PIANO DI DECOMMISSIONING OPERE FUTURE AREA POZZO GG-3 ED OPERE AFFERENTI

RELAZIONE GENERALE

DOCUMENT N°: IT-TPR-00-ADON-000118

Rev.	Status	Date	Revision memo	Issued by	Checked by	Approved by
03	AFU	12/06/2024	Approved for Use			
02	IFR	16/01/2024	Issued for Review			
01	IFR	05/01/2024	Issued for Review			
00	IFR	28/11/2023	Issued for Review	G. Adone	G. Adone	G. Adone

INDICE

1.0 DOCUMENTI DI RIFERIMENTO

I documenti a cui si fa riferimento nel presente studio sono rappresentati dai documenti di Progetto allegato al SIA.

2.0 DEFINIZIONI, INTERPRETAZIONI, ESCLUSIONE DI RESPONSABILITA', ABBREVIAZIONI ED ACRONIMI

2.1 DEFINIZIONI

Società: TOTALENERGIES EP Italia S.p.A.

Processo di Decommissioning: Processo strutturato ed integrato, che va dalla fase di sviluppo a quella di effettiva esecuzione delle operazioni di Decommissioning.

Decommissioning degli Asset: Lo smantellamento delle strutture, la chiusura mineraria e l'abbandono dei pozzi, lo smaltimento dei materiali, la decontaminazione dell'area ed il ripristino delle condizioni originarie del sito in ottemperanza a legislazione locale, regolamenti e permessi.

Studio di Decommissioning: Documento predisposto allo scopo di identificare e definire la migliore soluzione possibile per l'effettuazione delle attività di Decommissioning al termine della vita produttiva utile dell'Asset.

Smantellamento: Smontaggio della struttura, attraverso sia il taglio che la sua tranciatura, al fine di produrre sezioni sempre più ridotte, per consentirne un facile trasporto, riciclo/riutilizzo e/o smaltimento.

Rimozione: Processo di smontaggio, smantellamento, modifica e/o trasporto, che porta un Asset alla sua destinazione finale.

2.2 INTERPRETAZIONE

Per le aree oggetto di intervento è previsto il ripristino della vegetazione attraverso la messa a dimora di un I contenuti presenti all'interno dello studio hanno carattere generale

2.3 ESCLUSIONE DI RESPONSABILITA'

Il presente Piano di Decommissioning è basato su dati ed informazioni forniti da TOTALENERGIES EP Italia S.p.A., informazioni basate su uno studio preliminare necessario all'autorizzazione delle opere.

Per quanto sopra, i dati e le informazioni dovranno essere debitamente accertati durante la fase di definizione del Progetto esecutivo di Decommissioning, da redigere a valle del Progetto esecutivo di realizzazione pozzo GG3 ed opere afferenti.

La Società TOTALENERGIES EP Italia S.p.A. garantisce l'esattezza o la completezza dei risultati dello studio limitatamente al "grado di accuratezza" dichiarato.

0ACRONIMI/ABBREVIAZIONI	DEFINIZIONI
PdP	Piano di Decommissioning
GG-3	Area Pozzo "Gorgoglione 3"
HSE	Health, Safety, Environment
PIG	Dispositivo/Attrezzatura utilizzato dotato di spazzole o dischi e generalmente utilizzato per pulire o ispezionare una condotta
CER	Catalogo Europeo Rifiuti
RAEE	Rifiuto da Apparecchiature Elettriche e/o Elettroniche

Tabella 1 – Acronimi ed abbreviazioni

Di seguito sono descritti i diversi interventi suddivisi per le singole aree di intervento.

3.0 OBIETTIVI DELLO STUDIO

Il presente Piano di Decommissioning (PdD) è relativo alle opere afferenti allo sviluppo del pozzo GG-3. In particolare, *sono stati ipotizzati due differenti scenari che prevedono, rispettivamente, la dismissione in caso di pozzo improduttivo (Scenario 1) e dismissione a fine vita (Scenario 2). Nel caso dello Scenario 1, che si verificherà qualora l'accertamento minerario dovesse dare esito negativo, ipotesi tra l'altro molto remota, avverrà la dismissione delle seguenti infrastrutture:*

- *Area Pozzo GG-3;*
- *Cavidotto elettrico di alimentazione area pozzo.*

Nel caso dello Scenario 2, da attuare a fine vita utile del progetto, oltre alle sopra citate infrastrutture avverrà anche la dismissione della condotta (flowline) di collegamento "Area Pozzo GG-3 – Centro

Olio Tempa Rossa". Relativamente a tale scenario, in base alla modalità di dismissione della condotta potrebbero verificarsi due sotto scenari:

- *SCENARIO 2A – Dismissione con mantenimento in sito della condotta*
- *SCENARIO 2B – Dismissione con rimozione della condotta*

La scelta della migliore opzione di decommissioning verrà definita con il supporto di studi di valutazione comparativa che permetteranno di confrontare tra di loro le diverse soluzioni applicabili e di supportare il processo decisionale di scelta della migliore ipotesi di decommissioning rispetto ai criteri identificati nel rispetto dei Regolamenti e Leggi vigenti.

L'obiettivo principale del presente Piano è pertanto quello di descrivere le operazioni previste per *tutti* gli scenari sulla base dei vincoli territoriali e ambientali che potrebbero insistere sulle aree.

I risultati del presente Piano, contestualmente con l'analisi degli aspetti vincolistici, della sicurezza e dell'ambiente, potranno essere utilizzati per predisporre una corretta pianificazione tecnica/operativa delle operazioni al fine di individuare la soluzione preferibile.

Le attività del futuro Decommissioning dovranno essere considerate nella loro globalità ed eseguite in accordo ad uno specifico progetto. Di seguito si riporta una sintesi delle principali fasi che saranno intraprese nel Progetto futuro di Decommissioning:

- Predisposizione di un Progetto preliminare di Decommissioning
- Progetto definitivo di Decomissioning;
- Richiesta/Ottenimento delle autorizzazioni da parte degli enti competenti;
- Ricerca e qualifica dei possibili fornitori;
- Sviluppo del progetto esecutivo con cronoprogramma;
- esecuzione delle attività;
- Fine lavori e predisposizione della relativa reportistica (es. documentazione progettuale "as-built", disegni, Rapporti di Prova, etc.).

Ulteriore obiettivo del presente piano di decommissioning è di anticipare, nel rispetto della normativa mineraria, il programma di ripristino dell'area impegnata dalle attività mineraria svolta che la Società dovrà trasmettere, ai sensi dell'art. 39 del Decreto Direttoriale 15/07/2015 e ss.mm.ii., nel

caso in cui ritenesse necessario procedere con la chiusura mineraria del pozzo in quanto ritenuto sterile o esaurito o comunque non utilizzabile o non suscettibile di assicurare ulteriormente produzione in quantità commerciale, alla competente Divisione VIII - Sezione UNMIG dell'Italia Meridionale mediante specifica istanza di richiesta di autorizzazione ripristino. Detto programma comprenderà, oltre alle indicazioni riguardanti i ripristini delle aree impegnate, le modalità di decommissioning degli impianti connessi alla postazione pozzo.

Nel rispetto del programma di perforazione depositato ai sensi dell'art. 36 comma 3 del Decreto Direttoriale, per dare avvio alla perforazione del pozzo, il programma di ripristino prevederà anche le necessarie azioni per eseguire la caratterizzazione e per l'eventuale bonifica del sito, al momento non prevedibili, ai fini del successivo rilascio dello stesso, senza vincoli derivanti dalla pregressa attività di perforazione.

Ai sensi del citato art. 39, con particolare riferimento al comma 5, il programma di ripristino sarà autorizzato dalla Sezione UNMIG competente previa intesa con la Regione Basilicata competente per territorio.

4.0 ASPETTI DI SICUREZZA E AMBIENTE

Gli aspetti di progettazione di sicurezza ed ambiente, oltre ad essere conformi alle normative locali e internazionali applicabili, ai codici di buona pratica e agli standard, dovranno rispettare i requisiti contrattuali e il sistema di gestione HSE TOTALENERGIES EP Italia S.p.A..

In fase di esecuzione delle attività di Decommissioning, oltre alle "Best Practice" e procedure TOTALENERGIES EP Italia S.p.A. in vigore, dovranno essere applicate le disposizioni previste nelle Technical Guidelines in vigore (es. doc. AMTE TG-014-Rev.02 "Technical Guideline HSE Aspect on Decommissioning Activities") per quanto non in contrasto con la legislazione vigente o non superate da disposizioni più stringenti emesse da TOTALENERGIES EP Italia S.p.A..

Il processo di decommissioning, dalla progettazione all'esecuzione, dovrà avere l'obbiettivo di garantire la tutela:

- della salute e la sicurezza del personale;
- della salvaguardia dell'ambiente;
- della minimizzazione di danni potenziali e associate conseguenze economiche causate da incidenti.

5.0 DESCRIZIONE DEGLI ASSETS DEL CAMPO

L'area interessata dai lavori in progetto ricade all'interno della Concessione di Coltivazione Idrocarburi "Gorgoglione", di cui TOTALENERGIES EP Italia S.p.A. è contitolare (TotalEnergies EP Italia S.p.A. 50% - Shell Italia E&P 25% - Mitsui E&P Italia B 25%) e rappresentante unica.

La concessione ricade in un'area dell'Appennino Lucano e interessa, principalmente, il versante ed i rilievi circostanti in Sx idraulica del torrente Sauro, affluente in Sx idraulica del fiume Agri. Ha un'estensione di circa 250,59 km^2 e passa per 22 vertici.

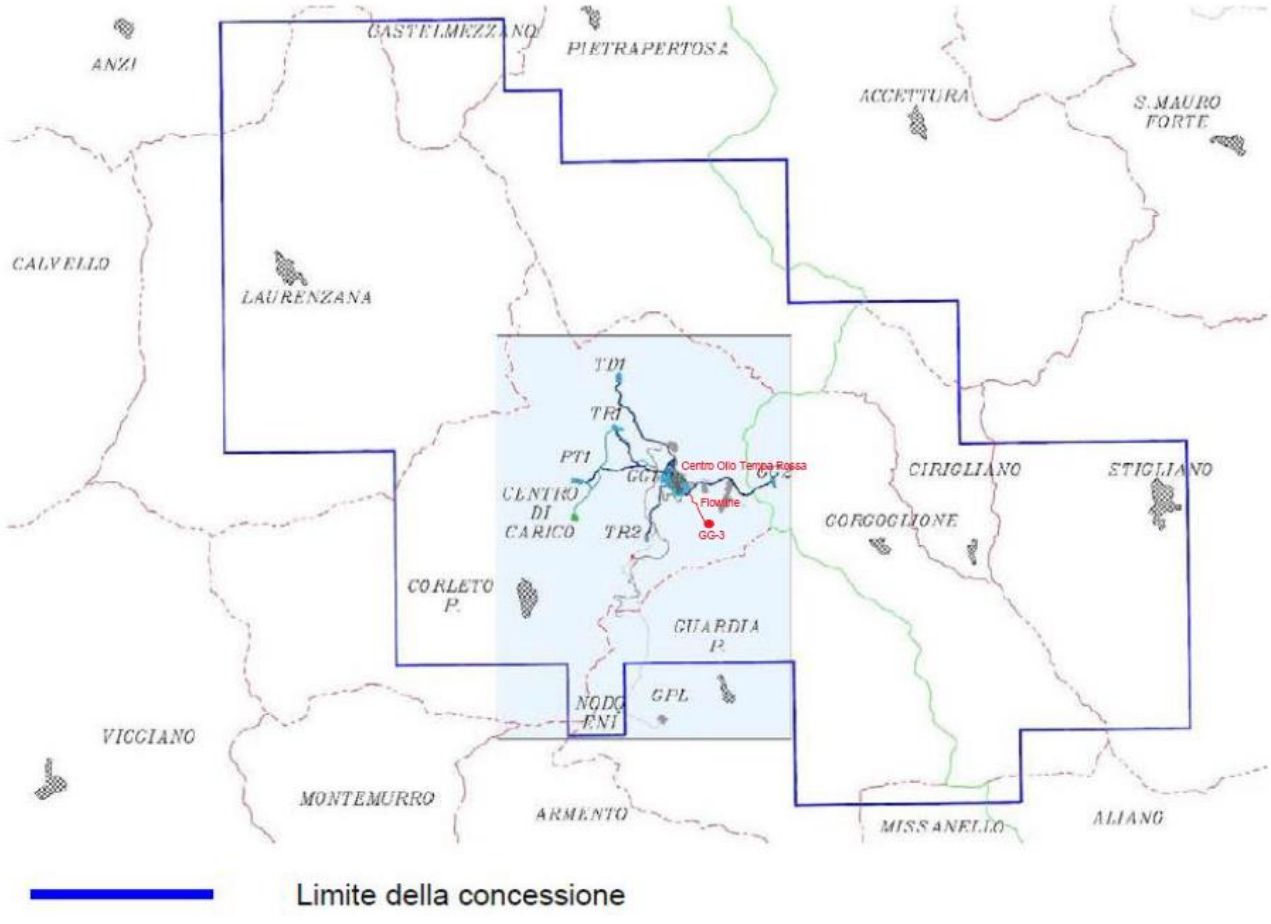


Figura 1 – Area oggetto di intervento

La TOTALENERGIES EP Italia S.p.A. gestisce la rete di raccolta che dai 6 pozzi attualmente attivi convoglia gli idrocarburi estratti al Centro Olio "Tempa Rossa", e da questo le linee di trasporto

per l'export dei prodotti trattati alla rete SNAM (gas naturale) ed all'oleodotto Val d'Agri – Taranto (olio) al Nodo di Corleto in zona "Cameretta".

Il progetto che la TOTALENERGIES EP Italia S.p.A. intende realizzare è relativo alla perforazione, costruzione e messa in produzione del pozzo denominato "Gorgoglione 3" (GG-3) da realizzarsi nel territorio comunale di Corleto Perticara (PZ) alla località Piano Petrini, sui terreni riportati in catasto al foglio n° 35 particelle n° 95-98-104-105-107-118-193-194-202-203-204-205-228-229-231-251-262-263-283-284-291-292.

Lo sviluppo del pozzo Gorgoglione 3 prevede le seguenti principali attività, riportate nella successiva Figura 2:

- Costruzione del piazzale di GG-3, nell'ambito della quale saranno allocati gli allestimenti necessari per l'esecuzione della fase di perforazione, della prova di produzione, della fase di completamento dell'allestimento finale e messa in produzione nonché delle attività straordinarie di work over durante l'esercizio del pozzo;
- Realizzazione e adeguamento della viabilità di accesso all'area pozzo;
- Posa dei cavidotti e linee elettrica e di controllo di interconnessione Centro Olio – area pozzo della lunghezza di circa 2600,00 ml;
- Posa della flowline di collegamento dell'area pozzo con il Centro Olio, in caso di accertamento minerario positivo, costituita da tubazione da 8" della lunghezza di circa 2600,00 ml;
- Ampliamento dell'area di colmata ('dumping area') esistente denominata Dumping D2 e completamento dell'area di colmata D12.

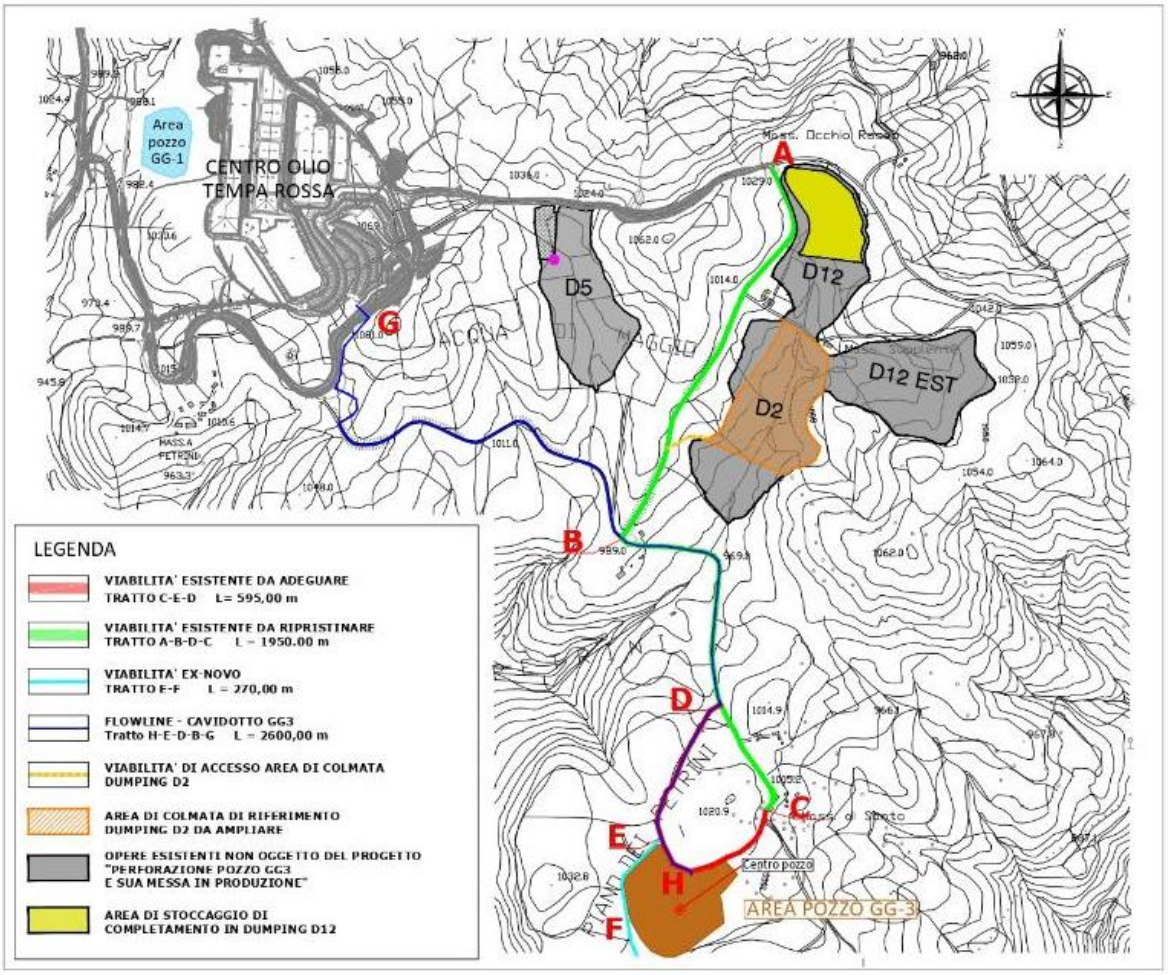


Figura 2 – Stralcio interventi di progetto (Rif. tavola "IT-TPR-00-SMDF-000401")

5.1 L'AREA POZZO GG3

L'area interessata dal pozzo GG-3 è ubicata all'interno dei limiti amministrativi del Comune di Corleto Perticara (PZ), a circa 5 Km dal centro abitato ed a circa 2 Km a sud dell'esistente Centro Olio "Tempa Rossa".

Le coordinate GAUSS-BOAGA e WGS84 del centro pozzo sono riportate nelle seguenti tabelle:

COORDINATE CENTRO POZZO "GG-3"		
GAUSS – BOAGA		
Est	*Nord*	*Quota s.l.m.*
2613040.5697	4472008.2594	1009.00

Tabella 2 – Coordinate centro pozzo "GG-3" GAUSS – BOAGA

COORDINATE CENTRO POZZO "GG-3"		
WGS84		
Latitudine	*Longitudine*	*Quota s.l.m.*
40.39343691	16.0961946	1009.00

Tabella 3 – Coordinate centro pozzo "GG-3" WGS84

Essa si colloca su un'area montana sub pianeggiante compresa fra i 1.010,00 e i 1.012,8 m s.l.m., alla Località "Piano dei Petrini", con una superficie complessiva di circa 41.286 mq. L'area di ingombro del pozzo attualmente non è interessata da nessuna infrastruttura, né da aree boschive.

L'area complessivamente sarà costituita dalla postazione mineraria recintata, con superficie di 37.986 mq, e da un'area esterna destinata a parcheggio di servizio con superficie di 3.300 mq.

La viabilità di accesso alla postazione GG-3 sarà costituita dalla strada comunale che si collega nel tratto finale ad una pista sterrata denominata "Strada Vicinale Petrini", ed infine alla strada campestre denominata "Strada Vicinale del Lago". Tutte saranno oggetto di interventi di sistemazione ed adeguamento.

Gli allestimenti e le apparecchiature da installare nell'Area Pozzo, nelle diverse fasi di sviluppo (preparazione del Sito, per perforazione, prove di produzione, allestimento finale), saranno le seguenti:

- Gabbionate metalliche per il contenimento e la stabilizzazione delle scarpate;
- Platea in c.a. adeguatamente dimensionata per sostenere i carichi statici e dinamici derivanti dalla installazione dell'impianto di perforazione, costituito da torre a tralicci metallici, argano di sollevamento, top drive, vasche confezionamento fango, Cementatrice, Silos chimici, Generatori, Soletta area pompe e Mud Tanks;
- Cantina in c.a. per l'alloggiamento della testa pozzo;

- Bacino di contenimento per il posizionamento di serbatoi di gasolio ed oli esausti, da utilizzare durante la perforazione e le prove di produzione, dotato di recinzione di protezione e di cancelletto di accesso;
- Pesa a ponte formata da una soletta di fondo e pareti laterali perimetrali, completa di piastre metalliche di appoggio, cavidotto e corda rame nuda per il collegamento di messa a terra;
- Basamento per fiaccola di sicurezza;
- Vasca Corral e fluidi speciali - Vasca Fango e acque di riciclo dotate di idonee scale di sicurezza;
- Basamento stoccaggio prodotti chimici liquidi e solidi con cordolo laterale dimensionato per il contenimento di eventuale fuoriuscita accidentale di liquido dai serbatoi;
- Fondazioni in c.a. per basamento area campo e zona uffici;
- Basamento in c.a. per cavalletto Mast;
- Canalette in c.a. di delimitazione delle piattaforme di lavorazione per la raccolta ed il convogliamento delle acque meteoriche nelle vasche di raccolta, complete delle relative griglie metalliche;
- Attraversamenti casing completi di tubazioni in acciaio 9 5/8” di attraversamento e pozzetti di ingresso/uscita;
- Deposito esplosivi realizzato con idonea recinzione e cancelletto di accesso;
- Vasca di stoccaggio dell’acqua utilizzata per differenti scopi, tra cui l’utilizzo durante la perforazione e per l’alimentazione del sistema per finalità antincendio, di capacità di 4.000 m3, rivestita con geomembrana impermeabile in HDPE adeguatamente ancorata, cordoli di protezione in calcestruzzo del bordo superiore della vasca per evitare la caduta di materiale lapideo all’interno della stessa, e recinzione con cancelletto di accesso;
- Basamento in c.a. per n° 7 torri faro per l’illuminazione del piazzale;
- Fondazione in misto granulare stabilizzato e pavimentazione in ghiaietto per l’intero piazzale;
- Recinzione metallica a protezione dell’intero piazzale costituita da paletti metallici con altezza fuori terra di 2,00 m, oltre alla parte terminale piegata a 45° con lunghezza di 0,70 m, infissi in blocchi di calcestruzzo completamente interrati ad interasse di 2,00 m, rete metallica plastificata a maglie romboidali con altezza di 2,00 m, completata da tre ordini di filo spinato in corrispondenza della parte inclinata del paletto metallico;
- Cancelli metallici di ingresso pedonale e carrabile;
- Cancelli metallici per uscite d'emergenza completi di maniglioni antipanico;

- Staccionata in legno per delimitazione del piazzale e a protezione scarpate;
- Rete di raccolta acque nere costituita da: pozzetti in PVC sifonati con bicchieri per il recapito di ciascun container; pozzetti di ispezione e di interconnessione dei singoli tronchi fognari; tubazioni in PVC rigido con diametro 110 mm per gli allacciamenti dei singoli; prefabbricati e diametro 160 mm per il tronco principale; vasca Imhoff della capacità di 5 mc; fossa chiarificatrice a tenuta stagna della capacità di 4 mc; tubazione in PVC rigido con altezza di almeno 2,00 m oltre il piano di campagna per la captazione e lo smaltimento dei gas che si formano all'interno della fossa chiarificatrice;
- Rete di messa a terra;
- Pozzo, Testa pozzo ed impiantistica di superficie, composta da tubazione di profondità, da pompe di estrazione sommerse (dual ESP), da valvolame e tubazioni;
- Batteria impianti di dosaggio per additivi chimici consistente in una serie di skid di iniezione nel pozzo;
- Edificio denominato Sottostazione Elettrica con inclusi tre locali tecnici, baia trasformatore;
- Pig Launcher (o trappola di lancio del pig) consistente in una stazione di partenza per il dispositivo di ispezione e manutenzione mediante tecnica "Pig";
- Quadro di comando valvole (WHCP);
- Valvole di isolamento di emergenza (ESDV).

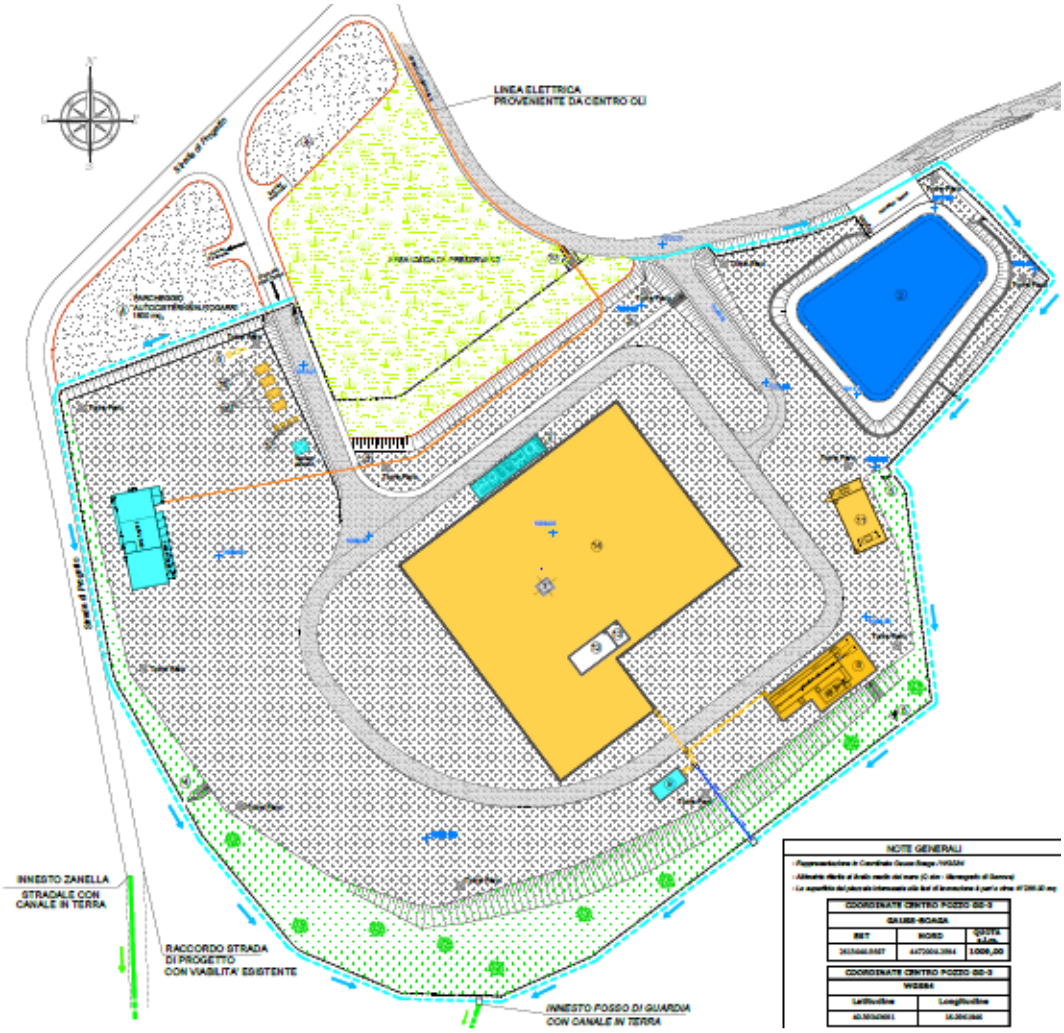


Figura 3 – Planimetria generale Area Pozzo GG-3 (Rif. tavola "IT-TPR-00-SMDF-000416_1/2")

5.2 CAVI ELETTRICI E DI TELECOMUNICAZIONI *(CAVIDOTTO)*

Per l'alimentazione elettrica delle apparecchiature durante le fasi di perforazione e prove di produzione e/o più in generale una volta in produzione durante le normali attività di manutenzione periodica previste al pozzo, (work over) è stata prevista la costruzione una conduttura elettrica di interconnessione tra Centro Olio e Area Pozzo, seguendo l'andamento planimetrico della flowline che sarà realizzata solo successivamente, con l'apertura della fase mineraria, qualora le prove di produzione diano esito positivo.

In particolare, verranno posati i seguenti elementi:

- *N° 3 cavi di comunicazione a fibre ottiche (FO);*

- *N° 1 linea elettrica di media tensione (MT) (11kV).*

I cavi verranno posati all'interno di uno scavo delle dimensioni di 50x100 cm su letto di sabbia e segnalati con apposito nastro di avvertimento oppure inseriti in tubi di protezione in corrispondenza degli attraversamenti.

La sezione del cavidotto elettrico è riportata nella seguente figura 4:

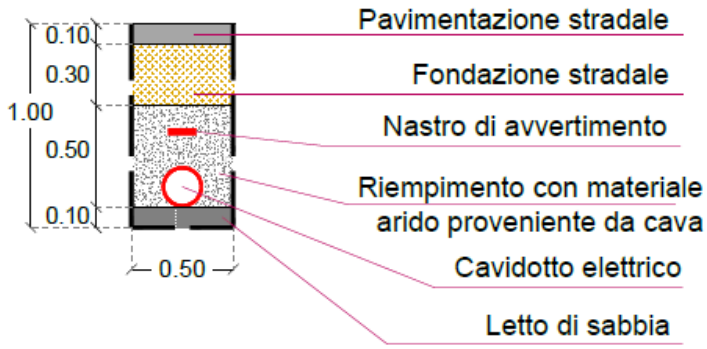


Figura 4 – Sezione cavidotto elettrico

5.3 CONDOTTA DI COLLEGAMENTO Ø 8" AREA POZZO – CENTRO OLIO

Come già anticipato nel precedente paragrafo, in caso di accertamento minerario positivo, il pozzo GG-3 sarà collegato al Centro Olio tramite una flowline da 8".

Tenuto conto che la quota del piazzale è fissata a 1.009,00 ml e la quota del centro olio è di 1.050,00 ml, ne consegue che il dislivello complessivo tra la quota di partenza e l'arrivo è di circa 41,00 ml.

Lo sviluppo planimetrico complessivo è di 2.600 ml, dei quali 80 ml all'interno del piazzale GG3 e 2.520 ml all'esterno dello stesso, si sviluppa interamente nel territorio del Comune di Corleto Perticara (PZ), e può essere distinto nei seguenti tronchi:

- Tronco interno all'area pozzo con uno sviluppo di circa 80,00 ml;
- Tronco su strada comunale in sterrato A-B-C-D con uno sviluppo di 2.230,00 ml;
- Tronco finale D-E, per una lunghezza di 290,00 ml, il tracciato abbandona la strada comunale per proseguire verso il Centro Olio su terreno.

  Nella seguente Figura 5 si riporta la planimetria con il percorso della flowline:

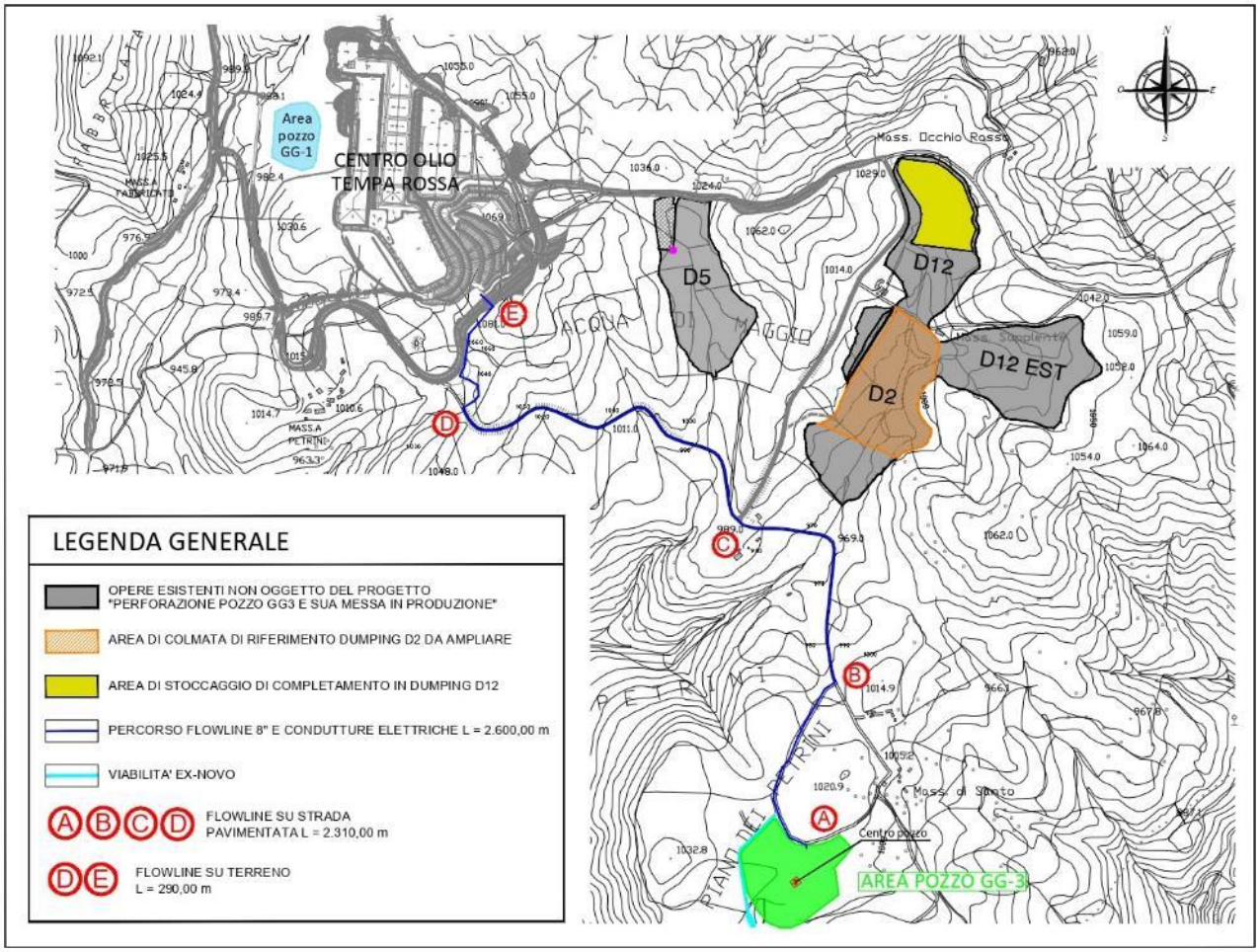


Figura 5 – Tracciato flowline

Il percorso delle condotte interseca differenti strutture civili ed elementi naturali, di seguito elencati:

N°	PROGR. (Km)	TIPOLOGIA ATTRAVERSAMENTO
1	0,565	Cavidotti pale eoliche
2	0,575	Strada Comunale
3	0,920	Strada Comunale
4	1,165	Strada Comunale
5	1,380	Corso d'acqua

N°	PROGR. (Km)	TIPOLOGIA ATTRAVERSAMENTO
6	1,600	Corso d'acqua
7	1,930	Strada Comunale e cavidotto pale eoliche
8	2,480	Strada di servizio del Centro Olio

Tabella 4 – Attraversamenti condotte

In corrispondenza degli attraversamenti delle strade più importanti, dei cavidotti e dove è ritenuto opportuno, le condotte saranno poste in opera in un tubo di protezione avente le seguenti caratteristiche:

TIPOLOGIA DA PROTEGGERE	TUBO DI PROTEZIONE	MATERIALE
Tubo di linea DN200 (8'')	DN480 (18")	API 5L X52 PSL1
Cavi di potenza MT	DN300 (12'')	API 5L X52 PSL1
Cavi FO e cavi di segnale elettrici	DN100 (4'')	API 5L Gr. B PSL1

Tabella 5 – Caratteristiche tubo di protezione

Si riporta di seguito il tracciato della flowline su ortofoto.

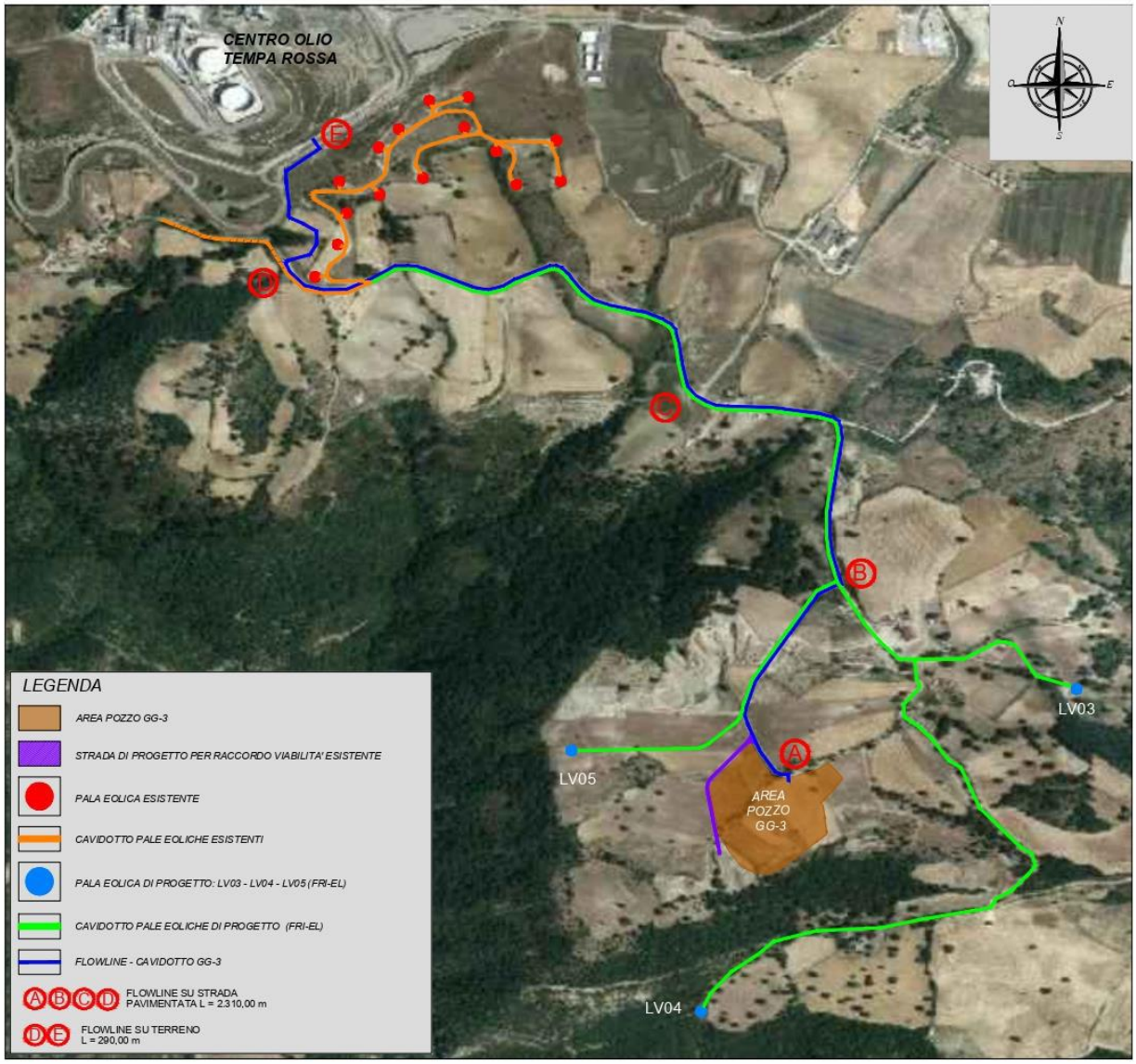


Figura 6 – Tracciato flowline su ortofoto

Il tipologico della sezione di scavo è riportato nella figura seguente, in sostituzione di quello erroneamente riportato nel documento IT-TPR-00-ADON-000118_rev02:

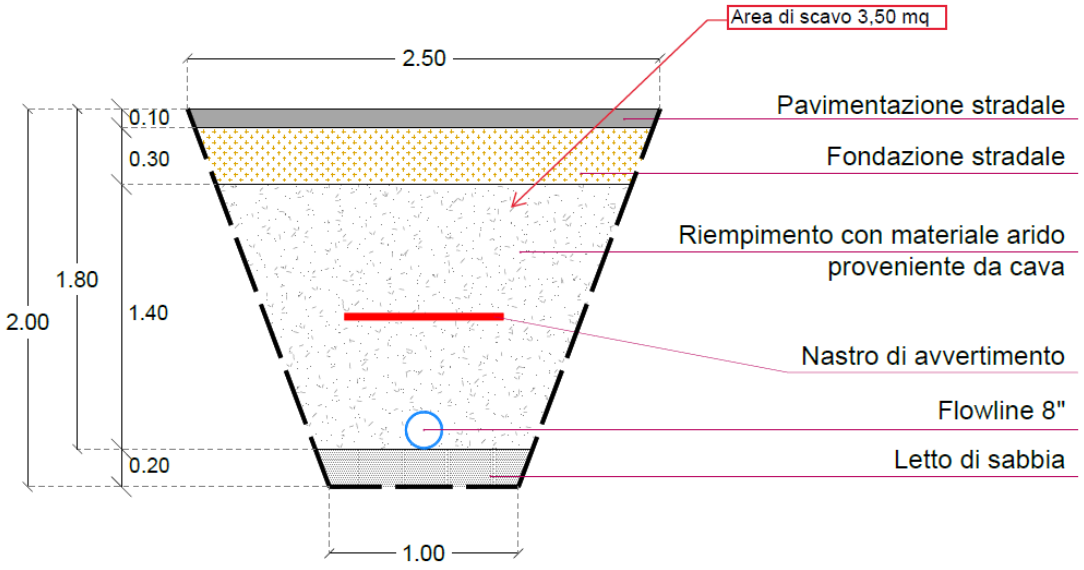


Figura 7 – Sezione corrente tipologica di scavo (Rif. tavola "IT-TPR-00-SMDF-000440_01 F 2/5")

6.0 DECOMMISSIONING CIRCOLARE

La sequenza di decommissioning e le attività descritte nei paragrafi seguenti sono state elaborate al fine di ottimizzare le operazioni, minimizzare i potenziali impatti sull'ambiente, l'utilizzo delle risorse e la produzione di rifiuti.

Il presente piano si basa sullo stato luoghi al momento in cui il documento è stato redatto. Tutte le valutazioni di natura tecnica, ambientale, legislativa e vincolistica in esso contenute dovranno quindi essere aggiornate al termine della vita produttiva dell'opera.

Al fine di massimizzare le performance ambientali, il progetto di decommissioning dovrà essere sviluppato tenendo in considerazione i principi di economia circolare definiti da TOTALENERGIES EP Italia S.p.A..

Il concetto di "*Decommissioning Circolare*" ha l'obbiettivo di massimizzare il valore degli assets definiti "maturi" dal punto di vista della produzione, attraverso l'applicazione sistematica del seguente approccio:

- **RIDUZIONE** della produzione di materiali di risulta (e dei rifiuti);
- **RIUTILIZZO** degli assets e/o dei componenti attraverso la riconversione delle strutture per altri scopi e/o la rilocazione su altri progetti delle apparecchiature riutilizzabili;

- **RECUPERO/RICICLO** dei materiali (es. acciaio, rame, alluminio) e valorizzazione degli elementi presenti (es. materiali nobili dai RAEE).

La filosofia di decommissioning è basata su un approccio di “reverse engineering”. Alcuni aspetti come la logistica e le cantierizzazioni riprendono quindi le valutazioni elaborate per la fase di installazione.

In fase di pianificazione ed esecuzione delle attività dovranno essere messe in atto tutti gli accorgimenti e/o soluzioni tecnologiche necessarie al fine di massimizzare la sicurezza delle operazioni e minimizzare gli impatti ambientali, quali:

- Un’attenta pianificazione delle risposte alle potenziali emergenze;
- Attenzione agli aspetti di “house keeping”;
- Minimizzazione delle attività di movimentazione e alterazione del terreno;
- Ottimizzazione degli spazi di cantiere;
- Uso di mezzi omologati e soggetti a regolare manutenzione al fine di limitare emissioni acustiche e in atmosfera.

6.1 PRINCIPI GENERALI PER LA DISMISSIONE E RESTITUZIONE DEL SITO

A fine vita utile, stimata *al 2068*, o in caso di esito minerario negativo (pozzo improduttivo), si procederà alla fase di dismissione (o decommissioning) del pozzo GG3 e delle infrastrutture ad esso connesse (flowline e cavidotto) ed al ripristino alle condizioni originarie di tutte le aree interessate dal progetto. Per la fase di dismissione, saranno seguiti i principi generali definiti per le attività di restituzione dei siti onshore in conformità agli standard e riferimenti interni di TotalEnergies di seguito elencati *e allegati al presente documento*:

- GM-EP-ENV-055 - Environmental specifications for site restitution;
- GS-EP-ENV-001 - Environmental requirements for projects design and E&P activities;
- GM-EP-APP-008 - Decommissioning of production facilities;
- GM-EP-ED-001 - Gestion du processus de restitution des sites (RES);

- *CR-OT-DW-424 - Permanent and Temporary Well Abandonment (sostituisce l'originaria procedura "CR-EP-FP-424 – Permanent and Temporary Well Abandonment" citata a pagina 18 del documento IT-TPR-00-ADON-000118_rev02).*

Sarà, inoltre, preso a riferimento quanto previsto dall'art. 39 "Chiusura di un pozzo e ripristino aree minerarie" del Decreto Direttoriale del 15-07-2015.

6.2 SEQUENZA GENERALE PER LA DISMISSIONE E RESTITUZIONE DEL SITO

Di seguito vengono descritte le fasi di dismissione del sito in funzione dei possibili scenari anticipati in premessa. Secondo gli standard e i regolamenti interni di TotalEnergies (GM-EP-ED-001 "Gestion du processus de restitution des sites (RES)") le attività di dismissione dei siti produttivi prevedono specifiche fasi operative.

Più nello specifico, in caso di esito minerario negativo (Scenario 1) la sequenza di dismissione del sito prevede le seguenti fasi:

1. *Messa in sicurezza delle apparecchiature, tubazioni e condotte;*
2. *Chiusura mineraria del pozzo;*
3. *Dismissione del cavidotto elettrico;*
4. *Decommissioning area pozzo e smantellamento delle infrastrutture e impianti;*
5. *Ripristino delle aree interessate dalle opere.*

La fine delle attività estrattive del pozzo GG-3 *(Scenario 2)* è pianificata per l'anno 2068, in linea con la vita utile prevista delle infrastrutture estrattive di Tempa Rossa, mentre le attività di smantellamento degli impianti sono stimate per l'anno 2069. *In tal caso, la dismissione del sito avverrà secondo le seguenti fasi:*

1. Messa in sicurezza delle apparecchiature, tubazioni e condotte;
2. Chiusura mineraria del pozzo;
3. *Decommissioning della condotta (flowline) e del cavidotto elettrico;*
4. *Decommissioning area pozzo e* smantellamento delle infrastrutture e impianti;
5. Rispristino delle aree interessate dalle opere.

A seguire si riporta un dettaglio delle principali fasi operative.

7.0 MESSA IN SICUREZZA DELLE APPARECCHIATURE, TUBAZIONI E CONDOTTE

La fase iniziale avverrà sotto la responsabilità dei dipartimenti Operazioni di Campo (Field Operations), con l'obiettivo di mettere in sicurezza le apparecchiature, tubazioni e condotte del pozzo GG-3 propedeutiche alla realizzazione delle fasi successive. Per questo si provvederà a:

- de-energizzare tutte le facilities (no pressione, no energia elettrica);
- scollegare dagli impianti elettrici e strumentali;
- bonificare, tramite flussaggio, tutte le apparecchiature e tubazioni al fine di rimuovere gli idrocarburi e sostanze chimiche presenti.

8.0 CHIUSURA MINERARIA DEL POZZO

La seconda fase è la chiusura mineraria del pozzo che sarà realizzata sotto la responsabilità del dipartimento di Perforazione (Drilling). In particolare, tale fase sarà eseguita secondo la specifica tecnica di TotalEnergies CR-OT-DW-424 "Permanent and Temporary Well Abandonment". La chiusura mineraria di un pozzo è la sequenza di operazioni che precede il definitivo ripristino dell'area: si chiude il foro con cemento, si tagliano le colonne e si procede alla messa in sicurezza del pozzo. Il pozzo chiuso minerariamente dovrà avere le stesse condizioni idrauliche precedenti all'esecuzione del foro.

Nello specifico, l'operazione consiste nell'apporre dei tappi definitivi per isolare in maniera permanente e idraulica il pozzo. In sostanza, la chiusura mineraria e la messa in sicurezza del pozzo viene fatte al fine di:

- evitare la potenziale contaminazione degli acquiferi;
- evitare la fuoriuscita in superficie di fluidi di strato;
- isolare i fluidi di diversi strati ripristinando le chiusure formazionali.

La chiusura mineraria potrà essere realizzata mediante l'uso combinato delle seguenti soluzioni:

- **Tappi di cemento:** eseguiti in pozzo per chiudere un tratto di foro. La batteria di aste viene discesa fino alla quota inferiore prevista del tappo, si pompa un volume di malta pari al tratto di foro da chiudere, e lo si porta al fondo mediante utilizzo di fango di perforazione. La malta cementizia è preceduta e seguita da un cuscino separatore di acqua, o spacer, per evitare contaminazioni con il fango e quindi scarsa presa; a conclusione viene estratta la batteria di aste dal pozzo.
- **Squeeze di cemento:** iniezione di cemento in pressione verso le formazioni, per chiudere gli strati precedentemente perforati per le prove di produzione; gli squeeze di malta cementizia vengono eseguiti con le cementatrici.
- **Bridge-plug/Cement retainer:** i bridge plug (tappi ponte) sono dei tappi meccanici che vengono calati in pozzo, con le aste di perforazione o con un apposito cavo, e fissati alla parete. Gli elementi principali del bridge plug sono: i cunei che permettono l'ancoraggio dell'attrezzo contro la parete della colonna e la gomma, o packer, che espandendosi contro la colonna isola la zona sottostante da quella superiore. I cement retainer sono invece tipi particolari di bridge-plug provvisti di un foro di comunicazione fra la parte superiore e quella inferiore con valvola di non ritorno, in modo da permettere di pompare della malta cementizia al di sotto.
- **Fango di opportuna densità:** le sezioni di foro libere (fra un tappo e l'altro) vengono mantenute piene di fango di perforazione a densità opportuna in modo da controllare le pressioni al di sopra dei tappi di cemento e dei bridge-plug.

Il numero e la posizione dei tappi di cemento e dei bridge plug possono dipendere dalla profondità raggiunta, dal tipo e profondità delle colonne di rivestimento e dai risultati minerari e geologici del sondaggio.

L'intervento richiederà l'utilizzo di un'unità coiled cubing, predisposta per discendere una tubazione di diametro ridotto all'interno del pozzo, con lo scopo di collocare la malta di cemento confezionato dall'unità di cementazione in corrispondenza delle quote selezionate; entrambe le unità sono trasportate su camion. I livelli depletati dopo la coltivazione saranno isolati dalla superficie con tre tappi di cemento, ciascuno della lunghezza di circa 150 – 200 m: il primo, e più profondo, sarà posizionato da fondo pozzo fino a coprire la quota dei livelli produttivi, il secondo sarà posizionato a

coprire la scarpa del CSG 9 5/8"; questo tappo di cemento sarà sovrastato da un bridge plug metallico a garanzia della tenuta idraulica, il terzo ed ultimo sarà posizionato da quota - 150 m fino alla superficie.

Dopo l'esecuzione dei tappi di chiusura mineraria, la testa pozzo verrà smontata. Lo spezzone di colonna che fuoriuscirà dalla cantina verrà tagliato a circa 2 metri di profondità dal piano campagna e su questo verrà saldata un'apposita piastra di protezione ("flangia di chiusura mineraria") sottoposta a prova di tenuta della saldatura mediante test di pressione a 20 atm.

Il programma di chiusura mineraria sarà approvato dalla competente Autorità Mineraria UNMIG (D.D. 15 luglio 2015 art.39 comma 1).

Di seguito lo schema rappresentativo del pozzo GG3 a seguito di eventuale chiusura mineraria:

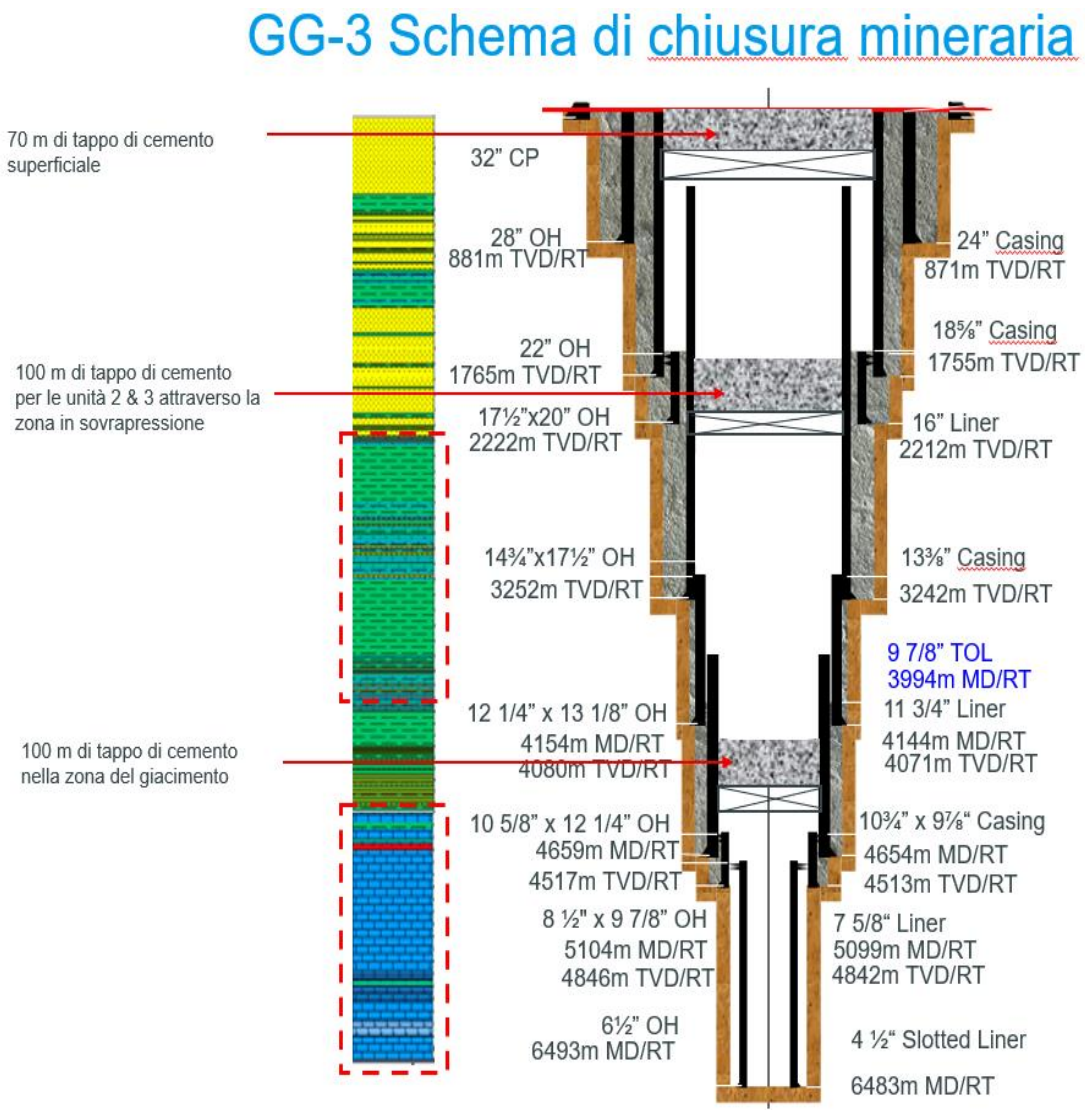


Figura 8 – Schema rappresentativo della eventuale chiusura mineraria

9.0 DISMISSIONE DEL CAVIDOTTO

In tutti gli scenari previsti (scenari 1, 2A e 2B) si procederà alla dismissione (o decommissioning) del cavidotto ed al ripristino alle condizioni originarie delle relative aree interessate.

Verranno seguite le stesse procedure indicate nei paragrafi precedenti, e di seguito si riporta una stima dei volumi di materiale movimentato per la messa a giorno del cavidotto:

LINEA	TERRENO MOVIMENTATO (m^3)
Cavidotto	1.260

Tabella 10 – Volume di terreno movimentato per rimozione cavidotto.

Stante la Normativa attualmente in vigore, al fine di poter valutare l'utilizzo dei terreni provenienti dagli scavi nelle operazioni di rinterro, si dovrà eseguire la caratterizzazione ambientale degli stessi in ottemperanza alla tabella 1 (Concentrazione soglia di contaminazione nel suolo e nel sottosuolo riferiti alla specifica destinazione d'uso dei siti da bonificare) colonna A (Siti ad uso Verde pubblico, privato e residenziale, mg kg-1 espressi come ss) di cui all'allegato 5, al Titolo V, della Parte Quarta, del decreto legislativo n° 152/2006, mettendo in atto l'insieme delle attività previste dalla Normativa vigente in materia al fine di accertare la sussistenza dei requisiti di qualità ambientale.

Tali attività prevedono un campionamento dei terreni da effettuare prima dell'inizio degli scavi, eseguito ogni 250 metri di sviluppo lineare del tracciato, distanza ridotta alla metà rispetto a quanto previsto nell'allegato 2 "Procedure di campionamento in fase di progettazione (articolo 8)" del D.P.R. 13 giugno 2017 n° 120: Nel caso di opere infrastrutturali lineari, il campionamento è effettuato almeno ogni 500 metri lineari di tracciato, prelevando per ogni punto 1 campione di terreno alla profondità di 1,00 ml ed uno a contatto con la tubazione.

In caso di esito positivo della caratterizzazione il materiale di risulta dello scavo sarà depositato lateralmente allo scavo stesso, lungo la fascia di lavoro, per essere riutilizzato in fase di rinterro della condotta. Tale operazione sarà eseguita in modo da evitare la miscelazione del materiale di risulta con lo strato humico accantonato, nella fase di apertura dell'area di passaggio.

10.0 DECOMMISSIONING DELLA CONDOTTA

La terza fase è il decommissioning della condotta. *Tale fase sarà eseguita solo in caso di accertamento minerario positivo e pertanto a fine vita utile del progetto.*

Sulla base della vita utile dell'opera e delle attuali conoscenze delle condizioni geo-morfologiche, ambientali e vincolistiche delle aree interessate dal tracciato della condotta, nel presente Piano di Decommissioning vengono analizzati i seguenti scenari di decommissioning:

- *SCENARIO 2A – Dismissione con mantenimento in sito della condotta*
- *SCENARIO 2B – Dismissione con rimozione della condotta*

Le attività descritte di seguito si basano sull'assunto che la condotta sia integra e in buono stato di manutenzione e che le attività di decommissioning vengano avviate immediatamente a valle della cessazione della produzione.

10.1 SCELTA DELLA MIGLIORE OPZIONE DI DECOMMISSIONING

La selezione della migliore opzione di decommissioning, possibile al termine della vita produttiva dell'opera, sarà definita con il supporto di studi di Valutazione Comparativa *dei possibili impatti ambientali e socio-economici* che permetteranno di confrontare le diverse soluzioni applicabili e di supportare il processo decisionale di scelta della migliore opzione rispetto ai criteri identificati. A titolo esemplificativo, di seguito è riportata la strutturazione gerarchica tipicamente utilizzata per lo sviluppo di una Valutazione Comparativa:

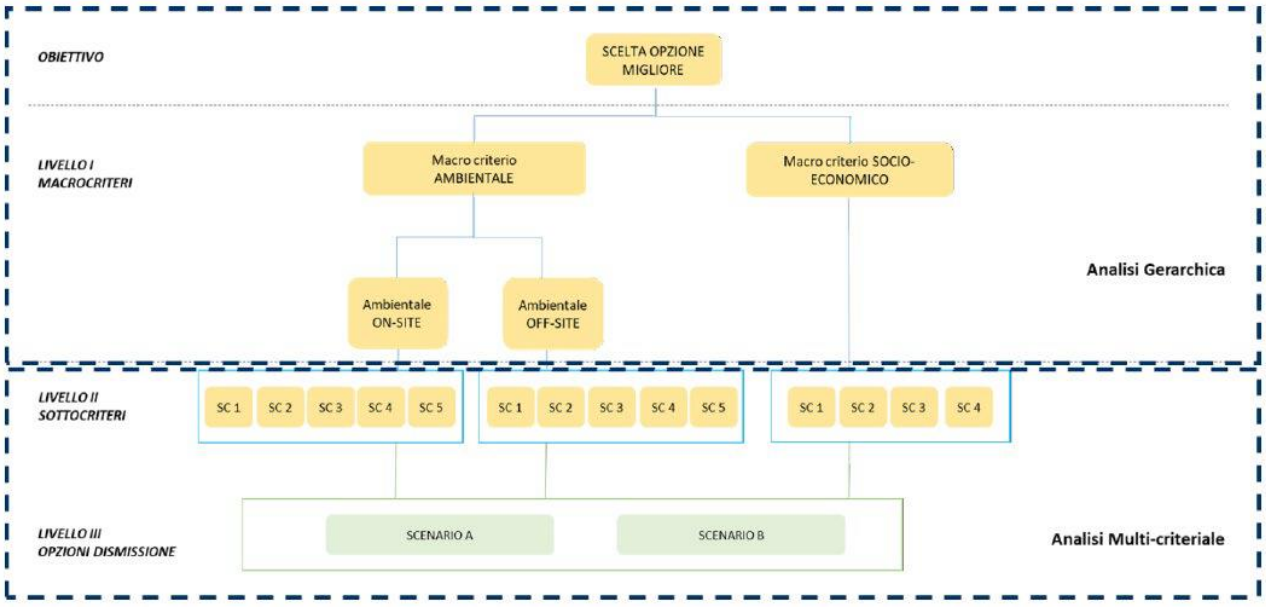


Figura 9 – Schema rappresentativo delle analisi gerarchiche e multicriteriale

I passaggi principali nella definizione delle Valutazioni Comparative sono i seguenti:

- Definizione di una lista di Macro-Criteri (riferiti al contesto Ambientale e socio-economico);

- Definizione di una lista di sotto-criteri *(es. perdita di habitat naturale, produzione rifiuti, generazione di indotto economico…),* rispetto ai quali confrontare i due scenari di dismissione, *che tenga conto delle componenti ambientali e socio-economiche interessate dalle attività di decommissioning, dell'ubicazione e delle caratteristiche territoriali dell'area e degli impatti preliminari attesi dalle operazioni di dismissione;*
- Raccolta delle informazioni tecniche ed ambientali riferite al sito specifico in cui insistono le condotte;
- Assegnazione di punteggi, *sulla base di valutazioni numeriche derivanti da studi specialistici (es. modellistica) e di valutazioni descrittive di esperti ambientali e/o sociali,* ad ogni sotto-criterio identificato per ogni macro-criterio al fine confrontare tra loro gli scenari di dismissione (analisi multicriteriale);
- Assegnazione di giudizi di importanza ad ogni macro-criterio e sotto-criterio (analisi gerarchica);
- Per ciascun scenario di dismissione, valutazione della prestazione complessiva con l'obiettivo di identificare la migliore opzione sotto il profilo ambientale e socio-economico.

