

Society of Petroleum Engineers Style Guide

Foreword

The Society of Petroleum Engineers (SPE) produces print and electronic publications and marketing materials that are distributed to engineers and others in the oil and gas industry worldwide. Because SPE disseminates technical information for a worldwide readership, it is particularly important to avoid local terminology and to adhere as closely as possible to recognized and widely accepted modes of English expression. Clear writing is essential to enhance the comprehension of SPE publications by readers from a number of geographic areas, nationalities, and language backgrounds.

SPE's rules of style are intended to promote clarity, conciseness, accuracy, and consistency in the society's publications. Guidelines on customary abbreviations for engineering units; numbering of references, figures, tables, equations, and appendices; language usage; nomenclatures and references lists; and punctuation are included in this booklet. The following writing guides are also helpful.

Bernstein, Theodore. 1983. *The Careful Writer—A Modern Guide to English Usage*. New York City: Atheneum Publishers.

Strunk, William Jr. and White, E.B. 1979. *The Elements of Style*, third edition. New York City: MacMillan Publishing Co. Inc.

The Chicago Manual of Style, 15th edition. 2003. Chicago: U. of Chicago Press.

Webster's Third New International Dictionary. 2002. Springfield, Massachusetts: Merriam-Webster.

Copyright © 2010 Society of Petroleum Engineers
P.O. Box 833836, Richardson, Texas 75083-3836, USA
phone +1.972.952.9393, fax +1.972.952.1150, email: techpubs@spe.org.

CONTENTS

1	TIPS FOR CLEARER WRITING	5
2	COMMON ERRORS IN USAGE/GRAMMAR	5
3	SPELLING	7
3.1	GENERAL.....	7
3.2	BRITISH/US SPELLINGS	7
3.3	OIL INDUSTRY TERMS	7
4	ABBREVIATIONS	11
4.1	GENERAL.....	11
4.2	COMMON ABBREVIATIONS	12
4.3	UNITS.....	13
4.4	CHEMICALS.....	15
4.5	ORGANIZATIONS.....	15
5	PUNCTUATION	15
5.1	COMMA.....	15
5.2	COLON.....	16
5.3	SEMICOLON	16
5.4	APOSTROPHE	16
5.5	PARENTHESES	17
5.6	QUOTATION MARKS.....	17
5.7	DASHES	17
5.8	HYPHENATION.....	18
5.9	AMPERSANDS.....	19
5.10	WEB-RELATED ITEMS.....	19
5.11	TYPEFACE	20
6	NAMES	20
6.1	PEOPLE, PERSONAL TITLES, DEGREES	20
6.2	COMPANIES, ORGANIZATIONS.....	21
6.3	GEOGRAPHIC	22
6.4	MEETING NAMES.....	23
7	NUMBERS	23
7.1	GENERAL.....	23
7.2	DATES AND TIMES.....	23
7.3	PHONE NUMBERS.....	24
7.4	UNITS OF MEASURE	24
7.5	WHOLE NUMBERS	24
7.6	FRACTIONS	25
7.7	CURRENCY.....	25
7.8	DIMENSIONS.....	25
8	ELEMENTS OF TECHNICAL PAPERS	25
8.1	TITLES AND HEADINGS	25
8.2	AUTHOR AND COMPANY NAMES	26
8.3	NUMBERING TABLES, FIGURES, AND EQUATIONS	26
8.4	ENUMERATION OF POINTS	26
8.5	EQUATIONS	27
8.6	UNITS.....	28
8.7	SYMBOLS AND NOMENCLATURE.....	28
8.8	REFERENCES	28

8.9	FOOTNOTES	33
8.10	CONVERSION FACTORS	33
8.11	FIGURES	34
8.12	TABLES.....	35
8.13	CHECKLIST OF ITEMS	35
APPENDIX A—COMPANY ABBREVIATIONS		36
APPENDIX B—GREEK ALPHABET		37
APPENDIX C—MATH SIGNS AND OPERATORS		38
APPENDIX D—COMMON PROOFREADING MARKS.....		39
APPENDIX E—SAMPLE FIGURES		40
APPENDIX F—SAMPLE TABLES		41

1 TIPS FOR CLEARER WRITING

Use active voice. The use of active rather than passive voice produces clearer, more concise writing.

Examples:

Passive voice: An improved method was recommended by the authors.
Results of the five experiments are shown in Fig. 2.

Active voice: The authors recommended an improved method.
Fig. 2 shows results of the five experiments.

Minimize the use of long, complex sentences. Most technical writing experts recommend an average sentence length of approximately 25 words. A mix of long and short sentences and a varied sentence structure are most readable.

Limit the use of abbreviations. Limit use of abbreviations to those that are used often in the article. Do not abbreviate terms used only once. When an abbreviation is used, spell out the term at the first use and present the abbreviation in parentheses following it; then use only the abbreviation in the rest of the paper.

Example:

We analyzed X-ray computerized tomography (CT) saturation profiles of waterfloods, oilfloods, and miscible core floods.

Rules on the use of abbreviations and a list of common oil industry terms and their abbreviations appear in Sec. 4.

Write concisely. Avoid repeating information. Eliminate unnecessary words and flowery language. A short word often is preferable to a longer word or phrase with the same meaning.

Examples:

<u>Instead of</u>	<u>Use</u>
in order to	to
due to the fact that	because
utilize	use
for the purpose of	to
in reference to	about
employ	use

Avoid jargon. The specialized term used for an object, place, or method in your geographic area or discipline might not be common elsewhere. Use the commonly accepted name or English word rather than local industry jargon.

2 COMMON ERRORS IN USAGE/GRAMMAR

ability, capacity—**Ability** is the human power to do; **capacity** is the power to receive.

about—Do not use as a synonym for **approximately**; use that word instead.

all of—Except with pronouns, **of** is unneeded (e.g., “all the drill bits,” but “all of them”).

allow, enable—**Allow** means “to not prevent from happening”; **enable** means “to facilitate happening.”

alternate, alternative—**Alternate** means **one after the other**; **alternative** means **one or the other**.

among, between—Use **among** when referring to three or more and **between** when referring to two (“between Wells A and B”) or to reciprocal relationships shared by two or more (e.g., “unitization **between** the operators”).

as—Often imprecise when used as a subordinate conjunction indicating cause. Sometimes used to mean **while, when, because, or since**; choose the precise word.

as to whether, whether or not—**Whether** is usually sufficient.

assure, ensure, insure—**Assure** means to **encourage**; **ensure** means **to make certain**. **Insure** should be used when referring to underwriting a loss.

based on—The main noun in a sentence is “**based on**” the subordinate noun contained in the “based on” phrase.

Correct: “Based on poor results, our decision was to terminate the project.”

Incorrect: “Based on poor results, we decided to terminate the project.” “**On the basis of**” should replace “based on” here.

below—Do not use as a synonym for **less than**.

commence, initiate—Use **begin** or **start**.

compare to, compare with—**Compare to** implies resemblances between essentially different ideas or things;

compare with implies contrasts between essentially similar ideas or things. Thus, waterflooding operations **compare to** gas lift operations; Well 1 production **compares with** that of Well 2.

complement, compliment—**Complement** means (1) fill up or make complete; (2) the quantity required to complete something (e.g., the personnel of a ship); or (3) one of two mutually completing parts. **Compliment** means **praise or respect**. **Complimentary** means without cost.

comprise—Means **to embrace** or **to include**. The whole **comprises** its parts. **Comprised of** is incorrect.

connote, denote—**Connote** is to imply; **denote** is to be explicit.

currently, presently—**Currently** means it is happening now. **Presently** means it will happen soon.

data—Takes a plural verb. **Datum** is singular.

different from—One thing **differs from** another; **different than** is grammatically incorrect. For example, “Life in the industry was different than he had expected it to be” should be rewritten as “Life in the industry was **different from** what he had expected it to be.”

dilemma—Does not mean “**a problem**” but implies a choice between two unattractive alternatives.

domestic—Use **US** to designate items of American origin.

due to—Use **through, because of, caused by, resulting from, owing to** if possible.

due to the fact that—use **because**.

effect, affect—**Effect** means **result** (noun) or **to bring about** (verb). **Affect** means **to influence**.

employed—Use **used** instead.

etc.—Means **and so forth** and should be used at the end of a list that **makes clear** exactly what kinds of other things are implied. Not correct when used at the end of a list introduced by “such as” or “for example.”

fact—**Actual fact** and **true fact** are redundant expressions. All facts are true and actual.

farther, further—Use **farther** when distance is implied, **further** when referring to time or quantity.

graph—A **graph** (noun) is a drawing that exhibits a relationship. Use **plotted** (verb) when you mean to locate points or figures on a graph.

having—It is better to use **with**.

hopefully—Means **with hope**. Incorrectly used in “Hopefully, we can leave tomorrow.” Correct use would be, “‘We should be able to leave tomorrow,’ he said hopefully.”

if, whether—**If** implies uncertainty, **whether** implies an alternative.

imply, infer—Something suggested or indicated is **implied**; something deduced from evidence is **inferred**. **A writer implies and a reader infers**.

in order to—Simply use **to**.

input—Often used incorrectly as a verb; **enter** is a verb, and **input** is a noun.

irregardless—Incorrect; use **regardless**.

knot—A **knot** is 1 nautical mile (6,076.1 ft or 1852 m) per hour. The expression **knots per hour** is redundant.

less, fewer—**Less** refers to quantity, **fewer** to number. (“We used **less** cement and **fewer** truckloads.”)

located—Use **positioned** instead where applicable and necessary; usually, however, just remove as redundant.

majority, minority—Use only when referring to numbers of things, not size.

none—Uses singular verb when meaning **no one** or **not one**.

on line, online/off line, offline—When something is started up, it is said to be brought **on line** (two words); when being turned off, it is said to be taken **off line** (again, two words). The exact verb can vary: put on line, set off line, etc.; the usage is often literal, referring to mechanical/electronic devices, but it also can be used metaphorically for any system or practice to be used or not. In nearly all other instances, **online** and **offline** are adjectives used as single words only.

only—**Only** goes next to the word it modifies. “The standard is based only on data from one source.” The same rule applies to **primarily, largely, principally, mainly, partly, and completely**.

over—Means **above** in a physical sense; do not use as a substitute for **more than** or **greater than**.

presently—See **currently**.

principal, principle—**Principal** (noun or adj.) means first or foremost. **Principle** (noun) means a basic truth or determined course of action.

prior to—use **before**.

proved, proven—**Proved** (verb) is the past tense of prove, meaning to establish truth or validity. **Proven** is used as an adjective that is used directly before a noun, meaning verified, as in “a proven talent.”

seasons—Seasons of the year are not capitalized except in this construction: “**Fall 1980**.”

since—Implies passage of time; use **because** when meaning “the reason for.”

so as to—Use **thereby**.

subsequent to—Use **after**.

takes into account—Use **accounts for**.

that, which—**That** is the defining or restrictive pronoun; **which** is the nondefining or nonrestrictive pronoun. “The

automobile **that** is out of gas is in the driveway,” tells which automobile. “The automobile, **which** is out of gas, is in the driveway,” adds a fact about the only automobile in question.

under way—Two words.

unique—Means **without equal**. There can be no degrees of uniqueness. Thus, **almost unique, totally unique, partially unique**, etc., are incorrect.

upscale—Use **scale up** as the verb form.

using, by using—Generally substitute **by use of** (for **using**) or **with** (for **by using**).

utilize—Use is preferable.

very—In technical writing, often overused and imprecise: “The results are very significant.” To express how significant the results are, report the p-value.

via—Means **by way of** in a geographical sense, *not by means of*.

where, which—**Where** refers to physical location; **which** (generally preceded by a preposition) refers to other circumstances, such as condition. Depending on the sentence, the preposition may be different: at which, by which, in which, with which, etc. (Wrong: “There have been four studies where the results contradict these findings.” Right: “There have been four studies **in which** the results contradict these findings.”) By convention, “where” is used in mathematical expressions (Example: “Suppose that $a = bq + r$, where $0 \leq r < b$.”)

whose, of which—**Whose** refers to something owned/possessed by a person; **of which** refers to something “owned by” or pertaining to a thing, such as a physical property of it. (Wrong: “The experiment, whose results are widely accepted, has not been duplicated.” Right: “The experiment, the results **of which** are widely accepted, has not been duplicated.”)

