV)
WATER:M1
LEAD:M2
IRON:M3
NEUTRON TRANSPORT:Q1,Q2,Q3
FAST NEUTRONS:M4
MEV RANGE 01-10
ABSORPTION:Q4

TITLE: Eigenvalues of the Discrete Ordinates Equation in Slab Geometry.
Augmentation: (Diamond difference and step function approximations)
NEUTRON TRANSPORT THEORY:M1
DISCRETE ORDINATE METHOD:Q1
EIGENVALUES
SLABS

SOLID STATE PHYSICS

Information on solid-state theory or information on solid-state properties that is generally applicable is indexed using the most specific descriptors available to indicate the system or structure investigated and the properties, characteristics, processes, or actions determined. Few guidelines can be given due to the diversity of information encountered in this subject area, but the following examples are illustrative of the general pattern.

TITLE: Stability of Void Lattices Under Irradiation.
CRYSTAL LATTICES:T1
PHYSICAL RADIATION EFFECTS:Q1
VOIDS

TITLE: Cherenkov Radiation Absorption in Crystalline Matter.
CRYSTALS:T1
CHERENKOV RADIATION:T2,Q1
ABSORPTION:Q2

TITLE: Simulation of Defect Images in Transmission Electron Microscopy.
CRYSTAL DEFECTS:T1
ELECTRON MICROSCOPY:T2,Q1
IMAGES:Q2
SIMULATION
TRANSMISSION

Solid State Plasma

Information on electron-hole plasmas in semiconductor materials is indexed using the subject descriptor SOLID-STATE PLASMA and a qualifier descriptor that indicates the properties, processes, or actions investigated. If a specific semiconducting material is studied, a subject descriptor indicating the specific material is used with the qualifier descriptor SOLID-STATE PLASMA.

Examples:

TITLE: Sausage-Shaped Instability in Semiconductor Plasma.
Augmentation: (Dispersion relations)
SOLID-STATE PLASMA: M1
SAUSAGE INSTABILITY:Q1
DISPERSION RELATIONS

TITLE: Theta-Pinch in Ge.
Augmentation: (Plasma density)
GERMANIUM:M1
SOLID-STATE PLASMA:M2,Q1
THETA PINCH:Q2
PLASMA DENSITY

Superconductivity

Information concerning basic theories of superconductivity and theoretical treatments of superconducting properties of unspecified materials is indexed using the subject descriptors SUPERCONDUCTIVITY, SUPERCONDUCTORS, or terms for the specific types of superconductors, e.g., TYPE-I SUPERCONDUCTORS.

Examples:

TITLE: Critical Current in Type-II Superconducting Films.
Augmentation: (Ginzburg-Landau theory)
TYPE-II SUPERCONDUCTORS:M1
CRITICAL CURRENT:Q1

SUPERCONDUCTING FILMS
GINZBURG–LANDAU THEORY

TITLE: Thermoelectric Effects in Superconductors Containing Paramagnetic Impurities.
SUPERCONDUCTORS:T1
THERMOELECTRIC PROPERTIES:Q1
IMPURITIES
PARAMAGNETISM

Information on superconducting properties of specific materials is indexed according to guidelines set forth in the MATERIALS portion of this Guide. The appropriate MATERIALS subcategory, e.g., 360104, Physical Properties, is used as primary category for this type of information, with a cross category to 656102, SUPERCONDUCTIVITY–Acoustic, Electric, Magnetic, Optical, and Thermal Phenomena. Information on specific materials indicating that the results apply to superconductors in general is indexed using a subject descriptor for the specific material in addition to the indexing patterns outlined above.

Example:

TITLE: Field Penetration into Type-I Superconducting Cylinders.
TYPE-I SUPERCONDUCTORS:T1
INDIUM:T2
PENETRATION DEPTH:Q1,Q2
CYLINDERS

TITLE: Low-Temperature Irradiation of Nb_3Sn Wires with 14-MeV Neutrons.
SUPERCONDUCTING WIRES:T1
NIOBIUM BASE ALLOYS:T2
TIN ALLOYS:T3
INTERMETALLIC COMPOUNDS
PHYSICAL RADIATION EFFECTS:Q1,Q2,Q3
FAST NEUTRONS

FUSION ENERGY

Confinement and Heating

When confinement and heating studies are reported, either on a theoretical basis or in devices (toroidal, mirror, pinch, etc.), the subject descriptor PLASMA CONFINEMENT or PLASMA HEATING or one of the more specific types of plasma heating such as ICR HEATING, ECR HEATING, BEAM INJECTION HEATING, JOULE HEATING, LASER-RADIATION HEATING, etc., may be used with appropriate qualifiers. A subject descriptor for the specific device or type of device is also used, e.g., TOKAMAK TYPE REACTORS, MAGNETIC MIRROR TYPE REACTORS, LASER FUSION REACTORS, etc. The augmentation should include the device, type of device, or other conditions or criteria, if pertinent.

Plasma Diagnostics

Diagnostic techniques are indexed using the subject descriptor PLASMA DIAGNOSTICS with qualifiers that name the equipment or technique, e.g., INTERFEROMETERS, ELECTRIC PROBES, X-RAY SPECTROSCOPY, MICROWAVE RADIATION. If significant information is given on the diagnostic method, a subject descriptor for the method should be included also.

Plasma Kinetics, Production, and Stability

Either experimental or theoretical studies involved in kinetics, production, and stability of plasma may be indexed using such subject descriptors as PLASMA GUNS, PLASMA DENSITY, PLASMA PRODUCTION, COLLISIONLESS PLASMA, PLASMA SIMULATION, or particular instabilities such as TRAPPED-PARTICLE INSTABILITY, CYCLOTRON INSTABILITY, DRIFT INSTABILITY, etc. Appropriate qualifiers are often difficult to assign in these areas, in which case the unqualified subject descriptor will suffice.

Plasma Wave Phenomena

Much of the wave phenomena involved in plasma oscillations from beam injection or interactions or from excitation by other sources, e.g., laser radiation, microwaves, or other electromagnetic radiation, is indexed using subject descriptors such as PLASMA, PLASMA WAVES, BEAM-PLASMA SYSTEMS, and ELECTROMAGNETIC RADIATION. Qualifiers such as RESONANCE or specific resonances, e.g., CYCLOTRON RESONANCE, HELICON RESONANCE, and HYBRID RESONANCE, or OSCILLATIONS or specific oscillations, e.g., BETATRON OSCILLATIONS, PHASE OSCILLATIONS, and SYNCHROTRON OSCILLATIONS, are available; also the qualifiers INTERACTIONS, EXCITATION, EMISSION, REFLECTION, SCATTERING, and TRANSMISSION will often be applicable.

Fusion Power Plants

Studies in this area usually deal with one of the following concepts: blanket engineering; magnet coils and fields; power supplies and circuitry; cooling systems; fuel systems; radiation hazards; or power conversion systems. Such studies are indexed using the most specific applicable descriptor.

Examples:

TITLE: Heating of a Pinch at Intermediate β-Values.
Augmentation: (Snow-plow model calculations)
TOROIDAL SCREW PINCH DEVICES:M1
ADIABATIC COMPRESSION HEATING:M,Q1
BETA RATIO
TIME DEPENDENCE
FIRST WALL
ION TEMPERATURE
ELECTRIC FIELDS
PLASMA SHEATH

TITLE: Ohmic Heating During Start-up.
TOKAMAK TYPE REACTORS:T1
JOULE HEATING:Q1
REACTOR START-UP
MAGNET COILS
TIME DEPENDENCE
EQUILIBRIUM PLASMA
MATHEMATICAL MODELS
SKIN EFFECT

TITLE: Electron Number Density Measurement by Ruby Laser Interferometry in a CO_2 Laser-Induced Gas Breakdown Plasma.
LASER-PRODUCED PLASMA:T1
PLASMA DIAGNOSTICS:T2
INTERFEROMETRY:Q2
ELECTRON DENSITY:Q1
HYDROGEN
CARBON DIOXIDE LASERS
RUBY LASERS
SCATTERING
LASER RADIATION

TITLE: Survey of Linear MHD Stability in Tokamak Configurations.
Augmentation: (Beta ratio)
TOKAMAK TYPE REACTORS:M1
PLASMA MACROINSTABILITIES:Q1

KINK INSTABILITY:M2
FLUTE INSTABILITY:M3
STABILIZATION:Q2,Q3
REVIEWS
LOW-BETA PLASMA
HIGH-BETA PLASMA
MAGNETOHYDRODYNAMICS

TITLE: Alfvén Instability and Micromagnetic Islands in a Plasma with Sheared Magnetic Fields.
PLASMA INSTABILITY:T1
ALFVEN WAVES:Q1
INHOMOGENEOUS PLASMA:T2
MAGNETIC FIELD CONFIGURATIONS:Q2
DRIFT INSTABILITY
PLASMA WAVES
SHEAR
PLASMA DRIFT
DISPERSION RELATIONS

TITLE: Extensions of Guiding Center Motion to Higher Order.
GUIDING-CENTER APPROXIMATION:T,Q1
PLASMA DRIFT:T1
DIFFERENTIAL EQUATIONS
TOKAMAK TYPE REACTORS
TRANSPORT THEORY
GYROFREQUENCY
TOROIDAL CONFIGURATION

TITLE: Lower Hybrid Wave Propagation in Inhomogeneous Plasma.
Augmentation: (Wave propagation theory)
INHOMOGENEOUS PLASMA: M1
PLASMA WAVES:M2,Q1
HYBRID RESONANCE:Q2
WAVE PROPAGATION
PARAMETRIC INSTABILITIES
LANGMUIR FREQUENCY

TITLE: Electrostatic Ion Cyclotron Waves and Ion Energy Diffusion in A Mirror Machine.
ION PLASMA WAVES:M1,Q2
CYCLOTRON FREQUENCY:Q1
2X DEVICES:M2
NEUTRAL ATOM BEAM INJECTION
ION DRIFT
ENERGY SPECTRA

TITLE: Superconductors for Tokamak Poloidal Field Coils.
Augmentation: (NbTi conductors)
TOKAMAK TYPE REACTORS:M1
SUPERCONDUCTING MAGNETS:M2,Q1
AC LOSSES:Q2
STABILITY:Q2
NIOBIUM ALLOYS
TITANIUM ALLOYS
ENERGY LOSSES
HYSTERESIS
EDDY CURRENTS

TITLE: Prospects for a DD Tandem Mirror.
TMX DEVICES:T1
THERMONUCLEAR FUELS:Q1
THERMONUCLEAR IGNITION
DEUTERIUM
TRITIUM
HELIUM 3
ALPHA PARTICLES
SYNCHROTRON RADIATION
ENERGY LOSSES
DIRECT ENERGY CONVERTERS
COST

TITLE: EUV Impurity Study of the ALCATOR Tokamak.
ALCATOR DEVICE:T1
IMPURITIES:T2,Q1
OXYGEN:T3
NITROGEN:T4
CARBON:T5
MOLYBDENUM:T6
EXTREME ULTRAVIOLET RADIATION:Q2,Q3,Q4,Q5,Q6
EMISSION SPECTRA
ENERGY LOSSES
MATHEMATICAL MODELS

TITLE: Development of Cryogenic Targets for Laser Fusion.
Augmentation: (D_2 and DT)
LASER FUSION REACTORS:M1
THERMONUCLEAR FUELS:M3,Q1
TARGETS
VERY LOW TEMPERATURE
FABRICATION:Q2,Q3
LASER IMPLOSIONS
MICROSPHERES:M2
DIFFUSION
DEUTERIUM
TRITIUM

TITLE: Energy Multiplication and Fissile Production of D-D Fusion-Fission Hybrid Reactors.
HYBRID REACTORS:T1
FUEL CYCLES:Q1
ENERGY BALANCE:Q1
BREEDING RATIO
BREEDING BLANKETS
URANIUM 233
PLUTONIUM 239

GENERAL AND MISCELLANEOUS

This broad category (990000) is reserved for those items that do not fit more appropriately into one of the more specific subject categories. For example, a mathematical paper on the propagation of plasma waves would be categorized to 700108, FUSION ENERGY—Plasma Research, Plasma Wave Phenomena. However, a paper entitled "High Order Time Stepping Methods for Nonlinear Evolution Equations" would

be categorized to 990100, GENERAL AND MISCELLANEOUS—Mathematics and Computers. Papers on the design and development of computer hardware, software, and management systems would also be categorized here. In each case the most specific descriptors available would be selected for subject indexing according to the principles previously outlined.

Other subcategories available include 990100, Management; 990300, Information Handling; 990400, Law; and 990500, Civilian Defense.

INFORMATION RETRIEVAL

The DOE/RECON system is a computerized interactive on-line system for storage of and retrieval from bibliographic data bases. It is maintained by the Technical Information Center of the Department of Energy to facilitate the dissemination of scientific and technical information to DOE offices and their contractors. DOE/RECON uses simple commands and Boolean logic to retrieve citations to documents in selected areas of interest. DOE offices and their contractors across the country can access the system using terminals equipped with television screens and teletype printers and connected by commercial telephone lines to the computer in Oak Ridge.

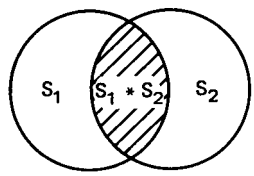
This description of DOE/RECON and of the data bases available for searching is not intended to be exhaustive. The reader interested in additional information should consult DOE/TIC-4586, *DOE/RECON User's Manual.*

To retrieve information effectively from the Energy Information Data Base (EDB), one should be thoroughly familiar with the indexing principles outlined in the foregoing descriptions. In essence, the structuring of retrieval strategy can be reduced to three steps: formulation of the concepts to be retrieved, reduction of these concepts to descriptors listed in the thesaurus (identifying at the same time related concepts that might have useful retrieval potential), and combining these descriptors by use of the Boolean operators AND(*), OR(+), or NOT(–). The AND, OR, and NOT logical combinations are used to increase recall or precision, e.g., a bibliography or a few pertinent references, as required.