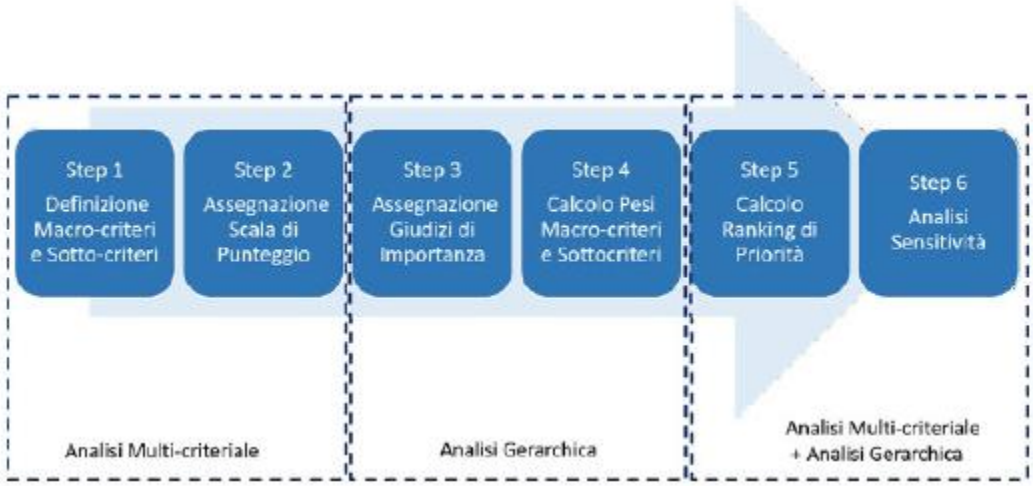


Figura 10 – Processo degli studi comparativi

Gli studi comparativi effettuati con l'obiettivo di identificare la migliore opzione di decommissioning delle condotte rappresentano un importante strumento di coinvolgimento *delle*

Autorità preposte in particolare di quelle ai fini minerari, durante le fasi autorizzative dei progetti di decommissioning. *Difatti tali attività farebbero parte di uno specifico iter autorizzativo che non può prescindere da una opportuna valutazione dello status delle reali condizioni delle condotte a fine vita e dello stato dei luoghi in ottemperanza alla normativa in vigore e a eventuali linee guida nazionali applicabili all'atto della valutazione dell'opzione di dismissione.*

In fase di elaborazione sarà pertanto fondamentale svolgere le analisi su base scientifica coinvolgendo possibilmente anche terze parti (costituite da istituti universitari riconosciuti nel settore) in modo che possano contribuire all'implementazione della metodologia e alla definizione dei criteri di valutazione

Per quanto sopra descritto in relazione agli esiti della valutazione comparativa la scelta dell'opzione di decommissiong della condotta potrebbe prevedere una differente soluzione per i diversi tratti della condotta. Ovvero, anche in base alle condizioni sito-specifiche, alcuni tratti potrebbero essere rimossi mentre altri potrebbero essere lasciati in sito.

10.2 DISMISSIONE IN SITU DELLA CONDOTTA *(SCENARIO 2A)*

Di seguito viene descritta la sequenza delle attività previste per il mantenimento in sito della condotta. In particolare:

- Mappatura delle aree interessate dal tracciato della condotta;
- Ispezione della condotta;
- Drenaggio;
- Piggaggio.

Le operazioni finali per il mantenimento in situ della condotta potranno interessare l'intero percorso della linea o parti di essa, sulla base dei risultati delle valutazioni comparative sugli impatti.

Al fine di rendere possibile la dismissione in situ sarà necessario completare le attività di bonifica procedendo con la fondellatura tramite insufflaggio di gas inerte e il riempimento con malta cementizia degli attraversamenti (stradali, fluviali, ecc.) al fine di evitare "a lungo termine" il collasso strutturale o lo svilupparsi di habitat "faunistici" al loro interno.

10.2.1 Mappatura delle aree interessate dal tracciato della condotta

La mappatura delle aree dovrà coprire l'intero sistema di condotta, comprese le strade di accesso, le recinzioni ed eventuali cancelli di accesso.

Tali informazioni, ove possibile, dovranno essere individuate con l'ausilio della documentazione "as-built" *redatta in fase di realizzazione e posa in opera*.

Qualora tali informazioni non fossero disponibili o incomplete, le aree dovranno essere mappate attraverso campagne di rilievo dedicate.

In fase di mappatura delle aree dovranno essere verificate:

- Le zone di accesso di mezzi e attrezzature all'area del tracciato;
- La presenza di punti in prossimità degli attraversamenti e delle interferenze lungo il tracciato. Tale verifica dovrà essere effettuata anche in accordo ai risultati emersi dall'analisi del regime vincolistico - studio di fattibilità ambientale per la valutazione delle alternative di dismissione della condotta, che verranno predisposti preliminarmente all'avvio delle attività;
- Situazioni che potrebbero risultare potenzialmente pericolose durante lo svolgimento dei lavori di bonifica e di successiva dismissione/rimozione (es. presenza di eccessiva crescita di arbusti/vegetazione lungo il percorso);
- Situazioni anomale in corrispondenza degli attraversamenti e delle interferenze;
- Presenza di altri eventuali lavori in corso lungo la striscia asservita della condotta.

10.2.2 Ispezione condotta

L'ispezione interna della condotta dovrà essere eseguita con le seguenti finalità:

- Rilevare la perdita di metallo nelle pareti dei tubi;
- Individuare e dimensionare le aree di corrosione ed eventuali danni meccanici;
- Rilevare crepe circonferenziali;

La soluzione tecnologica che più si adatta a questo tipo di ispezioni è rappresentata dal pigging intelligente (ILI).

Al fine di garantire il passaggio sicuro del pig intelligente, l'ispezione dovrà essere eseguita a valle delle attività preparatorie quali il drenaggio/pulizia della condotta (utilizzo di pressioni inferiori a quelle di esercizio) e la verifica della geometria interna.

10.2.3 Drenaggio della condotta

Il drenaggio ha lo scopo di ridurre le pressioni nei vari tratti della condotta attraverso il recupero della maggior quantità di prodotto presente.

Il prodotto, drenato dall'Area Pozzo GG-3 verso il Centro Olio "Tempa Rossa", verrà immesso nelle trappole di detenzione all'ingresso dello stesso.

Completato il drenaggio della condotta si procederà con:

- L'ispezione interna mediante pigging intelligente;
- Spiazzamento fluido residuo e rimozione dei fanghi mediante piggaggio.

10.2.4 Piggaggio condotta

A valle delle operazioni di drenaggio e di ispezioni interna si potrà procedere con la pulizia della condotta.

Per le attività di piggaggio sarà utilizzato come fluido di spinta l'azoto. Di seguito si riportano i principali "vantaggi" e "svantaggi" dovuti all'utilizzo di questo fluido.

VANTAGGI	SVANTAGGI	RISCHI
Assenza di fluido da trattare al termine dello spiazzamento	Per basse velocità di spiazzamento il pig si muove non uniformemente lungo l'oleodotto; il passaggio dei pig diventa più difficoltoso a causa della comprimibilità del fluido di spinta	Eventuali rotture provocherebbero la dispersione e l'eventuale congelamento del terreno localmente, mentre la componente liquida risulterebbe limitata e circoscritta, permettendo di intervenire con tempestività

VANTAGGI	SVANTAGGI	RISCHI
Il fluido non è tossico e si può scaricare in atmosfera previa filtrazione	La presenza di sacche di azoto nei punti alti richiede pressioni di pompaggio maggiori rispetto alla condizione a tubo pieno. La spinta del pig con azoto può presentare qualche difficoltà dovuta alla comprimibilità del fluido	
A fine lavori la linea risulta inertizzata ed è possibile eseguire attività a caldo		

Tabella 6 – Caratteristiche fluido di piggaggio azoto

Si assume che le attività di piggaggio vengano effettuate con lancio dalla trappola installata nell'Area Pozzo GG-3 e ricevimento nel Centro Olio "Tempa Rossa".

La sequenza minima di piggaggio proposta è descritta nella tabella seguente e potrà essere modificata o confermata durante la fase operativa di spiazzamento.

SEQUENZA	TIPOLOGIA PIG	
1	Foam Pig a bassa densità	
2	Pig di Poliuretano a media densità (tipo Bare RX3)	

SEQUENZA	TIPOLOGIA PIG	
3	Pig di Poliuretano a media densità (tipo Coated RX4)	
4	Pig di Poliuretano a media densità (tipo Wire Brush RX5)	
5	Verifica grado di pulizia della linea e valutazione della geometria interna tramite Caliper Pig	
6	Foam Caliper Pig	
7	Verifica dello stato del Foam Caliper Pig dopo piggaggio e analisi dei dati. Se la condizione geometrica della linea è soddisfacente si procede con pig di pulizia più invasivi come da sequenza di piggaggio 8 e 9.	
8	Pig BiDirezionale con dischi guida sottodimensionati e spazzole metalliche	

SEQUENZA	TIPOLOGIA PIG	
9	Brush Pig	

Tabella 7 – Sequenza di piggaggio

La velocità media di avanzamento del pig sarà compresa tra 0,5 e 2,0 m/s (con valori ottimali intorno a 1 m/s), tra il lancio del pig e suo il ricevimento.

I fluidi residui unitamente ai fanghi potranno essere convogliati nel serbatoio di raccolta sfiati e drenaggi del Centro Olio (per successiva aspirazione mediante autobotti) o immessi nelle unità di trattamento del Centro Olio.

10.2.5 Flussaggio della condotta

Qualora a valle dello spiazzamento/piggaggio venisse evidenziata la presenza di residui all'interno della condotta si procederà con il flussaggio della stessa.

In fase di progettazione delle attività verrà valutata l'opportunità di eseguire il flussaggio collegando la condotta in loop e raccolta reflui in Area Centro Olio.

Per le operazioni di flussaggio della condotta si stima la produzione di circa 200 m^3 di fluido, pari a circa 2 volte il volume della condotta (volume ottimizzabile in caso di lavaggio in loop della condotta).

Le modalità di approvvigionamento del fluido di flussaggio verranno definite in fase di progettazione delle attività (approvvigionamento su gomma o da corpo idrico sotterraneo). Visti i volumi previsti, dovrà essere eseguita una valutazione comparativa per stabilire la migliore modalità di approvvigionamento che minimizzi l'utilizzo delle risorse e l'impatto sull'ambiente.

Completato il flussaggio della condotta potrebbe verificarsi l'accumulo di fluido residuo in corrispondenza degli avvallamenti lungo il tracciato. Al fine di minimizzare i rischi correlati al verificarsi di questo scenario, in fase di progettazione dovranno essere previsti dei drenaggi localizzati in corrispondenza degli avvallamenti.

I principali avvallamenti che si possono identificare in questa fase sono in corrispondenza di attraversamenti dei fossi e strade come elencati al paragrafo precedente.

10.3 RIMOZIONE DELLA CONDOTTA *(SCENARIO 2B)*

Tale scenario potrà interessare l'intero percorso della condotta o parti di essa, sulla base dei risultati delle valutazioni comparative sugli impatti.

Difatti, i tratti di condotta per i quali i risultati delle valutazioni comparative e/o condizioni sito-specifiche evidenziassero l'impossibilità di procedere con la dismissione in situ, si dovrà provvedere alla loro rimozione in accordo a specifiche procedure operative da predisporre prima dell'avvio dei lavori.

Anche nell'ipotesi di rimozione, le operazioni preliminari e di flussaggio della condotta sono le medesime già descritte nel paragrafo relativo al mantenimento in sito.

Le attività specifiche previste per la rimozione della condotta sono riportate di seguito:

- Realizzazione di infrastrutture provvisorie lungo il tracciato della condotta;
- Apertura dell'area di passaggio;
- Messa a giorno della condotta;
- Sezionamento e rimozione della condotta e dei cavi;
- Rinterro aree e ripristini;
- Gestione degli attraversamenti.

10.3.1 Realizzazione di infrastrutture provvisorie

Le "infrastrutture provvisorie" saranno costituite principalmente da piazzole da adibire ad area logistica, stoccaggio delle tubazioni rimosse, gestione rifiuti, etc...

In analogia con quanto previsto per la fase di installazione, anche per la fase di rimozione delle condotte si prevede di predisporre un adeguato numero di piazzole lungo il tracciato, ipotizzabili da un minimo di 5 ad un massimo di 10, da posizionarsi in funzione dell'utilizzo e della disponibilità delle aree al momento dell'esecuzione dei lavori.

Al termine delle attività di rimozione dovrà essere prevista la rimozione di tali infrastrutture ed il ripristino delle aree.

10.3.2 Apertura dell'area di passaggio

Il pieno accesso alle aree richiederà l'apertura di un'area di passaggio tale da garantire l'esecuzione in sicurezza dei lavori ed il transito dei mezzi di servizio e di soccorso. L'apertura delle aree di passaggio, in funzione delle diverse necessità, potrà prevedere le seguenti attività:

- Rimozione vegetazione;
- Spostamento linee elettriche e/o telefoniche ricadenti nella fascia di lavoro.
- Realizzazione opere provvisorie, come tombini, guadi o quanto altro serve per garantire il deflusso naturale delle acque.

In accordo con quanto previsto per la fase di installazione della condotta, l'area di passaggio dovrà avere una larghezza pari a circa 12 m, generalmente ripartita in due fasce funzionali distinte:

- Una fascia laterale continua, larga circa 4 m, per il deposito del materiale di scavo della trincea;
- Una fascia della larghezza di circa 8 m per consentire:
  - Lo stoccaggio provvisorio dei tratti di condotta rimossi;
  - Il passaggio dei mezzi di lavoro (es. gru, mezzi di trasporto materiali e persone, soccorsi, etc…).

L'esecuzione delle attività sui fondi privati è legittimata da una servitù in essere. La progettazione delle attività dovrà, ove possibile, rientrare all'interno dell'ampiezza delle fasce di servitù che per le condotte oggetto del presente Piano di Decommissioning è pari a 6 m per parte rispetto all'asse della condotta.

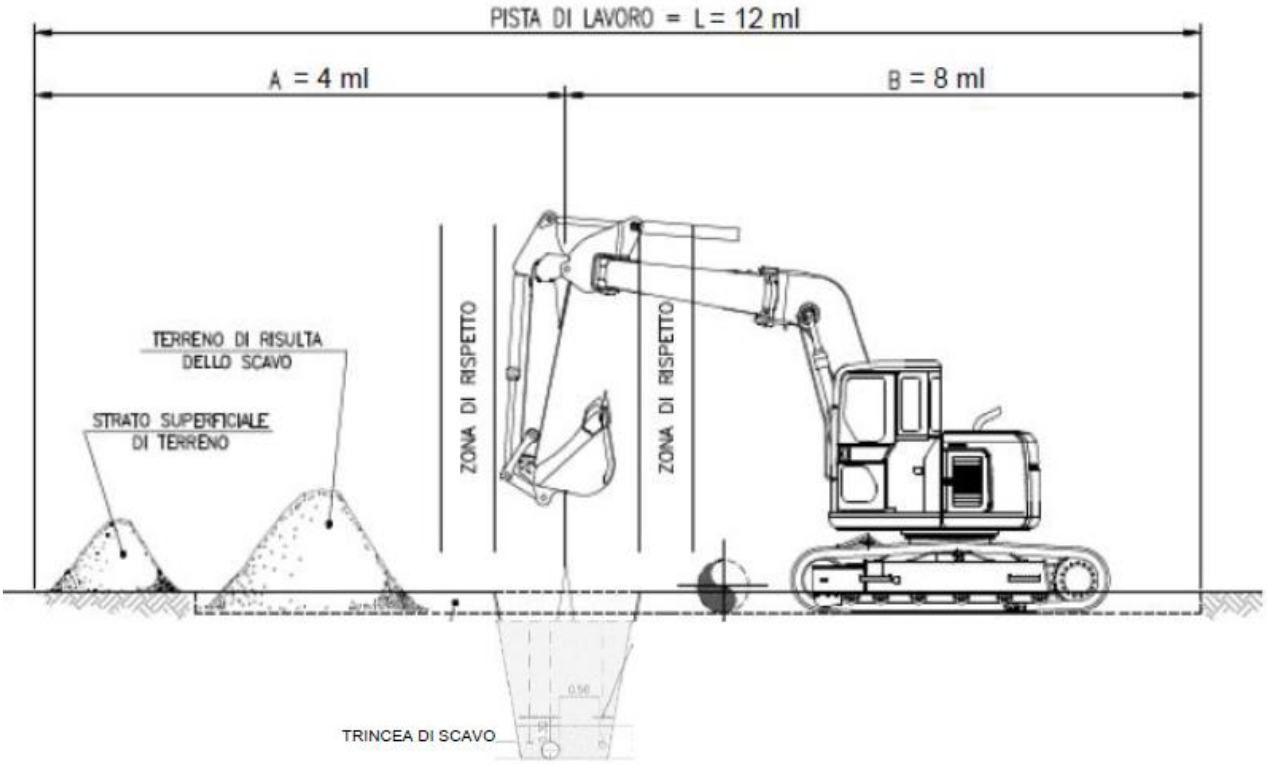


Figura 11 – Fasce di lavoro per rimozione condotta

In corrispondenza degli attraversamenti di infrastrutture (strade, cavidotti, ecc.), di corsi d'acqua e di aree particolari, l'ampiezza dell'area di passaggio potrà subire variazioni.

Per la realizzazione delle piste di lavoro, delle aree necessarie per le operazioni e l'accesso al tracciato delle condotte, in analogia con il progetto di installazione, sono state considerate le seguenti superfici:

TIPOLOGIA OPERA	**SUPERFICIE (m^2)**
Pista normale	31.200
Allargamenti	4.000
Piazzole	4.500
TOTALE	**39.700**

Tabella 8 – Estensione superfici di lavoro

Considerando che lo scotico superficiale interesserà una profondità di circa 30 cm da p.c., il volume complessivo di scotico è pari a: 11.910 m^3.

10.3.3 Messa a giorno della condotta

Per la messa a giorno della condotta dovrà essere considerata l'asportazione del medesimo volume di terreno prevista per la fase di installazione e riportata nella figura seguente.

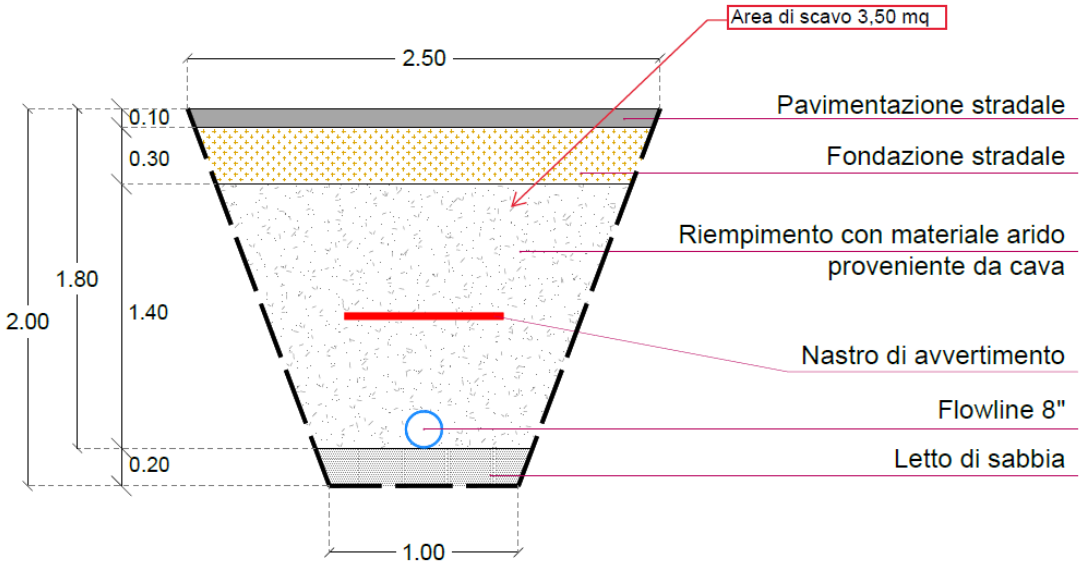


Figura 12 – Sezione tipologica di scavo

Le operazioni di scavo dovranno essere eseguite avendo cura di:

- Eseguire il taglio ordinato e strettamente indispensabile della vegetazione e l'accantonamento del terreno fertile;
- Accantonare il materiale di risulta separatamente dal terreno fertile di cui sopra;
- Gestire i materiali di scavo in modo tale che in fase di ripristino dell'area di passaggio, il riporto e la riprofilatura del terreno rispettino la morfologia originaria e la giusta sequenza stratigrafica.

Con riferimento alle dimensioni tipiche sopra riportate, il volume di terra movimentabile a seguito delle operazioni di scavo riprende l'analisi eseguita per la fase di installazione.

Di seguito si riporta una stima dei volumi di materiale movimentato per la messa a giorno della condotta:

LINEA	TERRENO MOVIMENTATO (m^3)
DN 200 (8'')	*8.820*

Tabella 9 – Volume di terreno movimentato per rimozione condotta

Stante la Normativa attualmente in vigore, al fine di poter valutare l'utilizzo dei terreni provenienti dagli scavi nelle operazioni di rinterro, si dovrà eseguire la caratterizzazione ambientale degli stessi in ottemperanza alla tabella 1 (Concentrazione soglia di contaminazione nel suolo e nel sottosuolo riferiti alla specifica destinazione d'uso dei siti da bonificare) colonna A (Siti ad uso Verde pubblico, privato e residenziale, mg kg-1) di cui all'allegato 5, al Titolo V, della Parte Quarta, del decreto legislativo n° 152/2006, mettendo in atto l'insieme delle attività previste dalla Normativa vigente in materia al fine di accertare la sussistenza dei requisiti di qualità ambientale.

Tali attività prevedono un campionamento dei terreni da effettuare prima dell'inizio degli scavi, eseguito ogni 250 metri di sviluppo lineare del tracciato, distanza ridotta alla metà rispetto a quanto previsto nell'allegato 2 "Procedure di campionamento in fase di progettazione (articolo 8)" del D.P.R. 13 giugno 2017 n° 120: Nel caso di opere infrastrutturali lineari, il campionamento è effettuato almeno ogni 500 metri lineari di tracciato, prelevando per ogni punto 1 campione di terreno alla profondità di 1,00 ml ed uno a contatto con la tubazione.

In caso di esito positivo della caratterizzazione il materiale di risulta dello scavo sarà depositato lateralmente allo scavo stesso, lungo la fascia di lavoro, per essere riutilizzato in fase di rinterro della condotta. Tale operazione sarà eseguita in modo da evitare la miscelazione del materiale di risulta con lo strato humico accantonato, nella fase di apertura dell'area di passaggio.

In ogni caso si provvederà alla rimozione ed al trasporto in impianti di conferimento all'uopo autorizzati, previa idonea preventiva caratterizzazione come da Normativa vigente (D.Lgs n° 152/06), di 20 cm di terreno ubicati al di sotto del piano di appoggio del tubo e di quello a contatto con il medesimo per tutta la lunghezza della flowline, pari a circa 1300 mc.

Per il completamento del rinterro saranno pertanto necessari 1300 mc di terreno certificato.

10.3.4 Sezionamento e rimozione della condotta e dei cavi

Completata la messa a giorno delle strutture interrate, si procederà con il sezionamento e rimozione della condotta e dei cavi.

Al fine di poter eseguire le attività di trasporto anche nelle aree più impervie, si assume che la condotta venga sezionata in tratti di 6÷8 ml. La lunghezza effettiva dipenderà dalle condizioni sito specifiche come la tipologia di accesso alle aree, la disponibilità di spazio a bordo scavo in cui stoccare i segmenti rimossi, etc..

Per le attività di taglio dovranno essere utilizzate tecniche di lavoro a freddo, che garantiscano maggiori margini di sicurezza per il personale operativo. In particolare, potranno essere utilizzate pinze demolitrici o cesoie idrauliche montate su escavatori cingolati e/o gommati e, ove necessario, alcune attività di demolizione potranno essere effettuate utilizzando seghetti pneumatici, idrotaglio e fili diamantati. I sezionamenti dovranno essere eseguiti previa prova strumentale eseguita da un tecnico abilitato, attestante l'assenza di miscele esplosive.

Tutte le attività di taglio dovranno essere eseguite in condizione di "Gas Free" certificato.

Durante tali attività potranno essere previste:

- Opere provvisionali di sostegno allo scavo;
- Teli impermeabili da utilizzare per la raccolta/contenimento di eventuali fuoriuscite accidentali di fluidi.

I tratti di condotta rimossi, caricati su idonei mezzi, potranno essere trasportati alle aree di stoccaggio o trasportate verso il destino finale.

Il decommissioning dei cavi (leak detection, MT e bassa tensione) potrà avvenire manualmente o mediante l'utilizzo della benna. Il carico e trasporto potrà essere eseguito mediante caricamento alla rinfusa sul mezzo di trasporto (es. scarrabile) o riempimento di big bags.

10.3.5 Ripristino delle aree

Al termine delle fasi di smontaggio e rimozione si procede a realizzare gli interventi di ripristino.

Le opere di ripristino previste possono essere raggruppate nelle seguenti due tipologie principali:

- Ripristini geomorfologici;
- Ripristini vegetazionali.

Ripristini geomorfologici

Lo scopo delle operazioni di ripristino geomorfologico è quello di riportare il profilo del terreno nelle condizioni preesistenti all'apertura della pista di lavoro.

Tale operazione consiste nel riempimento e livellamento sino al piano campagna degli scavi effettuati utilizzando per tale scopo il terreno scavato (previa predisposizione di un piano di riutilizzo delle terre e rocce da scavo in accordo alla vigente normativa) e/o materiale di altra provenienza esente dalla presenza di contaminanti (materiale vergine di cava certificato).

Il materiale di scavo che non risultasse conforme dovrà essere gestito come rifiuto ai sensi del D.Lgs. 152/2006.

Oltre alle aree di scavo e piste di lavoro, il ripristino dovrà garantire:

- La riapertura degli impluvi fluviali interrotti o deviati;
- La sistemazione in loco dello strato di humus eventualmente accantonato;
- Esecuzione di opere di ripristino e inerbimento;
- Apertura di scoline in terra in tutti quei punti dove possono verificarsi ristagni e nei tratti in pendenza.

Dovranno essere ripristinate tutte le opere demolite o parzialmente alterate come per esempio:

- I terrazzamenti
- I fossi di scolo
- I drenaggi
- Le cunette in terra o in muratura
- I muri anche a secco
- I canali di irrigazione
- E quant'altra demolito durante i lavori di sbancamento e scavo

Le scarpate, le sponde dei corsi d'acqua demoliti durante l'esecuzione dei lavori civili, dovranno essere ricostruiti garantendo la loro configurazione originaria e rendendoli operativi già al termine dei lavori di ripristino.

In presenza di forti pendenze, e laddove sussista la possibilità di erosione e franamenti del terreno riportato durante le operazioni di ritombamento degli scavi, potranno essere previste opere di stabilizzazione e sostegno del piano campagna con installazione di graticci, viminate, buzzoni, inerbimenti e piantagioni varie in accordo a quanto definito dal progetto di ripristino.

In presenza di aree private o pubbliche con impianti di tappeto erboso, cortili e accessi, essi dovranno essere riportati alle condizioni pre-esistenti garantendo pertanto il ripristino completo dei terreni ricadenti nelle aree di passaggio.

Ripristini Vegetazionali

Gli interventi di ripristino degli habitat naturali e seminaturali e delle aree agricole comprendono tutte le opere necessarie a ristabilire la funzionalità ecosistemica delle cenosi e le originarie destinazioni d'uso dei territori attraversati.

Nelle aree agricole, questi interventi avranno la finalità di riportare i terreni alla medesima capacità d'uso e fertilità agronomica presenti prima dell'esecuzione dei lavori, mentre nelle aree caratterizzate da vegetazione naturale e seminaturale, i ripristini avranno la funzione di innescare i processi dinamici che consentiranno di raggiungere, nel modo più rapido e seguendo gli stadi evolutivi naturali, la struttura, la composizione e la funzionalità delle fitocenosi originarie.

10.3.6 Gestione degli attraversamenti e opere in sotterraneo

Valutazioni dedicate dovranno essere eseguite per la gestione degli attraversamenti.

Di seguito si riportano le modalità di decommissioning applicabili per le principali tipologie di attraversamenti previsti:

N°	TIPOLOGIA ATTRAVERSAMENTO	OPZIONE DI DECOMMISSIONING APPLICABILE
1	Attraversamenti stradali	• Rimozione anelli di chiusura termostringenti; • Sfilaggio della condotta dai rispettivi tubi di protezione; • Riempimento del tubo di protezione con malta cementizia al fine di prevenire futuri collassi della struttura stradale. Qualora lo sfilaggio non fosse praticabile si procederà con il decommissioning in sito mediante: • Rimozione anelli di chiusura termostringenti; • Fondellatura mediante riempimento con malta cementizia dell'intercapedine condotta/tubo di protezione e della condotta e ciecatura delle due estremità.
2	Fossi	• Intercetto della condotta ai due estremi del fosso; • Sfilaggio della condotta dai rispettivi tubi di protezione; • Riempimento del tubo di protezione con malta cementizia al fine di prevenire futuri collassi della struttura stradale e successiva ciecatura; Qualora lo sfilaggio non fosse praticabile si procederà con la dismissione in situ mediante: • Sezionamento condotta e fondellatura mediante riempimento con malta cementizia dell'intercapedine condotta/tubo di protezione e della condotta e ciecatura delle due estremità.
3	Corsi d'acqua secondari	• Apertura vasche poste ai due estremi del corso d'acqua; • Fondellatura mediante riempimento con malta cementizia dell'intercapedine condotta/tubo di protezione e della condotta e ciecatura delle due estremità; • Demolizione vasche e ripristino morfologico dell'area.

Tabella 11 – Opzioni di decommissioning per le diverse tipologie di attraversamento

11.0 DECOMMISSIONING AREA POZZO GG-3

Il processo di decommissioning dell'Area Pozzo GG-3 potrà avvenire in due differenti scenari:

- In caso di accertata improduttività del pozzo a seguito delle prove di produzione;
- In caso di conferma della produttività del pozzo a seguito delle prove di produzione e quindi al termine della coltivazione dello stesso.

La differenza tra i due scenari consiste esclusivamente nelle diverse attrezzature meccaniche e strutture civili presenti nel soprasuolo dell'area pozzo (rif. tavola "IT-TPR-00-SMDF-000415_00 Foglio 1 di 2" per quanto attiene le prove di produzione, e rif. tavola "IT-TPR-00-SMDF-000416_00 Foglio 1 di 2" per quanto attiene l'allestimento finale), pertanto in linea generale per entrambi gli scenari le operazioni da eseguirsi comprendono:

- Bonifica e cleaning apparecchiature;
- Smantellamento opere meccaniche e civili;
- Ripristino morfologia del terreno allo stato ante-operam.

Sono escluse dal presente Piano le attività di caratterizzazione e bonifica ambientale, in quanto vincolate a degli studi dedicati da elaborare a valle delle indagini ambientali preliminari nell'area.

11.1 BONIFICA E CLEANING APPARECCHIATURE

11.1.1 Ipotesi di scenario di sole prove di produzione

Tutte le apparecchiature utilizzate per le prove di produzione verranno bonificate con l'intervento di Ditte specializzate che provvederanno ad eliminare tutti i residui presenti al loro interno stoccandone i liquidi risultanti in appositi serbatoi con successivo conferimento in impianti autorizzati al loro trattamento.

Ad operazione di bonifica e pulizia completata le apparecchiature verranno rimosse per un loro successivo utilizzo.

11.1.2 Ipotesi di scenario di coltivazione del pozzo

Questa fase ha lo scopo di rimuovere le sostanze contenute nelle apparecchiature e nei piping di collegamento alle stesse, al fine di renderle inerti ed idonee alla successiva rimozione, trasporto e conferimento ad impianto di recupero/smaltimento.

La finalità è quella di minimizzare il rischio di presenza di miscela esplosiva e deve essere realizzata prima delle operazioni di smantellamento che potrebbero comportare una possibile fonte d'innesco. Dovranno essere sottoposte a pulizia e raccolta di fluidi da disaccoppiamento di piping/flange/items tutte quelle parti d'impianto che hanno convogliato idrocarburi liquidi o gassosi e le parti d'impianto che hanno convogliato fluidi non pericolosi come aria compressa o acqua e che però potrebbero potenzialmente essere state contaminate da idrocarburi.

In fase di esecuzione saranno prese tutte le precauzioni necessarie ad evitare sversamenti, anche accidentali, di fluidi sul terreno durante le operazioni di pulizia. A titolo esemplificativo, di seguito si riporta un elenco delle attività che potrebbero comporre le operazioni:

- posizionamento ed installazione dei presidi di sicurezza e dei sistemi anti-spandimento;
- installazione e collegamento delle apparecchiature e della strumentazione necessarie (pompe, serbatoi, autorpurghi, ecc.);
- sezionamento dei circuiti/impianti (ove necessario) mediante l'installazione di flange cieche;
- estrazione e/o drenaggio della frazione liquida, con carico diretto su autocisterna o feed (ove necessario);
- spiazzamento/flussaggio e svuotamento mediante l'utilizzo di azoto;
- inertizzazione e raggiungimento stato di "gas free".

Durante l'esecuzione delle attività sarà inderogabile operare mettendo in atto procedure e misure che impediscano eventuali sversamenti al suolo. Se necessario, si provvederà a raccogliere i residui eventualmente presenti in recipienti di adeguata capacità. Tutti i prodotti delle operazioni di pulizia degli impianti saranno considerati rifiuti e come tale gestiti in accordo alle prescrizioni dettate dalla normativa vigente. Le operazioni verranno opportunamente documentate avendo cura di indicare i circuiti/apparecchiature trattate, la data in cui sono state eseguite le operazioni, la firma di autorizzazione a procedere con l'operazione successiva e il numero di certificato "gas-free" (dove necessario).

Il loop di lavaggio ipotizzato, da confermare durante le future fasi di progettazione di dettaglio, prevede il flussaggio delle apparecchiature convogliando i fluidi verso la vasca di raccolta sfiati e drenaggi.

In fase di progettazione viene valutata la possibilità di flussare le apparecchiature in linea secondo il seguente schema di massima:

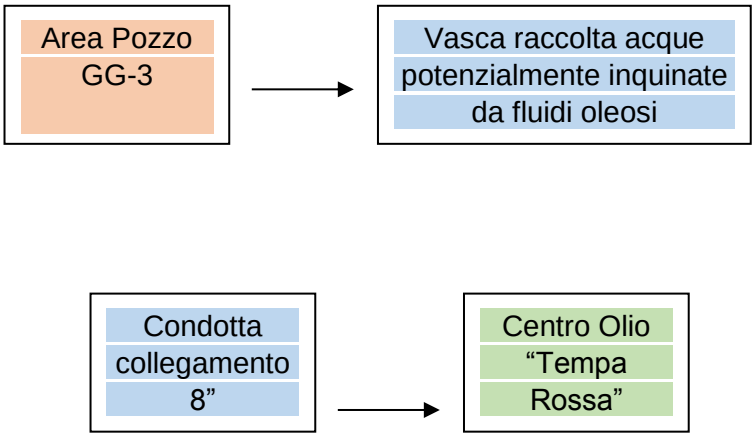


Figura 13 – Schema esempio flussaggio in linea

In questa configurazione la sequenza delle operazioni è la seguente:

- Bonifica e cleaning apparecchiature;
- Sezionamento apparecchiature Area Pozzo GG-3;
- Smantellamento opere meccaniche di superficie e interrate;
- Rimozione opere civili.

11.2 SMANTELLAMENTO OPERE MECCANICHE

Questa fase avverrà unicamente per lo scenario di coltivazione del pozzo, cioè a fine vita utile dello stesso.

Per l'esecuzione delle demolizioni meccaniche dovranno sempre essere adottate tecniche di demolizione a freddo. In particolare, pinze demolitrici o cesoie idrauliche montate su escavatori cingolati e/o gommati e, ove necessario, le attività di demolizione potranno essere eseguite utilizzando seghetti pneumatici, idrotaglio o fili diamantati.

Eventuali operazioni preliminari, verifiche radiometriche e di assenza di idrocarburi, che si rendessero necessarie ai fini dello smantellamento/demolizione in sicurezza, dovranno essere tassativamente eseguite con metodologia "a freddo" scegliendo tra le tecniche di demolizione suddette e ritenute più idonee all'attività da eseguire.

Figura 14 – Esempi di utensili di taglio e demolizione meccanica

L'elenco delle apparecchiature oggetto di demolizione è riportato nella tabella seguente:

AREA POZZO GG-3 – ELENCO APPARECCHIATURE DA SMANTELLARE
Testa pozzo
Trappole di lancio
Serbatoio raccolta sfiati e drenaggi
Pompe recupero drenaggi
Pompe di rilancio drenaggi
Pannello a blocchi elettro idraulico
Skid iniezione stoccaggio chemicals (fluidi di processo)

Sottostazione elettrica e strumentale
Tubazioni in genere fluidi processo interrate ed aree, valvole, ecc.
Cavi elettrici e strumentali, sensori, illuminazione, ecc.

Tabella 12 – Apparecchiature Area Pozzo GG-3

I prodotti metallici derivanti dalle demolizioni, qual ora idonei, dovranno essere ridotti volumetricamente al fine di renderli funzionali alle operazioni di recupero presso impianti autorizzati.

Dati i ridotti spazi operativi la riduzione volumetrica dei materiali dovrà avvenire presso l'area di lavoro in corrispondenza delle aree pavimentate disponibili. Il materiale ridotto volumetricamente sarà accumulato all'interno di cassoni scarrabili con setti di separazione posizionati nelle immediate vicinanze della zona di riduzione volumetrica, in attesa di essere caratterizzati e successivamente conferiti ad idoneo impianto esterno di recupero o smaltimento.

Completate le demolizioni meccaniche si potrà procedere con la demolizione delle opere civili.

11.3 SMANTELLAMENTO OPERE CIVILI

In questa fase le opere in calcestruzzo e calcestruzzo armato, fuori terra ed interrate dovranno essere demolite, ridotte volumetricamente per consentirne il deposito ed il caricamento e deferrizzate.

Durante la demolizione dovranno essere disponibili i presidi di prevenzione contro le polveri quali, ad esempio, nebulizzatori e/o irroratrici.



Figura 15 – Esempio di sistemi di abbattimento polveri in funzione durante le operazioni di demolizione

Al termine delle demolizioni le cavità realizzate per la messa a giorno delle strutture interrate dovranno essere ritombate con materiale idoneo e certificato.

In analogia con le demolizioni meccaniche, le attività di frantumazione e deferrizzazione dei materiali di risulta dalle demolizioni civili dovranno avvenire presso un'area di lavoro posta nelle immediate vicinanze dell'opera demolita, predisponendo idoneo telo impermeabile al fine di evitare la contaminazione del suolo sottostante. Il materiale così ridotto volumetricamente sarà custodito presso l'area di cui innanzi in attesa di essere caratterizzato e successivamente conferito ad idoneo impianto esterno di smaltimento.

11.3.1 Ipotesi di scenario di sole prove di produzione

In questa ipotesi l'elenco delle opere civili oggetto di demolizione è riportato nella tabella seguente:

AREA POZZO GG-3 – ELENCO OPERE CIVILI DA DEMOLIRE
Vasca gasolio
Vasca stoccaggio greggio
Basamento fiaccola di emergenza
Pesa a ponte
Vasca stoccaggio acque meteoriche di prima e seconda pioggia
Vasca corral stoccaggio detriti e fluidi esausti
Vasca corral stoccaggio fluidi speciali
N° 13 basamenti per torri faro
Cantina
Basamento/plateone
Basamento stoccaggio prodotti chimici
Basamento area campo uffici

Basamento per cavalletto Mast
Fossa Imhoff e fossa chiarificatrice
Vasca di stoccaggio acqua industriale per antincendio

Tabella 13 – Opere civili Area Pozzo GG-3

La demolizione di tali opere comporterà presuntivamente la produzione di circa 4300 mc di calcestruzzo da avviare a recupero/smaltimento.

11.3.2 Ipotesi di scenario di coltivazione del pozzo

In questa ipotesi l'elenco delle opere civili oggetto di demolizione è riportato nella tabella seguente:

AREA POZZO GG-3 – ELENCO OPERE CIVILI DA DEMOLIRE
Vasca gasolio
Vasca stoccaggio greggio
Basamento fiaccola di emergenza
Pesa a ponte
Vasca stoccaggio acque meteoriche di prima e seconda pioggia
Vasca corral stoccaggio detriti e fluidi esausti
Vasca corral stoccaggio fluidi speciali
N° 13 basamenti per torri faro
Cantina
Basamento/plateone
Basamento stoccaggio prodotti chimici
Basamento area campo uffici

Basamento per cavalletto Mast
Fossa Imhoff e fossa chiarificatrice
Canalette, cunicoli per cavi tubazioni, ecc.
Edificio sottostazione elettrica e trasformatori
Vasca di stoccaggio acqua industriale per antincendio

Tabella 14 – Opere civili Area Pozzo GG-3

La demolizione di tali opere comporterà presuntivamente la produzione di circa 4600 mc di calcestruzzo da avviare a recupero/smaltimento.

In ultimo, per entrambi gli scenari, verrà rimosso il misto di pavimentazione per un quantitativo stimabile approssimativamente in circa 5000 mc che, previa idonea caratterizzazione, verrà avviato a recupero/smaltimento, e tutte le recinzioni delle aree.

11.4 RIPRISTINO DELLE AREE

Successivamente allo smantellamento e rimozione degli impianti, strutture e fabbricati, per entrambi gli scenari ipotizzati ossia “esecuzione delle sole prove di produzione” o “coltivazione del pozzo”, si provvederà a ripristinare le aree allo status ante operam, nel rispetto delle caratteristiche della destinazione d’uso pregressa dell’area e delle previsioni degli strumenti urbanistici. A tal fine saranno condotte attività di caratterizzazione delle matrici ambientali (suolo e acque sotterranee) nel rispetto della normativa vigente di concerto con gli Enti competenti. Per pervenire a una corretta caratterizzazione delle aree, si prevede di eseguire una verifica storica degli eventuali incidenti, sversamenti, ecc. che possano aver dato origine a potenziali contaminazioni. Saranno quindi prelevati campioni di terreno a varie profondità e di acque sotterranee per la successiva analisi chimica; le localizzazioni ed i composti da analizzare saranno definiti in funzione della ricerca storica suddetta e comunque in prossimità delle possibili eventuali sorgenti di contaminazione. Tutti i rifiuti prodotti durante la fase di ripristino verranno smaltiti in conformità della normativa vigente e in funzione dei risultati della caratterizzazione analitica.

Si procederà quindi al completo ripristino morfologico e vegetazionale dell'intera area fino al raggiungimento della condizione "ante-operam", con la reintegrazione di un volume di terreno proveniente da cave di prestito esterne, da individuare al momento dell'esecuzione del ripristino, certificato chimicamente in accordo ai limiti indicati nella *tabella 1 (Concentrazione soglia di contaminazione nel suolo e nel sottosuolo riferiti alla specifica destinazione d'uso dei siti da bonificare) colonna A (Siti ad uso Verde pubblico, privato e residenziale, mg kg-1 espressi come ss) di cui all'allegato 5, al Titolo V, della Parte Quarta, del decreto legislativo n° 152/2006* – Norme in materia ambientale *attualmente in vigore*, pari a circa 58.600 mc costipato in sito (cfr. *IT-TPR-00-SMDF-000401_03 "Relazione tecnica"*) necessario per la rimodellazione dell'area e la sua restituzione all'originaria destinazione agricola.

Particolare cura ed attenzione dovrà essere adottata affinché tale sistemazione reintegri perfettamente la zona umida adiacente già preservata nella fase di progettazione.

12.0 GESTIONE DEI RIFIUTI

Per le attività previste a progetto, i rifiuti prodotti saranno di tipo speciali e riconducibili a quelli di un ordinario cantiere civile.

In particolare, si stima che la tipologia di rifiuti speciali prodotti sia riconducibile alle seguenti categorie:

- Rifiuti speciali derivanti da scarti di lavorazione ed eventuali materiali di sfrido;
- Imballaggi carta, cartone, plastica, legno;
- Rifiuti speciali di plastica e ferro;
- Stracci, indumenti protettivi, assorbenti;
- Reflui civili;
- Inerti (es. terre e rocce da scavo);
- Eventuali altri reflui.

Tutti i rifiuti prodotti (in ogni area e per ogni fase) saranno gestiti saranno gestiti in conformità alla normativa vigente (D.Lgs. 152/2006 e ss.mm.ii.) e in particolare, saranno gestiti secondo il criterio del Deposito Temporaneo ai sensi dell'art.183, comma 1, lettera bb) del D.Lgs. 152/06 e ss.mm.ii..

La gestione dei rifiuti sarà eseguita privilegiando, ove possibile, il trasporto a centro di recupero autorizzato, come prima scelta in alternativa al conferimento dei rifiuti stessi in discarica.

Tale attività consisterà in:

- Conferimento dei rifiuti presso centri di recupero autorizzati alla messa in riserva e al recupero;
- Smaltimento dei rifiuti presso discariche autorizzate.

Di tutti i rifiuti saranno definite, prima dell'avvio ad impianti di recupero/smaltimento, le seguenti caratteristiche:

- Codice CER (sulla base delle analisi di caratterizzazione);
- Quantità;
- Modalità di recupero/smaltimento (sulla base delle analisi di caratterizzazione).

Tutti i rifiuti in deposito temporaneo, privilegiando la differenziazione per tipologia, saranno etichettati riportando il codice CER e la descrizione del rifiuto.

Il recupero/smaltimento di ciascuna tipologia sarà eseguito conformemente a quanto ottenuto dalla caratterizzazione dei rifiuti.

I rifiuti prodotti saranno successivamente prelevati con automezzi autorizzati e idonei allo scopo (es. autospurgo, autobotti, cassoni, etc.) ed inviati ad impianti regolarmente autorizzati per il successivo smaltimento/recupero.

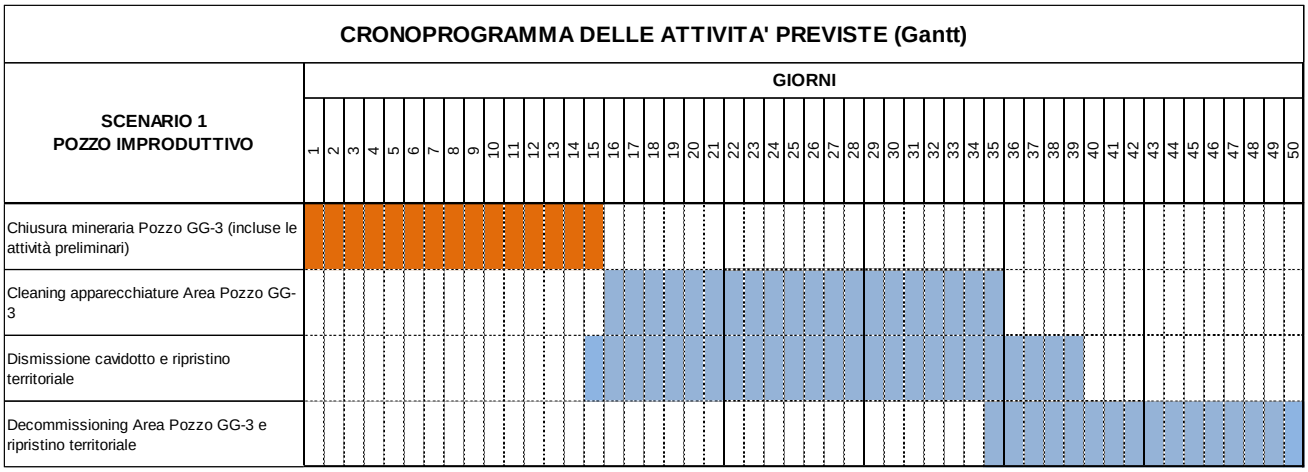
Le attività di trasporto e recupero/smaltimento saranno svolte da soggetti autorizzati ai sensi della normativa di settore.

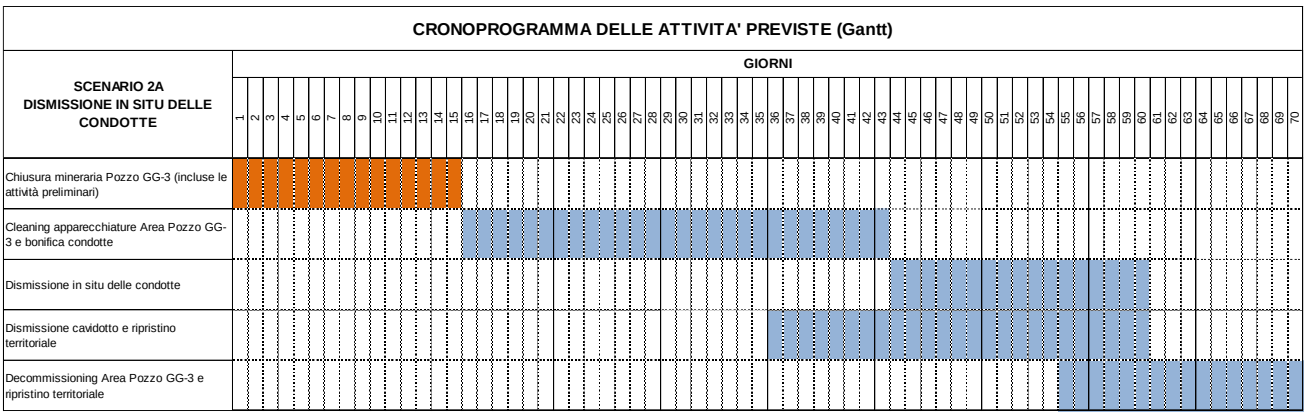
12.1 PIANO PRELIMINARE DELLE ATTIVITÀ

Di seguito si riporta il piano preliminare delle attività previsto per i due scenari di decommissioning delle condotte (Dismissione in situ vs Rimozione totale).

Le seguenti attività non sono incluse nel piano:

- Engineering e Permitting;
- Indagini ambientali preliminari e/o attività di bonifica post decommissioning.





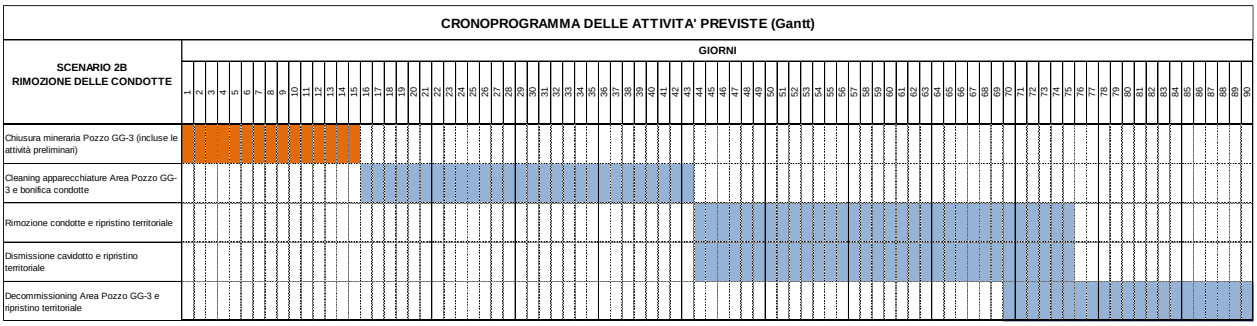


Figura 16 – Piano preliminare delle attività

Le tempistiche riportate, 50 giorni per lo *"SCENARIO 1",* 70 giorni per lo *"SCENARIO 2A"* e 90 giorni per lo *"SCENARIO 2B"*, sono da considerarsi indicative e dovranno essere aggiornate in fase di elaborazione del progetto di decommissioning sito-specifico.

In ogni caso, si precisa che, *la fase di decommissioning sarà avviata in caso di esito minerario negativo (pozzo improduttivo) o a conclusione della vita utile del pozzo, stimata al 2068. Prima dell'avvio delle attività di dismissione*, *sarà predisposto e condiviso con gli Enti competenti un progetto esecutivo di decommissioning che, tra l'altro, andrà a definire con maggiore dettaglio le modalità di gestione delle terre e rocce da scavo e sarà comprensivo degli elaborati previsti dal DPR 120/2017 attualmente in vigore o dalla normativa vigente al momento della dismissione stessa. Le attività di decommissioning dell'opera saranno appaltate a una o più ditte specializzate, munite di tutti i requisiti necessari per garantire le massime condizioni di sicurezza e di protezione dell'ambiente e della salute durante le operazioni presso l'area di progetto.*

13.0 DOCUMENTI ALLEGATI

Fanno parte integrante della presente relazione si rimanda gli elaborati allegati che si riportano di seguito:

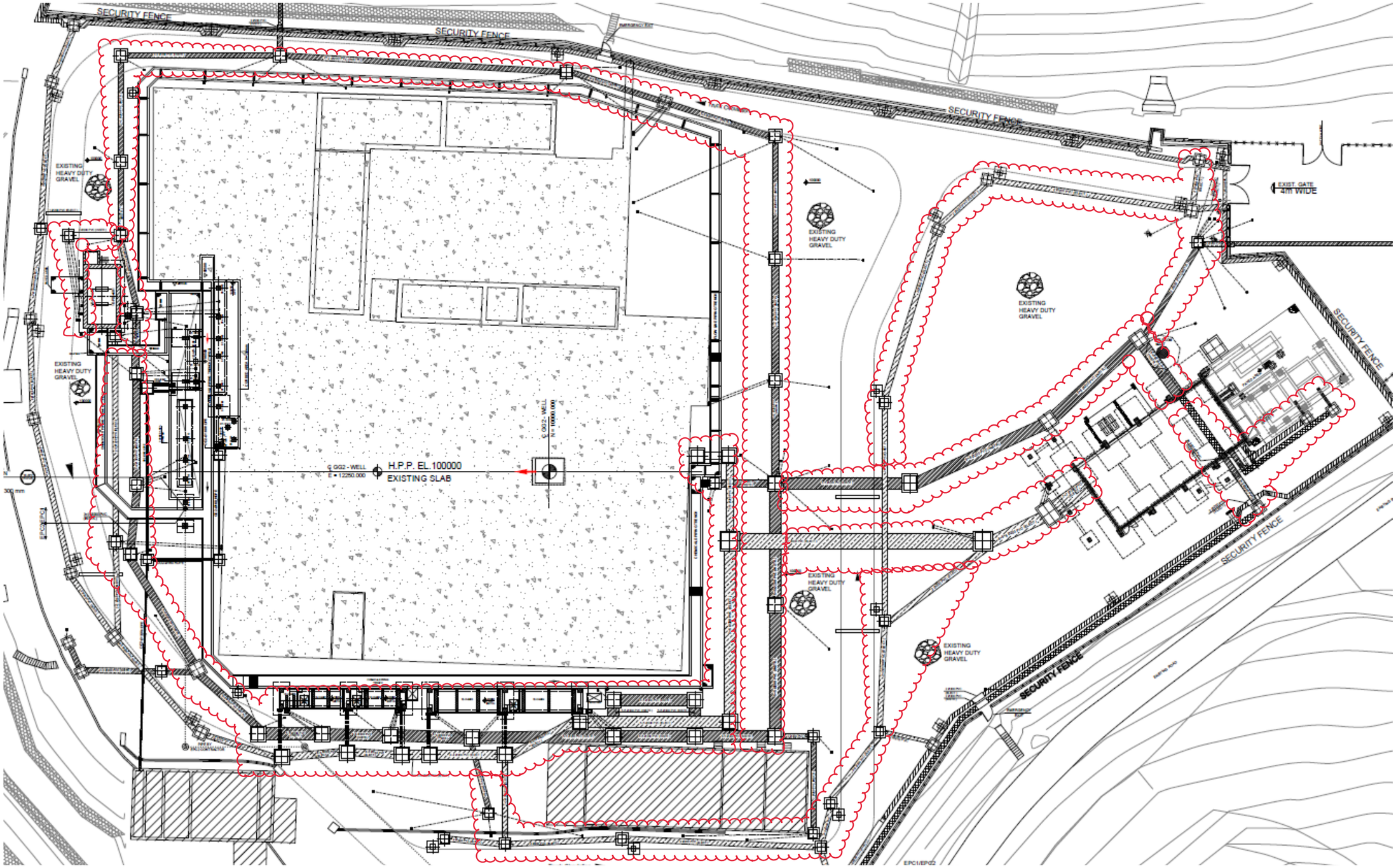
IT-TPR-00-SMDF-000402_00	Corografia generale e vincolo
IT-TPR-00-SMDF-000411_00	Sistemazione area piazzale e sezione tipo
IT-TPR-00-SMDF-000416_00 Foglio 1/2	Planimetria – layout allestimento finale
IT-TPR-00-SMDF-000439_00	Flowline – tracciato su ortofotocarta
IT-TPR-00-SMDF-000451_00	Fotoinserimento rendering 3D allestimento finale
IT-TPR-00-ADON-000119_00	Planimetria schema tipologico sottoservizi
IT-TPR-00-ADON-000120_00	Raffronto impianto realizzato/impianto dismesso e sito ripristinato
IT-TPR-00-ADON-000121_00	Cronoprogramma
GM-EP-ENV-055	*Environmental specifications for site restitution*
GS-EP-ENV-001	*Environmental requirements for projects design and E&P activities*
GM-EP-APP-008	*Decommissioning of production facilities*
GM-EP-ED-001	*Gestion du processus de restitution des sites (RES)*
CR-OT-DW-424	*Permanent and Temporary Well Abandonment*

PIANO DI DECOMMISSIONING OPERE FUTURE AREA POZZO GG-3 ED OPERE AFFERENTI

PLANIMETRIA SCHEMA TIPOLOGICO SOTTOSERVIZI

DOCUMENT N°: IT-TPR-00-ADON-000119

Rev.	Status	Date	Revision memo	Issued by	Checked by	Approved by
00	IFR	28/11/2023	Issued for Review	G. Adone	G. Adone	G. Adone



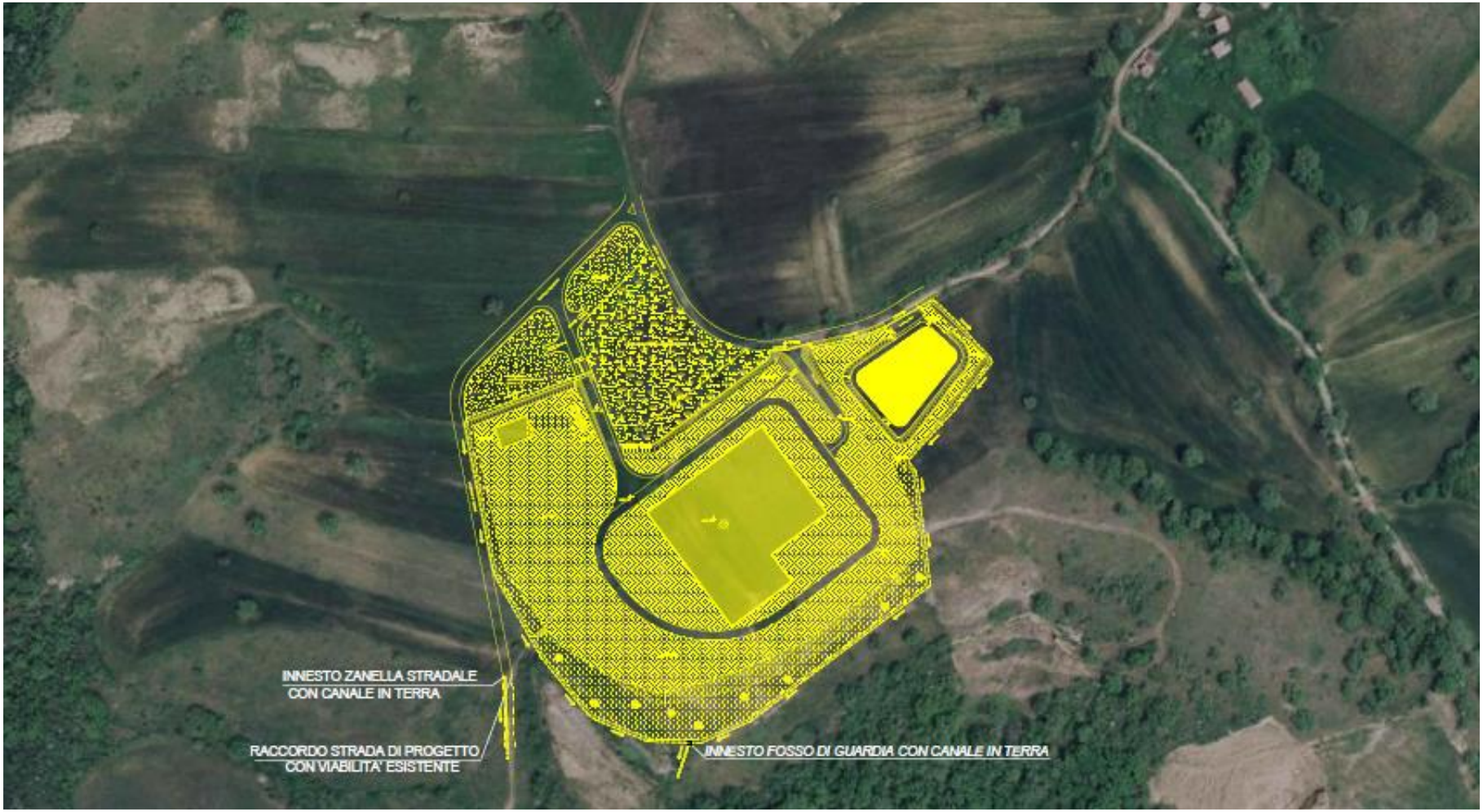
NOTA: PER IL PIAZZALE I SOTTOSERVIZI NON SONO ANCORA STATI DEFINITI, PERTANTO IL PRESENTE RAPPRESENTA UNO SCHEMA DI POSSIBILE LAYOUT DEGLI STESSI.