3 SPELLING

3.1 General

3.1.1 In the growing vocabulary of the industry, many verb/adverb or verb/preposition combinations are combined into one word. They should be written as two words when used as verbs.

workover well	to work over the well
at breakthrough	water will break through
buildup pressure	pressure can build up

3.1.2 Certain compounds formed by two nouns should be written as one word when combined to form an adjective.

casinghead gas	the casing head
oilfield problems	an oil field
oilwell tools	the oil well

3.1.3 When forming the plural of a non-English word, use the anglicized form if it is thoroughly accepted.

abscissas	darcies
focuses	formulas

However, a number of words take the Latin plural form.

analyses	indices	strata	data	appendices
vortices	media	radii	criteria	phenomena

3.2 British/US Spellings

US spelling conventions are followed for SPE periodicals, books, and most other materials. An exception is made for meeting programs and proceedings. Paper titles for all SPE meeting programs and proceedings follow whichever English spelling convention the author(s) elect(s) to use. Programs and other promotional materials prepared for meetings organized by SPE offices in Dubai, London, and Kuala Lumpur (most meetings held in Europe, the Middle East, India, Africa, and the Asia Pacific region) follow British spelling conventions. SPE meetings organized from the SPE office in Dallas follow US spelling conventions. In both cases, each document should be consistent.

3.3 Oil Industry Terms

Listed here are the preferred spellings of common terms in SPE literature (except as noted in Sec. 3.2).

A

a posteriori
a priori
aboveground (adj.)
acknowledgment
adviser
afterflow

afterproduction (adj.)
alongside
analog
anti- (joined prefix)
axisymmetric

B

backflow
backflush
backpressure (noun, adj.)
backrake
backup (noun, adj.)
backwash
ballout (noun)
bandwidth
-based (hyphenated suffix)
baseline
bean up (verb phrase)
beanup (noun)
bicenter
bleedoff (noun)
blowdown
blowout (noun, adj.)
borehole
bottomhole (adj.)
bottomwater (noun, adj.)
breakdown (noun, adj.)
breakthrough
brownfield (noun, adj.)
bubblepoint (noun, adj.)
build up (verb)
buildup (noun, adj.)
bullheading
buoyant
bypass
byproduct

C

caprock
carry-over (noun)
Cartesian
casinghead (adj.)
catalog
centerline
changeover (noun, adj.)
channeling
chokeline (noun)
Christmas tree
clean out (verb)
cleanout (noun, adj.)
clean up (verb)
cleanup (noun, adj.)
co- (joined prefix)
coalbed
coal gas (noun)
coal-gas (adj.)
coastline
coauthor (noun only)
cofferdam
coiled tubing (noun)
coiled-tubing (adj.)
cokriging
coreflood (noun, adj.)
cost-effective
counter- (joined prefix, except counter-ion)
crossbed
crossfault

crossflow
crosslink (noun, verb)
crossplot
cross section (noun)
cross-sectional (adj.)
crosswell (adj.)
cutoff (noun, adj.)

D

database
de-aeration
deep water (noun)
deepwater (adj.)
dewpoint (noun, adj.)
disk (disc in zoology and botany)
dogleg
dot-com
down- (joined prefix)
drainhole
drawdown
drawworks
drill bit (noun)
drill-bit (adj.)
drill collar
drill-in fluid
drill off (verb phrase)
drilloff (noun, adj.)
drillout (noun, adj.)
drillpipe
drillship
drillsite
drillstem
drillstring
-drive (joined suffix)

E

e-business
e-commerce
edge water (noun)
edgewater (adj.)
electric line
electrical submersible pump
electro- (joined prefix)
eLibrary
email
endpoint
engine room
extra- (joined prefix in most uses)
extranet

F

fail-safe
fallback (noun)
falloff
farm out (verb phrase)
farmout (adj.)
feedwater (noun)
Fiberglas (trade name)
fiberglass (generic term)
fiber-optic (adj.)

fieldwide (adj.)
fill up (verb)
fill-up (noun, adj.)
filter cake (noun)
filter-cake (adj.)
fireflood
fire tube (noun)
fire-tube (adj.)
firsthand
five-spot (noun, adj.)
flood front
floodwater
flowback (noun, adj.)
flow chart
flowline (noun, adj.)
flow loop
flowmeter
flow rate
-fold (joined suffix)
follow-up (adj., noun)
frac pack (noun)
frac-pack (adj.)
-free (hyphenated suffix)
freestanding
fresh water (noun)
freshwater (adj., adv.)

G

gamma ray log (no hyphen)
gas cap
gas field (noun)
gasfield (adj.)
gasflood
gas lift (noun, adj.)
gauge
gray (not “grey”)
gridblock
gridpoint
groundtruthing
groundwater (noun, adj.)
guar
guidepile

H

half-life (noun, adj.)
half-length
half-width
heavyweight
hindcast
hold down (verb)
holddown (noun)
hold up (verb)
holdup (noun, adj.)
hookload (noun)
hookup (noun, adj.)
hot-water (adj.)
huff 'n' puff

I

in situ (adv.)

in-situ (adj.)
infill
inter- (joined prefix)
Internet
intranet

J

jack up (verb)
jackup (adj.)
judgment

K

kerosene
keypunch
keyseat
kick off (verb phrase)
kickoff (noun)
knockout (noun, adj.)
knowledge base

L

laboratory (not “lab”)
leak off (verb)
leakoff (noun, adj.)
life cycle
liftoff (noun)
lightweight
line pipe
lock up (verb phrase)
lockup (noun)
log-normal
long-reach
long-standing

M

main-bore (adj.)
main bore (noun)
make up (verb)
makeup (noun, adj.)
man-hour
man-year
meter (not “metre”)
micro- (joined prefix)
mid- (joined prefix)
Mid-Continent (SPE section)
milled-tooth bit
mineback (noun)
mis-tie(s)
mixed-wet
modeled
modeling
moonpool
motherbore
mudcake
mudline
mud motor
mud-weight (adj.)
multi- (joined prefix)
multiphase flow

N

naphtha
 net-pay
 non- (joined prefix)

O

off-bottom
 offline (adj.)
 offset
 offshore
 off-take (noun)
 oil field (noun)
 oilfield (adj.)
 oilflood
 oil well (noun)
 oilwell (adj.)
 oil-wet
 online (adj.) (see Sec. 2)
 on-site (adj., adv.)
 on-stream (adj.)
 open flow
 openhole (adj.)
 outcrop
 over- (joined prefix)

P

pack off (verb phrase)
 packoff (noun)
 padeye
 particle-size distribution
 pay out (verb)
 payout (noun)
 phase out (verb phrase)
 phaseout (noun)
 pick up (verb phrase)
 pickup (noun, adj.)
 pinchout (noun)
 pinch out (verb phrase)
 pipeline
 plaster of Paris
 plexiglass
 plugback
 Poisson's ratio
 poly- (joined prefix)
 pore-water fluid
 Portland cement
 post- (hyphenated prefix)
 pre- (joined prefix)
 preventative
 printout (noun)
 pro- (joined prefix)
 pseudo- (joined prefix)
 pseudosteady state (noun)
 pseudosteady-state (adj.)
 pulse-loading
 pumpdown
 pumphead
 pumpoff (adj.)

Q

quasi- (joined prefix, except quasi-equilibrium)

R

rate-pressure
 rathole
 re- (joined prefix)
 read out (verb phrase)
 readout (noun)
 real time (noun)
 real-time (adj.)
 rigsite
 roller-cone bit

S

salt water (noun)
 saltwater (adj., adv.)
 sandface
 sandout
 sandpack
 sand screen
 scaleup (noun, adj.)
 screenout (noun, adj.)
 seabed, seafloor
 sealbore
 seastate (noun, adj.)
 seawater
 seismic (adj.)
 seismics (noun)
 self- (hyphenated prefix)
 semi- (joined prefix)
 setup (noun)
 shaly
 shoreline
 short-term
 shut down (verb phrase)
 shutdown (noun)
 shut in (verb)
 shut-in (noun, adj.)
 shut off (verb)
 shutoff (noun, adj.)
 sidetrack
 sidewall
 slackoff
 slickline
 slickwater
 slimhole
 slimtube
 slug catcher
 space out
 splash plate
 standalone (adj.)
 standby (adj.)
 stand off (verb)
 standoff (noun, adj.)
 start up (verb)
 startup (noun, adj.)
 steady state (noun)
 steady-state (adj.)

steam chest
steamdrive (noun, adj.)
steamflood
step-out (adj.)
stepout (noun)
stepwise
stick/slip
stock tank (noun)
stock-tank (adj.)
stopcock
straightedge
straightline (adj.)
streamtube
sub- (joined prefix)
sulfate
sulfide
sulfur
super- (joined prefix)
swage (not “swedge”)
sweepout (noun, adj.)

T

tail pipe
thin-section (noun in laboratory tests)
throughput
through-tubing (adj.)
tieback (noun, adj.)
tie line (noun)
tie-line (in mathematics)
timestep (noun)
timetable
tool face
tool joint
topdrive
tophole (adj.)
towout (noun, adj.)
traveltime
tricone
trunkline
tubinghead (adj.)
twistoff
type curve (noun)
type-curve (adj.)

U

ultra- (joined prefix)
ultradeepwater
un- (joined prefix)
under- (joined prefix)

under way
up- (joined prefix)
updip
uphole/upstream

V

V-door
vendor
viscoelastic

W

wash out (verb phrase)
washout (noun)
waste water (noun)
wastewater (adj.)
water cut (noun)
water-cut (adj.)
waterdrive
waterflood
waterfrac
water-wet
Web
website
well-being
wellbore
wellblock
wellhead
wellpoint
wellsite
wellstream
well test
-wide (joined suffix)
wind field (noun)
windfield (adj.)
wind speed (noun)
wireline
-wise (joined suffix)
workforce
work group
work over (verb)
workover (noun, adj.)
work string
worldwide
World Wide Web

X

X-ray

4 ABBREVIATIONS

4.1 General

- 4.1.1 Use abbreviations sparingly. Too many abbreviations will confuse the reader. Spell out the term at first use, place the abbreviation in parentheses after it, then use the abbreviation in the remainder of the manuscript.
- 4.1.2 The terms listed below that are capitalized when part of a company or organization name should be abbreviated in reference lists, bibliographies, and tabular material (tables of contents and other actual tables) and spelled out in

headings and running text. The terms listed in **Appendix A (Company Abbreviations)** are generally omitted from a company or organization name, except in an exhibitors list.

Organization-Related Abbreviations

Administration	Admin.
Associates	Assocs.
Association	Assn.
Department	Dept.
District	Dist.
Division	Div.
Institute, Institution	Inst.
International	Intl.
Manufacturing	Mfg.
National	Natl.
Society	Soc.
University (Universidad, Université, Universität, etc.)	U.

Other Abbreviations

bachelor of arts	BA
bachelor of science	BS
doctor of philosophy	PhD
et al. (and others)	et al.
et cetera (and the rest)	etc.
exempli gratia (for example)	e.g.,
exploration and production	E&P
id est (that is)	i.e.,
master of arts	MA
master of science	MS
one-, two-, three-, four-dimensional	1D, 2D, 3D, 4D
research and development	R&D
versus	vs.

4.1.3 Academic and honorary degrees should be abbreviated without periods or spaces. Adding the word “degree” after the abbreviation is optional.

PhD degree MS degree MBA

4.1.4 If you abbreviate names of societies and government agencies, use no periods or spaces.

SPE IADC SPWLA NPF

4.1.5 Use these and accepted abbreviations for other geographic subdivisions (states, provinces, etc.) only when accompanied by a specific locale when the location otherwise may be unclear.

UAE United Arab Emirates USA United States of America
UK United Kingdom EU European Union

4.1.6 Abbreviate units of measurement in the text only when used with numerical values (unless the abbreviation replaces a very long phrase, such as “several scf/D” for “several standard cubic feet per day”). A list of preferred abbreviations for engineering units appears in Sec. 4.3.10.

