Society of Petroleum Engineers

Style Guide

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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, T. 1983. *The Careful Writer—A Modern Guide to English Usage.* New York City: Atheneum Publishers.
>
> Strunk, W. Jr. and White, E.B. 1979. *The Elements of Style,* third edition. New York City: MacMillan Publishing Company
>
> *The Chicago Manual of Style,* 16th edition. 2010. Chicago: University of Chicago Press.
>
> *Webster's Third New International Dictionary.* 2002. Springfield, Massachusetts: Merriam-Webster.

SPE developed this Style Guide primarily for its own purposes, and it may reflect compromises or differences required by SPE's desire for a consistent style across its variety of communications—magazines, journals, books, websites, conference programs, and more. While SPE believes that many others may find the guidance in this document helpful, other publications or applications may have somewhat different needs that require some differences in style. SPE's objective in making this Style Guide available is to help authors and others understand the style that SPE will use in its publications. It is not SPE's intention to try to establish a style that is broadly applicable across the oil and gas industry; rather, the intent is to define how SPE will treat style questions in its own publications.

This Style Guide contains some repetition by design. The purpose of this repetition is to make the information easy to locate for someone applying the Style Guide. If the section is short, it has been repeated. If long, then a reference to the other section of the document has been included.

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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 Section 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:

Instead of	Use
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 (e.g., "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 the country to indicate the origin, since domestic will differ based on the location of the reader. For example, 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." ***Exception*:** The phrase "proved reserves," in which proved is an adjective, has a long history of usage in the industry and is therefore considered acceptable.
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 With “fracturing” appearing commonly in mass media, many news organizations use the verb “fracking.” However, SPE style uses this only when directly quoting someone else; in all other cases the word “fracturing” is spelled out.

3.1.4 A number of words in English 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, with the exception of the *Journal of Canadian Petroleum Technology*, which follows standard conventions for Canada. 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, Kuala Lumpur, London, and Moscow (most meetings held in Europe, the Middle East, the Indian subcontinent, Africa, and the Asia Pacific region) follow British spelling conventions. SPE meetings organized from the SPE office in Dallas follow US spelling conventions. All program material, regardless of the responsible office, should be consistent throughout.

3.3 Oil Industry Terms

Listed here are the preferred spellings of common terms in SPE literature (except as noted in Section 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.)
cloudpoint
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)
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-length
half-life (noun, adj.)
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
OnePetro
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
slow down (verb phrase)
slowdown (noun)
slug catcher
space out
speed up (verb phrase)
speedup (noun)
splash plate
standalone (adj.)
standby (adj.)
stand off (verb)
standoff (noun, adj.)
standpipe
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)
timeline
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 block
water blocking
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. 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 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 MA

4.1.3 Abbreviations of names of societies and government agencies should have no periods or spaces.

SPE IADC SPWLA NPF

4.1.4 Use these abbreviations for these major political entities.

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

4.1.5 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 50×10^3 ft^3/D 10 dm^3 3 cm^3

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

4.1.7 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 repeatedly 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.

one-, two-, three-, four-dimensional	1D, 2D, 3D,4D
alternating current	AC
bachelor of arts	BA
bachelor of science	BS
barrel of oil equivalent	BOE
basic sediment and water	BS&W
blowout preventer	BOP
bottomhole assembly	BHA
bulletin board system	BBS
capture unit	c.u.
cathode ray tube	CRT
central processing unit	CPU
cold water equivalent	CWE
computerized tomography	CT
computer user group	CUG
direct current	DC
exempli gratia (for example)	e.g.,
et al. (and others)	et al.
et cetera (and the rest)	etc.
exploration and production	E&P
enhanced oil recovery	EOR
equation of state	EOS
equivalent circulating density	ECD
file transfer protocol	FTP
formation volume factor	FVF
gas chromatography	GC
gas/oil contact	GOC
Gulf of Mexico	GOM
gas/oil ratio	GOR
graphical user interface	GUI
health, safety, security, and environment	HSSE
high-pressure/high-temperature	HP/HT
hydrocarbon pore volume	HCPV
hydrolyzed polyacrylamide	HPAM
hydroxyethyl cellulose	HEC
hydroxypropyl guar	HPG
id est (that is)	(i.e.,)
inside diameter	ID
interfacial tension	IFT
international oil company	IOC
kelly bushing	KB
lease automatic custody transfer	LACT
liquefied natural gas	LNG
liquefied petroleum gas	LPG
local area network	LAN
master of arts	MA
measured depth	MD
measured depth from rotary table	MDRT
master of science	MS
measurement while drilling	MWD
national oil company	NOC
nuclear magnetic resonance	NMR
net present value	NPV
oil-based mud	OBM
oil in place	OIP
oil initially in place	OIIP
oil originally in place	OOIP
operating system	OS
original oil in place	OOIP

outside diameter	OD	total dissolved solids	TDS
porosity units	p.u.	total depth	TD
pounds of proppant added	ppa	true vertical depth	TVD
doctor of philosophy	PhD	ultraviolet	UV
pore volume	PV	uniform resource locator	URL
pressure/volume/temperature	PVT	versus	vs.
productivity index	PI	water alternating gas	WAG
research and development	R&D	water-based mud	WBM
rate of penetration	ROP	water/oil contact	WOC
residual oil saturation	ROS	water/oil ratio	WOR
root mean square	RMS	weight on bit	WOB
scanning electron microscope	SEM	wide area network	WAN
self-potential	SP	World Wide Web	WWW
shots per foot	spf	X-ray diffraction	XRD
specific gravity	SG		

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.