PIANO DI DECOMMISSIONING OPERE FUTURE AREA POZZO GG-3 ED OPERE AFFERENTI

RAFFRONTO IMPIANTO REALIZZATO/IMPIANTO DISMESSO E SITO RIPRISTINATO

DOCUMENT N°: IT-TPR-00-ADON-000120

Rev.	Status	Date	Revision memo	Issued by	Checked by	Approved by
00	IFR	28/11/2023	Issued for Review	G. Adone	G. Adone	G. Adone



Stato con impianto realizzato

Rendering con sovrapposizione impianto

Stato con impianto dismesso e sito ripristinato

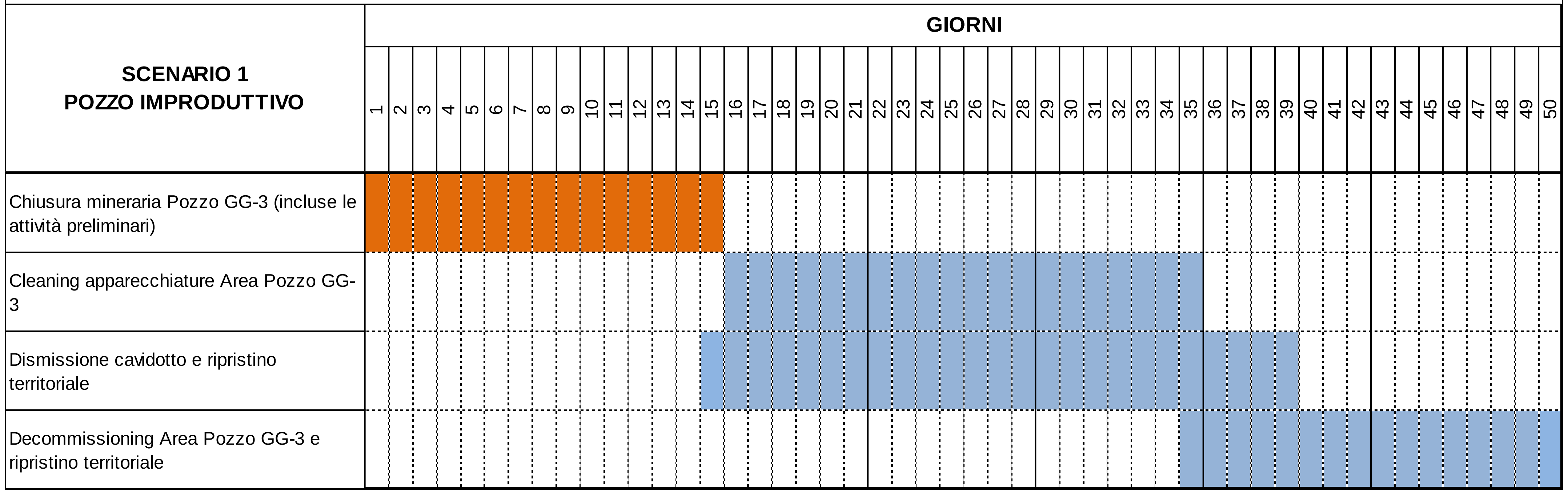
PIANO DI DECOMMISSIONING OPERE FUTURE AREA POZZO GG-3 ED OPERE AFFERENTI

CRONOPROGRAMMA

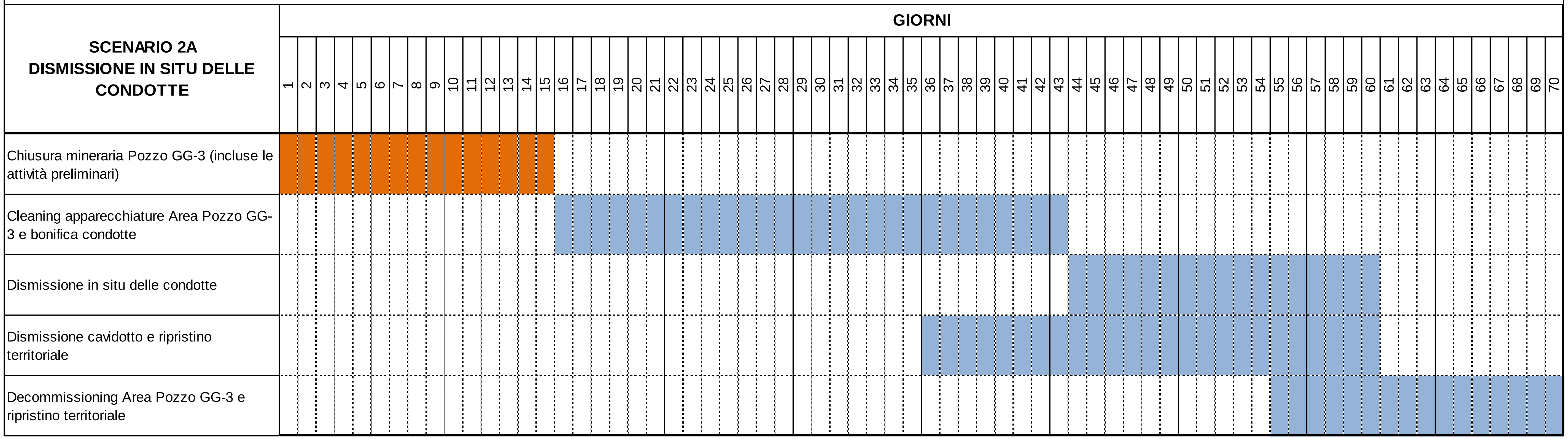
DOCUMENT N°: IT-TPR-00-ADON-000121

Rev.	Status	Date	Revision memo	Issued by	Checked by	Approved by
01	AFU	24/05/2024	Approved for Use			
00	IFR	28/11/2023	Issued for Review	G. Adone	G. Adone	G. Adone

CRONOPROGRAMMA DELLE ATTIVITA' PREVISTE (Gantt)



CRONOPROGRAMMA DELLE ATTIVITA' PREVISTE (Gantt)



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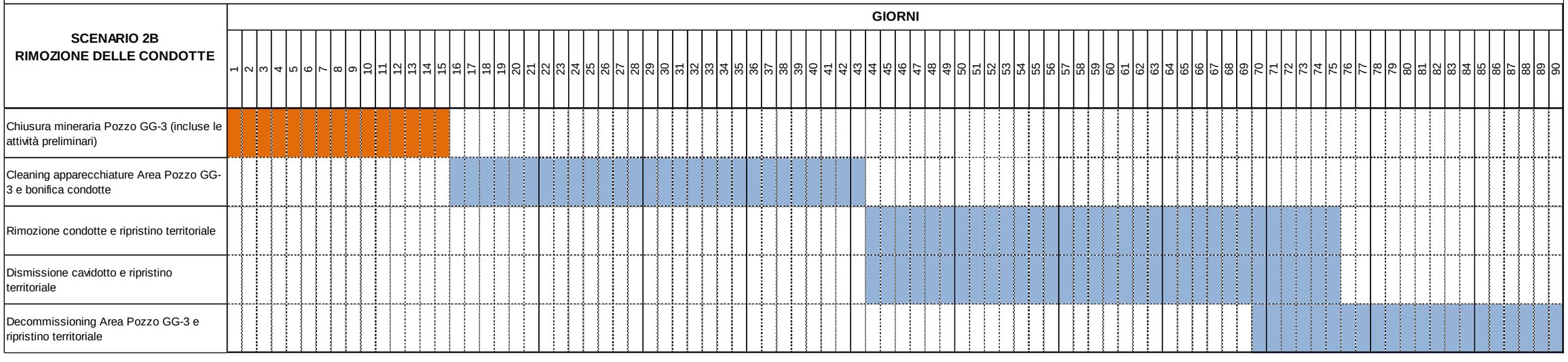
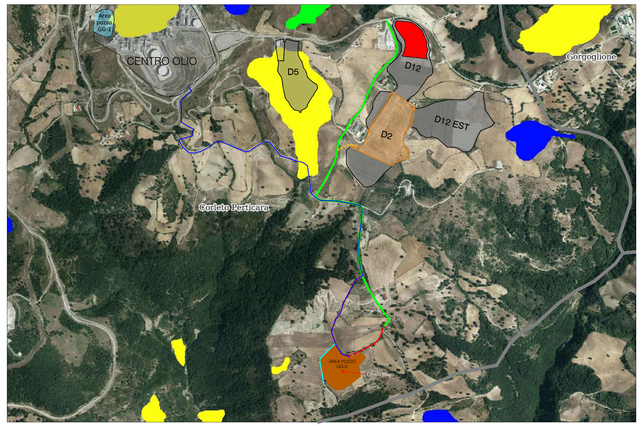


PLANIMETRIA VINCOLO IDROGEOLOGICO - PAI - FRANE

- Viabilità esistente da ripristinare
- Viabilità esistente da adeguare
- Viabilità di accesso all'area di colmata Dumping D2
- Viabilità ex-novo
- Flowline - Cavidotto GG-3

- Opere esistenti non oggetto del progetto "perforazione pozzo GG3 e sua messa in produzione"
- Area di colmata di riferimento dumping D2 da ampliare
- Area di stoccaggio di completamento in dumping D12

R1 R2 R3

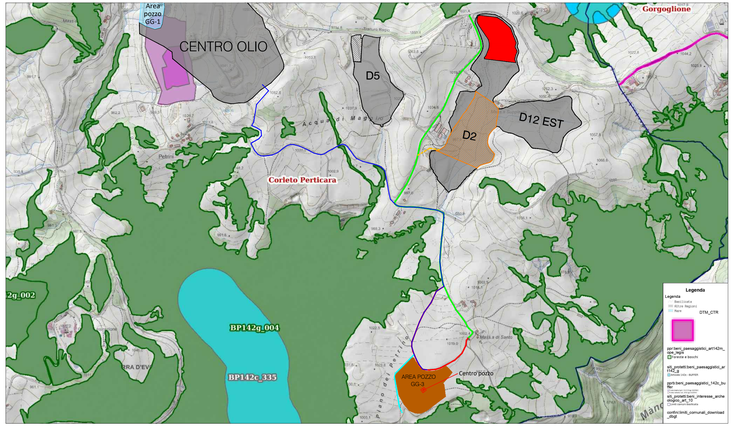


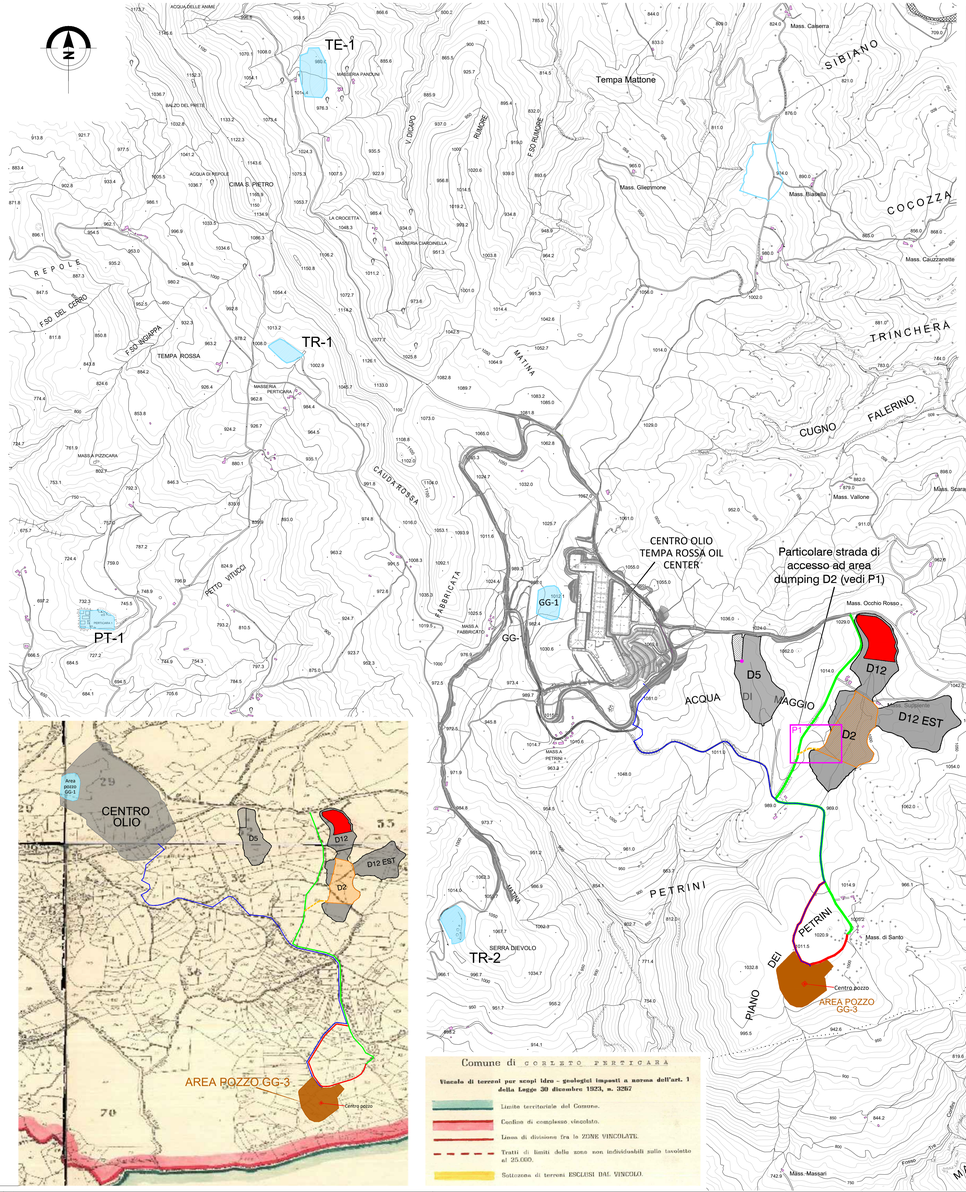
PLANIMETRIA VINCOLO FORESTALE

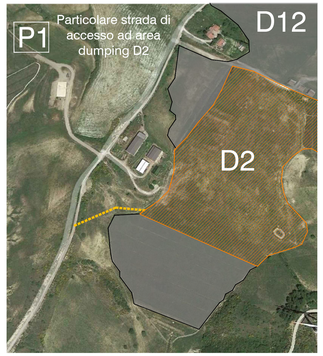
(fonte RSDI Regione Basilicata)

- Viabilità esistente da ripristinare
- Viabilità esistente da adeguare
- Viabilità di accesso all'area di colmata Dumping D2
- Viabilità ex-novo
- Flowline GG-3 / Conduttura GG-3

- Opere esistenti non oggetto del progetto "perforazione pozzo GG3 e sua messa in produzione"
- Area di colmata di riferimento dumping D2 da ampliare
- Area di stoccaggio di completamento in dumping D12







NOTE GENERALI

- *L'equidistanza fra le curve di livello è di metri 10*
- *Altimetria riferita al livello medio del mare (Q slm - Mareografo di Genova)*
- *La superficie del piazzale interessata alle fasi di lavorazione è pari a circa 41'286.00 mq*

COORDINATE CENTRO POZZO GG-3

WGS84		GAUSS-BOAGA		
Latitudine	Longitudine	EST	NORD	QUOTA s.l.m.
40.39343691	16.0961946	2613040.5697	4472008.2594	**1009,00**

COORDINATE PUNTO RECINZIONE DAS

WGS84		GAUSS-BOAGA		
Latitudine	Longitudine	EST	NORD	QUOTA s.l.m.
40.40769744	16.09281283	2612733.9986	4473587.6506	**1024,50**

SIMBOLOGIA

- TE-1 AREA POZZO TEMPA DEMMA 1
- TR-1 AREA POZZO TEMPA ROSSA 1
- TR-2 AREA POZZO TEMPA ROSSA 2
- GG-2 AREA POZZO GORGOGLIONE 2
- PT-1 AREA POZZO PERTICARA 1
- GG-1 AREA POZZO GORGOGLIONE 1

LEGENDA INTERVENTI

- GG-3 GORGOGLIONE 3 (oggetto di intervento)
- Viabilità esistente da ripristinare
- Viabilità esistente da adeguare
- Viabilità di accesso all'area di colmata Dumping D2
- Viabilità ex-novo
- Flowline - cavidotto GG-3
- Opere esistenti non oggetto del progetto "perforazione pozzo GG3 e sua messa in produzione"
- Area di colmata di riferimento dumping D2 da ampliare
- Area di stoccaggio di completamento in dumping D12

scala grafica (m)

0 100 200 400 600 800 1000

Revision	Date	Status	Revision memo	Issued by	Checked by	Approved by
00	03/05/2023	AFD	Accepted For design	G. LO SASSO	M.DE FALCO	M.DE FALCO

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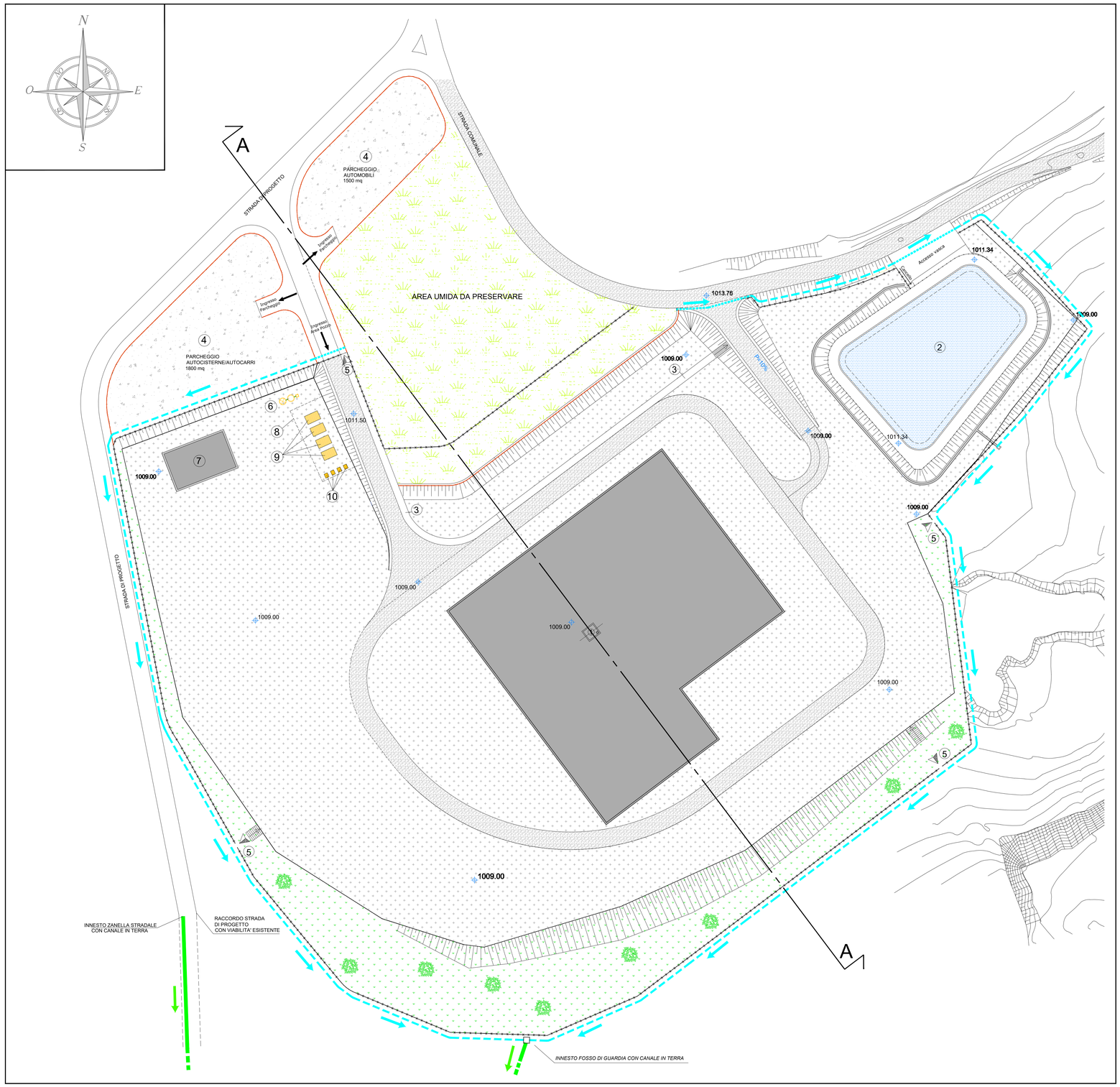
Ing. Michele De Falco

PROGETTO DI PERFORAZIONE DEL POZZO ESPLORATIVO DENOMINATO "GORGOGLIONE 3" E SUA EVENTUALE MESSA IN PRODUZIONE

GG-3 - COROGRAFIA GENERALE E VINCOLI

Doc. Type:	LAY	Syst. / S-Syst.:		Discipline:	CIV	Electronic Filename:	IT-TPR-00-SMDF-000402_00.dwg
COMPANY Document N.	IT-TPR-00-SMDF-000402			Rev.	00	Scale	Varie
Contractor Document N.	IT-TPR-00-SMDF-000402_00			Format:	A1	Sheet	1 of 1



NOTE GENERALI

- *Rappresentazione in Coordinate Gauss-Boaga/WGS84*
- *Altimetria riferita al livello medio del mare (Q slm - Mareografo di Genova)*
- *La superficie del piazzale interessata alle fasi di lavorazione è pari a circa 41'286.00 mq*

COORDINATE CENTRO POZZO GG-3		
GAUSS-BOAGA		
EST	**NORD**	**QUOTA s.l.m.**
2613040.5697	4472008.2594	**1009,00**

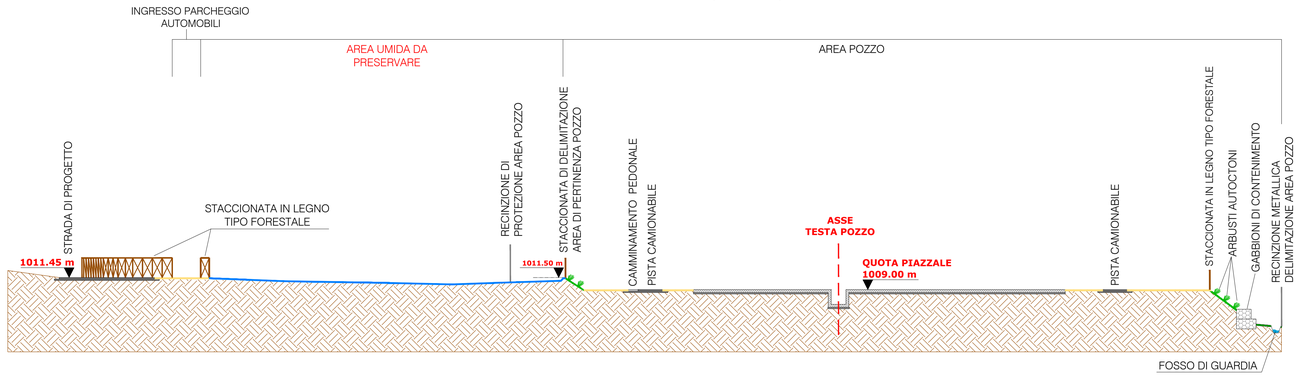
COORDINATE CENTRO POZZO GG-3	
WGS84	
Latitudine	**Longitudine**
40.39343691	16.0961946

LEGENDA

1. Centro pozzo GG-3
2. Vasca di stoccaggio acqua industriale V=4.000,00 mc (Per le funzioni d'uso vedasi tav. 414 - 415 - 416)
3. Percorso pedonale
4. Area parcheggio
5. Uscite di emergenza
6. Fossa Imhoff e fossa chiarificatrice
7. Basamento per area campo
8. Area inghiaiata con contenitori a tenuta e con copertura per deposito temporaneo rifiuti
9. Cassoni Scarrabili a tenuta
10. imballaggi - IBC - big bag

- Aree a verde
- Area umida da preservare
- Area inghiaiata
- Platea in c.a.
- Parcheggio in misto stabilizzato
- Pista camionabile
- Staccionata in legno
- Recinzione area pozzo con rete metallica
- Fosso di guardia in terra con geostuoia
- Canali in terra con geostuoia

SEZIONE (A - A)



Revision	Date	Status	Revision memo	Issued by	Checked by	Approved by
00	03/05/2023	AFD	Accepted For design	G. LO SASSO	M.DE FALCO	M.DE FALCO

TotalEnergies

TEMPA ROSSA

STUDIO TECNICO ASSOCIATO

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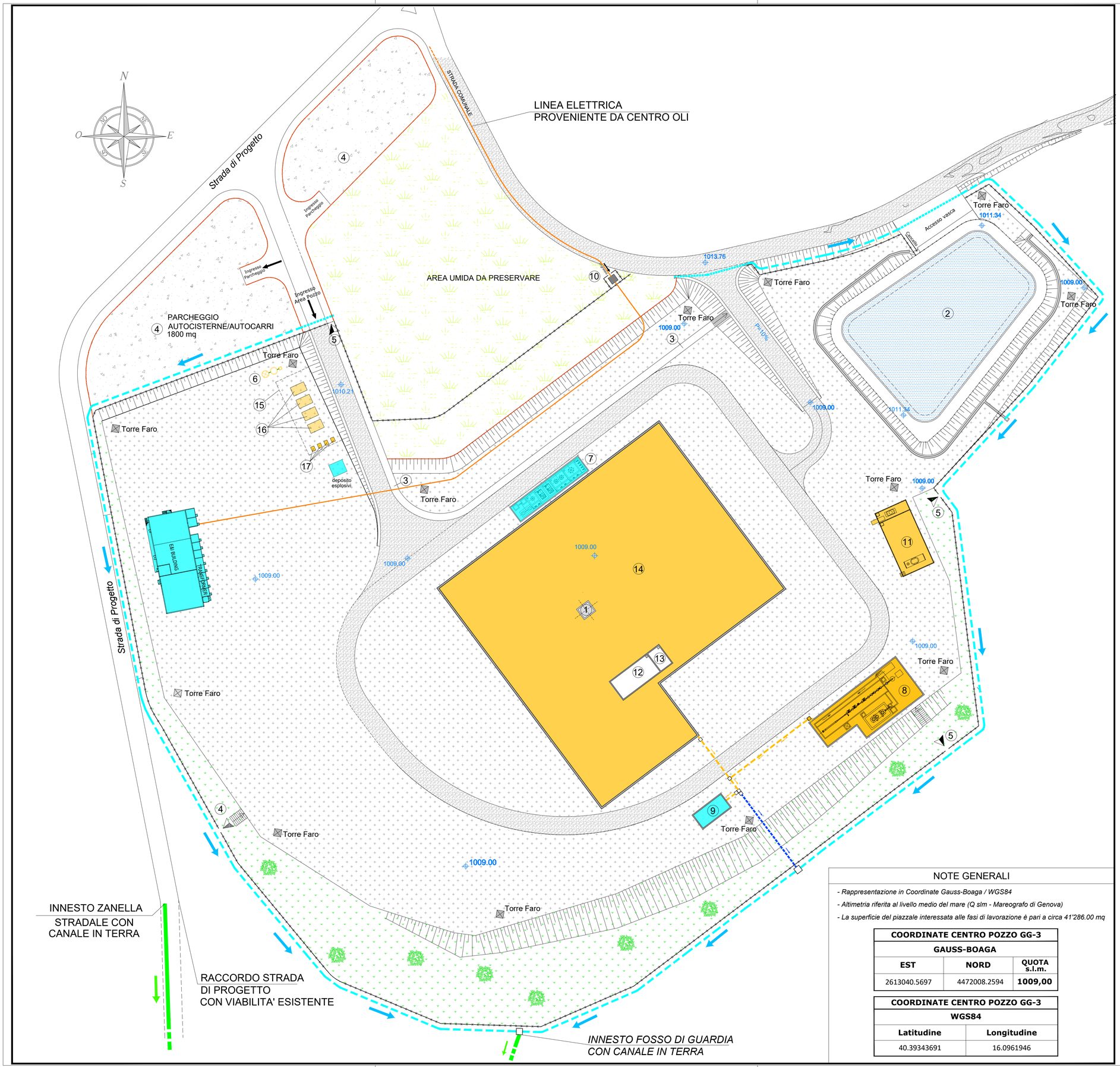
Ing. Michele De Falco

PROGETTO DI PERFORAZIONE DEL POZZO ESPLORATIVO DENOMINATO "GORGOGLIONE 3" E SUA EVENTUALE MESSA IN PRODUZIONE

GG-3 - AREA POZZO: SISTEMAZIONE AREA PIAZZALE E SEZIONE TIPO

Doc. Type:	LAY	Syst. / S-Syst.:		Discipline:	CIV	Electronic Filename: IT-TPR-00-SMDF-000411_00.dwg
COMPANY Document N.	IT-TPR-00-SMDF-000411			Rev.	00	Scale 1/500
Contractor Document N.	IT-TPR-00-SMDF-000411_00			Format:	A0	Sheet 1 of 1



LEGENDA

1. Cantina pozzo
2. Vasca di stoccaggio acqua antincendio V=4.000,00 mc
3. Percorso pedonale
4. Area parcheggio
5. Uscite di emergenza
6. Fossa Imhoff e fossa chiarificatrice
7. Area di stoccaggio prodotti chimici provvista di tettoia
8. Trappola di lancio e ricezione
9. Vasca stoccaggio acque meteoriche prima e seconda pioggia.
10. Junction box per alimentazione elettrica impianto di perforazione
11. Bacino di contenimento area stoccaggio gasolio - olio idraulico
12. Vasca corrall stoccaggio detriti e fluidi esausti (**non attiva**)
13. Vasca corrall stoccaggio fluidi speciali (**non attiva**)
14. Piazzale area pozzo in c.a.
15. Area inghiaiata con contenitori a tenuta e con copertura per deposito temporaneo rifiuti
16. Cassoni scarrabili a tenuta
17. Imballaggi - IBC - big bag

- Staccionata in legno
- Recinzione area pozzo con rete metallica
- Canali in terra con geostuoia
- Fosso di guardia in terra con geostuoia
- Tubazione interrata acque meteoriche potenzialmente contaminate
- Tubazione interrata scarico acque metoriche da pozzetto di by-pass a fosso di guardia
- Aree inghiaiate
- Pista camionabile
- Superfici impermeabili non contaminate
- Superfici impermeabili potenzialmente contaminate
- Aree a verde
- Parcheggio in misto stabilizzato
- Area umida da preservare
- Torre faro

scala grafica (m)

5 10 20 30 40 50

NOTE GENERALI

- *Rappresentazione in Coordinate Gauss-Boaga / WGS84*
- *Altimetria riferita al livello medio del mare (Q slm - Mareografo di Genova)*
- *La superficie del piazzale interessata alle fasi di lavorazione è pari a circa 41'286.00 mq*

COORDINATE CENTRO POZZO GG-3		
GAUSS-BOAGA		
EST	**NORD**	**QUOTA s.l.m.**
2613040.5697	4472008.2594	**1009,00**

COORDINATE CENTRO POZZO GG-3	
WGS84	
Latitudine	**Longitudine**
40.39343691	16.0961946

Revision	Date	Status	Revision memo	Issued by	Checked by	Approved by
00	03/05/2023	AFD	Accepted For design	G. LO SASSO	M.DE FALCO	M.DE FALCO

TotalEnergies — TEMPA ROSSA

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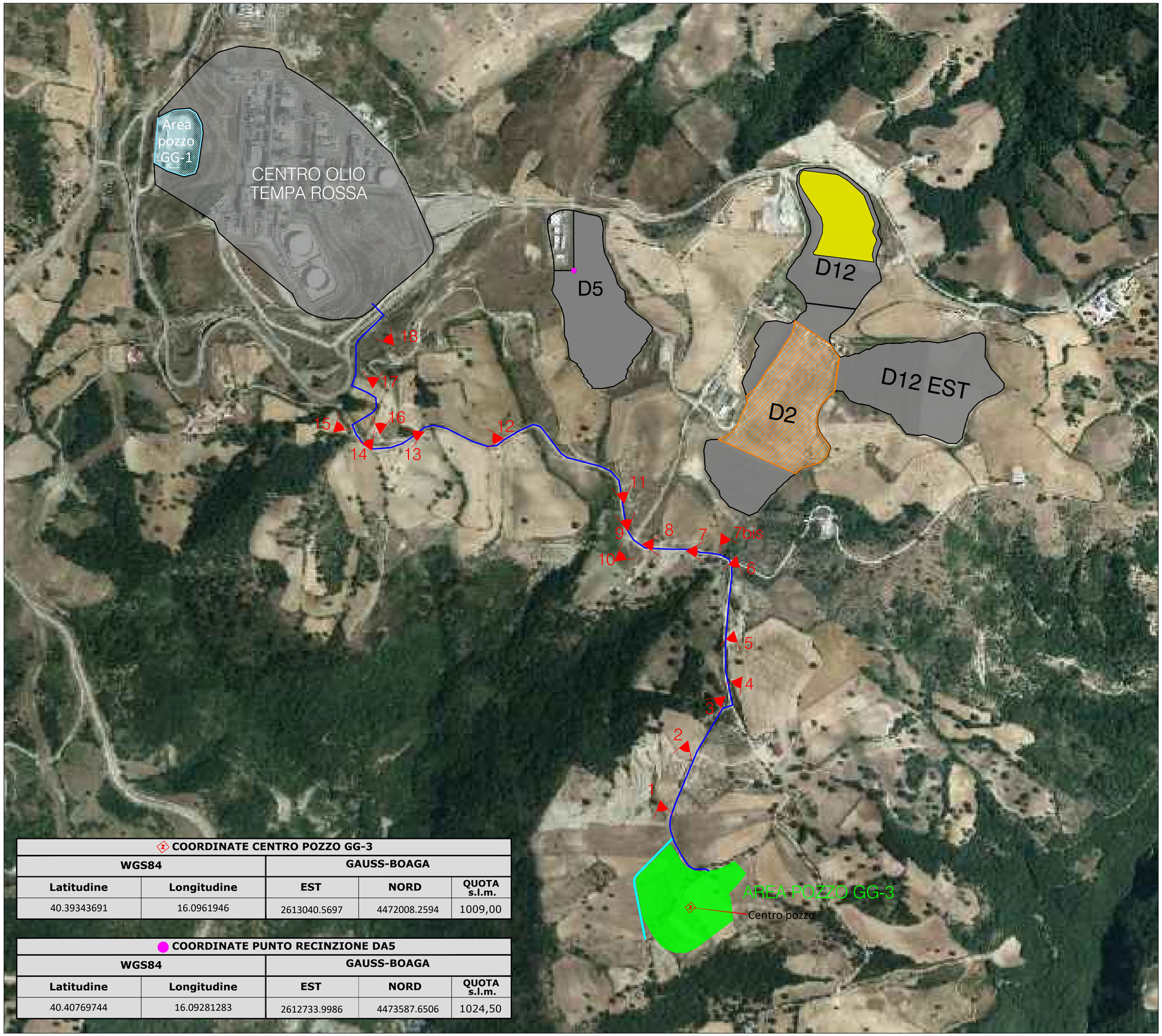
PROGETTO DI PERFORAZIONE DEL POZZO ESPLORATIVO DENOMINATO "GORGOGLIONE 3" E SUA EVENTUALE MESSA IN PRODUZIONE

GG-3 - AREA POZZO: PLANIMETRIA - LAYOUT ALLESTIMENTO FINALE

Doc. Type:	LAY	Syst. / S-Syst.:	Discipline:	CIV	Electronic Filename
					IT-TPR-00-SMDF-000416_00.dwg

COMPANY Document N.	IT-TPR-00-SMDF-000416	Rev.	00	Scale	1/500
Contractor Document N.	IT-TPR-00-SMDF-000416_00	Format:	A1	Sheet	1 of 2

Inquadramento generale



COORDINATE CENTRO POZZO GG-3				
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"PERFORAZIONE POZZO GG3 E SUA MESSA IN PRODUZIONE"

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AREA DI STOCCAGGIO DI COMPLETAMENTO IN DUMPING D12

Revision	Date	Status	Revision memo	Issued by	Checked by	Approved by
00	03/05/2023	AFD	Accepted For design	G. LO SASSO	M.DE FALCO	M.DE FALCO

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PROGETTO DI PERFORAZIONE DEL POZZO ESPLORATIVO DENOMINATO "GORGOGLIONE 3" E SUA EVENTUALE MESSA IN PRODUZIONE

GG-3 - FLOWLINE - TRACCIATO SU ORTOFOTOCARTA - PUNTI DI OSSERVAZIONE FOTOGRAFICI

Doc. Type:	LAY	Syst. / S-Syst.:	Discipline:	CIV	Electronic Filename IT-TPR-00-SMDF-000439_00.dwg
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Contractor Document N.	IT-TPR-00-SMDF-000439_00		Format:	A1	Sheet: 1 of 1

Revision	Date	Status	Revision memo	Issued by	Checked by	Approved by
00	03/05/2023	AFD	Accepted For design	G. LO SASSO	M.DE FALCO	M.DE FALCO

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PROGETTO DI PERFORAZIONE DEL POZZO ESPLORATIVO DENOMINATO "GORGOGLIONE 3" E SUA EVENTUALE MESSA IN PRODUZIONE

GG-3 - AREA POZZO: FOTOINSERIMENTO RENDERING 3D: ALLESTIMENTO FINALE

Doc. Type:	REP	Syst. / S-Syst.:	Discipline:	CIV	Electronic Filename
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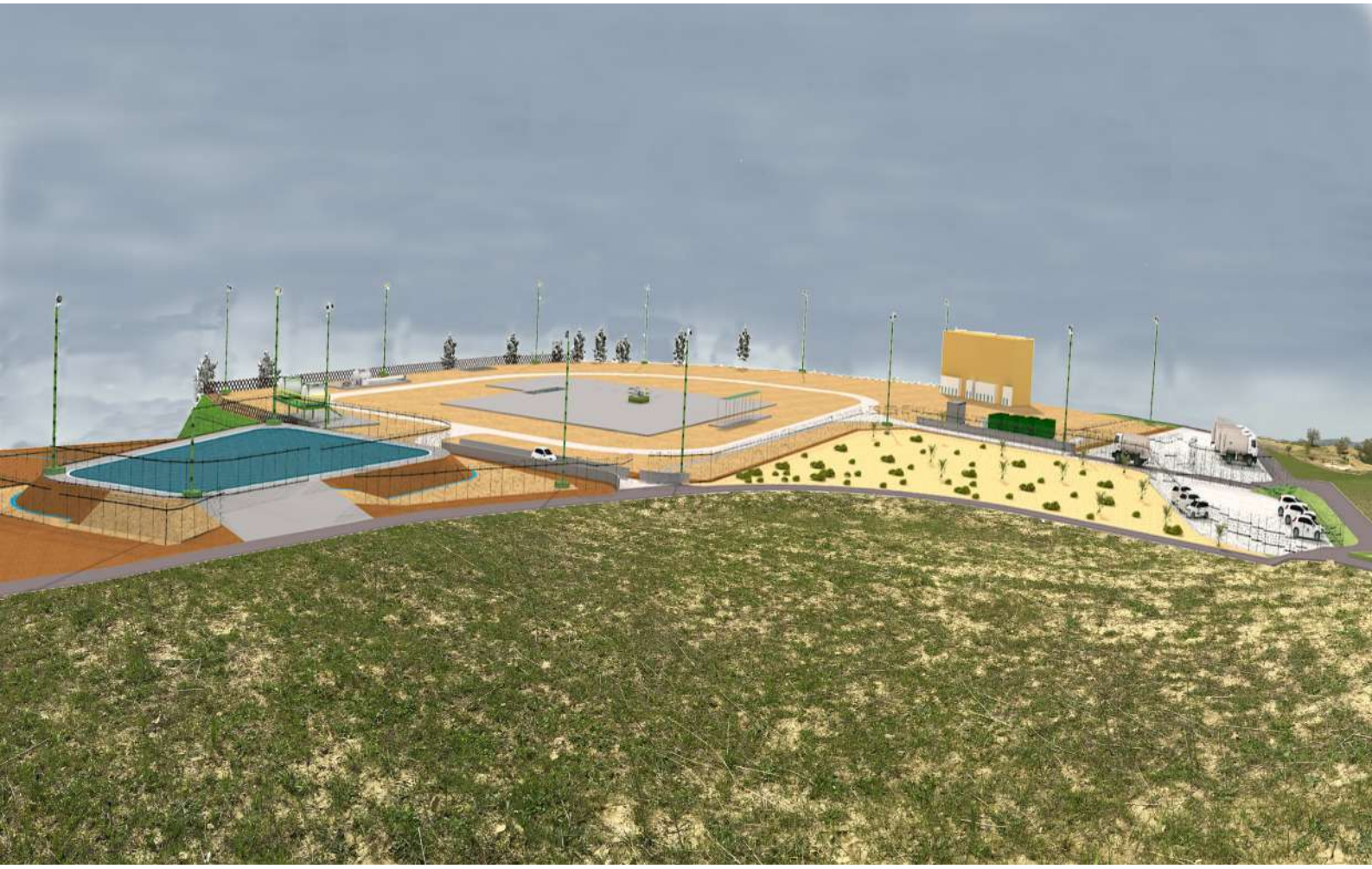
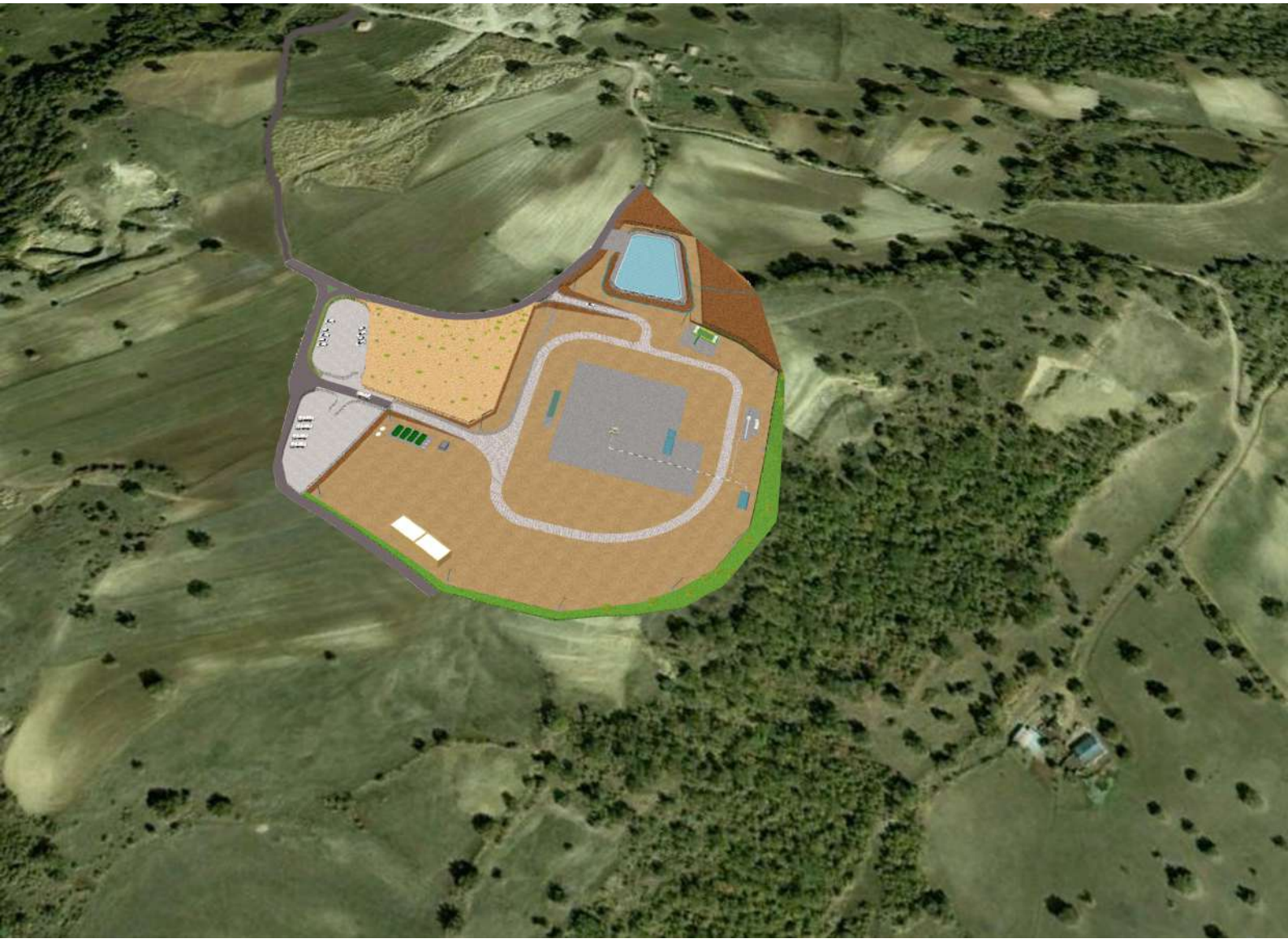




Scope

This Guide &Manual provides guidance on the decommissioning and disposal of disused oil and gas production facilities.

Field of application

Application of this guide by the affiliates remains subject to the assessment of Asset Retirement Obligations and also to local, regional and international laws, regulations and conventions as well as applicable contracts. This document clarifies the statements made in the DIR EP 13. The objective of this guide is to assist in the execution of a decommissioning pre-project. The new financial standard FAS 143 gives a definition of the long-term assets (and asset developments) to be considered during the application of this guideline, which is deemed to be compliant with the requirements FAS 143. This guideline is applicable to both onshore and offshore production facilities and situations where Total is the operator, but may also be used as a guide for partner-operated fields. Decommissioning projects shall be treated as any other projects and follow the same requirements for studies and project execution. However, decommissioning projects require special attention due to the fact that particular challenges are introduced in some areas:

- Decommissioning is not only an engineering project. Public confidence and support is also required
- Understanding and interpretation of national and international laws and regulations
- Selection of the recommended decommissioning arrangements and assessment of their Environmental Impact.
- Disposal of disused installations and waste management.
- Site remediation ;
- Cost estimation
- Financial treatment of decommissioning costs ;
- Issues related to termination of a licence.
- Stakeholder dialogue.

It is recommended that the database kept by HSEQ/ESSH/ENV and DSO/ED is actively used in such a process.

Revisions

Document update realised by standards coordination Reorganisation 2015

02	06/2015	Organisation change – January 2015
01	11/2012	Update following the EP reorganization, March 2011
00	09/2004	First issue
Rev.	Date	Purpose of the revision

Owning entity: DSO/ED	Managing entity: DSO/ED

Approvals

Original Signed

Technical Validation:	Quality Control:	Final Approval:
Ch. Combet	H. de Lapasse	J.Y. Durieux

Date: 10/2012

Contents

Reference documents

The reference documents listed below form an integral part of this Guide & Manual.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
OSPAR Decision 98/3	OSPAR Decision 98/3 on the Disposal of Disused Offshore Installations
OSPAR Convention	The convention for the protection of the marine environment of the North East Atlantic
IMO A.672	Guidelines and standards for the removal of offshore installations and structures on the continental shelf and in the exclusive economic zone
1972 LC72	The London Dumping Convention and its 1996 protocol
UNCLOS Article 60.3	The United Nations Convention On Law of the Sea
Geneva Convention on the continental Shelf - Article 5.5 & Article 210.5	
E&P Forum Report n°2.70/242	Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites
FAS 143	Accounting for Asset Retirement Obligations

Total Standards

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published.

Reference	Title
CR EP ACC 001	Accounting for E&P inventories of Consumables
CR EP ACC 009	Provisionfor site restitution obligation
CR EP FP 424	Plug and Abandon
DIR EP 13	Site Restitution
DIR EP 11	Development project
CR EP APP 001	Project Statement of Requirements (SOR)

1. Introduction

1.1 Background

In this guideline the term decommissioning includes the following activities, which are carried out during Decommissioning Pre-Project and Project Phases:

- Site information surveys,
- Assessment of the possibility of reusing all or parts of the facilities, either at their current location or at another site,
- Assessment of the possibility of recycling all or parts of the facilities,
- Environmental Impact Assessment,
- Risk Management,
- Programme planning, including obtaining necessary approvals,
- Public consultation and dialogue with stakeholders,
- Decommissioning of production and utility systems and equipment,
- Well plugging and abandonment,
- Preparation for disposal including hook down,
- Removal/transportation,
- Re-use of all or parts of the facilities,
- Dismantle/recycle/disposal (including material and waste management).
- Remediation and reclamation of site,
- Post-remediation and reclamation monitoring and surveys,
- Cancellation of rights and obligations / Hand-over of rights and obligations in the event of asset transfer / Remaining activities, as the case might be.

1.2 Financial Aspects

Please note that assessment of fiscal impacts (possibility of deduction of expenses versus remaining income) and budgetary allocations of the costs shall be performed as early as possible for producing installations and from the start of production for new projects.

The new accounting standard FAS 143 requires decommissioning costs to be integrated into the value of the fixed asset from the outset, i.e. when the concerned development is placed in service. For this reason, the rules applicable to financial aspects (yearly provisions) are not dependent on the degree of maturity of the asset ceasing operation (See CR EP ACC 009 for further details)

1.3 Preparation and Planning

For fields in production, preparation and planning for decommissioning should start no later than 3 to 4 years before the anticipated end of economic production in order to ensure that:

- Local, regional and international laws, regulations and conventions as well as applicable contracts are assessed and possible decommissioning arrangements are thoroughly evaluated. Decommissioning is a sensitive issue and care must be taken in selecting the decommissioning and disposal arrangements.
- Stakeholder dialogue starts as early as possible thereby creating a common perception of the issue and building confidence in the Company's approach for arriving at the recommended option.
- The necessary approvals (internal, partnership and local authorities) are received in a timely manner and preparation for the works are carried out smoothly (e.g. effective planning of field operations and maintenance activities at the end of the field life)

1.4 General Principles for Decommissioning Studies

The company will follow the Best Practical Environmental Option (BPEO) method for all decommissioning activities and use Environmental Impact Assessments (EIA) as a tool to document this approach. The BPEO provides the greatest benefit, or entails least damage, to the environment as a whole at an acceptable cost both in the long and short term. It is determined by the comparative assessment of alternative decommissioning arrangements based upon the following criteria: technical feasibility, environmental impact to air, land and water; risks to the health and safety of both the workforce and the public and economics.

Subject to local, regional and international laws, regulations and conventions as well as applicable contracts, the company will follow the following principles for decommissioning activities:

Production Installations and Associated Facilities

Offshore: Whenever local reuse is not possible, decommissioning alternatives to be studied shall be based upon the OSPAR Decision 98/3, the International Maritime Organisation IMO A.672(16) from 1989, the 1972 London Dumping Convention 1996 protocol and/or local regulations as applicable. A comparative assessment shall be carried out in order to arrive at the recommended disposal arrangement. Disposal of removed parts shall be assessed according to the internationally agreed waste management hierarchy (reuse, recycling, treatment and responsible disposal).

Onshore: According to the Oil and Gas Producers (OGP) guidelines for decommissioning. (E&P Forum Report 2.70 entitled "Decommissioning, Remediation and Reclamation Guidelines for Onshore E&P Sites" dated 1996).

Pipelines and Cables

Offshore: Offshore export pipelines will be left in place and cleaned of all hazardous substances to the appropriate standard. In some cases trenching or removal of complete pipelines, or parts thereof, will need to be evaluated. Small in field flowlines (typically less than 12" diameter) will be suitably cleaned and removed. Larger in field flowlines can be left in situ provided it can be demonstrated that no unacceptable risk exists.

Cables will be left in place (except in-field cables which will normally be removed).

Onshore: For onshore pipelines and cables, a case-by-case evaluation will be required by applying the BPEO method.

Wells

Wells shall be abandoned in accordance with the requirements of CR EP FP 424 “Plug & Abandon “.

2. The Cessation Decision Process

The cessation and decommissioning process for a field is similar in many respects to its development and should therefore follow the same decision process. For marginal fields or isolated wells a simplified decision process may be possible.

3. Decommissioning Considerations during Pre-Development Stage

Consideration shall be given to the decommissioning of a field during the initial field concept development and installation design.

3.1 Concept Selection

Decommissioning cost estimates shall be prepared during the pre-development stages of conceptual studies and field development planning.

If other aspects are similar, a development scheme having the lowest decommissioning cost should normally be preferred.

If other aspects are similar, a development scheme having the least total environmental impact during and after decommissioning should normally be preferred.

3.2 Project Definition / Basic Engineering and Design of the Facilities

During the Pre-Project Definition and Basic Engineering Phases, the design shall be developed not only to optimise the production phase and field economics, but also to minimise the decommissioning costs and the final environmental impact of the development.

In particular, all installations shall be designed to be totally removable (with the possible exception of pipelines in certain situations). This implies that the necessary technologies for the removal and disposal of the installations shall be available at the time of the development project. Furthermore, the design shall allow these technologies to be effectively applied at the time of decommissioning (e.g. structures installed after a floating phase shall be re-floatable at the end of their operating life).

The proposed plan for field decommissioning shall be submitted together with the field development plan.

4. Evaluation of Residual Value

The first major step in determining when to cease production is to conduct a Residual Value study. This should be undertaken when field production starts to fall below the plateau level and when economics start to deteriorate (increasing production cost per barrel).

The objective of this study is to evaluate the remaining value of a field at a given point in time, and to recommend appropriate measures. These may include:

- Further development, or
- Sale of the property, or

- Cessation of production.

The time between cessation of production and decommissioning of the facilities may play a significant role in the economic assessment of cessation and decommissioning costs.

5. Decommissioning Pre-Project Phase

5.1 Introduction

In the Decommissioning Pre-Project Phase all the aspects necessary to define the decommissioning work and to obtain the requisite approvals are to be addressed.

It is normal for national regulatory authorities to require the field licensees to provide a document defining how they intend to decommission the facilities at the end of the field life. The form, content and title of such a document will vary in line with national legislation but in this guideline it is referred to as the **Decommissioning Pre-Project** or the **Decommissioning Plan**. It may be necessary to submit such a Decommissioning Plan to the regulatory authorities a considerable time before the end of the licence or the end of production.

- The subsidiary is responsible for liaising with the authorities, the JOA parties, the licensees and the stakeholders. In particular the subsidiary submits the necessary documents, among which is usually a Decommissioning Plan, to the relevant regulatory authorities.
- The subsidiary is responsible for the involvement of stakeholders throughout the process. In some countries there is a legal obligation for stakeholder dialogue as a part of the development of a project. The involvement of stakeholders can be time-consuming and can significantly affect the timing and schedule of the project.

  An important success criteria with respect to stakeholder dialogue is to determine the objectives and strategies for their involvement as early as possible in order for them to participate at the correct point in time. Stakeholder involvement will be more important in the early phases when the strategic decisions are made. Obviously, there will be issues that cannot be clarified in the early study phases, but this should not prevent an open and transparent dialogue to start as stakeholders can give valuable input to the process and this will also help to avoid unexpected questions/objections later.

  Stakeholder identification will be the responsibility of the subsidiary. Local governmental officials will have input to the process. It is of vital importance for the planning and timing of the project development that the subsidiary makes an assessment of how stakeholder groups can affect the time schedule.

  The subsidiary is also responsible for gathering the necessary data to allow the selection of appropriate disposal alternatives and for the planning of the decommissioning work. Clear reports containing the relevant information should be provided to DSO/ED. The Operator is responsible for the preparation of the main internal/external communication plan.
- DSO/ED/APP carries out the technical works including cost estimates during the Pre-Project Phase (unless derogation has been obtained) up to the approval of the Decommissioning Pre-Project by the various local and international authorities and stakeholders.

- The subsidiary may perform its own Decommissioning Pre-Project and cost estimates (with suitable derogation) but in all cases DSO/ED/IC/EST carries out the verification of the cost estimate established during the Pre-Project Phase and a *Comité Technique Projet* will have to be convened,

5.2 Input Data for Pre-Project Activities

Typically the following information will need to be gathered to allow the necessary Pre Project activities to be performed:

- Identification of applicable legislation and guidelines including:
  - International laws, guidelines, conventions (e.g. UN, IMO, etc.)
  - Regional conventions (e.g. OSPAR, Mediterranean, etc.)
  - National laws (e.g. petroleum, maritime, trade, industry, environmental, interior etc.)
  - Industry guidelines (e.g. Oil and Gas Producers Association (OGP) guidelines)
- Relevant production licence information (PSC, JOA, etc.) including conditions, clauses on decommissioning, expiry, etc.
- Description of relevant legal aspects, termination of ownership, possible indefinite liabilities, etc.
- Relevant financial and fiscal aspects
- Detailed description of the facilities and of the field(s), including relevant parts of the design documentation, weight reports, process description, etc.
- Hazardous and non-hazardous materials inventory
- Seabed survey data including information relating to drill cuttings piles, etc.
- Preliminary Risk Management Plan
- Residual Value Report
- Follow-up of previous cessation-related actions indicated in pre-development environmental impact assessment
- Information on potential sources of contamination and site impacts
- General and detailed site characterisation for onshore facilities
- Well architecture
- Well drilling history
- Records from the well production period (e.g. successive well completions, servicing, annulus pressure anomalies, corrosion and deposits, etc.)
- Records of all contacts with authorities, stakeholders etc. from preliminary discussions to formal approval

5.3 Main activities during the pre-project phase

5.3.1 Engineering

- Identify all facilities and sites for decommissioning
- Identify and evaluate the alternative disposal arrangements based upon realistically available, but state of the art technologies
- Run “Life-of-Project” (LOP) economic analysis
- Identify and evaluate indefinite or long term maintenance requirements and liabilities
- Compare the risks associated with the various disposal alternatives
- Compare the environmental impact of the various disposal alternatives
- Compare the cost and schedule implications of the various disposal alternatives,
- Produce a specific recommendation taking into account safety, environment, technical aspects, costs and impact on stakeholders (public opinion, fisheries, wildlife, sea traffic, etc.).

5.3.2 Re-use Initiatives

Initiatives are to be taken to investigate the possibility of re-using all or parts of the facilities in the oil and gas industry, or in the non-petroleum related sectors. Suitably focussed advertising may be required to publicise the availability of the facilities and to arouse interest in their re-use.

5.4 Decommissioning Pre-Project Report (Decommissioning Plan)

5.4.1 General

The main deliverable from the work above is the Pre-Project Report (Decommissioning Plan), which should include the recommended decommissioning arrangements for the field facilities.

It should summarise the conclusions of the Pre-Project studies and include the following:-

- Sufficient detail to explain the rationale for the recommended disposal arrangements
- Estimation of costs
- Initial Project Execution and Verification Plan
- Preliminary schedule
- SOR

5.4.2 Objectives

- The Decommissioning Pre-Project Report is subject to internal approval according to the normal approval procedure for pre-projects as well as partner approval prior to submission to the authorities.
- The main purpose of the Pre-Project Report is to present aspects relating to the decommissioning and disposal of the facilities in order to get approval from the relevant authorities for the recommended disposal arrangements.

- The Pre-Project Report is the baseline for communication with stakeholders
- The Pre-Project Report represents the binding agreement on the fundamental parameters of the project, between DSO/ED, HSEQ, the Operator and the Project Team. (SOR)
- Other purposes of the Pre-Project Report are identical to those contained in a Statement or Requirement for a Development Project. (See Company Rule CR EP APP 001 for further details).

5.4.3 Contents

The content of the Pre-Project Report shall comply with the requirements of national regulations where they exist. A typical list of contents is given in Appendix 2. Within the Company the Pre-Project Report shall, as a minimum, include the following:

- The recommended disposal arrangements for the facilities including details of well plugging and abandonment activities, possible reuse potential (or justification for no reuse) of the facilities and dismantling and disposal activities.
- Details of any post-decommissioning activities such as monitoring or maintenance.
- A comparison of the recommended disposal arrangement with other disposal options considering safety, environmental impact, technical risk and cost aspects.
- Details of Communication aspects and Stakeholder dialogue.
- Reference to the studies undertaken during the Pre-Project Phase and their relevance to the decommissioning process.

Some countries require an Environmental Impact Assessment in which case it may be included as part of the Pre-Project Report.

5.5 Other deliverables from Pre-Project Phase

- Risk Management Plan which will most likely be an update of the Preliminary Risk Management Plan.
- Some countries also require the submission, and acceptance by the relevant authorities, of a detailed risk assessment relating to the safety of personnel undertaking the planned decommissioning activities. In the UK such a document is called the “Abandonment Safety Case” whilst in Norway the risk analysis forms part of the “Application for Consent” document. It should be noted that such documents are not part of the Decommissioning Plan but relate specifically to the recommended disposal option. The approval process for the risk analyses may be rather lengthy (six months in the case of the Abandonment Safety Case) and therefore it may be necessary for them to be prepared during the Pre-Project Phase.

5.6 Communication and Stakeholder Dialogue

Experience has shown that decommissioning is a process, not only an engineering project. A technically and scientifically sound solution which complies with all regulations is sometimes not enough to secure public confidence and support.

During the Pre-Project Phase regular communication on the issue should therefore take place with external entities to ensure compliance with regulations and government policy and to

engage in constructive, open and transparent dialogue with outside parties. This will normally involve communication with the following entities:

- **Relevant authorities**

  To ensure common understanding of the challenges and consistent communication.

- **Stakeholders**

  The objective of the stakeholder dialogue is not necessarily to arrive at a consensus, but to create a common perception of the issues, the inherent challenges and to collect views and ideas from the stakeholders so as to create confidence in the work performed by the company.

- **Other operators**

  Individually or via national associations such as UKOOA, OLF, NOGEPA, etc.

- **Media**

  Various information media can be used but direct public access to up-to-date information relating to the main decommissioning activities should be made available on a website.

6. Authority Approval

6.1 Early Discussions

Discussion and co-ordination with the relevant authorities should take place from an early stage to ensure that:

- The Operator is taking all necessary actions in a timely manner,
- The regulations applicable to cessation of production and decommissioning of the facilities are well understood,
- Any particular factors or requirements that need to be considered during Pre-Project Phase are identified.

Early dialog with the authorities will also promote an attitude of openness and co-operation and will assist in the assessment and selection of disposal alternatives. It should be noted that in many countries, the government carries a large portion of the cost of the decommissioning work and therefore has a direct interest in the disposal options being studied.

6.2 Formal Approval

Normally the formal process of governmental approval begins when the Decommissioning Plan is submitted to the authorities. The process of review and approval/acceptance will vary from country to country but may well take a considerable period of time as it can involve:

- Technical evaluation of recommendations,
- Liaison between government departments,
- Consideration of political and environmental implications,
- Consultation with other sovereign states,
- Consultation with international organisations,

For example, if it is proposed to leave a concrete substructure in place in the North Sea a derogation request to the OSPAR Convention is necessary. This requires the national authorities to consult with the other OSPAR members and this process alone could take up to 32 weeks.

7. Decommissioning Project

7.1 Phases of Work

When the relevant authorities have approved the disposal arrangements for the facilities, the Decommissioning Project may be launched. Although the actual activities will depend upon the facilities to be decommissioned many projects will involve the following phases of work:

- Decommissioning of the production and utility systems and equipment
- Plugging and abandonment of the wells
- Dismantling and disposal of facilities
- Reclamation and remediation of the site
- Cancellation of title and fulfilment of residual liabilities

7.1.1 Reclamation and Remediation of the Site

1. **Onshore facilities:**

   A program describing the complete set of actions and documents needed for remediation and reclamation of the site after the decommissioning shall be produced in accordance with national regulations or industry practices (Ref. OGP guidelines). It shall include(the following is not exhaustive): the need for sampling campaigns, plans for site surveys remediation program fitted adapted to the specific needs of the sites, reports required by national authorities (and eventual verification by third party), photos and video documentation etc.

   HSEQ/ESSH/ENV shall be consulted on the establishment of such programs.

2. **Offshore facilities:**

   A program describing the complete set of actions and documents needed for reinstatement and reclamation of the site after the decommissioning shall be produced in accordance with national regulations or industry practices (Ref. OGP guidelines). It shall include(the following is not exhaustive): the need for sampling campaigns, plans for site surveys reinstatement programs adapted to the specific needs of the sites, reports required by national authorities (and eventual verification by third party), photos and video documentation etc.

   The first seabed survey after the completion of the decommissioning project is to be considered part of the Decommissioning Project. Further surveys and monitoring is generally considered part of the remaining activities.

7.1.2 Cancellation of Title and Fulfilment of Residual Liabilities

The final objective of Decommissioning Project is to ensure the necessary modification of all existing contracts, agreements and permits to reflect the cancellation/modification of title. The

entity responsible for the long term liability arising from any residual items left on site or for other aspects shall be assigned as part of the negotiations associated with the cancellation of title.

This phase also includes the establishment of permanent documentation archives which would be relevant to the future:

- diagnosis, mitigation and resolution of any potential problems which might arise from the decommissioned field (e.g. key documents on the abandoned wells)
- Verification of the decommissioned status of the field to any stakeholder.

