



## CASE STUDY

### INTRODUCTION

Title: Accident at modular rig.  
Location: Offshore.  
Loss/ Outcome: Expelling of tubing hanger along with wireline assembly from Wellhead causing injury to 4 persons.

### BRIEF OF INCIDENT

Well was under workover for servicing and zone transfer. During subduing operations, communication was suspected between A and B sections of wellhead at a shallow depth. It was decided to detect the leakage with the help of ALFA (Acoustic Leak Flow Analyser) tool.

The ALFA tool was made up and lowered inside the slick line lubricator. Gas injection through A-Section was carried out and the B-Section of wellhead was kept open through burner boom. At this stage there was a sudden surge of pressure in the well due to which the landing joint with wire line lubricator, tubing hanger, rotary table and bushing were flung out. The incident caused injuries to four persons who were present on the rig floor.

### OBSERVATIONS/ SHORTCOMINGS

- ❖ Logging with ALFA tool was planned with gas injection in section A and return from section B.
- ❖ Wire line equipment was rigged up in night shift.
- ❖ Landing joint with wire line assembly was rested on tubing hanger flange. There was no tubing below tubing hanger. There was no isolation valve from tubing hanger to wire line assembly.
- ❖ Pipe Ram of BOP was not closed.
- ❖ Two rounds of ALFA tool logging i.e. dummy round and reference log without gas injection were completed.
- ❖ Gas injection was started in pressurized 9 5/8" casing (section A) by well head team with B-Section open to burner boom. Suddenly there was increase in pressure causing huge upward thrust on tubing hanger and lifted it out from the wellhead. This resulted in throwing out of complete wire line assembly along with tubing hanger from the wellhead injuring four persons working on rig floor. Three persons were discharged from the hospital within 2-3 days, however fourth person was discharged after around 1 month of treatment at reputed hospital.

### REASONS OF FAILURE/ ROOT CAUSE

- ❖ Anchor bolts of tubing hanger were probably not fully tightened as evident from marks at only 3 places on periphery of tubing hanger.
- ❖ There was no detailed plan for the job mentioning maximum permissible injection pressure which can be subjected safely.

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- ❖ Job of this nature involving lowering of ALFA tool without tubing was being done for the first time on this rig. No risk assessment or job safety analysis was carried out either in base office or at the rig before executing the job.
- ❖ Pipe ram of BOP was not kept in closed position.
- ❖ Required provision to regulate the gas injection (through adjustable choke) in the annulus was not available /working. Thus at time of starting gas injection in production casing before lowering logging tool there was sudden increase in gas injection pressure
- ❖ The risks involved in carrying out logging job in pressurized 9 5/8" casing (Gas injection in section A) without a defined return passage (Through suspected leakage in section B) was not anticipated by any of the persons involved in the operation. The gas injected at a high pressure caused an upward thrust on the tubing hanger and lifted it out from the well head.
- ❖ Lack of coordination between various agencies involved in the operation viz the operator, drilling contractor, wireline agency and ALFA tool agency.
- ❖ Monitoring of pressure gauge by ALFA tool logging supervisor from rig floor while standing close to pressurized lubricator assembly even though the same could have been monitored through choke manifold gauge at main deck.

### **RECOMMENDATIONS**

- ❖ Detailed plan for workover jobs including mid-course changes should be prepared.
- ❖ Commencement of jobs that are not routine in nature should be preceded by a comprehensive risk assessment / job safety analysis along with appropriate risk mitigation measures.
- ❖ Work permits for such critical jobs should be linked with JSA document
- ❖ Whenever multiple agencies are involved in a job, a document stating the roles and responsibilities of each agency must be prepared prior to commencement of job. Further if such jobs are to be taken in night shift, work permits should be issued only under experienced supervision during execution of job.
- ❖ All wireline jobs should be carried out after adequate tightening of anchor bolts on tubing hanger as per OEM recommendation.
- ❖ X-mas tree should be preferably on the wellhead for execution of such specific jobs. In case X-mas tree is replaced with BOP, pipe ram should be kept in closed position.
- ❖ Persons working on rig floor should be away from pressurized lines or equipment during execution of such jobs.
- ❖ Internal safety audit of the rig should be conducted by Operator.



**Missing bell nipple & rotary table**



**Tubing hanger with abrasion marks**

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