25 ft 50 × 10³ ft³/D 10 dm³ 3 cm³

4.1.7 Use the same abbreviation for both singular and plural forms of measurements. (See also Sec. 7.4.5.)

4.1.8 Abbreviate such words as “article,” “volume,” and “section” in literary references within the text when the number is cited.

Chap. 1 Vol. 9 Art. 5 Sec. 3

4.1.9 Abbreviate and capitalize “equation,” “figure,” “reference,” and “column” when followed by a number or designating letter. Do not abbreviate “table,” “appendix” or “page.” Abbreviate “number” when it is part of the proper name of a well, but omit the word in other cases. Do not use # as an abbreviation for “number.”

Fig. 6 Eq. 5 Well 9 Col. A
No. 4 Table 10 Appendix C Page 57

4.2 Common Abbreviations

4.2.1 The following terms are often abbreviated in SPE literature. If used often in an article, they should be spelled out at first use (in the text, not counting use in the title), followed by the abbreviation in parentheses, and abbreviated throughout the rest of the article.

alternating current	AC	capture unit	c.u.
barrel of oil equivalent	BOE	cathode ray tube	CRT
basic sediment and water	BS&W	central processing unit	CPU
blowout preventer	BOP	cold water equivalent	CWE
bottomhole assembly	BHA	computerized tomography	CT
bulletin board system	BBS	computer user group	CUG

direct current	DC	oil in place	OIP
enhanced oil recovery	EOR	oil initially in place	OIIP
equation of state	EOS	oil originally in place	OOIP
equivalent circulating density	ECD	operating system	OS
file transfer protocol	FTP	original oil in place	OOIP
formation volume factor	FVF	outside diameter	OD
gas chromatography	GC	pore volume	PV
gas/oil contact	GOC	porosity units	p.u.
Gulf of Mexico	GOM	pounds of proppant added	ppa
gas/oil ratio	GOR	pressure/volume/temperature	PVT
graphical user interface	GUI	productivity index	PI
health, safety, security, and environment	HSSE	rate of penetration	ROP
high-pressure/high-temperature	HP/HT	residual oil saturation	ROS
hydrocarbon pore volume	HCPV	root mean square	RMS
hydrolyzed polyacrylamide	HPAM	scanning electron microscope	SEM
hydroxyethyl cellulose	HEC	self-potential	SP
hydroxypropyl guar	HPG	shots per foot	spf
independent oil company	IOC	specific gravity	SG
inside diameter	ID	total dissolved solids	TDS
interfacial tension	IFT	total depth	TD
kelly bushing	KB	true vertical depth	TVD
lease automatic custody transfer	LACT	ultraviolet	UV
liquefied natural gas	LNG	uniform resource locator	URL
liquefied petroleum gas	LPG	water alternating gas	WAG
local area network	LAN	water-based mud	WBM
measured depth	MD	water/oil contact	WOC
measured depth from rotary table	MDRT	water/oil ratio	WOR
measurement while drilling	MWD	weight on bit	WOB
national oil company	NOC	wide area network	WAN
nuclear magnetic resonance	NMR	World Wide Web	WWW
net present value	NPV	X-ray diffraction	XRD
oil-based mud	OBM		

4.2.2 With regard to acronyms, leave them all uppercase if they are “true” acronyms, in which each letter stands for an actual word. “False” acronyms are brought into downstyle (i.e., uppercase first letter only).

THUMS	(Texaco, Humble, Union, Mobil, Standard)
OPEC	(Organization of Petroleum Exporting Countries)
Arco	(Atlantic Richfield Company)

4.2.3 Many programming languages, some software applications, and a few other products have their names trademarked in all capital letters and are exceptions to the “true” acronyms rule; if the name is a trade name, capitalize the entire name—or the indicated portion of it—according to the trademarked style.

MS-DOS	Logo
BASIC	Pascal
COBOL	WordPerfect
FORTRAN	Macintosh OS
UNIX	dBASE for Windows
CHEARS	QuarkXPress
PIPESOFT-2	CorelDRAW

4.3 Units

4.3.1 Do not add “s” to abbreviated forms of plural units of measure; use the same abbreviation for both singular and plural forms (e.g., 10 bbl, not 10 bbls).

Note: Add the “s” when the unit is spelled out (e.g., darcy/darcies, day/days, ton/tons, and mile/miles) or when it appears without a number (e.g., “The permeabilities of the samples varied widely.”).

- 4.3.2 Abbreviate units of measurement in the text only when used with numerical values (unless the abbreviation replaces a very long phrase, such as “several scf/D” for “several standard cubic feet per day”).
 25 ft $5 \times 10^3 \text{ ft}^3/\text{D}$ 10 dm^3 3 cm^3
 Abbreviate such units in figures and tables.
- 4.3.3 For units of time, use the customary abbreviations “sec” (second), “min” (minute), “hr” (hour), and “yr” (year), and use the metric abbreviations “s” (second), “min” (minute), “h” (hour), “d” (day) (in metric units only; use “D” with nonmetric units), and “a” (year), **in combined units only**. Otherwise, spell out the term.
 42 m/d, *but* 42 days 34 ft/D, *but* 34 days 12 cm/s, *but* 12 seconds
- 4.3.4 Use abbreviations instead of ciphers or symbols to represent customary units of measurement.
 lbm or lbf, not # in., not " ft, not '
- 4.3.5 Use the degree sign (°) with angles, temperatures [except metric K (Kelvin)], and compass coordinates.
 20° slope 65°F 2°W
- 4.3.6 Use the slash (/) in place of “per” between two abbreviated units of measurement.
 40 psi/ft 15 cm/s 40 lbm/ft
 [Exception: shots/ft is written thus at first use, followed by (spf) to indicate its abbreviated form in further uses.]
- 4.3.7 Use the hyphen (-) in customary units and the product dot (·) in metric units to indicate multiplication in combined units.
 md-ft md·m B/D-psi $\text{m}^3/\text{d}\cdot\text{kPa}$
- 4.3.8 Use lbm for pounds mass and lbf for pounds force.
- 4.3.9 Use cm^3 , not cc, for cubic centimeter.
- 4.3.10 The following are abbreviations for common oilfield units of measure. Consult the *SPE Metric Standard* for a complete listing of preferred SI units.
- | | | | |
|----------------------------|--|--------------------------------|--|
| barrels of fluid per day | BFPD [m^3/d fluid] | kilowatt hour | kW-hr [J] |
| barrels of liquid per day | BLPD [m^3/d liquid] | kips per square inch | ksi [Pa] |
| barrels of oil per day | BOPD [m^3/d oil] | mho per meter | $\bar{\Omega}$ /m [S/m] |
| barrels of water per day | BWPD [m^3/d water] | millidarcy | md |
| barrels per day | B/D [m^3/d] | million electron volts | MeV [MJ] |
| barrels per minute | bbbl/min [m^3/s] | million cubic feet | MMcf |
| billion cubic feet | Bcf [10^9 m^3] | mils per year | mil/yr [m/a] |
| billion cubic feet per day | Bcf/D [$10^9 \text{ m}^3/\text{d}$] | ohm | Ω |
| cubic feet per barrel | ft^3/bbl [m^3/m^3] | pound per cubic foot | lbm/ft ³ [kg/m^3] |
| cubic feet per day | ft^3/D [m^3/d] | pound per gallon | lbm/gal [kg/m^3] |
| cubic feet per minute | ft^3/min [m^3/s] | reservoir barrel | res bbl [res m^3] |
| cubic feet per pound mass | ft^3/lbm [m^3/kg] | reservoir barrel per day | RB/D [res m^3/d] |
| cubic feet per second | ft^3/sec [m^3/s] | square feet | ft ² [m^2] |
| cubic yard | cu yd | square mile | sq mile [km^2] |
| darcy | (spell out) | standard cubic feet per barrel | scf/bbl |
| dead-weight ton | DWT [Mg] | standard cubic feet per day | scf/D [std m^3/d] |
| feet per minute | ft/min [m/s] | standard cubic foot | scf [std m^3] |
| feet per second | ft/sec [m/s] | stock-tank barrel | STB [stock-tank m^3] |
| foot-pound | lbf-ft or ft-lbf [J] | stock-tank barrels per day | STB/D [stock-tank m^3/d] |
| gallons per minute | gal/min [m^3/s] | stoke | St [m^2/s] |
| gallons per day | gal/D [m^3/d] | thousand cubic feet | Mcf |
| gram | g | trillion cubic feet | Tcf [10^{12} m^3] |
| horsepower-hour | hp-hr [J] | | |
| inches per second | in./sec [cm/s] | | |
| kilopond (1,000 lbf) | klbf [N] | | |
- 4.3.11 Abbreviations MM for million and M for thousand should be used ONLY with cubic feet to express gas volumes. Avoid the use of MM with such expressions as barrels of oil (MMBO) or barrel of oil equivalent (MMBOE); instead, spell out “million.”

4.4 Chemicals

butane	C ₄	isobutane	<i>i</i> -C ₄
carbon dioxide	CO ₂	isopentane	<i>i</i> -C ₅
carbon monoxide	CO	methane	C ₁
ethane	C ₂	nitrogen oxides	NO _x
heptane	C ₇	<i>n</i> -pentane	
hexane	C ₆	pentane	C ₅
hydrofluoric acid	HF	potassium chloride	KCl
hydrogen sulfide	H ₂ S	propane	C ₃
hydrochloric acid	HCl	sodium chloride	NaCl

4.5 Organizations

The following are abbreviations for some of the organizations that may be mentioned in SPE literature. When these organization names are used often in an article, they should be spelled out at first use, followed by the abbreviation in parentheses, and abbreviated throughout the rest of the article. Words like “Society” and “Institute” should always be abbreviated when included in reference lists, bibliographies, and tabular material (tables of contents and other actual tables) and should be spelled out in headings and running text (see Sec. 4.1.2).

American Petroleum Institute	API
American Institute of Mining, Metallurgical and Petroleum Engineers	AIME
American Association of Petroleum Geologists	AAPG
American Chemical Society	ACS
American Gas Association	AGA
American Geophysical Union	AGU
American Society for Testing and Materials	ASTM
American Society of Civil Engineers	ASCE
American Society of Mechanical Engineers	ASME
American Institute of Chemical Engineers	AIChE
Gas Technology Institute	GTI
International Association of Drilling Contractors	IADC
Iron and Steel Society	ISS
National Association of Corrosion Engineers	NACE
Petrotechnical Open Software Corporation	POSC
Society of Exploration Geophysicists	SEG
Society for Mining, Metallurgy, and Exploration	SME
Society of Professional Well Log Analysts	SPWLA
The Minerals, Metals, and Materials Society	TMS
US Department of Energy	US DOE

5 PUNCTUATION

5.1 Comma

- 5.1.1 Do not use commas in dates in the day/month/year format.
The project began on 5 June 1994.
If the day of the month is not given, do not use a comma to separate the month and the year.
Waterflooding began in April 1975.
- 5.1.2 In a series of three or more elements, use commas between each element and before the final conjunction.
... papers by Rogers, Smith and Sloan, and Greenlee
... the effects of viscosity, flow rate, and porosity
- 5.1.3 Use commas to set off states used with locations, but do not set off “II” and “III” and “Jr.” and “Sr.”
Jim Wilson Jr. arrived in Bakersfield, California, USA, last week.
- 5.1.4 Use a comma to separate two coordinate adjectives that modify the same noun; however, do not use the comma when the adjectives depend on what follows. The comma is needed when the adjectives are similar in meaning.

an efficient, simple, cheap way
a dark red dye
a dark red, commercial dye
Commas are used correctly if they logically can be replaced by “and.”

- 5.1.5 Set off parenthetical words or phrases with commas.
Of course, we decided to stay.
We should, nevertheless, leave soon.

5.2 Colon

- 5.2.1 Use a colon after a complete sentence to introduce a formal list, examples, equations, or an additional statement.
- 5.2.2 Do not insert a colon between a verb or preposition and its object(s).
The data were time, volume, and depth.
- 5.2.3 Use a colon to introduce a long, formal quotation.
- 5.2.4 Use a colon to express a ratio between numbers; use a slash (/) to express a ratio with words (e.g., area/volume ratio).