BASIC, COBOL, FORTRAN, Macintosh OS, QuarkXPress, UNIX

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.

The permeabilities of the samples varied widely.

In the experiment, the weight was measured in tons.

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 5×10^3 ft^3/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). 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 (º) with angles, temperatures [except for metric K (Kelvin)], and compass coordinates.

20º slope 65°F 2°W 30ºAPI

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

Exceptions:

shots/ft is written thus at first use, followed by (spf) to indicate its abbreviated form in further uses

BLPD, BOPD, BFPD, BWPD are other exceptions allowed where P is used for 'per.'

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 m^3/d·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]	gallons per minute	gal/min [m^3/s]
barrels of liquid per day	BLPD [m^3/d liquid]	gallons per day	gal/D [m^3/d]
barrels of oil per day	BOPD [m^3/d oil]	gram	g
barrels of water per day	BWPD [m^3/d water]	horsepower-hour	hp-hr [J]
barrels per day	B/D [m^3/d]	inches per second	in./sec [cm/s]
barrels per minute	bbl/min [m^3/s]	kilopond (1,000 lbf)	klbf [N]
billion cubic feet	Bcf [10^9 m^3]	kilowatt hour	kW-hr [J]
billion cubic feet per day	Bcf/D [10^9 m^3/d]	kips per square inch	ksi [Pa]
cubic feet per barrel	ft^3/bbl [m^3 /m^3]	millidarcy	md
cubic feet per day	ft^3/D [m^3/d]	million electron volts	MeV [MJ]
cubic feet per minute	ft^3/min [m^3/s]	million cubic feet	MMcf
cubic feet per pound mass	ft^3/lbm [m^3/kg]	mils per year	mil/yr [m/a]
cubic feet per second	ft^3/sec [m^3/s]	ohm	Ω
cubic yard	cu yd	pound per cubic foot	lbm/ft^3 [kg/m^3]
darcy	(spell out)	pound per gallon	lbm/gal [kg/m^3]
dead-weight ton	DWT [Mg]	reservoir barrel	res bbl [res m^3]
feet per minute	ft/min [m/s]	reservoir barrel per day	RB/D [res m^3/d]
feet per second	ft/sec [m/s]	square feet	ft^2 [m^2]
foot-pound	lbf-ft or ft-lbf [J]	square mile	sq mile [km^2]

standard cubic feet per barrel	scf/bbl	stock-tank barrels per day	STB/D
standard cubic feet per day	scf/D [std m^3/d]		[stock-tank m^3/d]
standard cubic foot	scf [std m^3]	stoke	St [m^2/s]
stock-tank barrel	STB [stock-tank m^3]	thousand cubic feet	Mcf
		trillion cubic feet	Tcf [10^{12} m^3]

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-C_4
carbon dioxide	CO_2	isopentane	i-C_5
carbon monoxide	CO	methane	C_1
ethane	C_2	nitrogen oxides	NOx
heptane	C_7	pentane	C_5
hexane	C_6	potassium chloride	KCl
hydrofluoric acid	HF	propane	C_3
hydrogen sulfide	H_2S	sodium chloride	NaCl
hydrochloric acid	HCl		

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.

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
European Association of Geoscientists and Engineers	EAGE
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.

Jim Wilson Jr. arrived in Bakersfield, California, USA, last week.

5.1.4. Do not set off "II" and "III" or "Jr." and "Sr." with commas.

Jim Wilson Jr. arrived in Bakersfield, California, USA, last week.

5.1.5 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."

5.1.6 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).

Incorrect: The benefits of this practice were: timeliness and cost savings.
Correct: 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).

5.2.5 Phrases after a colon are capitalized if they are a full sentence. However, if they are part of a list or are an incomplete thought, they are not capitalized.

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. This is common in paper bylines as well as Acknowledgment sections.

> Section officers are Jim Black, Chairperson; Susan Hall, Program Chairperson; and Bill Williams, Secretary.

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.

*Exception***:** The order of authors listed on a paper is important; it reflects their level of contribution to the paper. As a result, authors should never be reordered or grouped to simplify company lists.

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.

*Exception***:** for use on websites, apostrophes are used in straight form.

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** use an apostrophe 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.

The US DOE's latest study is a revealing one.
Total-ELF's well in the area has enjoyed great productivity.

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”).

*Exception***:** for use on websites, quotations are used in straight form.

5.6.2 In general, use quotation marks to cite exact phraseology from another source, and to set off titles when italics are not used.

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.