Part of this documentation shall be issued to the authorities, as required.

In the case of residual items left on site (for example, the concrete substructures of offshore platforms) the Decommissioning Project shall be responsible for the procurement and installation of suitable marking and identification devices.

No transfer of liability of items left in place may take place unless:

- These marking and identification means have been approved by the relevant authorities,
- The definition of residual liabilities has been approved by the relevant authorities,
- The associated inspection/maintenance documentation has been issued in its final format,
- The documentation related to the field and to the residual items has been suitably archived.

7.2 Specific Aspects of Decommissioning Projects

7.2.1 Project Health, Safety and Environment (HSE) Plan

Decommissioning a production facility will probably involve inherently different hazards than those encountered during either construction activities as part of the field development or normal operation of the facilities during their production life. The reasons for this are several:

- The condition of the facilities may have degraded during the operational life or during a period of reduced maintenance following cessation of production (a long “cold phase”),
- The need for inherently more hazardous operations and activities for cutting/dismantling the equipment and structures,
- For offshore fields decommissioning may involve a large quantity of offshore man hours and considerable subsea works, i.e. diving etc..

A Decommissioning Project may last for many years, and might involve the repetition of similar sequences of work (e.g. removing similar wellhead platforms). Particular effort should be made to ensure that experience feedback is applied to improve safety performance in latter stages of the work.

It is strongly advised that a Project HSE Plan is prepared at an early stage in the project.

This document will define risk targets and safety performance objectives during all project phases.

It will be used as a reference document to support:

- The Decommissioning Plan, when assessing the various disposal options,

- The Decommissioning Project team, by defining what HSE performance is required from the contractors involved in the decommissioning work.

The Project HSE Plan should conform with the project planning, and will thereby allow an effective interface with the Affiliate's HSE Management System.

7.2.2 Engineering and Documentation

- An Environment/Waste Management system should be developed and implemented to provide a full audit trail of hazardous and non-hazardous materials and substances from the original inventory to the completion of the final disposal of each batch of materials. This shall include a system of waste classification of each category of material by reference to an appropriate standard such as; national, EU, US, or IMO regulations.

  The document shall specify the goals for recycling all the main categories of material to be disposed.

  This document shall be referenced in the final closeout report of the project, and shall be considered as one of the key deliverables. The achieved recycling rates per category of material shall be detailed in the close out report.

- A Well Plugging and Abandonment Programme shall be developed.
- A Contingency Plan should be developed for each phase of the Decommissioning Project (e.g. re-float of an offshore structure), in order to allow effective response to unplanned events. The Contingency Plan should appear as the main risk reduction measure in the Risk Management Plan initiated during the Pre-Project Phase (see Section 5.5).

7.2.3 Communication Plan

The communication initiative launched during the Pre-Project Phase (see Section 5.6) shall be continued throughout the Project.

7.2.4 Sales/Re-use Strategy

The marketing initiatives carried out in the Pre-Project Phase (see Section 5.3.2), shall be continued throughout the dismantling process to promote the re-use of the facilities.

7.2.5 Project Controls and Audits

Basically, the sequence of Reviews (Project Technical Reviews PTRs, Project Control Reviews PCRs, HAZIDs, HAZOPs), and Project Committees (PCs) are identical to the ones applied to development projects (see Annexe to DIR EP 11).

8. Post-Decommissioning

A technical description (to the required detail) of any installations or parts of installations that are left in place shall be issued and submitted to the relevant national and international authorities for approval.

The technical and legal responsibilities following decommissioning of the facilities (ownership of installations, production licence, liabilities, etc.) shall be clearly defined and guidelines prepared regarding how to handle any questions/problems/incidents/claims that may arise.

Bibliography

Reference	Title of the publication
CR EP ACC 001	Accounting for E&P inventories of Consumables
BPEO method	Best Practical Environmental Option method
EIA	Environmental Impact Assessments

Appendix 1 Current Status of International and Regional Conventions

(Offshore Decommissioning)

The full text of relevant international Conventions and guidance on the application be obtained from HSEQ/ESSH/ENV

Financial Accounting Standards Board (FASB):

- FAS 143

International Conventions

- Removal of disused installations:
  The basic principles are set out in Article 60.3 of the United Nations Convention On Law of the Sea (UNCLOS); they are developed in Resolution A.672(16) of the Assembly of the International Maritime Organisation (the "1989 IMO Guidelines").
- Fate of removed installations:
  The London Dumping Convention (LC72) and its 1996 Protocol set the constraints related to dumping at sea of disused installations. Other disposal options are dealt with by coastal states only.

1958 Geneva Convention on the Continental Shelf

- Convention implemented before the development of offshore E&P activities.
- Article 5.5 states that "Any installations which are abandoned or disused must be entirely removed".
- But it is widely acknowledged that Geneva's provisions are superseded by UNCLOS' provisions.

1982 United Nations Convention On Law of the Sea (UNCLOS)

- This is the main framework Convention in force, accepted worldwide.
- It is not prescriptive, but provides guidance.
- Article 60.3 qualifies Article 5.5 of Geneva Convention as it states that: "Any installation or structure which is abandoned or disused shall be removed to ensure the safety of navigation, taking into account any generally accepted international standards established in this regard by the competent international organisation. Such removal shall also have due regard to fishing, protection of the marine environment and the rights and duties of other states. Appropriate publicity should be given to the depth and dimensions of any installations or structures not entirely removed."
- Article 210.5 recalls that dumping within territorial sea and exclusive economic zone requires formal approval of coastal state.

IMO (International Maritime Organisation) 1989 Guidelines

- IMO is the "competent international authority" regarding Article 60.3 of UNCLOS.
- Structures put in place before 1.1.98: Total removal of all structures in less than 75 metres water depth and weighing less than 4000 tonnes in air (excluding deck and superstructures) is required.
- Structures put in place after 1.1.98: The water depth criterion is deepened to 100 metres. Moreover, all installations put in place after 1.1.98 are required to have been designed to be totally removable.
- When structures are left in place, their upper part must be removed so that 55m of clear water is secured for navigational purposes.
- Permits a “rigs to reef” program or any other new secondary use of a structure.

The IMO guidelines only covers removal and then only from a navigational safety perspective. The IMO Guidelines make no reference to dumping which is dealt with in the 1972 London convention.

Following the Brent Spar affair, IMO reaffirmed (in 1996) that the 1989 guidelines are still relevant.

Note: In the **Gulf of Mexico**, the possibility of the “rigs to reef” option has been applied to 10% of the installations but 90 % have been brought to shore for disposal

1972 London Dumping Convention (LC72) and its 1996 Protocol

- The Convention is acknowledged as a world-wide convention, although many third world countries have not signed it. It is potentially applicable to all marine areas, except in the internal waters of a coastal state (where inland laws apply).
- The 1996 Protocol is not yet in force (ratification is a lasting process), but is expected to be in force before end 2003 The LC72 has adopted Specific Waste Assessment Guidance for disposal at sea of disused offshore installations. These guidelines will also come into force when the 1996 Protocol does. LC72 regulates dumping at sea, which is considered as one of the means to dispose of waste. An authorisation of the coastal state is required prior to any dumping at sea.
- Coastal states should define specific locations for dumping of bulky structures.
- Dumping of harmful or hazardous material is prohibited. Installations must be cleared of such material before a permit for dumping can be granted (it concerns, amongst others things, hydrocarbon residues, heavy metals and LSA).
- 1996 Protocol prohibits dumping at sea of any material, except for 7 categories specified in its Annex 1. Platforms are one of the 7 categories. The 1996 Protocol stipulates that a thorough waste assessment of the material to be disposed of by dumping must be submitted prior to a permit being granted. This waste assessment must include assessment of alternatives to dumping at sea.
- So far, IMO is responsible for the secretarial duties of LC72 and its 1996 Protocol.

Regional Conventions

Most regional conventions have been set up under the umbrella of the United Nations Environment Programme, UNEP. These are Bucharest 1992 (Black Sea), Cartagena 1983 (Caribbean), Nairobi 1985 (Eastern Africa), Kuwait 1978 (Persian Gulf), Barcelona 1976 (Mediterranean Sea), Jeddah 1982 (Red Sea and Gulf of Aden), Noumea 1986 (South Pacific), Lima 1981 (South Pacific) and Abidjan 1981 (West and Central Africa). As a rule, these conventions contain only broad statements (aims and objectives). Some of them have adopted protocols to deal with more focused topics, such as offshore activities. One may add, however, that to the extent these conventions make specific statements regarding removal and disposal, they are normally consistent with 1982 UNCLOS and/or make reference to the IMO 1989 Guidelines.

The Baltic Sea is covered by Helsinki, 1974 and 1992, which outside the UNEP programme.

The latest and strictest convention as regards platform removal/disposal, however, is the Convention for the Protection of the Marine Environment of the North East Atlantic, OSPAR. This convention is also outside the UNEP programme.

OSPAR Convention (Olso – Paris Convention for the North- East Atlantic)

- The Convention, set up in the seventies and renewed in 1992, covers the North East Atlantic which includes the North Sea.
- Decommissioning of disused installations is regulated by OSPAR Decision 98/3, this is a legally binding decision and in force since the first quarter of 1999. It states that: "The dumping, and the leaving wholly or partly in place, of disused offshore installations within the maritime area (= in the *North-East Atlantic*) is prohibited."
- Nevertheless, the OSPAR Decision 98/3 makes provisions such that exemptions could be granted for concrete installations and for all or part of the footings of a steel installation weighing more than 10,000 tonnes and placed in the maritime area before 9 February 1999 and also in some other very restricted cases. However, before a permit (for dumping, leaving in place or partial removal) is granted, the relevant state shall consult the other contracting parties to the Convention. The operator shall provide a well documented assessment of the various options demonstrating that the recommended decommissioning arrangements are the best solution in order to obtain a derogation
- The Decision 98/3 was to be reviewed in 2003, *with a view of restricting the exemption clause*, but the revision will probably be postponed until 2008.

Two examples of regional conventions made within UNEP are given below:

Kuwait Convention (Arabic Gulf)

- Article XIII of its offshore protocol (signed 1989) states that the State Competent Authority may require that "platforms and other sea-bed apparatus and structures are to be removed, in whole or in part, to ensure the safety of navigation and in the interests of fishing."
- The same article has provisions regarding pipelines, which can be left in place when buried.
- No more precise guidance is given, and one can assume that IMO guidelines remain valid.

Barcelona Convention (Mediterranean Sea)

- Article 20 of its offshore protocol (signed 1996, not yet in force) states: "The operator shall be required by the competent state to remove any installation which is abandoned or disused, in order to ensure safety of navigation, taking into account the guidelines and standards adopted by the competent international organisation." It is similar to Article 60.3 of UNCLOS.
- Barcom is currently preparing guidelines for the decommissioning of disused installations.

Note 2.Implementing international conventions in local laws and regulations. The general practice is that once countries become parties to conventions, they modify their laws to reflect the intent of the international agreements. This is, in some countries, done simply by signing the convention and as such the convention becomes a part of the regulatory regime. In other countries the applicable text in the law is updated.

Appendix 2 Typical Contents of a Decommissioning Pre-Project (Decommissioning Plan)

This appendix lists the typical contents of a Decommissioning Pre-Project / Decommissioning Plan which could be adapted to suit a specific decommissioning project bearing in mind the actual production facilities to be decommissioned and the local regulations and requirements.

Main Report

Foreword

Executive Summary, Conclusions, Recommendations

- Brief field history and description, list of owners,
- Study objectives,
- Evaluation principles,
- Description of various decommissioning and disposal options considered with an assessment of environmental, safety risk, technical risk and cost aspects associated with each option.
- Brief review of various important sub-surface and surface aspects, including inherent uncertainties,
- Recommendations containing an assessment of the above issues.

Chapter 1. Introduction

- Study Objectives,
- Field history and present status,
- Future production strategy,
- Detail description of all wells, pipelines, cables and facilities to be decommissioned (details on potential drill cuttings are also required),
- Inventory of materials,
- Applicable contractual and regulatory conditions,
- Description of evaluation process and principles, including risk acceptance criteria, if applicable.

Chapter 2. Evaluation of the Interest of Incremental Development / Assessment of Re-use Potential

This part of the study is similar to a development study and may, depending on the case at hand, be treated either as a preliminary study (supplementary development of undeveloped reservoir levels or zones), or as a conceptual study (search for best scenario), or/and as a pre-project (study of a supplementary development already identified as the best scenario).

This chapter should cover the following aspects at an appropriate level of detail.

- Remaining reserves and production forecasts with all or part of existing facilities, and with and without additional facilities,
- Any remaining uncertainties,
- Cost and schedule for additional facilities,
- Necessary input for economic evaluation.

Depending on the economics, this chapter should include a justification of the recommendation to either pursue further production (with or without additional investment) or to abandon.

The possible non-oil and gas reuse alternatives (e.g. artificial reef, gas power plant, etc.) should be screened and assessed as required.

Chapter 3. Decommissioning Evaluation

In the case of partial decommissioning (e.g. a selection of fields to be decommissioned from the existing infrastructure), this section shall describe the solutions for maintaining the integrity of the remaining facilities and fields as part of the ongoing operation.

Consideration shall be given to all operational aspects of the proposed new configuration, with specific regard to:

- Reservoir engineering (e.g. interference between fields located in the same area, shared aquifer, etc..),
- Process conditions (e.g. specification of produced gas when blending solutions are operated),
- Operational safety.

The degree of detail required for the decommissioning evaluation studies to be carried out (removal/disposal arrangements, planning, cost, safety targets, etc..) should be adapted to the nature of the study (e.g. objectives of the studies, timeframe retained for potential cessation project, context of potential reuse, etc.).

In particular, this section could consist of either a preliminary assessment/evaluation (with a coarse estimate of the required resources, cost and planning), or a conceptual study aiming to determine the best removal/disposal method, and/or a complete pre-project with a detailed study of the retained alternatives.

This chapter should contain the following information at an appropriate level of detail:

- Description of the constraints applicable to surface and sub-surface aspects,
- Presentation of the various disposal alternatives with reference to applicable regulations and contracts,
- Evaluation principles,
- Solutions retained for well plugging and abandonment,
- Detailed solutions retained for decommissioning the production and utility systems, with detailed inventory of fluids to be disposed,
- Resources required for monitoring the condition of the facilities during a potential cold phase,

- Presentation and assessment of the various decommissioning/disposal options that have been evaluated. This presentation should be structured around each item of the fields to be decommissioned since conclusions might differ from one item to the other.

  This section shall include a description of the technical solutions and resources with an evaluation of their feasibility, cost and planning. IT shall also detail the risks to personnel during and after the decommissioning project, the risks to the environment and the probability of failure during implementation with potential consequences on cost and planning.
- Presentation and substantiation of the recommended decommissioning/disposal arrangements with comparative presentation of the reasons for the choice,
- Presentation of the recommended restitution and reclamation solutions (surveys, cuttings / debris clearance, onshore decontamination etc.),
- Summary of the environmental impact of the recommended solutions,
- Summary of the safety aspects of the recommended solutions,
- Cost, Time and Resource estimates of the recommended solutions,
- Identification of risks, uncertainties, and recommendation on potential additional studies to be carried out during early phases of the project.

Chapter 4. Risk Management:

This section shall present details of the risk management system that will be used to control the safety of personnel, and the risk to the environment and company assets during the proposed decommissioning operations. (Note: A full evaluation of the risk to personnel engaged in the work, either in quantitative or qualitative terms may also be required by the national authorities after the disposal arrangements recommended in the Decommissioning Plan have been accepted for implementation)

Chapter 5. Decommissioning Project Execution

- Decommissioning project schedule,
- Project execution,
- Contractual strategy,
- Public consultation process,
- Project management and verification,
- Risk management scheme.

Chapter 6. Residual Liabilities after the Decommissioning Project

- Identification of potential authorities to be made aware of the decommissioned status of the fields,
- Potential maintenance / monitoring activities,
- Identification of potential remaining obligations / liabilities.

Chapter 7 Recommendation Summary of the disposal arrangements recommended for the production facilities.

Annexes

Annex A: List of References

Annex B: List of Supporting Studies and Reports

Annex C: Reservoir Engineering Dossier

Annex D: Well Engineering Dossier

Annex E: Existing Production Facilities Dossier

Annex F: Environmental Impact Assessment (EIA)

Annex G: Cost Estimate Dossier

Annex H: Communications and Stakeholder Dialogue

Annex I: Abbreviations and Glossary

Appendix 3 Guidelines Regarding Decommissioning of Various Types of Facilities

As decommissioning arrangements differ due to the peculiarities of the installations and geographical areas, it is preferential to draft guidelines rather than a Group decommissioning standard applicable to all affiliates.

An outline of decommissioning arrangements for various types of facilities is presented in the table below. The following arrangements would be used as a basis for an early cost estimate as required for Asset Retirement Obligations (ARO) provision computations

The application of this guide by the affiliates remains subject to the assessment of ARO obligations and further to local, regional and international laws, regulations and conventions as well as applicable contracts.

Facility	Reference	Possible decommissioning arrangements
Wells	CR EP FP 424 Plug & Abandon	• Plug & abandon. Site remediation
Onshore facilities and sites	• National regulations exist in several countries and have to be consulted. • The operating contract often contains provisions. • Guidelines have been issued by the International Oil & Gas Producers Association (OGP, formally E&P Forum): *Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites* (E&P Forum report n° 2.70/242, October 1996).	• Reuse of facilities or infrastructure • Dismantle/recycle/disposal (including material management) of all equipment, piping and structures, underground and above ground, • Remediation and reclamation, • Post-remediation and reclamation monitoring and surveys,
Onshore pipelines	• National regulations exist in several countries and have to be consulted.	• Trenched or buried pipelines: cleaned, secured, plugged, and left in place. • Surface-laid pipelines: either leave in place or remove (to be decided on a case-by-case basis).

Appendix 3

Facility	Reference	Possible decommissioning arrangements
Jackets removal and disposal	• Local, regional and international laws, regulations and conventions as well as applicable contracts • OSPAR Decision 98/3, International Maritime Organization (IMO)resolution A.672(16) of 1989,1972 London Dumping Convention and the related1996 protocol (guidance regarding disposal at sea.)	Main jacket removal options are: • Total removal, • Partial removal, • Toppling, • Dumping, either in deep water or in a rigs-to-reefs area. **Note** : If sections are to be dumped they need to be cleaned of all harmful or hazardous materials according to LC72 provisions (see Appendix 2). The options available depend on size, water depth and regulations applicable in the specific geographical area. In most cases total removal could be the preferred arrangement. The removed parts should be taken to shore for dismantling / recycling / scrapping,
Concrete substructures	• Local, regional and international laws, regulations and conventions as well as applicable contracts • OSPAR Decision 98/3, • International Maritime Organization (IMO) resolution A.672(16) of 1989 1972 London Dumping Convention and the related 1996 protocol (guidance regarding disposal at sea.)	• Leave in place after cleaning.
Topsides removal and disposal	• National regulations exist in several countries and have to be consulted.	Main topsides disposal options are: • Reuse • To shore for dismantling / recycling / scrapping,
Offshore export pipelines	• National regulations exist in several countries and have to be consulted	• Leave in place after cleaning.

Appendix 3

Facility	Reference	Possible decommissioning arrangements
Subsea flowlines, umbilicals, cables, flexible jumpers, in-field pipelines	• National regulations exist in several countries and have to be consulted.	Small bore lines (flowlines and in field lines), umbilicals and cables: • to be cleaned / plugged / secured / left in place / trenched • to be removed / brought to shore / recycled or scrapped. Decision to be taken based upon risk assessment results. Large bore lines (flowlines and in-field lines) • to be cleaned / plugged / secured / trenched and left in place. Decision to be taken based upon risk assessment.
Sub-sea Installations (templates, manifolds, etc.)	• National regulations exist in several countries and have to be consulted.	• Structures, modules and equipment normally to be removed, brought to shore, and dismantled / reused / recycled / scrapped.
Offshore sea bottom	• National regulations exist in several countries and have to be consulted.	• Survey to be performed. In the USA and in the UK sector of the North Sea, surveys and trawling tests are required after decommissioning to demonstrate that the area is clean and safe.
Offshore drill cutting	• National regulations exist in several countries and have to be consulted.	• Left in place. Consult HSEQ/ESSH/ENV for further guidance
Floating installations	• National regulations exist in several countries and have to be consulted.	• Normally totally removed, brought to shore, and reused or dismantled / partially reused / scrapped.

Objet

Fournir un guide pour la mise en œuvre de la DIR EP 13 définissant le processus « restitution des sites » et préciser les principes et responsabilités lors de l'estimation et de la comptabilisation des coûts afférents.

Domaine d'application

Les coordinateurs RES en filiale (en général le responsable ou le correspondant « Planning-développement »), et la structure RES mise en place en filiale selon la DIR EP 13, leurs correspondants au Siège, et tous les acteurs du Siège impliqués dans le processus d'évaluation des projets RES, d'estimation des coûts et de comptabilisation des RES dans les filiales EP.

Le guide porte sur l'évaluation technique des abandons et l'estimation des coûts, mais aussi sur les enjeux contractuels qui définissent le cadre d'application, ainsi que l'impact fiscal dont l'exercice des RES est l'aboutissement.

Révisions

mise à jour effectuée par la coordination Réorganisation 2015

01	06/2015	Changement d'organisation – janvier 2015
00	12/2010	Création
Rév.	Date	Objet de la révision

Entité propriétaire : DSO/ED	Entité gestionnaire : DSO/ED

Approbations

Original Signé

(Ecrit JM Gorisse, H. de Lapasse)

Validation Technique :	Contrôle Qualité :	Approbation Finale :
G. Dieste	H. De Lapasse	A. Goffart

Date : 11/2010

Sommaire

Documents de référence

Les documents de référence listés ci-dessous font partie intégrante de ce Guide & Manuel.

Documents Externes

Sauf indication contraire explicite, la version applicable de ces documents, ainsi que celles des annexes et additifs éventuels, est la dernière révision publiée à la Date de mise en application de ce document.

Référence	Titre
OGP	Offshore Installations E&P Forum Report: Decommissioning offshore Oil & Gas Installations Finding the Right Balance
	Onshore Installations E&P Forum Report 1996: Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites
	The abandonment of offshore oil & gas fields (Oilfield Publications Ltd 1995)
	Disposal of disused offshore concrete gravity platforms in the OSPAR Maritime Area - Feb 2003
	Creating Artificial Reefs from Decommissioned Platforms in the North Sea, Volume I (summary and executive overview), four leading scientists for ODCP - Sep 1997
	Offshore pipeline decommissioning - Aug 1997
	Decommissioning of Offshore Structures - Energy Use Considerations, Environment and Resource Technology Ltd (ERT) report ERT 97/016 – Feb 1997
	Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites - Oct 1996
	Decommissioning Offshore Oil & Gas Installations Finding the Right Balance- Jun 1996
	Offshore decommissioning and disposal: background issues and facts- Dec 1995
UKOOA 2005	Guideline on Decommissioning Cost Estimation
UKOOA	Guidelines on Stakeholder Engagement for Decommissioning Activities
Convention de Genève sur le plateau continental – 1958	
Convention de Londres sur les rejets en mer – 1972 et protocole de 1996	

Référence	Titre
UNCLOS	United Nations Convention on the Law of the Sea
Convention de Bâle - 1989	
UNEP	United Nations Environnent Programme
UK Act	UK : POP Act 1972, Env. Protection Act 1990, DTI Guidelines 1998
NPD	The Norwegian Petroleum Sector law on Cost Sharing of Abandonment 1987, NPD Guidelines 1990
OSPAR Convention	Convention et décisions 98/3 - Mer du Nord
ICPE	Installations Classées pour la Protection de l'Environnement France : ICPE 1976 et décrets associés
IAS 16	Property, Plant and Equipment
IAS 37	Provisions, Contingent Liabilities & Contingent Assets
ASC 932	Extractive Activities – Oil and Gas

Documents Total

Sauf indication contraire explicite, la version applicable de ces documents, ainsi que celle des annexes et additifs éventuels, est la dernière révision publiée.

Référence	Titre
DIR EP 11	Projet de développement
DIR EP 13	Restitution des Sites
DIR-GR-SEC-008	Analyse des risques technologiques
CR EP ACC 009	Provision pour obligation de restitution des sites
CR EP FP 424	Bouchage et Abandon
CR EP HSE 041	Gestion des risques technologiques
GM EP APP 006	The non-operated assets charter for technical assistance and feedback
GM EP APP 008	Decommissioning of production facilities
GM EP ENV 055	Spécifications environnementales pour la restitution des sites
GM EP EST 006	Estimation des coûts de Restitution des Sites pour les installations de surface
GM EP FP 430	Long term budget estimation of permanent well plug & abandon

1. Terminologie & glossaire

1.1 Définitions

Abandon de puits – *well abandonment*

Opérations menées pour obturer définitivement un puits en vue de son abandon. La complétion est partiellement retirée et les bouchons de ciment mis en place (cf. CR EP FP 424)

Le terme abandon est consacré par l'usage pour les puits. Cependant il peut suggérer un délaissement et donc son emploi est à éviter pour les autres types d'ouvrage.

Actif – Asset

Un actif est un ensemble de constructions ayant une finalité commune définie de production, de transformation, de transport, … partageant des caractéristiques communes de propriété, de logique industrielle, de situation contractuelle qui en font une unité opérationnelle, fiscale et comptable.

A l'intérieur d'un actif on peut distinguer des sous-ensembles, qui peuvent eux-mêmes être décomposés en sous-ensembles, et ainsi de suite selon les besoins.

Cela signifie que tous les sous-ensembles d'un actif sont amortis selon un rythme commun : à proportion des productions (UOP) pour une installation de production, à proportion des quantités transportées (UOT) pour une installation de transport, à proportion du temps pour les bâtiments d'un siège.

Approbation par les autorités – *Approval by the authorities*

Elle conclut le projet de RES et comprend :

- L'inspection finale et l'émission du dossier décrivant l'état final des lieux,
- L'approbation des autorités.

Bouchage de puits – well plugging

Opérations menées pour obturer provisoirement ou définitivement un puits.

Cessation d'activité – Cessation of activity

Ensemble des activités qui suivent l'arrêt définitif d'une installation industrielle. Dans ce cas particulier, ce terme est synonyme de restitution des sites.

Démantèlement – *Dismantling*

Le démantèlement comprend :

- L'inspection initiale du site (EBS ou simple *survey*),
- Le démontage des installations à terre ou en mer,
- L'enlèvement et le transport vers le lieu de découpe et de recyclages.

Désarmement – *Decommissioning*	Cette phase consiste à rendre inerte l'installation c'est-à-dire sans danger lié au fluide et à l'énergie. Tous les systèmes de procédé et d'utilité sont arrêtés. Les capacités et les lignes sont vidangées, dégazées, nettoyées et platinées. On récupère les produits chimiques pour recyclage ou élimination. Le résultat de ces opérations est de mettre l'installation en phase froide (*cold phase*). On trouvera souvent le mot désarmement ou *decommissioning* utilisé dans un sens plus large synonyme de RES, couvrant l'ensemble des opérations de désarmement proprement dites, démantèlement et réhabilitation
Dialogue – *Dialogue*	Le dialogue avec les autorités et les parties prenantes est partie intégrante de tout projet et donc de la restitution des sites. Il prépare le projet, l'accompagne tout au long de sa réalisation jusqu'à son achèvement.
Estimation des coûts – *Cost estimate*	Une estimation des coûts complète chacun des plans successifs de RES. Dès que disponible et validée, l'estimation est utilisée par les plans long terme et budgets.
État des lieux de référence ou État Environnemental de Référence– *Environmental Reference State (EBS) / (ERS)*	Étude, menée chaque fois qu'il est nécessaire de faire un point, pour établir un bilan précis de la situation environnementale.
État des lieux initial ou point zéro – *Environmental Baseline Study (EBS)*	Étude, menée avant tout projet, pour établir un bilan précis de la situation environnementale initiale.

Étude d'Impact Environnemental et Sociétal (EIE/EIS/EIES) ***Environmental and Social Impact Assessment (EIA/SIA/ESIA)***

Étude, menée en amont d'un projet, visant à identifier, prévoir, évaluer ses impacts sur l'environnement (Identification des risques à l'environnement – *Sustainable Development Review)*, et à proposer des solutions pour les réduire ou les éviter. A l'issue de cette étude, est établi un plan de gestion et de suivi des impacts. Une EIE est menée systématiquement pour tout nouveau projet.

La définition de l'environnement peut être plus ou moins large, se limiter à l'environnement naturel ou inclure l'environnement humain et sociétal. Une étude d'impact sociétal (EIS) remplit les trois fonctions suivantes :

- identifier les conséquences sociales, économiques et culturelles (normes, valeurs, etc.) susceptibles d'être engendrées par une action, un projet public ou privé dans un contexte donné et sur une communauté donnée,
- caractériser ces impacts en termes d'intensité, de durée, de probabilité d'occurrence,
- améliorer la conception du projet pour minimiser ses impacts négatifs et renforcer ses impacts positifs.

L'EIES devient un outil de gestion des risques par excellence. Il est de plus en plus admis que, pour être crédible et légitime, elle ne doit pas être du seul ressort de l'expert mais impliquer également les populations potentiellement impactées dans toutes les phases de l'étude : depuis la définition du périmètre, l'identification et l'évaluation des impacts, jusqu'au monitoring du plan de gestion de ces derniers.

Une note du Comité exécutif de Total exige la prise en compte des impacts sociaux et économiques des activités dans le processus d'approbation des projets.

Étude de risque – ***Risk assessment***

Le plan de RES comporte une étude de risque afin d'évaluer les risques techniques et humains associés à chacune des options concevables. Cette étude permet d'orienter le choix de la solution retenue parmi les options envisagées.

Obligations de RES – ***Asset retirement obligations***

Ensemble des obligations de RES résultant des lois, réglementations et contrats en vigueur.

Parties prenantes – ***Stakeholders***

Tous les individus, groupes et organisations :

- sur lesquels l'activité de l'entreprise a un impact direct ou indirect, positif ou négatif,
- qui ont un impact direct ou indirect, positif ou négatif sur l'activité de l'entreprise.

Plan Préliminaire de RES –

Preliminary *RES plan*

La restitution des sites est un processus patrimonial qui comprend une phase d'évaluation : le Plan Préliminaire et le Plan de RES , ainsi qu'une phase opérationnelle : le Projet de RES.

Le Plan Préliminaire de RES est établi en vue de la restitution des sites, prenant en compte le contexte réglementaire en vigueur et les règles internes et s'appuyant sur une étude conceptuelle des différentes options techniques envisageables. Il recouvre la totalité des actions nécessaires pour remettre puis rendre un site dans un état déterminé qui satisfait les autorités du pays, l'opérateur, les partenaires et certaines parties prenantes. Ces actions comprennent en particulier :

- le bouchage et l'abandon des puits,
- l'abandon des canalisations et pipes,
- le démantèlement des installations de surface
- la restitution et la réintégration du site dans l'environnement dans un état compatible avec son futur usage.

Le *démantèlement des installations de surface* consiste à l'enlèvement, à la destruction et à la mise en décharge de toutes les structures qui ne peuvent plus être recyclées, récupérées ou réutilisées.

La *réhabilitation du site* consiste à appliquer les modes de traitement nécessaires pour rendre le site conforme à l'usage auquel il est destiné. Ce sera par exemple tous les travaux concernant la collecte et l'élimination des déchets, la dépollution des sols et des nappes et le suivi du site si demandé.

Ces actions consistent après la fermeture du site industriel à le réintégrer dans l'environnement selon l'usage auquel ce site est destiné. La restitution d'un site peut être partielle, lorsqu'une partie des installations est arrêtée ou complète lorsqu'elle s'inscrit dans un programme de cessation d'activité

Pour définir la restitution des sites on utilise généralement et souvent indifféremment différents termes comme abandon, démantèlement, remise en état des sites, réhabilitation ou obligations de restitution des sites. Le terme retenu par Total est *restitution des sites (RES dans ce qui suit)* qui résume bien la globalité des charges d'une compagnie pétrolière.

En anglais on utilise le plus fréquemment et souvent indifféremment les termes : *abandonment*, *decommissioning*, *cessation*, *site restitution*, *site restoration*, ou encore *Asset Retirement Obligations (ARO)*. Le terme retenu par Total est *Site restitution*.

Le plan préliminaire de RES comprend toutes les acquisitions nécessaires (études, survey, ..) pour évaluer, au fil de l'exploitation, le futur projet de RES et notamment l'estimation des coûts correspondants.

Le premier plan préliminaire de RES est établi par l'Avant-Projet de développement, comme élément du dossier de décision du projet. Au cours de la vie de l'ouvrage le plan préliminaire de RES est mis à jour annuellement ou révisé lorsqu'il y a lieu.

Plan de RES –

RES plan

Le plan de RES comprend les études et actions nécessaires pour préparer le projet RES et permettre une validation de ce projet par toutes les parties prenantes.

Son premier objectif est de sécuriser le Planning et les Coûts d'abandon.

Un plan de RES partiel détaillé précède aussi chaque restitution de site partielle. A l'approche de la cessation d'activité une première version du plan de RES est produite pour préparer la communication avec les parties prenantes, planifier les phases d'études, établir un premier budget de travaux. Enfin le plan de RES définitif est établi lors d'une étude de niveau Avant-Projet.

Le plan de RES décrit le cadre réglementaire, les objectifs à atteindre pour l'état final du site et les solutions envisagées ou retenues (enlèvement total ou partiel, recyclage ou traitement des déchets, immersion des structures,…). Le plan présente également le programme des études (études d'impact environnemental et sociétal, études de risques), le planning préliminaire des travaux et l'estimation des coûts.

Projet de RES – ***RES Project***

Le projet de RES recouvre la totalité des actions nécessaires pour rendre un site dans un état déterminé qui satisfait les Autorités, l'opérateur, les partenaires et les parties prenantes, il comprend les phases suivantes (cf. pour plus de détails les GM EP APP 008, GM EP EST 006, GM EP ENV 055, CR EP FP 424) :

Phases de préparation : établissement d'un plan de RES de niveau Avant-Projet, incluant une étude d'impact environnemental et sociétal (*Environmental and social Impact Assessment*), un état des lieux (*Environment Baseline Study*) et un dialogue avec les Autorités et les parties prenantes, avec en conclusion l'approbation du plan de RES,

Phases de réalisation : C'est l'exécution du plan de RES qui comprend, selon ce qui est applicable, les étapes suivantes :

- arrêt de l'exploitation
- désarmement ou *decommissioning*, des installations : préparation de la restitution, avec mise en sécurité hors hydrocarbures des installations et préparation à l'abandon des puits, préparation de la phase d'attente ou de démantèlement, surveillance des installations en attente de l'enlèvement,
- abandon des puits,
- démantèlement (inspection initiale, démontage des installations, transport vers le lieu de découpe et de recyclage,
- réutilisation des équipements, recyclage ou gestion des déchets, dépollution des sols si nécessaire, revégétalisation,
- inspection finale et émission du dossier d'Abandon décrivant l'état final des lieux, approuvé par les Autorités),
- surveillance post RES et le transfert de responsabilité

Réhabilitation de site – ***Site Rehabilitation***

Ensemble des opérations visant à remédier aux impacts occasionnés sur les milieux par une activité industrielle et à prévenir (via la dépollution, la résorption, etc.) leurs effets futurs, pour rendre le site apte à un nouvel usage industriel ou autre.

Restauration de site – ***Site restoration***

Ensemble des opérations visant à rétablir un site dans un état très proche de son état primitif.

Restitution des sites (RES) – *Site restitution*

La restitution des sites accomplit les obligations du processus (cf. DIR EP 13)

Après la fermeture d'un site industriel, ensemble des actions réalisées pour le réintégrer dans son environnement ou lui conférer un nouvel usage. Ces actions sont définies de sorte à rendre le site dans un état déterminé qui satisfait les autorités, l'opérateur, les partenaires et les parties prenantes.

La restitution d'un site peut être partielle, lorsqu'une partie des installations est arrêtée, ou complète lorsqu'elle s'inscrit dans un programme de cessation d'activité d'un site industriel.

Ce terme a été retenu par le Groupe de préférence au terme remise en état qui recèle l'ambiguïté de pouvoir suggérer une remise en un état identique à l'état primitif. Pour cette raison on évitera ce dernier terme.

Réutilisation, gestion des déchets, réhabilitation – *Re-use, waste management, rehabilitation*

Cette étape comprend :

- La réutilisation des équipements, le recyclage ou la gestion des déchets, avec traçabilité des traitements
- La dépollution des sols, si nécessaire, et leur réhabilitation.

1.2 Glossaire financier

FRANCAIS	ENGLISH
Actif Un actif est une ressource contrôlée par l'entreprise du fait d'évènements passés et dont des avantages économiques futurs sont attendus par l'entreprise.	**Asset** An asset is a resource controlled by the entity as a result of past events and from which future economic benefits are expected to flow to the entity.
Avantages économiques L'avantage économique futur représentatif d'un actif est le potentiel qu'a cet actif de contribuer, directement ou indirectement, à des flux de trésorerie et d'équivalents de trésorerie au bénéfice de l'entreprise.	**Economic benefits** The future economic benefit embodied in an asset is the potential to contribute, directly or indirectly, to the flow of cash equivalents to the entity.
Les avantages économiques futurs représentatifs d'un actif peuvent aller à l'entreprise de différentes façons. Par exemple, un actif peut être : a) utilisé seul ou en combinaison avec d'autres actifs dans la production de biens ou de services, ou	The future economic benefits embodied in an asset may flow to the entity in a number of ways. For example, an asset may be: a) used singly or in combination with other assets in the production of goods or services to be sold by the entity, or

b) échangé contre d'autres actifs, ou
c) utilisé pour éteindre un passif,
d) etc.

Passif

Un passif est une obligation actuelle de l'entreprise résultant d'évènements passés et dont l'extinction devrait se traduire pour l'entreprise par une sortie de ressources représentatives d'avantages économiques.

Ressources représentatives d'avantages économiques

L'extinction d'une obligation actuelle implique que l'entreprise abandonne des ressources représentatives d'avantages économiques afin de satisfaire à la demande de l'autre partie. L'extinction d'une obligation actuelle peut se produire de diverses façons, par exemple par :

a) la réalisation de travaux, ou
b) un paiement en trésorerie, ou
c) un transfert d'un autre actif, ou
d) une fourniture de services, ou
e) la substitution de cette obligation par une autre obligation,
f) etc.

Provision

Une provision est un passif dont l'échéance ou le montant est incertain.

Fait générateur d'obligation

Un fait générateur d'obligation est un événement qui crée une obligation juridique ou implicite qui ne laisse pas à l'entreprise d'autre solution réaliste que d'éteindre cette obligation.

Obligation juridique

Une obligation juridique est une obligation qui découle :

a) d'un contrat (sur la base de ses dispositions expresses ou implicites), ou
b) des dispositions légales ou réglementaires, ou
c) de la jurisprudence.

b) exchanged for other assets, or
c) used to settle a liability,
d) distributed to the owners of the entity.

Liability

A liability is a present obligation of the entity arising from past events, the settlement of which is expected to result in an outflow from the entity of resources embodying economic benefits.

Resources embodying economic benefits

The settlement of a present obligation usually involves the entity giving up resources embodying economic benefits in order to satisfy the claim of the other party. Settlement of a present obligation may occur in a number of ways, for example, by:

a) carrying out work,
b) payment of cash,
c) transfer of other assets,
d) provision of services,
e) replacement of that obligation with another obligation, or
f) conversion of the obligation to equity.

Provision

A provision is a liability of uncertain timing and amount.

Obligating event

An obligating event is an event that creates a legal or constructive obligation that results in an entity having no realistic alternative to settling that obligation.

Legal obligation

A legal obligation is an obligation that derives from:

a) contract (through its explicit or implicit provisions),
b) legislation, or
c) case law.

Obligation implicite

Une obligation implicite est une obligation qui découle des actions d'une entreprise lorsque :

a) elle a indiqué aux tiers, par ses pratiques passées, par sa politique affichée ou par une déclaration récente suffisamment explicite, qu'elle assumera certaines responsabilités ; et que
b) en conséquence, elle a créé chez ces tiers une attente fondée qu'elle assumera ces responsabilités.

Passif éventuel

Un passif éventuel est :

a) une obligation potentielle résultant d'événements passés et dont l'existence ne sera confirmée que par la survenance (ou non) d'un ou plusieurs événements futurs incertains qui ne sont pas totalement sous le contrôle de l'entreprise ; ou
b) une obligation actuelle résultant d'événements passés mais qui n'est pas comptabilisée car :
   i) il n'est pas probable qu'une sortie de ressources représentatives d'avantages économiques sera nécessaire pour éteindre l'obligation ; ou car
   ii) le montant de l'obligation ne peut être évalué avec une fiabilité suffisante.

Probable

Le terme probable doit s'interpréter comme « plus probable qu'improbable ». C'est-à-dire la probabilité que l'événement se produise est plus grande que la probabilité qu'il ne se produise pas.

Immobilisations corporelles

Les immobilisations corporelles sont des actifs corporels :

Constructive obligation

A constructive obligation is an obligation that derives from an entity's actions where:

a) by an established pattern of past practice, published policies or a sufficiently specific statement, the entity has indicated to other parties that it will accept certain responsibilities; and
b) as a result, the entity has created a valid expectation on the part of those other parties that it will discharge those responsibilities.

Contingent liability

A contingent liability is:

a) a possible obligation that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of one or more uncertain future events not wholly within the control of the entity; or
b) a present obligation that arises from past events but is not recognized because:
   i) it is not probable that an outflow of resources embodying economic benefits will be required to settle the obligation; or
   ii) the amount of the obligation cannot be measured with sufficient reliability.

Probable

Probable means more probable than not: i.e. the probability of the event to occur is greater than the probability it does not.

Plant, property and equipment (PP&E)

Property, plant and equipment are tangible items that:

a) qui sont détenus par une entreprise soit pour être utilisés dans la production ou la fourniture de biens ou de services, soit pour être loués à des tiers, soit à des fins administratives ; et b) dont on s'attend à ce qu'ils soient utilisés sur plus d'un exercice.	a) are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and b) are expected to be used during more than one period.
Amortissement L'amortissement est la répartition systématique du montant amortissable d'un actif sur sa durée d'utilité.	**Depreciation** Depreciation is the systematic allocation of the depreciable amount of an asset over its useful life.
Montant amortissable Le montant amortissable est le coût d'un actif, ou tout autre montant substitué au coût dans les états financiers, diminué de sa valeur résiduelle.	**Depreciable amount** Depreciable amount is the cost of an asset, or other amount substituted for cost, less its residual value.
Durée d'utilité La durée d'utilité est : a) soit la période pendant laquelle l'entreprise s'attend à utiliser un actif, b) soit le nombre d'unités de production ou d'unités similaires que l'entreprise s'attend à obtenir de l'actif (typiquement dans l'industrie pétrolière les réserves)	**Useful life** Useful life is: a) the period over which an asset is expected to be available for use by the entity, or b) the number of production or similar units expected to be obtained from the asset by the entity.
Coût Le coût est le montant de trésorerie ou d'équivalents de trésorerie payé ou la juste valeur de toute autre contrepartie donnée pour acquérir un actif au moment de son acquisition ou de sa construction.	**Cost** Cost is the amount of cash or cash equivalents paid or the fair value of the other consideration given to acquire an asset at the time of its acquisition or construction.
Valeur résiduelle La valeur résiduelle est le montant net qu'une entreprise s'attend à obtenir pour un actif à la fin de sa durée d'utilité après déduction des coûts de sortie attendus	**Residual value** The residual value of an asset is the amount that an entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its useful life.
Juste valeur La juste valeur est le montant pour lequel un actif pourrait être échangé entre parties bien	**Fair value** The fair value is the amount for which an asset could be exchanged between knowledgeable,

informées, consentantes et agissant dans des conditions de concurrence normale.	willing parties in an arm's length transaction.
Valeur comptable	**Carrying amount**
La valeur comptable est le montant pour lequel un actif est comptabilisé au bilan après déduction du cumul des amortissements et du cumul des pertes de valeur relatifs à cet actif.	The carrying amount is the amount at which an asset is recognised after deducting any accumulated depreciation and accumulated impairment losses.
Perte de valeur	**Impairment loss**
Une perte de valeur est l'excédent de la valeur comptable d'un actif sur sa valeur recouvrable.	An impairment loss is the amount by which the carrying amount of an asset exceeds its recoverable amount.

2. Introduction

La restitution des sites d'exploitation en fin de production d'un gisement ou en fin d'usage d'une installation fait partie du domaine du développement durable, c'est-à-dire de l'objectif de Total de « rendre son développement plus acceptable en conciliant durablement équité sociale, respect de l'environnement et croissance économique, dans une perspective de progrès continu »

Les accords internationaux, les lois des pays où le Groupe opère, ses engagements contractuels et ses propres règles définissent ses obligations en matière d'abandon des puits, de démantèlement futur des installations, déconstruction des ouvrages ou réhabilitation de l'environnement.

Les normes comptables, dont les normes IAS 16 et IAS 37, définissent les règles de comptabilisation de ces coûts. L'application de ces dernières nécessite l'estimation des coûts des travaux à réaliser.

Avec les documents suivants ce guide constitue le référentiel RES de l'EP :

- DIR EP 13,
- CR EP ACC 009,
- CR EP FP 424,
- GM EP APP 008,
- GM EP ENV 055,
- GM EP EST 006,
- GM EP FP 430.

3. Objectifs

Les objectifs sont ceux définis par la Directive DIR EP 13, rappelés ci-après.

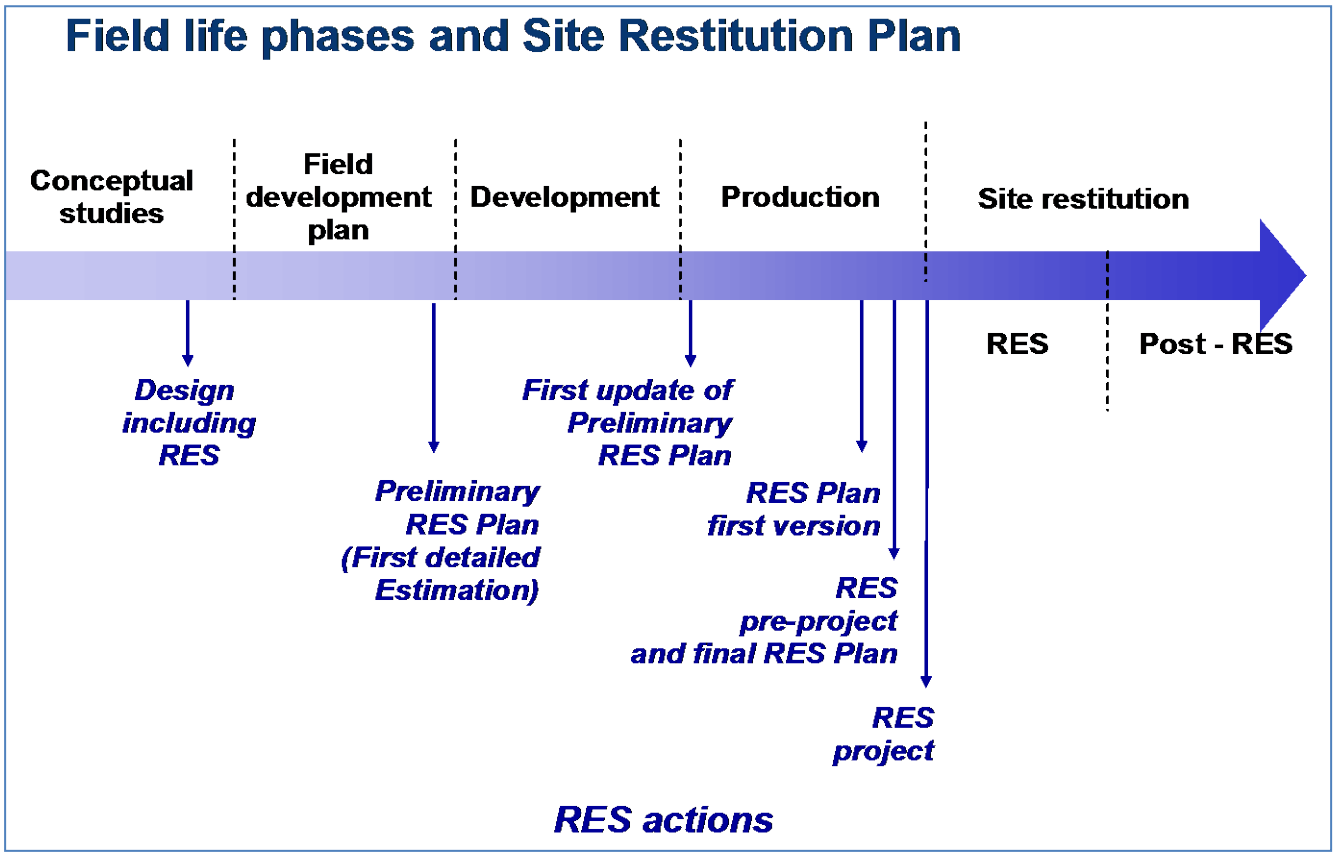
L'objectif du processus « restitution des sites » (processus RES) est de gérer tout au long de la vie de l'actif les obligations du Groupe en matière d'arrêt, démantèlement et abandon de tous les ouvrages réalisés par l'Exploration Production, et de remplir ces obligations en fin de vie.

Il s'agit de gérer aux mieux les responsabilités du Groupe en conformité avec le cadre réglementaire des conventions et législations locales, nationales, régionales et internationales, dans le respect de la politique de développement durable de Total et dans les meilleures conditions économiques.

Le processus prend naissance dès les négociations de prise de permis et les premières études conceptuelles de construction et ne se termine qu'à l'extinction avérée des responsabilités du Groupe et donc, potentiellement, bien après l'achèvement des travaux de restitution des sites.

Tout au long de la vie d'un actif, la gestion des obligations s'efforce de prévenir les difficultés ultérieures et d'optimiser les coûts futurs. Elle traduit ces coûts dans les comptes du Groupe.

Le processus RES est au premier chef un processus patrimonial. Il comporte néanmoins une phase opérationnelle, celle de la réalisation effective des travaux d'arrêt, de démantèlement et d'abandon que constitue le projet de RES.



4. Règles générales

Elles sont définies par la DIR EP 13. Les paragraphes qui suivent en précisent la mise en œuvre.

4.1 Aspects patrimoniaux et contractuels et réglementaires

4.1.1 Reconnaissance d'une obligation

Conformément à la DIR EP 13 § 2.3, les obligations de RES sont évaluées à partir des textes légaux, réglementaires et contractuels en vigueur, qui résultent notamment de la traduction au niveau national des conventions ou textes signés au niveau international.

Les critères d'obligation sont ceux existant à la date de l'analyse sans anticiper sur l'évolution des lois, règles, contrats et de leur interprétation (sous réserve du § 4.5.2).

L'appréciation de la réalité des obligations dans les cas particuliers (rien n'est dit dans le contrat, le terme du contrat est bien avant la fin prévue d'exploitation) requiert une analyse détaillée du contexte dans chaque cas.

Les conclusions de la filiale sur l'existence ou non d'une obligation et sur son contenu doivent être revues par les correspondants du siège qui, en liaison avec la Direction Juridique de l'EP, valideront cette analyse. Ces conclusions seront revues périodiquement à l'initiative de la filiale en fonction de l'évolution des textes et des éléments nouveaux.

4.1.2 Aspects réglementaires

Quel que soit le type d'installation projetée, dès les études préliminaires, le projet de développement est en principe conçu de façon à permettre la Restitution des Sites, conformément aux réglementations en vigueur et aux règles du Groupe. Le choix du concept devra intégrer l'optimisation des coûts et la minimisation des impacts environnementaux et sociétaux.

Les risques d'évolution des réglementations et des fiscalités incitent à réaliser le démantèlement des installations dès qu'elles cessent d'être utiles à la production. Chaque fois qu'il n'existe plus de perspective d'utiliser un ouvrage pétrolier, puits, installation ou équipement, sera envisagé un abandon, un démantèlement partiel ou complet.

Le tableau suivant regroupe les principaux textes du cadre réglementaire international et régional. On rappelle ici que c'est tout d'abord la réglementation du pays qu'il faut appliquer et qu'en l'absence de règles locales précises, ce sont les conventions internationales et régionales qui s'appliquent.

Convention et réglementations	
Convention Internationales	Convention de Genève sur le plateau continental - 1958 Convention de Londres sur les rejets en mer – 1972 et protocole de 1996. Convention des Nations Unies sur le droit de la mer UNCLOS - 1982 Guides et standards IMO - 1989 Convention de Bâle - 1989
Convention Régionales	Décision OSPAR 98/3 (Atlantique Nord Est et Mer du Nord) Convention UNEP : Koweït, Barcelone,…
Règlement Nationaux	Règles spécifiques des pays (onshore et offshore) comme: UK: POP Act 1972, Env. Protection Act 1990, DTI Guidelines 1998 Norway: Petroleum Act 1985, Law on Cost Sharing of Abandonment 1987, NPD Guidelines 1990 France : ICPE 1976 et décrets associés

Note : En Mer du Nord et Nord-Est Atlantique s'appliquent les décisions de OSPAR 98/3. Dans le reste du monde, en l'absence d'autres réglementations régionales ou locales plus contraignantes, ce sont les règles OMI (Organisation Maritime Internationale) qui s'appliquent.

Hormis les cadre des conventions ci-dessus, il existe plusieurs documents émis par l'OGP (O&G Producers Association – ex-E&P Forum) concernant les bonnes pratiques en matière de RES:

- Guidelines on Decommissioning Cost Estimation (UKOOA 2005),
- Disposal of disused offshore concrete gravity platforms in the OSPAR Maritime Area - Feb 2003,
- Creating Artificial Reefs from Decommissioned Platforms in the North Sea, Volume I (summary and executive overview), four leading scientists for ODCP - Sep 1997,
- Offshore pipeline decommissioning - Aug 1997,
- Decommissioning of Offshore Structures - Energy Use Considerations, Environment and Resource Technology Ltd (ERT) report ERT 97/016 – Feb 1997,
- Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites - Oct 1996,
- Decommissioning Offshore Oil & Gas Installations Finding the Right Balance- Jun 1996,
- Offshore decommissioning and disposal: background issues and facts- Dec 1995.

4.1.3 La RES et les contrats d'association

En principe chaque partenaire est seul responsable de la part qui lui revient dans le coût de RES. Les partenaires étant en général conjoints et solidaires, des garanties de solvabilité des partenaires adaptées à leur statut financier sont prises dans les JOA, en se prémunissant dès le départ contre l'effet du remplacement possible d'un partenaire par un autre de moindre statut.

Nota : Cas des contrats *buy back*

Ce sont des contrats d'entreprise ayant pour objet la construction par le contracteur d'installations, leur mise en route et leur opération pour le compte du client pendant une période limitée, étant spécifié que ces installations seront remises in fine au client et placé sous sa responsabilité. Le contracteur n'a dans ce type de contrat aucune obligation.

4.1.4 Cas des actifs Non-Opérés et des OPCOs

Actifs Non-Opérés

Le responsable de l'actif non opéré définit, en liaison avec la Direction Géographique, HSEQ et DSO, en fonction de l'enjeu, le niveau de suivi du Plan de RES puis du projet de RES non opéré par le Groupe, ainsi que la répartition de ce suivi entre la Filiale et le Siège.

L'enjeu communiqué par l'opérateur sera challengé en tenant compte de l'impact financier pour le groupe, du niveau de risque du projet de RES et des opportunités d'acquisition d'expérience.

Les études et planning sur les travaux RES des opérateurs seront utilisés dans la mesure du possible comme base d'évaluation des coûts et échéanciers des projets RES des actifs non opérés.

OPCO's

En fonction du niveau de contrôle exercé par le Groupe au sein de l'OPCO, le responsable en charge des intérêts du groupe dans l'OPCO :

- S'assure que le processus de RES appliqué aux actifs de l'OPCO est similaire dans ses principes à celui prévu par le Groupe pour les actifs Opérés (cas d'un contrôle fort au sein de l'OPCO),
- Applique un suivi du processus de RES équivalent au suivi cité ci-dessus pour le cas d'actifs Non Opérés (cas d'un contrôle faible).

4.2 Aspects techniques

Se reporter à la DIR EP 13 §2.2.

4.2.1 Etudes préliminaires lors de la conception des installations

Les ouvrages seront conçus pour pouvoir être démantelés.

Qu'il s'agisse d'opérations d'exploration, de forages, de construction d'installations de production d'un champ, d'une usine de traitement, d'un terminal, d'un ouvrage d'art, d'un bâtiment, … à terre ou en mer, la restitution des sites est prise en compte très tôt dans la définition et la conception des installations et en particulier dès les études conceptuelles et d'Avant-Projet de développement.

Le choix du concept intègre autant que possible l'optimisation des coûts de RES futurs et la minimisation des impacts environnementaux et sociétaux.

4.2.2 Types d'évaluation

Il y a quatre types d'évaluation dans le processus de la RES (tel que décrit ci-dessous) selon la phase de vie de l'actif :

- **L'estimation initiale** de la RES est réalisée lors des études de développement :
  - Dans le cadre des **premières études de développement** (Etude prospect et Préliminaire) par une **évaluation préliminaire** des travaux de RES correspondants
  - Dans l'étude Conceptuelle le niveau d'étude est préliminaire si il s'agit d'une évaluation portant sur un "green field", et le niveau d'étude peut devoir être conceptuel si il s'agit d'une évaluation portant sur un champ existant ou un "brown field".
  - Lors **de l'étude d'Avant-Projet de développement** la première version du plan préliminaire de RES est établie sur la base d'une étude **de niveau « conceptuelle »** si il s'agit d'une évaluation portant sur un "green field", et le niveau d'étude peut devoir être d'Avant-Projet si il s'agit d'une évaluation portant sur un champ existant ou un "brown field".
- **Mises à jour et révisions du plan préliminaire de RES** : la première révision du plan préliminaire de RES suit la mise en production, les suivantes sont réalisées périodiquement au cours de la vie de l'actif, cependant chaque année une simple **mise à jour** du plan préliminaire de RES est faite pour tenir compte des ouvrages ajoutés, abandonnés ou démantelés. Une **révision** comprenant une nouvelle étude est lancée lorsque les circonstances remettent en cause les données de la dernière étude ou lorsque celle-ci date de plus de cinq ans
- **Première version du plan de RES**, alors qu'il existe encore des réserves et/ou une production suffisantes pour ajuster les provisions comptables et selon la complexité du projet de RES envisagé, la première version du Plan de RES est élaborée. Une **étude conceptuelle** de RES est réalisée, celle-ci prépare la communication avec les parties prenantes (autorités et groupes ou organisations sur lesquels le projet a un impact ou qui ont un impact sur le projet), planifie les phases d'études et permet d'établir un premier budget des travaux.
  - **Le plan de RES définitif** est établi par **l'Avant-Projet de RES** qui a pour but de valider la définition, l'organisation, les coûts et le planning du futur projet RES avec toutes les parties prenantes. Cet Avant-Projet sert de cahier des charges aux études d'engineering.

Chaque filiale est responsable de lancer (et le cas échéant mener) les études et de planifier les opérations dans le respect de son référentiel. Elle peut solliciter les experts des métiers, mais en garde la responsabilité ultime.

La définition des études correspondantes à ces quatre types d'évaluation est décrite dans la GM EP APP 008.

4.2.3 Critère de fin d'exploitation

4.2.3.1 Critère pour fermeture d'un puits, une installation ou un champ

Perspective à moyen ou long terme

Les considérations économiques sont dominantes pour établir la fermeture d'une installation de production. Les différents scénarios envisageables pour gérer le puits, l'installation ou le champ dans le futur sont comparés à la solution de l'arrêter.

Lorsqu'à partir d'une certaine date il n'existe plus de scénario pour le futur dont la somme des flux de trésorerie (*cash flows*) – à l'exclusion toutefois des flux de trésorerie liés aux obligations de restitution des sites – est positive, cette date est celle où il convient de fermer le puits, l'installation ou le champ.

Pour un puits isolé ou une installation simple la comparaison des scénarios se fait à la marge, c'est-à-dire sans hypothèse d'évolution de l'organisation et donc des frais de structure.

Pour une installation complexe ou un champ la comparaison des scénarios tiennent compte des changements structurels auxquels conduit leur fermeture.

Perspective à court terme

Quand il s'agit de prendre la décision opérationnelle de cesser d'utiliser et de fermer un puits, une installation ou un champ aux considérations économiques précédentes s'ajoutent des considérations supplémentaires parmi lesquelles celles qui consistent à s'assurer qu'il n'existe pas d'autre usage envisageable de la construction :

- pour un puits il faut vérifier qu'il n'y a plus de réservoir non perforé, qu'aucun autre usage pour le puits (injecteur, EOR) n'est envisageable,
- pour un champ il faut faire l'inventaire des autres niveaux présents, du potentiel de récupération améliorée, du potentiel d'exploration dans le voisinage qui ne serait justifiée que si l'installation subsiste.

Pour un puits, la décision est validée par un avis de VDG/GEO.

Pour un champ, la décision est prise en suivant le processus ComAD, ComAD, ComVal. Les travaux d'abandon sont réalisés à la date de la fin de production (par l'opérateur du moment), de manière indépendante par rapport à la date de fin de licence. La date de fin de production sert de référence, mais l'optimisation et/ou les synergies avec d'autres démantèlements peuvent amener à décaler la date de réalisation.

Il est donc nécessaire de prévoir la date de fin de production sachant que les queues de production sont parfois tangentes, étirées dans le temps et susceptibles d'être raccourcies ou prolongées selon le cours du baril et des frais opérationnels.

4.2.3.2 Cas où la fin de la production survient après la fin de contrat

Il s'agit du cas où le terme du contrat est antérieur à la fin prévisible de la production. Cette situation est décrite dans la CR EP ACC 009 (§ 5.6) et est brièvement résumé ci-dessous :

La situation peut être claire dans le contrat, c'est ce qui est préférable et c'est donc ce qu'il est recommandé de rechercher dans la cas de nouveaux contrats.

Cependant il existe des cas où le contrat est muet ou insuffisamment explicite, il convient alors de faire les hypothèses suivantes :

1. la filiale assume elle-même les opérations de RES relatives aux constructions devenues inutiles avant le terme du contrat,
2. la filiale contribue seulement à la RES des constructions subsistant au moment de la rétrocession des installations et en aucun cas à celle des constructions édifiées ultérieurement,
3. la filiale imagine les divers scénarios vraisemblables sur la base de précédents, d'indications informelles éventuelles, … Si un scénario unique émerge ce sera celui qui servira à valoriser l'obligation, si plusieurs scénarios sont en concurrence la valeur de l'obligation est la somme pondérée des valeurs des différents scénarios envisageables (espérance mathématique). La valeur de l'obligation selon un scénario particulier est la valeur actualisée des coûts des travaux,
4. un scénario de référence est proposé : celui dans lequel la filiale se libérerait de ses obligations en versant au terme du contrat une somme correspondant à la fraction du coût de l'obligation estimée au terme de la production calculée au prorata de la part de production revenant à la filiale durant le contrat rapportée à la production totale ultime estimée du champ,
5. dans tous les cas le scénario technique d'estimation des coûts est celui qui respecte le calendrier le plus probable des évènements de RES réels à venir (basé sur le profil 2P technique).

4.2.4 Inventaire et périmètre

En règle générale, toutes les constructions utilisées par l'Exploration Production pour ses activités sont concernées, celles contribuant directement à la production pétrolière, puits, installation de surface, pipelines, usine de liquéfaction ou de transformation des bruts, mais aussi toutes les autres constructions, bâtiments de bureau ou de chantier, routes, pistes.