Recall and precision in information retrieval are more adequately defined by the following:

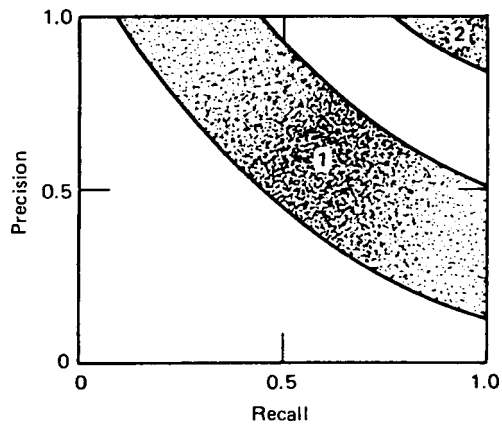
S_1 = the set of relevant items, with respect to a given search, that exists in the data base

S_2 = the set of retrieved items



$$\frac{[S_1 * S_2]}{[S_1]} = \text{recall} \qquad \frac{[S_1 * S_2]}{[S_2]} = \text{precision}$$

Square brackets indicate the number of items in the set.

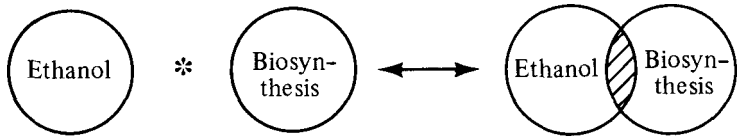


Information retrieval experience has shown that most searches will fall within the shaded area 1. That is, high recall and high precision are mutually exclusive, and the average search could not fall within area 2, which could be considered the ideal situation.

Thesaurus development also has an appreciable influence on recall and precision, particularly in the case of a rapidly growing data base such as EDB. As the data base becomes large beyond some point, high recall becomes an undesirable feature, as the search requester can ill afford the time to delve through an extensive number of references. The value of a data base lies in its ability to provide *acceptable* answers to specific searches. The availability of highly specific terms in the thesaurus, which increases indexing specificity, enhances retrieval precision, while keeping recall at an acceptable level. For this reason, the EDB thesaurus is constantly evolving.

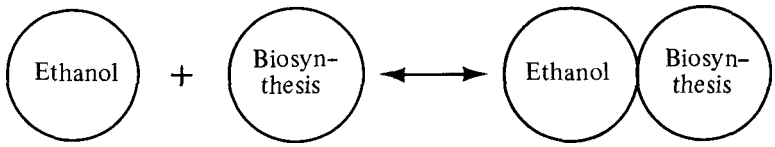
A specific example may help to clarify the reader's understanding of the foregoing concepts.

Suppose that we wish to retrieve all items in the data base indexed to both ETHANOL and BIOSYNTHESIS, i.e., all items having to do with the biosynthesis of ethanol.



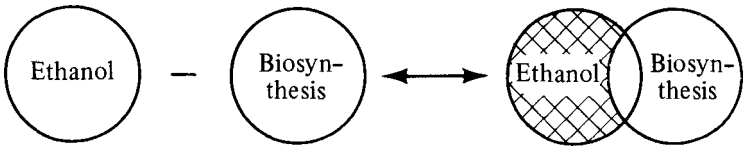
The shaded area represents those citations indexed to both ETHANOL AND (*) BIOSYNTHESIS. This Boolean operator is restrictive and reduces the number of citations retrieved.

In a second case suppose that we wish to retrieve all items in the data base indexed to *either* ETHANOL or BIOSYNTHESIS, i.e., citations are wanted on everything about ethanol and everything about biosynthesis.



The Boolean operator OR (+) is additive and increases the number of citations.

Finally, suppose that we wish to retrieve all citations indexed to ETHANOL but *not* to BIOSYNTHESIS.



The shaded area represents those items retrieved using the Boolean operator NOT (–).

The *EDB Subject Categories* can also be a powerful tool both in increasing the relevancy of a search or in simplifying the search strategy needed to encompass a specific subject area. For example, if one is interested in the mechanical properties of some specific alloys, it would probably be simpler to use the appropriate MATERIALS subcategory, e.g., 360103, rather than descriptors for specific mechanical properties. In addition, any particular subject search can be limited to the broad area of interest, e.g., CHEMISTRY, ENVIRONMENTAL SCIENCES, and NUCLEAR PHYSICS, and thereby remove or considerably lessen the possibility of a large number of false coordinations or combinations of descriptors, thus increasing precision.

SELECT and COMBINE Commands

Information is retrieved from any of the data bases on the DOE/RECON system by the use of the two commands SELECT and COMBINE. In this system these two commands are represented by Symbols: # is

the symbol for SELECT and $ the symbol for COMBINE. The SELECT command is used to create sets. The sets, which are numbered, are then manipulated with Boolean logic by the COMBINE command to derive a set containing only citations of interest.

These two commands can best be explained by illustration. Assume documents are wanted on the hydrolysis of cellulose:

```
1    824  IT=CELLULOSE
2    989  IT=HYDROLYSIS
```

The numbers 1 and 2 are the set numbers. The number 824 is the number of documents indexed to CELLULOSE and 989 the number indexed to HYDROLYSIS.

The commands given would be typed in on the terminal #CELLULOSE, which would result in Set 1, and #HYDROLYSIS, which would result in Set 2. The COMBINE command would be $1*2 which would result in

```
3    216    1*2
```

This means that there are 216 documents which have been indexed to *both* CELLULOSE and HYDROLYSIS. Notice that the IT= index was used. This does not matter with CELLULOSE as it has no narrower terms (NT). HYDROLYSIS, however, has the NTs ENZYMATIC HYDROLYSIS, ACID HYDROLYSIS, and ALKALINE HYDROLYSIS. Therefore, the citations retrieved include those indexed to HYDROLYSIS and also those indexed to the narrower terms.

Assume that we wish to exclude all papers by C. R. Wilke. We would SELECT all papers by Wilke by #AU=WILKE, C.R. This would result in Set 4.

```
4    53  AU=WILKE, C.R.
```

To exclude these papers the Boolean operator NOT (–) would be used.

```
5    188  $3-4
```

Set 5 would then contain citations on hydrolysis of cellulose authored by others than Wilke.

The complete search strategy would look like this

```
1    824  IT=CELLULOSE
2    989  IT=HYDROLYSIS
3    216  $1*3
4     53  AU=WILKE, C.R.
5    188  $3-4
```

Some other simple searches might clarify this further.

Find citations on the cost of fabricating solar cells.

1. #MD=SOLAR CELLS/FABRICATION
2. #COST
3. $1*2

Find citations on oil wells in the North Sea, but exclude those on drilling.

1. #OIL WELLS
2. #NORTH SEA
3. $1*2
4. #DRILLING
5. $3-4

Anything on air pollution control or abatement of sulfur dioxide.

1. #MD=SULFUR DIOXIDE/AIR POLLUTION ABATEMENT
2. #MD=SULFUR DIOXIDE/AIR POLLUTION CONTROL
3. $1*2

For detailed information on the use of these and other commands, consult the *DOE/RECON User's Manual.*

Descriptor Searching

As has been explained, when an indexer assigns descriptors to a document, the most specific descriptors available are used. Some of these descriptors are then paired with the use of M's and Q's to reflect more specifically the subject content. Both the individually selected descriptors and the paired descriptors can be used to retrieve citations with a high degree of relevancy.

Before citations are loaded onto DOE/RECON, the descriptors are upposted by the computer. This means that broader terms are added by the computer to the indexer-assigned descriptors. This can be better understood by referring to the sample word block for ELECTRIC CABLES.

ELECTRIC CABLES
UF *Cables (Electric)*
BT1 Cables
BT1 Conductor Devices
BT2 Electrical Equipment
BT3 Equipment
NT1 Coaxial Cables
NT1 Cryogenic Cables
NT1 Gas-Insulated Cables
NT1 Oil-Filled Cables
NT1 Superconducting Cables
RT Power Transmission Lines

If an indexer has assigned the descriptor SUPERCONDUCTING CABLES to a document, the computer will add the descriptors ELECTRIC CABLES, CABLES, CONDUCTOR DEVICES, ELECTRICAL EQUIPMENT, and EQUIPMENT to the citation. These descriptors can also be used to retrieve documents for broad areas of interest.

The indexer-assigned descriptors (selected descriptors) are retrieved by the use of the prefix SD=, the major descriptor pairs by MD=, and the upposted descriptors by IT=. The use of these prefixes can be illustrated by additional examples.

If citations were desired on all types of electric cables, regardless of the type, then #IT=ELECTRIC CABLES would retrieve all documents indexed to ELECTRIC CABLES and also any document indexed to COAXIAL CABLES, CRYOGENIC CABLES, OIL-FILLED CABLES, or SUPERCONDUCTING CABLES. Similarly, #IT=THERMAL POWER PLANTS would retrieve documents indexed to THERMAL POWER PLANTS and FOSSIL-FUEL POWER PLANTS, GEOTHERMAL POWER PLANTS, NUCLEAR POWER PLANTS, and all specific power plants given as NTs under them. Of course, if the descriptor selected is at the bottom of a hierarchy, as COAXIAL CABLES, then IT=COAXIAL CABLES would retrieve only documents with that descriptor. The IT= index is used when citations that cover broad areas of interest are wanted.

When a more precise search is needed, the use of the SD= index will retrieve only those descriptors assigned by the indexer. SD=ELECTRIC CABLES will retrieve only those documents to which the indexer had assigned the descriptor; documents indexed to COAXIAL CABLES will not be retrieved. Documents dealing with the installation, wear, damage, corrosion, etc., of electric cables as a class would be assigned this descriptor. At the bottom of a hierarchy both IT= and SD= would retrieve exactly the same documents. It is only as the hierarchy is ascended that these two indexes become significant.

The most precise search is obtained by the use of the major descriptor pairs, accessed by MD=. When an indexer has selected the most specific descriptors available and then paired them, the document is then described as precisely as possible. MD=ELECTRIC CABLES/CORROSION would retrieve only those documents dealing specifically with the corrosion of electric cables. Notice that there is no upposting in the MD= index. If all documents discussing electric cables as the prime focus were wanted, then MD=ELECTRIC CABLES/* would retrieve all documents in which ELECTRIC CABLES had been tagged with an M. MD=ELECTRIC CABLES/Q would retrieve all documents in which a Q tag had been affixed.

Data Elements

A complete cataloging record is that unit of information that completely (and uniquely) identifies an item in the data base. It includes the bibliographic data, abstract, subject descriptors, and other information

needed for special purposes. A data element is a designated portion of the cataloging record. Each data element is assigned a number, e.g., the abstract is always specified as data element number 950, which facilitates the location of that portion of the cataloging record. In this way users of the output products can easily determine the subject the item covers, the bibliographic citation for the item, how to obtain a copy, etc. Additional information is also required to maintain control of the item during the processing cycle, for obtaining statistics such as the total number of each type of item included in the data base, and for other information needs, such as determining whether TIC distributed the item.

A comprehensive description of the data elements and the manner in which data are initially entered into TIC's interactive processing system is provided in DOE/TIC-4602, *DECOL MANUAL* (*Descriptive Cataloging On-Line*).

The Descriptive Cataloging data elements and their inclusion on various types of items processed are listed in the following table.

DESCRIPTIVE CATALOGING DATA ELEMENT AND TYPE OF ITEM MATRIX

Data element			Type of item											
No.	Name	Mnemonic	R	RA	J	TJ	B	BA	P	E	D	TG	TA	X
	File name		X	X	X	X	X	X	X	X	X	X	X	X
000	Abstract number	AN	–	–	–	–	–	–	–	–	–	–	–	–
010	Serial number	SN	X	X	X	X	X	X	X	X	X	X	X	X
020	Type of item	TY	X	X	X	X	X	X	X	X	X	X	X	X
030	Classification	CL	X											
040	Literary indicator	LI	X	X	X	X	X	X			X	X	X	X
050														
060	Personal author (A)	AUA		X	X			X					X	
070	Personal author (M)	AUM	X	X		X	X	X	X		X	X	X	X
080														
090	Primary title (A)	TLA		X	X			X				X		
100	Subtitle (A)	STA												
110	Primary title (M)	TLM	X	X		X	X	X	X	X	X	X	X	X
120	Subtitle (M)	STM												
130	Primary title (S)	SET					X							X
140														
150	Primary report number	RN	X	X		X				X		X	X	X
160														
170	Affiliation (A)	AFA		X	X			X					X	
180														
190	Affiliation (M)	AFM												
200	Original title (M)	OTM					X	*						
210	Secondary report number	SR	X	X	X	X	X	X				X	X	X
220	Patent number	PN							X			X		
230	International classif. codes	ICC	*		X	X	X		X			X	*	
240	Contract number	CN	X		X	X	X	*				X		X
250	CODEN	CO			X	X								
260	Original title (S) (Journal title)	JT			X	X								
270														
280														
290														
300	Assignee	AS							X					
310	City of publication	CY					X	X			X			X
320	Name of publisher	Pb					X	X			X			X
330														
340	Volume	JV			X	X								
350	Issue	JI			X	X								
360	Pages (S)	JP			X	X								
370	Date	Da	X	X	X	X	X	X	X		X	X	X	X
380	Filed date (Patents)	PD							X					
390	Pages (M)	PGM	X	X		X	X	X	X		X	X	X	X
400														
410	Translation note	TN				X						X	X	