5.7 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
Midwestern	quasilegal	pseudosteady	multiphase
nonlinear	repressured	subsea	prestimulation
semilog	ultradeep	updip	

However, use a hyphen after a prefix when a vowel is doubled (exceptions are cooperate, coordinate, isooctane, 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

5.8.6 Hyphenate the following terms.

president-elect
three-fourths (and other fractions that are spelled out)

5.8.7 Use hyphens to avoid ambiguity.

the lower-production interval (interval producing a lower production than other intervals)
the lower production interval (interval of production that is physically lower than others)

or when two or more words in their combined sense modify a noun.

'round-the-clock watch	all-time record	in-situ combustion	five-spot flood
oil-in-place calculations	gas-cap material	stock-tank oil	straight-line portions
restored-state cores	trial-and-error method	6-in. hole	second-order equation
clay-containing fluid	rule-of-thumb method	steady-state flow	cross-sectional area
peer-reviewed paper			

Note that when such terms follow the word modified, they do not ordinarily require hyphens:

the well is shut in combustion occurred in situ

barrels of oil in place fluid containing clay

When a unit of measurement comes before a noun, if it is preceded by an article, it should be hyphenated; if there is no article, there should be no hyphen.

It is a 75-lbm drill bit. It is set at 75 ft true vertical depth.

5.8.8 Adjective phrases formed by an adverb and a verb usually are hyphenated:

a slow-moving front the quick-drying cement

but not adverb/adjective combinations where the adverb ends in "-ly."

regularly producing well fully developed field

Some other combinations do not take hyphens.

relative permeability capillary pressure gamma ray

5.8.9 Use the suspended ("floating") hyphen for relating similar qualities.

The pressure- and temperature-dependent characteristics must be established.

5.8.10 "Fold" is a joined suffix unless formed with a hyphenated number or numeral.

twofold 100-fold Twenty-five-fold

5.8.11 Hyphenate compound directions when they are used to form one direction. Use a slash to represent "to" in a direction.

The wind blew from the north-northwest.

The fault ran northwest/northeast.

5.8.12 Only break words and hyphenate them at the ends of the lines of right-margin-justified copy. Ragged-right-margin copy should not have word breaks.

5.9 Ampersands

Ampersands, which substitute for "and," are not permitted in most instances. Exceptions include a few abbreviations (such as E&P, R&D, and BS&W), as well as preservation of the ampersand where it appears in trade names and publication titles. Avoid using ampersands in the titles of SPE meetings.

SPE Res. Eval. & Eng. SPE Drilling & Completion

Health, Safety, Security, Environment & Social Responsibility discipline area

5.10 Web-Related Items

5.10.1 Most uses of the prefix "e" to denote computerized or electronic form are hyphenated and lowercase.

e-business e-commerce

Exceptions: email, eBook

5.10.2 The e-prefix is not capitalized, even in a title or at the beginning of a sentence, unless it is part of copy that is already in all capital letters.

A Closer Look at e-Commerce

e-business is looking better all the time.

WELCOME TO THE E-ZONE!

5.10.3 The e-prefix is not hyphenated in the use of a trademarked name with this as its style.

eSPE (defunct)

eUpdate

eLibrary (defunct)

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.

Exception:

Digital object indentifiers (dois) are formatted with the full URL according to guidelines issued by Cross-Ref for the use of dois. http://dx.doi.org/10.2118/114172-MS

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).

***Examples*:**

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** is the author of more than 500 books, many

about robots; he is even credited with having coined the word “robotics.” He holds a PhD in biochemistry from Columbia University.

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 periodical 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 a bit more entertaining.

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 at the first reference.

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 (in the instance of Jean-Paul 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 Arabian Oil Company

6.2.5 Capitalize names of specific national and state legislative, executive, and judicial bodies.

US Supreme Court	UK Parliament

6.2.6 Capitalize official names of organizations but not general terms.

US Navy	the navy

6.2.7 Do not capitalize such words as national, federal, government, and state in nonspecific or incomplete references.

federal bureau	government agencies
state bureaus	Nigerian government

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

SPE NPF AAPG API UKOOA IATMI

6.3 Geographic

6.3.1 Most names of cities should be followed by the state and country or the country in which they are located. The major oil industry centers and well-known cities listed here can be used alone.

Aberdeen	Denver	New York City
Abu Dhabi	Doha	Paris
Amsterdam	Dubai	Rio de Janeiro
Anchorage	Hong Kong	Riyadh
Athens	Houston	Rome
Beijing	Jakarta	San Francisco
Berlin	Kuala Lumpur	Shanghai
Buenos Aires	Lagos	Singapore
Cairo	London	Stavanger
Calcutta	Los Angeles	Sydney
Calgary	Mexico City	The Hague
Caracas	Moscow	Tokyo
Chicago	Mumbai	Tulsa
Dallas	New Orleans	Washington, DC

6.3.2 When providing locations in the US that are not listed in Sec. 6.3.1, give the city, state (unabbreviated), USA. For locations outside the US and not listed in Sec. 6.3.1, give the city and the country. Once a location has been established in an article or a program, the city can be referred to without the state or country.

The 1997 SPE Annual Technical Conference and Exhibition will be in San Antonio, Texas, USA, on 5–8 October.

6.3.3 Capitalize such words as river, ocean, valley, etc., and geographic locations when they represent worldwide accepted usage, real properties, or legal entities.

