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July 19, 2010

COPY

Paul F. Zukunft  
Rear Admiral, USCG  
Federal On-Scene Coordinator  
Unified Area Command  
1250 Poydras St.  
New Orleans LA 70113

RE: Proposal for Dissolved Oxygen Technical Calibration

Dear Admiral Zukunft,

This letter addresses a request for discrete oxygen data utilizing the Winkler titration method presented in the "Joint Analysis Group (JAG) Review of Data to Examine Subsurface Oil in the Vicinity of DWH MC-252, May 8-June 19, 2010." The data would be used to better understand the effects of subsurface oil and gas in the subsurface and in particular to calibrate the CDT-O2 sensor and other oxygen probes.

BP proposes to undertake the recommended calibration of CDT-O2 sensors and probes using the Winkler titration method. BP does not think it is wise to tie this science calibration exercise to the ability of the UAC to use Subsea Dispersant Injection to mitigate any future release of hydrocarbons, should that happen, from the currently shut-in MC252 well.

A reduction in Dissolved Oxygen (DO) is an important indicator of active biodegradation, and cases are known where the levels of DO become so low that marine life cannot remain in the area. However, this is not the case in the MC252 oil spill as the JAG reports that "hypoxic conditions were not yet observed in subsurface waters near the well." Separately, the same JAG report demonstrates a significant decline in maximum fluorescence over time since June 1<sup>st</sup> 2010.

On June 2<sup>nd</sup> the Enterprise began capturing 15,000 BOPD and 34 million cubic feet of gas per day at the LMRP cap. Both oil and the associated gases can provide additional carbon into the system, increase biological activity, and decrease oxygen levels. On June 17<sup>th</sup> 2010 the Q4000 increased surface recovery rates to about 24,000 BOPD and 58MMCFGD, further reducing the amount of oil and gas in the water column. Fluorescence anomalies have declined further and DO levels have risen since the Q4000 started flaring.

The technical issues of calibrating the CTD-O<sub>2</sub> sensors using the Winkler titration method have been discussed with both NOAA and the EPA. BP supports this exercise. BP has begun Winkler titration on the M/V Ferrell that we recently equipped with a CDT rosette. We are waiting on the vessel to return to port to upload the reports and digital data to the NOAA FTP site. BP notes that the NOAA vessel M/V Nancy Foster has also recently begun Winkler titration work near the source. NOAA, EPA and BP are also awaiting the results of this test – especially the data that repeated a recent CDT cast of the Ocean Veritas.

BP is currently making plans to acquire the following data on the M/V Ocean Veritas and R/V Brooks McCall as soon as the NOAA planning schedule can make available additional specialized equipment, supplies and qualified technicians.

The agreed protocol will involve:-

1. A robust number of samples must be collected and analyzed for dissolved oxygen using standard Winkler titration methods to provide EPA with a quality assurance (QA) check of the in-situ measurements obtained with the membrane-based dissolved oxygen sensors (i.e., CTD rosette and other probes) that are presently employed for the routine monitoring.
2. The target is at least of 100 water samples taken for analysis using standard Winkler titration methods. Assuming 100 samples, 60 of these samples should be taken at depths of 1000m and below; and 40 samples should be taken between the surface and 1000m depth. If more than 100 samples are taken, this same 60/40 ratio of samples below and above 1000m will be maintained as reasonably as possible.
3. At least ten (10) depths spanning the Gulf surface to approximately 1500m must be included. Particular attention should be paid to the depths below 1000m (as per 2 above) in order to assist in determining the degree of oxygen change that is indicated by the sensors. Winkler titration samples will be collected from locations and depths where there are fluorometric readings that are indicative of the presence of subsurface oil or chemically dispersed oil.
4. The correlation coefficient between the automated Winkler titration method and the CTD-O<sub>2</sub> sensors and probe measurements from paired samples will be calculated. The intention is to provide information to calibrate the degree to which both in-situ sensors and laboratory sensors accurately measure dissolved oxygen levels in the sea water.
5. A skilled technician who is trained to conduct the Winkler titration method should perform these analyses.