420	Language	LA	X	X	X	X	X	X	X		X	X	X	X
430	Availability-price	AV	X			X	X		*		X	X		X
440	Drop note	DN	X	X	X	X	X	X	X	X	X	X	X	X
450	Conference title	CT	X	X	X	X	X	X				X	X	
460	Conference place	CP	X	X	X	X	X	X				X	X	
470	Conference date	CD	X	X	X	X	X	X				X	X	
480	Report number guidelines													
490	Thesis statement	TS									X			
500	Contract code	FGC	X			X						X		
510	Distribution category	Di	X			X						X		
520	Report origin	RO	X			X			X			X		
530	File selected for	SF	X	X	X	X	X	X	X	X	X	X	X	X
540	Subject categories	SC	X	X	X	X	X	X	X	X	X	X	X	X
550	Source of bibliographic information	BI	X	X	X	X	X	X	X	X	X	X	X	X
560	Country of affiliation	CF	X	X	X	X	X	X	X	X	X	X	X	
570	Country of publication	CPC	X	X	X	X	X	X	X	X	X	X	X	X
580	State code	STC	*		*		*							X
590	INIS temporary record number	TRN	–	–	–	–	–	–	–	–	–	–	–	
600	INIS type	IT	X	X	X	X	X	X	X	X	X	X	X	
610	INIS categories	IC	X	X	X	X	X	X	X	X	X	X	X	
620	Title augmentation	AUG	X	X	X	X	X	X	X	X	X	X	X	X
630														
640	NTIS note		X	X	X	X	X	X	X	X	X	X	X	X
650														
660														
670	Original bibliographic source		–	–	–	–	–	–	–	–	–	–	–	
680														
690														
700	Corporate code (M)	CCM	X	X		*	*	*	*	X	X	X	X	X
710	Corporate author (M)	CM	X	X		*	*	*	*	X	X	X	X	X
720–800														
801–899	Subject descriptors		X	X	X	X	X	X	X	X	X	X	X	X
900–940														
950	Abstract		X	X	X	X	X	X	X	X	X	X	X	X

Note: – Entered by the system from other data
* TIC does not use for this type of items

Data Bases

There are approximately 30 data bases on the RECON system, six of which are prepared and maintained by the Technical Information Center (TIC). They are Energy Information Data Base (EDB), Nuclear Science Abstracts (NSA), General and Practical Information Data Base (GAP), Research in Progress (RIP), Power Reactor Docket Information (PRD), and Issues and Policy Summaries (IPS). A seventh data base, Federal Energy Data Index (FED), is prepared for the Energy Information Agency under the supervision of TIC.

The philosophy used in the preparation and maintenance of these seven data bases is the same for all and has been discussed and illustrated in this manual. This commonality of philosophy improves the ease of information retrieval in crossing from one data base to the other.

All unclassified technical and scientific information that is processed by the Technical Information Center is put into EDB. This data base contained over 580,000 citations at the end of June 1980 and is growing at an annual rate of about 160,000 citations.

NSA contains all the nuclear information processed at the Technical Information Center from 1967 to June 1976. Since that time the nuclear information has been put in EDB. NSA is no longer being updated, but its worldwide coverage of nuclear information is unsurpassed.

GAP is designed to indicate information in the field of energy that would be of interest to the general public. Its primary coverage is solar energy, energy conservation, and energy policy. References to flyers and pamphlets as well as to general interest articles are found in this data base.

RIP gives citations to research contracts sponsored by the Department of Energy and to government research on the environmental aspects of energy.

PRD is no longer being updated. It contains docket information on the construction and operation of nuclear facilities.

IPS contains references to public statements by Department of Energy officials. This includes congressional testimony, press releases, press interviews, etc.

FED has citations to documents published by the Energy Information Administration and to the tables and graphs contained in these documents.

The other data bases available on the DOE/RECON system are furnished by DOE contractors or by private organizations. The format of each of these has been determined by the supplier. A list of all data bases accessible on RECON follows.

Data Bases Accessible on RECON

1. DOE Energy Data Base (EDB)
2. Nuclear Science Abstracts (NSA)
3. General and Practical Information (GAP)
4. Water Resources Abstracts (WRA)
5. National Referral Center (NRC)
6. Nuclear Structure Reference (NSR)
7. Energy Research in Progress (RIP)
8. Environmental Mutagens (EMI)
9. Radiation Shielding Information (RSI)
10. Central Inventory of Models (CIM)
11. Environmental Science Index (ESI)
12. American Petroleum Data Base (API)
13. Nuclear Safety Information Center (NSC)
14. Solar Data Bases (SLR)
15. Water Resource Research (WRE)
16. Energy Information Abstracts (EIA)
17. Radiation Shielding Codes (RSC)
18. Enhanced Oil & Gas Recovery (ERG)
19. Epidemiology Information System (EIS)
20. Environmental Teratology (ETI)
21. Issues and Policy Summaries (IPS)
22. Forestry Data Base (FDB)
23. Agent Registry File (ARF)
24. Federal Energy Data Index (FED)
25. Tulsa Data Base (TUL)
26. Power Reactor Docket Information (PRD)
27. National Energy Software (NES)
28. Separation Systems (SEP)
29. TIC Test File (ERC)
30. Oil and Gas Reserve File (OGR)
31. Government & Industry Exchange Program (GID)

EDB Unit Record and Prints

The names of all searchable and printable data elements in the EDB unit record are listed below.

Data element	Search-able field	Printable Fields in Format* 0	2	3	4	5	6	Search by	Examples
Accession number	X	X	X	X	X	X	X	Direct access	%78j2345
Type of document	X	X	X	X	X	X	X	Limit command	)2/all/j
Report number	X	X	X	X	X	X	X	RN	RN=ORNLTM2744
Report prefix	X	X	X	X	X	X	X	RP	RP=ORNL
Personal authors	X	X	X		X	X	X	AU	AU=Smith, A.J.
Title	X	X	X	X	X	X	X	TL	TL=energy
Corporate code	X						X	IC	IC=950259
Corporate source	X	X	X		X	X	X	CS	CS=Livermore
Publication description		X	X		X	X	X		
Journal coden	X						X	JO	JO=CMPRB
Availability		X	X			X	X		
Date	X	X	X		X	X	X	YR	YR=1978
Language	X	X	X			X	X	LA	LA=French
Contract number	X	X	X			X	X	CN	CN=EY-76-S-02-3084
Country of publication	X						X	CP	CP=US
Country of affiliation	X						X	CO	CO=US
Patent nation	X						X	PN	PN=British
Contract code	X						X	CD	CD=Conservation
Document origin	X						X	DO	DO=P
Announcement journal	X						X	AJ	AJ=ERA
Augmentation	X						X	Look command	L1/T/'1890'
Distribution category	X						X	DC	DC=95
Primary subject category	X	X	X			X	X	PC	PC=020400
Subject category	X	X	X			X	X	NC	NC=010404
Abstract	X	X				X	X	Look command	L2/A/'RTR'
Subject descriptors (manual)	X	X	X				X	SD	SD=hydrogen
Subject descriptors (manual + computer)	X						X	IT	IT=coal
Major subject descriptors	X	X	X				X	MD	MD=coal/chemical analysis
Data tag	X	X	X				X	DT	DT=coal
Internal code	X						X	BS	

*Format 1 lists only accession numbers.

RECON "Shortcuts"

BYPASS SYSTEM MESSAGE AT SIGN-ON

Dial-up users can bypass the full-page introduction at sign-on by use of the word NO following the user ID.

Example:

ARECON
Enter ID
PDQNO (ID with "NO" added without space)
Enter Password
▣▣▣▣▣▣▣▣

SEARCH IDENTIFICATION PAGE

The search identification page can be bypassed if a search title, comments, etc., are not needed. Use the BEGIN command with a file number, e.g., !3.

The identification page is not used for a mailing address. It is not necessary to type in your own mailing address for each search. Printouts are automatically mailed to the address on file at ORNL.

SUBJECT CATEGORIES

Use of the command #NC=(first two digits of major categories) will retrieve everything in that category. For example, #NC=08 will form a set containing every item assigned the categories 080000 through 080900, indicating some aspect of hydrogen fuels technology. #NC=080000 will retrieve only very general papers on hydrogen fuels, e.g., reviews or bibliographies.

Many items are assigned more than one category with the most pertinent subject area assigned first. Primary categories can be searched using the prefix PC. #PC=142000 will retrieve only items in which solar heat storage is the major emphasis.

There is a second level of upposting not always readily apparent in the category listings. All categories are upposted to the fourth numeral in the 6-digit categories. For example, the items under 052000 (Nuclear Fuels–Waste Management) are the total of all items in 052001 (Waste Processing) and items in 052002 (Waste Disposal and Storage) plus any general papers originally categorized specifically to 052000.

SUBJECT DESCRIPTORS

Use of the IT field retrieves both the indexer-assigned descriptors (SD) plus the computer-generated broader terms (upposting). When the indexer assigns STRESS CORROSION to a paper the computer automatically assigns the broader term CORROSION. The *Thesaurus* should always be consulted to identify the narrower terms included under a particular descriptor. If these NT's are not wanted in your search, you can eliminate them by using, for example, #SD=COAL. Consulting the *Thesaurus* is also useful in the reverse situation in which you do want narrower terms included in your search. In this case, you can avoid selecting in your set formation any of the NT's listed.

MAJOR DESCRIPTORS

Major descriptors are those paired by the indexer as being indicative of the basic thrust of the paper, e.g., INTAKE STRUCTURES/BIOLOGICAL FOULING. Use of the MD prefix will limit retrieval to fewer, more pertinent items and is essentially the same as scanning the subject index in TIC printed products.

Example:

CITATIONS

173	MD=STEELS/CORROSION
2617	MD=STEELS/* (all items with STEELS as MD)
2129	MD=CORROSION/Q (all items with CORROSION used as qualifier)

TITLE WORDS

Caution should be exercised in searching titles for chemical symbols, compounds, elements, etc. Many false coordinations are possible, and the resulting sets formed may be practically useless. An example shown in the September 1979 *RECON Newsletter* is illustrative of the difficulties involved in title searching for H_2. The search format is:

1. #TL=H
2. #TL=SUB
3. #TL=2
4. $1*2*3 or $(1-3/*)

Three out of the first 10 titles read:

(Title) $SUP 133$Nd energy level bands with negative parity based on H/SUB11/2/state

(Title) Nitrogen absorption of plants under coexistence of organic and inorganic nitrogens, (2). What is incorporated predominantly from the media in which [U-$SUP 14$C] glutamine, [2,3-$SUP 3$H] arginine, and $SUP 15$N-NO$SUB 3$ coexist.

(Title) Cs$SUB 2$SO$SUB 4$-Pr$SUB 2$(SO$SUB 4$) $SUB 3$-H$SUB 2$O and NiSO$SUB 4$-Pr$SUB 2$ (SO$SUB 4$) $SUB 3$-H$SUB 2$O systems at 75 deg C

The same caution also applies to searching abstracts for chemicals using the LOOK command.

PRINT COMMAND

To delete print requests enter:

DELETE/set number
or
D/set number

The DELETE command deletes all prints from that set. If you delete a print set you later need, you can combine the set with itself, e.g., $7+7, to produce a new set number that can be printed.

The default print command is 200 items. If you want to print more than 200, you can specify the number up to 2000, e.g., & 8/5/1-902.

GENERAL COMMENTS

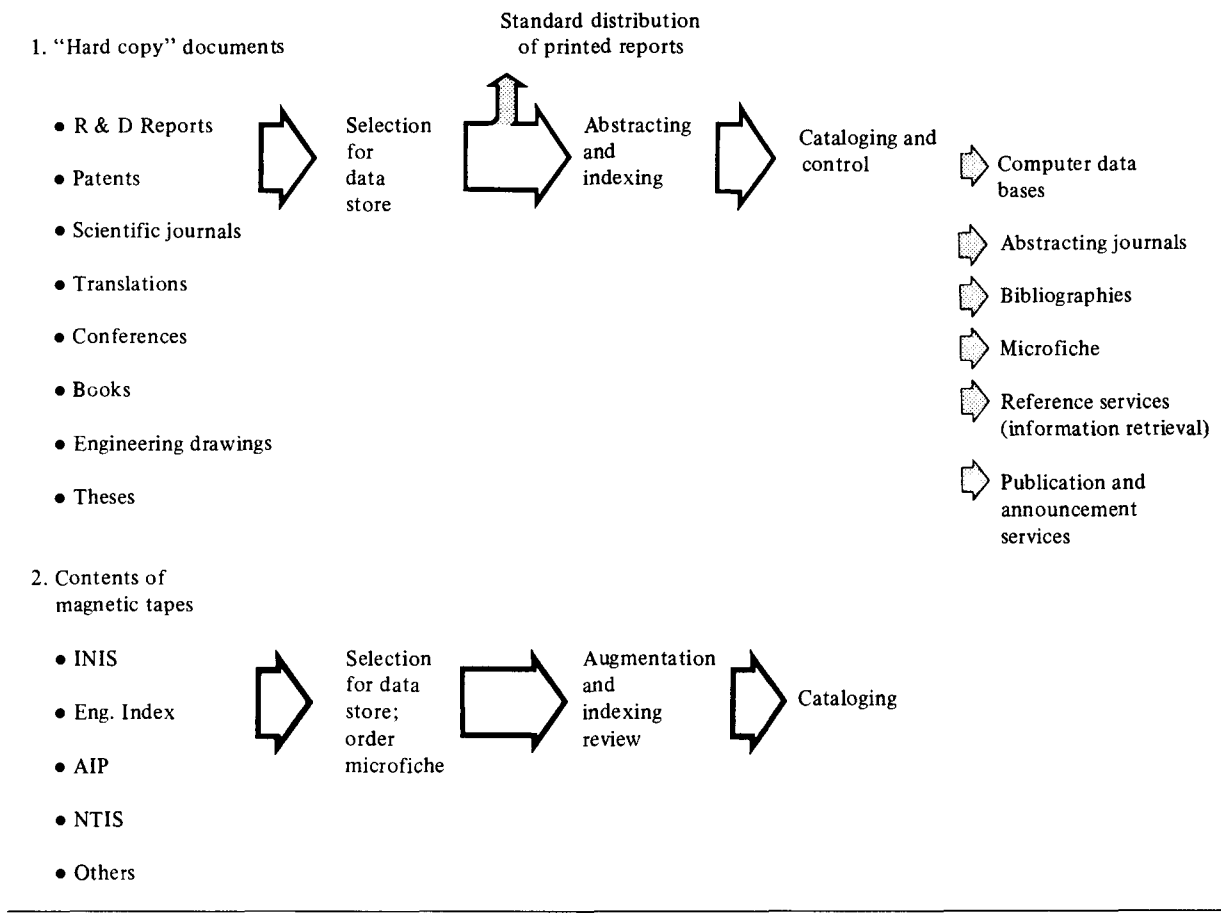
Avoid using LOOK command on abstracts of large sets if at all possible. Cut down the size of the set in any way you can, e.g., search title words, eliminate patents, etc.