Pacific Ocean	Gulf of Mexico	Glasscock Unit	North Sea
Middle East	Loire Valley	Platform B	

6.3.4 Do not capitalize terms that refer to a direction or general location.

west Texas eastern Europe offshore Egypt
midcontinent area (BUT Mid-Continent Section of SPE)

6.3.5 Do not capitalize geologic formations, such as belt, formation, zone, field, pay, basin, pool, reservoir, delta, sand, shale, and trend.

Arbuckle zone Cardium A pool east Texas field Delaware basin
Exceptions: Permian Basin and Overthrust Belt

6.3.6 Capitalize geologic ages (e.g., "Mesozoic"), including leading adjectives (e.g., Upper Jurassic).

6.3.7 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*.

However, do not capitalize the article "The" when it does not begin a sentence and refers to an academic institution.

Correct: The University of Texas enjoys a sizeable endowment.
Incorrect: The author is a member of the faculty at The University of Texas at Austin.

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 The number of the meeting should not be considered part of the official meeting name. For example, in the phrase "the 2010 SPE 85th Annual Technical Conference and Exhibition," "85th" is not part of the title, only the year, organization and conference name.

6.4.3 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.

6.4.4 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 × 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 8×10^6 m^3/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 followed by SI metric units 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 SPE uses the 24-hour clock for its events, including all major meetings (ATCE, OTC, IPTC, Offshore Europe, and the Drilling Conference). When using the 24-hour clock, colons are not used (e.g., *1400 hours*) Exceptions are determined on a case-by-case basis and include regional events where the 12-hour clock is customary to the regional attendees. 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 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."

7.2.4 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.

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 with the exceptions BOPD, BFPD, BLPD, BWPD.

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

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

20º slope 65°F 2°W

Do not use ' for feet or " for inches. Instead, use "ft" and "in."

7.4.3 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 ft^3/D 10 dm^3 3 cm^3

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

7.4.5 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.

7.4.6 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 20ºC

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 Spell out the first term to distinguish between two numbers that come together.

twenty-one 2-acre tracts two 3-hour tests

7.5.7 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-in. pipe was set.

7.5.8 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").

7.5.9 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/iso/en/prods-services/popstds/currencycodeslist.html) for the first usage, and omit the currency symbol ($, £, ¥). If currencies alternate repeatedly (i.e., if there is more than one switch) within a paper or document, use the abbreviation at each instance of a currency. However, if a currency will be used often and/or consistently throughout a paper or other SPE material, such as on meeting registration forms, an asterisked footnote noting the type of currency used (e.g., "Prices are in US dollars.") is sufficient.

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.

12	USD 55.50	12.00
18	USD 50.00	13.43
11	USD 35.25	12.00

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. While SPE prefers the use of initials in the byline, authors can elect to use full names instead.

Joseph B. Brown, SPE, Consolidated Flange; Paul D. Smith, Smith Consulting; and Edward White, SPE, Worldwide Washers

8.2.2 If two or more authors in a row have the same company affiliation, it should not be repeated after each name.

Edward White, SPE, Paul D. Smith, and Joseph B. Brown, SPE, Consolidated Flange; and S.R. Lane, SPE, Worldwide Washers

NOTE: The order of authors is important and should never be changed to simplify company references.

8.2.3 Corporate suffixes should be included in author bylines, as well as bios, if they are provided. The following is a list of common abbreviations for these suffixes.

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)
C.A.	Compañía Anónima (Venezuela)
Cia.	Companhia/Compañía (Brazil, Portugal, Spain, Latin America)
Cie.	Compagnie (Belgium, France, Luxembourg)

Co.	Company
Corp.	Corporation
CRL	Compañía de Responsabilidad Limitada (Spain)
C.V.	Commanditaine 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, US)
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.	Osakeyhtiot (Finland)
plc	Public Limited Company (UK)

P.T.	Perushaan Terbetas (Indonesia, often appears before company name)
Pte.	Private (Singapore)
Pty.	Proprietary (Australia, South Africa)
Pvt.	Private (India, Zimbabwe)
S.A.	Societé 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)
	Societé Anonyme à Responsabilité Limiteé (Belgium, France, Luxembourg)
Sdn. Bhd.	Sendirian Berhad (Malaysia)
S.L.	Sociedad Limitada (Spain, Portugal, Latin America)
Soc. Cve.	Societé Coopérative (Belgium)
SpA	Societá per Azioni (Italy)
SRL	Societá a Responsabilita Limitata (Italy)
S.V.	Samenwerkende Vennootschap (Belgium)

8.2.4 Bylines must be punctuated properly so as to avoid confusion of credit or affiliation. Below are examples of different byline constructions and how they ought to be punctuated.

2 people, 1 company: No comma before the "and."

Joe Ford and Tom Gibson, ExxonMobil Corp.

2 people, 2 companies: Comma before the "and."

Joe Ford, ExxonMobil Corp., and Brad Smith, Schlumberger

3 people, 3 companies: Semicolons to separate, and semicolon before the "and."