5.3 Semicolon

- 5.3.1 Use the semicolon to separate clauses that are not linked by a conjunction and to separate long, involved coordinate clauses.
Drilling to such depths is rare; much of the technology is experimental and rapidly changing.
- 5.3.2 Use the semicolon to divide elements in a series when any of the elements contains commas.
Section officers are Jim Black, Chairperson; Susan Hall, Program Chairperson; and Bill Williams, Secretary.
2 people, 1 company: No comma before the “and.”
Joe Ford and Tom Gibson, Exxon Mobil Corporation
2 people, 2 companies: Comma before the “and.”
Joe Ford, Exxon Mobil Corporation, and Brad Smith, Schlumberger
3 people, 3 companies: Semicolons to separate, and semicolon before the “and.”
Joe Ford, Exxon Mobil Corporation; Brad Smith, Schlumberger; and Karen Moore, BP
X people, 2 companies: commas to separate, and comma before the “and.”
Joe Ford, Tom Gibson, and Steve Johnson, Exxon Mobil Corporation, and Karen Moore and Jan Foster, BP
X people, 3+ companies: semicolons to separate, and semicolon before the “and.”
Joe Ford and Tom Gibson, Exxon Mobil Corporation; Jan Foster, BP; Brad Smith, Schlumberger; and George White, Chris Jones, and Sandra Kennedy, Batman and Robin Consulting.
- 5.3.3 Organize material between semicolons around common elements.
Committee members are Jim Black, Chairperson, and Sam Smith, Secretary, Tonka Oil Company; Directors Al Jones, PDQ Drilling Company, and Max Wentworth, Sherman Associates; and Joe Johnson, Vice Chair, Texas Tools.
- 5.3.4 Use the semicolon before conjunctive adverbs such as “therefore,” “however,” “thus,” “moreover,” and “consequently.”
The first test failed; consequently, we ran another.
NOTE: “Whereas” should be preceded by a comma, never a semicolon.

5.4 Apostrophe

- 5.4.1 Apostrophes should be consistently typeset in curly form, not straight and vertical or slanted like an accent.
- 5.4.2 Use the possessive form for informal measures involving time, space, and quantity.
3 years’ experience a dime’s worth a yard’s length

- 5.4.3 Use the apostrophe alone to form the possessive of a plural noun ending in “s.” Use ’s to form the possessive of words not ending in “s.”
the mud’s weight the wells’ total production
- 5.4.4 **DO NOT** add ’s when forming the plural of figures, letters, years, abbreviations, etc.
the 1920s all As BHAs
- 5.4.5 The apostrophe replaces an omitted letter or letters in contractions.
didn’t shouldn’t huff ’n’ puff
- 5.4.6 Use ’s when forming the possessive of an abbreviated word.
Exxon Mobil Corporation’s well
- 5.4.7 When forming the possessive of compounds, the last part of the compound takes the possessive form.
the equation of state’s derivation
- 5.4.8 For words showing joint possession, only the last in the succession takes the possessive.
Smith and Jones’ paper
- 5.4.9 Individual possession is indicated by forming the possessive of each word in the group.
Smith’s, Johnson’s, and Jones’ papers

5.5 Parentheses

- 5.5.1 Use parentheses to set off phrases that start with i.e. or e.g.
- 5.5.2 Use parentheses to set off explanatory or incidental matter that is not part of the main thought of the sentence.
The time was right (despite some feelings to the contrary) to begin construction.
- 5.5.3 Use brackets [] around a parenthetical phrase already containing parentheses.
The difference was small [compared with the earlier study (1976)].

5.6 Quotation Marks

- 5.6.1 Quotation marks should be consistently typeset in curly form (e.g., “like this”).
- 5.6.2 In general, use quotation marks to cite exact phraseology from another source, to set off titles when italics are not used, and to enclose a word or phrase being used in an unusual manner at its first use.
- 5.6.3 Use quotation marks at the opening of each paragraph and at the close of the final paragraph of a long quotation. If the quotation is to be set in contrasting type or to be indented from the rest of the copy, do not use the quotation marks.
- 5.6.4 Set commas and periods inside quotation marks. Other punctuation marks go inside the quotation marks only if they belong to the material quoted.
- 5.6.5 When defining or introducing a new term, use the quotation marks only at the first reference.

5.7 Dashes

- 5.7.1 There are several kinds of dashes, differing from one another according to length. The main ones are the en and em dashes. The en dash is half the length of an em dash and longer than a hyphen:

Em dash: — En dash: – Hyphen: -

****NOTE: The dash is NEVER surrounded by spaces.****

In titles, colons are preferred in place of em dashes.

- 5.7.2 The most commonly used dash is the em dash, which is used to denote a sudden break in thought that causes an abrupt change in sentence structure; a pair of em dashes often sets such an intrusive item apart from the sentence parenthetically.

The Platonic world of the static and Hegelian world of process—how great the contrast!

The chancellor—he had been awake half the night waiting in vain for a reply—came down to breakfast in an angry mood.

An em dash also is inserted in the caption of a figure after its designation.

Fig. 1—Cutaway drawing of a well.

Table 1—Field Properties

- 5.7.3 The principal use of the en dash is to indicate continuing or inclusive numbers, such as in dates, times, or references.
- | | | |
|----------------|-------------------------|-----------|
| 1968–72 | 10 a.m.–5 p.m. | 0900–1300 |
| May–June 1967 | pp. 38–45 | 0230–0500 |
| 3–5 March 2002 | 13 May 1965–9 June 1966 | |

- 5.7.4 Do not mix the use of the en dash in this manner with words, such as “between/and” or “from/to,” in expressing a range.

Use either “...from 1968 to 1972...” or “...1968–72...”

NOT “from 1968–72...” or “...between 1968–72...”

Use “...between 10 a.m. and 5 p.m....” or “...from 1000 to 1700....” or “...10 a.m.–5 p.m....” or “1300–1630”

NOT “...from 10 a.m.–5 p.m.” or “...from 1400–1800...”

- 5.7.5 When the concluding date of an expression denoting a duration of time is in the unforeseeable future, the en dash is still used.

North Texas area wells contributing information to the ongoing study include Crumley B-213 (1979–), McConnell C-124 (1979–1992), West B-246 (1979–), and Bruce A-317 (1979–1983).

5.8 Hyphenation

- 5.8.1 Do not use hyphens to express a range of figures. Instead, use the complete idiom except with dates, page numbers, and addresses.

from 20 to 30%

NOT from 20–30%

- 5.8.2 Hyphens normally are not needed after ordinary prefixes.

coeducation	hydroelectric	electrochemical	interconnection	semilog
midwestern	pseudosteady	multiphase	quasilegal	updip
nonlinear	repressured	subsea	prestimulation	ultradeep

However, use a hyphen after a prefix when a vowel is doubled (exceptions are cooperate, coordinate, isoctane, and microorganism).

re-elect	pre-eminent	semi-insoluble
----------	-------------	----------------

Also, use a hyphen when the prefix precedes a proper name.

non-Newtonian	post-Ordovician
---------------	-----------------

Use a hyphen after any prefix if omitting it will convey the wrong meaning.

re-cover	recover	re-treat	retreat
re-form	reform	co-operate	cooperate

- 5.8.3 Hyphenate compound customary units of measurement.

acre-ft

md-ft

- 5.8.4 Hyphenate expressions such as “*n*-pentane.” However, do not hyphenate ordinary chemical combinations used as modifiers or chemical names with prefixes.

a sodium chloride solution

hydroxyacetic acid

- 5.8.5 Do not use a hyphen between words to take the place of “and” or “or.” Instead, use a slash.

oil/water interface

pressure/time plot

section/chapter news

pressure/volume/temperature data

Exception: permeability-thickness product.

- 5.10.3 The e-prefix is not hyphenated in the use of a trademarked name with this as its style.
 eSPE
 eLibrary
 eUpdate
- 5.10.4 Web addresses are formatted in plain typeface, with no hyperlink (i.e., no underline or special color), and followed by a period if the Web address ends the sentence.
 You can find the site by searching for it at www.webcrawler.com.

5.11 Typeface

- 5.11.1 **Bold** typeface is used for such things as authors' names in bylines and on first use in author biographies; section headings in articles; and first mention of figures and tables (see Sec. 8.3.5).
 Byline:
A.C. Clarke, Monolith Communications, and **I. Asimov**, US Robotics.
 Author biographies:
Arthur C. Clarke is the author of *2001: A Space Odyssey* and many other books. Clarke holds a PhD in astronomy from Oxford University and is credited with inventing the concept of the communications satellite. **Isaac Asimov** holds a PhD in biochemistry from Columbia University. Asimov is the author of more than 500 books, many about robots; he is even credited with having coined the word "robotics."
- 5.11.2 In most situations, any punctuation accompanying a boldface citation is set in bold as well.
 Note trends shown in **Fig. 1**.
 When a figure is cited for the first time and happens to be in parentheses, both the figure number and the parentheses should be bold, along with any punctuation that immediately follows the parentheses (**Fig. 2**). If a figure is cited for the first time and is enclosed in parentheses along with additional text, then **ONLY** the figure designation should be bold, not the parentheses or any following punctuation (see data in **Fig. 3**).
 Bold the first reference to a portion of a multipartite figure (**Fig. 1a**), but leave subsequent references to other parts in normal type.
- 5.11.3 *Italic* typeface is used for such things as species names; all publication titles; and a number of mathematical elements (see Sec. 8.7.1).
 In Europe, the pike, *Esox lucius*, is valued for food as well as sport.
SPE Journal has many fine articles, but those in the *National Enquirer* are funnier.
- 5.11.4 Normal typeface is used for the majority of the print in a paper. In a passage of italic type, any terms that would be set off in italics in normal type are converted to normal type for contrast.
 Wells, H.G. 1910. *Geological Absurdities in Journey to the Center of the Earth by Jules Verne*, 66–69. London: Gnome Press.
 Also, certain technical terms are set in normal type, despite general rules that may apply to the contrary in some situations: M (for molar) and N (for normal), for example.

6 NAMES

6.1 People, Personal Titles, Degrees

- 6.1.1 When possible, write a person's name as that person writes it. Particularly observe preferences in the use of initials or given name, spelling of "Mc" and "Mac," and capitalization of prefixes such as "de," "da," "du," "le," "van," and "von." When personal preferences cannot be determined, use two or more initials or, if only one given name is available, spell out the first name and capitalize all prefixes except "von" and "de."
 William L. Strong W.L. Strong
 William L. (Skipper) Strong Skipper Strong
- 6.1.2 Do not use the titles Mr., Mrs., Ms., Miss, Prof., or Dr. Occasionally, cultural norms will dictate the use of an honorific.
- 6.1.3 Do not use commas to set off "II," "III," "Jr.," or "Sr." in names.
 Jim Wilson Jr. arrived in Bakersfield, California, USA, last week.

- 6.1.4 When an author or speaker's nickname is used, it should be enclosed in parentheses.
W.T. (Bud) Parker
- 6.1.5 In running text, capitalize and spell out formal titles such as president, chairman, or vice president when they precede a name and "the" or "a" is not used. All titles appearing after the person's name should be lowercase. In program listings and headings, capitalize major words in titles, department names, etc.
The meetings will be hosted by President Jane Smith.
Meetings are hosted by the president of Acme, Jane Smith.
Giovanni Paccaloni, who served as 2005 SPE president, is being honored with an award.
Giovanni Paccaloni, 2005 SPE President
Please contact Maxwell Jones, vice president, finance.
- 6.1.6 Abbreviate academic and honorary degrees without periods or spaces. Use of the word "degree" is optional.
PhD MA LLB degree
- 6.1.7 Do not capitalize academic degrees when spelled out. Do not capitalize a field of study such as physics or petroleum engineering.
bachelor's degree BS in physics
- 6.1.8 Capitalize honorary membership titles and other SPE honors, awards, and distinctions.
SPE Distinguished Service Medal SPE Honorary Member
- 6.1.9 In reference lists and in technical program listings of papers and authors, use the author's initials instead of his/her given name and spell out his/her family name. Do not insert spaces between an author's initials.
M.B. Shelley G.B.L. Jones G. Elliot J.-P. Smith
- 6.1.10 Authors' names should be printed in bold in the author credits (byline) at first use, in regular type afterward.
- 6.1.11 Do not capitalize the names of devices, methods, theories, techniques, systems, or laws (except for proper names that are included).
Darcy's law Cartesian coordinates Muskat method
Laplace transform pendant-drop method Stokes' law

6.2 Companies, Organizations

- 6.2.1 Capitalize names of regions, sections, chapters, committees, and other units of SPE when written in full. Do not capitalize the general term when used alone or in the plural form.
Permian Basin Section the section
SPE Board of Directors the board meeting
- 6.2.2 Capitalize names of companies, institutes, foundations, colleges, universities, associations, etc., but do not capitalize the general term when used alone or in the plural form except in cases covered under Sec. 6.2.4.
Faraday Society society goals 25-Year Club members
- 6.2.3 Capitalize the official names of departments, districts, divisions, and similar major subdivisions of companies, organizations, or universities. Do not capitalize the general term when alone or plural.
Department of Petroleum Engineering API Production Division
the Geosciences and Chemistry departments the Monograph and Books committees
- 6.2.4 Capitalize all letters in company names only if they are true acronyms, each letter standing for a single word.
THUMS Texaco, Humble, Union, Mobil, and Standard
Arco Atlantic Richfield Company
Aramco Saudi American Oil Company
- 6.2.5 Capitalize names of specific national and state legislative, executive, and judicial bodies.
US Supreme Court UK Parliament

6.3.8 Capitalize the word “the” in The Hague and The Netherlands, as well as other official names of institutions [e.g., The Woodlands Marriott Hotel]; for additional examples, refer to the *Chicago Manual of Style*.