If both EDB and GAP files are searched, the overlap of items in both files can be deleted from the GAP search by using the command #ED=EDB and then subtracting this set from your "final" set.

Set	Citations	
1	5465	#IT=ENERGY CONSERVATION
2	10808	#ED=EDB
3	1919	#1-2

GAP items CANNOT be deleted from the EDB file by using the #AJ=GAP command. The GAP file was created using many items from EDB that were not input with the AJ=GAP designation.

TIC INFORMATION PROCESSING FLOW



APPENDIX I ITEMS NOT SENT TO INIS

TIC sends to INIS citations for all U. S.-published items within the subject scope of INIS, including foreign-originated items published in the United States, with the following exceptions:

By U. S. embargo

1. Department of Defense documents
2. Applied technology reports; availability code AT
3. Engineering materials; availability code EM
4. Liquid Metal Engineering Center reports; availability code LMEC
5. Reactor Standards Office reports; availability code RSO
6. Grand Junction Office documents; availability code GJO
7. Reports with NTIS availability of U. S. Sales Only

By specific INIS exclusion

8. Cover-to-cover translations
9. Monthly and quarterly progress reports
10. Entries for which there is no INIS subject category code comparable to the EDB subject category

APPENDIX II BASIC DUPLICATE GUIDELINES

Each item selected by TIC for input to the abstract journals and data bases is checked to determine if it matches a previously processed item; i.e., if it is a duplicate. An item at hand, although identical in content to a previously processed paper, may have a significantly wider availability (through appearance in a more accessible publication, for example) or it may be in a different language. Basic guidelines to aid in the duplicate checking process are:

1. A document of a given type can duplicate only a document of the same type, i.e., a journal article cannot duplicate a report.

2. Two journal articles are not considered duplicates if they are in different languages. This is also true for books and translations.

3. For the purpose of duplicate checking, conference papers are to be considered a document type and therefore are not to be considered duplicates of either reports or journal articles.

APPENDIX III UNCLASSIFIED TIC DATA BASES

The five unclassified data bases maintained by TIC and accessible on RECON are the Nuclear Science Abstracts (NSA) data base, the Energy Information Data Base (EDB), the General and Practical Information (GAP) data base, the Research in Progress (RIP) data base, and the Issues and Policy Summaries (IPS) data base. A sixth unclassified data base, the Abstracts of Limited Distribution Reports (ALD) data base, is planned for inclusion in the RECON system, but because of special restrictions on access to ALD, it is described in APPENDIX IV RESTRICTED TIC DATA BASES. The five unclassified data bases are described below.

NSA

Nuclear Science Abstracts (NSA) was a semimonthly abstract journal published by the U. S. Atomic Energy Commission (and later the Energy Research and Development Administration) during the years 1948–1976. The final issue was Volume 33, No. 12, dated June 30, 1976. Nuclear material was included in EDB as of July 1, 1976.

Broadly stated, the subject scope of *NSA* included all of nuclear science and technology. Scientific and technical reports of the Atomic Energy Commission (and Energy Research and Development Administration) and its contractors, other U. S. government agencies, other governments, universities, and industrial and research organizations are included in the NSA data base as well as books, conference proceedings, individual conference papers, patents, and journal literature. The unit record for each item has the *NSA* volume, issue, and abstract number, title, authors, complete bibliographic information (includes

journals, the title, coden, volume, issue number, number of pages, and date; includes for reports, institution name, availability, number of pages, and price), subject descriptors, and subject categories.

The NSA data base corresponds to Volume 21 (1967)–Volume 33 (1976) of *Nuclear Science Abstracts.* The number of citations as of June 1976 was 554,597.

EDB

In 1974 the U. S. Atomic Energy Commission's Technical Information Center began to process nonnuclear information and established the Energy Information Data Base (EDB) on RECON. Coal processing, specifically gasification, liquefaction, and desulfurization, was the first area of information processed. A bibliography on coal processing (TID-3349) covering the years 1930–1974 was printed, and the information collected during the preparation of this bibliography was the initial basis of EDB. Solar energy and geothermal energy were the next areas of information to be added. The subject areas covered for the EDB expanded rapidly, including coverage of older material as time permitted, with the aim of building a complete data base for the various energy fields. When the NSA data base was discontinued after July 1976, all unclassified information being processed at TIC, including nuclear information, was added to the EDB. Beginning with Volume 7 (1976), information announced in *Energy Abstracts for Policy Analysis (EAPA), Energy Research Abstracts (ERA),* and *Atomindex* is included in the EDB.

The EDB subject scope includes all information of interest to DOE. The broad categories included are advanced automotive propulsion systems; biomedical sciences (applied and basic studies); chemistry; coal and coal products; controlled thermonuclear research; electric power engineering; energy conservation and utilization; energy conversion, management, and storage; energy planning and policy; engineering; environmental sciences (aquatic, atmospheric, and terrestrial); environmental–social aspects of energy technologies; explosions and explosives; fission fuels; fusion fuels; geosciences; geothermal energy; health and safety; hydroenergy; hydrogen; instrumentation; isotope and radiation source technology; materials; natural gas; nuclear power plants; nuclear reactor technology; oil shales and tar sands; other synthetic and natural fuels; particle accelerators; petroleum; physics research; solar energy; tidal power; wind energy; and general and miscellaneous. A listing of the EDB first- and second-level subject categories, together with their six-digit codes, is given in the categorization section of this manual. The complete category scheme and scope notes are included in DOE/TIC-4584, *Energy Categories.*

Scientific and technical reports of the U. S. Department of Energy and its contractors, other U. S. government agencies, other governments, universities, and industrial and research organizations are included in the EDB as well as books, conference proceedings, individual conference papers, patents, and journal literature. A listing of the journals scanned is published as DOE/TIC-4579, *Serial Titles.*

The EDB unit record for each item has an accession number, title, author, complete bibliographic information (includes for journals the title, coden, volume, issue number, pages, and date; includes for reports the institution name, availability, number of pages, and price), subject descriptors, subject categories, and abstracts (available only for entries added after June 1, 1976).

The EDB was initiated in 1974; however, it contains material dating back to the late 1800s. The number of citations as of October 1, 1980, was 619,993.

GAP

The General and Practical Information data base (GAP) is designed to make general and practical energy information available to the planner and to the general public. The scope includes:

1. All practical energy information that is of use to homeowners, builders, architects, energy management officials, community planners, small businesses, farmers, educators, etc.
2. General information on concepts in various facets of energy that would aid persons wanting overviews, e.g., speech writers, students writing term papers, etc.
3. Legal and patent information if the end-user concept in item 1 above is met.

The file contains references to flyers, pamphlets, posters, etc., as well as to more traditional literature.

Examples:

Solar Energy—use for heating, cooling, and water heating for residences, agriculture, small businesses, schools, etc.

Energy Conservation—includes energy-saving information such as appliance efficiency, transportation practices, lifestyle practices, and conservation techniques (both new installation and retrofit) employed by residential, industrial, community, and governmental (federal, state, and local) consumers.

Policy—governmental (federal, state, and local) and private sector energy-related programs and services; studies of areas impacted by energy-related activities or policy.

Alternate Fuels—small-scale wind or water-current energy utilization; synthetic fuels from wastes or biomass.

Energy Statistics—fuel or energy consumption, reserves, supplies, prices, or sales data

As of October 1, 1980, the GAP file contained 16,285 citations.

RIP

The Energy Research in Progress (RIP) file was developed at the TIC in cooperation with the Energy R&D Inventory Project of the Oak Ridge National Laboratory. This inventory of energy-related research, development, and demonstration projects was initiated to satisfy requirements of DOE management, the Inventory of Energy Related Research for Congress, and commitments to provide the DOE research projects to the Smithsonian Science Information Exchange. These R&D projects may be sponsored by the federal government, state and local governments, private industry, nonprofit organizations, and educational institutions.

The scope of interest of the RIP file includes all energy sources (fossil, nuclear, and unconventional); electric power generation, transmission, distribution, and storage; energy conservation and utilization, including heating, cooling, lighting, industrial processes, transportation, agriculture, etc.; economic and legal aspects; environmental and health aspects; resource exploration, mining, processing, and reserve studies; and basic and applied research and engineering development.

The RIP unit record data elements include title (searchable); investigators (searchable); the telephone number and zip code of the principal investigator (the first two digits of the zip code are searchable); research organization at which the work is done (searchable); research organization type (searchable); contract number (searchable); duration of project (not searchable); manpower (not searchable); country or state where the research is performed (searchable); country code (searchable); sponsoring agency or organization (searchable); sponsor type code (searchable); contract officer's name and address (searchable); funding (not searchable); organizations providing time and/or resources toward the project but not conducting, supervising, or funding the work (not searchable); brief description of the project (searchable); subject categories (same as used in EDB, searchable); subject indexing (descriptors selected from the EDB subject thesaurus but with indexer-assigned free terms giving, for example, geographic locations, searchable); and publications resulting from the research project (not searchable).

The RIP file contained 11,092 citations as of October 1, 1980.

IPS

The Issues and Policy Summaries (IPS) file provides access to public statements on energy by DOE officials, members of Congress, and others. It is designed to help users keep abreast of significant decisions, policies, and activities of the Department of Energy.

The IPS data base includes printed, publically available materials such as news releases, Congressional testimony, speeches, media interview transcripts, White House documents, etc., that deal with current critical energy-related issues.

Searchable fields on RECON include title words, date, document number, document type, name (the person, usually a DOE official, who makes statements about, or is involved in, the subject that is indexed by the descriptors) and descriptors. Summaries of the documents are included and are searchable by using the RECON LOOK command. Microfiche collections will be available for the complete documents. The descriptors are selected from the *EDB Subject Thesaurus,* DOE/TIC-7000. In addition, corporate names are included with the descriptors, e.g., EXXON CORPORATION. Expanding helps to identify these.

As of October 1, 1980, 1,148 citations were included in the IPS file.

APPENDIX IV RESTRICTED TIC DATA BASES

Several limited-access files are maintained at TIC. All these files are computer maintained and searchable. A brief description of each file is given below.

ALD

The ALD file includes all citations published in *Abstracts of Limited Distribution Reports (ALDR)* since the Vol. 30, No. 1 (Jan.–Feb. 1974), issue. Through Vol. 36, No. 4 (July–Aug. 1980), *ALDR* was a bimonthly publication and contained both classified and unclassified limited-distribution information. Beginning with Vol. 36, No. 5 (Sept. 1980), *ALDR* became a monthly publication containing only unclassified limited-distribution information, i.e., information restricted by the issuing organization to DOE and its contractors. The unclassified ALD file will be accessible to authorized persons on RECON. The classified reports previously going into ALD will now go into a new classified file, the Classified Reports File (CRF).

AWD

The AWD file includes all citations published in *Abstracts of Weapon Data Reports (AWDR)* (see Appendix VI). Thus, AWD includes references to all reports containing nuclear weapon data (categories Sigma 1, 2, and 3) published and externally distributed by the DOE field offices and their contractors. The file was initiated in 1974 but extends back through 1970. A few reports dated prior to 1970 are included. Access to this file must be specifically authorized by DOE's Office of Military Application. The file is classified SECRET-RESTRICTED DATA, ATOMIC WEAPON DATA, Category Sigma 1.

SPI

The Sensitive Production Information (SPI) file was established in 1976 and includes classified DOE-sponsored research, development, and production information pertinent to uranium enrichment by gaseous diffusion and gas centrifugation. Laser isotope enrichment information may be added later. The file is classified SECRET-RESTRICTED DATA. Access must be specifically authorized by the Director, Centrifuge Technology Division, Office of Assistant Manager for Enriching Operations and Development, Oak Ridge Operations Office of the Department of Energy.

CRF

The Classified Reports File (CRF) was established in September 1980 and includes the classified reports previously going into ALD. Thus, CRF includes all classified reports that do not fall within the scope of AWD or SPI. CRF is classified SECRET-RESTRICTED DATA.

APPENDIX V WEAPON DATA THESAURUS

Introduction

WTI-9000, the *Weapon Data Subject Indexing Thesaurus,* follows generally the same format as TID-7000, the subject thesaurus for indexing the unclassified literature. WTI-9000, however, serves not only as an authority list of subject indexing terms but also as a quick reference, or glossary, to weapon terminology through the liberal use of definitions and explanatory paragraphs.

Classification and Availability

No attempt is made to limit or reduce the classification of information included in the thesaurus. Since much of the explanatory material is lifted directly from the documents being indexed, the thesaurus bears the highest classification pertinent to those documents. Thus, the cover and each page of the thesaurus are labeled "SECRET-RESTRICTED DATA," and the cover, in addition, bears the security designations "ATOMIC WEAPON DATA, CATEGORY SIGMA 1" and "CRITICAL NUCLEAR WEAPON DESIGN INFORMATION, DOD DIR 5210.2."

Owing to the extremely sensitive nature of weapon data information, access to that information is very tightly controlled. Requests for copies of the thesaurus must be approved by DOE's Office of Military Application. At TIC access to weapon data information must be specifically authorized. Areas in which weapon data information is stored or processed will be designated "RESTRICTED AREA, NO ADMITTANCE." These signs must be obeyed.

