



KIVI NIRIA

TO WHOM IT MAY CONCERN



RECOMMENDATIONS

How can Dutch Mining & Petroleum Engineers assist in the BP Gulf of Mexico Blow Out Disaster?

Introduction

As a consequence of the ongoing extensive remediation actions regarding the *Mississippi Canyon 252 'Macondo' well blowout / The Deepwater Horizon Spill* in the Gulf of Mexico, the Mining section of The Royal Institute of Engineers in the Netherlands, KIVI NIRIA, in conjunction with the Delft Mining Society/ 'Mijnbouwkundige Vereeniging', has held a brainstorming session last Friday, 2 July 2010, at the Delft University of Technology, faculty of Civil Engineering and Geotechnology.

With a very wide background of international E&P/ Oil and Gas-operating experience within The Netherlands and attended by about 30 mining and petroleum engineers and interested people, during the session a 'zero-emission'-solution was presented and discussed in detail, comprising of a full sealing cap and a pipeline connection to the 'Na Kika'-pipeline, about 6 miles from the 'Macondo'-well. This could all be operational within about 2 months.

Resulting from the Brainstorming session a number of Recommendations are listed in the appendix attached.

Please be notified that neither the Mining section of The Royal Institute of Engineers in the Netherlands, KIVI NIRIA, nor the Delft Mining Society/ 'Mijnbouwkundige Vereeniging', nor any of its members or officers, nor any of the affiliated companies, are in any way responsible, or can in any way be held responsible or held accountable, for the follow-up of any of these recommendations.

These recommendations are only meant to spark and stimulate further discussions on the best way(s) forward to get into any further effective control of the 'Macondo' blow-out within the foreseeable future.

Further information can be obtained at: mijnbouw@kiviniria.nl .

Thank you for your attention.

THE 'MACONDO' RECOMMENDATIONS

- 1) All sub-surface information on the target reservoir (and reservoir seals) and all executed drilling operations inclusive of all data (up to blow-out) is to be put on a public accessible database, so that for sub-surface solutions all relevant information becomes available: data such as all well logs, reservoir models, pressure data, cementing data, flow-rates and (expected) O/G ratio's. Furthermore BP's interpretation of the pipe situation inside the 'Horizon' BOP-stack should be published.

→ Currently lack of information leads possibly to assumptions and mis-interpretation on the actual 'status quo', hampering the judgment of a safe and optimal solution.

- 2) Expert teams are to be mobilised within, amongst, the Society of Petroleum Engineers (SPE) and the International Association of Drilling Contractors (IADC), exploiting the vast experience and knowledge available at these institutes and amongst its members, globally.

→ The 'Macondo' Blow-out is not a local, national or BP-problem, but a global problem, coordinated efforts by the whole oil and gas industry are essential to address this disaster.

- 3) Prior to executing any killing of the well, a 'Killing the Well on Paper'-exercise is to be held in advance, in which all steps leading to such kill are published, and each step is to be risk assessed;

The realistic option exists that due to the prolonged, unrestricted, production of the 'Macondo'-well currently ongoing, a significant subsurface washed out-hole, has been formed, making any relief well killing-exercise extremely challenging, risky or even hazardous. This together with the fact that unexpected pressure surges may crater the well around the casing shoes.

→ In fact, it is questionable that the relief wells are indeed a guarantee for killing the well from *the top* of the reservoir (as currently foreseen). The action of drilling the planned relief wells might cause an irreversible disaster that has no equal. Therefore further drilling the relief wells should be stopped until risks of cratering have been fully assessed, in the mean time the following two recommendations are to be considered seriously, consisting of a 'short term solution' and a 'long term solution'.

- 4) Instead of (only) trying to kill the 'Macondo'-well by one or two relief wells (as currently planned), a 'full connection-solution' to a nearby pipeline ('Na Kika', approx. 6 miles from the Macondo location) should be worked out immediately. This is seen as a **Short Term Solution**, taking a maximum 2 month to engineer, construct, lay and connect. Analyses performed by TNO, Oil and Gas Division, confirmed a minimum of 80,000bbl/day pipeline transport capacity and available flow is realistic. Clearly, from then on, there will be no oil flows into the Gulf of Mexico, this is a '*zero-pollution-solution*'.

→ See further the dedicated recommendation on this pipeline solution below (point 7).

- 5) Simultaneously, reservoir behaviour effects of the drilling of at least 4 additional wells to be positioned within the close area of the 'Macondo' well (within a about half a mile radius), is to be simulated with dedicated 3D/4D reservoir software and if this option seems effective, drilling of these wells is to be initiated soon. This is seen as a '**Long Term Solution**', taking at least 6-12 months to complete. It is expected that by drilling additional wells the reservoir pressure can be better controlled. These 4 producers should produce into new to be installed subsea production infrastructure, also to be connected to subsurface pipelines in the area.

→ These producers should preferably be used to extract oil from *the bottom* of the (producing) reservoir, partly reducing the reservoir pressure and thereby the total flow out of the 'Macondo' well.

- 6) After a certain period of production the 'Macando'-well is to be killed via relief wells entering the reservoir *from the bottom* or use one or two of the (minimal) 4 producers, and after having all data gathered and analysed.

→ This all to have full certainty of avoiding to have - for many years or decennia to come- an uncontrollable, cratered, 'Macando' well in the Gulf of Mexico, if a (too) early kill is performed.

- 7) In fact, a thought-out plan, incl. drawings and technical description, is already available and has been submitted to BP, to the DOE/ Department of Energy and to the US Coast Guard, known as:

'Safety alert: Stop drilling relief wells at next casing point BPCC29893: Full containment of spill', now renamed: *'The Dutch Hurricane Proof Solution'*, a solution presented by a dedicated Dutch Blow-out Team headed by Dick Swart and Professor Ruud van der Hoorn, Willem Heijnen, Wouter Schiferli and Arie Vliegthart. BP-log reference number is 'BPCC-29893', sent in on 15t of June, with modifications issued on 18 June, 21 June, 22 June and 24 June 2010.

For further questions on this ***'The Dutch Hurricane Proof Solution'***, please contact mr. Dick Swart, Team Leader: swart100@tiscali.nl . Telephone: +31-50-5251418 or Mobile: +31-6-51423227.

The presentation by this Team can be viewed in the attachment to these Recommendations.