6.4 Meeting Names

6.4.1 The official names of SPE meetings are listed in the SPE Long-Range Meetings Calendar. SPE meetings should be referred to by the name that appears in this document. Colons are preferred in place of em dashes in official meeting names.

6.4.2 Do not abbreviate any portion of the name of an SPE meeting. If using the full name is awkward because of its length, rewrite the sentence or use a generic term, such as “the conference.” The Offshore Technology Conference may be referred to as OTC, and the SPE Annual Technical Conference and Exhibition may be referred to as ATCE.

6.4.3 Capitalization of meeting names should follow capitalization rules for titles (see Sec. 8.1). Colons are preferred in place of em dashes in official meeting names.

7 NUMBERS

7.1 General

7.1.1 Large, rounded numbers should be written with the words “million” and “billion” or expressed in powers of 10 notation, with the number before the \times greater than 0 and less than 10. Spell out the preceding numerals if nine or less, except with sums of money or units of measurement (hours, days, years, and other units of time are considered units of measurement). Never use “billion,” “trillion,” etc., with SI metric units.

40 million six million consumers $8 \times 10^6 \text{ m}^3/\text{d}$ USD 4 million

7.1.2 Do not use commas in numbers in dates, pages, and addresses. Numbers of more than three digits used with customary (i.e., not SI metric) and nondimensional units use the comma.

456,789 bbl 2,956 ft October 1997
Page 1171 1600 Pennsylvania Ave.

Do not use the comma with SI metric units. Use a space instead; four-digit numbers require no space.

4 720 525 m^3 1525 m

7.1.3 Use the suspended hyphen when expressing a numerical series of dimensions.

The 3-, 5-, and 7-in. wellbores ...
A 25- to 50-lbm/bbl mud ... (Not “A 25–50-lbm/bbl mud ...”)

7.1.4 Ratios are punctuated with a colon when using numbers, with a slash when using words.

60:20 area/volume

7.2 Dates and Times

7.2.1 Use numerals, not words, to express times and dates (exceptions are noon, midnight, and names of days and months). Do not use commas in dates in the date/month/year format (see Sec. 5.1.1).

6 p.m. (not six p.m.)
The startup date was 5 June 1977.

If the day of the month is not given, do not use a comma to separate the month and the year.
Waterflooding began in April 1975.

7.2.2 Write 12-hour time with lower-case letters and periods. Provide the digits for minutes only when necessary.

10 a.m. 3:37 p.m.

Use “noon” and “midnight” rather than 12 p.m. or 12 a.m. Do not use “12 noon” or “12 midnight.”

Note: SPE uses the 24-hour clock for its events, including all major meetings (ATCE, OTC, IPTC, Offshore Europe, and the Drilling Conference). Exceptions are determined on a case-by-case basis and include regional events where the 12-hour clock is customary to the regional attendees. When used, 24-hour times should include four digits with no punctuation. Include “hours” after the time in text, but not in a listing of times, such as a schedule of events.

The course begins at 0800 hours.
0800 to 1200 Registration

7.2.3 Time ranges should include a.m. and p.m. for both ends only if an event begins in one and ends in the other. If the event is contained entirely in morning or afternoon, only the second time carries the designation of it.

from 10 a.m. to 2 p.m. 11 a.m.–6 p.m. 10–11 a.m.
from 2 to 6 p.m. 8 a.m.–noon

7.3 Phone Numbers

Use country codes with all phone numbers. The country code for the US and Canada is 1. Use periods rather than hyphens, parentheses, or slashes to separate parts of phone numbers.

Examples: +1.972.952.9393 +44.171.487.4250 1.800.555.1212

7.4 Units of Measure

See also Abbreviations: Units (Sec. 4.3).

7.4.1 Use the slash (/) in place of “per” between two abbreviated units of measurement.

40 psi/ft 15 cm/s 40 lbm/ft 20/40-mesh sand

7.4.2 Use the degree sign (°) with angles, temperatures [except metric K (Kelvin)], and compass coordinates.

20° slope 65°F 2°W

7.4.3 Do not use ‘ for feet or ‘‘ for inches. Instead, use “ft” and “in.”

7.4.4 Abbreviate units of measurement in the text only when used with numerical values (unless the abbreviation replaces a very long phrase, such as “several scf/D” for “several standard cubic feet per day”). A list of preferred abbreviations for engineering units appears in Sec. 4.3.10.

25 ft 50 million ft³/D 10 dm³ 3 cm³

7.4.5 Use the singular abbreviation for both singular and plural forms of measurements. If not abbreviated, use plural if appropriate.

7.4.6 Use only customary (i.e., English system) units or only SI units; do not mix. (Exception: Pipe sizes always can be expressed in inches, even if the rest of the text uses metric units.)

7.4.7 Percentages are expressed with the percent symbol (%) and are abbreviated as follows.

25% 12 mass% 21 vol% 17 mol% 13 wt%

7.5 Whole Numbers

7.5.1 In general, spell out “zero” and whole numbers from one through nine; use figures for 10 or more.

one two three 10 101
first second third 10th 101st

7.5.2 Use figures if the number expresses a unit of measurement or ratio.

1% 6 km 3 in. 6 m 2:1 20°C

7.5.3 Use figures for dates, street addresses, currency, and times of day.

USD 3 USD 0.27 2 p.m. 55 Park Avenue

7.5.4 Use figures for numbers when grouping similar things if any of the numbers are greater than 10.

contains 4 to 16 pages contains four to six pages

- 7.5.5 In general, avoid Roman numerals. Use Arabic numbers to designate tables, figures, and equations.
- 7.5.6 Use only numerals in statistical and tabular material.
- 7.5.7 Spell out the first term to distinguish between two numbers that come together.
 twenty-one 2-acre tracts two 3-hour tests
- 7.5.8 Spell out numbers that begin a sentence. If the numbers are so large that the sentence becomes awkward, rewrite the sentence.
 Ten wells are producers; 13 are dry holes.
 Four-inch pipe was set.
- 7.5.9 When using the number “1” or the word “one” in text can lead to confusion, the term “unity” may be substituted (e.g., “for mobility ratios other than unity”).
- 7.5.10 Use a capital “X” to indicate magnification: 500X.

7.6 Fractions

- 7.6.1 Spell out common fractions when they are used alone in the text. Use figures when the fraction is combined with a whole number or when it is used with a unit of measurement. Common fractions do not exist in the SI metric system; use decimal notation instead.
 2¼ pages ½-in. tubing 3.25 kg one-half the normal time
- 7.6.2 When writing decimal fractions, place a zero before the decimal point (0.5, not .5).

7.7 Currency

- 7.7.1 When expressing currencies, select the appropriate three-letter abbreviation from the list of ISO currency abbreviations (the list can be found at <http://www.iso.org/en/prods-services/popstds/currencycodeslist.html>), and omit the currency symbol (\$, £, ¥). If currencies will be used often, such as on meeting registration forms, a statement at the top of the form noting the type of currency used (e.g., “Prices are in US dollars.”) is sufficient.
Examples: USD 50.25 CAD 90.50 JPY 500
 GBP 50 EUR 10.50
- 7.7.2 In text, drop unnecessary zeroes from currencies. For example, write “USD 10” rather than “USD 10.00.” Retain the two decimals in a column of currencies only if one or more of the prices listed requires them.
 USD 55.50
 50.00
 35.25

7.8 Dimensions

- 7.8.1 The designations three-dimensional, four-dimensional, etc., are generally written as 3D, 4D, etc.
- 7.8.2 When physical dimensions are written out, they are expressed in numerals, and a multiplication symbol appears between the dimensions without any additional spacing. The unit is specified afterward normally.
 Each cell is 84×84×5 ft.

8 ELEMENTS OF TECHNICAL PAPERS

8.1 Titles and Headings

- 8.1.1 In titles and headings for books, articles, lectures, etc., capitalize nouns, pronouns, adverbs, and all other words of four or more letters. Also capitalize “no,” “nor,” “off,” “out,” “so,” and “up.” Capitalize words of fewer than four letters if they are a verb or part of or closely connected to a verb.
 Held Up To Inject Can Be Produced

- 8.1.2 Capitalize both parts of a compound adjective.
 Two-Phase In-Situ Full-Sized
- 8.1.3 Use a colon (preferred) or an em dash, rather than a comma, to set off part of the title; capitalize the first word after the em dash or colon, and then capitalize normally as for titles generally.
 Corrosive Service: A Study in Economics
 Horizontal Drilling—New Horizons

8.2 Author and Company Names

- 8.2.1 Author names on technical papers should include the name of each author, followed by “, SPE,” if he/she is an SPE member, followed by his/her company affiliation.
 J.B. Brown, SPE, Consolidated Flange; P.D. Smith, Smith Consulting; and Edward White, SPE, Worldwide Washers
- 8.2.2 If two or more authors have the same company affiliation, it should not be repeated after each name.
 Edward White, SPE, P.D. Smith, and J.B. Brown, SPE, Consolidated Flange, and S.R. Lane, SPE, Worldwide Washers
- 8.2.3 When possible, write a person’s name as he/she writes it. Particularly observe the spelling of “Mc” and “Mac” and capitalization of prefixes such as “de,” “da,” “du,” “le,” “van,” and “von.” When personal preferences are not determinable, use two initials rather than the given name (or spell out the given name if you know only one), and capitalize all prefixes except “von” and “de.” Also, be aware that the order of names (family name, given name, etc.) is different in different cultures. The author’s preference should always be considered.
- 8.2.4 Do not use the titles Mr., Mrs., Ms., Miss, Prof., or Dr.; occasionally, cultural norms will dictate the use of an honorific.

8.3 Numbering Tables, Figures, and Equations

- 8.3.1 Use Arabic numbers to label tables and figures; number them in order cited consecutively through the text and within appendices. Within each appendix, use Arabic numbers and the same letter designation as that of the appendix (Eq. A-1, A-2, etc.; Eq. B-1, B-2, etc.) Label two-part equations as Eq. 1a and Eq. 1b, or Eq. A-3a and Eq. A-3b. Do not label them as Eq. 1 and Eq. 1a, or Eq. A-3 and Eq. A-3a.
- 8.3.2 Designate all illustrations and nontabular material by “Fig.” Do not use the words “chart,” “exhibit,” “graph,” or “photo” when naming a specific figure. When referring to distinct parts of a single figure, use lower-case letters: Fig. 2a, Fig. 2b, Fig. 2c, etc.
- 8.3.3 Label tables, figures, and equations accompanying a Discussion of a Paper Table D-1, Fig. D-1, Eq. D-1, etc. Those accompanying the Author’s Reply to a Discussion are labeled Table R-1, Fig. R-1, Eq. R-1, etc.
- 8.3.4 When citing two-part figures in text, use “Figs. 2a and 2b” rather than “Figs. 2a and b.”
- 8.3.5 The first time a figure or table is cited in the text, put it in boldface. All subsequent citations of that figure or table should be in regular typeface.
 ...as shown in **Fig. 1**. Also note in Fig. 1 that the ...
 However, if a previously mentioned figure is grouped with another being mentioned for the first time, it is set in bold again.
 ...as indicated in **Fig. 1**. Further development is shown in **Figs. 1 through 4**.