Thesaurus Format

The word block for an entry (descriptor) consists of:

SN	Scope note—used to define or limit the descriptor or to provide explanatory material.
DA	Date of entry—first date is entry date; second date is date of last change to the descriptor word block. This field is created by the computer.
ST	Status—used to distinguish between valid and invalid descriptors.
BT	Broader terms
NT	Narrower terms
RT	Related terms
UF	Use for
USE	Use
SF	See for
SEE	See

The status numbers are 03 for valid terms and 04 for invalid terms. In the printed thesaurus valid terms will appear in all caps and invalid terms will be initial caps (unless the invalid term is an abbreviation, such as APBN, in which case the term should be in all caps).

Updating the Thesaurus

The Weapon Data Thesaurus can be accessed by Descriptive Cataloging for updating only during regularly scheduled classified processing sessions, i.e., at those times when the Computer Operations Section has thrown the necessary switches to ensure that the input terminals and associated cables are adequately shielded to prevent unauthorized access to the classified files. At present these classified input cycles take place every Wednesday or every other Wednesday, depending on the backlog of classified material to be processed. The following commands are used to update the file:

EMT	Enter main term—used to enter a main term not already in the thesaurus. Term must be entered in upper-lower case, unless otherwise designated.
CMT	Change main term—used to change spelling of a main term in the thesaurus. Old spelling; new spelling is entered.
DMT	Delete main term—used to completely remove an existing main term.
DD	Delete data—used to delete specific data under an existing main term.
ED	Enter data—used to add data to an existing main term.
CD	Change data—used to make spelling corrections or other corrections in non-reciprocal data fields for an existing main term. For the field to be corrected the old spelling; new spelling is entered.

The updating information is kept by the indexer on 5″ x 8″ cards and given to Descriptive Cataloging in batches.

Some examples of input format for various types of data are given below.

1. Enter main term:

EMT	Plutonium Hydrides
ST	03
BT	Hydrides;Plutonium Compounds
NT	Plutonium Deuterides

Explanatory information about the term is included by writing the information preceded by the code SN (for scope note) just above the ST code.

For invalid terms:

EMT	Impulse Gages
ST	04
USE	Momentum Gages

and

EMT	Impulse
ST	04
SEE	Electron Impulse;X-Ray Impulse

2. Change main term:

CMT	Forest Bust;Forest Burst

In this case the word "Burst" was misspelled.

3. Delete main term:

DMT	Heat of Fusion

In this case the main term is being replaced by another term, FUSION HEAT, which will be entered using the EMT operation. Note that the DMT operation will also remove all the structure associated with the term.

4. Delete data:

DD	Test Equipment
RT	Test Facilities

The DD operation can be used to delete any element of data under the main term. In the above instance it was decided that the RT should be a BT. After the deletion is made, the correct hierarchical relationship is entered using the ED operation, as shown below.

5. Enter data:

ED	Test Equipment
BT	Test Facilities

Any element of data can be entered using the ED operation.

The main term to which data are to be added is identified by the ED code, and the particular data element to be added is identified by SN, BT, NT, or RT codes as appropriate. More than one type of data can be entered in the same ED operation.

6. Change data:

Incorrect status code

CD	Gas Filters
ST	04;03

In the above case the main term GAS FILTERS has been input with status 04 (invalid term) when it should have had status 03 (valid term). The error was noticed when the term appeared in the printed thesaurus in upper-lower case (characteristic of an invalid term) but had the structure (BT, NT, RT) of a valid term.

Since a characteristic of the weapon data thesaurus is the frequent updating of scope notes under main terms (reflecting the continuing development and testing of nuclear devices), the CD operation is primarily used to make such changes.

Consider the following term in the thesaurus:

FOOFRAM BURST
(XYZ-sponsored test planned for December 1978.)
BT1 HOOPLA OPERATION
BT2 UNDERGROUND BURSTS
BT3 ATOMIC EXPLOSIONS
BT4 EXPLOSIONS

Eventually the indexer will receive the test completion report providing additional information, such as the specific device tested, the actual test date, and the yield. The indexer will make the following entries on index cards:

To change paragraph

CD	FOOFRAM BURST
SN	Planned for December 1978.; using a weapon X with a Furbish primary and a Rusty secondary. Fired December 18, 1978. Yield 20 kt.

Note that the updating information includes the words to be replaced (including the final period) followed by a semicolon. The information to be substituted follows the semicolon.

To enter the new data

ED	FOOFRAM BURST
RT	FURBISH;RUSTY;WEAPON X TEST DEVICES

The updated term will then appear in the thesaurus as

FOOFRAM BURST
(XYZ-sponsored test using a weapon X with a FURBISH primary and a RUSTY secondary. Fired December 18, 1978. Yield 20 kt.)
BT1 HOOPLA OPERATION
BT2 UNDERGROUND BURSTS
BT3 ATOMIC EXPLOSIONS
BT4 EXPLOSIONS
RT FURBISH
RT RUSTY
RT WEAPON X TEST DEVICES

Note that the parentheses are not specified in the input data but are provided by the computer for the printed thesaurus.

Sometimes the only change to the data (paragraph) consists of just adding additional information.

Suppose that, for the example given above, the test is cancelled. The input information will read

CD	FOOFRAM BURST
SN	1978.;1978. Not fired.

The updated entry will read

FOOFRAM BURST
(XYZ-sponsored test planned for December 1978. Not fired.)
BT1 HOOPLA OPERATION
BT2 UNDERGROUND BURSTS
BT3 ATOMIC EXPLOSIONS
BT4 EXPLOSIONS

In actual practice several changes may be made to the data under an entry (especially for nuclear tests) as new information comes to light. In this way the thesaurus will contain the most up-to-date information available. The final archival entry is made when a shot is fired or the device goes into stockpile.

After Descriptive Cataloging has input the data (usually after several input sessions) and before an attempt is made to update the thesaurus, the indexer should ask Computer Services Branch for a listing of the input. A careful scrutiny of this list can detect input errors that would prevent a successful update.

New Terms

The indexer is responsible for assigning descriptors that adequately reflect the content of the documents indexed. In many instances existing descriptors are inadequate and new ones must be selected. In most cases these descriptors will reflect concepts so usual that no explanatory material need be provided, e.g., isotopes, common compounds, properties, instruments, etc. In other cases (most usually for weapon-related information) a paragraph or definition must be added. Common types of descriptors requiring additional explanation are weapon tests, nuclear weapons and devices, missile systems, computer

codes, etc. In order to make such information available to the weapon community at an early date (rather than waiting for the next edition of WTI-9000), a list of the descriptors (along with the paragraphs and associated structure) is included in the back of a regular issue of *AWDR (Abstracts of Weapon Data Reports).*

Note: The weapon data indexer selects and approves all input to the thesaurus. It is imperative that such information be accurate.

Thesaurus Publication

A complete revision of WTI-9000 is published and distributed in December of each year. The indexer should cut off input to the thesaurus at an early enough date (usually about October 15) to allow adequate time for the editing and publishing cycle. The thesaurus repro copy should be generated and transmitted to the Publishing Branch prior to December 1. The weapon data indexer is responsible for providing the introductory material to the Publishing Branch and initiating the master in the Document Control & Evaluation Branch. He must provide an accurate and up-to-date distribution list at the time he initiates the master.

APPENDIX VI *ABSTRACTS OF WEAPON DATA (AWDR)*

AWDR, a bimonthly abstract journal published by the Technical Information Center, is limited to reports containing atomic weapon data (Sigma 1, 2, or 3) issued by DOE offices and their contractors. Coverage is essentially complete for reports issued after 1970; however, some earlier reports are included.

Each issue is reviewed for classification. Since only reports classified CONFIDENTIAL-RESTRICTED DATA and SECRET-RESTRICTED DATA are abstracted and no effort is made to limit the information included in the abstracts to achieve a lower classification, *AWDR* is a SECRET-RESTRICTED DATA publication.

For control purposes each issue of *AWDR* is assigned a report code consisting of the acronym AWDR, the last two digits of the date (year), and a number representing the publication sequence. Thus the issue numbered AWDR-79/1 means the first issue (the January-February issue) of *AWDR* published in 1979.

Each issue of *AWDR* contains corporate, personal author, report number, and subject indexes in addition to the abstract portion. All indexes show the citation number and the report number. The corporate and personal author indexes provide titles. The report number index indicates classification and Sigma category of each report. Multivolume index cumulations were issued annually for *AWDR* from its inception in 1974 through 1978(Vol. 5). The 1979 and subsequent editions, however, will be one-volume cumulations, except five-volume cumulations will be issued periodically.

In general the principles followed in preparing abstracts for *AWDR* are those set forth in this manual. The length of an abstract is 2000 characters and spaces. Author abstracts are used, if appropriate. Care must be exercised to ensure that no abstract is too long and that only font characters are used. Author abstracts are not changed merely for reasons of preference or brevity (except that the 2000-character limit must not be exceeded), but incorrect or ambiguous forms should be corrected. All abstracts must be written in the third person. Approved abbreviations are those listed in this manual. Abstracts in *AWDR* are not arranged by subject category but by Sigma category (Sigma 1, 2, or 3). Within each Sigma category the abstracts are arranged alphanumerically by report series code.

The classifications of titles and abstracts are given if they are shown in the report. For an author abstract the abstractor will write the classification, e.g., (S/RD) or (C/RD), immediately following the abstract. No classification will be shown for prepared abstracts. The Descriptive Cataloging Section will input the title classification, if known, in parentheses at the end of the title. In some cases a report may include both an unclassified and a classified title. Both titles are input along with the classifications.

For some reports classified Sigma 1, a statement may appear on the cover of the report that the title is unclassified except when associated with Sigma 1. To take care of this kind of situation, the following statement appears at the beginning of the Sigma 1 abstract section: *Some titles designated as unclassified may become SECRET-RD when associated with SIGMA 1.* The data transcriber will label the title as unclassified (U). In some cases (usually in a progress report or conference proceedings) the subject matter

may be so diverse that a single abstract cannot adequately cover the contents. In this case a separate abstract (and indexing) is prepared for each division or paper in the report. An overall abstract is then prepared for the complete report merely stating *Separate abstracts were prepared for_____ papers* (or chapters or sections) *in this report.* Indexing for this "lead" abstract must reflect the broad topic of the report.

Subject index terms (descriptors) used in indexing items for *AWDR* are taken from a controlled vocabulary of index terms, WTI-9000 (the *Weapon Data Subject Indexing Thesaurus*), *see* APPENDIX V.

Generally, the subject index construction and the philosophy of *AWDR* are designed to be consistent with those of the other abstract journals produced by TIC.

Free-language augmentation of the title is available if the title alone contains too little information for a meaningful index statement. Certain descriptors (such as names of materials, equipment, bursts, devices, weapons, places, etc.) denote main terms. These terms are assigned M or T flags if they are selected for the printed index. Other terms denote subsidiary, or qualifying, ideas (such as properties, processes, characteristics, etc.). These terms are assigned Q (for qualifier) flags. For the printed index, M and T terms are paired with corresponding Q terms by the use of numerical designations. An M1 descriptor will be paired with all Q1 descriptors, etc. A separate numerical designation is assigned to each M (or T) term. There may, however, be several Q terms with the same numeral. M or T terms without a numeral indicate that there is no qualifying term, i.e., the main term will appear unpaired in the index. An M flag indicates the presence of augmentation for that term, while a T flag indicates that there is no augmentation for the term.

All descriptors assigned to an item constitute a "keyword string." Some descriptors are desirable to facilitate machine retrieval but are unnecessary for the printed index. These descriptors will not be assigned M, T, or Q flags. The keyword string for each item, along with the augmentation, if any, is printed out in the abstract portion of *AWDR* and is located between the descriptive cataloging and the abstract.

Note: Detailed guidelines for pairing descriptors to form M/Q pairs are explained in the SUBJECT INDEXING section of this manual. These guidelines were formulated for unclassified data processing but are equally valid for classified publications.

The extensive use of code names and special weapon nomenclature in weapon data report literature makes it mandatory that new subject indexing terms be defined at the time of their first use. Thus, at the back of each issue of *AWDR*, a list of new subject indexing terms is provided that includes definitions, limiting statements, and cross references. This section of *AWDR* serves as a survey of current nuclear weapon developments, a unique service provided by TIC to keep the weapon design laboratories, their contractors, and DOE operations offices abreast of recent progress throughout the DOE Weapons Complex.

The highly sensitive nature of weapon data information requires that input to the data base be carried out under maximum security precautions. Areas in which weapon data information is stored or processed will be delimited by pink signs: RESTRICTED AREA—NO ADMITTANCE. Only personnel specifically authorized access to Atomic Weapon Data will be permitted in these areas. Because of the disruption caused to the unclassified processing activities, the Descriptive Cataloging Section will input weapon data (and other classified information) one day a week, usually Wednesday. At that time the Data Processing Branch will throw a series of switches that activate the classified processing system. The input terminals and cables are thereby shielded to prevent "tapping" by unauthorized personnel, and failsafe procedures are instituted.

When the time arrives for a new issue of *AWDR* to be compiled, a processing request form is completed and sent to the Data Processing Branch. This form (BD-5) specifies the data type (WDA), type of processing (galley or repro), volume and issue numbers, publication date, security classification (S/RD), starting page number, number of entries desired (all), and starting abstract number.

A galley listing of the issue must be requested first. This list must be reviewed carefully to detect any errors present in the original data or introduced during the input cycle. In particular, the reviewer must pay close attention to the subject indexing section of the galley to correct any errors detected by the computer in processing the data. An authority file consisting of the valid descriptors in WTI-9000 is kept on-line during processing of the subject index. Any descriptor in the data that does not match a descriptor in the authority file will be flagged with the error message "CK KYWD." That descriptor must be changed to a valid descriptor unless it is ascertained that the descriptor was introduced since the authority file was last updated.

Another type of error that may occur is that there may be an M (or Q) term for which there is no corresponding Q (or M) term. An error message of the form "HUMIDITY TESTING***NO MATCH***" will be printed out.

