

ISO 27916:2019 (E)

Carbon dioxide capture, transportation and geological storage — Carbon dioxide storage using enhanced oil recovery (CO₂-EOR)

Contents

	Foreword
	Introduction
1	Scope
1.1	Applicability
1.2	Non-applicability
1.3	Standard boundary
1.3.1	Inclusions
1.3.2	Exclusions
2	Normative references
3	Terms and definitions
4	Documentation
4.1	Purpose
4.2	Use of existing data
4.3	Initial documentation
4.4	Periodic documentation
5	EOR complex description, qualification, and construction
5.1	General
5.2	Geological characterization and containment assessment of the EOR complex
5.3	Description of the facilities within the CO ₂ -EOR project
5.4	Existing wells within the EOR complex
5.5	Operations history of the project reservoir
6	Containment assurance and monitoring within the EOR complex
6.1	Containment assurance and EOR operation management plan
6.1.1	EOR operations management plan
6.1.2	Initial containment assurance
6.1.3	Operational containment assurance
6.2	Monitoring program, methods, and implementation
6.2.1	Monitoring of potential leakage pathways
6.2.2	Monitoring methods
6.2.3	Monitoring program implementation
7	Well construction
7.1	New well construction
7.2	Well intervention
8	Quantification
8.1	General
8.2	Quantification principles
8.3	Quantification of input [minput]
8.4	Quantification of loss
8.4.1	Quantification of operational loss [mloss operations]
8.4.2	Leakage from facilities
8.4.3	Venting and flaring from operations
8.4.4	Entrained CO ₂ in products
8.4.5	Transfer of CO ₂
8.4.6	Loss from EOR complex

8.5	Allocation ratio for anthropogenic CO2
8.6	De minimis losses
8.7	Avoidance of double-counting
9	Recordkeeping and missing data
9.1	Record retention
9.2	Missing data procedures
10	Project termination
10.1	General
10.2	Periodic assurance of containment
10.3	Termination plan
10.4	Requisites for termination
10.5	CO2-EOR project termination
10.6	Post termination
Annex A (informative) Introduction to CO2-EOR	
A.1	General
A.2	CO2-EOR overview
A.3	How CO2-EOR works
A.4	Associated storage of CO2 in CO2-EOR operations
A.5	Potential advantages of associated storage of CO2 in EOR operations
A.6	Possible challenges for associated storage during CO2-EOR operations
A.6.1	Inventory and assessment of existing wells
A.6.2	Review of sealing formations
A.6.3	CO2 movement out of CO2-EOR project acreage
A.6.4	Re-use of injected CO2 in other portions of a field or other EOR projects
A.7	“In-situ” or “native” CO2
A.8	Offshore CO2-EOR
A.9	Residual oil zones could be produced by CO2-EOR methods
A.10	Adaptation of existing CO2-EOR subsurface characterization, planning and monitoring activities for associated storage during CO2-EOR
A.11	What information is needed to demonstrate the safe and long-term containment of anthropogenic CO2 stored in association with a CO2-EOR operation?
A.12	Determining the quantity of CO2 from a commingled stream that is to be quantified for associated storage
A.13	Demonstrating the net quantity of CO2 that is safely contained long-term in the EOR complex
A.14	Addressing other issues
A.15	Cessation of CO2 injection and hydrocarbon recovery: “coincident” and “non-coincident” cessation of CO2 injections
Annex B (informative) Example quantification calculation	
B.1	Introduction
B.2	Hypothetical project
B.2.1	Previously received and injected total and anthropogenic CO2 within the EOR complex
B.2.2	New CO2 received and the percentage of anthropogenic CO2
B.2.3	Native CO2 content
B.2.4	Oil production
B.2.5	Operational inlet loss [mloss operations inlet]
B.2.6	EOR complex loss [mloss EOR complex]
B.2.7	Other operational losses [mloss operations other]
B.3	Calculation procedures for the first year (for the total CO2)
B.3.1	Calculation of native CO2 recovered
B.3.2	Total CO2 input [minput]
B.3.3	Operational loss [mloss operations]
B.3.4	EOR complex loss [mloss EOR complex]
B.3.5	Associated storage calculation [mstored]
B.4	Calculation procedures for the first year for the anthropogenic portion of mstored
B.4.1	Calculation of native CO2 if included
B.4.2	Anthropogenic CO2 minput calculation using a ratio
B.4.2.1	Total CO2 mreceived for the first year
B.4.2.2	Total CO2 minput for the first year
B.4.2.3	Anthropogenic CO2 minput for the first year

- B.4.2.4 First year anthropogenic ratio for minput
- B.4.3 Operational inlet loss [mloss operations inlet] of anthropogenic CO2
- B.4.3.1 Total CO2 operational inlet loss [mloss operations inlet] for the first year
- B.4.3.2 Anthropogenic CO2 operational inlet loss [mloss operations inlet] for the first year
- B.4.4 EOR complex anthropogenic CO2 ratio
- B.4.5 Anthropogenic CO2 portion of operational other loss [mloss operations other] and EOR complex loss [mloss EOR complex]
- B.4.5.1 Total CO2 operational other loss [mloss operations other]
- B.4.5.2 Total CO2 EOR complex loss [mloss EOR complex]
- B.4.5.3 Anthropogenic CO2 operational other loss [mloss operations other]
- B.4.5.4 Anthropogenic CO2 EOR complex loss [mloss EOR complex]
- B.4.6 Quantification of anthropogenic CO2 stored in association with EOR operations

Annex C (informative) Unit conversion

Page count: 55