8.4 Enumeration of Points

- 8.4.1 Avoid numbering items in a series of brief elements.
 The measured liquid production was a result of external expansion, liquid expansion, and rock compaction.

- 8.4.2 If the points listed have multiple parts that need to be separated by commas, semicolons should be used to separate the points.
- 8.4.3 When points enumerated are more complex, use a colon after the introductory sentence, and separate the clauses by semicolons. For consistency, if one point is a complete clause, all should be.
 The measured liquid production was a result of several factors: expansion of the system external to the core was caused by...; expansion of the liquid contained in the pore spaces of the rock normally occurred when...; actual decrease in pore space was caused by compaction within....
- 8.4.4 When points are enumerated in a bulleted list, introduce them with a sentence followed by a colon or period, or with a phrase without a colon or period. Bulleted lists always start with a capital letter. Whenever possible, bulleted lists should be all complete sentences ending in a period or all incomplete sentences with no period at the end of a phrase or sentence fragment.
 The steps you can take to protect yourself from identity theft are as follows:
 - Destroy your private records and statements.
 - Secure your mail.
 - Safeguard your passwords.
 As president of the society, Smith will emphasize
 - Building support for young professionals
 - Recruiting mentors from core industries
 - Promoting sections to undergraduate students
- 8.4.5 Numbering points is necessary only when the point is referred to later in the article.
 The method specified in Point 3 could be used.
- 8.4.6 The Conclusions section of a paper commonly presents the final points as a numbered list.

8.5 Equations

- 8.5.1 Equations are subject to the same rules of grammar as sentences. Maintain correct grammatical structure in sentences that contain, precede, or follow equations. A complete sentence introducing an equation can end in a period or colon.
 In many cases, the relationship of motion,

$$A = Bx + (c - D_2), \dots\dots\dots(3)$$
 can be expressed more simply.
 Take special care to avoid confusion. For example, “When $Ax = By$, C varies” is clearer when written as “When $Ax = By$, then C varies.”
- 8.5.2 The symbols for “equals” (=), “yields” (\rightarrow), “reversibly yields” (\rightleftharpoons), and other such signs act as verbs. Sentences containing these symbols must be grammatically correct.
- 8.5.3 Align subscripts and superscripts properly to avoid confusion about whether a symbol or number should be set on the line or as a subscript or superscript.
- 8.5.4 Letter symbols should conform with SPE standard nomenclature (see Sec. 8.7). Define them in a formal alphabetical nomenclature at the end of the paper.
- 8.5.5 When typing an equation on more than one line, break the equation at a complete term and start the next line with a sign.

$$A_1 = 2B_2 + C \cdot (DF - DG)$$

$$+ 2B_1 \times F_2. \dots\dots\dots(2)$$
- 8.5.6 Use parenthetical pairs in the following order, proceeding from the inside of the equation outward: parentheses (), brackets [], and braces { }.

$$2\{[A(B + C/D) - E]2\} = 3F.$$

8.6 Units

Either SI metric or customary English units should be used consistently throughout the paper. Do not mix units by using metric units to measure one thing (pressure in kPa, for example) and English units to measure something else (pipe length in feet, for example).

8.7 Symbols and Nomenclature

The *SPE Letter and Computer Symbols Standard* provides more information on the use of symbols in SPE literature.

- 8.7.1 Letter symbols (including subscripts and superscripts) should be italicized in the text, equations, tables, and figures. Do not italicize numerals (including subscripts and superscripts), mathematical abbreviations (log, sin, cos, etc.), capital Greek letters, or chemical symbols. Do not italicize portions of letter symbols that are abbreviations (such as “max” for maximum) or that correspond to proper names (such as subscript Re in Reynolds number, N_{Re}). For more details, please refer to the subscript definitions list in the *SPE Letter and Computer Symbols Standard*.

$$p_D \quad T_{\max} \quad k_{rw}$$

- 8.7.2 Each symbol used in a paper should have a unique definition (i.e., the same symbol should not be used for two different things in the same paper or book chapter).
- 8.7.3 Symbols should consist of a one-letter kernel. Multiple-letter symbols (e.g., WOR for water/oil ratio or NPV for net present value) are not allowed. Subscripts and/or superscripts should be used to differentiate between symbols with the same one-letter kernel.
- 8.7.4 At the end of the paper or book, include an alphabetical Nomenclature of all symbols used. The list should include the letter symbol, an accurate and concise definition, the dimensions in which the quantity is measured, and the units of measure used in the paper.

p = pressure, m/Lt², psi

μ = viscosity, m/Lt, cp

Dimensions are mass (m), length (L), time (t), temperature (T), electrical charge (q), money (M), and amount (n). If dual units are used throughout the paper, the second set of units should appear in brackets.

L = length, L, ft [m]

ρ = density, m/L³, lbm/ft³ [kg/m³]

- 8.7.5 Common SPE standard symbols are listed below.

A	= area	q	= production rate
B	= formation volume factor	r	= radius
C	= concentration	S	= saturation
d	= diameter	t	= time
D	= depth	T	= temperature
h	= thickness	v	= velocity
J	= productivity index	V	= volume
k	= permeability	Z	= elevation
K	= coefficient	μ	= viscosity
L	= length	ρ	= density
m	= slope	ϕ	= porosity
N	= dimensionless number		
p	= pressure		
P_c	= capillary pressure		

- 8.7.6 Organize items in the Nomenclature as follows: first, list Roman alphabetical terms, each presented with lowercase versions first; second, list Greek alphabetical terms, each presented with lowercase versions first. Within these sets, individual terms are alphabetized accordingly (e.g., p precedes p_c , which precedes p_{eff} , which precedes P ; likewise, Δ precedes Δp in the Greek section).

8.8 References

- 8.8.1 Cite references in the text by placing the author’s last name and the year of publication in parentheses; then, include an alphabetical listing of the references at the end of the paper. [Note: This is a change from SPE’s previous reference style, which required references to be numbered in the order in which they were cited.] If the text cites more than one

reference from the same author in the same year, add “a,” “b,” etc. to distinguish between the references. References included in the same set of parentheses should be separated by semicolons.

Smith (1990) provides a detailed explanation of this method.

The method is analyzed in several studies (Smith 1990; Jones and Smith 1992; Smith et al. 2004).

Kabir et al. (2004a, 2004b) showed that...

- 8.8.2 When preparing the reference list, be sure to include complete information. List names of all authors up to ten; if a reference has more than ten authors, list the first seven authors’ names plus et al. The et al. form is permissible in the text only when referring to three or more authors of a single paper.
- 8.8.3 The general information to be included in the reference listing is author’s(s’) last name(s), first and middle initials; title of the paper or book; edition (where applicable); name of publication or publisher; city of publication; date or year of publication or presentation; volume number; and inclusive page numbers. For journal articles, include issue number in addition to the page numbers. For papers published in SPE journals, include the SPE-assigned paper number at the end of the reference (e.g., “SPE-12345-PA”). Always include the doi number associated with a reference, if one is available. Doi should always be placed at the end of the reference in format: “doi: #####.” The standard SPE doi prefix is 10.2118/paper#.
- 8.8.4 Omit the reference entirely if the bibliographical information is so vague that the reader could not locate the document referred to. “Personal communication” and unpublished reports are not acceptable references. If essential to the text, use footnotes to acknowledge such informal sources.
- 8.8.5 Use the following formats for references to recommended practices, standards, and specifications.
- | | |
|--------------------|---|
| In text: | <i>API Bull. SI, Policy and Procedures for Standardization of Oilfield Equipment and Materials,</i>
<i>NACE Standard TM-01-77</i>
<i>API Spec. 5CT</i> |
| In Reference List: | <i>API Spec. 2F, Specification for Mooring Chain</i> , third edition. 1981. Washington, DC: API.
<i>API RP 7G, Recommended Practice for ...</i> , 11th edition. 1989. Washington, DC: API. |
- 8.8.6 A more abbreviated form of publications and organizations is allowed in references. Abbreviations for organizations listed in Sec. 4.5 can be used in reference citations without being spelled out at first use. Following are other abbreviations used in references:
- | | |
|---|------------------------------------|
| Bulletin | <i>Bull.</i> |
| <i>Chemical Engineering Progress</i> | <i>Chem. Eng. Prog.</i> |
| <i>Drilling and Production Practice</i> | <i>Drill. & Prod. Prac. J.</i> |
| <i>Journal</i> | |
| <i>Journal of Canadian Petroleum</i> | <i>J Can Pet Technol</i> |
| <i>Technology</i> | <i>J Pet Technol</i> |
| <i>Journal of Petroleum Technology</i> | <i>Oil & Gas J.</i> |
| <i>Oil & Gas Journal</i> | <i>Pet. Eng. Intl.</i> |
| <i>Petroleum Engineer International</i> | <i>Proc.</i> |
| <i>Proceedings</i> | <i>RP</i> |
| Recommended Practice | Do not abbreviate |
| <i>SPE Advanced Technology Series</i> | <i>SPE Comp App</i> |
| <i>SPE Computer Applications</i> | <i>SPE Econ & Mgmt</i> |
| <i>SPE Economics & Management</i> | <i>SPE Drill & Compl</i> |
| <i>SPE Drilling & Completion</i> | <i>SPE Drill Eng</i> |
| <i>SPE Drilling Engineering</i> | <i>SPE Form Eval</i> |
| <i>SPE Formation Evaluation</i> | <i>SPE J.</i> |
| <i>SPE Journal</i> | <i>SPE Prod & Fac</i> |
| <i>SPE Production & Facilities</i> | <i>SPE Prod & Oper</i> |
| <i>SPE Production & Operations</i> | <i>SPE Prod Eng</i> |
| <i>SPE Production Engineering</i> | |
| <i>SPE Projects, Facilities &</i> | <i>SPE Proj Fac & Const</i> |
| <i>Construction</i> | <i>SPE Res Eng</i> |
| <i>SPE Reservoir Engineering</i> | |
| <i>SPE Reservoir Evaluation &</i> | <i>SPE Res Eval & Eng</i> |
| <i>Engineering</i> | |

- 8.8.7 All months and states should be spelled out.
- 8.8.8 Examples of SPE and non-SPE references.

SPE REFERENCES

Article in an SPE Journal, Also Published in Transactions

Harris, P.C. and Reidenbach, V.G. 1987. High-Temperature Rheological Study of Foam Fracturing Fluids. *J Pet Technol* **39** (5): 613–619; *Trans.*, AIME, **283**. SPE-13177-PA. doi: 10.2118/13177-PA.

Conference Paper (-MS)

White, C.D. and Horne, R.N. 1987. Computing Absolute Transmissibility in the Presence of Fine-Scale Heterogeneity. Paper SPE 16011 presented at the SPE Symposium on Reservoir Simulation, San Antonio, Texas, USA, 1–4 February. doi: 10.2118/16011-MS.

NOTE: Each fall, the Society holds its official annual meeting. The proper name for all such meetings through 1974 is “Annual Meeting” (e.g., “the 1972 SPE Annual Meeting”). Beginning with the 1975 annual meeting, the proper name changed to “Annual Technical Conference and Exhibition” (e.g., “the 1975 SPE Annual Technical Conference and Exhibition”).

Independently Submitted (Non-Conference) Papers, Not Found in OnePetro

Johnson, B. 1990. Reservoir Management. Paper SPE 36514 available from SPE, Richardson, Texas.

Published Journal Article (-PA)

King, M.J. and Mansfield, M. 1999. Flow Simulation of Geologic Models. *SPE Res Eval & Eng* **2** (4): 351–367. SPE-57469-PA. doi: 10.2118/57469-PA.

SPE Monograph or Textbook Series Titles

Matthews, C.S. and Russell, D.G. 1967. *Pressure Buildup and Flow Tests in Wells*. Monograph Series, SPE, Richardson, Texas **1**: 13–16.