Joe Ford, ExxonMobil Corp.; 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, ExxonMobil Corp., and Karen Moore and Jan Foster, BP

X people, 3+ companies: semicolons to separate, and semicolon before the "and."

Joe Ford and Tom Gibson, ExxonMobil Corp.; Jan Foster, BP; Brad Smith, Schlumberger; and George White, Chris Jones, and Sandra Kennedy, Batman and Robin Consulting Inc.

X people, 3+ companies, with repeated companies: semicolons to separate, and semicolon before the "and."

Joe Ford and Tom Gibson, ExxonMobil Corp.; Jan Foster, BP; Roger Mitchell, ExxonMobil Corp.; Howard Fleming, BP; Brad Smith, Schlumberger; George White, Batman and Robin Consulting Inc.; and Frank Mills and Sally Bowers, Schlumberger.

8.2.5 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.

8.2.6 Do not use the titles Mr., Mrs., Ms., Miss, Prof., or Dr.; occasionally, cultural norms will dictate the use of an honorific.

8.2.7 Do not use department names or university locations in author listings on technical papers. Use the name of the college or university only (which may include a location to differentiate it from another branch of the school).

Omar Jordan, Texas A&M University; John Simpson, The University of Texas at Austin; and Mahmoud Ali, Texas A&M University-Qatar.

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 When citing two-part figures in text, use "Figs. 2a and 2b" rather than "Figs. 2a and b."

8.3.4 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,

$$A = Bx + (c - D_2), \quad \text{.....(3)}$$

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 Each equation in the text should be indented and numbered, and should feature a dot leader that terminates at the equation number, which is in parentheses, on the right margin.

8.5.3 The symbols for "equals" (=), "yields" (→), and other such signs act as verbs. Sentences containing these symbols must be grammatically correct.

8.5.4 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.

8.5.5 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.

8.5.6 When typing an equation on more than one line, break the equation at a complete term and start the next line with a sign.

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

$$+ 2B_1 \times F_2. \quad \text{.....(2)}$$

8.5.7 Use parenthetical pairs in the following order, proceeding from the inside of the equation outward: parentheses ( ), brackets [ ], and braces { }.

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

8.5.8 The proper notation for an equation in the text of the paper is the abbreviation "Eq." The number of the equation does not appear in parentheses. The plural is "Eqs."

This construct is illustrated in Eq. 7.

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

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 $T_{\max}$ 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/Lt^2, 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/L^3, lbm/ft^3 [kg/m^3]

8.7.5 Common SPE standard symbols are listed below.

A	= area	P_c	= capillary pressure
B	= formation volume factor	q	= production rate
C	= concentration	r	= radius
d	= diameter	S	= saturation
D	= depth	t	= time
h	= thickness	T	= temperature
J	= productivity index	v	= velocity
k	= permeability	V	= volume
K	= coefficient	Z	= elevation
L	= length	μ	= viscosity
m	= slope	ρ	= density
N	= dimensionless number	φ	= porosity
p	= 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 pre-2007 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 If the referenced source is of considerable length and more than one part of it is referenced in the current paper, an in-text citation may include original figure or page numbers for reader clarification.

> This effect was first described several decades ago (Yousef 1956, his Fig. 4).
>
> A different section of the same earlier work was dedicated to this phenomenon (Smith et al. 1997, 234–236).

8.8.3 In the reference list, if a reference has more than three authors, list the first three authors' names plus et al. The et al. form is permissible in the text only when referring to more than **two** authors of a single paper.

8.8.4 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 digital object identifier (doi, always written in lower case) number associated with a reference, if one is available. The doi

should always be placed at the end of the reference in format: http://dx.doi.org/######. The standard SPE doi prefix is 10.2118/paper# without the SPE prefix. See specific examples in Sec. 8.8.8 below.

8.8.5 Omit the reference entirely if the bibliographical information is so vague that the reader could not locate the document referred to. "Personal communication," unpublished reports, and Wikipedia entries are not acceptable references. If essential to the text, use footnotes to acknowledge such informal sources.

8.8.6 Use the following formats for references to recommended practices, standards, and specifications.

In text:	API *Bull. S1, Policy and Procedures for Standardization of Oilfield Equipment and Materials,*
	NACE *Standard TM-01-77*
	API *Spec. 5CT*
In Reference List:	*Spec. 2F, Specification for Mooring Chain,* third edition. 1981. Washington, DC: API.
	RP7G, Recommended Practice for ..., 11th edition. 1989. Washington, DC: API.

8.8.7 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	*Bull.*
Chemical Engineering Progress	*Chem. Eng. Prog.*
Drilling and Production Practice	*Drill. & Prod. Prac. J*
Journal of Canadian Petroleum Technology	*J. Cdn. Pet. Tech.*
Journal of Petroleum Technology	*J. Pet Tech*
Oil and Gas Facilities	*Oil and Gas Fac.*
Oil & Gas Journal	*Oil & Gas J.*
Petroleum Engineer International	*Pet. Eng. Intl.*
Proceedings	*Proc.*
Recommended Practice	*RP*
SPE Advanced Technology Series	Do not abbreviate
SPE Computer Applications	*SPE Comp App*
SPE Drilling & Completion	*SPE Drill & Compl*
SPE Drilling Engineering	*SPE Drill Eng*

SPE Formation Evaluation	*SPE Form Eval*
SPE Journal	*SPE J.*
SPE Production & Facilities	*SPE Prod & Fac*
SPE Production & Operations	*SPE Prod & Oper*
SPE Production Engineering	*SPE Prod Eng*
SPE Projects, Facilities & Construction	*SPE Proj Fac & Const*
SPE Reservoir Engineering	*SPE Res Eng*
SPE Reservoir Evaluation & Engineering	*SPE Res Eval & Eng*
Transactions	*Trans.*

Chemical Abstracts Service is a good source to identify the common abbreviations used for other publication names.

