

**OIL INDUSTRY SAFETY DIRECTORATE  
NOIDA**

**SAFETY ALERT**

E&P (Onland)

No. 13/12

Title: **Uncontrolled flow of gas/oil/mud on a drilling rig during hole enlargement**

Location: **Drilling site**

Activity Type  
(Result/outcome): **Blowout**

**What happened:**

The 8 ½” hole was drilled up to surface casing lowering depth of 153 meters with mud of 1.15 gm/cc density. After circulation for hole cleaning, drill string was pulled out. Logging operations were carried out which took six hours. During logging operations, well was in stable condition and no drop in mud level / mud seepage loss / gas migration to surface or any activity was observed which would indicate that the well under balance. After completion of logging operations, hole was enlarged to 17 ½” up to 100 meters depth. Reaming of enlarged portion was carried three times prior to next drill pipe single connection. During hole enlargement, mud weight was increased from 1.15 to 1.17+ gm/cc. Mud pumps were stopped to disconnect Kelly for pipe connection.

When the pumps were stopped, self flow of mud was noticed. Alarm was raised and mud pumps were restarted in an effort to regain control over the well. The flow increased and suddenly converted into an uncontrolled flow of gas/oil/mud and water.

**What caused it:**

Immediate cause of the incident:

Poor information sharing between different departments for well construction design, operational planning, execution, monitoring & review. (Existence of shallow hydrocarbon bearing formation at 125 meters, as per recorded logs, was not informed to drilling section prior to hole enlargement for taking necessary precautions.)

Contributing factors:

1. During drilling of pilot hole, hydrocarbon bearing zone was opened with only one barrier & there was no provision of secondary control.
2. The combined effect of raising mud weight from 1.15 to 1.17+, suspended drilled cuttings in annulus (due to insufficient lifting) and dissolving / sticking characteristics of clay, resulted in increased Effective Mud Weight (EMW) in the annulus.

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It is provided for information purpose. This information should be evaluated to determine if it is applicable in your operations, to avoid reoccurrence of such incidents.

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This led to induced fracture in the upper exposed weak formations. The induced fracture in upper weak formation resulted in drop in mud level when pumps were stopped. Well became under balanced and inflow of formation influx started which turned into uncontrolled flow of gas/oil/mud in the absence of diverter / BOP. (It is also possible that mud loss could have started during raising mud weight but crew could not detect the same due to continued circulation & loading of mud.)

3. Top hole drilling procedures were not being followed.

**Corrective actions:**

1. **There should be documented procedure to ensure coordination / sharing of information (at the right time) between the concerned departments, to minimize possibility of such mishaps.**
2. Shallow Gas bearing pockets should be drilled through with two barriers i.e. mud and diverter for controlled diversion of trapped gas at shallow depth.
3. Shallow hydrocarbon reservoirs should be drilled with two barriers i.e. mud and BOP.
4. Weak formations above the hydrocarbon bearing zone should be cased and cemented up to surface prior to drilling hydrocarbon bearing formations.
5. It is suggested to carry out a review / management of change meeting between concerned departments prior to mud weight increase / decrease.
6. During top hole drilling, cutting lifting capability may be enhanced with controlled R.O.P., frequent pumping sweeps of high viscous pills at regular intervals and optimum discharge.
7. Well design and operation plan should be reviewed frequently based on additional information from recorded logs, other tests and modified accordingly.
8. Hazard identification and risk analysis should be included in well plans.

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