



PETROLEUM SAFETY AUTHORITY
NORWAY

Statoil Petroleum AS

NO-4035 Stavanger

Official in charge
Johnny Gundersen

Your ref.

Our ref. (please quote)

Date

Ptil 2009/1626/JG/GD/VKr/GEF/ESa/HE

Dear Sirs

Comments on the report of Statoil's investigation into the loss of well control on Gullfaks C on 19 May 2010

We refer to the incident of 19 May 2010 on Gullfaks C, to the investigation you have carried out, and to the meeting of 4 November 2010 at our premises where the report of the investigation was submitted to us.

Our general assessment is that the investigation has illuminated many key factors, and that this work has made an important contribution to the basis for your improvement efforts.

We have the following comments on the mandate for the investigation:

- We commented on the mandate, see our e-mail of 14 July 2010. It was confirmed to us that you would also be assessing which barriers functioned and thereby helped to prevent or limit the hazard. We cannot see that this has been assessed by the investigation team, which will mean that important knowledge about what prevented the incident from becoming even more serious will not be obtained.
- We note that the investigation team was asked in the mandate to assess "roles, responsibilities and interfaces from the start of the incident until normalisation". We consider that these considerations were equally relevant in the period before the incident, and that this limitation of the mandate could mean that underlying causes related to *why the incident occurred* will fail to be identified.

We have the following comments on the investigation and its results:

- Underlying causes related to control, management and other organisational factors are not discussed to any great extent. This may mean that factors which could have been relevant, such as lack of resources, pressure of time, changes/reorganisations, major replacements of personnel and inadequate training, are not discussed, and that important improvement measures are not identified. Examples of factors which have not been considered in detail include:
 - why risk assessments were not made in accordance with requirements
 - why no use was made of central specialist expertise supposed to be available (MPD)

- why key work processes were not familiar to personnel responsible for the activity
 - why internal control systems, including responsible management, did not pick up the undesirable conditions.
- The measures recommended reflect the direct and underlying causes identified by the investigation report. With reference to the point above, our assessment is that measures directed at organisational factors which lie further back in the causal chain have not been adequately identified.
- The following are specific examples of why we believe that the underlying causes have not been adequately analysed:
 1. Pressure in annulus C increased several times without this being observed and identified as an indication of problems with the well. We cannot see any discussion of why this was not identified as critical during planning and secured during execution. Ref also learning after the incidents with the cuttings injectors.
 2. The report says something about the uncertainty in pressure forecasts for the area above the reservoir, but does not discuss whether measures were adopted to reduce this uncertainty or why such measures had not been implemented earlier.
 3. The report notes that the incident on 23 December 2009 was red and should have been investigated, but says nothing about why an in-depth study was carried out instead. It also notes that the incident in A-39 should have been investigated, but says nothing about why this did not happen.
 4. The report identifies inadequate experience transfer from well C-01 to C-06A, but contains little discussion on possible reasons why this was so.
 5. Regarding the exemption application in connection with the requirement for two independent barriers, the report notes that casing and cement were not included in the assessment but does not discuss why this was so.
 6. The report notes that several conditions arose during the operation which should have resulted in a halt being called to reassess the job (examples include problems with PCD, ballooning, the well kick on 30 April and pressure changes in the annulus). However, nothing is said about why such a halt did not happen and no measures directed at this issue are recommended.
 7. The report identifies a lack of risk assessment, but does not discuss why this inadequacy arose and what it comprised. It notes, for example, that a more detailed well-specific risk analysis could have prevented the exclusion of casing and cement from the risk assessments. Again, the report does not touch on why more detailed analyses were not conducted.
 8. No peer review was conducted, without any explanation of why this was not done.
- The estimated leak rates are based on important assumptions which have not been verified (uncertainty concerning ventilation conditions, for example), and are very uncertain. Nor is the ignition probability based on actual ignition sources in the relevant areas and the duration of gas exposure. We note that Statoil's referenced supporting memo identifies further work which can be done to reduce this uncertainty and illuminate the hazard potential in the incident, without the company having chosen to continue with this work.

- The consequences of a possible fire/explosion in the well area are not analysed or discussed. That includes an assessment of how an accidental load could have affected the well barriers and their use.
- The investigation team notes that risk assessments were deficient, but does not clarify whether this reflected inadequacies in methods used, content, execution, participation or other conditions. Nor are specific recommendations made for measures related to this.
- The report discusses similar events to assess whether measures adopted in their wake might have prevented the incident. The only example considered here is an incident in well B-30. In our view, a number of other incidents and near misses on Gullfaks A, B and C are relevant in this context. That includes well A-36, which experienced a kick in September 2007. A number of incidents/near misses/experiences during drilling on Gullfaks have shown that pressure is uncertain and should have influenced the planning of the well. In our view, these similarities are independent of whether the wells are drilled conventionally or pressure-balanced. Similarities with the causes of events on other installations, such as the gas blowout on Snorre A, are not discussed.
- The possibility of sub-surface blowouts is identified in the report, which concludes that the likelihood of such an incident was very low. We cannot see this conclusion is adequately supported.
- The report contains only a limited discussion of opportunities to kill a possible blowout. Inadequate plans for a relief well are not discussed to any extent with an eye to causes and consequences. We also note that updating the plan for relief wells on Gullfaks is not recommended with a short deadline – we assume that a clarification of this issue also has a very high priority in the short term.

With reference to your plans for further work, which were presented at the meeting of 4 November 2010, we assume that improvement efforts will be organised and implemented in a way which ensures an adequate degree of independence.

We assume that you will take account of our comments and suggestion in your continued improvement work.

Yours sincerely

Hanne Etterlid (by authority)
Supervision coordinator

Johnny Gundersen
Principal engineer

This letter has been approved electronically in the PSA and accordingly bears no signatures