8.8.8 All months and states should be spelled out.

8.8.9 Examples of reference formats for different types of sources.

SPE MATERIALS

SPE Paper Published in Transactions (1921–1995)

Harris, P.C. and Reidenbach, V.G. 1987. High-Temperature Rheological Study of Foam Fracturing Fluids. In *Transactions of the Society of Petroleum Engineers*, Vol. 283, Part I, 613–619. Richardson, Texas: Society of Petroleum Engineers. ISBN 1-55563-013-8.

Conference Paper

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, 1–4 February. http://dx.doi.org/10.2118/16011-MS.

SPE Papers Not Originating From a Conference or Journal

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

[NOTE: These are sometimes called "unsolicited," "independently submitted," or "direct-to peer" papers.]

Online First Paper

Garmeh, 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).

Published Journal Paper

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

Discussion/Reply to Previously Published Paper

Peaceman, D.W. 1990. Further Discussion of Productivity of a Horizontal Well. *SPE Res Eng* **5** (3): 437–438. SPE-20799. http://dx.doi.org/10.2118/20799-PA.

[NOTE: Reference the individual discussion/reply SPE number (if available) and the journal issue the discussion appeared in, but list the doi number of the paper the discussion/reply is in reference to.]

SPE Distinguished Lecture

King, G.E. 1985. Foam and Nitrified Fluid Treatments-Stimulation Techniques and More. Paper SPE 14477 based on a speech presented as a Distinguished Lecture during the 1985–1986 season.

Kamal, M.M. 1998. What You Can and Cannot Obtain from Today's Well Testing Technology. Presented as an SPE Distinguished Lecture during the 1997–1998 season; February 1998 lecture presented in Perth, Australia.

SPE Distinguished Author Series

Clegg, J.D., Bucaram, S.M., and Hein, N.W. Jr. 1993. Recommendations and Comparisons for Selecting Artificial-Lift Methods. Distinguished Author Series, *J Pet Technol* **45** (12): 1128–1167. SPE-24834. http://dx.doi.org/10.2118/24834-PA.

SPE Books (incl. Monographs, Textbooks, and Reprints)

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

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

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

Poston, S.W. and Poe, B.D. Jr. 2008. *Analysis of Production Decline Curves*, 63–64. Richardson, Texas, SPE.

NON-SPE REFERENCES

Books

Book With One Author

Ahmed, T. 2006. *Reservoir Engineering Handbook*, third edition. Burlington, Massachusetts: Gulf Professional Publishing/Elsevier.

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 Three Authors

O'Hagan, A., Buck, C.E., Daneshkhah, A. et al. 2006. *Uncertain Judgements: Eliciting Experts' Probabilities*. West Sussex, UK: Statistics in Practice, John Wiley and Sons http://dx.doi.org/10.1002/0470033312.

Book With Editor Attributed

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

Book With Author and Translator Attributed

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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 page (or column for multi-column format) 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 page or 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
ºF	(°F–32)/1.8	= ºC
ºF	(ºF+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.

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

8.11 Author Bios

Guidelines for editing biographical paragraphs at the end of technical papers, with elements numbered in order of appearance:

First: Name and affiliation, with name bolded. Generalized staff duties and job titles are not capitalized, but capitalize a specific title.

a. **Joe N. Johnstone** is a reservoir engineer with Depco in Houston.

b. **Raganathan Kumar** is Team Leader with the Offshore Project at ChevronTexaco in San Ramon, California.

Second: Prior work history over the last decade at most. Use last name only in all subsequent references to the name after the full name is given in the opening line. Use an em dash to denote year spans.

Third: Research interests.

Fourth: Publications/patents.

Fifth: Academic credentials. The wording is specific, using the verb "holds" for advanced degrees:

a. Jones holds a __ degree in ____ from Stanford University.

b. Do not capitalize areas of study or academic disciplines.

   i. Patel holds an MS degree in petroleum engineering from the University of Tulsa.

   ii. Smith holds a BS degree in physics from Hendrix College, an MSc degree in chemistry from Bristol University, and a PhD degree in geothermal engineering from the University of Texas at Austin.

   iii. Aziz holds MS and PhD degrees from the University of Southern South Dakota, both in petroleum engineering.

Sixth: SPE service.

a. Edwards is a technical editor for *SPEREE.* She was also the co-author of the SPE volume *Waterflooding.*

8.12 Figures

8.12.1 Number all figures in the body of the paper in the order of their citation.

8.12.2 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).