Rear Admiral Paul Zukunft  
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6. Following completion of this QA check, EPA, NOAA and BP will determine the need for any further QA or use of the automated Winkler titration method within the routine subsurface monitoring.

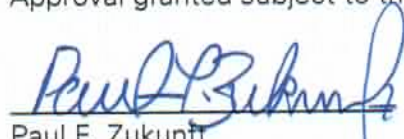
Please let me know if there is any additional information we can provide regarding BP's planned data acquisition.

Sincerely,



Douglas J. Suttles

Approval granted subject to the above: (ADDENDUM 4 ATTACHED)



Paul F. Zukunft  
Rear Admiral, USCG  
Federal On-Scene Coordinator

Date: 7/23/10 0900

## **Dispersant Monitoring and Assessment Directive – Addendum 4**

This is an addendum (Addendum 4) to the Dispersant Monitoring and Assessment Directive issued on May 10, 2010, by the U.S. Coast Guard (USCG) and the Environmental Protection Agency (EPA) to BP. The requirements in this Addendum 4 apply to Part 2 of the May 10, 2010 Directive and are in addition to the requirements of that Directive. BP shall commence Part 2 requirements before subsurface application of dispersant is initiated and continue the Part 2 requirements, Addendum 1, and this Addendum 4 until cancelled or modified by the USCG and EPA.

### **Additional Requirements:**

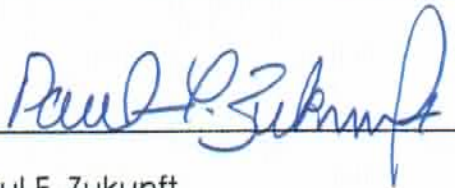
1. BP shall collect and analyze water samples for dissolved oxygen using an automated Winkler titration method to provide EPA with a quality assurance (QA) check of the in-situ measurements obtained with the membrane-based dissolved oxygen sensors (*i.e.*, CTD rosette and other probes) that are presently employed for routine dispersant monitoring.
2. For each cruise, a minimum of 50 water samples must be taken by BP for analysis using the automated Winkler titration. Of the minimum 50 samples, thirty (30) of these samples shall be taken at depths of 1000 meters (m) and greater; and, twenty (20) samples shall be taken between the Gulf surface and a depth of 1000 m. If more than 50 samples are taken, this same ratio of samples of above and below 1000 m shall be maintained as reasonably as possible.
3. Of the minimum 50 samples required by Paragraph 2 of this Addendum, at least ten (10) shall be taken at depths between the Gulf surface to approximately 1500 m. Particular attention should be paid to the depths below 1000 m (as per Paragraph 2 above) to assist in determining the degree of oxygen change that is indicated by the sensors. Additionally, Winkler titration samples shall be collected from locations/depths where there are fluorometric readings that are indicative of the presence of subsurface oil or chemically dispersed oil.
4. A correlation between the automated Winkler titration method and the probe measurements from paired samples shall be demonstrated by BP. The

purpose of this correlation is to provide information to calibrate the degree to which in-situ sensors reflect dissolved oxygen levels in the sea water.

5. BP shall ensure that only a technician who is skilled and properly trained to conduct the Winker titration method performs the analyses required by this Addendum.

6. A minimum of two (2) cruises (*i.e.*, approximately a week's time) shall be undertaken by BP to ensure that a sufficient amount of information is generated to provide an adequate QA check, unless otherwise directed by the USCG and EPA.

7. Following completion of this QA check, EPA will determine the need for any further QA or use of the automated Winkler titration method within the routine subsurface monitoring.



Date: 7/23/10

Paul F. Zukunft  
Rear Admiral, USCG  
Federal On-Scene Coordinator



Date: 7/20/10

Samuel Coleman, P.E.  
Director  
Superfund Division  
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Dallas, TX 75202