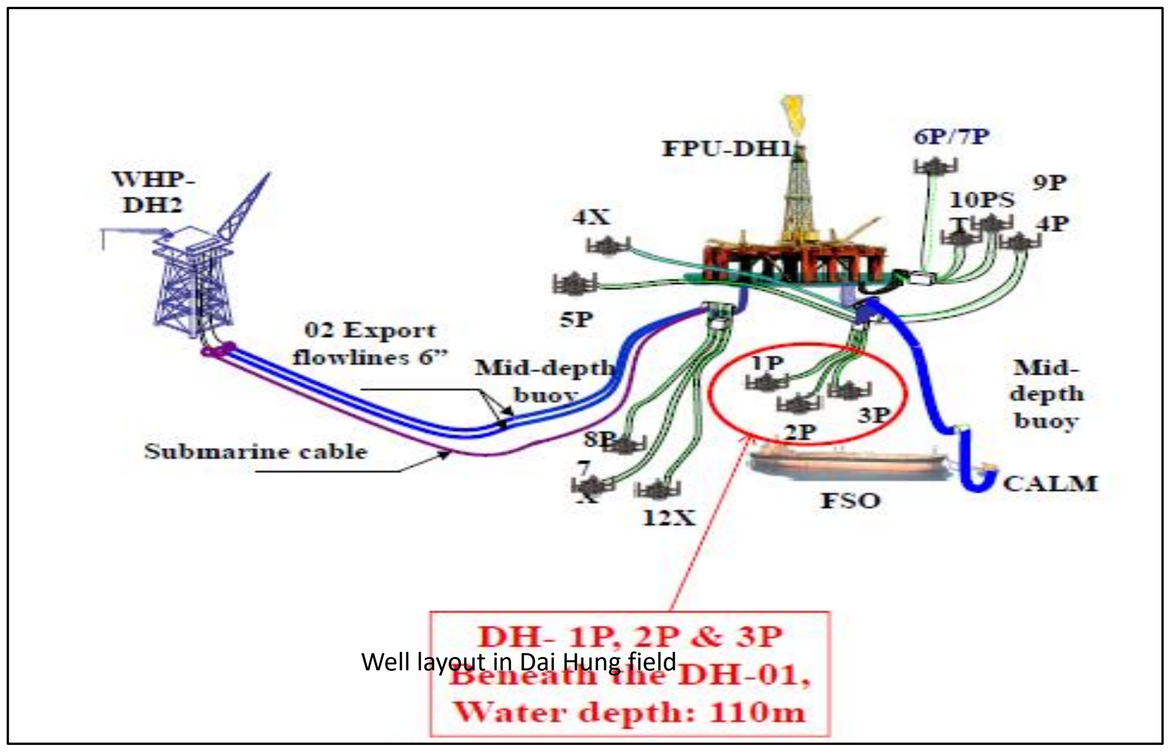
7TH INTERNATIONAL CONFERENCE
Scientific and Research Cooperation between Vietnam and Poland
18 – 20 October 2023, Kraków, Poland

LOCKCEM PUMPING PROGRAM FOR DH-3P WELL DAI HUNG FIELD, VIETNAM

Le QUANG DUYEN, Tran HUU KIEN, NGUYEN The Vinh, Tang, VAN DONG

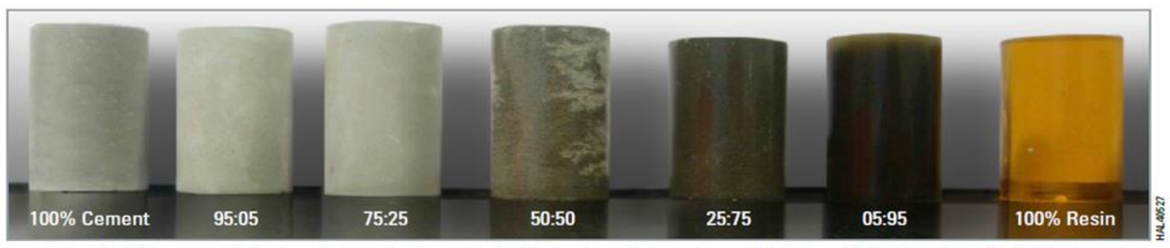
The objective of this study presents a case study of the temporary wellbore security operation performed in Dai Hung field, utilizing LockCem as the solution to prevent gas migration and accumulation through the valve system of DH-3P Subsea Xmas tree.



Well layout in Dai Hung field

Well layout in Dai Hung field

LockCem™ cement is a proprietary blend of a water-tolerant resin, WellLock® resin system*, with any class of Portland cement



A variety of LockCem cement laboratory test samples (percent-mix of resin shown below each sample) shown with the base slurry (far left)and a neat WellLock resin sample (far right).

A variety of LockCem cement laboratory test samples

Welllock and slurry shall be mixed and prepared in two separate tanks as below detail, and then they will be mixed together to become LockCem.

Material requirement is as below for slurry.