Occasionally the indexer may by mistake assign different numerals to the same descriptor selected as an M or T term. This may happen on long progress reports, for instance, if the indexer forgets that he has already used a particular descriptor. The error message will be "***ERROR- - -TERM WITH SAME INDEXING INFO REPEATED WITH DIFFERENT SUBSCRIPT***." Usually, no correction needs to be made in this case. If the indexer tries to pair a descriptor with itself, the error message will be "***ERROR- - -BAD M-Q MATCH***." If a descriptor is labeled with something other than an M, T, or Q, the error message will be "(DESCRIPTOR)***INVALID TYPE***." If two different descriptors (flagged as M or T terms) are assigned the same numerical designation, the error message will be "***ERROR- - -MULTIPLE INDEXING TERMS WITH THE SAME SUBSCRIPT***." These errors must be corrected.

The punctuation in the keyword string is important. Incorrect punctuation will be flagged by the computer and must be corrected. The hypothetical keyword string below will illustrate punctuation:

WATER:T1,T2;VISCOSITY:Q1;VAPOR PRESSURE:Q2;HIGH PRESSURE;
STEELS:M3;MECHANICAL PROPERTIES:Q3;HIGH TEMPERATURE;
TITANIUM:M4;RADIATION EFFECTS:Q3,Q4;

After the galley has been reviewed, it is given to the Descriptive Cataloging Section to input the corrections. A processing request form, identical to the one for the galley except that the "repro" blank is now checked, is delivered to the Data Processing Branch.

The Distribution List of *AWDR* has been reviewed and approved by DOE's Office of Military Application. Requests for copies of *AWDR*, as well as requests for searches of the AWDR data base from organizations and individuals not on the *AWDR* Distribution List, must be coordinated with:

Roy G. Boger, Jr., Chief
Weapons Information Branch
Division of Program Support
Office of Military Application

FTS 233-4376

APPENDIX VII UPDATING THE EDB SUBJECT THESAURUS

Frequency

The thesaurus should be updated twice a month. Distribution of updates is made to indexers (both in-house and contractors) and the October 1, January 1, and April 1 updates are distributed to RECON users and other interested parties. A complete revision is made in June of each year.

Procedure

TIC Descriptors

Every two weeks the new descriptors that have been requested by indexers and approved by section chiefs are evaluated. The terms that are deemed necessary for indexing are checked to see (a) if a synonym already exists in the thesaurus; (b) if the term is in other thesauri (a concentrated effort is being made by NTIS, NASA, and DOE to use the same terminology as much as possible); and (c) if the rules in IAEA-142

are obeyed. The terms accepted are checked for completeness of structure and given a status (all terms must have a status), definition, and scope note if necessary. The word block for an entry may consist of

SN	scope note (used to define the use of a descriptor, i.e., a restriction)
GC	group code (used to categorize descriptors)
FQ	frequency (not presently used)
DA	date of entry (First date is entry date; second date is date of last change to the descriptor word block. This field is created by the computer.)
ST	status
FI	for INIS (consists of INIS descriptor or descriptors that are to be used on INIS tapes instead of main entry)
Def	definition entry
BT	broader terms
NT	narrower terms
RT	related terms
UF	use for
USE	use
SF	see from
See	see
UF+	use for + terms

The following numbers are used in the status field

01	valid INIS descriptor and TIC descriptor
02	invalid descriptor (used for see and use references)
06	valid TIC descriptor; invalid INIS descriptor
07	valid INIS descriptor; invalid TIC descriptor
09	valid TIC descriptor

INIS Descriptors

Descriptors that have been approved by INIS can be received in three ways (a) on a printout that lists all transactions to the INIS thesaurus for a given time (received on an irregular basis from Todeschini), (b) on update sheets (received monthly), and (c) on thesaurus tapes. (The printout from the thesaurus tape consists of two listings; one of INIS terms not in the DOE thesaurus and one of DOE terms not in the INIS thesaurus. Using the printout is time consuming since INIS has a character limitation and many of the terms appear to be different when in reality INIS is using an abbreviated form.) The printout from any of the above sources is compared with the TIC authority to identify new descriptors and to identify TIC-requested descriptors that have been approved by INIS. A list of new INIS descriptors, including the proposed structure, and a list of TIC-proposed descriptors that have been approved by INIS are given to the section chiefs for review. After the comments are reviewed and appropriate corrections are made, the terms together with the TIC-proposed descriptors are marked for input.

The terms are marked with the transactions that are to be made. The following commands are used.

EMT	enter main term—used to enter a main term not already in the thesaurus. Term must be entered in upper-lower case.
CMT	change main term—used to change spelling of a main term in the thesaurus. Old spelling;new spelling is entered.
DMT	delete main term—used to completely remove an existing main term
DD	delete data—used to delete specific data under an existing main term
ED	enter data—used to add data to an existing main term
CD	change data—used to make spelling corrections or other corrections in nonreciprocal data fields for an existing main term. For the field to be corrected the old spelling;new spelling is entered.

Some special situations are

1. To change a term from status 2 to status 1, 6, or 9, the term must be deleted and the new word block entered as an "enter data."

DMT Runoff
ED Runoff
ST 09
RT atmospheric precipitation;watersheds

2. When a valid descriptor is deleted, any use reference to the term must be deleted in a separate step.

DMT Food and Drug Administration
DMT FDA

3. When adding a term for which there already exists in the thesaurus a logical broader or narrower term, care must be taken to assure that correct hierarchical relationships exist.

Step 1

EMT Rare Earth Nuclei
ST 09
BT Intermediate Mass Nuclei
NT Cerium 126;Cerium 128; etc.

already existing in the thesaurus is

INTERMEDIATE MASS NUCLEI
NT Cerium 126
NT Cerium 128
etc.

the word block for CERIUM 126 after completion of Step 1 would be

CERIUM 126
BT1 Intermediate Mass Nuclei
BT2 Nuclei

illegal

BT1 Rare Earth Nuclei
BT2 Intermediate Mass Nuclei
BT3 Nuclei

Therefore an entry should be made:

Step 2

DD intermediate mass nuclei
NT CERIUM 126; CERIUM 128, etc. (There is a maximum limit of 35 terms for one entry.) (NOTE: Entries other than EMT and DMT may be entered in all upper, all lower, or upper-lower case.)

Input

The following procedure is used for entering the data (underscore indicates the actual characters keyboarded by the operator).

All input terminated by carriage return
THESAURUS EDITOR
1. .Log 70,72
Password (This is changed periodically to assure area security.)
2. .TTY LC (to implement upper-lower case capability)
3. .r thesed
NEW UPDATE FILE? y
FILENAME AND EXT: fb0518.th1 (Use own initials, current date, period, and TH 1,2, etc.)
***
001
ENTER REQUEST: EMT
ENTER DATA FOR REQUEST: 710 Reactor

710 REACTOR NOT FOUND IN AUTHORITY
ENTER REQUEST: st
ENTER DATA FOR REQUEST: 09
ENTER REQUEST: bt
ENTER DATA FOR REQUEST: Enriched Uranium Reactors;Fast Reactors;Gas Cooled Reactors
ENRICHED URANIUM REACTORS APPEARS AS 01120174
FAST REACTORS APPEARS AS 01120174
GAS COOLED REACTORS APPEARS AS 01120174
ENTER REQUEST: end
ENTRY APPEARS AS:
001
EMT-710 REACTOR
ST-09
BT-ENRICHED URANIUM REACTORS;FAST REACTORS;GAS COOLED REACTORS
ACCEPT OR REJECT: a
***
002
ENTER REQUEST: stp
EXIT

The following example consists of an error situation.

***
001
ENTER REQUEST: EMT
ENTER DATA FOR REQUEST: 710 Reactor
710 REACTOR NOT FOUND IN AUTHORITY
ENTER REQUEST: st
ENTER DATA FOR REQUEST: 09
ENTER REQUEST: bt
ENTER DATA FOR REQUEST: Enriched Uranium Reactors;Fast Reactor;Gas Cooled Reactors
ENRICHED URANIUM REACTORS APPEARS AS 01120174
*FAST REACTOR NOT FOUND IN AUTHORITY
GAS COOLED REACTORS APPEARS AS 01120174
IS THIS OKAY? n
ENTER REQUEST: bt
ENTRY APPEARS AS:
BT-Enriched Uranium Reactors;Fast Reactor;Gas Cooled Reactors
ACCEPT OR REJECT: r
ENTER EDIT REQUEST: c
ENTER CHANGE CHARACTER: Reactor
ENTER CORRECTION: Reactors
ENTER REQUEST: dsp
ENTRY APPEARS AS:
001
EMT-710 Reactor
ST-09
BT-Enriched Uranium Reactors;Fast Reactors;Gas Cooled Reactors
ACCEPT OR REJECT: a
***
002
ENTER REQUEST: stp

*When a term other than the term being entered as a new descriptor is not found on the authority, a check should be made to see if the term is misspelled.

4. After stp command:

R.THSPRF

Output: FB.HEX

Input: FB0518.TH1 (carriage return)

FB0518.TH2 etc.

R.SPUR

Input: FB.HEX (carriage return)

Output: FB.ASC (carriage return)

PRI FB.ASC/NOTE:BARNES

The THSPRF and SPUR programs compile the update files for printing in ASCII, and the PRI command instructs the computer to generate a listing of the update files. When the proof copy (labeled THSUP.FIL) is received in S&T, it is carefully proofed to ensure that all new descriptors have the correct status, to check for logic errors, and to correct any typographical errors. Corrections are then made to the files by the following procedure:

1. .LOG 70,72
2. .TTY LC
3. .r thesed

NEW FILE UPDATE? n
ENTER EXISTING FILENAME AND EXT: fb0518.th1
ENTER ENTRY NUMBER OR "STP": 1
ENTRY APPEARS AS:
EMT-Shaft Guides
DA -081280;081280
ST -09
RT -SHaft Excavations
ACCEPT OR REJECT: r
ENTER REQUEST: rt
FIELD APPEARS AS:
RT -SHaft Excavations
IS THIS OKAY? n
ENTER EDIT REQUEST: c
ENTER CHANGE CHARACTERS: SH
ENTER CORRECTION CHARACTERS: Sh
FIELD APPEARS AS:
RT -Shaft Excavations
IS THIS OKAY? y
ENTER REQUEST: end
ENTER ENTRY NUMBER OR "STP": stp

User commands to be used for thesaurus input are

END	Signals end of input for a particular entry
DSP	Display entry. Can be issued as often as desired
KIL	Kill present entry
STP	Exit from editor
D	Delete present data element

When all corrections have been made to the update files, a request form is sent to the Data Processing Branch (Fig. 1).

The Thesaurus Maintenance Program is then initiated by Computer Operations. This program first merges the update files, then sorts the entries alphabetically and generates the reciprocal terms. At this point a listing is printed and sent to S&T for corrections. The corrections are made in the same manner as those to the update files, but one logs into 70,71 and the file name is THSUP.FIL. When the corrections are made, Computer Operations is notified to continue the update.

TI-253 (4-76)

REQUISITION FOR COMPUTER SERVICES

(DO NOT WRITE IN THIS SPACE)

Control Number _____

Date Received _____ Time _____

Job ID _____ Requestor Control No. _____ Priority _____

Description _____

Please run thesaurus update

Filenames – jr0612.TH 1

JR0812.TH2

JR0812.TH3

JR0812.TH4

JR0812.TH5

JR0812.TH6

Date of update – 8/12/80

Date of supplement – 8/15/80

Date of last revision – 9/4/79

Output Requested (Listings ☐ Repro ☐ Labels ☐ Tapes ☐ Other _____)

Number Copies _____ Date Required _____

Requested by	Contract (If Different)	Approved by (Branch Chief)
Date 8/12/80	Phone	Date 8/12/80

To be completed by Computer Services Branch

Assigned by	Assigned to	Est. Man/Hrs Required
Date	Date	Est. Completion Date

Date Program Operational _____ Date Documentation Completed _____ Actual Man Hrs _____

Completion Data _____

Date _____ Time _____ Received by _____

Original: Data Control. To suspense file and return to originator after completion.

Fig. 1 Requisition for computer services.

At various steps in the Thesaurus Maintenance Program, error messages are generated. Thesaurus processing is stopped until corrections are made and Computer Operations is notified to continue processing. Error correction is probably the most difficult part in updating the thesaurus, because it is often necessary to know why the error was generated before a correction can be made. Probably the most common error made is introducing both parts of a reciprocal relationship. Since the maintenance program generates reciprocals, duplicate terms will be created and one must be deleted. Another common error is caused by spaces inserted after the semicolon when multiple descriptors are input in a field. The space is read as a character by the computer, and therefore no match can be found.

When the processing has been completed, four listings or printouts are received by S&T:

DESALL LST	the updated authority
PROG LST	all transactions in update
CHNG LST	all changes in thesaurus since last revision
Repro listing of update	

After the new entries are marked with arrows, the repro listing is sent to the Publishing Branch.

APPENDIX VIII DATA TAGGING AND NUMERICAL DATA INDEXES

Data Tagging

Data tagging for EDB consists of indicating the presence of numerical data pertaining to specific subject matter through the use of labels on appropriate descriptors.

Numerical data are those numbers referring to physical quantities such as densities, melting points, power demand factors, R-values, occurrences of certain events such as failures of a piece of equipment, deaths of experimental animals, or coefficients or parameters such as the rate constant of a particular chemical reaction. These data usually have recognizable error limits. Very often such limits (accuracy, precision, covariance) are given explicitly, e.g., a cross section is measured to be 11.2 ± 0.7 mb; however, error limits may be omitted. Note that numerical data may also be reported implicitly in the form of a graph, whereby points on the graph still have error limits. In theoretical calculations, however, it is often not possible to indicate error limits.

The facets or characteristics of numerical data are listed below and discussed in relation to the logical processes involved in indexing the technical information content of a document.