8.12.3 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.

8.12.4 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.

8.12.5 Axis titles indicate quantity and unit, separated by a comma (not parentheses), with the unit abbreviated where appropriate.

Time, years ***NOT*** Time (years)

Depth, m ***NOT*** Depth, meters

8.12.6 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.

8.13 Tables

8.13.1 Number all tables in the body of the paper in the order of their citation.

8.13.2 Tables should be numbered with Arabic, not Roman, numerals in the order they are cited in the paper.

8.13.3 Tables should be the smallest size possible without loss of clarity. Table headings and column headings should be as concise as possible.

8.13.4 Column alignment should be obtained with either tabs or spaces, not a mixture of both.

8.13.5 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.

8.13.6 Use 8-point Helvetica Bold, centered, for table heads and 8-point Helvetica for body copy in tables.

8.14 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

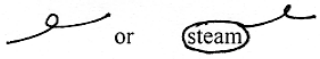
APPENDIX A—GREEK ALPHABET

Α	α	Alpha
Β	β	Beta
Γ	γ	Gamma
Δ	δ	Delta
Ε	ε	Epsilon
Ζ	ζ	Zeta
Η	η	Eta
Θ	θ	Theta
Ι	ι	Iota
Κ	κ	Kappa
Λ	λ	Lambda
Μ	μ	Mu
Ν	ν	Nu
Ξ	ξ	Xi
Ο	o	Omicron
Π	π	Pi
Ρ	ρ	Rho
Σ	σ	Sigma
Τ	τ	Tau
Υ	υ	Upsilon
Φ	ϕ	Phi
Χ	χ	Chi
Ψ	ψ	Psi
Ω	ω	Omega

APPENDIX B—MATH SIGNS AND OPERATORS

ℓ, exp	exponential function
+	plus
−	minus
±	plus or minus
×	multiplied by
÷	divided by
=	equal to
≠	not equal to
≈	nearly equal to
≅	congruent with
≡	identical with
≢	not identical with
≒	equivalent to
>	greater than
≯	not greater than
<	less than
≮	not less than
≥	greater than or equal to
≤	less than or equal to
~	difference between
$\sqrt{\ }$	square root
$\sqrt[3]{\ }$	cube root
$\sqrt[n]{\ }$	*n*th root
erf	error function
erfc	error function, complementary
→	vector
∴	therefore
∵	because
:	is to; divided by
::	as; equals (geometrical proportion)
∝	varies as
≐	approaches a limit
∞	infinity
∫	integral
d	differential
∂	partial differential
∑	summation of
!	factorial product
π	pi (math constant = 3.1416)
ε	epsilon (math constant = 2.7183)
°	degree (***DO NOT*** substitute a superscript letter O or number zero)
′	minute; prime
″	second
∠	angle
∇	del (gradient operator)
Δ	delta (difference operator)
∈	set identifier

APPENDIX C—COMMON PROOFREADING MARKS

Proofreader's Mark	Definition
	Delete, remove, take out
	Caret; insert at this point
	Add space, as between words, letters, or lines
	Transpose: sign encompasses the affected words, letters, or characters, and "tr" is placed in margin
	Restore or leave as printed; usually used to erase an incorrect proofreading mark
	Move to right or left
	Add hyphen
	Add dash
	Set as superscript
	Set as subscript
	Wrong font: used when character or word is wrong type size or style
	Set in boldface type
	Set in italic type face
	Lower-case letter
	Capitalize letter
	Begin new paragraph
	Spell out or abbreviate

APPENDIX D—SAMPLE FIGURES

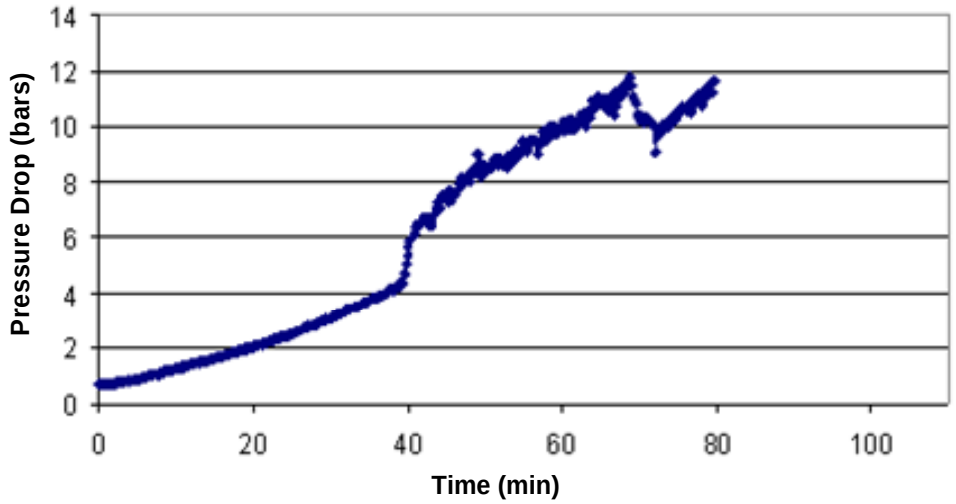


Fig. 10—Pressure drop vs. time during the injection of hematite suspension followed with suspension and gas (Case 2C).