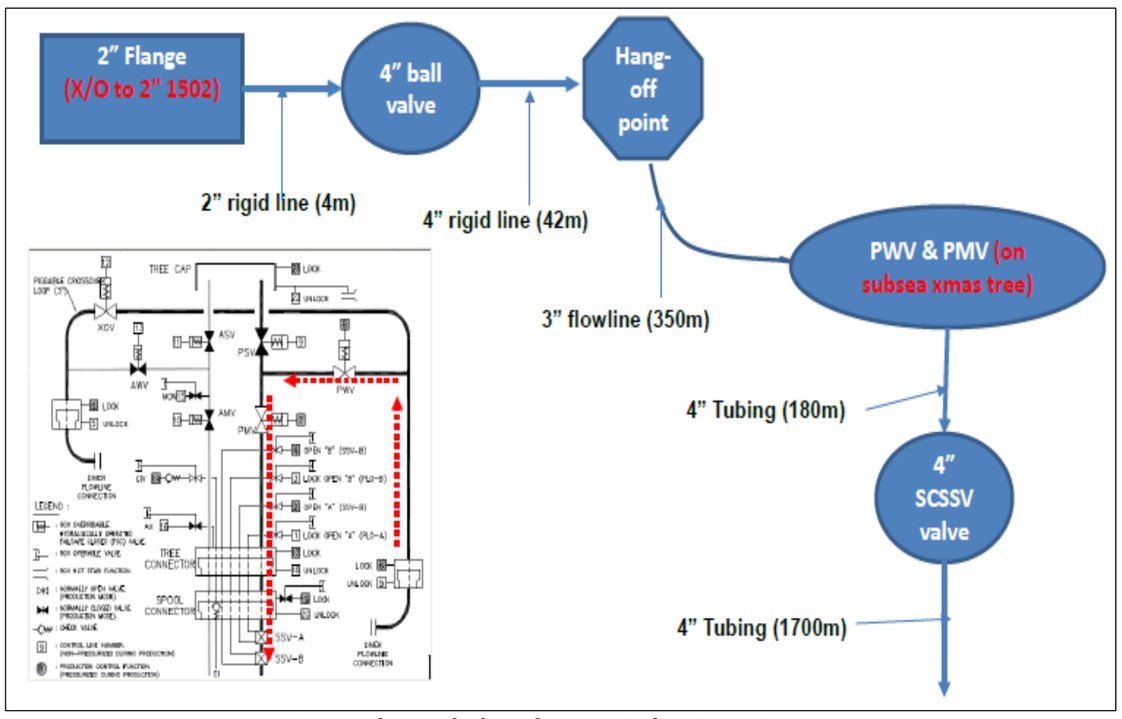
Slurry	UOM	QTY	Accumulative vol – BBL	Packing	Note
Freshwater	BBL	10.0	10.0		
D-AIR 3000L	GAL	2.1	10.1	5gal pail	
HGS 4K28	LB	501.3	15.2	Big bag	Measure 501lb bag at the base
HALAD 413L	GAL	12.3	15.5	55gal drum	Decan to 5gal pail
HALAD 344EXP	GAL	8.2	15.7	265gal tote tank	Decan to 5gal pail
SCR-100L	GAL	1.6	15.7	55gal drum	Decan to 5gal pail and measure 1.6gal at the base
Cement	KG	1749.5	19.2	25kg bag	70.0
Microbond	LB	231.4	19.4	50lb sack	Measure required quantity at the base

Materials for WellLock

WellLock	UOM	QTY	Accumulative vol - BBL	Packing	Note
WELLLOCK R1	GAL	107.9	107.9	53gal drum	Measure required quantity at the base
WELLLOCK R2	GAL	37.7	145.6	55 gal drum	Measure required quantity at the base
WELLLOCK H1	GAL	46.7	192.3	50gal drum	Measure required quantity at the base

Material requirement is as below for slurry

Viscous Pill	UOM	QTY	Accumulative vol - BBL	Packing
Fresh water	BBL	48.11	48.1	
Bentonite	LB	1750.00	50.0	50kg bag



Pumping piping isometric structure

Pumping schedule	Volume bbl	Rate bpm	Time min	Comment
Viscous Pill (drill water + Guam Gum)	40	3	13	To clean any unwanted debris, brine & to prevent Lockcem from losing into formations
Pump LockCem	12	3	4	Batch mix and pump LockCem slurry
Viscous Pill (drill water + Guam Gum)	10	3	3	To isolate Lockcem and Musol A solution
Musol A	20	3	7	To clean residual resin and slurry across valves
Retarded solution (5% SCR-100L of Freshwater)	37.1	3	12	To clean residual resin and slurry across valves

Pumping schedule

LockCem through the Christmas tree and subsea flowlines to stop the gas migration but also to leave no LockCem residue across the SCSSVs and valves in Christmas tree as needed to operate the valves to control the well later on. The feasible option is to use LockCem that is compatible with water and oil based fluids to be pumped through tight clearance. The requirement is also to form a gas-impermeable barrier and drillable with good compressive strength development to temporarily abandon the well.

LockCem provides the best of both the resin and the cement qualities. The resin transmits long-term performance advantages to cement sheath including increased compressive strength, a lower Young's modulus for greater ductility, and an increase in shear bond strength. Permeability of the cement can also be significantly reduced due to the incorporation of resin in the design. The slurry also includes expansion properties to prevent cement sheath gets shrinkage to create micro annulus that gas can migrate.

.