The data facets are:

1. System investigated (materials, compounds, automotive fuels, electronic equipment, solar collectors, electric batteries, etc.).
2. Action or process involved (heat transfer, chemical reactions, fuel consumption, power generation, etc.).
3. Quantity, property, or characteristic measured (thermal conductivity, power demand factors, prices, R-values, etc.).
4. Type of data according to method of determination (experimental, theoretical, compiled, etc.).

Facets 1, 2, and 3 refer to concepts that, as appropriate, will be represented by descriptors drawn from the thesaurus during the course of regular indexing of the document. Indexing the technical information content consists in providing descriptors that indicate the material or system being investigated, the properties, characteristics, or action being determined, the relevant ambient conditions, and significant measurement techniques or calculational methods used. Subject indexing consists in choosing appropriate M and Q terms to reflect the subject content, with M terms chosen from among the descriptors required to express facet 1, and the Q terms chosen from the descriptors indicating facets 2 or 3, as appropriate. If relevant and useful numerical data on these concepts are reported in the document, the corresponding descriptors will be labeled with the letter D (where D stands for *d*ata) in a manner that will be described in detail below. Numerical data quoted from other publications should *not* be tagged unless the document in question is in fact a compilation or evaluation or comparison of different sets of data. Note that the labeling of facets 1,

2, and 3 is *mandatory* whenever useful and relevant numerical data are presented in the document since facet 3 indicates the quantity measured, and the quantity measured, except in rare cases, is dependent upon or characteristic of the system and process or action investigated.

Facet 4 is indicated by the selection of a descriptor specifically drawn from among the narrower terms of the descriptor DATA whose word block is as follows:

DATA
- BT1 INFORMATION
- NT1 NUMERICAL DATA
  - NT2 DATA COMPILATION
  - NT2 EVALUATED DATA
  - NT2 EXPERIMENTAL DATA
  - NT2 THEORETICAL DATA
  - NT2 STATISTICAL DATA

STATISTICAL DATA is a relatively new descriptor added to the word block and is to be used to indicate numerical data *calculated* on the basis of probability or statistical considerations rather than on the basis of theoretical concepts.

These descriptors must also be labeled with the letter D; furthermore, these descriptors should *never* be used alone on documents for which no data tagging is carried out.

The use of the splitting procedure takes on renewed significance in the tagging of numerical data. Just as the set of descriptors is subdivided to prevent potential false coordination of concepts in regular indexing, the use of splits is essential to prevent ambiguity in tagging data facets, since the D labels are unnumbered.

The D labels are attached to descriptors in a manner analogous to M and Q labels, i.e., a D label is separated from a descriptor to which it is attached by a colon (:) and if both M and/or Q labels and also a D label have been assigned to a descriptor, these are separated from each other by a comma (,). For example: . . . PROTON REACTIONS:M2,Q1,D; CROSS SECTION:D; . . . .

The guidelines listed below are noted to assist the indexer in making the appropriate decision with respect to data tagging. These guidelines do not represent hard and fast rules and *must* be tempered with the indexers expertise in the specific subject area as to the significance of the numeric data under consideration.

Generally, the following should *not* be data tagged:

1. Patents and text books
2. Equations or formulas that are derived but not used to calculate new data
3. Routine equipment specifications
4. Routine economic data that do not represent a significant contribution of the paper
5. Information presented only in graphical form without useful scale (arbitrary units) or from which useful data cannot be extracted (generally such graphs represent the qualitative behavior of the data)
6. Data by-products of methods or techniques that are within the subject scope of EDB but where the data themselves are not in scope, e.g., mass of the spleen determined by scintiscanning or arsenic content of hair determined by activation analysis.

Numerical Data Indexes

The creation of the data indexes is based on the same principles used to construct subject indexes, i.e., subject descriptors that reflect the major concepts investigated in a document are tagged with M and Q labels, indicating Main headings and Qualifier descriptors that are machine-coordinated to create a subject index entry. Main heading descriptors are generally the names of specific materials or systems as indicated in data facet 1. Qualifier descriptors describe the process applied to, or properties of, the subject terms as indicated by facets 2 and 3. These descriptors are juxtaposed to form an *Entity/Attribute* entry in an index. Referring to Fig. 2, it is seen that the M/Q entries for this paper are STAINLESS STEEL-304/INTERGRANULAR CORROSION and LITHIUM/CORROSIVE EFFECTS.

The on-line data index mentioned earlier is one of a number of inverted-file indexes provided for searching the Energy Information Data Base (EDB) on the Department of Energy's RECON retrieval system. There are presently 38 dedicated and over 400 dial-up terminals that access the DOE/RECON system which are provided by DOE on a controlled basis to the national laboratories, energy centers, contractor installa-

Grain boundary penetration kinetics of nitrided type 304L stainless steel. Reeves, J. A., Jr., et al.

DESCRIPTORS	FLAGS
STAINLESS STEEL-304	D M1
INTERGRANULAR CORROSION	D Q1
GRAIN BOUNDARIES	D
LITHIUM	D M2
CORROSIVE EFFECTS	D Q2
NITRIDATION	
EXPERIMENTAL DATA	D
ISOLATED VALUES	D

Fig. 2 A typical indexing work sheet with the technical information content and the numerical data content indicated.

tions, and DOE offices. EDB will soon be available on several commercial systems for access by industry, other government agencies, and the general public.

Figure 3 illustrates a typical record on EDB. Surrogate records include the complete bibliographic citation, abstract, and subject descriptors selected to indicate the information content. Note that all fields are appropriately labeled.

The Data Index on EDB is an inverted-file index made up of all D-labeled descriptors. Each D-labeled descriptor forms a single entry in the Data Index. In addition, the M- and Q-labeled descriptors form a compound entry and two separate entries indicating its usage as a main heading and as a qualifier descriptor as indicated by DESCRIPTOR/DESCRIPTOR, DESCRIPTOR/*, and DESCRIPTOR/Q entries. Entries in the Data Index are illustrated in Fig. 4. Note the entries for the precoordinated M/Q pair STAINLESS STEEL-304/INTERGRANULAR CORROSION and the separate entries STAINLESS STEEL-304/* for the Main heading and INTERGRANULAR CORROSION/Q for the Qualifier entries. These entries facilitate retrieval of numerical data for someone interested in all properties of stainless steel-304 or someone interested in the phenomenon of intergranular corrosion independent of specific materials.

The AND, OR, and NOT logical combinations of entries are used to increase recall and precision. Of course, searching for precoordinated M/Q descriptor entries ensures higher precision than if single descriptor entries are combined using the AND logic. All records identified as a result of a retrieval strategy utilizing the Data Index on EDB will produce bibliographic citations to documents containing data described by the selected descriptors. The text search capability available on EDB as well as other inverted-file indexes such as subject categories can also be used to increase the retrieval precision. Most authors tend to write informative abstracts that incorporate the major numerical results of their research; therefore the presence of the abstract enhances the value of EDB in data retrieval. If not provided by the author, the numerical data can be added to the abstract by the document analyst. For extensive data that cannot be incorporated in the abstract, an indicative notation identifying the nature of the data contained in the original document can be added to the abstract.

<ACCESSION NO.> 77J0018870
<TITLE> GRAIN BOUNDARY PENETRATION KINETICS OF NITRIDED TYPE 304L STAINLESS STEEL
<AUTHORS> REEVES, J.A. JR.; OLSON, D.L.; BRADLEY, W.L.
<AUTHOR AFF> COLORADO SCHOOL OF MINES, GOLDEN
<PUB DESC> NUCL. TECHNOL., V. 30, NO. 3, PP. 385-389
<DATE> SEP 1976
<CATEGORIES> EDB-360105
<PRIMARY CAT> EDB-360105
<ABSTRACT> GRAIN-BOUNDARY PENETRATION WAS DETERMINED FOR NITRIDED TYPE 304L STAINLESS STEEL IN NITROGEN-CONTAMINATED LIQUID LITHIUM. THE GRAIN BOUNDARY PENETRATION FOLLOWED A PARABOLIC RATE EXPRESSION. THESE RESULTS, ALONG WITH PREVIOUS WORK ON AS-RECEIVED TYPE 304L STAINLESS STEEL, SHOWED A DEFINITE INCREASE IN PENETRATION RATE FOR NITRIDED STAINLESS STEEL, BUT THIS INCREASE WAS NOT RELATED TO A CHANGE IN THE APPARENT ENERGY OF ACTIVATION.
<DESCRIPTORS> CORROSIVE EFFECTS: Q2,D; EXPERIMENTAL DATA: D;GRAIN BOUNDARIES: D;INTERGRANULAR CORROSION: Q1,D; ISOLATED VALUES: D;LITHIUM: M2,D; NITRIDATION;STAINLESS STEEL-304: M1,D;

Fig. 3 A bibliographic record as it appears on EDB.

E05	DT=CORROSIVE EFFECT S/Q----------	8
E06	DT=GRAIN BOUNDARIES	3
E07	DT=INTERGRANULAR CO RROSION/Q---------	2
E08	DT=LITHIUM/CORROSIV E EFFECTS---------	1
E09	DT=LITHIUM/◆-------	10
E10	DT=STAINLESS STEEL-304/INTERGRANULAR CORROSION---------	1
E11	DT=STAINLESS STEEL-304/◆----------	15

Fig. 4 Inverted file entries in the EDB Data Index.

The printed data index referred to earlier is a new index that has been added recently to the Department's *Energy Research Abstracts (ERA),* a semimonthly abstract journal that provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses and monographs originating in the Department of Energy, its laboratories, energy centers, and contractor installations. The Numerical Data Index in *ERA* is also based on the use of descriptors selected from the energy thesaurus to reflect the numerical data content of a document as outlined earlier. The entries in the printed data index have the following format:

SUBJECT DESCRIPTOR/QUALIFIER
Descriptor; Descriptor; Descriptor; . . .
Title, citation number (document citation)

The descriptors used as main headings or subject descriptors are selected on the same basis as indicated earlier, i.e., they reflect specific materials or systems as indicated in data facet 1. Also, as before, the qualifier descriptors describe the process applied to, or properties of, the subject terms as indicated by facets 2 and 3. To facilitate the location of data on processes and properties, entries based on a permutation of the above format, i.e., QUALIFIER/SUBJECT DESCRIPTOR, are also included in the index. The additional descriptors listed reflect data facets 4, 5, and 6, that is, pertinent ambient conditions, data type (experimental, theoretical, etc.), and data form (isolated values, tables, or graphs). As illustrated, the title may be supplemented with additional information as appropriate. The document citation is the journal title, volume, issue, and pagination in the case of a journal item. The report number is used as the document citation in the case of report literature. The citation to the original publication is provided in this index so that one may proceed directly from the index entry to the publication containing the data. This greatly enhances the ease of locating the data since the intermediate step of looking up the abstract is eliminated. This direct citation of the original publication is particularly advantageous for use in a library where the publications are immediately accessible and also when a cumulative Data Index is being used. Figure 5 illustrates entries in the data index which are machine-generated using the algorithm just described. Note the precoordinated M/Q entries to facilitate the location of data on specific materials and the permutation of the entry to facilitate the location of data on specific processes or properties.

At present this printed data index capability is being used only to generate a data index for *ERA,* but it has potential uses in other printed products such as specialized bibliographies and other secondary source current awareness journals. It may also be used to generate an index to the numerical data contained in specific reports or report collections distributed by the Center.

LITHIUM/CORROSIVE EFFECTS
Stainless Steel-304; Intergranular Corrosion; Grain Boundaries; Experimental Data; Isolated Values; Grain boundary penetration kinetics of nitrided Type 304L stainless steel, 5:1234 (Nucl. Technol. V. 30, No. 3, pp. 385-9)
CORROSIVE EFFECTS/LITHIUM
Stainless Steel-304; Intergranular Corrosion; Grain Boundaries; Experimental Data; Isolated Values; Grain boundary penetration kinetics of nitrided Type 304L stainless steel, 5:1234 (Nucl. Technol. V. 30, No. 3, pp. 385-9)
STAINLESS STEEL-304/INTERGRANULAR CORROSION
Grain Boundaries; Lithium; Corrosive Effects; Experimental Data; Isolated Values; Grain boundary penetration kinetics of nitrided Type 304L stainless steel, 5:1234 (Nucl. Technol. V. 30, No. 3, pp. 385-9)
INTERGRANULAR CORROSION/STAINLESS STEEL-304
Grain Boundaries; Lithium; Corrosive Effects; Experimental Data; Isolated Values; Grain boundary penetration kinetics of nitrided Type 304L stainless steel, 5:1234 (Nucl. Technol. V. 30, No. 3, pp. 385-9)

Fig. 5 Entries in the *ERA* Numerical Data Index generated by the format algorithm.

APPENDIX IX INIS TAPE PROCESSING

Tapes containing TIC input to INIS are prepared at semimonthly intervals. In running the TIC-assigned descriptors against the INIS Authority File, four error lists are generated.

List I: Abstract numbers, keyword strings, and M/Q pairs of citations on which descriptors are used that have flags and are valid EDB terms but have been declared invalid for INIS.

List II: This list includes citations (descriptive cataloging, keyword strings, and abstracts) with descriptors recognized as new descriptors by the INIS checking program, i.e., they have never been accepted or rejected by INIS.

List III: Descriptors from List II arranged in alphabetic order along with the abstract numbers of the citations on which they appear.

List IV: Word blocks for the descriptors in List III.

Thus, an item appearing in List I would be included in List II only if its index terms included a descriptor appearing in List III.