Un inventaire exhaustif de toutes les constructions est tenu à jour, quelque soient les obligations. Y figurent toutes les constructions que celles-ci appartiennent ou aient appartenues un jour à la filiale (actifs rendus ou vendus), qu'elles soient opérées ou non. Il comporte les informations disponibles sur les obligations de RES, la localisation précise des constructions, leur description sommaire, l'historique des évènements majeurs, leur état (en opération, abandon temporaire ou définitif pour les puits, démantèlement partiel ou total des installations, risques particuliers, …), l'historique des estimations de coûts ainsi que les références aux documents archivés.

Le but de l'inventaire du périmètre (ou battery limit) est de lister les installations sur lesquelles portent les provisions potentielles d'abandon. Cet inventaire est juridique (obligations), technique et fiscal.

Il n'y a pas de comptabilisation de provision :

- dans les cas où il n'est pas possible de définir une fin d'utilité des ouvrages et un calendrier d'exécution des travaux, il devient impossible de définir une valeur de l'obligation, car celle-ci se définit comme la valeur actualisée du coût estimé des travaux. néanmoins il existe une exigence de déclaration d'un passif éventuel (CR EP ACC 009 § 4.4). Ce sera par exemple

le cas des pipelines et des terminaux pétroliers, des usines de liquéfaction de gaz (GNL) dont le devenir n'est pas lié aux champs en activité (utilisation par de nouveaux champs, voire transport pour compte de tiers) jusqu'au moment où l'arrêt de l'installation devient prévisible pour des raisons techniques (obsolescence) ou commerciales (arrêt de l'activité des clients). On tiendra à jour l'estimation des travaux RES dès la mise en service de l'installation même en l'absence de comptabilisation de provision.

- Pour les constructions pour lesquelles il n'existe aucun doute sur leur réemploi effectif après cessation d'usage (existence d'un marché actif en garantissant la revente, engagement contractuel spécifique de reprise par un tiers, …)..on se dispensera d'en évaluer le coût de démantèlement et de restitution des sites , mais elles devront figurer à l'inventaire.

L'inventaire se compose de façon non exhaustive des réalisations suivantes :

4.2.4.1 Les sites d'exploration et appréciation

- Camps et layons d'acquisitions sismiques en milieu sensible : forêt tropicale, mangrove, zones arctiques, zones d'activités économiques (aquaculture, zones de cultures, …)
- Les sites de forage : puits d'exploration et appréciation , puits d'eau, caves, réseaux de drainage, bourbiers, pads et plateformes de forage, magasins, bâtiments de logistique, etc…

4.2.4.2 Les champs de production et installations de transport et stockage

- Puits de développement : puits de production huile et gaz, puits injecteurs d'eau et de gaz, puits releveur d'eau, puits de réinjection ou rejet (disposal well),
- Vannes et réseaux de collecte, câbles et ombilicaux (manifolds, flow lines, …),
- Plates-formes puits et de production/utilités, plates-formes quartier, FPSO, FSO et autres stockages flottants, risers, systèmes d'ancrages,
- Bouées de chargement,
- Têtes de puits sous-marines, templates, cluster sous marins,
- Systeme de production sub-sea,
- Pipelines intra champ (infield) et pipeline export/import, onshore et offshore,
- Têtes de puits de production à terre et groupes de puits ou clusters, dalles et caves,
- Centre de production et usine de traitement,
- Terminal, centre de stockage (tank farm),
- Les bases logistiques, les camps de construction et bases vie à terre et installations associées : unités de traitement des eaux sanitaires, des déchets et autres décharges contrôlées.

4.2.5 Principes et étapes de réalisation d'un projet RES

Se reporter à la GM EP APP 008

Les principes et procédures simplifiées de réalisation d'un projet RES, sont définis dès le Plan Préliminaire de RES en indiquant les hypothèses correspondantes retenues pour les différentes étapes du projet de RES telles qu'indiquées dans les phases 1 à 4 de la figure ci-dessous.

	ETUDES ET PROJET	PRODUCTION	RESTITUTION DES SITES - PHASES DE REALISATION				SITES RESTITUES
		Démarrage de la production	Arrêt de la production	Installation inerte		Site abandonné	Transfert de responsabilité
			Phase 1 Decommissioning	Phase 2 Abandon des puits	Phase 3 Démantèlement	Phase 4 Surveillance	
			Mise en sécurité Arrêt des utilités, de l'energie Vidange nettoyage inertage Gestion des déchets spéciaux Surveillance en attente de démantelement	Enlevement de la completion Bouchage des puits	Inspection initiale Préparation au démontage Démontage enlèvement Transport vers le lieu de découpage et de recyclage Elimination des déchets Réhabilitation des sols Inspection finale et approbation	Inspections post abandon Maintenance (balisage)	
Opération	SCR/ED ou TDO/PJC	EXPLOITATION	EXPLOITATION / SE	FORAGE	PROJET	EXPLOITATION	TIERS
Estimation des coûts de RES	FILIALE ou SCR/ED/EST	FILIALE ou SCR/ED/EST	TDO/EXP	TDO/FP	SCR/ED/EST	TDO/EXP	

4.2.5.1 Phase de préparation et de decommissionning :

Cette phase comprend toutes les activités :

- nécessaires pour approuver le concept de réalisation des travaux RES: études et « surveys »
- destinées à rendre les installations « sures » et inertes vis-à-vis de l'environnement. Elle consiste notamment à mettre tous les équipements hors pression et hydrocarbures et à préparer les installations à la phase de démolition ou de démantèlement. Ces opérations sont sous la responsabilité des exploitants du (des) site(s).

4.2.5.2 Phase d'abandon des puits :

La phase d'abandon des puits concerne tout type de puits. Les puits sont abandonnés en accord avec les règles du groupe ou de la législation locale si cette dernière est plus contraignante. Cette phase intervient avant ou après celle de decommissionning en fonction de disponibilité d'appareils. Cette phase est déterminée et réalisée par les équipes « Forages ».

4.2.5.3 Phase de projet :

La phase « projet » comprend toutes les opérations de démantèlement et démolition des installations, leur transport vers le lieu de recyclage et la réhabilitation des sites de production. La maîtrise d'œuvre de cette phase est confiée aux équipes « projet ».

4.2.5.4 Phase de monitoring - post RES:

Une fois le projet RES terminé, une période de surveillance des sites plus ou moins longue selon les méthodes de réhabilitation et de recyclage devra être menée avant le rendu définitif des sites et notamment dans le cas d'environnements particulièrement sensibles.

Cette phase sera gérée conjointement par les exploitants et les équipes « «sécurité/environnement ».

Les coûts d'un projet RES se décomposent donc traditionnellement en 4 volets principaux :

- **Préparation et « decommissionning »** qui comprend :
  - les études et tous « surveys » préparatoires,
  - le chiffrage des opérations d'arrêt de la production, de la mise en sécurité des installations, de l'inertage des différents équipements avant démantèlement.
- **Bouchage et abandon des puits (« wells P/A »)**
- **Démantèlement, transport, stockage** des installations et infrastructures et de la **réhabilitation** du site
- **Monitoring et suivi « post RES »**

Les études qui permettent l'estimation des coûts RES sont donc pluridisciplinaire (DSO, HSEQ,..), elles sont toujours placées sous la responsabilité de la filiale qui peut en déléguer toute (ou partie) de la réalisation aux métiers concernés. En règle générale la coordination de ces études au siège est faite par ED/APP, (cf. section 6.2)

4.2.6 Principes d'estimation des coûts de RES

4.2.6.1 Règles générales

Le montant comptabilisé en provision est la meilleure estimation de la dépense nécessaire à l'extinction de l'obligation actuelle. C'est le montant que la filiale devrait raisonnablement payer pour éteindre son obligation à la date de clôture ou pour la transférer à un tiers à cette même date.

Les estimations du résultat et de l'effet financier sont déterminées à partir du jugement du management, complétées par l'expérience de transactions similaires. Dans le cas du recours à des rapports d'experts indépendants, la plus grande prudence doit être observée en critiquant les hypothèses de travail et le réalisme des montants avancés. La filiale garde la responsabilité ultime des études et des projets d'abandon.

Le plus récent plan préliminaire de RES ou le plan de RES établit l'estimation du coût et le calendrier des travaux de RES pour chaque actif.

L'estimation des obligations dont la réalisation est éloignée dans le temps est basée sur les hypothèses suivantes :

- les travaux et services sont effectués dans des conditions de marché normales avec des fourchettes pour prendre en compte les incertitudes liées au « long terme ». Selon le calendrier d'exécution, des prix de milieu de cycle définis comme des prix moyens sur une période de quelques années pourront servir de base pour l'établissement des incertitudes,
- les optimisations découlant d'une recherche raisonnable de synergies sont mises en oeuvre (abandons et démantèlement réalisés par campagne, moyens partagés avec d'autres opérateurs ou d'autres filiales, etc.),
- le calendrier des travaux est supposé être celui qui résulte de la fin d'utilisation de l'ouvrage telle qu'appréciée à partir des profils 2P de production, indépendamment de la date de fin de licence,
- les frais de structure de la filiale sont calculés comme pour un projet de développement en tenant compte d'une activité raisonnable de la filiale à la même époque,
- Il sera appliqué des « contingencies » conformément à la méthode d'estimation réalisé en accord avec la méthodologie d'ED/IC/EST décrite dans la GM EP EST 006.

En pratique les estimations sont souvent faites en deux temps :

- Estimation du nombre des unités d'œuvre (appareil x jour, heures, tonnes, m3, etc…),
- Valorisations monétaires des unités d'œuvre.

De façon à refléter la meilleure estimation du moment, à garantir que les valeurs estimées obéissent aux principes précédents et à prendre en compte les dernières connaissances disponibles sur les progrès technologiques, la valeur de l'obligation est ajustée quand cela est jugé nécessaire. On prendra garde à éviter de prendre en compte des variations trop rapides de coûts soit à la hausse soit à la baisse dues à une conjoncture exceptionnelle ou temporaire.

4.2.6.2 Estimation des coûts de la phase de decommissionning

Les coûts de decommissioning sont estimés par le métier « l'Exploitation » sur la base d'un cahier des charges pour l'arrêt de la production et l'inertage des toutes les installations.

Ces coûts sont variables selon la complexité et la localisation des installations à decommissionner.

Remarque : A titre d'ordre de grandeur ils représentent généralement entre 5 % (pays d'Afrique par exemple) et 15 % (zone mer du Nord par exemple) des coûts globaux des travaux de RES.

4.2.6.3 Estimations des coûts d'abandons des puits

Les coûts d'abandons des puits sont estimés par le métier forage de manière la plus réaliste possible dans une hypothèse de prix « long terme » dans la majorité des cas.

Les opérations seront conformes aux règles d'abandon décrites dans la CR EP FP 424 ainsi qu'aux normes en vigueur définies par la réglementation locale du pays.

Les puits présentant un programme d'abandon similaire dépendant

- de l'environnement et du support (subsea, offshore dry tree, swamp, onshore,…),
- du type d'appareil utilisé,
- du statut du puits.

seront regroupés si possible par catégorie homogène.

Une estimation des coûts d'abandons d'un puits standard dans sa catégorie facilitera l'évaluation globale des coûts d'abandons.

A ces « coûts standard », il sera appliqué des facteurs correctifs sur la durée des opérations d'abandon reflétant l'écart au programme « standard », en fonction de critères tels que :

- architecture du puits (déviation, profondeur)
- type de complétion (simple, sélective, double,..)
- potentielles difficultés à prendre en compte lors des opérations (restrictions, poissons, annulaires sous pression, état des tubulaires, corrosion, etc…)

Le choix et les coûts de mobilisation/déménagement/démobilisation des appareils seront déterminés au sein de campagnes optimisées en fonction des opérations programmées et du planning des projets.

4.2.6.4 Estimations des coûts des projets de RES (cf. GM EP EST 006)

- Estimation des coûts lors des études **Prospect et Préliminaire** de développement.

  Lors de ces études de « développement » en amont de l'Avant-Projet, l'estimation des coûts de projet RES peut être évaluée par un pourcentage des CAPEX de surface (cf. GM EP EST 006 § 6.2), selon la grille indicative ci-dessous:

Installations en mer	**Installations à terre**
Plate-forme puits: entre 10 et 30 %	Régions désertiques: entre 5 et 10%
Plate-forme de production: entre 8 et 15 %	Régions forestières/agricoles:entre 10 et 15%
Plate-forme torche: entre 30 et 50 %	Régions isolées (Sibérie): entre 15 et 20%
Installations flottantes FPSO, bouée: entre 5 et 10%	
Pipelines laissés en place: entre 2 à 5%	Pipelines laissés en place: entre 2 à 5%
Pipelines enlevés: entre 30 et 50%	Pipelines enlevés: entre 30 et 50%

- Estimation des coûts lors des **études Conceptuelle et Avant-Projet** de développement :

  Cette évaluation est établie au périmètre de tous les ouvrages qu'il comprend : puits et installations de production. Les estimations des coûts de RES réalisées dans ce cadre est décrite dans le § 7 de la GM EP EST 006 sur la base d'hypothèses de prix « long terme » en général. Elles s'appuient sur un inventaire des installations décrites dans l'étude et sur des hypothèses de démantèlement cohérentes avec la méthodologie et les règles définies dans le référentiel de la filiale.

4.2.6.5 Anticipation d'événements futurs

Les coûts sont évalués généralement pour des périodes de réalisation situées loin dans le temps. L'incertitude due à des événements futurs est une des difficultés pour apprécier de façon justifiable les coûts de RES.

Par exemple, le montant des provisions comptabilisé reflète une attente raisonnable d'observateurs objectifs et techniquement qualifiés, prenant en compte tous les indices dont ils disposent quant à l'état de la technologie au moment du démantèlement comme : les réductions de coûts attendues du fait d'une plus grande expérience de l'application d'une technologie existante ou le coût attendu de l'application d'une technologie existante à une opération plus importante (ou plus complexe) que celles effectuées couramment. Exemple : le choix d'un appareil de forage adapté aux campagnes d'abandon des puit.

Toutefois, la mise au point d'une **technologie entièrement nouvelle** n'est pas anticipée, sauf si elle s'appuie sur des indications objectives suffisantes.

4.2.6.6 Risques et incertitudes

Les risques et incertitudes qui affectent inévitablement de nombreux événements et circonstances sont pris en compte pour parvenir à la meilleure estimation d'une provision *(*IAS 37 § 42).

L'obligation peut être estimée en pondérant tous les scénarios possibles en fonction de leur probabilité d'occurrence .Cette méthode statistique d'estimation retient la valeur moyenne des différentes valeurs possibles pondérées par leur probabilité (espérance mathématique). [cf : DIR-GR-SEC-08 et CR EP HSE 041.

*En l'absence d'une approche probabilisée, **une fourchette de coûts** ainsi qu'une valeur P50 de l'estimation sera proposée pour la valeur des coûts des travaux d'obligations de RES.*

4.2.6.7 Valeur résiduelle

La valeur résiduelle éventuelle, montant net que la filiale s'attend à obtenir pour l'actif à la fin de sa durée d'utilité après déduction des coûts attendus, a un traitement comptable spécifique. *En conséquence, elle est évaluée, mais ne peut être déduite des coûts des travaux.*

4.2.7 Optimisation du planning et des coûts

En conformité avec la DIR EP 13, les RES sont réalisées avec le souci d'optimiser le planning et les coûts.

Concrètement, les plannings sont établis en recherchant toutes les synergies possibles mais en même temps la filiale veille à ce que l'étalement induit de l'exécution des travaux ne l'expose pas à voir ses obligations accrues par une législation plus exigeante ou la prise en charge d'une partie des coûts réduite par une réglementation fiscale moins favorable.

Le périmètre des synergies s'étendra tout d'abord aux bornes de la filiale et des différents assets qui composent son domaine minier. Un périmètre plus élargi comprenant les opérateurs d'un même pays voire de pays voisins fera partie aussi des synergies potentielles à rechercher.

Ceci conduit à intégrer le planning de RES d'un actif dans un planning d'ensemble les travaux RES pour toute la filiale, ce planning fera partie du « Plan de RES consolidé Filiale ».

4.3 Aspects environnementaux (cf. le GM EP ENV 055)

4.3.1 Règles générales

Les lignes guide définissant les objectifs généraux à atteindre en fin de travaux de RES pour les puits, les superstructures, les infrastructures (jackets métalliques – infrastructures en béton), les installations flottantes et ouvrages sous-marins et les pipelines (canalisations de liaison ou pipes export/import) sont définis dans le GM EP ENV 055.

Un programme environnemental détaillé sera réalisé avec les objectifs suivants :

- Identifier et caractériser l'ensemble des pollutions,
- Mesurer l'extension de la pollution.

Suite à cette analyse, les résultats seront exploités afin de répondre aux objectifs fixés :

- Définir les objectifs de réhabilitation, en se basant sur les connaissances scientifiques et techniques du moment, compatibles avec l'usage futur du site et de son environnement,
- Déterminer une stratégie de réhabilitation en évaluant les méthodes de traitements permettant d'atteindre les objectifs et les coûts de dépollution.

Le choix de la technique de traitement la plus appropriée dépend des conditions du site, du type et de la concentration des contaminants présents et des exigences des parties concernées.

4.3.2 Audit environnemental

Le Groupe veut préserver ses droits et circonscrire ses responsabilités. En application de ce principe, on procède systématiquement à un audit environnemental :

- avant une acquisition ou une cession (*due diligence*)
- avant et après les travaux de RES

D'une façon générale on s'assure le concours d'organismes indépendants chaque fois qu'il y a lieu de préserver les intérêts du Groupe contre un risque de plainte ultérieure pour dommage à l'environnement.

4.3.3 Diagnostic spécifique initial

Après une inspection d'ensemble préliminaire, un diagnostic spécifique est conduit en cas de présence de produits, matériaux ou déchets dangereux, de matériel contaminé, et chaque fois que des incidents de pollution ont pu contaminer le sol ou l'eau (nappes phréatiques temporaires, superficielles ou profondes).

Par ailleurs, une évaluation de type EBS est menée selon une méthodologie similaire à celle utilisée pour caractériser l'état initial avant la réalisation du projet de développement.

Ce diagnostic est mené dans la phase initiale du plan de RES (phase d'étude conceptuelle de RES).

4.3.4 Elimination des produits et matériaux dangereux

Les produits et matériaux dangereux (produits chimiques toxiques – boues – matériaux contaminés aux PCB ou par des métaux lourds – amiante – matériaux ou dépôts radioactifs – CFC ...) sont identifiés, récupérés, transférés et (pré-)traités selon des procédures spécifiques en vue d'un traitement final approprié avant d'être éliminés par des filières agréées.

4.3.5 Réhabilitation des sols

Le programme des travaux destinés à la réhabilitation des sols (comportant le cas échéant un objectif de dépollution avec choix de technique de traitement) est défini en concertation avec les autorités et les parties prenantes en fonction de la destination finale des sites restitués (terrain industriel, terre agricole, terrain constructible ...). Lors de la concertation, les seuils de décontamination sont déterminés en prenant en compte et en définissant leur opérabilité.

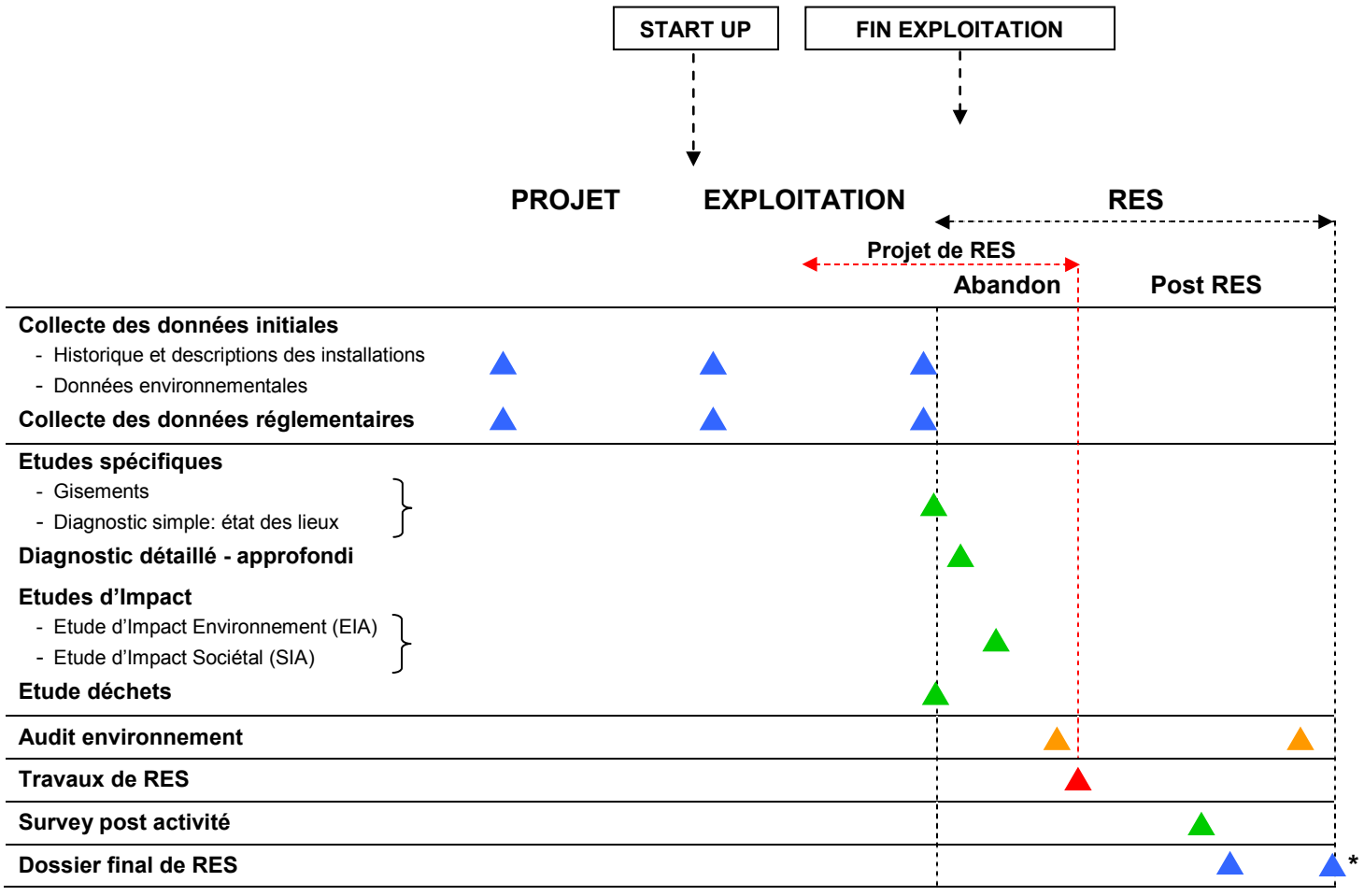
4.3.6 Diagnostic spécifique final et suivi environnemental

Afin de confirmer l'atteinte des objectifs de remise en état, un diagnostic final est réalisé à la fin des travaux de RES ; il comporte notamment un échantillonnage à terre des sols, des eaux souterraines et eaux de surface adjacentes et en mer de la colonne d'eau et des sédiments.

Ce diagnostic est intégré au dossier final de RES qui précise toutes les opérations réalisées par les travaux de RES afin de démontrer que le risque résiduel est acceptable pour le milieu.

Suivant le cas, un suivi environnemental complémentaire est maintenu après l'achèvement des travaux de RES afin de caractériser l'évolution de cet impact résiduel.

4.3.7 Résumé des jalons « Environnement" propres aux projets RES



4.4 Recommandations concernant les phases de travaux RES

4.4.1 Bouchage et abandon des puits (exploration, délinéation, production)

Il s'agit des puits d'exploration, d'appréciation, de production (huile, eau et gaz), d'injection (eau et gaz) et des puits d'observation y compris les équipements de surface. Les principes et procédures sont applicables sur les puits à terre comme en mer.

Les puits d'exploration et de délinéation non réutilisés ainsi que les puits de production définitivement arrêtés devront être bouchés et abandonnés suivant la procédure définie par la CR EP FP 424 et en accord avec les réglementations locales particulières telles que définies dans le référentiel « filiale ».

Un puits pour l'élimination des fluides de lavage et produits de *flushing (lors du decommisionning) pourra être conservé* si la réglementation le permet.

Les procédures d'abandon de puits seront étudiées et adaptées à la situation de chaque puits; selon qu'il soit situé à terre ou en mer, qu'il soit éruptif ou non, qu'il possède une complétion simple ou double, qu'il soit injecteur ou producteur. Une procédure détaillée sera établie pour chaque puits conformément à la Règle Technique Métier du Groupe.

Les principales phases de l'abandon sont les suivantes:

- Préparation du site pour l'installation de l'appareil,
- Remontée de la complétion,
- Pompage des bouchons de ciment à divers endroits de la colonne autant que de besoin pour assurer les objectifs d'isolement de zones tel que défini dans la procédure établie pour chaque puits,
- A terre, coupe du casing en dessous du sol, une plaque est soudée sur l'orifice et recouverte de béton.
- En mer, coupe du casing sous la mud line,

4.4.2 Decommissioning des installations de production (cf. GM EP APP 008)

Cette phase consiste à rendre inerte l'installation c'est à dire sans danger lié au fluide ou à l'énergie pour l'environnement humain et naturel. Dans cette configuration, une installation faisant l'objet d'une surveillance minimale peut rester plusieurs années sans danger à condition de maintenir les accès pour les contrôles obligatoires. Elle inclue le decommissioning des installations de surface et celui des lignes en vue de leur abandon définitif.

Certains sites servent de transit d'effluent ou d'énergie pour d'autres champs. Dans ces cas, l'ensemble de transit (ESDV, gares racleurs, autres) est conditionné pour que les automatismes soient neutralisés et aménagés pour permettre les opérations en manuel.

Les principes généraux retenus sont les suivants :

- les installations à abandonner seront totalement déconnectées des installations en fonctionnement (principalement par les pipes).
- l'ensemble des équipements pétroliers installés est nettoyé de ses hydrocarbures résiduels.

- les installations de surface sont décomprimées, vidangées, nettoyées de tous fluides liquides ou gazeux ; les hydrocarbures, produits chimiques, bouteilles de gaz, les équipements récupérables, les huiles et produits de tout type sont retirés et stockés à terre. Les capacités et lignes sont dégazées et lavées pour supprimer tout risque d'explosion lors d'interventions ultérieures, qui peuvent intervenir plusieurs mois après le decommissioning.
- les pipes sont nettoyés par raclages successifs et répétitifs ; sauf contre indication de la législation en vigueur, ils sont abandonnés sur place en l'état sans récupération.
- les installations sont abandonnées, propres et sans danger potentiel du point de vue sécurité/environnement.
- l'inertage des éléments contenant des produits particulièrement dangereux (amiante, dérivés mercurés, radioactivité, produits toxiques….) devront faire l'objet d'une procédure de traitement particulière.

Unités de procédé :

Ce paragraphe comprend de façon complète toutes les unités de Process (exemple non exhaustif : les séparateurs, les scrubbers, les ballons de déshydratations et de stockage, les générateurs électriques, les compresseurs, les échangeurs, les chaudières, les pompes).

L'équipement concerné sera complètement purgé, dégazé et nettoyé. Toutes les conduites seront également purgées et nettoyées.

Tout l'équipement est débarrassé des substances dangereuses, telles que les lubrifiants, liquides de refroidissement et autres produits chimiques, qui sont stockées et traités dans des sites adéquats. Les sédiments (pouvant être localement radioactifs) contenus dans les bacs et cuves seront nettoyés et traités spécifiquement.

Tout équipement statique ou tournant pouvant être réutilisé sera démonté.

Tuyauteries :

Toutes les tuyauteries sont purgées, dégazées et nettoyées avec si possible un raclage.

Les conduites entre les différents sites ou entre les puits et les centres de traitement sont traitées de la façon suivante :

- les conduites d'huile et de gaz seront raclées et flushées. Les effluents de nettoyage devront pouvoir être récupérés,
- les conduites d'injection d'eau et de relevage d'eau seront généralement considérées comme propres.

Moyens à mettre en œuvre pour la phase '' DECOMMISSIONING'' :

- Logement du personnel dans les bases vie existantes, un camp de chantier ou un quartier vie temporaires
- Moyens de transport pour les rotations du personnel, les produits toxiques et le matériel démonté
- Equipements spécifiques et outillages divers : pompes, flexibles, nettoyeurs haute pression, produits chimiques, compresseur,

- Les équipes travaux : opérateurs, chefs d'équipe, superviseurs et spécialistes,

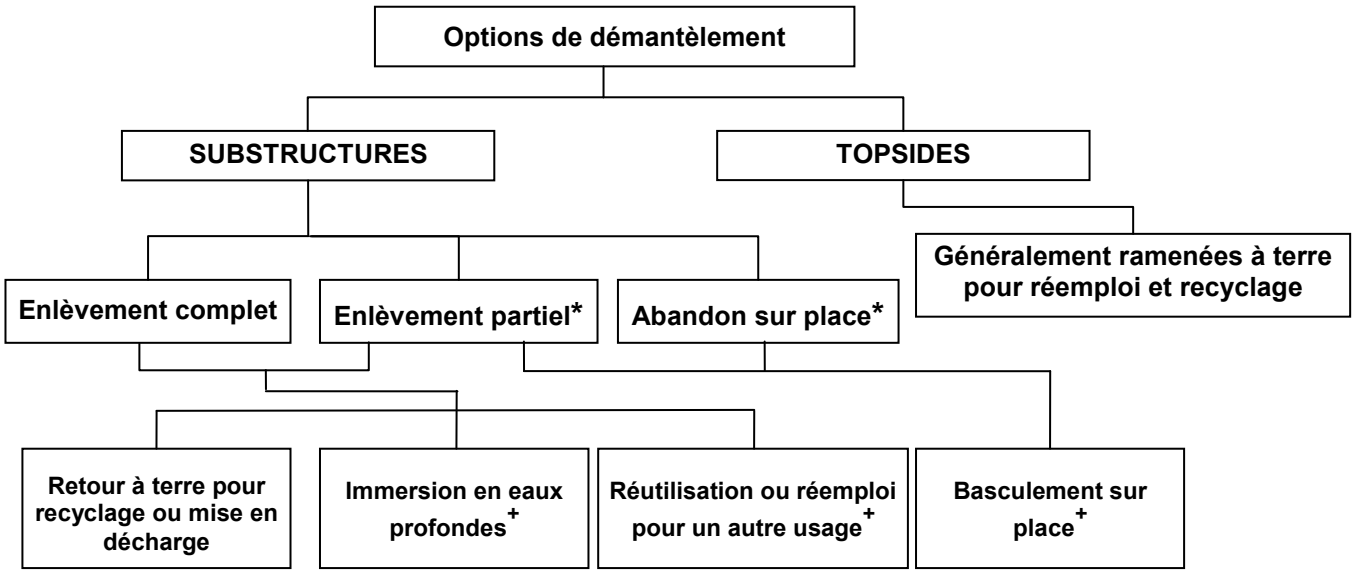
NB : En cas d'arrêt complet des installations, une surveillance permanente des sites devra être mise en place jusqu'à la phase de démantèlement.

4.4.3 Surveillance des installations décommissionnées en attente d'enlèvement

- les sea-lines ou les câbles électriques décommissionnés ne seront pas surveillés.
- Les infrastructures décommissionnées nécessiteront une surveillance et une maintenance minimales, en attendant leur enlèvement éventuel dans les années suivantes. Les fonctions minimales à assurer seraient les suivantes :
  - contrôles, mesures sur la protection cathodique une fois par an (pas de contrôle sous-marin des anodes et des structures.
  - maintenance des caillebotis, échelles une à deux fois par an.
  - inspection/nettoyage du balisage quatre fois par an.
  - analyse labo des effluents de cocoonage
  - contrôle des pression , évents etc.

4.4.4 Démantèlement des installations en mer

Le choix des alternatives de démantèlement est très important en mer car le retrait ou l'abandon des installations peut avoir un impact conséquent sur l'environnement.



* Option admise par IMO et conditionnellement par OSPAR (soumise à dérogation seulement pour les structures en béton et les fondations de plus de 10000 t, en place avant que le démantèlement complet devienne une condition).

+ Option admise par IMO et refusée par OSPAR

- Topsides

L'intégralité des *topsides* sera enlevée après une mise en sécurité préalable de la plateforme. Les équipements (capacités, canalisations, …) seront flushés, nettoyés et inertés : ces opérations seront réalisées sous la responsabilité de l'exploitant (et ce jusqu'à l'accomplissement de la phase d'inertage de l'installation ou *Cold Phase*).

Les superstructures seront généralement ramenées à terre pour être recyclées ou réemployées.

- Infrastructures métalliques ou jackets

L'intégralité de la ou des plateformes métalliques sera enlevée et transportée à terre pour y être recyclée ; les fondations ou *footings* seront également retirées de façon à ne laisser aucune structure au dessus du fond de la mer. Pour des raisons de responsabilité potentielle ultérieure, la solution *toppling* (découpage à -55 m et partie supérieure abandonnée au fond de la mer) ne sera utilisée que dans des circonstances où le Groupe peut-être définitivement déchargé de toute éventuelle responsabilité ultérieure et dans la mesure où il aura été démontré l'impossibilité d'un recyclage. De même, l'option d'abandon sur place ou de réutilisation en récif artificiel ne sera envisagée qu'au cas par cas, après élaboration d'un dossier dûment argumenté et avec l'accord des autorités pour une immersion du *jacket* dans une zone de réserve dédiée et approuvée.

- Cas des Infrastructures en béton (GBS ou *Gravity Base Structure*) de mer du Nord

L'enlèvement complet est obligatoire pour toutes les structures en béton mises en place postérieurement à 09/02/1999, date d'effet de l'obligation de concevoir des structures qui puissent être remise en flottaison.

Pour les structures mises en place antérieurement à cette date, la Convention OSPAR prévoit une possibilité de dérogation.

- Canalisations et pipelines d'export

Les canalisations *infield* seront raclées et flushées. Suivant les diamètres, elles pourront être soit enlevées (par exemple pour un diamètre inférieur à 12''), soit laissées en place et ensouillées ou recouvertes (rock dumping) après mise en eau. Ces opérations sont suivies d'un *survey* de contrôle.

Les pipes lines d'export seront laissés en place, elles feront l'objet d'un raclage et *flushing*, un *survey* de reconnaissance sera effectué pour démontrer qu'elles ne constituent pas un danger pour les activités de chalutage .Si nécessaire, il pourra être envisagé d'enfouir ou de recouvrir certaines sections de pipelines (*rock dumping*).

- Ouvrages sous marins

Les têtes de puits sous-marines, les *risers*, *riser towers*, *manifolds*, *jumpers*, liaisons hydrauliques, câbles seront normalement enlevés.

- Installations flottantes

Les installations flottantes telles que les FPSO, TLP, installations semi-submersibles, bouées de chargement, seront déconnectées, et remorquées à terre pour un démantèlement et/ou une réutilisation. Les lignes d'ancre seront relevées et transportées à terre ; les ancres à succion resteront en place s'il est techniquement impossible de les relever.

- Les déblais de forage

Les déblais rejetés (*cuttings piles*) accumulés au fond de la mer, seront généralement laissés tels quels en fin de vie du champ. L'étude d'impact du plan de cessation devra justifier cette solution.

4.4.5 Programme de démantèlement des installations à terre et en milieu côtier

A terre, le choix du devenir des installations se fait essentiellement en fonction de l'usage futur du site, il n'est donc pas nécessaire d'effectuer une étude d'impact aussi détaillée qu'en mer.

- Installations de surface

Sur le périmètre concernant le centre de production, l'usine ou le stockage, l'installation sera préalablement mise en sécurité puis l'intégralité des infrastructures et superstructures (dalles de fondations, supports et équipements de *process*) sera nettoyée et enlevée.

Les substances dangereuses récupérées sont stockées ou détruites en tenant compte des risques pour l'environnement. Tout matériel ou équipement inutile est découpé pour être ferraillé. Les bacs de stockage seront inertés et débarrassés de leurs boues de fond de bacs, avant d'être démontés et ferraillés.

Les bâtiments sont retirés ou abandonnés sur place pour réutilisation, les fondations et les caves de puits sont cassées jusqu'à une profondeur d'au moins 1 mètre.

Les aires concernant les bassins de rétention ou des unités de traitement de type API, et autres fosses (lagune, *catch pit, burn pit*, ...) ainsi que les aires de stockage des produits chimiques et produits dangereux feront l'objet d'une reconnaissance des sols détaillée et pourront donner lieu à un programme spécifique de nettoyage, traitement et réhabilitation.

Les matériaux sont recyclés dans la mesure du possible et les déblais sont mis en décharge agréée.

Toutes les voies d'accés sont terrassées, reprofilées et revégétalisées si nécessaire. Les pentes et le drainage sont restitués.

- Canalisations et pipelines

Les canalisations aériennes et enterrées situées dans le périmètre de l'usine, ainsi que les canalisations aériennes hors périmètre, seront nettoyées, flushées et enlevées.

Les canalisations et pipelines enterrés situés en dehors du périmètre seront laissés en place, sauf si la règle locale impose leur enlèvement ou si une section de conduite enterrée est insuffisamment enfouie, et représente une gêne, un danger compte tenu des pratiques locales (agricoles, …).Ces canalisations seront dans tous les cas préalablement raclées, nettoyées et, si elles sont laissées en place, mises en eau inhibée puis les extrémités seront bouchées.

- Contrôle des nappes et eaux superficielles

La ressource en eau (nappes temporaires, superficielles et profondes) devra faire l'objet d'une attention particulière et, si nécessaire, être décontaminée, conformément aux règles et standards en vigueur.

En l'absence de piézomètres existant sur le site, dans tous les cas de vulnérabilité potentielle, des puits d'investigation et de contrôle de la nappe phréatique devront être mis en place afin de s'assurer de la qualité des eaux.

- Réhabilitation des sols

Le programme des travaux sera défini, le cas échéant en concertation avec les autorités, afin de minimiser l'impact consécutif à ces travaux ainsi que l'impact résiduel et sociétal en fin de travaux.

Suivant les cas, et notamment la destination finale des sites restitués (terrain industriel, terre agricole, terrain constructible, …), les terrains pourront faire l'objet d'une réhabilitation des sols, qui pourra comporter, après étude simplifiée voire détaillée des risques (ESR/EDR), une réhabilitation faisant appel à des procédés adaptés de restauration (*remediation*) pouvant aller jusqu'à l'excavation préalable et la substitution des sols ou la restitution des sols traités.

La réhabilitation du site pourra également comprendre l'enlèvement du remblai (sable, tout venant, latérite, …), ayant servi à construire les plates-formes de fondation des installations ou de soubassement des infrastructures.

Dans certains cas et en particulier si cela a été prévu au départ, il pourra être effectué la décompaction du sol, le remodelage des terrains, la remise en place du sol initialement décapé ainsi qu'à la re-végétalisation et la replantation. La lutte contre l'érosion sera à prendre en compte.

Avant d'établir un programme des travaux de réhabilitation, il est nécessaire de délimiter les zones à restaurer, celles à dépolluer en connaissant les polluants et les concentrations à abattre. Il ne s'agit plus à ce stade de constater un impact sur l'environnement mais de le quantifier.

4.5 Aspects financiers

A noter : il faut distinguer les provisions des versements sur des comptes séquestres.

- Dans le jargon financier, la provision est un mécanisme purement comptable et n'est pas monétaire (pas "cash"). Ce mécanisme permet de répartir des coûts futurs (des travaux de RES par exemple) sur les résultats des années précédant ces travaux futurs. Ainsi, l'année des travaux, leurs coûts n'ont pas d'impact sur le résultat de la période, si le montant de la provision a été correctement déterminé. Le montant de la provision est déterminé par l'obligation de réaliser des travaux, et les modalités de sa constitution sont définies par la norme comptable internationale IAS 37.

- Les versements sur des comptes séquestres ont pour but de s'assurer que tous les participants (Etat et partenaires) apporteront l'argent nécessaire pour payer l'exécution des travaux. Il s'agit d'une procédure purement monétaire ("cash"). Les modalités et le rythme des versements font l'objet d'un accord local avec toutes les parties prenantes.

4.5.1 Inscription dans les comptes

Les normes comptables IAS 16 et IAS 37 (CR EP ACC 009 § 5.1 et 5.3) demandent :

- l'inscription d'une provision de la valeur de l'obligation actuelle, définie comme valeur actualisée du coût des travaux de RES
- l'intégration de la valeur actualisée du coût des travaux de RES à la valeur de l'actif définie à l'origine comme le coût de celui-ci
- la prise en compte dans les exercices suivant la mise en production des charges correspondantes par un double mécanisme :

- d'amortissement de la valeur d'actif correspondant au coût des travaux RES
- de revalorisation de la provision en fonction du passage du temps, de sorte qu'en fin de vie du gisement, son montant corresponde à celui des travaux en monnaie courante

Bien que non dépensés au départ, les coûts de RES font partie des coûts constitutifs des installations de production des gisements. Ils sont donc capitalisés et amortis à proportion de la production rapportée aux réserves restant à produire pour un champ ou des quantités transportées aux quantités à transporter pour un système de transport.

Le fait que les normes IAS 16 et IAS 37 imposent que les comptes traduisent ces obligations dès le premier baril produit, entraîne que ces questions appartiennent au présent et non à un futur lointain.

4.5.2 Évènements futurs

Les événements futurs pouvant avoir un effet sur le montant nécessaire à l'extinction d'une obligation sont traduits dans le montant de la provision lorsqu'il existe des indications objectives suffisantes indiquant que ces événements se produiront.

En pratique, dans le cas général, il n'y a pas lieu de remettre en cause une étude conceptuelle pour tenir compte spécifiquement d'un éventuel progrès technologique, la révision périodique recommandée (de l'étude est suffisante pour intégrer ce progrès. Cependant si une percée technologique particulière conduit à modifier le schéma retenu par l'étude conceptuelle, une nouvelle étude devient nécessaire pour prendre en compte ce progrès.

L'effet d'une nouvelle législation possible est pris en compte dans l'évaluation d'une obligation existante lorsque des indices objectifs suffisants existent qu'une promulgation de cette législation est quasiment certaine. Les indications devront indiquer à la fois ce que la législation imposera et s'il est quasiment certain qu'elle sera promulguée et mise en œuvre en temps voulu.

En pratique, il est rare que la promulgation d'une législation soit quasiment certaine avant que cette législation soit effectivement passée.

4.5.3 Calcul des provisions et immobilisations

Exemple:

Mise en production le 01/01/09 d'un champ d'une durée de vie de 10 ans ; le coût de restitution est estimé à 100 $MUSD_{2005}$; les travaux RES seront réalisés en 2019, année suivant l'arrêt de production ; l'obligation RES est constatée en 2009. Le régime fiscal local ne permet de déduire ni les travaux ni les provisions.

- **Calcul de la valeur d'actif RES et de la provision initiale**

Le coût estimé des travaux en USD de l'année est inflaté jusqu'à l'année de réalisation des travaux (2.5 % par an). Ce montant est actualisé en utilisant le taux de 6% et constitue la valeur d'actif et la provision RES initiale.

NB : Les taux sont généralement stables, mais sont susceptibles d'être révisés.

Exemple de calcul:

MUSD	2009		2019
Coût des travaux RES en monnaie de l'année	100,0	2.5%/an →	128,0
Immobilisation RES (travaux actualisés à 5%)	71,5	← 6%/an	

Les écritures comptables sont les suivantes :

	Débit	Crédit
→ Immobilisation RES	71,5	
→ Provision RES		71,5

- **Dotations à la provision et l'amortissement**

L'immobilisation corporelle de l'actif incorpore les coûts de RES, elle est amortie suivant la même méthode et au même rythme applicable à l'actif.

- **Accrétion temporelle**

Chaque année, la valeur comptable de la provision est augmentée pour refléter l'écoulement du temps au taux de 6%.

4.5.4 Changements affectant les provisions

Les provisions sont revues à chaque clôture et ajustées pour refléter la meilleure estimation à cette date (IAS 37 § 59).

En pratique, à chaque clôture il est fait une simple **mise à jour** des provisions pour tenir compte des changements de périmètre (ouvrages ajoutés ou retranchés). Il est superflu de réévaluer les provisions tant que la variation du coût estimé des travaux ne diffère pas significativement de l'inflation du Plan Long Terme, car alors, après actualisation, la provision est inchangée.

Si la variation des tarifs estimés des unités d'œuvre s'écarte sensiblement de l'hypothèse retenue d'inflation, il s'avère nécessaire d'appliquer de nouveaux tarifs tout en conservant les unités d'œuvre de la plus récente estimation. Les tarifs d'unité d'œuvre régionaux sont publiés par les métiers et reflètent l'évolution lissée des prix

Enfin une **révision** (nouvelle évaluation) devient nécessaire s'il y a de bonnes raisons de penser que l'étude précédente est obsolète ou si celle-ci a vieilli (par exemple date de plus de 5 ans).

Les mises à jour et révisions d'estimation des obligations doivent être validées selon les procédures définies par la DIR EP 13. Notamment durant l'exploitation : validation des révisions par un Comité Appréciation- Développement, et validation par le CDEP à l'occasion du Budget.

4.5.5 Reporting ASC 932

- Périmètre ASC 932

Le reporting ASC 932 ne considère les coûts qu'aux limites des installations de production proprement dites à l'exclusion des installations de transformation ou de retraitement. Cet impératif conduit à distinguer systématiquement dans les estimations ou les calculs financiers la part des coûts relatifs aux constructions incluses dans le périmètre ASC 932 de celles hors périmètre (cf. CR EP ACC 009 § 8.7).

Dans certains cas cette distinction est particulièrement délicate, par exemple dans le cas d'un FPSO, on appliquera alors un pourcentage forfaitaire des coûts à la partie de l'installation faisant partie du périmètre. On veillera à ce que ce pourcentage soit homogène avec celui retenu pour partager les investissements.

- Cash Flows Futurs ASC 932

Ce calcul se place dans l'hypothèse de productions limitées au profil 1P. Il nécessite une évaluation des coûts relatifs aux RES. Cependant il n'exige qu'une évaluation approchée de ces coûts dans la mesure où ceux-ci actualisés au taux de 10% ont une incidence très atténuée. On pourra par exemple estimer les RES en appliquant au cas 1P un ratio RES/Capex égal au ratio RES/Capex du cas 2P du PLT (l'application d'un ratio réserves 1P/2P est formellement proscrite).

Sur cette base, on peut appliquer l'égalité suivante :

$$\text{Travaux RES}_{1P} \;/\; \text{CAPEX}_{1P} = \text{Travaux RES}_{2P} \;/\; \text{CAPEX}_{2P}$$

…et donc déterminer l'approximation des Travaux RES en 1P :

$$\Leftrightarrow \quad \mathbf{Travaux\ RES_{1P} = CAPEX_{1P} \times Travaux\ RES_{2P} \;/\; CAPEX_{2P}}$$

Il n'est donc fait aucune estimation spécifique pour ce besoin particulier.

4.5.6 Aspects fiscaux

Parallèlement à l'évaluation des obligations, les filiales examineront les règles de fiscalisation des provisions et des dépenses correspondantes à partir des textes légaux, réglementaires et contractuels applicables.

La prise en compte corrélative d'un impôt différé dépend de la déductibilité fiscale qui peut concerner :

- les dépenses réelles de travaux RES, à condition que l'assiette fiscale au moment de l'exécution des travaux soit suffisante, ce qui dépend tant de la réglementation (par exemple : fiscalité banalisée ou non - *ring fence*) que des perspectives d'évolution des activités de la filiale, révisées chaque année au moment du Plan à Long Terme ; ou
- les provisions, qui en général suivent des règles de déductibilité fiscale différentes de la charge dans les comptes consolidés résultant de l'application de la présente norme.

4.5.7 Valeurs de référence

Dans tous les cas les valeurs de provisions et d'immobilisations inscrites dans la dernière clôture des comptes seront supposés être validées et serviront de référence pour toutes mises à jour ou révisions.

5. Le Processus de la RES

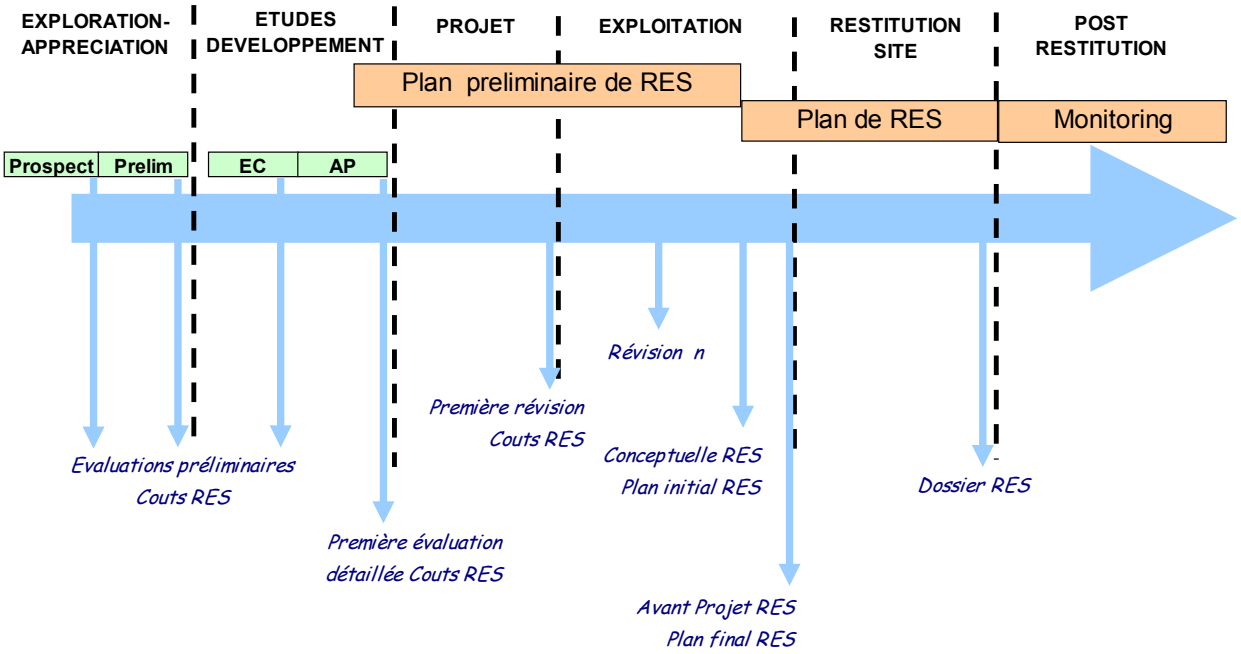
5.1 Généralités

1. Le besoin d'estimer et de valider le coût de la RES répond à une triple nécessité :

- lors de la décision initiale de développement, intégrer ce coût dans le processus décisionnel
- durant la vie en production de l'actif, faire évoluer conformément aux règles comptables les valeurs d'actif et les provisions couvrant les besoins futurs des travaux de RES
- à l'approche de la fin de vie, aider à préparer, en termes de budget et d'organisation, les phases d'études techniques et de coordination avec les parties prenantes visant à définir les travaux et initier le projet de RES

2. Si l'estimation de coût des travaux RES est à réexaminer chaque année sous l'autorité du coordinateur RES de la filiale, l'effort qu'il convient de fournir pour ces estimations et validations de coût a pour objectif de refléter l'enjeu qu'elles représentent dans les différentes phases de vie de l'actif.

3. Les estimations de coûts fournies par les opérateurs tiers seront systématiquement comparées à des estimations faites en propre pour des installations comparables. Elles donneront lieu à une validation interne qui pourra aller jusqu'à une réestimation complète par la filiale, si l'ampleur des écarts et leurs conséquences comptables le justifient. Dans les phases où il est demandé que l'estimation repose sur une étude conceptuelle, on devra réaliser une telle étude si l'opérateur ne le fait pas.



5.2 Phase initiale : le plan préliminaire de RES

Le plan Préliminaire de RES concerne la période allant de la première évaluation détaillée des coûts de RES dans l'étude d'Avant-Projet de développement, au plan initial de RES issu de l'étude conceptuelle de RES (voir § 4.2.2 et § 5.1).

Le processus d'approbation de développement d'un actif assure la bonne définition des travaux futurs de RES, et de leur capacité à être réalisés dans le cadre des technologies connues. Sous réserve d'évaluation technico-économique des alternatives, il conviendra aussi de donner la préférence aux schémas favorisant le démantèlement futur des installations.

Dès les études de développement en amont de l'Avant-Projet, les coûts des projets RES sont évalués et pris en compte dans la valeur économique du futur projet. Dans la mesure où les installations définies sont relativement standards et que, de ce fait, une méthode simplifiée d'estimation par l'application de ratios des CAPEX conduit à une précision suffisante à ce stade, on se limitera à une estimation de ce type (cf. GM EP EST 006 et §5.2 ci-dessus). Il est noter que le projet RES peut intervenir comme un des critères dans le processus de sélection de la meilleure architecture lors de l'étude conceptuelle de développement.

C'est dans le cadre de l'étude d'Avant-Projet qui précède la prise de décision de développer que sera réalisée la première étude conceptuelle (plan préliminaire de RES) de façon à avoir une vue aussi juste que raisonnable dès ce stade des coûts de RES et d'éviter d'avoir à constater un réajustement excessif des estimations au moment de la mise en production. La nécessité de produire les procédures techniques dans le Plan Préliminaire de RES prêche plutôt pour une estimation de type Analytique – et non pas par Ratio – dès la phase « Avant-Projet de développement »

Le plan préliminaire de RES et l'estimation des coûts associés s'appuient sur cette étude de niveau « conceptuelle » où les options techniques retenues sont conformes au contexte réglementaire en vigueur et aux règles internes définissant les principes d'abandon des puits et de démantèlement des installations.

Les choix conceptuels et les estimations de RES sont validés en même temps que l'ensemble du projet de développement par les comités de validation s'appliquant (COMAD, COVAL,…COMEX).

Lors du projet les études de caractère environnemental et sociétal : EBS et EIA serviront de référence pour caractériser l'état initial et les impacts attendus par le développement des activités de production.

5.3 Phase de production

Avec la mise en production commence l'inscription en valeur d'actif des coûts futurs de RES et l'écriture comptable des amortissements du capital et des provisions pour RES.

5.3.1 La première révision du plan préliminaire de RES

La première révision des coûts de travaux RES (plan préliminaire de RES) s'effectue après le start-up sous la responsabilité de la filiale en tenant compte de ce qui a été effectivement construit (*as built*) lors de la phase « projet ».

Sauf variations significatives des hypothèses ou du périmètre retenues lors de l'Avant-Projet, cette révision ne donne pas lieu à une nouvelle étude (selon appréciation du Coordinateur RES

de la filiale et suivant les écarts entre l'Avant-Projet et la Réalisation effective à la mise en production). A la mise en production, il conviendra de mettre à jour ou de réaliser le cas échéant un état « zéro » de l'existant cad la collecte des données initiales : inventaire et plans des installations, données environnementales (repris de l'EIA et de l'EBS effectuées en Avant-Projet).

5.3.2 Les mises à jour et révisions successives du plan préliminaire de RES

Chaque année, sous la conduite du coordinateur RES de la filiale sera assurée une **mise à jour** de l'estimation en unité d'oeuvre uniquement destinée à refléter l'évolution du périmètre (exemple : puits nouveaux ou modification des installations), tout en conservant les conclusions générales et les unités d'oeuvre de la dernière étude conceptuelle disponible. La valorisation des unités d'œuvre sera éventuellement revue en utilisant les plus récents tarifs diffusés par les métiers.

Les différentes mises à jour pourront être menées lors des exercices annuels du PLT, du Budget. La valeur intégrée dans les comptes et le « reporting » financier reflètera la vision du périmètre la plus réaliste au 31/12 de l'année.

C'est seulement si l'évolution du contexte, quelle qu'en soit la cause, changement réglementaire, changement majeur des installations, évolution technologique, perspective de nouvelles options de travaux, … rend la dernière estimation en date obsolète, que la filiale initie une **révision complète** de l'étude conceptuelle et du plan préliminaire de RES afin d'intégrer les nouveaux éléments.

Il est recommandé d'initier une révision du plan préliminaire de RES tous les 5 ans, et d'éviter de sur réagir aux fluctuations du marché.

5.3.3 Restitution de site partielle

Dans le cas d'une restitution de site partielle, il y a lieu d'appliquer d'une part le processus de RES aux installations faisant l'objet d'abandon, et d'autre part – lorsque la taille des installations restantes le justifie – de mettre en œuvre un projet de modification sur la partie non abandonnée des installations.

De ce fait, on préparera en parallèle :

- un « Plan de RES Partiel » pour l'abandon des installations concernées,
- des études dédiées (de type études de développement) destinées à spécifier les caractéristiques des installations restant en opération.

Cette approche préparatoire globale devra en outre déterminer le positionnement dans le temps des deux phases opérationnelles correspondantes (reconfiguration des installations restant en opération – travaux d'abandon de puits, de démantèlement et activités de remise en état sur les installations à abandonner).

5.3.4 Périmètre des évaluations RES et exercices annuels

5.3.4.1 Plan Long Terme (PLT)

Lors de l'exercice Plan Long Terme de la filiale, les coûts et échéanciers des travaux RES sont estimés sur la base des réserves **2P (dev et non dev)** pour les projets pris en compte sur la durée du plan.

Le cas de base sera bâti sur les hypothèses du reporting financier au 31/12 de l'année précédente, en y incluant les résultats des mises à jour ou des révisions validées à la date de l'établissement du PLT.

Les travaux RES propres aux projets des « **variantes** » du PLT seront estimés avec la méthode appropriée au degré de maturité des études des développements des projets en question (cf. § 4.2 et 5.4)

Lors du plan les regroupements en campagnes et autres synergies seront identifiés. A cette occasion les coûts et échéanciers des travaux RES seront examinés avec ED/APP en même temps que les autres coûts de développement (CAPEX et OPEX).

5.3.4.2 Prévision de clôture et budget

Pour l'exercice budgétaire, les coûts des travaux RES se limitent au périmètre 2PDEV des objets en exploitation à la clôture de l'année en cours (prévision de clôture). Ces coûts sont validés techniquement (voir processus validation), ils sont approuvés avec le budget de la filiale.

5.3.4.3 Reporting financier

Pour le reporting financier de fin d'année, il est effectué une mise à jour éventuelle des chiffres présentés pour la clôture lors de l'exercice budgétaire. Les coûts RES du reporting financier de fin d'année font référence.

5.3.4.4 PRIME et ASC 932

Dans le cas de l'exercice PRIME et pour le ASC 932, les coûts de RES pourront être revus pour tenir compte de l'échéancier et du contenu des projets inscrits dans le périmètre des profils prouvés 1P.

5.4 Fin de vie : le plan de RES

La réalisation du plan de RES définitif constitue un projet.

Les règles des processus « études de développement » et « projet » s'appliquent aux études de RES et au projet de RES.

A l'approche de la fin de vie de l'actif, les volumes résiduels à produire, sur lesquels provisionner les variations éventuelles d'estimation des coûts RES, se réduisent rapidement ce qui accroît l'exigence de fiabilité et de précision de l'estimation. Un taux de déplétion 2P de 80% à 85% est considéré critique à cet égard.

Un ComAD valide la fin de l'exploitation des réserves.

Il convient alors de préparer le projet de RES proprement dit. Un état des lieux final en exploitation est alors réalisé.

5.4.1 Première version du plan de RES – L'étude Conceptuelle de RES

Au plus tard entre 4 et 6 ans avant la fin de production probable (2P) de l'actif, suivant la complexité du projet de RES envisagé, une étude conceptuelle entièrement nouvelle est menée, incluant un *screening* de toutes les options concevables dans le cadre réglementaire en vigueur et la description détaillée de l'option recommandée, destinée :

i) à produire la première version du plan de RES qui servira à communiquer avec les parties prenantes (partenaires, autorités, ONG, …)
ii) à établir le premier budget de travaux de RES
iii) à planifier les phases d'études (Avant-Projet, basic, …), les équipes de projet et les travaux d'exécution

Dès que disponible, l'estimation résultant de cette nouvelle étude est utilisée pour affiner les provisions comptables.

Cette étude conceptuelle a plus précisément pour objet de :

- Reprendre les éléments techniques contenus dans le Plan Préliminaire de RES
- Etablir toutes les données de base actualisées, nécessaires et qui concernent :
  - Les données techniques des installations concernées ainsi que leur état
  - Le contexte industriel local
  - Les obligations telles que retenues par la Filiale
- Consolider les objectifs de RES propres à l'actif ou l'installation concernée
- Etablir les éléments techniques préliminaires concernant les différentes étapes du projet de RES (abandon des puits ; decommissioning – démantèlement – transfert – découpage , recyclage – réhabilitation des sols pour les installations de surface...)
- Estimer les coûts de réalisation et leur échéancier
- Comparer les différentes options techniques et contractuelles envisageables puis sélectionner une solution qui sera développée plus en détail par l'Avant-Projet
- Montrer une analyse de risque environnemental et sociétal pour chaque scénario étudié,
- Etat des lieux environnemental (Base Line Study) et diagnostic détaillé sur les états de pollution terrestre et marine éventuels et/ou les impacts des opérations passées sur l'environnement.
- Proposer au stade préliminaire une organisation de projet et une stratégie contractuelle de réalisation.

(Son contenu type plus détaillé figure dans la GM EP APP 008)

Cette étude se traduit par

- un rapport d'étude conceptuelle de RES,
- Une première version du plan de RES (ou plan de RES initial), document destiné à toutes les parties prenantes pour approbation des choix.

Elle se coordonne avec les surveys et audits menés en parallèle (surveys de sols et d'inspection des installations – base line environnemental – audit, voire diagnostic, environnemental – bilan possible du contexte industriel local .....).

Cette étude est normalement réalisée par ED ; elle peut être menée par la Filiale après délégation formelle.

Avant le déclenchement de cette étude, un ComAD valide la fin de l'exploitation des réserves ainsi que le scénario et les hypothèses retenus pour le projet de RES.

5.4.2 Le plan définitif de RES : l'Avant-Projet de RES

Le plan de RES définitif sera décrit et est établi par l'étude d'Avant-Projet de la RES.

Cette étude d'Avant-Projet de RES établit le cahier des charges qui sera mis en œuvre par le projet de RES.

Elle a plus précisément pour objet de :

- Affiner et consolider les données de base compilées et utilisées par l'étude conceptuelle de RES
- Consolider et préciser les objectifs de RES propres à l'actif ou l'installation concernée
- Etablir en termes plus précis les éléments techniques de la solution retenue par l'étude conceptuelle de RES, définis pour chaque étape de la RES.
- Redéfinir de façon plus détaillée :
    - Le planning de réalisation
    - La stratégie contractuelle et les premiers éléments du Plan d'Exécution
    - Les coûts de réalisation et leur échéancier.

(son contenu type plus détaillé figure dans la GM EP APP 008)

Elle comporte une étude d'impact environnemental (EIA) et sociétal (SIA) et, a minima, un état des lieux environnemental (*environmental base line survey*).

Elle se traduit par :

- un rapport d'étude d'Avant-Projet,
- un SOR (statement of requirements) définissant le cahier des charges techniques du projet de RES,
- Un plan de RES final pour approbation des parties prenantes,

Elle est validée par un ComAD, Coval, CDEP et/ou COMEX.

Elle sert de base et de support au dialogue à mener par la filiale avec les parties prenantes afin d'obtenir tous les accords nécessaires pour lancer la phase opérationnelle.

Elle fournit les éléments techniques suffisants pour permettre au management de sanctionner le projet de RES correspondant et lancer cette phase de réalisation initiée par une étude de basic engineering.