Bourgoyne, A.T., Chenevert, M.E., and Millhein, K.K. 1986. *Applied Drilling Engineering*. Textbook Series, SPE, Richardson, Texas **2**: 173–175.

SPE Reprint Series Titles

Chambers, M.R. ed. 2002. *Multilateral Wells*. Reprint Series, SPE, Richardson, Texas **53**: 15-21.

SPE Transactions Papers

Tracy, G.W. 1955. Simplified Form of Material Balance Equation. SPE-438-G. *Trans.*, AIME **204**: 243–255.

SPE Online First Papers

Garmey, G., Johns, R.T., and Lake, L.W. 2009. Pore-Scale Simulation of Dispersion in Porous Media. *SPE J.* SPE-110228-PA (in press; posted 19 February 2009).

NON-SPE REFERENCES - BOOKS

Book With One Author

Lake, L. 1989. *Enhanced Oil Recovery*. Englewood Cliffs, New Jersey: Prentice Hall.

Book With Two Authors

Jaeger, J.C. and Cook, N.G.W. 1979. *Fundamentals of Rock Mechanics*. London: Chapman and Hall.

Book With More Than 10 Authors

Author, A1., Author, A2., Author, A3., Author, A4., Author, A5., Author, A6., Author, A7. et al. 1999. *Book Title*, edition. City, State/Country: Series, Publisher.

Book With Editor Attributed

Pirson, S.J. ed. 1958. *Oil Reservoir Engineering*, 56–58. New York City: McGraw-Hill Book Co.

Book Without Author Attributed

Platts' Oilgram Regulatory Insight, second edition, 2. 1976. New York City: McGraw-Hill Book Co. Inc.

Book With Author and Translator Attributed

Snyyvek, J.B. 1968. *Petroleum Science*, second edition, trans. L. Friedman. Cambridge, Massachusetts: Oilfield Science Series, Elsevier (1977).

Chapter in a Book (Author and Editor Attributed)

Somasundaran, P. 1975. Interfacial Chemistry of Particulate Flotation. In *Advances in Interfacial Phenomena of Particulate/Solution/Gas Systems*, ed. P. Somasundaran and R.B. Grieves, Chap. 1, 1–15. New York City: Symposium Series, AIChE.

Foreign Title (Translated)

Author, A. Year. *English Title (Foreign Title)*. State: Publisher.

Reprint

Muskat, M. 1949. *Physical Principles of Oil Production*. Columbus, Ohio: McGraw-Hill (repr. Springer, 1981).

NON-SPE REFERENCES – JOURNAL ARTICLES

Article in a Non-SPE Magazine

Journel, A.G. 2002. Combining Knowledge From Diverse Sources: An Alternative to Traditional Data Independence Hypotheses. *Mathematical Geology* **34** (5): 573–596.

Article With Two Authors Attributed

Ashby, M.F. and Hallam, S.D. 1986. The failure of brittle solids containing small cracks under compressive stress states. *Acta Metallurgica* **34** (3): 497–510.

Article With Three to Ten Authors Attributed

Jessen, K., Michelsen, M., and Stenby, E.H. 1998. Global Approach for Calculation of Minimum Miscibility Pressure. *Fluid Phase Equilibria* **153** (2): 251–263.

Article With More Than 10 Authors Attributed

Author, A1., Author, A2., Author, A3., Author, A4., Author, A5., Author, A6., Author, A7. et al. 1999. Title. *Journal volume#* (issue#): pp–pp.

Article Without Author Attributed

Doubling of reserves seen possible. *Oil & Gas J.* (31 May 1976) 22–25.

Article With Author and Translator Attributed

Borisov, J.P. 1964. *Oil production using horizontal and multiple deviation wells*, trans. J. Strauss. Bartlesville, Oklahoma: R&D Library, Phillips Petroleum Co. (1984).

Article Submitted/Not Yet Published

Hagoort, J. *In press*. Simplified Analytical Method for Estimating the Productivity of Horizontal Wells Producing at Constant Rate or Constant Pressure. *Journal of Pet Sci and Eng* (submitted January 8, 2006).

Meeting Paper Included in a Proceedings Volume

Fisk, H.N. 1955. Recent Mississippi River Sedimentation and Peat Accumulation. *Proc.*, Fourth World Petroleum Congress, Rome, Sec. I/C, 1–21.

Online Article With No Author Attributed

Well Fire and Brimstone. Schlumberger, www.schlumberger.com/phony/. Downloaded 26 March 2007.

Oral Presentation, Not Included in Conference Proceedings

Detienne, J.L. and Po, V. 2005. PWRI Design for Soft Sand Formations. Oral presentation given at the SPE Advance Technology Workshop on Produced Water Re-injection, Biarritz, France, 20–24 June.

NON-SPE REFERENCES – MISCELLANEOUS

Bulletin

Bull. 11L3, Sucker Rod Pumping System Design Book, first edition. 1970. API, Washington, DC (May 1970).

Corporate or Business Website

Pinnacle Technologies. 2007. FracproPT, <http://www.fracpro.com/fracpropt.html> (accessed 17 May 2008).

Foreign Language Sources

Author, A. Year. *English Title (Foreign Title)*. State: Publisher.

GB/T 13173.6-1991, Determination of foaming power for synthetic detergents—Ross-Miles method (in Chinese). 1991. Beijing: Standardization Administration of China (SAC).

Patents – US and International

Cardenas, R.L., Carlin, J.T., and Flournoy, K.H. 1974. Surfactant Oil Recovery Process for Use in Formations Containing High Concentrations of Polyvalent Ions Such as Calcium and Magnesium. US Patent No. 3,799,264.

Moses, V. and Harris, R.E. 1994. Acidising Underground Reservoirs. International (PCT) Patent No. WO 94/25731.

PhD Dissertation or MS Thesis

Fleml, R.C. 1967. Sedimentology of the Sespe Formation, Southwestern California. PhD dissertation, Princeton U., Princeton, New Jersey.

Published Company or Government Report

Enhanced Recovery. 1975. Houston: Shell Oil Co., 2.

Doscher, T.M. 1982. Scaled Physical Model Studies of the Steam Drive Process. Final report, Contract No. DE-AT03-77ET 12075, US DOE, Washington, DC (November 1982).

Recommended Practices and Standards

API RP 61, Recommended Practice for Evaluating Short-Term Proppant-Pack Conductivity, first edition. 1989. Washington, DC: API.

ASTM A370-05, Standard Test Methods and Definitions for Mechanical Testing of Steel Products. 2005. Conshohocken, Pennsylvania: ASTM International. DOI: 10.1520/A0370-05.

Software

Adobe Dreamweaver CS4, Version 10.0. 2008. San Jose, California: Adobe Systems Incorporated.

Chu, K.T. and Prodanovic, M. 2008. Level Set Method Library (LSMLIB), <http://ktchu.serendipityresearch.org/software/lsmllib/index.html> (accessed 1 November 2008).

Technical/Educational Course

CSPG. 2006. Coal Bed Methane: An Integrated Approach to Reservoir Characterization and Production. CSPG CSEG SWLS Short Course SCPRE 10 presented 12 May 2006, Calgary, Alberta.

Unpublished Report

Li, C. 1999. Experimental investigation and theoretical analysis of the shale water activity at downhole conditions. Annual report, Drilling Research Program, University of Texas, Austin, Texas (unpublished).

Unpublished Results and Personal Communications

Use as footnote only (see 8.9). Do **not** include a numbered reference in reference list.

*Personal communication with J. Doe. 2006. Dallas: Exxon Mobil Corp.

User Guide/ Manual

Gray, H.E. 1974. Vertical Flow Correlation in Gas Wells. In *User Manual for API 14B Subsurface Controlled Safety Valve Sizing Computer Program*, Appendix B. Washington, DC: API.

GEM Advanced Compositional Reservoir Simulator, Version 2006 User Guide. 2006. Calgary, Alberta: CMG.

8.9 Footnotes

- 8.9.1 Use footnotes only as a last resort. Whenever possible, incorporate such material into the text using parentheses. Very small type used for footnotes makes it particularly difficult to read equations.
- 8.9.2 If footnotes are unavoidable, keep them as brief as possible and place them at the bottom of the column in which the reference to them appears. Use an asterisk (*) for the first, double asterisk (**) for the second, dagger (†) for the third, double dagger (‡) for the fourth, and (§) for the fifth footnote to each text column.

8.10 Conversion Factors

- 8.10.1 If dual units are provided for all units used in an article, paper, or book (including those in figures and tables), no conversion factor table is needed.
- 8.10.2 Use customary or SI units consistently. If only one system of units is used (customary or metric), then a conversion factor table must be included at the end of the article, paper, or book. The table should include conversion factors for all units used, including those used in figures and tables.

Sample Conversion Table

SI Metric Conversion Factors

bbl	× 1.589 873	E-01 = m ³
ft	× 3.048*	E-01 = m
hp	× 7.460 43	E-01 = kW

*Conversion factor is exact.

- 8.10.3 The list below includes SI metric conversion factors for common engineering units. *The SI Metric System of Units and SPE Metric Standard*, the society's official standard, is available at www.spe.org.

acre	× 4.046 856	E - 01 = ha
acre	× 4.046873	E + 03 = m ²
acre-ft	× 1.233 489	E + 03 = m ³
ampere-hr	× 3.6*	E + 03 = C
Å	× 1.0*	E - 01 = nm
°API	141.5/(131.5+°API)	= g/cm ³
atm	× 1.013 250*	E + 05 = Pa
bar	× 1.0*	E + 05 = Pa
bbl	× 1.589 873	E - 01 = m ³
Btu	× 1.055 056	E + 00 = kJ
Ci	× 3.7*	E + 10 = Bq
cp	× 1.0*	E - 03 = Pa·s
cycles/sec	× 1.0*	E + 00 = Hz
dyne	× 1.0*	E - 02 = mN
eV	× 1.602 19	E - 19 = J

ft	× 3.048*	E - 01 = m
ft ²	× 9.290 304*	E - 02 = m ²
ft ³	× 2.831 685	E - 02 = m ³
°F	(°F - 32)/1.8	= °C
°F	(°F + 459.67)/1.8	= K
gal	× 3.785 412	E - 03 = m ³
hp	× 7.460 43	E - 01 = kW
hp-hr	× 2.684 520	E + 00 = MJ
in.	× 2.54*	E + 00 = cm
in. ²	× 6.451 6*	E + 00 = cm ²
in. ³	× 1.638 706	E + 01 = cm ³
kip	× 4.448 222	E + 03 = N
knot	× 5.144 444	E - 01 = m/s
ksi	× 6.894 757	E + 03 = kPa
kW-hr	× 3.6*	E + 00 = J
lbf	× 4.448 222	E + 00 = N
lbm	× 4.535 924	E - 01 = kg
mL	× 1.0*	E + 00 = cm ³
mho	× 1.0*	E + 00 = S
mile	× 1.609 344*	E + 00 = km
oz	× 2.957 353	E + 01 = cm ³
psi	× 6.894 757	E + 00 = kPa
psi ²	× 4.753 8	E + 01 = kPa ²
sq mile	× 2.589 988	E + 00 = km ²
stokes	× 1.0*	E - 04 = m ² /s
ton	× 9.071 847	E - 01 = Mg
ton, metric	× 1.0*	E + 00 = Mg
tonf	× 8.896 444	E + 03 = N
tonne	× 1.0*	E + 00 = Mg

*Conversion factor is exact.

8.10.4 The following units apply in both the customary system and SI metrics and do not require conversion.

<u>Unit</u>	<u>Abbreviation</u>	<u>Unit</u>	<u>Abbreviation</u>
ampere	A	parts per million	ppm
capture unit	c.u.	porosity unit	p.u.
cubic centimeters	cm ³	revolutions per minute	rev/min
frequency	Hz	shots per foot	spf
gram	g	volt	V
liter	L	volume percent	vol%
micron (micrometer)	µm	watt	W
millidarcy	md	weight percent	wt%

8.11 Figures

- 8.11.1 Number all figures in the body of the paper in the order of their citation.
- 8.11.2 Figures should be numbered with Arabic, not Roman, numerals in the order in which they are cited. Related figures or figure sections may be labeled with a shared numeral and consecutive lowercase letters (e.g., Figs. 1a through 1d).
- 8.11.3 Figures should be the smallest size possible without loss of clarity, preferably designed to occupy either a single column or the full width of the page.
- 8.11.4 Use 8-point Helvetica Bold for axis titles and 8-point Helvetica for body copy inside figures (if any). Capitalize axis titles; within the figure, capitalize only the first word and any proper nouns used within phrases.
- 8.11.5 Axis titles indicate quantity and unit, separated by a comma (not parentheses), with the unit abbreviated where appropriate.