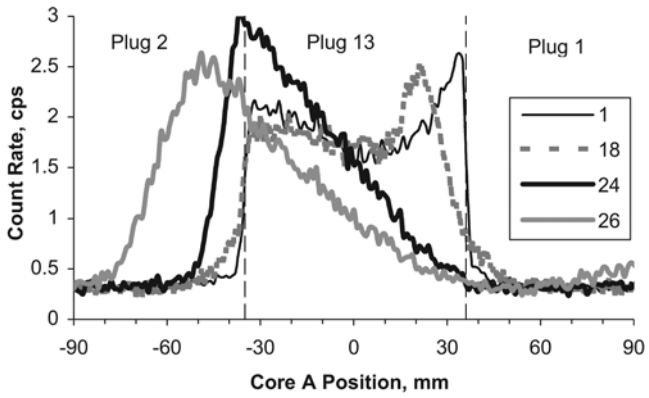


Fig. 5—Composite Core A: consequences of the contact between injection water and connate water for Measurements 1, 18, 24, and 26. Diffusion is against the flow direction.

Red: 20% Overlap

Blue: 75% Overlap

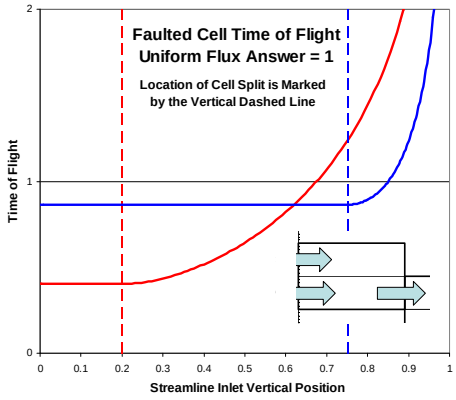


Fig. 12— Time of flight to the faulted cell face for a fault with 20% face overlap and with a 75% face overlap. As the overlap area is reduced, the contrast between the fast flow along the bottom of the cell and the slow flow near the top becomes more extreme.

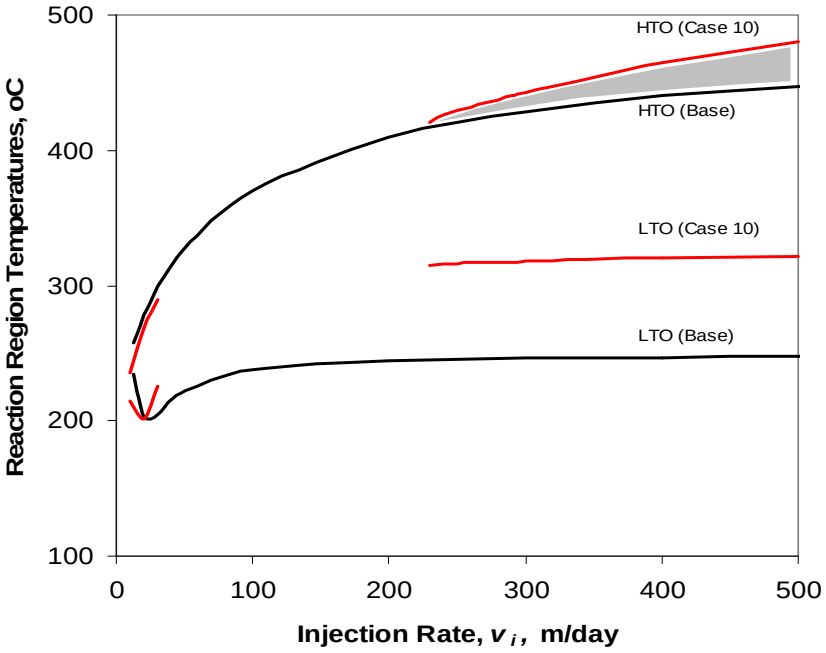


Fig. 3—Hydrocarbon deposition effect (Case 10) on combustion front propagation. Temperatures of the reaction regions vs. air injection rate. The hydrocarbon amount ahead of the LTO region is 50% larger than the base value.

APPENDIX E—SAMPLE TABLES

TABLE 1—SUMMARY OF HISTORY-MATCHING RESULTS FOR THE WCA RESERVOIR

Model Name	Model Description	No. of Flow Simulations	Initial Error	Matched Error	Validation Error
A1	TI1, hard cond. data, no seismic	27	132	83	91
A2	TI1, hard cond. data, no seismic	14	141	91	112
A3	TI1, no hard cond. data, no seismic	39	133	79	97
B1	TI2, hard cond. data, seismic	26	154	98	116
B2	TI2, hard cond. data, seismic	32	146	97	102
B3	TI2, hard cond. data, no seismic	10	140	99	96
	Averages:	25	141	91	102

TABLE 2—RELEVANT DATA FOR THE MULTICOMPONENT MIXTURE

Component	Composition (mole fraction)	P_c (bar)	T_c (K)	Acentric Factor	Molecular Weight (g/mol)	$BIC_{C_1\text{-}x}$
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