Tout comme l'étude conceptuelle de RES, cette étude est normalement réalisée par ED ; elle peut être menée par la Filiale après délégation formelle.

5.4.3 Réalisation du projet de RES

Le projet de RES est réalisé selon les mêmes principes que ceux appliqués à un projet de développement, tels que définis par la DIR EP 11.

Plus particulièrement :

- la maîtrise d'œuvre est assurée par une équipe projet constituée au sein de la filiale,

- cette équipe projet livre des puits bouchés et abandonnés, et un site remis en état selon les règles en vigueur, des équipements et des ouvrages de surface démantelés et transférés en décharge agréée ou lieu approprié ainsi qu'un dossier garantissant la traçabilité des actions d'abandon réalisées et comportant notamment la documentation liée au traitement des déchets sensibles et les résultats des différents surveys et audits environnementaux,
- la conduite du projet de RES s'effectue en appliquant un processus qualité similaire à celui mis en œuvre pour les projets de développement,
- la valorisation éventuelle d'équipements démantelés est à la charge de la filiale mais n'est pas nécessairement assurée par l'équipe projet,
- en fin de projet, le site est transféré à l'entité désignée au sein de la filiale (exploitation – département en charge du domaine foncier), avant cession éventuelle

Le projet de RES intègre par ailleurs une approche comportant une identification des risques, un état des lieux avant les travaux (diagnostic environnemental), et une étude d'impact environnementale et sociétale définissant les mesures appropriées.

La planification de la RES prend en compte les exigences de ce processus et des consultations qu'il entraîne.

5.5 Transfert de responsabilité

La responsabilité ultime d'un site et des ouvrages qui y demeurent ne peut pas toujours être transférée à l'État, à un fonds spécial ou au nouvel usager. Cela reste néanmoins un objectif et la filiale s'efforcera de réduire le plus possible cette responsabilité rémanente et les risques qu'elle comporte.

5.6 Validation et approbation

Se reporter à la DIR EP 13 § 6 et § 1.1.

5.6.1 Lors de la prise de permis ou de nouveaux contrats

Lors de l'attribution de nouveaux permis d'Exploration ou d'Exploitation, le processus d'approbation des obligations de RES sont indiqués par les contrats (licence, JOA, ..).

5.6.2 Lors de la phase d'Exploration / Appréciation

La validation des obligations de RES liées à des travaux d'Exploration ou d'Appréciation est réalisée dans le cadre du processus d'approbation de ces travaux.

5.6.3 Plans Préliminaires de RES

La version initiale de Plan Préliminaire de RES est établie lors de l'Avant-Projet de développement, elle est validée par le processus qui valide l'ensemble de cet Avant-Projet.

Les **mises à jour** successives du Plan Préliminaire de RES sont établies par la Filiale (et consolidées généralement avec ED et avec les éléments du Plan Long Terme), elles sont approuvées dans le cadre du processus budgétaire.

Les **révisions** du Plan Préliminaire de RES sont validées par un ComAD spécifique, en cas de variation significative, avant validation finale par le CDEP dans le cadre du processus budgétaire.

Remarque : Les estimations des coûts de RES sont pris en considération dans les comptes à l'occasion de la validation de la prévision de clôture et du budget, leur intégration dans le Plan Long Terme ne constitue pas une validation comptable.

5.6.4 Plan définitif de RES

Quelques années avant la fin de l'exploitation, l'étude conceptuelle (première version du Plan de RES) est validée selon un processus similaire au cas d'une étude conceptuelle de développement, c'est à dire :

- ComAD : validation de la date de fin d'exploitation et des risques associés à l'évaluation des réserves restantes à produire et validation du scénario retenu pour l'Avant-Projet RES,
- CoVal éventuel pour validation du Plan de RES initial distribué aux parties prenantes.

Le Plan définitif de RES (partie du dossier de décision du projet de RES) est validé conformément au processus d'approbation des investissements :

- Un ComAD valide les données de base Géosciences et les résultats de l'étude d'Avant-Projet,
- Les comités Validation, CDEP, Risques-COMEX sont déclenchés pour la sanction du Plan définitif de RES.

5.6.5 Projet de RES

La réalisation du projet de RES (programme d'études, consultations et travaux) s'effectue conformément aux éléments retenus dans le plan définitif de RES et est soumise aux jalons de validations du processus propres aux projets de développement (cf. DIR EP 11)

6. Organisation et rôle des entités

6.1 Responsabilités des filiales

6.1.1 Général

Une filiale est pleinement responsable de remplir ses obligations de RES tant pour les actifs opérés que les actifs non opérés ou co-opérés.

Chaque filiale rédige :

son propre référentiel en accord avec les règles et recommandations EP et Groupe

une note d'organisation du processus restitution des sites, définissant les rôles des divers acteurs dans le processus RES selon les étapes

Au sein de chaque filiale un coordinateur RES assure la coordination des acteurs et la cohérence d'ensemble. Il est responsable du bon fonctionnement du processus d'estimation, et de la documentation des estimations et de leur conservation. Il s'assure du caractère réaliste

des estimations et de leur cohérence dans le temps. Pour ce faire celui-ci sollicite les conseils de la coordination RES du siège, assurée par ED.

A chaque étape du processus de RES, la filiale trouve assistance et expertise auprès des métiers des directions fonctionnelles.

L'organisation et les processus mis en œuvre dans la filiale sont auditables par le siège.

6.1.2 Phase de production

Pour chacun des actifs, la filiale établit un plan préliminaire de RES, comportant des procédures d'abandon des puits et de démantèlement des installations de surface conformes à son référentiel, en accord avec les règles et recommandations EP et Groupe

Dans les Plans Long Terme et Budgets, la filiale commente et justifie les montants inscrits au titre des RES.

6.1.3 Fin de vie

En fin de vie, la filiale est maître d'ouvrage du « Projet de RES » et gère à ce titre la phase de réalisation des opérations d'abandon des puits et des travaux de remise en état des sites.

Dans ce cadre, elle engage en temps utile et coordonne l'ensemble des discussions avec les parties prenantes (Autorités, partenaires, ONG, communautés ...).

6.2 Rôle de ED

La coordination RES du siège est assurée par ED. A ce titre elle :

- s'assure de la cohérence et de la tenue à jour des documents définissant le cadre de référence,
- s'assure du respect du cadre de référence et de la mise en place par les filiales d'une organisation et de procédures conformes,
- s'assure du bon fonctionnement du processus RES et de la cohérence des évaluations,
- suscite et diffuse les outils communs d'aide à l'estimation et à la conservation de l'information,
- facilite les échanges d'expérience entre filiales,
- a un rôle d'alerte en cas de difficultés constatées ou possibles,
- suscite et supervise les audits,
- consolide les programmes des filiales,
- assure la coordination avec SG en ce qui concerne les validations des révisions de coûts RES lors des sessions budgétaires et du reporting annuel.

NB : Pour la coordination et la réalisation des études RES pour le compte des filiales (à leur demande), le **secteur ED/APP** est en **charge** de cette fonction avec les divers entités de ED et des autres métiers techniques, au même titre que toutes études de développement.

A ce titre le chef de secteur APP ou l'architecte en charge d'un pays est le correspondant de la filiale pour les études de type RES.

6.3 Rôle de SG/JUR

JUR apporte à la Filiale (notamment lorsqu'il n'existe pas d'équipe juridique localement), aussi bien qu'à ED et à SG, l'assistance nécessaire relative à l'analyse et l'interprétation des accords internationaux, des règlementations nationales et des contrats.

A ce titre, JUR :

- Participe à la détermination des risques,
- Assiste ED pour déterminer le périmètre des obligations,
- Assiste SG pour définir les schémas comptables adaptés aux obligations,
- Assiste et expertise les filiales.

6.4 Rôle de SG

SG apporte à la Filiale, aussi bien qu'à ED, l'assistance nécessaire relative à la déclinaison des règles comptables appliquées aux dernières évaluations budgétaires du Plan de RES.

A ce titre elle :

- met à jour le référentiel EP concernant les règles pour provisionner le montant des obligations de restitution des sites,
- diffuse les modalités d'application : instructions Plan Long Terme, procédure budgétaire, hypothèses de prix,
- s'assure de la cohérence des mises en œuvre de ces aspects comptables et financiers entre les différentes Filiales,
- participe à la mise au point d'outils communs d'aide à l'estimation et à la conservation de l'information,
- participe aux audits,
- Assiste et expertise les filiales,
- Consolide les calculs financiers.

6.5 Rôle des autres entités

6.5.1 Rôle de GSR

GSR est responsable des éléments géosciences pris en compte pour déterminer la date de fin d'exploitation de l'actif ou de l'installation considérée. Il veillera notamment à ce que l'abandon de puits ou d'installations de production ne compromette pas la production de réserves ou de ressources non exploités.

6.5.2 Rôle de DSO

6.5.2.1 Forage-puits

DSO/FP définit les règles du référentiel technique EP relatives au bouchage et à l'abandon des Puits. Elle en assure la mise à jour et la diffusion.

DSO/FP apporte aux filiales et à ED l'expertise et l'assistance technique qu'elles sollicitent :

- Participation aux études conceptuelles et d'Avant-Projet,
- Assistance aux filiales pour toute ré-évaluation des programmes techniques et des estimations de coûts,
- Participation aux revues techniques en phases de préparation puis de réalisation des opérations sur Puits,
- Participation aux audits,
- Recommande et valide les hypothèses de coûts unitaires pour l'estimation des coûts d'abandon des puits,
- A un rôle de conseil pour la méthodologie applicable pour les opérations d'abandon.

6.5.2.2 Exploitation

DSO/EXP est garante des procédures relatives à l'arrêt et à la mise en sécurité des installations de surface, de leur inertage et des opérations de decommissioning dans le respect des règles de sécurité et de respect de l'environnement. Ceci pour permettre à l'équipe projet de réaliser en toute sécurité les actions de démantèlement.

Elle apporte aux filiales et à ED l'expertise et l'assistance technique qu'elles sollicitent :

- Participation aux études conceptuelles et d'Avant-Projet de RES (programme technique et estimation des coûts et durées de toute la phase decommissioning),
- Assistance aux filiales dans le cadre des mises à jour des plans préliminaires de RES,
- Participation aux revues techniques (phases conception et phase réalisation),
- Défini les opérations nécessaires et leur coût pour les activités liées à l'arrêt et le decommissionning des installations.

6.5.2.3 Projet / Technologues

DSO/PJC et DSO/TEC apportent aux filiales et à ED l'expertise et l'assistance technique qu'elles sollicitent :

- Participation aux études conceptuelles et d'Avant-Projet de RES (resp: éléments préliminaires de Plan d'Exécution de Projet – techniques de démantèlement .....),
- Assistance aux filiales pour expertise du contexte industriel (capacités effectives des yards existants – possibilité de valorisation des équipements – recherche de synergies régionales ...),
- Assistance dans la conduite du projet de réalisation de RES,
- Apporte un Feed back des projets RES réalisés ou en cours de réalisation.

6.5.3 Rôle de EP/HSEQ

HSEQ établit les règles du référentiel technique EP relatives aux contraintes [hygiène – sécurité sociétal– sûreté – environnement et qualité] à respecter lors de la remise en état d'un site industriel. Elle en assure la mise à jour et la diffusion.

HSEQ apporte aux filiales et à ED l'expertise et l'assistance technique qu'elles sollicitent dans les domaines suivants :

- Participation aux études conceptuelles et d'Avant-Projet de RES et plus particulièrement :
  - **Sécurité** : contribution à l'analyse de risque des phases de travaux sur Site,
  - **Environnement** :
    (1) contribution au choix des diverses options techniques (configuration du site en fin de RES – traitement et recyclage des déchets – réhabilitation des sols),
    (2) définition des études et actions spécifiques à caractère environnemental et développement durable à mener durant la phase de fin de vie des installations (base line – surveys – études d'impact – audits ...) et assistance à la filiale pour les lancer en temps utile.
- Assistance filiale pour :
  - expertise du contexte sociétal,
  - actions de dialogue avec les Autorités et les parties prenantes.
- Participation aux audits durant toutes les phases du processus de RES (études de conception – réalisation du projet – actions post-RES)

Se référer à la GM EP ENV 055 pour ce qui concerne les spécifications environnementales pour la restitution des sites.

6.6 Interfaces

Les activités du processus RES, suivent chaque actif de sa genèse au terme de l'existence des obligations qu'il crée. Elles s'inscrivent dans le cadre de la politique HSE et des « relations siège – filiales » et sont concomitantes avec les activités de nombreux autres processus qu'elles recoupent :

- Affaires nouvelles : évaluation – acquisition d'actif,
- Cession d'actif,
- Appréciation – conception,
- Avant-Projet de développement,
- Projet de développement,
- Exploitation,
- Plan Long Terme et budget.

Le processus RES implique de façon pluridisciplinaire une très grande partie des métiers de l'EP : EXPLO, DSO, HSEQ, SG et JUR et a une forte interaction avec les aspects « business ».

Les coordinateurs de RES en filiale et au siège (ED) veillent à ce que les exigences du processus de RES soient bien assurées tout au long de la vie de l'actif. Ils sont aussi garants que les coûts associés aux obligations RES soient mis à jour ou révisés en fonction de l'évolution de l'inventaire des actifs et de changements notables pour les hypothèses d'estimation de ces coûts.

En outre, les coordinateurs RES veillent au bien fondé de la fin d'exploitation d'un actif en relation avec EXPLO, SG et « Business ».

Ils constituent à ce titre l'interface privilégiée avec les tous acteurs concernés.

7. Produits et livrables

Les principaux produits du processus de RES sont selon les étapes de vie de l'actif :

7.1 A la génèse de l'actif

- Les accords internationaux auxquels le pays hôte a adhéré,
- La réglementation nationale en matière de RES,
- les clauses contractuelles concernant les travaux RES définies à la prise de permis et la constitution de l'association,
- garantie de solvabilité pour la réalisation et les coûts des travaux de RES pour l'association (ou joint venture).

7.2 Pendant les phases d'Exploration / Appréciation

- Une définition des travaux de restitution et de remise en état des sites de forages d'exploration et d'appréciation ainsi que des remédiations pour les impacts dus aux acquisitions sismique (layons, trous de tirs, campement, routes et accès, ….), des surveys géologiques et géotechnique, etc…
- Un échéancier préliminaire des coûts des travaux de RES dans le cadre des études de type « prospect » et « préliminaires ».

7.3 Lors des études de développement

- les spécifications de protection des sites dans les diverses phases des projets d'exploration (puits, layons, routes) et production (puits, infrastructures),
- un échéancier préliminaire des coûts des travaux de RES dans le cadre des études conceptuelles,
- le premier plan préliminaire de RES, dans le cadre de l'Avant-Projet de développement.

7.4 Pendant la phase de production

- Un inventaire exhaustif de tous les ouvrages,
- les mises à jour ou révisions successives du plan préliminaire de RES,
- les inscriptions comptables à compter du jour de la mise en production et jusqu'à la fin des travaux de RES.

7.5 A la fin de vie

- à l'approche de la fin de vie, la première version du plan de RES,
- le plan définitif de RES produit par l'Avant-Projet de RES,

- le projet de RES : sites restitués, ouvrages démantelés, effluents et polluants traités en conformité avec le cadre réglementaire selon le programme approuvé,
- à la fin du projet de RES, le dossier final de RES précisant toutes les opérations et travaux réalisés par le projet de RES (dossiers techniques – photos – vidéos) ainsi que les résultats des surveys, diagnostics et audits environnementaux,
- accords fournis par les Autorités sur la base du dossier d'abandon,
- post-abandon : éventuellement, le suivi des installations laissées en place.

7.6 Documentation

La documentation comprenant :

- Le référentiel « filiale »,
- les obligations attachées à l'actif,
- les caractéristiques et l'état des ouvrages avant démantèlement,
- le dossier final de RES.

est conservée au-delà de la réalisation des travaux de RES afin de permettre de défendre les intérêts patrimoniaux du Groupe en cas de litige.

8. Documentation, archivage et outils

Les estimations retenues par les comptes doivent pouvoir satisfaire aux exigences du contrôle interne et des audits des commissaires aux comptes. Ceci impose l'existence et la conservation de toute la documentation concernant les études d'estimation : hypothèses d'obligation et de travaux, calculs et valorisation des unités d'œuvre et plus généralement tous les éléments pouvant justifier ces estimations.

Pour assister les filiales dans l'exercice de cette responsabilité il sera progressivement mis en place dans les filiales des outils :

8.1 Base des données filiales des coûts RES

Une base de données sera mise à disposition des filiales avec comme objectif la sauvegarde des différentes versions des estimations de coûts RES de chaque actif.

Cette base de données sera maintenue par le coordinateur RES de la filiale et ne se substitue en aucun cas aux outils d'estimation des coûts.

Elle a pour objet :

- d'être un inventaire exhaustif des installations et constructions susceptibles d'être restituées dans lesquels le Groupe possède ou a possédé un intérêt,
- de contenir toutes les informations partagées entre les métiers,
- d'être la mémoire des RES : référence des plans préliminaires de RES successifs et du plan de RES, estimations successives, hypothèses…,
- de consolider au niveau de la filiale le programme de RES,

- de comparer les évolutions de coûts entre deux versions et d'expliciter les mises à jour ou les révisions,
- de fournir au financier des données directement utilisables pour ses calculs de provisions,
- d'être en accord avec les exigences des contrôles financiers (SOX et autres).

8.2 Base des données puits

Cette base de données est définie dans la CR EP FP 424 comme ci-dessous :

"A well status register including all the suspended, temporary abandoned and permanently abandoned wells shall be maintained by each affiliate under the responsibility of the Drilling and Completion Manager up to the end of the production license or as per local regulation.

The well status register should include the name of the well, the well coordinates, the well status, the well schematic, etc..

Abandonment considerations and related cost estimates should be included in the project studies.

Any temporary abandonment should cover at least the expected duration of the suspension and the requirement to re-enter the well safely. As much as possible, temporary suspension of exploration or appraisal wells until a further re-entry for development purpose must allow to definitively abandon the well without a heavy re-entry with a drilling rig, but using light means such as a diving vessel for offshore wells or light work over rig onshore.

Final schemes of any permanent abandonment of a well will be part of the final drilling report of this well."

8.3 Outil d'aide à l'estimation des coûts d'abandon de puits

C'est un guide pour mener une étude des coûts d'abandon des puits d'une filiale à travers un processus en différentes étapes dans lesquelles les travaux sont d'abord évalués en unités d'œuvre (jours appareil, jours services puits et supervision, consommables), puis valorisés selon des tarifs harmonisés.

Un outil d'aide de la mise en œuvre de ce processus est envisagé.

- Pour les hypothèses de coûts unitaires : fourchettes de coûts journalier (d'appareils et de services) Mob/demob, part des coûts consommables et autres coûts,
- Pour les estimations des durées et des coûts des opérations « P/A »:

Une catégorisation des puits sera si possible effectuée (GM EP FP 430 révisée en janvier 2009) afin de regrouper les puits par classes homogènes :

- soit par environnement : onshore, swamp, offshore shelf, deep-offshore
- soit par méthode d'abandon : ex même appareil de forage ou ex notion de groupement en campagne.
- soit par estimation de coûts d'abandon similaires (notion de typologie de puits : ex puits onshore/offshore puits déviés, puits difficiles)
- ou toute autre logique de regroupement décrite ci-dessus au § 4.2.6.3

8.4 Outil d'aide à l'estimation des coûts de démantèlement des installations de surface

Il est envisagé de mettre à disposition du coordinateur RES de la filiale un outil pour estimer de façon très préliminaire les coûts des travaux RES par des calculs de coûts simples de type Excel. Les estimations seront historiées dans une base de données.

8.5 Outil d'aide au calcul des valeurs d'actifs RES et des provisions

Les filiales sont invitées à organiser ce calcul en fonction de leur contexte propre de telle sorte que l'outil puisse passer sans difficulté dans les mains des personnes en charge successives. Un outil général distribué pourrait être développé si son utilité était démontrée.

Bibliographie

Référence	Titre de la publication
API RP 57	Recommended practices for offshore well completion, servicing, workover and plug and abandonment operations
London Convention 1972 et 1996 - Immersion des déchets	
DIR EP 01	Politique Hygiène/Santé Sécurité Environnement de l'EP
DIR EP 12	Exploitation
DIR EP 14	Coordination de la politique d'image de l'Exploration & Production en direction des publics spécialisés et professionnels
CR EP HSE 051	Respect de l'environnement dans les activités E&P
GS EP ENV 001	Environmental requirements for projects design and E&P activities
GS EP SAF 041	Technological risk assessment methodology
GM EP APP 003	Content of Preliminary development studies
GM EP APP 004	Content of Conceptual development studies
GM EP APP 005	Content of Pre-Project studies
GM EP APP 009	Sustainable development in development studies
Total	Les chemins du développement durable
Total	Rapport sociétal et environnemental

Annexe 1 Contenu type d'un plan préliminaire de RES

PLAN FILIALE

1 – Référentiel Filiale

- Références réglementaires
  - Locales
  - Régionales
  - Nationales
  - Internationales
- Référentiel Technique EP
- Organisation du processus RES dans la filiale, rôles et responsabilités des acteurs

2 – Plan de RES consolidé Filiale

Tableau de Bord Filiale

- Périmètre des actifs
  - Liste des actifs – statut
  - Carte des actifs
- Obligations contractuelles et associatives
  - Données générales
  - Spécificités par actif
- Planning d'ensemble des RES
- Echéancier global des RES

PLAN PAR ACTIF

1 – Plan Préliminaire de RES de l'actif

- Contexte contractuel spécifique
- Contexte environnemental :
  - Contraintes et réglementations spécifiques
  - Traités ou conventions internationales
  - ONG présentes
- Etudes réservoir
  - Géologie
  - Réserves
  - Profils de production

- Obligations – fin d'exploitation
  - Obligations spécifiques
  - Hypothèses d'estimation de la fin d'exploitation
  - RES partiel
- Inventaire et périmètre
  - Liste des puits et classification
  - Liste des installations de surface
  - Descriptif technique
  - Données de base utiles pour l'estimation des coûts
- Objectifs de RES
- Etude de RES préliminaire
  - Principes d'abandon, désarmement et démantèlement
  - Hypothèses techniques, moyens mis en œuvre
  - Estimation des coûts et hypothèses des coûts d'unité d'œuvre (Rig, Barges, USD/t, coûts/m2/ m3)
- Planning de réalisation et campagnes
- Echéancier des coûts

2 – Points Spécifiques

- Développements futurs (base 2P PLT)
- Variantes PLT
- Périmètre 1P (pour PRIME et ASC 932)

Remarque:

Le plan préliminaire de RES et un recueil de données **évolutif** avec la vie de l'actif depuis la phase de développement jusqu'à une échéance proche de la cessation d'activités

Annexe 2 Sommaire type d'un plan de restitution des sites

Les plans préliminaires de RES et le plan de RES traitent selon ce qui est applicable à chaque stade des points suivants :

Objet

Domaine d'application,

Documents de référence,

Objectifs à atteindre.

Étude d'impact environnemental et sociétal

Plan de consultation et dialogue avec les parties prenantes

Principes d'abandon des puits à terre et en mer

Principes de désarmement et démantèlement des installations à terre

Équipements de procédé, structures métalliques

Fondations en béton, Clôtures

Remblais, pistes, routes, bâtiments

Bassins, bourbiers

Conduites ensouillées et aériennes, traversées de rivières

Principes de désarmement et démantèlement des installations en mer

Enlèvement des ponts, des jackets, des équipements sous marins, des supports flottants

Enlèvement des conduites sous marines des flexibles, des câbles

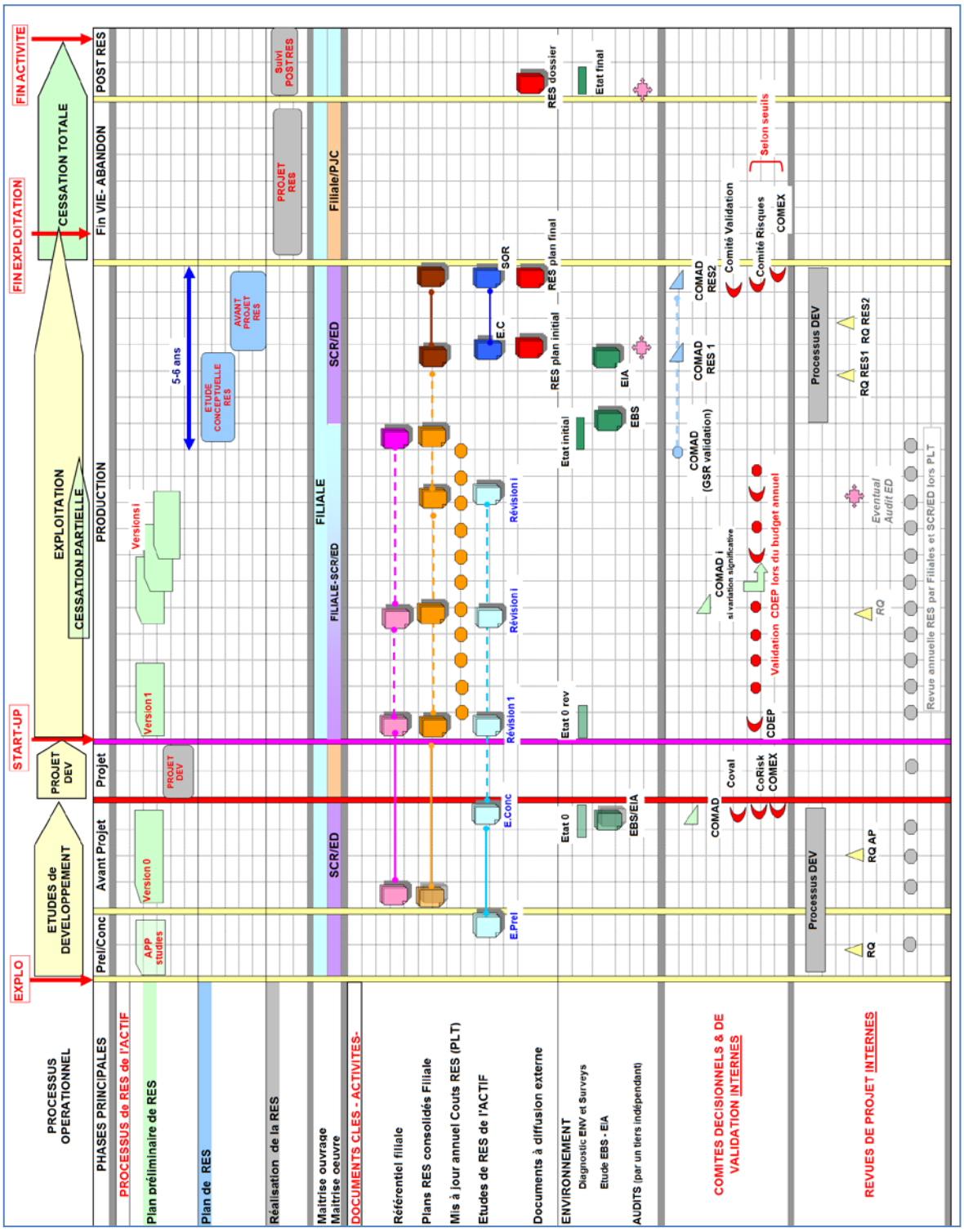
Traitement des déchets, ferraillage, immersion

Moyens navals et terrestres

Planning

Estimation des coûts

Annexe 3 Processus de RES



Annexe 4 Tableau des règles de fonctionnement

Item	Description	Action
Estimation initiale des coûts	A la date de la 'First Oil - Gas', le coût retenu dans le Plan Préliminaire de RES (PPR) pour le calcul de la 1ère provision est celui calculé en fin de projet de construction / réalisation . Il annule et remplace la valeur estimée en avant projet	Filiale
Mise à jour de l'obligation	3 types d'événements au cours de la vie de l'asset: - Changement de périmètre de l'obligation (ex : puits infills, nouvelle installation, nouvelle législation) - Révision : ré-estimation de l'obligation à périmètre constant - Réalisation des travaux	Filiale
Période de révision	- Tous les 5 ans au maximum - lorsque les données contractuelles changent - ajustements à l'approche du Projet RES (PR)	Filiale
Mécanisme d'alerte	Dernière révision de plus de 5 ans ou sur déclenchement de SCR/ED	Filiale ou ED
Base de l'estimation	- Conditions de marché normales (milieu de cycle, sans risque, sans anticipation de l'évolution des technologies, en monnaie constante), - Optimisations résultant des synergies normales, - Travaux à la fin de la production sur la base des profils 2P (ou cas de base PLT) - Révisions périodiques auditables	Filiale / EST
Quand demander la Validation ED (a priori)	A la discrétion de la filiale sauf si sur demande ED. Lorsque le montant de la Révision dépasse 30% du coût d'abandon par actif. Et lorsque la somme des Révisions dépasse 15% pour l'ensemble de la filiale. Ceci hors effet de change	Filiale
Délégation	Délégation de l'estimation des coûts d'abandon à ED/EST si les moyens de la filiale ne permettent pas de réaliser l'étude (sur RFS).	Filiale
Etude Contractée	La filiale peut faire appel à un engineering externe. Celui-ci ne doit rien publier sans validation de la filiale et de SCR/ED/EST	Filiale
Date prévisionnelle d'abandon	Par défaut : année suivant la dernière année de production du 2P (cas de base PLT). Ou année suivant la fin de service d'une installation.	Filiale
Taux de change	celui du PLT de l'année en cours de révision. Exemple: PLT2011 pour une révision en 2011, même si l'impact est au Budget 2012	Taux fourni par FEI
Reporting	Inscription du montant de chaque actif révisé, dans le T13	Filiale
Validation ED	Sur demande de la filiale ou de SCR/ED. RQ sur dossier de révision soumis au ComAD. Le dossier de révision doit être terminé 1s de juin. Il explique les écarts avec la révision précédante et les écarts au T13	Filiale + ED
Échéancier Type	1. Revues Qualité S2 - S3 Juin 2. Consolidation ED-FEI S3 - S4 Juin 3. ComAD papier S1 Juillet 4. Informations Technique Directions S2 - S4 Juillet 5. Réunions Filiales – DIGs S1 S2 Septembre 6. Remise à FEI des budgets et commentaires S4 Septembre 7. Réunions budgétaires préparatoires FEI/DIGs S2 Octobre 8. Présynthèse CDEP FEI et arbitrages S3 Octobre 9. Réunions budgétaires finales CDEP S4 Octobre 10. Présynthèse COMEX S4 Novembre 11. COMEX S1 Décembre	DIGs + Filiale

Scope

This guide specifies the environmental care actions to be taken in the successive phases of the site rehabilitation process in the frame of the EP HSE Policy and Total's commitment to Sustainable Development.

Field of application

This guide is applicable in the context of site restitution (RES) operated by Total E&P affiliates.

For non-operated sites, the affiliates must make sure they are familiar with the rules adopted by the operator and will do their utmost to have rules adopted that come as close as possible to the Group recommendations whenever there are no internal rules, or when existing rules are less strict.

Revisions

Document update realised by standards coordination
Reorganisation 2015

02	01/2024	Update of OneTech's documents' codification without any other modification
	05/2015	Organisation change – January 2015
01	03/2008	Codification change
00	12/2005	Initial version
Rev.	Date	Purpose of the revision

Owning entity: HSEQ/ESSH	Managing entity: HSEQ/ESSH

Approvals

Original Signed in French

Technical Validation:	Quality Control:	Final Approval:
CH CHAINEAU G FRACHON	R CAMPS	L HEUZE

Date: 03/2008

Contents

Reference documents

The reference documents listed below form an integral part of this Guide & Manual.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
API RP 57	Well abandonment rule
Guide OGP 338	Disposal of disused offshore concrete gravity platforms in the OSPAR Maritime Area - 2003
Guide OGP 258	Offshore pipeline decommissioning - 1997
Guide OGP 36320	Offshore Installations E&P Forum Report: Decommissioning offshore Oil & Gas Installations Finding the Right Balance - 1996
Guide OGP 242	Onshore Installations E&P Forum Report: Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites - 1996
Guide OGP 232	Offshore decommissioning and disposal: background issues and facts - 1995
	Main regional and international conventions: - United Nations 1982 – Law of the Sea (UNCLOS) - IMO (International Maritime Organisation) 1989 - London Convention 1972 and 1996 – Dumping convention OSPAR (Oslo Paris) Convention and decisions 98/3 – North Sea

Total Standards

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published.

Reference	Title
DIR EP 13	Site Restitution
CR EP HSE 051	Respecting the environment in Exploration & Production processes
CR EP FP 100	Well design - Plug and abandon (cancelled document)
GS EP ENV 001	Environmental Requirements for Projects Design and E&P activities
GS EP ENV 121	Environmental impact assessment - onshore activities (cancelled document)
GS EP ENV 122	Environmental impact assessment - offshore activities (cancelled document)

Reference	Title
GM EP ED 001	Gestion du processus de restitution des sites (RES)
GM EP APP 008	Decommissioning of production facilities
GM EP APP 009	Sustainable Development in development studies

1. Introduction

The Restitution of exploration and production Sites (RES) at the end of a reservoir's productive life or when an installation ceases to be used is an integral part of environment management and sustainable development. International agreements, the laws of the countries in which the Group operates, its contractual commitments and its own rules all lay down obligations with respect to future dismantlement of the installations (DIR EP 13).

1.1 Objective of the guide

The guide presents the general approach and the environmental actions to be undertaken at each step in the restitution process.

It defines the basic technical provisions that apply to onshore, offshore and coastal installations whenever there are no more exacting regulatory provisions.

It stipulates the contents of the environmental studies to be conducted and of the final site restitution dossier.

1.2 Persons concerned

Depending on the phase in the asset's life, the persons concerned by this guide are:

- the person in charge of the studies that prepare the construction decision,
- the development project manager who draws up the initial Preliminary RES Plan,
- the RES coordinator and the actors involved in making estimates and in the accounting operations for RES in the affiliates,
- the RES pre-project and project manager,
- the HSE managers and site safety-environment managers (RSES) of the relevant sites.

1.3 Definitions

Site restitution (RES) spans all the actions necessary for the remediation of a site and returning it to a third party, such as the authorities, in conditions that satisfy the administration, the operator, the partners and the stakeholders (communities, NGO, associations, etc.). Those actions comprise, in particular:

- plugging and abandonment of the wells. The procedure for this is covered in CR EP FP 100,
- abandonment of buried pipes and pipe networks,
- dismantling of the surface installations surface,
- restitution and reintegration of the site into the environment in a condition compatible with the use to which it is to be put.

They consist, after closure of the industrial site, in reintegrating it into the environment such that it can be put to the intended use. Restitution of a site may be partial, when part of the installations are shutdown or complete when it is undertaken in the frame of a programme for cessation of activity.

Well abandonment is the series of abandonment operations including:

- Well plugging to permanently isolate the different reservoirs one from the others and the reservoirs from the surface,
- Dismantlement of the installations such as partial cutting of the casing, removal of the wellhead and fill-in of the cellar,
- Monitoring of abandoned wells, if required.

Dismantlement of the surface installations entails the removal, the destruction and disposal of all the structures that can no longer be recycled, recovered or re-used.

Site rehabilitation consists in applying the appropriate treatments to render the site conform to the use to which it is destined. This may include, for example, works involving the collection and elimination of wastes, contamination of the soils and water tables, and monitoring of the site if required.

1.4 Regulatory context

The table below lists the main texts that compose the international and regional regulatory framework. It should be pointed out here, for memory, that it is first and foremost the host country's regulations that are to be applied and that when there are no precise local rules, it is the international and regional conventions that apply (annex 1).

Table 1: Conventions and regulations

Conventions and regulations	
International Conventions	Geneva Convention on the continental shelf - 1958 London dumping Convention– 1972 and protocol of 1996. United Nations Convention on the Law of the Sea UNCLOS - 1982 IMO Guides et standards - 1989 Basle Convention - 1989
Regional Conventions	**OSPAR Decision 98/3** (North-East Atlantic and North Sea) UNEP Convention: Kuwait, Barcelona,…
National rules	Rules specific to each country (onshore and offshore) such as: - UK: POP Act 1972, Env. Protection Act 1990, DTI Guidelines 1998 - Norway: Petroleum Act 1985, Law on Cost Sharing of Abandonment 1987, NPD Guidelines 1990 - France: ICPE 1976 and associated decrees + Mining Code

N.B. OSPAR 98/3 decisions apply to the North Sea and the North-East Atlantic. For the rest of the world, in the absence of more exacting regional or local regulations, the rules of the IMO (International Maritime Organisation) apply offshore.

1.5 Best practices

The OGP (O&G Producers Association – ex-E&P Forum) has issued several documents on the subject:

- Disposal of disused offshore concrete gravity platforms in the OSPAR Maritime Area - Feb 2003,
- Creating Artificial Reefs from Decommissioned Platforms in the North Sea, Volume I (summary and executive overview), four leading scientists for ODCP - Sep 1997,
- Offshore pipeline decommissioning - Aug 1997,
- Decommissioning of Offshore Structures - Energy Use Considerations, Environment and Resource Technology Ltd (ERT) report ERT 97/016 – Feb 1997,
- Decommissioning, Remediation and Reclamation Guidelines for Onshore Exploration and Production Sites - Oct 1996,
- Decommissioning Offshore Oil & Gas Installations Finding the Right Balance- Jun 1996,
- Offshore decommissioning and disposal: background issues and facts- Dec 1995.

2. General internal provisions

Whatever the type of installation envisaged, the development project must be designed, right from the preliminary studies, in such a way as to permit Site Restitution in compliance with the applicable regulations and the Group rules (CR EP HSE 051, GM EP ED 001, GM EP APP 008). The choice of concept must integrate optimisation of costs and minimisation of environmental and societal impacts (GS EP ENV 001, GM EP APP 009.)

Owing to the risks of changes in regulations and taxation rules, it is wise to dismantle the installations as soon as they have ceased to be useful in production. Whenever there are no prospects of a petroleum structure, well, installation or item of equipment being used, an abandonment, partial or complete dismantlement must be envisaged.

To prepare the RES Plan, dismantlement studies must be conducted based on the Best Practical Environmental Option method (see GM EP APP 008). Recognised independent organisations should be called on for this when appropriate. The RES is to be dealt with as a project and, as such, must integrate the complete environmental management process, namely, an approach comprising a risk identification such as the Sustainable Development Review (SDR), an Environmental Baseline Study or EBS, and an Environmental Impact Assessment or EIA, Social Impact Assessment or SIA). It must be planned to factor in the requirements of this process and the consultations it entails.

For any RES project, an RES Plan must be prepared in particular, comprising:

- A preliminary study undertaken at the end of the pre-project, and updated at the end of the project,
- A conceptual study comprising the options analysed and the options retained, the schedule of operations planned, the procedures for shutdown and securement of the installations, clean-up and disassembly of the installations, removal of the equipment and materials, recycling of the materials and a programme for inspection and rehabilitation of the sites. It is to be undertaken at the beginning of the RES project,

- The environmental and societal impact assessments related to the project (GS EP ENV 121, GS EP ENV 122),
- An ancillary dossier or document containing the main conclusions of the administrative consultation meetings and, for large projects, of the public consultations (consultation of the stakeholders: NGOs, associations, neighbourhood inhabitants, fishermen, farmers, etc.).

The Site Restitution operations are prepared and followed up in observance of the environmental requirements laid down in company rule CR EP HSE 051.

3. Preliminary phase of the RES

At the end of production and/or use of an installation before its abandonment, the actions detailed in the following points are to be undertaken.

3.1 Collation of initial data

This first step consists in drawing up an inventory of the data available. This collation is essential and serves to orient the subsequent phases. It is based on a precise, detailed historic record of the installation under consideration.

3.1.1 Historic record and description of the installations

The data collected include:

- The plans of the installations (x, y and z coordinates of the wells, buildings, platforms, access paths, drainage systems), waste disposal zones and sludge pits for onshore sites,
- The architecture of the wells (vertical section),
- The plan of the overland/buried pipes,
- The historical record and reports on past activity,
- The list of the products present on the site and their characteristics,
- The accidentology (nature of the pollutant, quantity released, types of medium affected, area covered, actions engaged),
- Archives, photographs, etc.

Such data are often difficult to obtain for installations that are no longer used at the time or which have already been abandoned. It is therefore useful, upstream of the RES project, to draw up an inventory of the data to do with those installations which have already been abandoned, or even dismantled. For new installations, up-to-date historic records of the site must be kept to preserve the memory of the site's life.

3.1.2 Environmental data

The environmental data include:

- a general map, showing the position of the site within its environment,
- a description of the environment,
- a hydrogeological study (location of water tables),

- the initial condition of the environment prior to the operations (baseline state),
- other information for consideration: sensitivity of the site (water catchment, vulnerability of the water tables, damp zones), socio-economic parameters (land occupation, activities), safety around the site.

To collate all that information, the following will be used among others: available site environmental studies such as the initial state of the site before production operations (Environmental Baseline Study - EBS, Environmental Impact Assessment - EIA, the environment reviews, the risk studies (Simplified Risk Assessment - ESR, Detailed Risk Assessment - EDR), the results of survey studies and surveillance undertaken as part of environmental monitoring.

3.2 Identification of regulatory constraints

In this step, the regulatory requirements (international, national, local, and professional references) must be determined so as to establish the works programme, the objectives of decontamination and to choose the appropriate treatment to remediate the contaminated environments.

More particularly, the local regulations and the contractual obligations must be monitored, provided they are in phase with Group reference documents.

3.3 Specific studies to be performed

The initial documents collated must be completed by any studies that may be missing. A full environmental diagnosis of the site may be undertaken if no campaign measuring the quality of the environment has been carried out during the production phase (CR EP HSE 051).

3.3.1 Reservoir characteristics

Certain risks call for particular care in the well abandonment procedure. A residual risk study on leakage after well plugging must be conducted in order to:

- confirm that there is adequate protection of groundwater resources for industrial and/or personal use (DWS, …),
- confirm that risks arising from migration of the gases (acid gases for instance) are adequately managed,
- confirm that the environment is protected against the risk of pollution by hydrocarbon leakage.

3.3.2 Onshore diagnosis

The objective of the diagnosis is to determine the general condition of the site (state of play) in order to plan for any rehabilitation works that may be needed. To begin with, a detailed inspection of the installations must be undertaken, identifying:

- zones that have undergone pollution incidents and that may be sources of pollution,
- contaminated materials,
- products and materials that can be recycled,
- any hazardous materials, wastes, etc. present.

Next, soil and water samples must be taken from spots where pollution is likely to be found, and analysed. An in-depth diagnosis of the pollutions may be carried out if contamination is discovered on the site and is above the threshold standards.

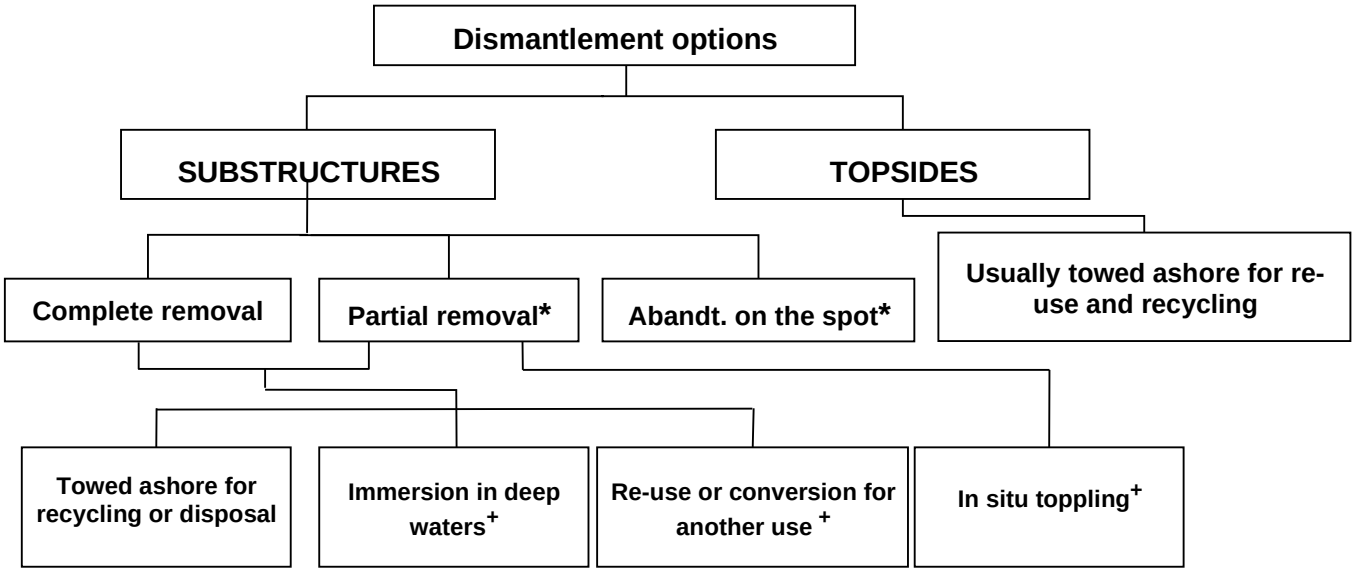
3.3.3 Diagnosis offshore

The objective is to assess the general condition of the site in order to determine the impact of the industrial activity on the marine environment. That condition is evaluated against the initial state (as determined in the EBS) and using the methodology employed for an EBS (GS EP ENV 112, GS EP ENV 113).

4. Dismantlement of the installations and abandonment works

4.1 Dismantling programme for offshore installations

The choice of dismantlement alternatives is extremely important offshore, as the removal or abandonment of the installations may have a consequent impact on the environment.



* Option accepted by IMO and, with conditions, by OSPAR (subject to waiver exclusively for concrete structures and for foundations weighing in excess of 10 000 t, in place before complete dismantlement became a condition).

\+ Option accepted by IMO and refused by OSPAR

4.1.1 Well plugging and abandonment (exploration, delineation, production)

Exploration and delineation wells not to be re-used must systematically undergo abandonment procedure in observance of the same rules as for production wells. Definitively shutdown wells must be shut in as required by the procedure defined in CR EP FP 100. For the partial decommissioning of a field, the wells to be definitively shut in and abandoned should be clearly identified and selected.

Special case of reinjection wells (disposal wells): At the end of its life, when all activity on a field has ceased, it is nevertheless recommended, if regulations permit, that at least one well should be kept to eliminate washing fluids and flushing products. The same plugging and abandonment procedures must be applied to that well as for exploration or production wells.

4.1.2 Superstructures and topsides

The whole of the topsides must be removed, after the platform has first been secured. The equipment (vessels, pipes, etc. must be flushed out, cleaned and inerted. These operations are to be carried out under the responsibility of the field operator (through to completion of the installation inerting phase, or Cold Phase).

Some items of equipment (pumps, compressors…) may be recovered. The remaining equipment must then be removed, taken ashore and scrapped.

The superstructures will generally be taken ashore to be recycled or re-used. Recycling entails cleaning of the installation onshore, and scrapping. The cleaning waters are recovered as far as is possible and subjected to the appropriate treatment.

4.1.3 Metal infrastructures or jackets

Metal platforms must be entirely removed and transported ashore for recycling; the foundations or footings must also be withdrawn so as to leave no structure rising above the seafloor. For reasons of subsequent potential liability, the in situ toppling solution (cutting off the upper part of the structures at -55 m below the surface and toppling it to the seafloor) can be used in circumstances where the Group may be definitively relieved of any subsequent responsibility and where recycling has been demonstrated to be impossible. Likewise, the option of abandoning the structures on the spot or re-using them as an artificial reef may be envisaged only on a case-by-case basis, after preparation of a duly substantiated dossier, and with the consent of the authorities for immersion of the jacket in a dedicated, approved reserve area. In all cases, the environmental impact assessment must justify the solution adopted.

4.1.4 Concrete infrastructures (GBS or Gravity Base Structure)

These platforms are specific to the North Sea. Full removal is compulsory for all concrete structures installed after 09/02/1999, the date the requirement for designing floatable structures came into effect.

For structures installed before that date, the OSPAR convention provides for the possibility of a waiver depending on the appraised risk of rupture or leakage when an attempt is made to put the structure out to float. Each structure in this category may require a prior request for authorisation, which must be justified by a study demonstrating the risks. Under this condition, the structure may remain in place after having been cleaned (as for structures used for storage), all metal equipment removed and flagged.

In all cases the installations are cleaned, the wash water is recovered and treated, the abandoned parts are secured and the parts dismantled onshore may be reused and the materials recycled or stored in an approved waste disposal area.

4.1.5 Pipelines and links between platforms

Infield pipelines are pigged and flushed. Depending on the diameters, they may be either removed (for example, for pipes with diameters less than 12”) or left in place and buried or covered (rock dumping) after filling in. These operations are followed by a control survey.

4.1.6 Export Pipelines

The pipelines may be left in place and will be pigged and flushed (the cleaning effluents will have to be recovered and stored in a tanker or in a specific disposal well, kept until the end of operations. After inerting, a reconnaissance survey is conducted to ensure that they do not constitute a danger for trawling activities (buried pipelines or self-entrenched pipelines). If necessary, certain sections of the pipelines may be buried or covered by rock dumping.

4.1.7 Subsea installations

The heads of subsea wells, risers, riser towers, manifolds, jumpers, hydraulic links and cables are normally removed. Flowlines follow the rule described in paragraph 4.1.5.

4.1.8 Floating installations

Floating installations such as FPSO, TLP, semi-submersibles installations, loading buoys, will be disconnected and towed to land for dismantling and/ or reuse. The anchor lines will be lifted out and transported onshore. Suction anchors will remain in place if it is technically unfeasible to remove them.

4.1.9 Cuttings

Managing the situation created by drill cuttings involves the constant application of best practices defined in company rules. Except for special cases of sensitive, protected environments (shallow water, deltaic environments…) or reglementation obligations, cuttings are disposed of in the sea (in cuttings piles) and accumulate on the seafloor, where they are periodically surveyed during the life of the field, and are left as such at the end of field life. In all cases, the impact study of the decommissioning plan must comprise a well-argued file justifying this solution.

4.1.10 Examples of oil installation reuse

Reuse of offshore installations for petroleum operations:

- Reuse as treatment centre for other, nearby fields,
- Reuse as a point of convergence (hub) for several export pipelines.

Reuse in place:

- Artificial reefs: this alternative is recognised as having a beneficial effect on the marine environment.
- Wind energy: this involves reusing the remains of concrete structures as foundations for an offshore wind turbine. The energy created can be exported by cable to other platforms.
- Scientific study centre: marine research, aquaculture, and a meteorological station.
- Lighthouse.

Recycling of certain materials:

- Reuse of metal structures (scrap metal),
- Reuse of concrete structures as foundations for other works. The risk in removal and transportation must be assessed,
- Reuse of part of the superstructures.

4.2 Installation dismantling programme onshore and in coastal environments

The dismantling of onshore and coastal zone installations entails operations that are a lot less complex than those offshore. The choice of the fate of installations and buried pipelines essentially depends on the future use of the site and it is therefore necessary to conduct an impact study as detailed as for offshore use.

4.3 Surface installations

Within the perimeter encompassing the production, the facilities or storage centre, the installation will first be secured and then all of the infrastructures and superstructures (base slabs, process frames and equipment) will be cleaned and removed.

All equipment must be completely purged, degassed and cleaned. Any recovered dangerous substances must be stored or destroyed, in an environmentally-friendly way. All unneeded material or equipment must be cut up for scrapping; Storage tanks must be inerted and be emptied of the muds in the bottoms of the tank, before being disassembled and scrapped.

Buildings will be razed or left in place for reuse. They are decontaminated according to their level of contamination. The foundations and well caves are broken down to a depth of at least 1 metre.

Retention basin or API treatment areas and other trenched (lagoons, catch pits, burn pits…) and storage areas for chemical products and dangerous products will be subjected to a detailed soil reconnaissance survey and may give rise to a special cleaning, treatment and rehabilitation programme.

Materials are recycled whenever possible and cuttings are disposed of in an authorised waste disposal area or in a controlled area.

4.3.1 Access roads

All of these areas must be terraced, reshaped and replanted if necessary. Slopes and drainage are restored.

4.3.2 Pipe networks and pipelines

Aboveground and buried pipelines located within the site perimeter, and aboveground pipelines outside the perimeter are cleaned, flushed through and removed. Hydrocarbon residues will be eliminated as well as possible, by scrubbing with a pigging brush, and cleaning products which will be evacuated to treatment installations or flushed down a drain by a freshwater, and detergent cleaned with recovery and treatment of effluents.

The pipelines buried outside of the perimeter are left in place, except if local regulations require their removal or if a section of buried pipe is not sufficiently buried, so as to present a danger, taking into account the local practices (agricultural) or the fate of the land after abandonment. In

all cases, these pipelines will be pigged, cleaned and filled with inhibited water and ends plugged if left in place.

4.3.3 Well plugging and abandonment

See 4.1.1.

4.3.4 Investigation of soils, ground and surface waters

A detailed investigation programme will be conducted on sites where soil and groundwater contamination have an impact on man and the environment. The objectives of this programme will aim at:

- Identifying and characterising all types of contamination,
- Measuring the extension of the contamination (modelling).

Following this analysis, the results are exploited to best fit the objectives set:

- Define rehabilitation objectives, based on current scientific and technical knowledge, compatible with the future use intended for the site and its environment.
- Determine a rehabilitation strategy by evaluating the methods and treatments that contribute to meeting the objectives set and the decontamination costs determined.

Signs of past and current pollution are systematically sought, identified and characterised, particularly below and near installations permanently storing potential contaminants, or in capacities used to temporarily store such products (barrels, tanks, manifolds, API, old mud pits, internal discharge areas…). In no case should sampling be limited to the surface. The sampling depth is determined on the basis of the soil characteristics of the ground.

Water resources (temporary groundwater, surface water and deepwater) must be carefully analysed and, where required, be decontaminated in compliance with rules and standards in effect. If no piezometers are present on the site, and in all cases of a potentially vulnerable environment, investigation and control wells will be drilled to survey the quality of the ground water below installations and in the vicinity of the site.

The analytical programme will be established as a function of the potential pollutants that may be found, such as total hydrocarbons, aromatic compounds (BTEX, HAP), phenols, PCBs, heavy metals…

4.3.5 Definition of decontamination objectives and choice of a rehabilitation technique

In accordance with applicable legislation, the decontamination standards and the parties concerned, are defined in the decontamination objective, which is set according to the future use intended for the site.

The future site use possibilities must be discussed with the authorities and relevant parties at a date early enough in the programming phase, so as to obtain the authorisations for the programme of works in its entirety.

On the basis of the future use, the installations which may potentially be reused and those which are to be removed, will be identified.

When a site has been treated according to a given use, it is important to ensure that it will not be targeted for a new use which is incompatible with the residual contamination on the site.

The choice of the most appropriate treatment technique depends on the site conditions, the type and concentration of the contaminants present and the requirements of the relevant parties.

When contaminant multiples are present, different technologies can be combined.

4.3.6 Determining ways of reusing installations

Depending on the future use of the site: industrial, agricultural, residential, other, certain installations may be left in place for other uses. The aim is also to systematically recover recyclable materials.

4.4 Removal and elimination of dangerous products and materials

All chemical and hazardous products must be systematically identified and eliminated by authorised channels. Muds and fluids contained in reservoirs must be recovered and treated. Materials contaminated with PCBs and other dangerous products are carefully removed and disposed of in an approved waste disposal area after pre-treatment, or sealed in containers for shipment to a treatment centre. Asbestos insulation is removed and placed in containers marked for appropriate treatment. Oils are collected and recycled or eliminated. Equipment contaminated by Naturally Occurring Radioactive Materials (NORMs) must be labelled, isolated and stored in a controlled area.

Before dismantlement, and hazardous wastes must be inventoried to make a list of all hazardous wastes on the site. Radioactive products or NORMs, products and materials contaminated by asbestos, PCBs, toxic chemical products, CFCs or heavy metals (arsenic, cadmium, mercury…) are identified and quantified. Appropriate solutions are sought for their recovery and elimination. Appropriate methods of elimination are used, when they exist. Otherwise, the use of internal means (temporary storage, controlled waste disposal, crushing, incineration, bio-treatment…) or alternative solutions such as the set-up of specialised companies or exportation, are recommended.

All installations and equipment dismantled on site or sent to a specialised centre for demolition, recycling or scrapping must first be decontaminated in accordance with the defined level of decontamination.

All appropriate health and safety measures must be taken to protect the personnel in charge of these operations.

4.5 Agreement and authorisation request

The dialogue between the various parties involved starts as early as possible to reach an agreement on the future use of the site and the restitution process. It may be necessary to submit a dismantling schedule to authorities long before cessation of activity. Required authorisations must be received at the appropriate time and the work programme must be carried out gradually.

5. Rehabilitation phase

5.1 Rehabilitation

Before drawing up a rehabilitation works programme, the zones to be remediated and those to be decontaminated (after determining the contaminants and their concentrations) must be delimited. The aim at this stage is not to substantiate the impact on the environment, but to quantify it.

5.1.1 Soil rehabilitation

The work programme defined, with local authorities where applicable, will factor in the final destination of the restored sites (industrial land, agricultural land, constructible land…) to minimise the impact of the works and the residual and societal impact ensuing the works. The land may undergo soil rehabilitation, which may comprise, after a simplified or detailed risk assessment (ESR/EDR), rehabilitation using appropriated remediation processes, and up to prior excavation and substitution of the soils or restitution of treated soils.

The rehabilitation of the site may also include removal of landfill (sand, unsorted materials, laterite…) used to build the foundation platforms of the installations or the base of the infrastructures.

In certain cases, especially if planned from the start, the soil may be decompacted, the land remodelled, the surface soil originally stripped off put back into place, and finally revegetalised and planted. The fight against erosion is factored in.

5.1.2 Soil and groundwater treatment

Before initiating site decontamination, the first stage, after elimination of the source of the contamination, is to recover the maximum amount of free hydrocarbons detected in the natural environment, and to eliminate all risks of fire or explosion on and off the site.

In-situ treatments involve treating and managing soils and in-situ groundwater. They have the advantage of requiring little manpower and materials and may be the only solution for sites with restricted logistics and access. However, they may require long-term surveillance owing to the variability of the subsurface conditions.

Two types of in situ treatment may be distinguished: without excavation (extraction of contaminants by degassing in a vacuum, washing with water, physical stabilisation, biological treatment, natural attenuation, and on-site confinement with or without evacuation (physical barriers).

Ex situ treatments, for soils only, are usually carried out after excavation. This involves removing the contaminants from their original matrix. They cannot be treated or left in place and the excavation, transport of the material and design and construction of the required equipment result in high costs. These techniques vary from simple land spreading to thermal desorption and incineration.

5.1.3 Treatment of mud pits

The onshore treatment of zones representing high pollution risks is carried out by recovery of the residual oil and pasty products by pumping, incineration or recycling of such hydrocarbons, in-depth treatment of the mud pit and overflow area (stabilisation with lime, bio-treatment…) and re-profiling of the zone, followed by revegetalisation.

5.1.4 Reintegrating a site in its environment

The aim of reintegrating the site in its environment is to produce a stable surface and a layer favourable to vegetation, compatible with the future use of the site. The site is profiled to blend into the landscape surrounding it. The slopes are reduced, natural drainage is restored, unwieldy debris is removed, the soil is aired by stirring, and the vegetational cover is restored for erosion control.

The drainage structures and erosion control are set up, where required. Site revegetalisation is evaluated and implemented for rapid reconstitution of the vegetational cover to minimise erosion and to ensure that the site is assimilated in its near environment.

When a revegetalisation programme is required, species adapted to the local environment are selected, and trees are planted when the surface is stabilised.

5.1.5 Work reporting

As the work progresses, ideas for improvement may arise and it is interesting to record them. The progress of the work is to be reported in a document which recorded the incidents or problems encountered in the work execution phase. Feedback is to be encouraged and used.

5.2 Residual impact

5.2.1 Final diagnosis

The final diagnosis after work is integrated in the overall dismantling project to assess if the potential risk is acceptable for the environment and to confirm the success of rehabilitation operations and whether or not the objectives have been reached.

The onshore diagnosis (end-of-works baseline) consists of at least the following:

- Soil sampling and analysis in formerly contaminated and adjacent areas,
- Groundwater sampling and analysis at zones of possible or known impact,
- Sampling and analysis of adjacent surface waters to ensure that contamination did not migrate during cleaning operations.

Offshore diagnosis consists of at least the following:

- Sampling and analysis of the water column at several levels, to control the impact of works,
- Sampling and analysis of sediments,
- Sampling of cutting piles to obtain a reference state and their composition before site abandonment, if this has not previously been done,
- Seafloor inspection, if required.

5.2.2 Environmental monitoring and post abandonment surveillance

As long as they are under the affiliate's responsibility offshore installations remaining in place (concrete infrastructure) must be reported and signalled in compliance with maritime regulations in effect. The affiliate must ensure the surveillance and maintenance of the signalling equipment.

The relevant administrations must be informed of the maintenance or removal of installations to update nautical charts and territorial zoning maps (weather or not easement are to be upheld and other safety zones or modifications to such zones).

Except in special cases or when responsibility is transferred to another operator, the affiliate maintains, for the installations remaining in place, its responsibility as operator during the period of validity of the permit or concession.

After treatment, a surveillance programme is implemented to ensure that the residual impact remains acceptable and to determine if the site may be officially abandoned.

Surveying the environment involves, for onshore:

- Inspections of the site and treated installations,
- Regular soil sampling and analysis of the areas treated and areas at risk (pipelines, wells…),
- Sampling and analysis of groundwater (search for contaminants) near control piezometers placed in areas at risk,
- Sampling and analysis of surface waters to check for the absence of contaminants and for sediments in suspension indicating erosion,
- Inspection of soils, slopes, drainage ways and vegetal cover,
- Inspection of site conditions (vegetation, productivity),
- Index and archive the surveillance files.

Offshore, surveillance consists of:

- Regular inspection of abandoned installations, notably wells and pipelines,
- Regular sampling of the benthic zone to observe the time required for the environment to return to its natural state,
- Regular sampling of cuttings to observe the long-term degradation of contaminants,
- In sensitive environments such as mangroves, coral reefs, coastal environments…regular surveys to the time required for the environment to return to its natural state.

5.3 Final site restitution dossier

A final site restitution dossier is prepared, explaining all the operations carried out to rehabilitate the environment (with photographs, videos, documentation, etc…) and archived by the affiliate environment entity and also sent to be archived to HSE (CR EP HSE 051). It contains all the studies carried out associated with the Environment – baseline studies, EIA, elimination of waste, detailed diagnoses, rehabilitation works, environmental monitoring, regulatory framework…).

The documentation concerning each structure, specifying its location, technical characteristics, history of key events, state or condition and audit reports will be kept for an unlimited period of time. This rule affects well identification sheets with the conditions for plug and abandon operations, the dossiers for mud pits and waste cuttings from drilling, the dossiers of all types of infrastructures left on site in whole or in part, the resale and reuse dossiers, the scrap metal monitoring registers, the demolition equipment and all waste, etc.

A trace of the existence of pipe networks and the operations carried out on them must be kept to allow contractors who may discover the pipe network during subsequent work, to identify which pipe(s) is(are) out of service and which one(s) can be cut, either without any particular danger or provided that certain precautions are taken. Precautions are absolutely vital if there is a concentration of several pipelines that are abandoned or in service.

Easements: in collaboration with the managers of the different areas affected, public or private, the easements on a case by case basis according to the environment of each section crossed, the work carried out and residual risks will be discussed with a view to factoring in environmental concerns. The work will be done in such a way as to ensure that no easement is required.