Procedure for List I

This list consists of the keyword strings and M/Q pairs for items involving two types of invalid INIS descriptors. The determination has been made that some descriptors not accepted by INIS are desirable for indexing information for the TIC data bases. These descriptors bear the designation 06 (valid TIC descriptor; invalid INIS descriptor) in the status field. Valid INIS descriptors (that are also valid TIC descriptors) have status 01 which is printed following each such descriptor in the EDB Subject Thesaurus (DOE/TIC-7000). Examples of 06 terms include certain precoordinated combinations such as COAL GASIFICATION, HYDROGEN PRODUCTION, and COAL INDUSTRY, whereas INIS uses COAL, GASIFICATION, HYDROGEN, PRODUCTION, and INDUSTRY. Similarly, TIC uses URANIUM DEPOSITS (INIS: URANIUM ORES and GEOLOGIC DEPOSITS) and ENVIRONMENTAL TRANSPORT (INIS: RADIONUCLIDE MIGRATION and ENVIRONMENT). Other such examples exist.

When the INIS checking program encounters one of these terms (type 06), it generates the valid INIS terms that have been entered in the FI field in the thesaurus. If the conversion is one term to one term or if the conversion is one term with no flag to two terms, the computer assigns the new term with no error message generated. If, however, the descriptor to be converted has an M or Q and is to be converted to two terms, the computer assigns an M99 flag to one of the terms and writes the error message "NO Q TERM FOR TAG-99." As an example of what might happen in such a case, consider the TIC-assigned keyword string:

801 TRITIUM:T1;SOILS:T2;RADIONUCLIDE MIGRATION:Q2;ENVIRONMENTAL TRANSPORT:Q1;

After passing through the INIS editing program, the keyword string becomes:

801 TRITIUM:T1;SOILS:T2;RADIONUCLIDE MIGRATION:Q2;RADIONUCLIDE MIGRATION; ENVIRONMENT:M99,Q1;

The tag 801 preceding the descriptors designates the field reserved for the keyword string in the input cycle. In the above example the duplicate descriptor and the M99 flag must be deleted. The proper keyword string should be:

801 TRITIUM:T1;SOILS:T2;RADIONUCLIDE MIGRATION:Q2;ENVIRONMENT:Q1;

The corrections are made on List II. The item to be corrected is located on List II using the abstract number that appears above each M/Q pair on List I. Not all items on List I are included on List II. In those cases in which the item is missing from List II, the appropriate place is found in the abstract number sequence, and available blank space is used to write down the abstract number and the additions and deletions that must be made in sufficient detail to enable the descriptive cataloger to make the corrections. Some more error examples are given below.

1. TIC input:

   801 RADIOACTIVE WASTE MANAGEMENT:M1;REVIEWS:Q1;

Error list:
801 WASTE MANAGEMENT;RADIOACTIVE WASTES:M99,M1;REVIEWS:Q1;
Corrected record:
801 WASTE MANAGEMENT:M2,Q1;RADIOACTIVE WASTES:M1;REVIEWS:Q2;

2. TIC input:
801 URANIUM DEPOSITS:M1,Q2;AERIAL PROSPECTING:Q1;NEW YORK:M2;
Error list:
801 GEOLOGIC DEPOSITS;URANIUM ORES:M99,M1,Q2;AERIAL PROSPECTING:Q1;
NEW YORK:M2;
Corrected record:
801 GEOLOGIC DEPOSITS;URANIUM ORES:M1,Q2;AERIAL PROSPECTING:Q1;NEW YORK:M2;

3. TIC input:
801 FISHES:T1;IMPINGEMENT:Q1;AQUATIC ECOSYSTEMS;
Error list:
801 FISHES:T1;IMPINGEMENT (DROP):Q1;AQUATIC ECOSYSTEMS;
Corrected record:
801 FISHES:T1;SAMPLING:Q1;AQUATIC ECOSYSTEMS;

The last example is an instance in which the TIC term has been totally rejected by INIS, in which case the error can be corrected only by assigning a valid INIS descriptor (or none at all) to replace the invalid one.

Procedure for Lists II and III

Lists II and III are processed somewhat in parallel. The descriptors on List III are first checked against the list of descriptors previously submitted to INIS. This list is maintained as an on-line file with the data elements TERM, STATUS, DATE REQUESTED, and NUMBER OF TIMES REQUESTED. An alphabetical listing of all requested descriptors is kept on the desk of the thesaurus specialist. List III is checked against this list to identify those descriptors being submitted for the first time.

The new descriptors identified on List III are carefully evaluated by analysis of the abstracts on List II before formal request for approval from INIS is made. Several criteria are used to judge the desirability of sending a descriptor to INIS:

1. Is TIC on firm ground in requesting the descriptor?
2. Does the descriptor fit a standard pattern that has been accepted by INIS, e.g., isotopes, chemical compounds, etc.?
3. Is the descriptor similar to ones that have been rejected by INIS?
4. Is there reason to believe that the descriptor may be suitable for EDB but not for INIS?

In the event the reviewer decides *not* to request approval of the descriptor by INIS, it is deleted from the descriptor string of the item(s) on List II. The descriptor is also deleted from List III.

When all corrections have been made to List II, it is given to Descriptive Cataloging for the corrections to be made. If an error has been missed or inadequately corrected by the reviewer, or if another error is introduced during processing, a new list of errors will be generated. These errors must be corrected by the reviewer and the corrections sent to Descriptive Cataloging.

List III is then used to make corrections to the on-line file of descriptors requested from INIS. The newly requested descriptors should be added together with information on the date requested and the number of times requested. The date is given as the INIS issue, e.g., 80-17, Issue No. 17 of Volume 80. The times-requested data for the remaining descriptors should be altered to reflect the number of times requested in that INIS issue. The complete procedure for maintaining this file is given in the Thesaurus Maintenance notebook kept on the subject specialist's desk.

Procedure for List IV

The descriptors being requested for the first time should be marked on List IV, and the appropriate TRN number(s), obtained from List III, should be added. The list should then be given to the S&T branch secretary to type the proposed descriptors (and their associated word blocks) for transmittal to INIS.

GLOSSARY

This glossary contains definitions of terms frequently used in the information processing activities of TIC.

abstract a brief synopsis of the contents of a document.

accessions list tabulation of the reports received by TIC. Maintained both in printed form and on a file in the in-house computer system.

ALDR Abstracts of Limited Distribution Reports, a TIC monthly abstract journal containing citations of unclassified limited-distribution reports.

analytics preparation of individual abstracts and indexing for different parts of a document, e.g., chapters in a book or individual papers in conference proceedings.

availability notation of the source from which a document or report may be obtained.

AWDR Abstracts of Weapon Data Reports, a classified abstract journal issued bimonthly by TIC and limited to citations of DOE-sponsored reports containing atomic weapon data (Category C-72).

bilateral agreement agreement between TIC and a group or agency in another country for cooperative effort or exchange of information.

broader term (BT) in thesaurus structure a term embodying a general aspect, e.g., PRIMATES is a broader term (BT) of MONKEYS.

cataloging record *See* **citation.**

categories 1. subject categories—six-digit codes assigned to citations entered into TIC's computerized bibliographic information system, broadly grouping information by subject for storage, retrieval, and manipulation; 2. distribution categories—alphanumeric codes assigned to reports to permit distribution of report literature to appropriate recipients. Unclassified reports are distributed according to DOE/TIC-4500. Classified reports are distributed according to M-3679.

citation bibliographic description of a single published report, journal article, patent, book, etc., including abstract and descriptor indexing.

classification the security restriction placed on the distribution of a sensitive document. In order of increasing sensitivity, OUO = Official Use Only; CNSI = Confidential–National Security Information; CRD = Confidential–Restricted Data; SNSI = Secret–National Security Information; SRD = Secret–Restricted Data; and TS = Top Secret.

CODEN unique five alphabetic characters assigned to a journal title, e.g., JACSA is the CODEN for *Journal of the American Chemical Society.*

command an order given to the computer through a keyboard terminal.

computer terminal a device for communicating with a computer from a remote location.

CRF Classified Reports File, a classified data base maintained by TIC and containing citations of classified reports not going into the SPI ((uranium-enrichment technology) or AWD (atomic weapon data) files.

data for TIC purposes, the terms "data" and "information" are used interchangeably.

data base an organized collection of citations, usually prepared for loading on a computer.

data element a part of a citation with a specific item of information, e.g., title, author.

data tagging attaching a symbol to a descriptor indicating the presence of numeric data.

descriptor a term from the subject thesaurus used in indexing documents.

dial-up 1. the use of standard, nondedicated telephone lines to access RECON; 2. a terminal using such lines.

disk a rotating circular plate having a magnetizable surface on which information may be stored as a pattern of polarized dots on concentric recording tracks.

distribution categories *See* **categories.**

document *See* **report.**

document locator system an in-house computerized system by which reports are logged into and therefore out of the different report processing stations at TIC. This system makes it possible to locate any report immediately and to determine the length of time it stays at a given location.

EAPA Energy Abstracts for Policy Analysis, a monthly publication by TIC.

EDB Energy Information Data Base, the bibliographic data base containing all scientific and technical information processed at TIC.

entry *See* **citation.**

ERA Energy Research Abstracts, a bimonthly publication of citations to DOE-sponsored research.

false drop retrieval of an unwanted citation in a search of a data base.

file *See* **data base.**

font a particular typeface and size, including upper and lower case, punctuation, numerals, symbols, etc.

format the arrangement or appearance of the data elements of a citation as shown on a RECON terminal screen or printed out by a printing device.

galley a computer listing of information to be proofed, or edited, prior to printing; usually printed on low-grade paper on which the corrections are noted.

GAP one of the data bases prepared by TIC. It contains *g*eneral *a*nd *p*ractical information for the layman.

index a list of records arranged in some logical order, e.g., an author index.

index line the string of data elements associated with one descriptor pair in a printed index. It consists of the main descriptor/qualifying descriptor pair, title of the document indexed, title augmentation (if any), document number if a report, and the citation number.

information for TIC purposes, the terms "information" and "data" are used interchangeably.

INIS International Nuclear Information System, an international organization responsible for compiling all scientific and technical information dealing with nuclear energy. TIC provides U. S. nuclear information to the system and receives nuclear information from it.

input information processed into data-processing equipment; process of delivering data to the equipment.

interactive system a computer system using terminals in which data are input directly into a file and manipulated to obtain a desired result. The computer responds with directions for additional input or provides error messages.

invalid term a term in the thesaurus which cannot be used in indexing documents. A USE reference always directs one to the accepted term.

IPS Issues and Policy Summaries, a data base produced by TIC containing citations to public statements by DOE officials. It also appears as a weekly publication.

keyword *See* **descriptor.**

lead abstract brief indicative abstract prepared for a report, book, or conference proceedings for which individual abstracts are being prepared for each chapter or conference paper.

listing *See* **printout.**

literary indicator a data element indicating the document type, e.g., report, report analytic, translation, etc.

magnetic tape a plastic, metal, or paper tape that is coated or impregnated with magnetizable iron oxide particles. It is used for information storage and retrieval.

master the copy of a report that is kept by TIC in the master vault on permanent file.

master vault vault area in which one copy of all reports sent to TIC are kept on permanent file.

memory a device in which data may be stored and from which it may be retrieved, e.g., magnetic tape or disk.

narrower term in a hierarchical structure, a descriptor which is a more specific example of a general concept, e.g., AIR SOURCE HEAT PUMPS is a narrower term to HEAT PUMPS.

NSA Nuclear Science Abstracts, a data base containing all nuclear information processed at TIC. It is in machine-readable form for the years 1967-76.

NTIS National Technical Information Service, an agency of the Department of Commerce, with the responsibility for making government reports available to the public. All DOE reports are sent to NTIS for sale.

on-line direct communication between a computer and a terminal by means of telephone lines.

output 1. opposite of input. Information processed out of data-processing equipment; 2. the process of retrieving data from the equipment.

printout a printed output from a data-processing machine or system.

program a detailed and explicit set of instructions for accomplishing some task expressed in a form suitable for input to a computer.

RECON interactive computer system for loading bibliographic data bases.

record *See* **citation.**

related term in thesaurus structure, a descriptor having an affinitive relationship to another descriptor, but not a hierarchical relationship.

remote access the ability to enter a computer system or a file through a terminal located at a distance from the central computer.

report a document which contains results of, and progress made with, research and/or development work, investigations, or surveys. It is not published in conventional form such as journals or books.

report number a unique alphanumeric code given to a report to identify it from all others.

repro page proof made on smooth paper and used for photographic reproduction of a document.

retrieval the act of finding and selecting specific information.

RIP Research in Progress, a data base containing citations to research, development, and demonstration contracts.

scope note in the thesaurus, a phrase limiting or defining the use of a descriptor.

Electronic Circuits and Devices, 85
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Handling Equipment and Procedures, 83
Heat Transfer and Fluid Flow, 84
Lasers, 84
Marine, 87
Materials Testing, 85
Mining and Drilling Equipment, 84
Pollution Control Equipment, 87
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Protective Structures and Equipment, 83
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Enrichment, Nuclear Fuels, 42
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search 1. commands used to retrieve information from a data base; 2. the information retrieved.

SPI Sensitive Production Information, a classified TIC data base containing DOE-sponsored reports pertinent to uranium-enrichment technology.

split system the operation of the data processing equipment in a dual mode to permit simultaneous processing of classified and unclassified information.

storage act of putting information into some type of equipment where it can be saved for later retrieval.

subject categories *See* **categories.**

tape *See* **magnetic tape.**

terminal *See* **computer terminal.**

thesaurus a structured list of descriptors used in the indexing and retrieval of literature; a controlled vocabulary.

TIMS Technical Information Management System, a computerized system to monitor reporting requirements of all DOE research, development, and demonstration contracts.

update 1. series of abstract journals published by TIC covering specific areas of interest, such as *Fusion Energy Update;* 2. the addition of new data or information to a computer file.

valid term in thesaurus structure, a descriptor which can be used in indexing the subject content of a document.

vault *See* **master vault.**

word block in thesaurus structure, a valid main term together with broader terms, narrower terms, related terms, scope notes, and definitions.

word processor equipment for the creation, dissemination, storage, and retrieval of the written word by typewriter terminals that use magnetic tape for storage, automatic control, editing, and retyping.