Time, years	<i>NOT</i> Time (years)
Depth, m	<i>NOT</i> Depth, meters

- 8.11.6 Punctuate figure captions like sentences, and capitalize only the first word. If an acronym that has not already been defined in the text appears in a figure, it should be defined in the caption at its first use. Avoid using unfamiliar abbreviations in figures.

8.12 Tables

- 8.12.1 Number all tables in the body of the paper in the order of their citation.
- 8.12.2 Tables should be numbered with Arabic, not Roman, numerals in the order they are cited in the paper.
- 8.12.3 Tables should be the smallest size possible without loss of clarity. Table headings and column headings should be as concise as possible.
- 8.12.4 Column alignment should be obtained with either tabs or spaces, not a mixture of both.
- 8.12.5 If possible, tables should be designed to occupy a single column or the full width of the page. Care should be taken to avoid any arrangement that unduly increases the depth of a table.
- 8.12.6 Use 8-point Helvetica Bold, centered, for table heads and 8-point Helvetica for body copy in tables.

8.13 Checklist of Items

All technical papers will have at least some of the following elements after the body of the paper, in this order.

- Nomenclature (if needed)
- Acknowledgments (if any)
- References
- Appendix (if included)
- Conversion Factors
- Author Biographies

APPENDIX A—Company Abbreviations

Note: Do not include these abbreviations in headlines or running text.

A.B.	Aktiebolag (Finland, Sweden)
A.G.	Aktiengesellschaft (Austria, Germany, Switzerland)
A/L	Andelslag (Norway)
A/S	Aksjeselskap (Denmark, Norway)
Bpk.	Beperk (South Africa)
B.V.	Besloten Vennootschap met beperkte, Anasprakelijkheid (The Netherlands)
CRL	Compañía de Responsabilidad Limitada (Spain)
C.A.	Compañía Anónima (Venezuela)
Cia.	Companhia/Companía (Brazil, Portugal, Spain, Latin America)
Cie.	Compagnie (Belgium, France, Luxembourg)
C.V.	Commanditaire Vennootschap (The Netherlands)
Edms. Bpk.	Eiendoms Beperk (South Africa)
Ets.	Etablissements(s) (Belgium, France, Luxembourg)
Ges.	Gesellschaft (Austria, Germany, Switzerland)
GmbH	Gesellschaft mit Beschränkter Haftung (Austria, Germany, Switzerland)
H.B.	Handelsbolag (Sweden)
Inc.	Incorporated (US)
I/S	Interessentselskab (Denmark, Norway)
K.B.	Kommanditbolag (Sweden)
K.G.	Kommanditgesellschaft (Austria, Germany, Switzerland)
K.K.	Kabushiki Kaisha (Japan)
K/S	Kommandittselsap (Denmark, Norway)
LLC	Limited Liability Company (Middle East)
Ltd.	Limited (Ireland, Pakistan, South Africa, UK, US, Zimbabwe)
Ltda.	Limitada (Brazil, Portugal, Spain)
Ltee.	Limitee (Canada)
mbH	mit beschranker Haftung (Austria, Germany, Switzerland)
Mij.	Maatschappij (The Netherlands)
N.L.	No Liability (Australia)
NPL	No Personal Liability (Canada)
N.V.	Naamloze Vennootschap (Belgium, The Netherlands)
Oy.	Osakeyhtiö (Finland)
plc	Public Limited Company (UK)
P.T.	Perusahaan Terbetas (Indonesia, often appears before company name)
Pte.	Private (Singapore)
Pty.	Proprietary (Australia, South Africa)
Pvt.	Private (India, Zimbabwe)
S.A.	Société Anonyme (Belgium, France, Luxembourg, Switzerland) Sociedad Anónima (Spain, Spanish Latin America)
SAI	Sociedad Anónima Inversiones (Spanish Latin America)
SAC	Sociedad Anónima Comercial (Spanish Latin America)
SARL	Sociedad Anónima de Responsabilidade Limmitada (Brazil, Portugal) Société Anonyme à Responsabilité Limiteé (Belgium, France, Luxembourg)
Sdn. Bhd.	Sendirian Berhad (Malaysia)
S.L.	Sociedad Limitada (Spain, Portugal, Latin America)
Soc. Cve.	Société Coopérative (Belgium)
SpA	Società per Azioni (Italy)
SRL	Società a Responsabilita Limitata (Italy)
S.V.	Samenwerkende Vennootschap (Belgium)

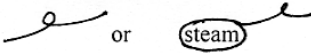
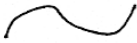

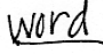
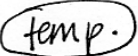
APPENDIX B—Greek Alphabet

A	α	Alpha
B	β	Beta
Γ	γ	Gamma
Δ	δ	Delta
E	ε	Epsilon
Z	ζ	Zeta
H	η	Eta
Θ	θ	Theta
I	ι	Iota
K	κ	Kappa
Λ	λ	Lambda
M	μ	Mu
N	ν	Nu
Ξ	ξ	Xi
O	o	Omicron
Π	π	Pi
P	ρ	Rho
Σ	σ	Sigma
T	τ	Tau
Y	υ	Upsilon
Φ	ϕ	Phi
X	χ	Chi
Ψ	ψ	Psi
Ω	ω	Omega

APPENDIX C—Math Signs and Operators

ℓ , exp	exponential function	\rightarrow	vector
+	plus	\therefore	therefore
-	minus	\because	because
\pm	plus or minus	:	is to; divided by
\times	multiplied by	\therefore	as; equals
\div	divided by		geometrical proportion
=	equal to	∞	varies as
\neq	not equal to	\doteq	approaches a limit
\approx	nearly equal to	∞	infinity
\cong	congruent with	\int	integral
\equiv	identical with	d	differential
$\not\equiv$	not identical with	∂	partial differential
\Leftrightarrow	equivalent to	\sum	summation of
$>$	greater than	!	factorial product
\nlessgtr	not greater than	π	pi (math constant = 3.1416)
$<$	less than	ε	epsilon (math constant = 2.7183)
\nlessgtr	not less than	$^{\circ}$	degree (DO NOT substitute a superscript letter O or number zero)
\leq	greater than or equal to	'	minute; prime
\geq	less than or equal to	"	second
\sim	difference between	\sphericalangle	angle
$\sqrt{\quad}$	square root	∇	del (gradient operator)
$\sqrt[3]{\quad}$	cube root	Δ	delta (difference operator)
$\sqrt[n]{\quad}$	n th root	\in	set identifier
erf	error function		
erfc	error function, complementary		

APPENDIX D—Common Proofreading Marks

<u>Proofreader's Mark</u>	<u>Definition</u>
	Delete, remove, take out
^	Caret; insert at this point
#	Add space, as between words, letters, or lines
(tr) 	Transpose: sign encompasses the affected words, letters, or characters, and "tr" is placed in margin
stet	Restore or leave as printed; usually used to erase an incorrect proofreading mark
] [Move to right or left
≡	Add hyphen
—	Add dash
³	Set as superscript
₄	Set as subscript
wf	Wrong font: used when character or word is wrong type size or style
(bf) 	Set in boldface type
(ital) 	Set in italic type face
w	Lower-case letter
<u>W</u>	Capitalize letter
¶	Begin new paragraph
	Spell out or abbreviate

APPENDIX E—Sample Figures

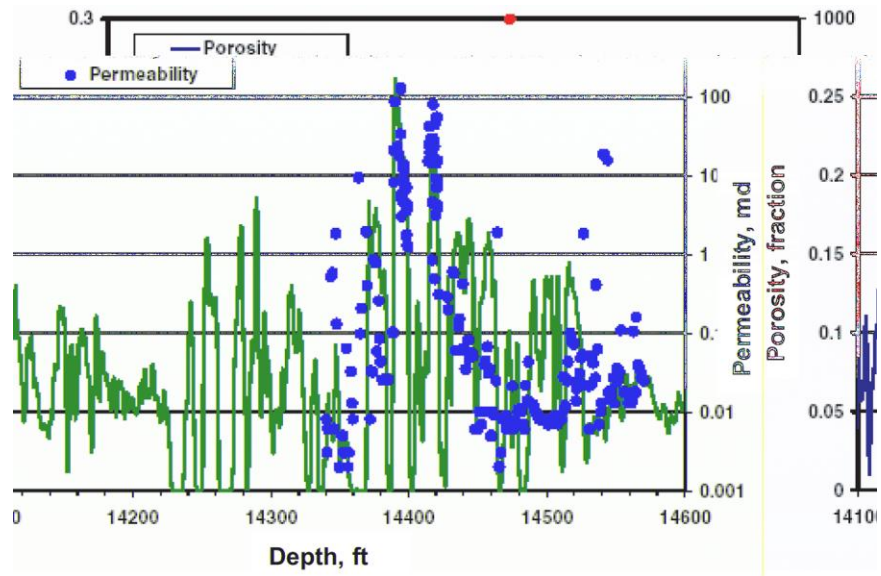


Fig. 1—Core permeability (circle) and density-log porosity as a function of depth for one of the wells drilled through the Jauf formation (Al-Qahtani and Buhidma 2001). This shows the variability in both properties over a rather small depth interval.

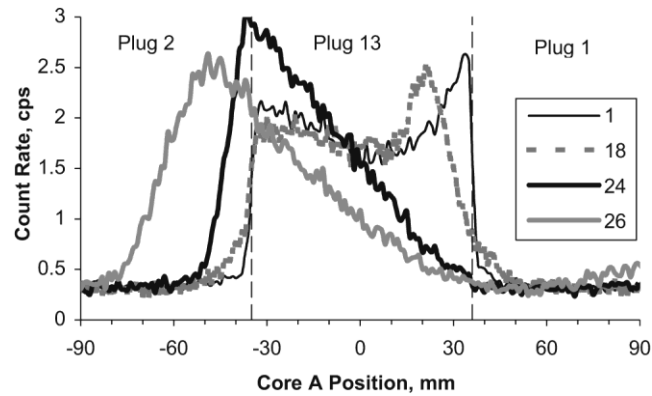


Fig. 5—Composite Core A: consequences of the contact between injection water and connate water for Measurements 1, 18, 24, and 26. Diffusion is against the flow direction.

APPENDIX F—Sample Tables

Model Name	Model Description	No. of Flow Simulations	Initial Error	Matched Error	Validation Error
A1	T11, hard cond. data, no seismic	27	132	83	91
A2	T11, hard cond. data, no seismic	14	141	91	112
A3	T11, no hard cond. data, no seismic	39	133	79	97
B1	T12, hard cond. data, seismic	26	154	98	116
B2	T12, hard cond. data, seismic	32	146	97	102
B3	T12, hard cond. data, no seismic	10	140	99	96
Averages:		25	141	91	102

Component	Composition (mole fraction)	P_c (bar)	T_c (K)	Acentric Factor	Molecular Weight (g/mol)	BIC_{C_1-x}
CO ₂	0.03229	72.80	304.20	0.225	44.01	0.150
C ₁	0.62253	46.00	190.60	0.008	16.04	0.000
C ₂	0.09644	48.83	305.40	0.098	30.07	0.000
C ₃ –C ₄	0.09080	40.90	387.49	0.162	49.70	0.000
C ₅ –C ₆	0.03436	32.30	478.50	0.263	77.24	0.000
C ₇ –C ₁₀	0.05979	24.52	568.20	0.703	110.89	0.000
C ₁₁ –C ₁₄	0.02450	18.00	658.12	0.748	167.60	0.040
C ₁₅ –C ₂₀	0.02085	13.00	723.00	0.778	237.67	0.050
C ₂₁ –C ₂₉	0.01288	12.57	771.03	1.135	334.25	0.090
C ₃₀₊	0.00556	8.00	860.39	1.750	550.00	0.160