5.4 Environmental audit

In addition to the RES Plan mentioned above and in keeping with the principle of preserving rights and determining the scope of the responsibilities defined for the management of our obligations, an environmental audit is systematically carried out before and after RES work, and generally speaking, every time we are required to protect our interests against a risk of subsequent claims regarding environmental damage.

Bibliography

Reference	Title of the publication
DIR EP 01	Hygiene Safety Security Societal Environment policy of E&P
DIR EP 12	Exploitation
DIR EP 14	Coordination of E&P s image policy with an eye on specialised and professional publics
CR EP ACC 009	Provisionfor site restitution obligation
GS EP ENV 112	Environmental baseline and monitoring studies: Offshore and Nearshore Sites
GS EP ENV 113	Environmental baseline study – coastal survey (cancelled document)
GM EP APP 003	Content of preliminary development studies
GM EP APP 004	Content of conceptual development studies
GM EP APP 005	Content of Pre-Project Studies
GM EP FP 01	The financial organisation of E&P subsidiaries
GM-OT-EST-006	Site Restitution cost estimation applied to surface installations
	Garland E., 2005. Environmental Regulatory Framework in Europe: an Update. SPE 93796.
	Parente V., Ferreira D., Moutinho dos Santos E. and Luczynski E., 2005. Offshore decommissioning issues: Deductibility and transferability. Energy Policy, In Press.
	Osmundsen P. and Tveterås R., 2003. Decommissioning of petroleum installations—major policy issues. Energy Policy, Volume 31, Issue 15, 1579-1588.
	Hamzah B. A., 2003. International rules on decommissioning of offshore installations: some observations. Marine Policy, Volume 27, Issue 4, 339-348.
	Baine M., 2002. The North Sea rigs-to-reefs debate. ICES Journal of Marine Science, Volume 59, Supplement 1, S277-S280.

Appendix 1 Regulations

International

The International conventions bind the States that have signed and ratified them. They represent the framework in which these States are to act and are not directly applicable to Oil & Gas Companies. However, they provide a broad outline of what tends to become accepted international usage.

Different international texts, varying in nature and scope, apply to site restitution:

The convention on the continental shelf (signed in Geneva on 29 April 1958)

Article 5(5) of the convention states that “Any installations which are abandoned or disused must be entirely removed”.
Even if a new convention on the law of the sea was signed in 1982 (UNCLOS), we can consider that the 1958 convention still applies in the States who ratified it, but who did not sign or ratify UNCLOS.

It should also be noted that the principle of entire removal is often still mentioned in national law.

The United Nations Convention on the Law of the Sea (signed in Montego Bay on 10 December 1982) (“Unclos”)

Article 60 (Exclusive economic zone) and article 80 (Continental shelf) prescribes the obligation to remove any "abandoned or disused installations or structures (…) to ensure safety of navigation taking into account any generally accepted international standards”. Among other issues, such removal shall also have “due regard for fishing and due protection of the marine environment”. The last paragraph of these articles could be interpreted as saying that part of the installations may be left on site, as “appropriate publicity shall be given to the depth, position and dimensions of any installations or structures not entirely removed”.

These articles that refer to “the generally accepted international standards established in this regard by the competent international organisation”, are a throwback to the work of the International Maritime Organisation (IMO), the United Nations organisation specialised in maritime issues.

The A.672 (16) resolution of the International Maritime Organisation (IMO) of 19 October 1989 on the Guidelines and standards for the removal of offshore installations and structures located on the continental shelf and in the exclusive economic zone”.

This resolution prescribes that:

- Any abandoned or disused installation located in less than 75 metres of water and weighing less than 4 000 tonnes in the air (excluding the deck and superstructure) should be entirely removed,
- For installations emplaced after 1 January 1998, the water limit changes to 100 m,
- The Coastal State may determine that the installation or structure may be left wholly or partially in place, if technical, safety or environmental imperatives, or the cost, justify such action,
- Any installations or structures left in place must be declared.

On or after 1 January 1998, “no Installation or structure should be placed on any continental shelf or in any exclusive economic zone unless the design and construction of the installation or structure is such that entire removal upon abandonment or permanent disuse would be feasible”.

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Decision 98/3 of the Oslo and Paris convention (OSPAR) (covering the North Sea and the North East Atlantic)

OSPAR decision 98/3 relating to the disposal of disused offshore installations (entry into force 9/02/99) establishes the general principle of the prohibition of dumping, and the leaving wholly or partly in place, of disused offshore installations within the maritime area covered by the OSPAR convention. Derogations to this principle are however planned. Therefore, any disused oil or gas installation must be totally removed and brought back onshore to be disposed of.

Only possible derogations:

- The lower parts of jackets weighing more than 10 000 tonnes in air, emplaced before 09/02/99,
- Existing concrete installations (including floating installations and concrete anchor-bases);
- Severely damaged installations.

Obtaining a derogation from the competent national authority is the subject of a procedure, including a consultation with the other contracting parties.

These provisions, that expressly call upon the principle of precaution, are more restrictive than those prescribed by the IMO mentioned above.

Decision 98/3 specifies that “specify the owner of the parts of the installation remaining in the maritime area and the person liable for meeting claims for future damage caused by those parts (if different from the owner) and the arrangements under which such claims can be pursued against the person liable”.

Arctic convention:

The dismantling procedure is to be planned at the time of the initial impact study and reviewed when the installation is no longer required.

The guidelines of IMO resolution A672 and the provisions of the 1996 protocol to the London convention must be complied with.

Encouragement to cement and seal wells to prevent hydrocarbon leakage. Pipelines may be removed or emptied of their contents if they are left in place. Site cleaning must be done taking into account different parameters, such as noise or nearby populations.

Other maritime conventions with regional scope:

The Barcelona Convention for the Mediterranean (1976) must be mentioned, not all the protocols are in force, and the Kuwait Convention for the Gulf (1978), which generally prescribe the obligation to remove (wholly for the former and partly for the latter) disused installations. The Abidjan Convention for West and Central Africa (1981) stipulates that the contractor States must take appropriate measures to prevent or reduce the pollution resulting from oil and gas production. There are also a number of conventions concerning the protection of the environment in the South-East Pacific, the Red Sea and the Gulf of Aden, the Caribbean, the Black Sea and the Baltic Sea.

The London Convention on the dumping of waste (1972) and its protocol on the prevention of marine pollution resulting from the dumping of waste (1996)

These documents state that the dumping of oil and gas installations (after having removed potentially polluting elements) is possible, but only after having obtained a permit from the pertinent country in the context of a complex procedure that aims to prove that dumping is the best environmental solution.

The main international principles

Even if, as they stand, they have no obligatory power, a number of principles resulting from the Earth Summit in Rio (1992) and contained in “Action 21”, are worthy of note, as they are characteristic of the general context in which States and Oil companies evolve:

- Principle of sustainable development,
- Principle of preventive action (and correction of environmental damage at the source),
- Principle of precaution (do not wait for scientific proof before taking preventive measures),
- Principle of the polluter-payer,
- Principe of participation and the citizens' right to information.

These principles apply to both onshore and offshore activities.

Other, subsequent international diplomatic conventions have also set down principles aiming to protect the environment. Among them, we can mention the Convention on the protection of wetlands (Ramsar, 1971-1982), the Convention on the ban of importing dangerous wastes into Africa (1991), the ASEAN agreement on the Conservation of Nature and Natural Resources (1985), the convention on biological diversity, Rio (1992).

National

Though international references exist concerning the abandonment of offshore sites, for onshore sites, we can base ourselves essentially on national regulations. Affiliates that do not have laws containing prescriptions specific to this subject or are highly restrictive, can refer to French or European law.

The environmental issues to be managed when an onshore oil or gas site is abandoned are essentially soil contamination, the protection of groundwater and the management of waste from dismantling operations.

Dismantling and plugging

There are a number of preventive measures to be taken when an installation is abandoned. Effectively, poorly plugged wells, pipelines left in ground without precautions having been taken may cause soil contamination and consequently groundwater pollution.

In France, when a site shuts down, the operator makes known the measures that s/he plans to employ to stop all the possible disturbances and nuisances generated by his/her activities and to prevent the risks of such, disturbances happening[1].

Furthermore, development works and projects, that are undertaken by an installation governed by authorisation must respect the environmental concerns and the release to service of these installations is conditioned by the constitution of financial guarantees destined to ensure the surveillance of the site and notably the rehabilitation of the site after closure[2].

[1] "Code minier" article 79

[2] Environmental code: book 5 Installations classified for environmental protection

Before ceasing activity, a document specifying the measures taken or planned to ensure environmental protection is submitted to the pertinent authorities.

These measures may include:

- The evacuation or disposal of dangerous products and waste present on site,
- The decontamination of soil and groundwater that may have been polluted,
- Insertion of the installation site into its environment,
- If necessary, the surveillance to be carried out of the impact of the installation on the environment.

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Concerning the abandonment of wells, all the necessary provisions must be made to isolate reservoirs from one another and isolate the surface using durable resources. In addition, the operator must report to the relevant authorities the measures taken to close in the well, describing the operations in detail, specifying the condition of the well when it was plugged and the procedures to be followed if the well had to be re-opened for any reason.[3]

Concerning pipelines, a standard[4] relating to pipeline transportation systems for the oil and natural gas industries sets out the recommendations to follow in the case of abandonment:

- The pipelines must be closed after decommissioning,
- The likelihood of corrosion that may cause ground subsidence must be reduced,
- Measures must be taken to ensure that the pipelines do not become a drain channelling water and other fluids,
- If a pipeline represents a hazard in terms of the health of persons or the environment, it must be removed.

Finally, a pipeline may be considered as waste and is therefore governed by the regulations concerning waste and the protection of land and water.

[3] Decree No. 2000-278 of 22 March 2000: Title “Forage”. Articles 49 and 50

[4] ISO/13623 Standard relating to pipeline transportation systems in the oil and natural gas industries.

Protecting the environment

When onshore sites are rehabilitated, the pollution risks to be managed concern essentially the land and groundwater.

- Land:

There is no law or decree, but rather recommendations and principles to be applied in the context of the regulations governing installations classified for environmental protection.

In France, the circular dated 3 December 1993 from the Minister for the Environment[5] sets the principles of the policy for the treatment of contaminated sites and soils. It specifies that the treatment of each site depends on its effective impact on the environment and the use for which it is destined, factoring in the health risks for man and the environment.

The setting of rehabilitation objectives draws on the synthesis of an environmental diagnosis and an evaluation of the health risks for man and the environment. The circular of 10 December 1999[6] presents the applicable principles for the prescription of rehabilitation work:

- The in-depth diagnosis and EDR (Detailed Risk Study) must include the identification of targets to be protected, the characterisation of pollution sources and the means of transmission as well as the model for transmission and exposure,
- The health risks for man must be evaluated by quantifying the toxic doses to which persons are exposed,
- The risks for the environment must also be assessed.

The simplified risk assessment guide provides the threshold values defining the source of pollution represented by an area of land as well as the so-called “statement of impact” values for the residual soil pollutants if the land is an exposed environment (sensitive or non-sensitive use).

- Groundwater:

At a European level the direct disposal of hydrocarbons into groundwater is prohibited and the disposal of metals and metalloids is restricted. The indirect disposal of these substances is subject to authorisation and in particular, the pollution caused by hydrocarbons from oil and gas activity must be removed from

the inland and costal surface waters, from the territorial seawater and from groundwater[7]. Moreover, it is recommended that the quality of unpolluted groundwater be maintained, to prevent the exacerbation of any pollution if necessary and to regenerate the contaminated groundwater [8].

In French regulations, the law on water[9] now an integral part of the environmental code, states in its first article that “water is part of national heritage and its protection and value enhancement are in the public interest”. Then, it lists the interests that it aims to assure, including “the protection against any form of pollution and the restoration of the quality of surface and ground waters and seawaters within the limits of territorial waters” under the demands of “health, community sanitation, civil security and the drinking water supply for the population”, just to cite a few. The water law therefore sets the prevention obligation to avoid notably the pollution of surface and ground waters.

The simplified risk assessment guide also gives threshold values defining the source of pollution represented by a water layer as well as the so-called “statement of impact” values for the residual pollutants of this environment if it is considered as a potential exposure environment (sensitive or non-sensitive use).

[5] Circular of 3 December 1993 from the Minister for the Environment on the policy for the rehabilitation and treatment of contaminated sites and soils.

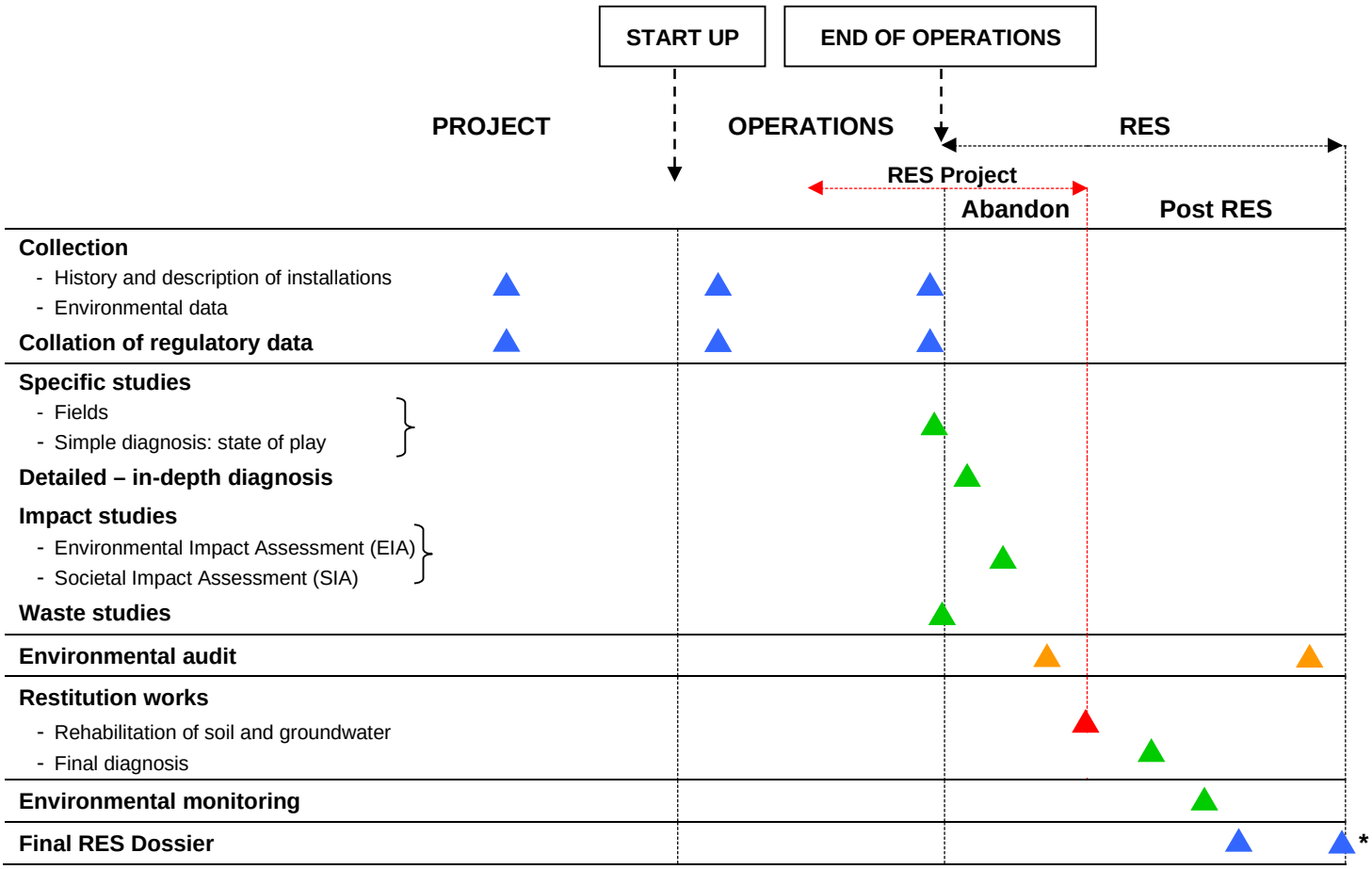
[6] Circular of 10 December 1999 from the Minister for the Environment: Principles for setting rehabilitation objectives.

[7]: EEC Directive 80/68/ from the Council of 17 December 1979, concerning the protection of groundwater against pollution caused by certain dangerous substances.

[8]: Resolution of the Council of 20/02/95 concerning the protection of groundwater.

[9]: Water law of 3 January 1992.

Appendix 2 Management of the environment during RES



*: the duration of rehabilitation works may justify the preparation of a second, final RES dossier once all on-site operations have been completed (decontamination of soil, groundwater, post-activity surveys…)

GENERAL SPECIFICATION

ENVIRONMENT

GS EP ENV 001

Environmental requirements for projects design and E&P activities

06	01/2024	Update of OneTech's documents' codification without any other modification
	05/2015	Organisation change – January 2015
05	01/2011	General revision
04	09/2009	Addition of section 5.2, appendixes 1 and 2. Update of sections 5.3; 5.4; 5.7; 5.8
03	10/2005	Addition of EP root to document identification and update. Refer to the text for main changes
00	04/2001	Old Elf SG SHE 004

Document update realised by standards coordination Reorganisation 2015

Owning entity: HSEQ/ESSH	Managing entity: HSEQ/ESSH

Contents

1. Scope

1.1 Purpose

The purpose of this General Specification is to establish the environmental requirements for projects design and E&P activities.

1.2 Applicability

This General Specification applies to all operated affiliates and projects managed by the E&P branch of the Group.

It covers all the phases of the projects design and E&P activities: seismic exploration, exploratory and production drilling, preliminary and conceptual, pre-project, basic and detailed engineering, construction, installation, commissioning, production, decommissioning.

Remark: some requirements cannot be applied as early as the preliminary or conceptual stages or pre-project study (data not available, not relevant to apply so early in the project life, etc.). In this case, they shall be applied at a later stage.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
Decision 2000/532/EC	Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (and subsequent amendments and/or corrections)
Directive 99/31/EC	Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (and subsequent amendments and/or corrections)
Directive 2000/76/EC	Directive 2000/76/EC of the European Parliament and of the Council of 04 December 2000 on the incineration of waste (and subsequent amendments and/or corrections)
Directive 2008/98/EC	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives

Reference	Title
IFC Policy and Performance Standards	Policy and performance standards on social & environmental sustainability, International Finance Corporation, World Bank Group, 2007
IMO MARPOL 73/78	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL) and subsequent amendments (2008)
IMO A.672	Guidelines and standards for the removal of offshore installations and structures on the continental self and in the Exclusive Economic Zone, adopted on 19 October 1989
ISO 1996-1	Acoustics — Description, measurement and assessment of environmental noise — Part 1:Basic quantities and assessment procedures
ISO 1996-2	Acoustics - Description, measurement and assessment of environmental noise - Part 2 : determination of environmental noise levels
Montreal Protocol	The Montreal Protocol on substances that deplete the ozone layer, September 1987 and subsequent amendments
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic, September 1992 and subsequent amendments
OSPAR Recommendation 2008/1	OSPAR Recommendation 2008/1 amending OSPAR Recommendation 2000/4 on a Harmonised Pre-screening Scheme for Offshore Chemicals (HOCNF), 2008
Regulation (EC) No 1907/2006	Regulation (EC) N°1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
Report No 29555	A voluntary standard for global gas flaring and venting reduction, World Bank Group, May 2004

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS-OT-CIV-700	Minimum requirements for building design and construction
GS-OT-CIV-740	Temporary construction camps and associated facilities (onshore)
GS EP ENV 111	Environmental baseline and monitoring studies: Onshore Sites

Reference	Title
GS EP ENV 112	Environmental baseline and monitoring studies: Offshore and Nearshore Sites
GS EP ENV 113	Environmental Baseline Study: Coastal survey (cancelled document)
GS EP ENV 120	Environmental impact assessment of E&P activities
GS EP ENV 270	Deep well disposal
GS EP ENV 421	Landfill design and operation for E&P sites
GS-OT-GEO-505	Monitoring of Metocean Conditions for Offshore Units
GS-OT-MEC-010	Rotating Machine Package Specification - Turbogenerator
GS-OT-MEC-020	Rotating Machine Package Specification - Turbopump
GS-OT-MEC-030	Rotating Machine Package Specification - Turbocompressor
GS-OT-MEC-032	Rotating Machine Package Specification - Gas Engine or Electrical Motor driven Reciprocating Compressor
GS-OT-MEC-292	Rotating Machines Packages Installation Requirements
GS EP SAF 221	Safety rules for buildings
GS EP SAF 228	Liquid drainage
GS EP SAF 262	Pressure protection relief and hydrocarbon disposal systems
GS EP SAF 341	Location and protection of onshore hydrocarbon storage
GS-OT-STR-651	General principles for a F(P)SO design

3. Terms and Definitions

Best Available Techniques (BAT)
The latest stage of development (state of the art) of processes, of facilities or of methods of operation which indicate the practical suitability of a particular measure for limiting discharges, emissions and waste (OSPAR Convention, appendix 1), when economically achievable.

Coastal (also called nearshore) water
In the absence of more stringent local regulations, coastal water starts from the lowest low-tide point and extends up to 3 nautical miles towards the sea

Fresh water
Any surface or groundwater which can be used for human consumption or agricultural use without undergoing a complex processing. This usually applies to waters from utilities grid, from non-contaminated aquifers (private wells) and from non-contaminated rivers or lakes: dry residue < 1500 mg/l.

Hazardous waste	Any waste which displays one or more of the following hazardous properties: explosive, oxidizing, flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, toxic for reproduction, mutagenic, sensitizing, ecotoxic..., for man and the environment A complete list of hazardous wastes is usually provided in the respective regulations, and differentiates them from non-hazardous wastes (for example Decision 2000/532/EC)
Inert waste	Waste which is not subject to any significant physical, chemical or biological transformation, shall not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact, in a way likely to give rise to environmental pollution or harm human health. The total leachability and pollutant content of the waste and the ecotoxicity of the leachate must be insignificant.
Low Pressure/ Low Low Pressure gases (LP/LLP gases)	Gases that include, but that are not limited to, condensate and crude stabilization units' emissions, TEG units' emissions, etc. Other sources, depending on the project.
Non-hazardous waste	Waste not covered in previous category (usually waste from households, as well as commercial, industrial, institutional and other waste which, because of its nature or composition, is similar to waste from households)
Potable water	Any water, pumped from surface water or groundwater which can be used directly for human consumption with limited treatment (also called drinking water).
Produced water	Means water which is produced in oil and/or gas production operations and includes formation water, condensation water and re-produced injection water; it also includes process water used for desalting oil.
"Unless not feasible"	Technical non-feasibility or disproportionate economic cost if compared to the environmental benefit.
Waste	Any substance or object which the holder discards or intends or is required to discard (Directive 2008/98/EC). Wastes are characterized according to their toxicity and degree of risk for the environment, and are classified into three main groups based on risk criteria (Directive 99/31/EC)

The list of acronyms used in the present document is in **Appendix 1**.

4. Environmental regulations and standards

EP HSE Policy states that: *"In all its operations, the EP acts in compliance with national and international legislation and regulations, with the applicable industry standards and Company Specifications."*

Local regulations and standards relevant to environmental preservation in offshore/onshore oil and gas activities shall be applied.

The provisions included in the present specification shall be applied in the absence of more stringent local regulations or standards.

5. Environmental requirements for projects design and E&P activities

To reduce any significant impact of the future activities on the natural and human environment, mitigation measures shall be identified and selected according to the BAT concept and approved by Company.

The Environmental Impact Assessment study (EIA) requirements, when available, shall be integrated in the design definition.

5.1 Environmental footprint

The minimisation of the environmental footprint of the project in any of its phase and including construction shall be systematically implemented.

Particular attention shall be paid to areas where biodiversity is particularly rich or sensitive.

The Environmental Baseline Study (EBS) and EIA studies (refer to GS EP ENV 111, GS EP ENV 112, GS EP ENV 113 and GS EP ENV 120) or any relevant information provided by Company shall be used as a basis for localization of rich biodiversity and ecologically sensitive zones (deep offshore ecosystems, spawning grounds, sea grass beds, coral reefs, mangroves, natural reserves, pristine rain forest, etc.) and social aspects (fishing zones, water intake points, archaeology, rock art, community settlements, aquaculture, tourist areas, etc.).

Local environmental and social sensitivities shall be taken into account to determine the followings:

- Onshore: site selection, land use, layout of the installation, safety and security distances, pipeline RoW width limitation, pipe route selection, access, visual impact limitation, clearing limitation, landscaping and site conservation, erosion control, etc.
- Offshore: restricted areas, drawbacks to marine fisheries and maritime transportation, seabed disturbance, etc.

Site selection and location shall also take into account natural risks (flooding, seismic events, soil erosion, ground stability and other geo-hazards, etc.).

5.2 Flaring and GHG emissions

The design of new developments shall comply with the following:

- Elimination of continuous flaring and venting in accordance with Company's commitment to adhere to what is stated in the GGFR Voluntary standard (Report No 29555).
- To keep as low as possible GHG emissions. This includes temporary flaring and venting minimisation, and optimization of fuel gas and energy efficiency.
- To monitor directly or indirectly the flows and characteristics of significant GHG emission sources.
- GHG emission sources and associated emissions shall be identified according to the Company-approved methodology.

- Minimisation of GHG emissions and optimization of energy efficiency shall be considered in the selection of the development scheme and main equipments. The accordance with Company's objectives with respect to energy efficiency and GHG emissions reductions shall be considered.

5.2.1 Flaring and venting minimisation in new projects

Facilities shall be designed to comply with the following:

- No continuous flaring of associated gas, including LP and LLP gas streams, during normal operation, unless there is no feasible alternative. To be noted that safety flaring (gas purging of flare headers) is not covered by this requirement.
- If gas cannot be marketed or used as fuel gas, re-injection either into the producing reservoirs or other adequate reservoirs shall be the base case.
- No continuous venting of associated gas, unless there is no feasible alternative. If venting is to be considered, its replacement by flaring shall be evaluated wherever it represents an environmental benefit in terms of GHG emissions and complies with Company's safety requirements.
- No continuous venting of CO_2 from decarbonatation units (amines, membranes), unless there is no feasible alternative or the native CO_2 vented is not significant when compared to the CO_2 from the combustion.
- Flaring during new field's start-up shall be minimized. The project team shall set a strategy and a detailed technical plan (available for internal review) to demonstrate how flaring shall be minimized: schedule of commissioning, flaring and venting profiles including well drilling, testing and workovers and mitigation measures.
- Temporary flaring related to operational upsets shall be minimized by ensuring the targeted availability of the critical systems. Adequate redundancy and/or adequate spare parts philosophy, preventive and curative maintenance strategy and means shall be implemented.
- Flare headers metering systems should cover all the range of gas flow to flare with a good accuracy.
- Instrumentation technologies powered by instrument gas should be avoided whenever feasible, or vented volumes should be minimized.

A non-exhaustive list of complementary measures to be studied in the design for flaring reduction can be found in **Appendix 2**.

5.2.2 Optimization of fuel gas and energy use in new projects

The design of a new facility shall ensure an optimized use of energy, including, but not limited to, the minimization of fuel gas consumption:

- Optimization of energy use shall be considered not only for the oil & gas plateau, but also for the entire life of the facility.
- Where justified by the process heat requirements, the installation of a WHRU on gas turbines shall be the base case.

- A system for quantifying the energy consumption (fuel gas, electricity, mechanical power) of each key component of the system (gas turbine, compressor, pump, and heater), shall be installed in order to enable the monitoring and optimization of the energy efficiency of that component.
- If possible, the main energy consuming machines should include a system to perform the on-line monitoring of the energy efficiency and to compare it to the expected energy efficiency, in order to be optimized by the operation's team.
- Sampling points shall be installed to characterize the composition of LP and HP fuel gases.

A non-exhaustive list of complementary measures to be studied in the design for optimizing fuel gas and energy use can be found in **Appendix 3.**

5.3 Other atmospheric emissions

Installations shall be designed to comply with the following principles:

1. To reduce the emission of gaseous or solid compounds that affect the air quality and human health: H_2S, SOx, NOx, VOC, CO, particulates, etc.
2. To monitor the flow and the characteristics of significant emissions before releasing them to the atmosphere.

5.3.1 Reduction of NOx, SOx, VOCs and particulate matter emissions

- When some flaring is unavoidable, an efficient flare tip (smokeless device, reference: GS EP SAF 262) shall be installed in order to maximize the combustion efficiency.
- Burning emissions from well testing or purging shall be minimised by optimising the burning system design and the testing procedures.
- Emission sources shall be designed so that ground level concentrations meet ambient air quality standards.
- Dispersion studies should be undertaken on a case by case basis in order to assess the potential impact on air quality.

5.3.1.1 NOx emissions

Gas-fueled turbines used either for power generation or mechanical drive purposes shall be selected to reach a NOx emissions target of 75 mg/Nm3 (i.e 37 ppm vol.) or less, at 15% O2.

The selection of diesel and/or gas engines shall be done according to their NOx emissions levels which shall be as low as possible. Engines equipped with a NOx control system should be preferred.

5.3.1.2 H_2S and SO_2 emissions

Utility fuels with the lowest possible sulphur content shall be selected.

Where relevant, a H_2S removal and conversion system should be installed in order to avoid H_2S emissions.

In any installation where sour gas is produced, and which is likely to emit significant quantities of SO_2, sulphur shall be removed from the fuel gas and disposed of in sound environmental conditions (Sulphur Recovery Unit or re-injection into deep layer), unless not feasible.

Where SO_2 emissions are foreseen, a dispersion study shall be carried out to check the compliance with the applicable air quality standards.

5.3.1.3 VOC emissions

Facilities shall be designed in order to minimise VOC emissions which are mainly associated with crude/ condensates storage and loading (FPSO/FSO, terminals), OWTU including API basins, and glycol units.

Whenever it is technically and safely possible, the onshore oil storage tanks shall be fitted with a floating roof. The recovery of VOC from fixed-roof storage tanks and FSOs/ FPSOs storage shall be the base case.

5.3.2 Emissions and air quality monitoring

Gaseous emissions: sampling points shall be installed on the main stacks to monitor the fuel gas emissions. For further details, refer to GS-OT-MEC-292 and to the dedicated rotating machine package specification (GS-OT-MEC-010 or GS-OT-MEC-020 or GS-OT-MEC-030 or GS-OT-MEC-032).

Meteorological station: a meteorological station shall be systematically installed to measure continuously and record, as a minimum, temperature, wind, rainfall, and nebulosity in accordance with GS-OT-GEO-505.

Air quality monitoring: in specific sensitive areas, measurement stations and/or detectors/monitors may be required to ensure a permanent monitoring/control of air quality.

5.4 Liquid effluents

5.4.1 Management of liquid effluents and preservation of water resources

The main categories of liquid effluents to be considered are the following: produced water, process waters, drainage waters, ballast waters, hydrotesting effluents, sewage, cooling waters, brines, workover fluids and well test fluids. Drilling fluids are considered in § 5.6.

All onshore and offshore installations, including drilling rigs, shall be designed to avoid any risk of leak: the site and the facilities shall be watertight and fitted with adequate retention ponds (onshore), process skid base plates and drip pans connected to a relevant drainage system (in accordance with GS EP SAF 228) and collected for proper elimination.

All potential discharges to surface waters (rivers, lakes, sea,,..) or aquifers shall be identified, quantified and their impact on the environment assessed. A dispersion study may be undertaken on a case by case basis in order to assess the potential risk of the effluent discharges on the natural environment.

Water resources, in particular for onshore or coastal sites, shall be protected and managed through a sustainable development approach taking into account the local environmental and socio-economic constraints.

Any pumping from potable water aquifers for industrial purposes (pressure maintenance, cooling water, etc.) shall be strictly forbidden.

Pumping from fresh water aquifers for industrial purposes (pressure maintenance, cooling water, etc.) shall be avoided.

Injection of used waters, including produced water, to potable or fresh water aquifers shall be strictly forbidden.

In case of pumping fresh waters from aquifers, rivers, etc., cannot be avoided the pumping station shall be systematically equipped with sampling point(s) to enable the periodic monitoring of water quality and a flow meter to record the volume of pumped waters. In addition water level shall be recorded regularly.

5.4.2 Produced waters (incl. Process waters)

Produced waters shall be characterised in terms of volume, physical parameters (temperature, salinity, suspended matters, etc.) and chemical parameters (heavy metals, TPH, dissolved components –including phenol, ammonia, mono and poly-aromatic hydrocarbons, radionuclide, etc.).

Measures ensuring reduction/separation at source (water shut-off, downhole disposal, when applicable) should be considered.

The disposal options for the produced waters shall be studied according to the following priority:

1. **Where feasible re-injection into the reservoir shall be implemented.**
2. Disposal into other adequate geological formation: injection into deep saline geological aquifers, other than the reservoir, shall also be considered (refer to GS EP ENV 270).
3. Treatment and further discharge to the natural environment **(if the above options have been proven not feasible).** In that case, chemicals used for oil-water separation and water treatment, and their dosage, shall be selected according to their impact on the environment. An environmental risk assessment shall be carried out in particular as regards hydrocarbons, thermal and/or chemicals effects.

   - Offshore, the produced water treatment process shall be designed to ensure, as a minimum, an oil-in-water content not exceeding **30 mg/l** (quantity of dispersed aliphatic hydrocarbons, measured by an IR method approved by the Company), during normal operations and at any discharge point. On F(P)SOs, when produced waters are mixed with contaminated seawaters as defined in IMO MARPOL 73/78 Annex I, Regulation 39, they must be treated in order to be disposed of with a maximum oil content of 15 ppm according to IMO MARPOL 73/78 Annex I and in accordance with GS-OT-STR-651.
   - In coastal and onshore areas, the oil-in-water content of the produced water discharges shall not exceed **10 mg/l** (quantity of dispersed aliphatic hydrocarbons, measured by an IR method approved by the Company), at any time during normal operations and at any discharge point. Additional discharge standards (e.g. physical and chemical parameters) on water quality can be defined taking into account the local conditions.
   - In the vicinity, or under the influence, of river mouths (transitional areas) a modeling study shall be performed to determine the acceptable oil-in-water content of the discharged

effluent on a case by case basis. (The 10 mg/l specification might be applied beyond the 3 nautical miles limit).

A dilution system of treated or untreated produced water whose purpose is to lower the average concentration of oil to comply with the performance standards shall be prohibited (refer to OSPAR Convention).

Downgraded situations:

- Temporary off-spec produced water discharge related to operational failure (e.g. injection system or oily water treatment) shall be minimized by designing critical systems with adequate capacity/redundancy.
- In addition, in onshore or coastal areas, temporary buffer capacities should be installed to accommodate off-spec waters before reprocessing them when the normal operations can be resumed.

5.4.3 Drainage and bilge waters

In addition to GS EP SAF 228 requirements, the following shall be applied:

- **Offshore**, effluents from open drains shall meet **a discharge target of 30 mg/l of oil content.**

  On F(P)SOs, **machinery space effluents** drainage (or bilge waters) shall be collected separately and treated in order to be disposed of with a maximum oil content of **15 ppm** in compliance with IMO MARPOL 73/78.

- **Onshore**, the oil content in open drain discharges **shall not exceed 10 mg/l.**

In any case, the oil recovered shall be sent back to the process.

5.4.4 Contaminated seawaters

On F(P)SOs, seawater introduced into oil tanks (contaminated waters as defined in IMO MARPOL 73/78 Annex I, Regulation 39) must be treated in order to be disposed of with a maximum oil content of **15 ppm** according to IMO MARPOL 73/78 Annex I.

5.4.5 Ballast water

On F(P)SOs, ballast tanks must be designed in compliance with the IMO MARPOL 73/78.

Any discharge of contaminated effluents shall be discharged according to IMO MARPOL 73/78.

5.4.6 Hydrotesting effluents

Chemicals to be used for treatment shall be selected according to the requirement below.

Onshore, to minimize water consumption, the possibility of testing the pipe section by section with recycling of the effluents in the next section of the pipe shall be considered in the design.

Effluents from hydrotesting shall be neutralized and filtered before their discharge to the environment.

A modelling study shall be carried out to assess the potential impact of the discharge on the environment.

If necessary, the effluents shall be stored in temporary pits for treatment before their discharge.

The release process of hydrotesting effluents shall be studied since the design phase taking into account the environmental conditions.

In coastal areas, the use of sea water shall be preferred for hydrotesting. The possibility of discharging the effluents at a controlled flow rate and/or in batch during ebb tide, below the water surface shall be considered in the design.

Discharges from the offshore side shall be preferred in all cases.

When required, a discharge plan may be developed and approved by the local authorities.

5.4.7 Sewage effluents

Sewage effluents include grey waters (effluents from sinks, showers and laundries) and black waters (toilet effluents) from accommodation, including domestic areas like kitchen and toilets.

The sewage system of living quarters and camps shall be designed in accordance with GS-OT-CIV-700, GS EP ENV 403 and GS EP SAF 221 requirements. It should contain as a minimum septic tanks and secondary treatments like macerators and/or bioreactors for offshore installations.

For onshore installations, depending on the environmental conditions, treatment units like biofilters, lagoonings, should be designed to treat wastewaters for camps with less than 2000 workers. For camps with a number of workers above 2000, in case of limited land availability, prefabricated electro-mechanical sewage treatment units can be envisaged. In case of sufficient land, biological sewage treatment units (activated sludge units, lagoons, planted filters,…) can also be used.

Due consideration shall be given for the sizing of the sewage treatment system of living quarters, including construction camps where the number of workers can significantly increase.

Discharges of effluents from the sewage treatment system into the environment must be compliant with the local regulations and with IMO MARPOL 73/78 for offshore installations.

Sludge should be managed through the waste management system.

Sampling points shall be installed at the effluent outlets.

The maintenance of the installation shall be considered as early as the design phase.

5.4.8 Well test fluids

The well test discharges and emissions shall be minimised.

The test equipment shall be correctly designed in order to ensure adequate effluents collection and to avoid any liquid overflow or drop-out (with the test separator correctly sized and the burners designed to fully flare all fluid volumes).

Well test burners shall be selected according to the BAT concept with **improved combustion**. Whenever possible, the liquid phase of the separator shall be re-injected into the process lines or stored in appropriate tanks, and only the gaseous phase shall be burned.

5.4.9 Workover fluids and well clean-up

Production facilities shall be designed to collect, store, treat and eliminate effluents from workover and well operations (clean-up and maintenance) through an adequate system (incinerator, special burners, licensed disposal facilities, etc.). In any case, the discharge of untreated hazardous fluids into the environment is prohibited. Liquids shall be recycled as much as possible.

5.4.10 Water intake protection versus discharges

The location of the water discharge points shall be carefully studied in order to avoid any chemical/ biological contamination, or adverse thermal effect on the existing or projected intake points.

5.4.11 Cooling waters

The temperature of the outlet effluents shall be adapted to the sensitivity of the local environment.

For coastal or offshore waters, the generally accepted temperature increase shall not exceed a maximum of 3°C, 100 m away from the outfall discharge point.

It may be necessary to reduce this maximum temperature for sensitive environments such as coral reefs, rivers, etc. In that case, a modelling study shall be carried out to determine the thermal plume and an ad hoc environmental risk assessment shall be carried out.

For inland plants, the water intake for cooling purposes should be minimized, and the water discharge should be designed in order to reduce the impact on the environment or the water supply to other potential users.

5.4.12 Laboratory effluents

Effluents shall be managed according to GS EP SAF 228 requirements.

5.4.13 Disposal devices

Onshore, prior to discharging treated produced water to surface water and regardless of the disposal solution considered the system shall be fitted with an observation pond as defined in GS EP SAF 228.

Offshore and in coastal areas, discharge-to-sea systems shall be extended below the lowest water level at a depth to be determined by a dispersion study. The need for a diffuser at the end of the disposal tube to ensure an optimal dispersion should be considered.

5.4.14 Monitoring of liquid effluents

In order to fulfil monitoring and reporting requirements during the construction and operation phases, sampling points and/or on-line analysers shall be installed at the effluent treatment unit outlets (OWTU, cooling water, sewage effluents, etc) to enable continuous periodical quantitative analyses.

In addition, flow meters shall be installed at OWTU outlet and other **significant** disposal points (eg. cooling water).

As a minimum, hydrocarbons shall be analysed in produced water effluents (by an IR method approved by the Company).

In onshore and coastal areas, pH, temperature, organic compounds (such as BTEX, Phenol, etc.), BOD, COD, TSS, heavy metals, sulfides and chlorides should be analysed.

Other parameters analyses like ammonia, radionuclide, PAH,…can be required on a case by case basis.

5.4.15 Groundwater monitoring

Onshore, monitoring wells (piezometers) shall be installed in order to monitor the quality of the groundwater if there is a risk of contamination of the water table.

They should be installed close to the main oil and chemicals storages, upstream and downstream from both of them.

5.5 Waste management

5.5.1 General principles

Waste generated during all works, including drilling, construction and production phases, shall be clearly identified, classified as hazardous, non-hazardous or inert (refer to **Appendix 4**) and quantified to allow their adequate collection, segregation, temporary storage, treatment and disposal.

Waste collection, segregation and temporary storage

Waste collection and temporary storage shall be designed to minimise the risk of escape to the environment (for example by particulates, infiltration, runoff or odours). On-site waste storage should be limited in time and volume.

In accordance with the local context, waste sorting (preferably at source or after collection) shall be organized to segregate wastes that require different treatment or disposal systems and to avoid mixing non compatible products.

Dedicated containers (bins, skips etc.) shall be provided in quantities adapted to anticipated waste streams and removal frequency. They should be labelled clearly by type of waste (for example by colour-coding and illustrated by pictographs) and should be installed in the vicinity of work units and in living quarters (away from food storage locations). Containers should be made from durable materials compatible with the waste to be collected, be leak-proof, sturdy, stable, easy to handle/clean/disinfect. They should be designed to prevent the ingress of animals (vectors), escaping odours and placed under cover if necessary for protection from direct sunlight, wind and rain.

Preliminary treatment such as compactor/grinder or clean-up facilities may be necessary to reduce waste volumes or hazards, according to further treatment and disposal options.

Waste treatment & disposal

For each waste stream, treatment and disposal alternatives shall be studied, and preferred treatment & disposal options shall be selected, based on:

- The waste management “5 R principles” hierarchy, i.e.: Reduce, Recover, Reuse, Recycle, Residue disposal.

- A preliminary review of the technical capacity of infrastructures available at local or regional level to handle the waste (in-house or third-parties).
- A risk assessment to evaluate the different waste management alternatives for health, the environment and Company reputation.

In case of absence of, or poorly-constructed or operated existing waste management facilities, Company may decide to provide its own infrastructures, to upgrade existing local facilities or to encourage local third-party capacity building.

In any case, all necessary waste treatment and disposal facilities (controlled landfill, incinerator, bio-centre, etc.) shall be fully operational for the drilling, construction and production phases.

Any landfill shall be designed according to GS EP ENV 421.

Incinerator must be designed to satisfy the applicable regulations on atmospheric emissions in compliance with Directive 2000/76/EC and Directive 94/67/EC or equivalent.

5.5.2 Specific requirements for non-hazardous and inert waste

Recycling/ reuse of plastic, paper, cardboard, glass, scrap metal, wood shall be considered.

Onshore, large installations with living quarters or camps shall be fitted with a compactor, a grinder and when necessary an incinerator in accordance with GS EP SAF 221 requirements.

As regards the onshore construction camps, which can involve up to several thousands of workers, a modular approach to the sizing for waste treatment shall be studied.

Offshore, the disposal of garbage must comply with IMO MARPOL 73/78 requirements.

5.5.3 Specific requirements for Hazardous waste

Hazardous waste storage should be designed with special arrangements, e.g.:

- storage on an impervious surface connected to a drainage and collection system and/or in a bunded area in compliance with GS EP SAF 228,
- storage area equipped with suitable fire-fighting equipment and spillage recovery equipment such as shovels and absorbent materials,
- restricted/controlled area and access to the storage site (in particular for radioactive waste).

When necessary, special containers shall be installed to collect mercury or NORM waste (including contaminated equipments, pipelines, etc.) for adequate elimination to be approved by Company.

Medical waste with potential risk due to infectious agents and toxic substances shall be separated from other wastes. Used needles and syringes shall be packaged in specific puncture-proof and safe-locking ‘Sharps’ containers. Other biohazardous waste shall be collected in bags or recipients marked with ‘Biohazard’ symbol. Medical waste shall be incinerated, or disposed of by landfilling after preliminary treatment by chemical or thermal disinfection.

Lubricating oils and used oils shall be systematically collected to be either injected into the process stream or burnt in specially designed incinerators or eliminated through dedicated recycling circuits - when locally available.

Disposal of non-treated oily effluents and hazardous waste into pits, either for burning (burn pits) or burial, is prohibited.

5.6 Drilling fluids and cuttings

5.6.1 Drilling fluids selection and disposal

All the fluid components for NADF or WBDF shall be selected according to the chemicals selection criteria defined below in § 5.7.

WBDF should be preferred when appropriate.

The use of diesel oil in drilling mud is forbidden in any case.

When a NADF is used, the content in aromatics of the base fluid should be less than 0.1% and shall be, in any case, less than 3% by weight. The measure shall be performed by UV spectrophotometry (method of Burdett).

NADF shall be recovered to be recycled or disposed of. Rigs shall be equipped with a fully watertight floor and efficient closed loop systems in order to optimise the fluid re-circulation and to reduce losses. It is forbidden to discharge NADF to the environment.

5.6.2 Drill cuttings and centrifugation residues treatment and disposal

Treatment and disposal options shall be systematically studied taking into account the regulatory and environmental context.

In the absence of local permitting requirement, the following shall be applied:

In conventional offshore areas, the drill cuttings treatment system shall ensure that the percentage of **NADF discharged** to the sea with cuttings and centrifugation residues (fines) shall not exceed **8 % by weight** (weight of base fluid by weight of dry retorted cuttings, measured with the Retorkit 50 cc method) for **each completed well and only for the sections drilled with NADF.** In addition, daily, the average content of NADF in the dry drill cuttings discharged to the sea shall never exceed 14% by weight.

In sensitive marine areas, NADF cuttings discharge shall not exceed an oil concentration of 1% **by weight** on dry cuttings as required by IFC Policy and Performance Standards).

When not feasible, other practicable solutions shall be studied, such as cuttings reinjection or transfer/ Ship to Shore for treatment.

In shallow waters where cuttings discharge is likely to strongly modify the sea bottom topography, cuttings discharge shall be forbidden unless a modelling study demonstrates no hazards to navigation.

Onshore, the most relevant method taking into account the oil or other contaminant contents (heavy metals,...), or a combination, for the drill cuttings treatment and disposal should be selected among the followings :

- Cuttings Re-injection, according to the applicable regulation;

- Storage in suitably lined pits prior to treatment, recycling, and/or final treatment and disposal;
- Drying, burying and covering by top soil (unsalted WBDF);
- Inerting method: stabilisation (mixing cuttings with cement and/or lime at a ratio depending on oil content) with an adequate control of leachate;
- Thermal method: thermal desorption, incineration;
- Biological treatment: static composting (biopile), dynamic composting (windrows); Landfarming
- Controlled landfill (as per GS EP ENV 421).

5.7 Chemicals

Chemicals shall be selected according to the following criteria: lowest toxicity, lowest bioaccumulation potential and highest biodegradation and must be in compliance with applicable regulations such as Regulation (EC) N°1907/2006 for Europe.

Offshore, chemicals shall be selected according to a pre-screening scheme based on the OSPAR methodology in force (refer to OSPAR Recommendation 2008/1) and provided with their MSDS.

A risk assessment should be carried out to assess the potential toxicological effect of chemicals when discharged to sensitive area.

The use of the following substances is prohibited :

- Ozone Depleting Substances and all products listed in the Montreal Protocol: any use of **CFC**, **HCFC** and **Halons**, which contribute to decreasing the ozone layer, is prohibited except for essential use, under derogation. Alternatives shall be used.
- The use of any transformer containing **PCB**-type fluids is forbidden.
- The use of **Glycol ether** is prohibited.

Bulk supply of chemicals via tote tanks or dedicated containers shall be considered to minimise transfer operations and avoid packaging waste.

The chemical stock shall be properly managed to ensure that any over-capacity and leftover chemicals is avoided. The supply contracts for chemicals/ materials should consider the possibility of returning the unused products to the suppliers.

5.8 Design of chemicals and petroleum products storage

Petroleum products comprise crude oil, diesel, helifuel,...

The storage design shall take into account the products compatibility.

An adequate sized area shall be allocated for the chemicals and petroleum products storage.

The storage areas shall be designed to avoid any leak or spillage to the environment.

As a minimum, the storage and transfer areas shall include a secondary containment (double walled container, skid base plate, bunded area, concrete area connected to a tank, ...), adequate ventilation and should be protected from rainfalls and direct sun radiation.

Onshore, large storage areas shall be fitted with an impervious slab (concrete or other) with a slope towards a gutter and a relevant drainage system and be designed in accordance with GS EP SAF 341.

Overfills of vessels and tanks should be prevented to avoid spills.

Leak detection may be used in conjunction with secondary containment, particularly in highly sensitive areas.

5.9 Noise level

During construction and operations, three kinds of noise levels have to be taken into account:

1. Equipment noise emissions:

   All the noise abatement measures shall be taken to ensure an adequate acoustical insulation of the engines, compressors, turbines (enclose engines) and gas flow lines and valves (lagging, in-line silencers, etc.).

2. Noise emissions on the worksite, offices and living quarters (refer to GS EP SAF 221).

3. Noise emissions at the facility's boundary limit and in residential areas close to the installations :

   A noise modelling study should be carried out during the design phase to evaluate the global noise level and select appropriate technologies, equipment and arrangements to reduce the impact of the installation on the environment and the local communities. The noise maps should consider normal, downgraded and emergency situations.

Onshore, the design shall ensure that the noise levels recorded out of doors of typical receptors, beyond the property boundary of the facilities during normal operation of the site, do not exceed the limits set out in the following table (based on IFC Policy and Performance Standards) or result in a maximum increase in background levels of 3dB at the nearest receptor location off-site, at any time.

Receptor	**Noise Level Guidelines (Out of doors) One hour LAeq (dBA)**	
	Daytime	Night time
	7 am –10 pm	10 pm – 7 am
Residential ;institutional; educational	55	45
Industrial; commercial	70	70

Measurement and assessment of noise in the environment shall be carried out according to ISO 1996-1 and ISO 1996-2 methodology or equivalent.

5.10 Dust, odours and lighting

The study of the layout of the process area, in particular the flare and the OWTU, shall take into account the main wind direction to avoid to impact community settlements.

Lighting should be reduced to the minimum and directed in such a way so as to limit nuisance to the surrounding communities and to avoid to attract animals (such as birds or turtles).

5.11 Spill response equipment

Spills may concern oil, diesel, lube oils, chemicals, condensates, etc.

The results of the preliminary risk assessment study carried out by Company at an early phase of the project shall be used as a basis to determine the needs for spill response equipments and their adequate storage on site in accordance with a tiered response organisation.

The location for the equipment storage area shall be close to the helideck an easily reached by a crane.

5.12 Decommissioning of installations

The decommissioning of installations shall be integrated in the early phase of the design and carried out according to the site restitution study (RES), when available.

In addition to local regulations, the decommissioning practices for offshore installations shall be based on IMO A.672, which applies to all marine areas (CS and EEZ), except for the North East Atlantic regions where OSPAR Convention is in force, and Company's requirements.

The following points shall be considered since the design phase : well plugging, installation cold phase, cleaning operations, hazardous products elimination, pieces of equipment and facilities which shall be dismantled and removed, The site restitution should include a restoration program of the natural environment.

The development well architecture shall be designed to facilitate the ultimate plugging operations.

For offshore and onshore sites, as a minimum, the followings shall be anticipated in the design to be implemented at the end of the activities:

Offshore:

All offshore installations shall be designed in such a way so that their entire removal is feasible.

- Superstructures/ topsides shall be totally removed after flushing, cleaning and inerting the requested equipment (capacities, drains).
- Jackets shall be totally and entirely removed and transported to the shore for recycling. Dumping into deep sea environments and/or re-use as an artificial reef may only be considered with the stakeholders' agreement and approval of the authorities.
- Drains and connections between platforms shall be flushed and, depending on the diameters, they can be either removed or left in place with the possibility to be covered (rock dumping) after having been filled in with water.
- Export pipelines shall be flushed, cleaned, may be filled in with water and then left in place. The contaminated effluents from cleaning shall be treated or re-injected in order to fulfil regulatory requirements.
- Underwater installations including wellheads, risers, tower risers, manifolds, jumpers, hydraulic connections and cables shall be removed. In deepwaters, the removal of installations shall be considered on a case by case basis.

- Floating installations, such as FPSO's, TLP, semi-sub, loading buoys, shall be disconnected and towed to the shore for dismantling or re-use.
- Anchor lines shall be removed and transported to the shore. Suction anchors may be left in place if their removal is not possible.

Onshore:

- Production sites and tankfarms, including infrastructures (foundations) and superstructures, shall be cleaned and totally removed.
- Production pads and clusters shall be reclaimed.
- Wells shall be plugged according to Company's requirement.
- Aerial drains and pipelines shall be cleaned, flushed and removed.
- Buried pipes shall be cleaned and flushed, then removed or left in place depending on the future use of the land and subject to the approval of the concerned authorities. If the pipes remain in place, they shall not be the source of any possible incident.
- The treatment of cleaning contaminated effluents shall be designed so as to fulfil the applicable regulatory requirements.
- Underground water and contaminated soils shall be reclaimed in accordance with Company requirements.

Replanting should be considered to re-insert the site into the environment.

Bibliography

Reference	Title of the publication
E&P Forum Report No 2.49/170	Oil industry operating guidelines for tropical rainforests, April 1991
E&P Forum and IUCN Report No 2.54/184	Oil and gas exploration and production in mangrove areas. Guidelines for environmental protection, November 1993
Report No 2.55/185	Oil and gas exploration and production in arctic and subartic onshore regions. Guidelines for environmental protection, 1993
E&P Forum Report No 2.59/197	Methods for estimating atmospheric emissions from E&P operations, September 1994
E&P Forum Report No 2.70/242	Decommissioning, remediation and reclamation guidelines for onshore exploration and production sites, October 1996
E&P Forum Report No 2.72/254	Environmental Management in oil and gas exploration and production. An overview of issues and management approaches, May 1997
OGP Report 2.84/329	Oil & gas exploration & production in arctic offshore regions. Guidelines for environmental protection, June 2002
E&P Forum Report No 10.16/258	Offshore pipeline decommissioning, August 1997
OGP Report 342	Environmental aspects of the use and disposal of non aqueous drilling fluids associated with offshore oil & gas operations, May 2003
OGP Report 413	Guidelines for waste management with special focus on areas with limited infrastructure, September 2008
UNEP	Regional Seas Program 1974
UNEP Barcelona Convention	Convention for the Protection of the Mediteranean Sea against pollution (1974) and Offshore Protocols
Rio Convention (1992)	Convention on Biological Diversity (1992)
AFNOR NF FD X31-61 (french standard)	Qualité du sol – Méthodes de détection et de caractérisation des pollutions. Réalisation d'un forage de contrôle de la qualité de l'eau souterraine au droit d'uns site potentiellement pollué, October 1999
	IMO Hong Kong International Convention for the safe and environmentally sound recycling of ships, 2009 (HONG KONG SRC 2009)
IMO MEPC 139(53)	Guidelines for the application of the revised MARPOL Annexe I requirements to Floating Production, Storage and Offloading facilities (FPSOs) and Floating Storage Units

	(FPUs)
London Convention (LC72)	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (1996)
	IMO International Convention for the Control and Management of ships' ballast water and sediments (BWM,2004)

Appendix 1 Glossary

API	American Petroleum Institute
BAT	Best Available Techniques
BOD	Biological Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CFC	ChloroFluoroCarbons
COD	Chemical Oxygen Demand
CS	Continental Shelf
EEZ	Exclusive Economic Zone (maritime zone within the 200 nautical miles)
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency (USA)
F(P)SO	Floating (Production) Storage Unit
GGFR	Global Gas Flaring and Venting Reduction
GHG	Greenhouse Gases
HCFC	HydroChloroFluoroCarbons
HP	High Pressure
IR	Infrared
IUCN	The World Conservation Union
LP	Low Pressure
LLP	Low Low Pressure
MSDS	Material Safety Data Sheet
NADF	Non-Aqueous Drilling Fluid
NORM	Naturally Occurring Radioactive Material
OGP	International Association of Oil & Gas Producers
OSPAR	Oslo Paris Convention
OWTU	Oily Water treatment Unit
PCB	Polychlorinated Biphenyls
RES	Site Restitution Study
RoW	Right of Way
TLP	Tension Leg Platform
TPH	Total Petroleum Hydrocarbon
TSS	Total Suspended Solids

UV	Ultraviolet
VOC	Volatile Organic Compounds
WBDF	Water Base Drilling Fluid
WHRU	Waste Heat Recovery Unit

Appendix 2 Complementary measures for flaring reduction

As a complement to the requirements and recommendations enunciated in section 5.2.1, the following measures enable the reduction of flaring (non-exhaustive list):

- The valorisation of LP and LLP gas streams as fuel gas, export and/or re-injection can be made through the installation of a Flare Gas Recovery Unit.
- The valves installed on the lines connected to the flare can have internal leaks and release significant quantity of gas towards the flare. The selection of appropriate valves enables the minimization of those leaks.
- The purge of flare lines with nitrogen can be evaluated provided that methane vented together with nitrogen does not induce more GHG emissions than hydrocarbon flaring.
- For fields with expected wells offloading, the volume of gas from sensitive wells offloading could be significant. A compression system would enable recovering this gas and injecting it into the production lines.

Appendix 3 Complementary measures for optimizing energy use

As a complement to the requirements and recommendations listed in section 5.2.2, the following measures enable the optimization of energy use (non-exhaustive list):

- For the power range considered, gas turbines, compressors and pumps should be selected among the equipments offering the best energy efficiency.
- The choice in the number of machines on-duty enables the optimization of fuel gas on the life-of-project basis.
- Variable speed drive enables the reduction of energy consumption during the periods of operation below the nominal load.
- The management of heat transfers in the process should be optimized to keep fuel gas consumption as low as possible (if necessary a pinch analysis can be performed).
- The use of a combined cycle gas/ steam turbine enables large energy savings. It should be evaluated for large onshore plants with energy consumption above 100 MW (electrical + mechanical).

Appendix 4 Waste types and categories

Waste categories	Waste types
Hazardous waste	Chemical waste Contaminated packaging (drums, cans…) Used oils PCB Paint waste (pots, brush…) Hydrocarbon contaminated waste (tank bottom sludges, pigging waste, oil filters, oily rags, contaminated soils …) Asbestos Used batteries Fluorescent tubes Mercury waste Printing cartridges (1) Electric and electronic waste(1) Grit blasting waste(1) Medical waste Ashes from waste incineration(1)
	NORM (Naturally Occurring Radioactive Materials: scales, contaminated equipment) Radioactive sources (smoke detectors, …..)
	Regular oil or crude based mud cuttings, Low toxicity oil base mud cuttings, Synthetic oil base mud cuttings
Non hazardous waste	Water based mud cuttings(1)
	Biodegradable waste (vegetal waste, biodegradable food waste) General waste (non contaminated packaging, wood, paper, metal scrap, plastic, glass…)
Inert waste	Sub-products from earth works such as gravels and non contaminated demolition rubble

(1) depending on potential contaminants

TotalEnergies

COMPANY RULE

Drilling & Wells

CR-OT-DW-424

Permanent and Temporary Well Abandonment

REVISION	REVISION DATE	PURPOSE OF REVISION	TECHNICAL VALIDATION	FINAL APPROVAL
00	01/2024	Recodification of the document following the creation of OneTech	VP OT/TL/DW	SVP OT/CL

Document concerning the following branch(es), applicable on the date of its publication:

EP	GRP	MS	OT	RC
X				

Foreword	This English version must be considered as the reference version.

TABLE OF CONTENTS

1. Scope

This document defines the requirements for permanent abandonment, temporary abandonment or suspension of all types of wells (including side-tracks).

2. Reference documents

The reference documents listed below form an integral part of this Company Rule.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
Not applicable	

TotalEnergies Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

Reference	Title
CR-OT-DW-400	Drilling and Wells operations classification
CR-OT-DW-420	Barriers for Drilling, Completion and Workover operations
CR-OT-DW-422	Barriers & Envelopes on completed and suspended-completed wells
CR-OT-DW-425	Well Integrity Management in Drilling & Wells
CR-OT-DW-472	Primary Casing Cementing
GM-OT-DW-650	Formation Pressure Integrity Tests selection and Procedures
GM-OT-OPP-232	Well Integrity Management in Field Operations
GM EP FP 470	Guidelines for Cement Plug Operations

3. Foreword

3.1. Abbreviations

CBL	Cement Bond Log
D&W	Drilling and Wells
ELOT	Extended Leak Off Test
FP	Fracture Pressure

FCP	Fracture Closure Pressure
FPP	Fracture Propagation Pressure
FIP	Fracture Initiation Pressure
HQ	Headquarters
IZI	Identified Zone to be Individually Isolated
LOP	Leak Off Pressure
LOT	Leak Off Test
MAIP	Maximum Anticipated IZI Pressure
P&A	Plug & Abandon
P&A SOR	Plug and Abandon Statement of Requirements
SG.	Specific Gravity
SOR	Statement Of Requirements
VDL	Variable Density Log
WBE	Well Barrier Element

3.2. Definitions

Cap rock Principle	The principle of isolating an IZI by installing a Well Barrier at a depth in a wellbore that has a formation fracture pressure capable of withstanding the maximum anticipated pressure resulting from the IZI.
Combined Well Barrier	A Well Barrier comprising all combined Well Barrier Elements
Combined Well Barrier Elements	Well Barrier Elements set in a single operation that are common to the primary and secondary Well Barriers.
Creeping Formation	A formation that closes and seals an annular space with time. Typically, a shale or salt will have specific characteristics that allow it to creep without failure of its structure.
Drilling fluid	Fluid introduced into the wellbore for operational purposes. This can include muds or clear fluids including water.
Fluid	Fluid present in exposed geological formations with the potential to flow into the wellbore. This includes water, oil or gas.

External Environment	Any location which has to be isolated from potential flow of fluid from an IZI. This includes subsurface zones as well as the surface/seabed environment or atmosphere.
Flow Zone	A formation containing fluid with the capability to flow either via natural or induced permeability.
Fracture Pressure (FP)	Fracture Pressure is the maximum pressure that a formation can withstand without fracturing.
Identified Zone to be individually Isolated (IZI)	A flow zone or a series of flow zones that require to be isolated from the external environment and other IZI. A single IZI can comprise multiple flow zones that do not need to be isolated from each other.
Maximum Anticipated IZI Pressure (MAIP)	The maximum pressure that could exist within an IZI throughout the lifetime of the P&A.
Mechanical plug	A mechanical device typically constructed of metal components and elastomers which is set in the wellbore and is not qualified as a permanent barrier element.
P&A SOR	Statement of Requirements document detailing the required parameters for the permanent abandonment of a specific well or wells.
Permanent Well Abandonment	The abandonment of a well that will never be re-entered. No future access to the wellbore is possible.
Permanent WBE	A WBE designed, qualified and verified for the lifetime of the P&A.
Permanent Well Barrier	A Well Barrier containing only Permanent Well Barrier Elements.
Primary Well Barrier	First set of barrier elements that prevents flow from an IZI.
Secondary Well Barrier	Second set of barrier elements that prevents flow from an IZI.
Single Well Barrier	A well barrier conforming to the requirements of a primary well barrier only.
Temporary Well Barrier Element	A WBE designed, qualified and verified for a limited period.
Temporary Well Abandonment	The temporary abandonment of a well after the construction phase. The well will at some unspecified time in the future be either permanently abandoned or re-entered.
Temporary Well Barrier	A Well Barrier containing at least one Temporary Well Barrier Element.
Well Barrier	A system of one or several Well Barrier Elements that contains fluids within a well to prevent uncontrolled flow of fluids within or out of the well.
Well Barrier Element (WBE)	An individual component of a Well Barrier. This includes internal cement plugs and annular isolations which together combine to form the full cross-sectional Well Barrier.

4. Key principles

4.1. Cap Rock Principle

{Rule 1:
All Permanent Well Barriers shall be designed in accordance with the Cap Rock Principle.}

According to this principle, a Permanent Well Barrier is designed to ensure that the formation between an IZI and the Barrier isolating it from the external environment, is sufficiently strong to contain the maximum anticipated pressure induced by the IZI. See Figure 1.

In essence, the Cap Rock principle defines the **minimum depth** at which a Barrier can be set in a wellbore relative to the IZI it will be isolating.

The essential features of this principle should be the following:

- **Maximum anticipated IZI pressure (MAIP):** This pressure is based on the maximum potential pressure over the lifetime of the P&A, including the impact of re-pressurization where depleted reservoirs are present. Refer to Section 5.2 “Definition of IZI”.
- **Fluid density:** this parameter represents the lowest-density fluid potentially present in the IZI (or any IZI isolated by the Permanent Well Barrier).
- **Integrity of the wellbore between the IZI and the Barrier:** The formations between the IZI and the Well Barrier are competent enough to act as a containment, regardless of the presence of any casing. These formations are impermeable and their **Fracture Pressure (FP)** is greater than the potential pressure from the IZI, up to the base of the Barrier.
- The **Fracture Pressure** is defined as the maximum formation fracture pressure that the external formation can withstand at the base of a Well Barrier. The fracture pressure can be defined in different ways depending on the type of well and the formation. Refer to Appendix 1 for guidance.

Refer to GM-OT-DW-650 for definitions of formation integrity measurement.

This principle applies to both the Primary and Secondary Well Barriers.

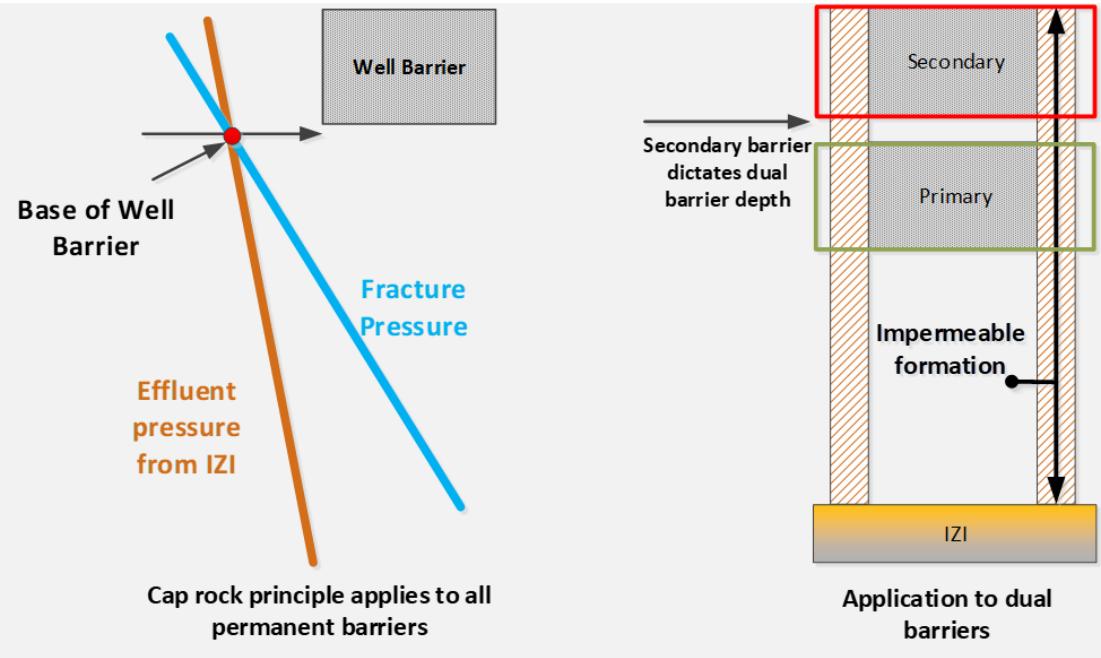


Figure 1 - Cap Rock Principle and Application

The Cap Rock principle defines the **minimum** setting depth of a Well Barrier. In practice, Well Barrier should be set **deeper** than the minimum setting depth where this can be achieved without significant cost and risk.

4.2. Well Barrier Coverage

{Rule 2:
All Well Barriers shall extend across the full cross section of the wellbore.}

The Well Barrier should comprise at least two Well Barrier Elements (WBE) - in open hole - or typically more where casing string(s) are present. Each WBE to be individually verified; together the WBEs compose the overall Well Barrier.

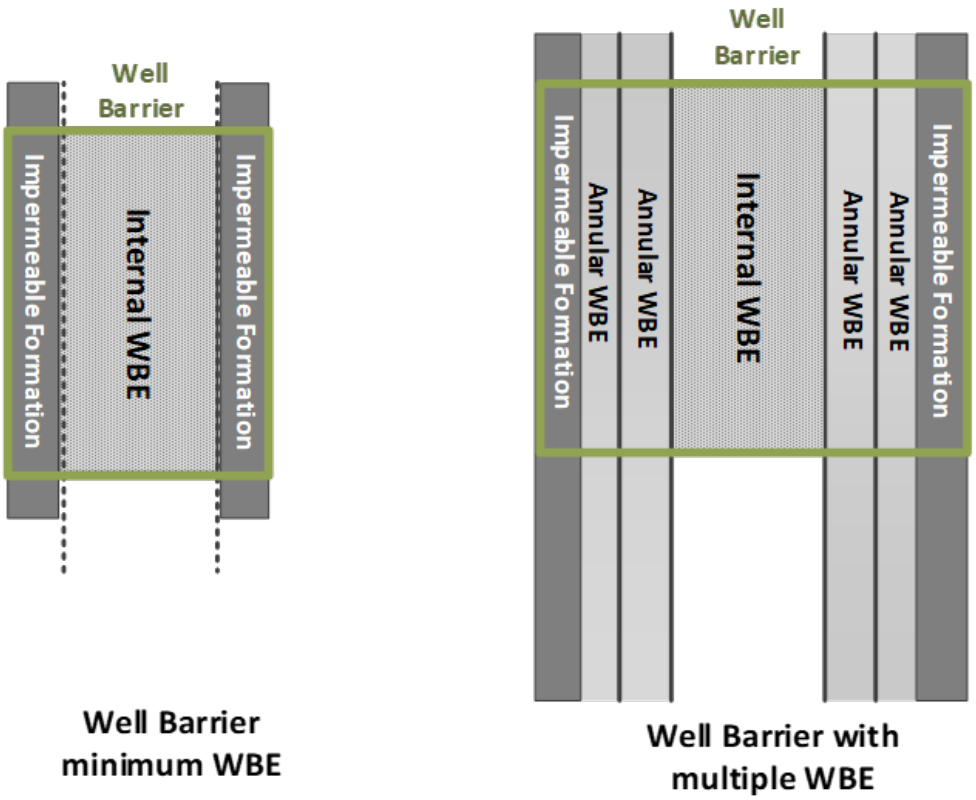


Figure 2 - 'Rock-to-Rock' Well Barriers

4.3. Well Barrier Requirements

{Rule 3:
For Permanent Well Abandonment, the following shall apply:

- **Each IZI to be isolated from the external environment by Permanent Well Barriers.**
- **Two Permanent Well Barriers to be installed where moveable hydrocarbons or overpressure are present in the lifetime of the abandonment.**
- **A minimum of one Permanent Well Barrier to be installed where no hydrocarbons are present and there is no potential to flow to surface/seabed.}**

4.3.1. Combined Well Barrier Elements

Primary and secondary Well Barrier Elements can be combined (see Section 6).

4.3.2. Number of Well Barriers

In application of Rule 3 two Permanent Well Barriers are defined as:

- an IZI contains hydrocarbons or
- an IZI has the potential to flow to surface/seabed, regardless of the fluid type.

4.3.2.1. A single Well Barrier can be accepted for certain low-risk cases

A single Well Barrier is sufficient in zones with no hydrocarbons and no potential to flow unassisted to surface/seabed (e.g. hydrostatic water zone) subject to a documented risk review.

4.3.2.2. Single barriers in other 'low risk' cases

Single barriers could be acceptable in other low risk cases but require a derogation. This includes crossflow between IZIs. This is due to the potentially negative impact of crossflow between zones that have already been designated as IZI (i.e. requiring isolation). This is a particular issue where crossflow would lead to reservoir damage or uncontrolled fracturing if the pressures generated are too high. This requires a review in the light of the original conclusion of the IZI assessment. For this reason, a Derogation to rule 3 is required for the use of a single barrier.

5. Design and Preparation of Permanent P&A

{Rule 4:
Preparation of any permanent well P&A shall require a specific SOR document – P&A SOR.}

5.1. P&A SOR

The P&A SOR document relates to P&A of individual wells - typically a development well prior to re-drill.

For a multi-well P&A campaign, a broader project-based P&A SOR will be carried out. The SOR process for this type of campaign is not covered in this Company Rule.

For exploration wells, the P&A design should be addressed early in the well planning process due to the short time available for P&A after completion of the drilling and evaluation phases. In this case, requirements below to be incorporated in the initial well SOR and updated at the end of the drilling phase.

The purpose of the P&A SOR is to:

- Define the interfaces and set up coordination and cooperation between Drilling & Wells and other disciplines.
- Ensure that all relevant information regarding the well and installation status are clearly identified and gathered from all parties involved in due time for the P&A planning and preparation.
- Allow enough time to fully assess the potential for optimization, i.e. time and cost savings in the design and execution of the P&A program.

The Drilling & Wells entity will be responsible for the P&A SOR, which will be approved by the Drilling & Wells, Subsurface and Field Operations disciplines.

The P&A SOR should:

- Be defined early enough to fully take into account the constraints from all entities involved in the preparation / realization process.
- Provide all necessary information required to define the P&A design as well as cost and duration estimates of the well.

5.2. Data to be contained in the P&A SOR

This dataset will require input from a number of entities. The P&A SOR document should contain (but is not limited to) the following items:

- Preliminary well classification as per CR-OT-DW-400.
- General data (field data, location, age, history overview, etc.).
- Well status including:
  - Well name, TUWI, TUWBI.
  - Summary of the well construction history.
  - Detailed current status of well including integrity history and current operating conditions.
  - Details of current well barrier status.
- Geological data including:
  - The definition of all IZIs present in the well (see Section 3.4).
  - A post drilling recalibration of the pore and fracture gradients.
  - Any specific geological issues or hazards including changes in reservoir or overburden conditions from the original drilled well conditions.
  - Presence of any formations characterized with 'creeping' potential and therefore potentially capable of forming annular barriers.
- Where any required data is missing, the P&A SOR to clearly state the uncertainties, and how this data is gathered (e.g. pre-P&A data gathering campaign).

5.3. Definition of IZI

{Rule 5:
For any well to be permanently or temporarily abandoned, the Drilling & Wells entity shall obtain the identification and characterization of all the IZIs, from the Geoscience entity.}

An IZI:

- Has a unique top depth and a unique bottom depth in the well.
- Can be a group of flow zones sharing similar pressure / fluid characteristics where inter-zonal isolation is deemed unnecessary and when the effect of crossflow has been assessed as posing an acceptable present and future risk. Crossflow risk to be subject to a detailed review by the Geoscience entity.
- Represents a potential hazard (present or future) requiring the permanent restoration of natural isolation to prevent any flow of fluids (from or into the IZI), as in the following cases:
  - Eruptivity: risk of fluids flowing from the IZI into another formation or to the external environment.
  - Depletion: risk of fluids flowing from another formation or the external environment into the IZI.
  - Environmental sensitivity: risk of pollution and associated interference with other human activities like farming, other industries (geothermal), potable water source, etc.

The identification and characterization of all IZIs by the Geosciences and D&W entities should take into account:

- The entire well history including drilling, re-entries, workovers, well interventions and production records. This analysis to identify all potential IZIs based on well records from the drilling phase (e.g. gas shows while drilling) and the subsequent production phase (e.g. sustained annulus pressure).
- The future long-term pressure regime in the IZI (normally reservoir sections) during the lifetime of the P&A. This final pressure will depend on various factors to be assessed including:
  - Natural re-pressurization of a currently depleted reservoir with time.
  - Potential future depletion due to production from adjacent fields.
  - Potential for pressure changes due to injection or disposal of water, CO_2 or other fluids in partially abandoned reservoirs. To be noted that this could result in final pressures that are above the initial reservoir pressure.
- The potential for pressure changes to have occurred in the overburden during the production life of the field, through compaction effects or fault mobilization. Such changes will be evidenced by effects such as the evolution of sustained annulus pressure and changes in the overburden pore pressure profiles encountered during drilling of infill wells.

A risk assessment should be carried out where necessary to justify the characterization of an IZI.

Where a specific study of future reservoir pressure is not feasible or is deemed unnecessary, then the P&A design should be based on the initial reservoir pressure.

The conclusion of this IZI identification and characterization phase should be documented; it will form the basis for the P&A design. As such it will be a fundamental part of the P&A SOR.

Refer to Appendix 3 for an example of an IZI listing.

5.4. P&A information in the Well Drilling program

{Rule 6:
Every P&A SOR and drilling / completion or workover program shall systematically include the following information:

- **A descriptive list of all IZIs (prognosis or actual if available).**
- **A tentative P&A schematic with a description of all Well Barriers.}**

During the well construction phase, it is important that future P&A requirements be considered. This will ensure the alignment of well construction and future P&A considerations in the design phase and avoid unnecessary cost exposure in the future.

6. Properties of Permanent Well Barriers

6.1. Combined Well Barrier Elements

Combined Well Barrier Elements are permitted where these satisfy the requirements of both the primary and secondary Barriers. This arrangement allows setting of both primary and secondary WBEs in one operation, where design and placement are strictly controlled.

Typically, this includes combined internal cement plugs set in a single operation, casing primary cement jobs or formation as an annular barrier element.

Where internal cement plugs are set as combined barrier elements then particular attention should be paid to the use of a support to prevent cement slumping and contamination as detailed in GM EP FP 470. The use of non-pressure retaining supports that allow subsequent pressure testing of the plug to be considered (e.g. parabows, ported retainers, etc.).

As stated in Rule 1, the Cap Rock principle applies to both primary and secondary Barriers, in particular the requirement for the value of the fracture pressure at the base of the secondary Well Barrier to be greater than the potential fluid pressure. This applies to combined Well Barrier Elements in the same way as individual Well Barrier Elements. Refer to Figure 3.

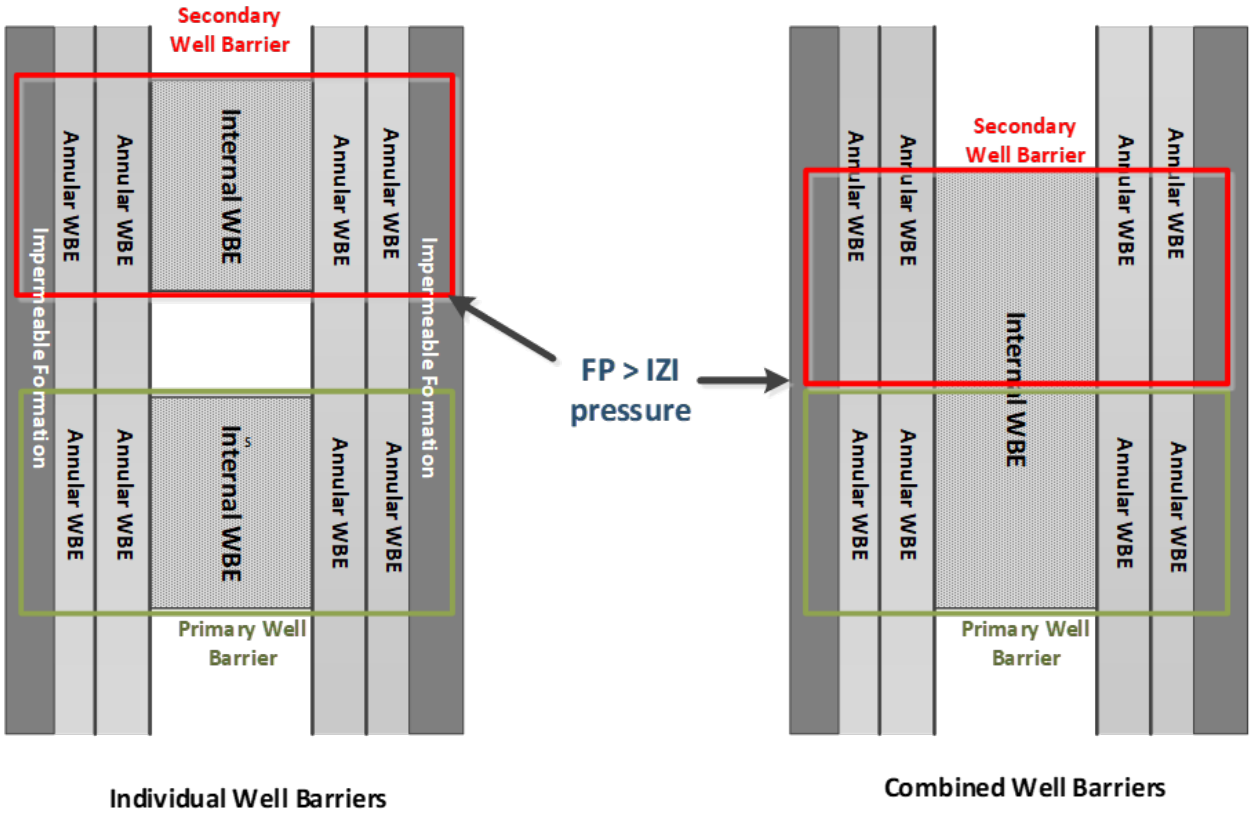


Figure 3 - Individual and Combined Well Barriers

6.2. Permanent Well Barrier Length Requirements

{Rule 7:
Verified continuous length shall be as following:
- **50m for Individual Well Barriers;**
- **100m for Combined Well Barriers.**

Three exceptions to this rule are permitted as detailed below.}

Three exceptions to this requirement are permitted:

1. Where the annular WBEs are verified by logging.
2. Where a window is milled in casing to establish a Well Barrier

For these cases, the length can be reduced to:

- 30 m for individual Well Barriers.
- 60 m for combined Well Barriers.

3. Where insufficient distance exists between IZIs.

The original isolation distance can be restored with a continuous cement plug.

Individual Well Barriers (primary and secondary) should each have a minimum verified length of 50 m. Where combined Well Barrier Elements are used, then the overall verified length will be a minimum of 100 m.

Where annular WBEs have been verified by logging, then the overall required length can be reduced to 30 m for a single WBE or 60 m for a combined WBE. This reflects the higher degree of confidence in the logged cement quality.

Where a window is mechanically milled in casing to establish a Well Barrier, then the overall required length should be reduced to 30 m for a single WBE or 60 m for a combined WBE. This reduced length is justified due to the high degree of technical risk in extended downhole milling. The milling operation also allows extensive preparation of the wellbore for placement of the subsequent barrier.

The design, placement and testing of the subsequent cement plug across the window should be carefully controlled to obtain maximum confidence in the cement quality.

This reduced minimum length applies to the entire Well Barrier as stated in Rule 2. Moreover, the Well Barrier should be ‘rock-to-rock’ and extend across the entire cross section of the wellbore. The minimum height requirement of 30 m therefore applies to the overlap of all WBEs in the Barrier (refer to Figure 4).

Where the distance between IZIs is insufficient to set standard-length well barriers, a single continuous barrier plug can be set covering the entire distance between the IZIs, thereby restoring the original isolation between the IZIs.

Note that these are minimum lengths and that in practice, longer cement plugs will be placed to allow for contamination, dressing off and compliance with minimum cement pumping volumes as specified in GM EP FP 470.

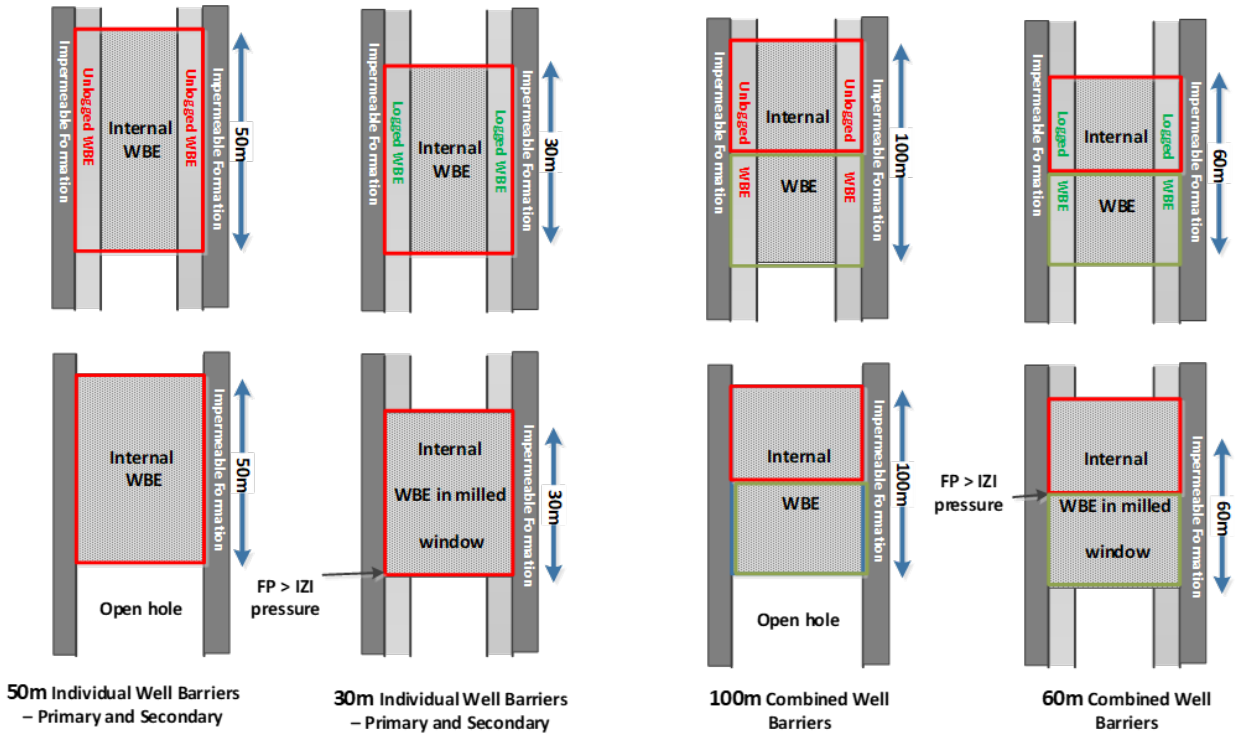


Figure 4 - Minimum Height of Well Barriers

6.3. Specific Permanent Barrier Issues

6.3.1. Abandonment of an Open Hole

Where an IZI is present in an open hole, the placement of the barriers depends on the fracture pressure of the open hole. Where the fracture pressure of the open hole is acceptable as per the Cap Rock Principle, then the Well Barriers can be set inside the casing to provide a rock-to-rock barrier with the casing annulus WBE.

Where the fracture pressure is not sufficient in open hole to withstand the IZI pressure, then the Well Barrier(s) should be placed sufficiently deep in the open hole to meet the cap rock principle.

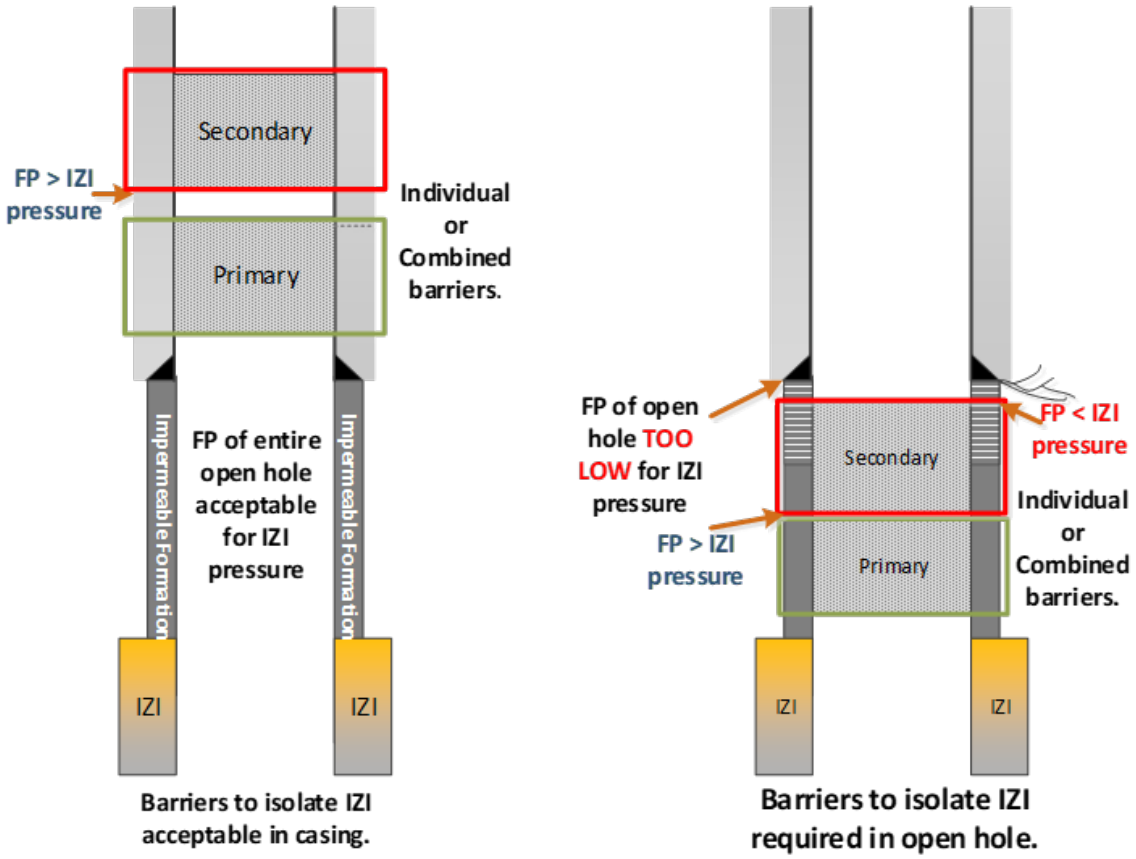


Figure 5 - Isolation of Open Hole

Examples of Permanent well P&A can be found in Appendix 2.

6.4. Materials for Permanent Well Barrier Elements

{Rule 8:
A Permanent Well Barrier shall be composed of any of the following:

- **Competent wellbore formation strong enough to withstand the pressure generated by the IZI.**
- **Cement qualified for the long-term conditions predicted in the well.**
- **Natural 'creeping' formation qualified as an annular barrier.**
- **Casing or tubing if fully encased in validated cement or formation.}**

All Well Barrier Elements should be constructed of materials that are qualified to provide a stable barrier over the life of the well abandonment.

Prior to their use, all materials used for barriers should demonstrate that they are suitable for the conditions likely to be encountered over the life of the well abandonment.

The following points should be taken into account for **the acceptance of** materials used for WBE:

- The **wellbore conditions** which will define the design of WBE materials will be provided in the P&A SOR. This will specify the long-term pressure and temperature regime as well as the type of fluids the WBE can be in contact with.
- **Cement** is considered a proven material for general P&A service, if designed and qualified for the specific wellbore conditions it will see over the long-term. This qualification to follow CR FP EP 472 and GM EP FP 470 and be carried out for any P&A barrier design.
- **Creeping Formation** can be accepted as an annular barrier provided it is validated as specified in Section 7 of this document.
- **Alternative Materials** will become increasingly relevant as WBEs in the P&A perimeter and will potentially provide significant benefits over cement. This can include materials such as resins, metals and geopolymers, along with settled solids such as barite, sands or bentonite.

  These materials will require formal approval by TotalEnergies HQ prior to their use in the field.
- **Steel** can only be considered as a long-term barrier where it is fully encased in cement or formation over the full length of the barrier and isolated from well fluids. Typically, this is the case where casing or tubing are present between a cement (or formation) filled annulus and a verified internal cement plug over the full length of the barrier.

The following should not be considered as WBE materials:

- **Control Lines and Instrument cables** are not considered as an acceptable part of a WBE where they fully penetrate or otherwise compromise the integrity of the WBE. This follows the logic of accepting steel as a barrier only when it is fully encased in an approved material, whereas control lines have a core that is either open or filled with an unapproved material.
- **Mechanical devices** (float shoe / collar, cement retainers, mechanical plugs or packers) present a long-term risk of deterioration of their metallic elements (corrosion) and their sealing elements. As such, they are not acceptable as permanent WBE's on their own. They can however be used as supports to cement WBEs.
- A **cemented shoe track** is not considered as an acceptable permanent WBE unless it can meet the placement and verification requirements for both the internal and external (annulus) isolation as per Section 7 of this document.
- **Fluids** are not considered as an acceptable permanent WBE, regardless of their density and solid content, due to the risk of hydrocarbon percolation and fluid swap out.

6.5. Permanent Well Barriers in wells with completions in place

6.5.1. Leaving some completion elements in hole

Any completion element (tubing section, packer, wireline plug, etc.) can be left in hole, provided this can be achieved without compromising the Well Barrier requirements set out in this document.

The main challenges are centered around the impact of equipment left in hole on the verification of the Well Barriers required to safely abandon the well. This is related to restricted access where completion components left in the well can restrict physical access to tag and verify cement barriers or to the placement of cement barriers in areas with complex geometry (e.g. around tubing left inside casing).

The guiding principles for accepting completion elements left in hole are that the Well Barrier placement and verification can be shown to meet the standards required by this document, with the components left in the wellbore.

6.5.2. Particular issues to be addressed

When completion components are left in the wellbore, annular WBE verification can be restricted due to loss of access. In this case, the emphasis will be on validation of annular barrier competence through existing logs, job placement data analysis and pressure testing.

Verification of newly installed cement plugs can be restricted due to lack of access for logging or other tools. Typically, this would apply where cement barriers are circulated into or around completion tubing strings. Consideration should be given during the planning phase to the effectiveness of subsequent pressure testing and tagging and how the P&A design could be optimized to increase the effectiveness of these verification methods. In these cases, the design and implementation of the barrier placement are even more critical, as job records will likely play a major role in the barrier verification. Rigorous cement placement modelling to be carried out in the 'non-standard' placement situations.

A detailed risk review should support the final P&A design in these cases.

For these situations, the same minimum length requirements apply for individual or combined plugs as per Rule 7. Refer to Figure 6.

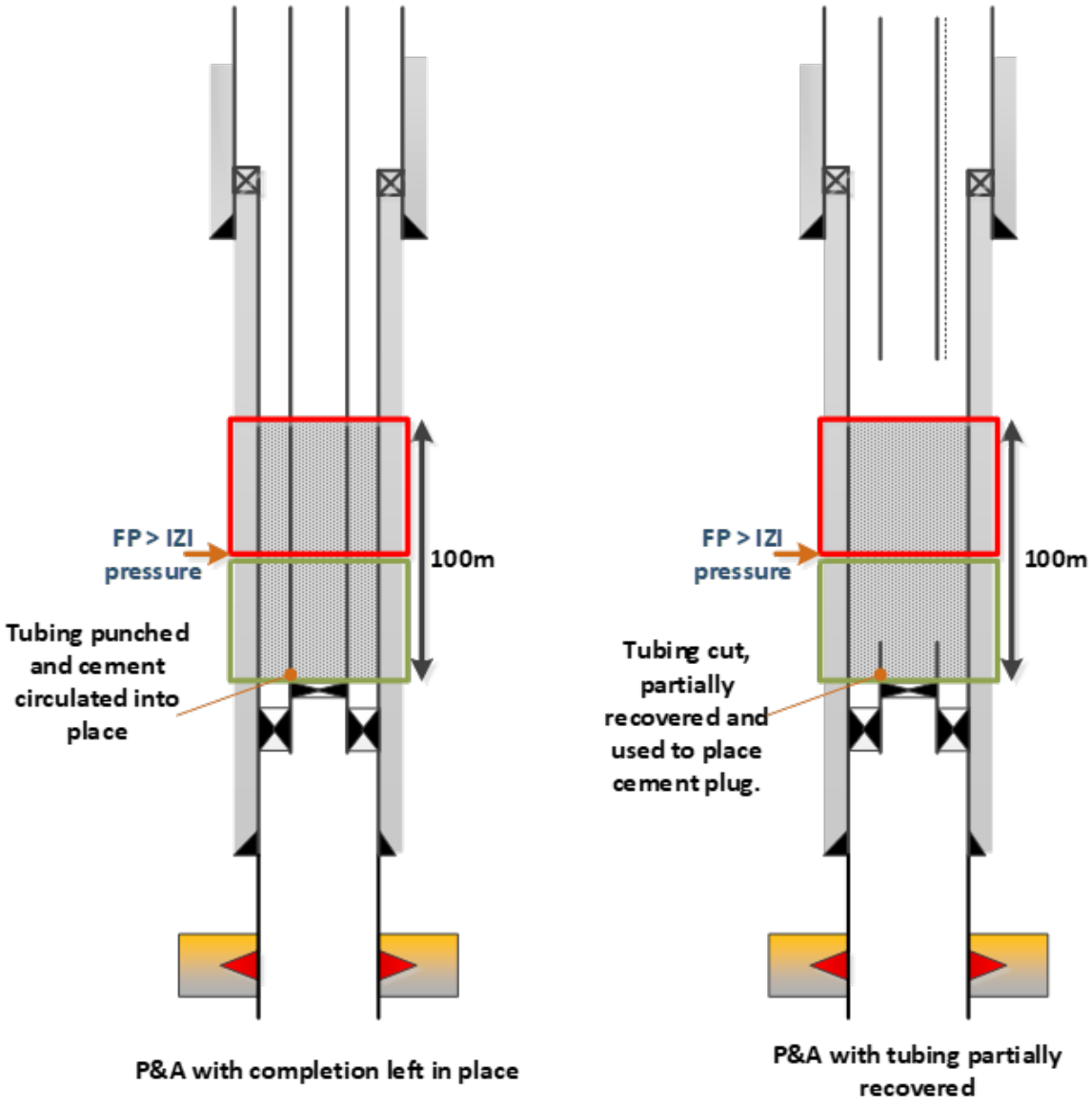


Figure 6 - Typical options for P&A with tubing left in place

7. Validation of Permanent Well Barrier Elements

{Rule 9:
Each WBE making up a Well Barrier shall be considered as validated when it is:

- **Designed and qualified for its working environment.**
- **AND installed as per design.**
- **AND verified with an appropriate method.}**

A basic principle for a Well Barrier is that it can only be considered as validated if all the WBEs that compose it are validated: the non-validation of any single WBE disqualifies the entire Well Barrier.

7.1. Working environment

The first condition to validate a WBE is the use of fit-for-purpose materials and equipment. All materials should be designed and qualified for compatibility with the expected fluids and to withstand the maximum expected temperature and differential pressure as detailed in Section 6.4.

7.2. Installation as per design

The second condition to validate a Well Barrier Element is to install it as per design and as per operational program, which should follow GM EP FP 470 for cement plug operations or CR-OT-DW-472 for annular cementation.

7.3. Verification of Well Barrier Elements

Well Barrier is only validated once all WBEs are verified. Different types of WBEs require different verification methods, as detailed below:

7.3.1. Annular cement verification

{Rule 10:
The annular cement WBE shall be verified either by:

- **Validation of original records including cement placement and / or original logs considering the subsequent production life of the well OR.**
- **A new logging program to assess the cement quality.}**

The verification of annular cement as a WBE is given in CR-OT-DW-472.

However, at the time of abandonment, the original primary cement validation to be re-assessed, due to the potential impact of well life cycle (well production, formation movements, high pressure testing, etc.) on the quality of the isolation since the initial placement of the cement. On older wells, this is often complicated due to lack of detailed records, lack of logs or a cement barrier design and placement that are not compliant with the latest standards. The following methodology should be applied:

- Where detailed records or logs are available, then these can be re-assessed to determine if the original cementation meets the requirements of this Company Rule. This would involve a review of the existing logs and / or an assessment of the cementation against the checklist.
- Consider data on the well integrity since the original cementation. This to include an assessment of the current well integrity and the absence or presence of annulus pressures.
- The presence of annulus pressures, excessive pressure testing or severe production conditions (HT or HP) to normally result in a specific isolation assessment including logging and / or an annular isolation remediation program.

Logging: logging is aimed at assessing the quality of annular isolation and therefore a cement bond log, at minimum, should be run. However, improved confidence can be achieved using additional ultrasonic cement scanner logs. This type of logging also has the advantage of identifying any potential formation creep which could contribute to the annulus isolation. Additionally, the use of leak detection logging can be considered.

7.3.2. Formation as an Annular Barrier Element - Verification

{Rule 11:
An annular formation barrier shall be verified by all of the following:

- **Characterization of the formation as 'creeping' by the Geoscience entity AND**
- **Two independent logging measurements AND**
- **On the first well in a field:**
  - **A pressure test across the formation WBE.}**

The ability of a formation to form a competent annular barrier depends on the characteristics of the formation itself and a number of other factors including the type of fluids left in the annulus, the residual annular fluid pressure, temperature and others. The time required to form a competent barrier can vary greatly, or conditions could preclude the barrier forming at all. It is therefore important to verify that the barrier has formed and not simply assume that this is the case. The following conditions should be satisfied for the verification of a creeping formation as a barrier:

- The target formation to be characterized by the Geoscience entity, in terms of its capability to creep, along with an assessment of its permeability.
- The formation barrier to be logged using two independent measurements. Note that CBL, VDL and scanner measurements are all considered independent. Azimuthal measurements will be required (i.e. 360 degrees coverage).
- For the first well in a field, the creeping formation integrity to be validated by a pressure test applied across the formation Well Barrier Element. Pressure test to be taken to the LOP (planned in the same way as a drilling LOT, to avoid excessive pressure / volume). Refer to Figure 7.

For subsequent wells in the same field and in the same laterally continuous formation interval, a log alone is sufficient to validate the barrier.

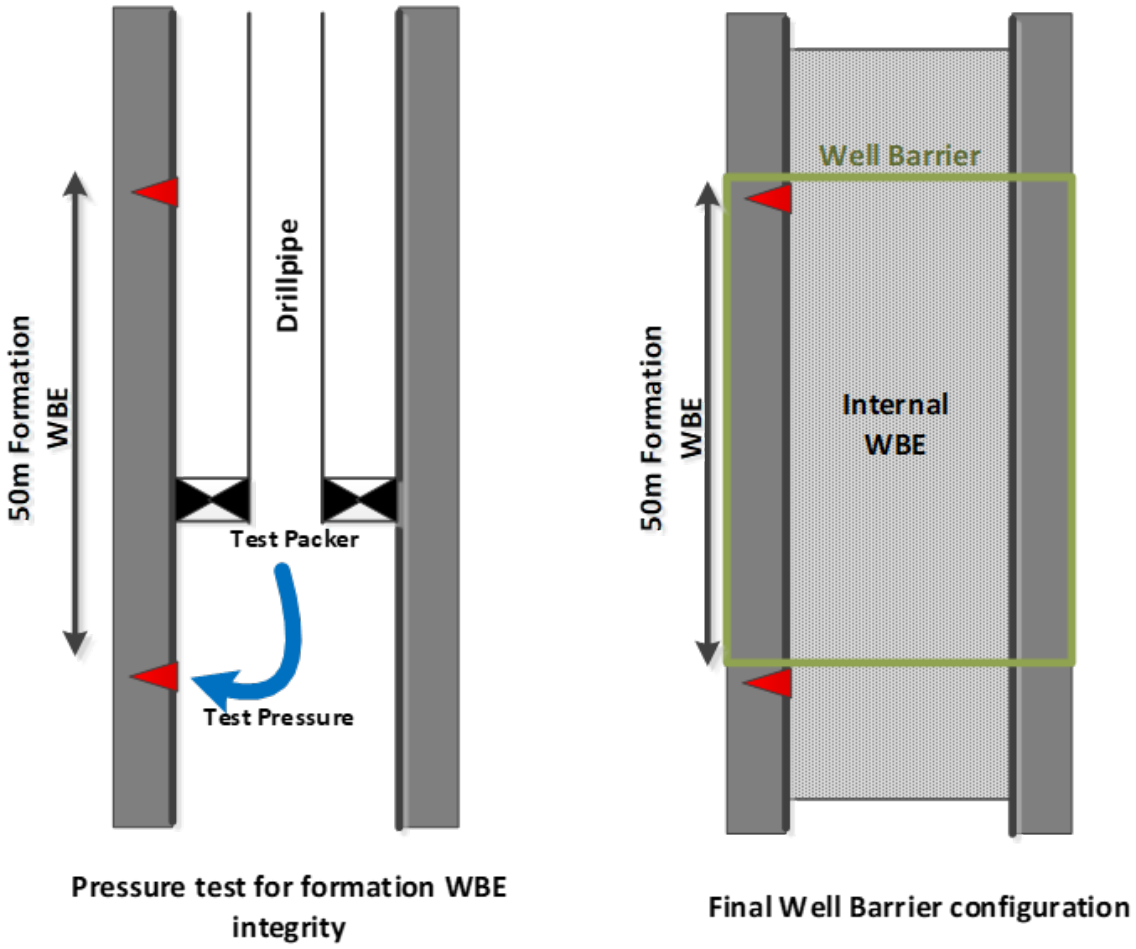


Figure 7 - Example of formation barrier pressure test

7.3.3. Inside-cement-plug verification

{Rule 12:
All inside cement-plugs shall be weight tested.}

{Rule 13:
In addition to weight test, a pressure test shall be performed to validate the deepest cased hole plug where a leak-off is possible below the plug.}

For inside cement plugs, the weight test is the base case validation method (rule of thumb: 1 ton per inch of stinger diameter).

Where inside cement plugs are set as combined barrier elements, then particular attention should be paid to the use of a support to prevent cement slumping and contamination as detailed in GM EP FP 470. The use of non-pressure retaining supports that allow subsequent pressure testing of the plug to be considered (e.g. parabows, ported retainers, etc.).

Additionally, a pressure test of the deepest plug is recommended where a leak-off below the plug is possible (Figure 8). Typically, this would be:

- Well with IZI in open hole: pressure test the deepest plug set in cased hole.
- Well with impermeable open hole and unperforated IZI behind casing: pressure test the deepest plug set in cased hole.
- Well with perforated IZI in cased hole: pressure test the deepest cement plug set above the shallowest perforated IZI.

Where a cement plug is set on a previously pressure tested support, it is not necessary to perform a subsequent pressure test which would be of little use.

Pressure tests should be taken to a value above the estimated leak-off pressure below the barrier but no greater than 60% of casing burst capacity. Recommended values are:

- Surface plugs: 35 bar over leak-off pressure below.
- Other plugs: 70 bar over leak-off pressure below.

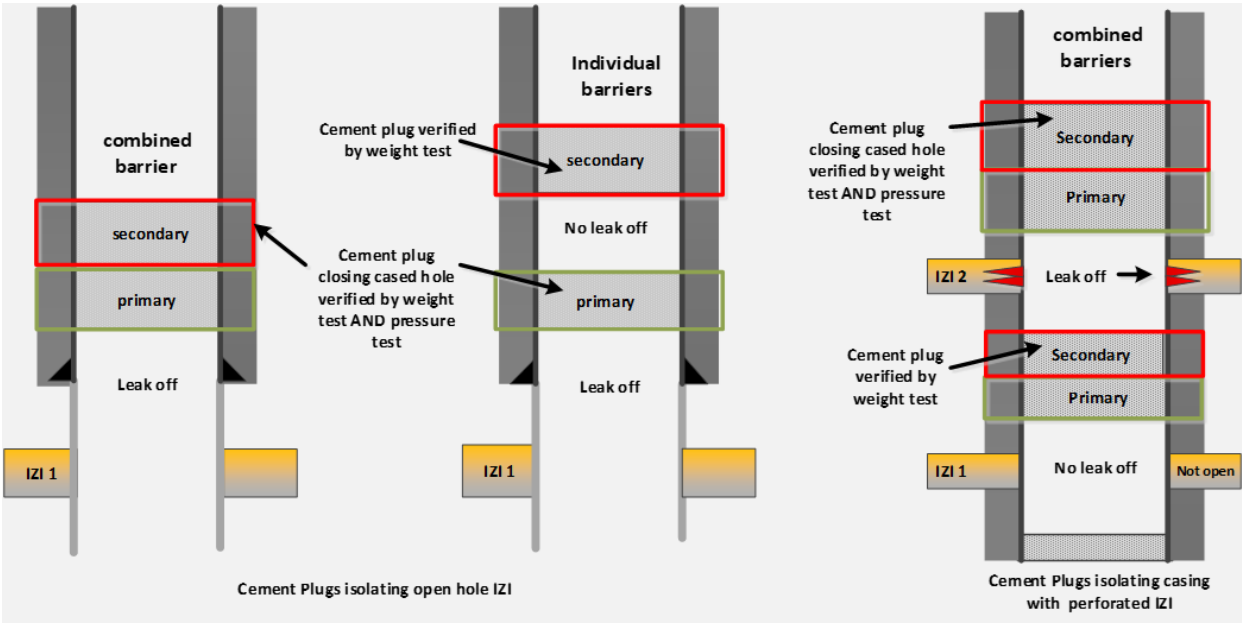


Figure 8 - Situations where pressure testing of the cement plug is required

8. Isolation of the surface ground or seabed

{Rule 14:
For onshore wells, as a standard requirement, the following shall apply:

- **The wellhead and all casings to be cut at 2 m minimum below ground and removed.**
- **An inside surface cement plug (50 m MD minimum length) to be set up to the surface cut.}**

{Rule 15:
For offshore wells, as a standard requirement, the following shall apply:

- **Where fluids other than those approved for disposal at sea are present in well annuli at the surface, measures to be taken to prevent the release of these fluids to the sea after removal of the wellhead.**
- **In water depths less than 500 m:**
  - **The wellhead and all casings to be cut and removed a minimum of 3 m below seabed.**
  - **A cement plug to be set below seabed where isolation of annuli is required for environmental reasons.**
- **In water depths greater than 500 m, a risk assessment to be performed to decide if wellhead and casings removal are required or not.}**

Wellhead and casings removal should be done at a depth where they do not present a hazard at the time of P&A or in the future. The retrieval depth to consider the potential future movement of surface sediments or scour in subsea applications.

The installation of an inside cement plug close to the ground / seabed is intended to cap the wellbore primarily to globally isolate the well from the environment. It is not intended as a pressure barrier. Where a shallow barrier is required to isolate a shallow IZI, then it should conform to the requirements of permanent barriers as detailed in this document.

For onshore wells, the sealing of the wellbore at surface is recommended to restore the ground and prevent pollution or incident with exposed wellbores.

For offshore, the release of any unacceptable fluids (i.e. those for which offshore disposal is not permitted) to the sea should be prevented. Where such fluids (e.g. non-aqueous muds) will be exposed to the sea after wellhead removal, then measures to be taken to prevent the escape of these fluids to sea. Such measures to include displacement of the annuli to clean fluid before wellhead removal, or other solutions.

Where only approved fluids are present in exposed annuli or wellbore, then placing a cement plug to replace the seabed ground is optional as it will occur naturally over time, under the effect of sea currents. However, this should be supported by a documented risk assessment.

9. Temporary Well Abandonment

{Rule 16:
For Temporary Well Abandonment, the following shall apply:

- **All IZIs to be isolated from each other as per Rule 3.**
- **All IZIs except the shallowest to be isolated by two Permanent Well Barriers as per Rule 3. For the shallowest IZI, isolation from ground / seabed to be achieved by a Primary Permanent Well Barrier and at least a Secondary Temporary Well Barrier.}**

9.1. Temporary Well Abandonment

A **Temporary Abandonment** is where a well is abandoned for a temporary period. The well will at some unspecified future time be either permanently abandoned or re-entered for development.

For Temporary Well Abandonment, the “Two Barrier policy” remains applicable.

The Secondary Well Barrier isolating the shallowest IZI from the ground / seabed can be Temporary (containing at least one Temporary Barrier Element), with all the other Well Barriers being Permanent including isolation between IZIs.

The use of non-Permanent Barriers sometimes makes potential future re-entry operations easier. However, it normally entails the use of a rig for re-entry if permanent P&A is required. Strong consideration should be given to the future cost of re-entry where the use of a temporary upper barrier is proposed. Permanent upper barriers (cement plugs) remain removable by drilling if required, but allow future permanent P&A operations to be limited to wellhead recovery only and allow low-cost rigless operations. This is particularly relevant for high-cost subsea or remote areas.

The depth and placement of an upper temporary barrier should take into consideration potential failure of the first (deeper) barrier. Furthermore, consideration to be given to set this barrier sufficiently deep in order to facilitate re-entry of the well.

The type of fluids remaining above the uppermost barrier should be adapted when a well is planned to be Permanently Abandoned later using only rigless techniques.

Criteria, requirements and verification of ‘Temporary Well Barriers’ are different from those of ‘Permanent barriers’ which are detailed in this Company Rule. For the definition of Temporary Barriers refer to CR-OT-DW-422.

Temporary Abandoned Wells have specific monitoring and risk assessment requirements as well as inspection and maintenance requirements associated with wellheads, annuli and surface valving. Refer to CR-OT-DW-425 for details.

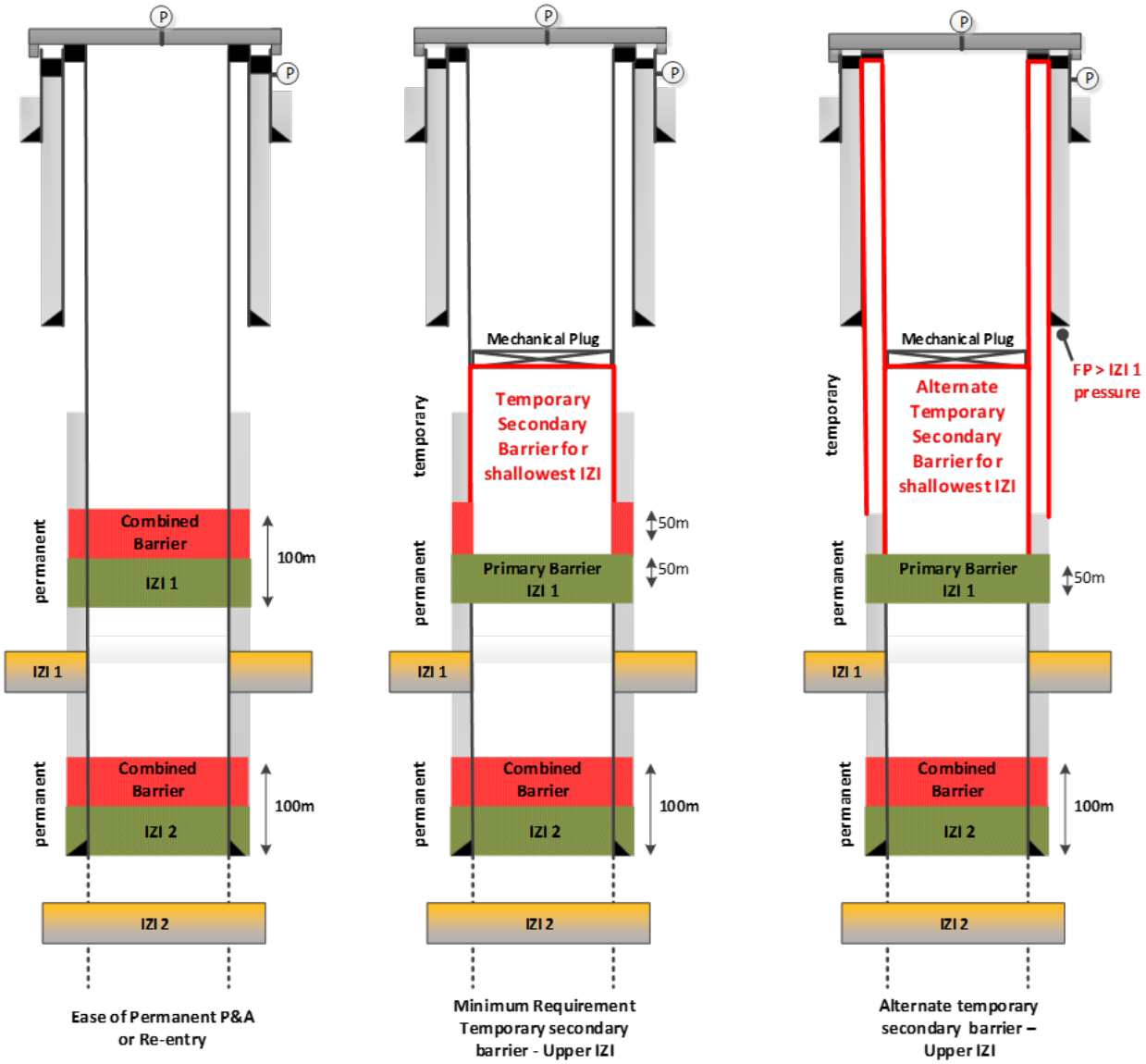


Figure 9 - Examples of Temporary Well Abandonment

9.2. Well Suspension

A **Suspended Well** is a well that is suspended during the construction phase and will be re-entered at a known future date for further operations.

For Well Suspension, any Well Barrier can be Temporary.

It should be noted that the criteria, requirements and verification of 'Temporary Well Barriers' are different from those of 'Permanent barriers' which are detailed in this Company Rule. For the definition of Temporary Barriers refer to CR-OT-DW-422 and for further details on Well Suspension refer to CR-OT-DW-420.

Refer to GM-OT-OPP-232 regarding different well status and definitions.

Bibliography

Reference	Title of the publication
API RP 90	Annular Casing Pressure Management for Offshore Wells
API RP 90-2	Annular Casing Pressure Management for Onshore Wells
GM-OT-DW-203	Drilling & Wells Technological Risk Assessment
ISO 16530-1	Petroleum and natural gas industries - Well integrity - Part 1: Life cycle governance
NOGEPA Industry Standard NO. 45	Well Decommissioning
Norsok Standard D-010	Well Integrity in Drilling and Wells operations
Oil and Gas UK	Guidelines for the Abandonment of Wells
Oil and Gas UK	Guidelines on Qualification of Materials for the Abandonment of Wells.

Appendix 1: Defining the Fracture Pressure at base of the Well Barrier

Fracture Pressure. The 'Cap rock Principle' dictates that the fracture pressure of the formation at the bottom of a Well Barrier should be greater than the pressure from the IZI at that depth. This determines the shallowest setting depth of the Well Barrier.

The fracture pressure of the formation at the base of the well Barrier is critical to its future integrity. If the formation fractures under the effects of the IZI pressure, then this could result in an uncontrolled escape of fluids past the well barriers. The risk of fracture is impacted by many issues including the type of fluid in the IZI and the type of formation where the barrier is set. The condition of the wellbore is also a factor, particularly where reservoir depletion could have impacted the stress regime in the overburden where the barrier is set.

Fracture Closure Pressure (FCP). The most robust figure to use is the FCP. Use of this value will typically ensure against the impact of the issues noted above. However, in some circumstances, this value will be too conservative.

It is recommended that FCP be used as the base case for determining the minimum Well Barrier setting depth, where this can be done without major operational cost or technical risk.

Fracture Propagation Pressure (FPP). The FPP should be used where the deeper setting depth required by the use of FCP will result in significant cost or technical risk. However, this value is not appropriate in some circumstances, particularly in gas reservoirs or reservoirs with significant depletion.

Where the FPP cannot be used, then a geomechanics review should be carried out with FP/TFP/GM/FP to determine the appropriate value to use.

Determining the FCP or the FPP. The values of FCP or FPP are best determined from ELOT data taken in the field. This data should be used where it is available.

Where no ELOT data is available, then the following rules of thumb can be used, based on the LOT data profile* for the field. The Leak Off Pressure (LOP) at the base of the Well Barrier is determined from this profile. The FCP and FPP are determined from the following:

1. **FCP = β (LOP)**
2. **FPP = β (LOP) + 0.03.**

Where:

- The values of FPP and LOP are in SG.
- The values of the parameter β depend on the pore pressure (shale pressure) of the formation in SG. This is given in Table 1.

Ppore in sg	β
1	0.907
1.1	0.913
1.2	0.919
1.3	0.925
1.4	0.931
1.5	0.937
1.6	0.944
1.7	0.95
1.8	0.956
1.9	0.963
2	0.97

Table 1 - Value of parameter β to derive FCP from LOP

Example: Pore (shale) pressure at base Barrier - 1.4 SG

Factor β - 0.931

LOP from field data - 1.7 SG

FCP 1.7 x 0.931 - 1.58 SG

FPP 1.58 + 0.03 - 1.61 SG

Summary of Fracture Pressure application

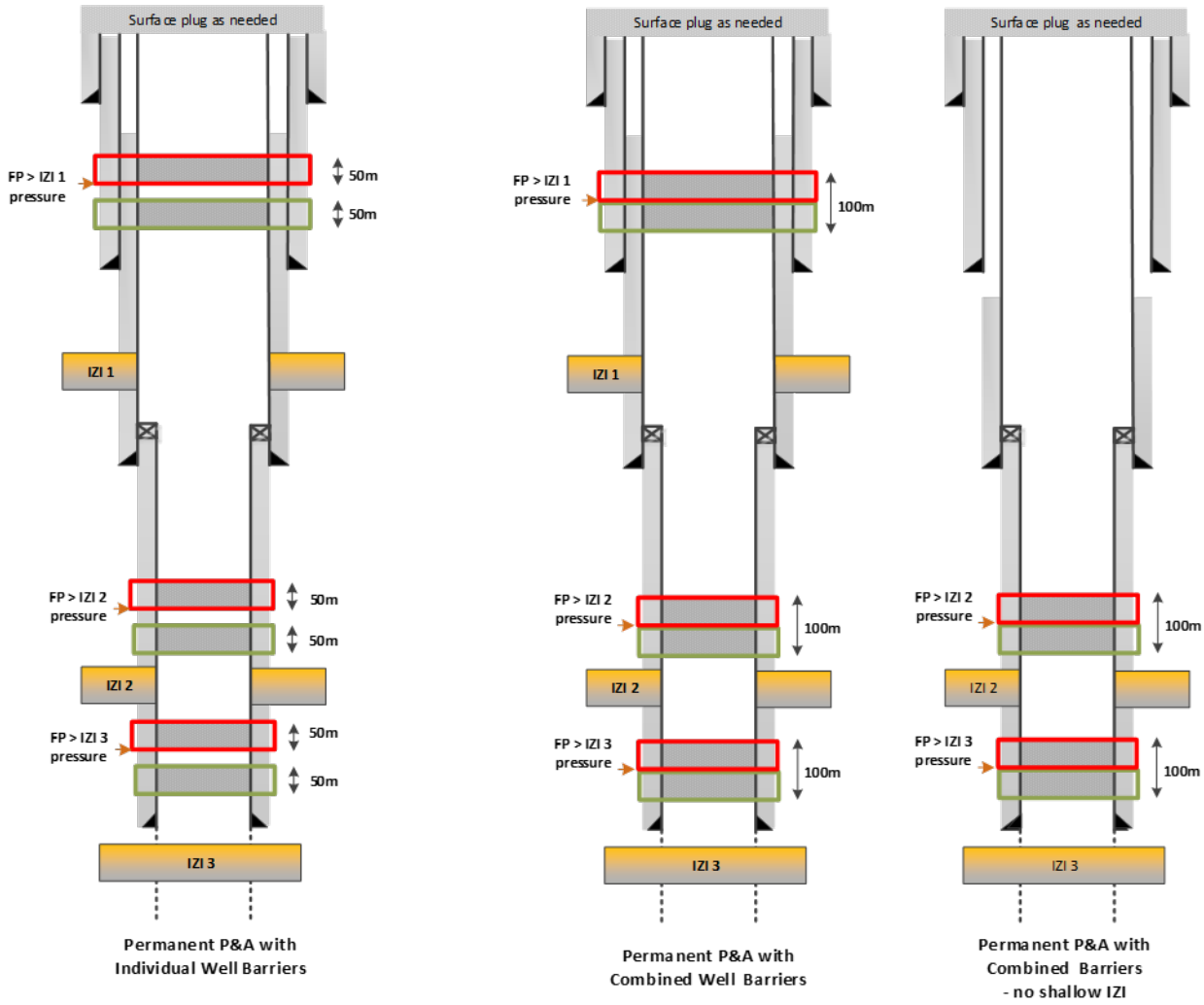
Fracture Pressure	Acceptable Application	Geomecha Review needed
Fracture Closure (FCP)	All wells	n/a
Fracture Propagation (FPP)	Exploration Wells	High cost or risk to achieve
	IZI with oil or water	Depleted reservoirs
		Gas IZI

* LOT data profile:

Where actual LOP data are not available at the barrier depth, they can be derived from:

- The pre-drilling FIP_{min} ML case, to be validated by calibration with LOP data taken during the drilling of the well.
- Where the actual LOP data differs from the FIP_{min} ML case profile, then a post mortem review to be carried out to revise the FIP_{min}.

Appendix 2: Examples of Permanent P&A



Appendix 3: Example Listing of all IZIs in a well

List of identified zones to be individually isolated (IZI) - *EXAMPLE*

Well	XXX-xx			PAP	0				Date	DD/MM/YYYY		
IZI Name	Depth (m MDRT)		Current pore pressure estimate			Ultimate pore pressure estimate			Effluent			Comment
	Top	Base	Bar	@ depth (mTVDRT)	EMW (sg)	Bar	@ depth (mTVDRT)	EMW (sg)	O	G	W	
IZI1	830	870	85	850	**1.02**	85	850	**1.02**			X	**Potential cross-flow zone** - From IZI4 before depletion, - From IZ2 after water injection. **Zone environmentally at risk** - Aquifer used for farming.
IZI2	2000	2030	215	2015	**1.09**	300	2015	**1.52**	X			**Potential flow zone** - Pore pressure > hydrostatic, - Water injection planned. **Potential cross-flow zone** - from IZI4 before depletion.
IZI3	2200	2230	230	2215	**1.06**	230	2215	**1.06**	X			**Potential flow zone** - Pore pressure > hydrostatic. **Potential cross-flow zone** - From IZI4 before depletion, - From IZ2 after water injection.
IZI4	2600	2650	300	2625	**1.17**	150	2625	**0.58**		X		**Potential flow zone** - Pore pressure > hydrostatic. **Potential cross-flow zone** - From IZI2 after IZI4 depletion and water injection in IZ2.

10. Revisions

10.1. Revisions before recodification project

CR EP FP 424

07	04/2022	Document digitalized - new version issued without any modification of the technical content. Rules re-organized in alignment with IOGP requirements
06	07/2019	Global revision of the rule. Covers all topics raised during Maersk Oil Gap Analysis
05	07/2015	Global revision of the rule
04	08/2011	Revision of referential following reorganization
03	01/2007	Change of CR codification (old ref. CR FPA 100)
02	10/2003	Modify rule 18 - Change of Group name and logo
00	06/2001	First Issue
Rev.	**Date**	**Purpose of the revision**

10.2. Revisions after recodification project

Rev.	**Date**	**Purpose of the revision**