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Topic: Outreach and Engagement

Paper Title: *“How does engagement with the academic community benefit spill response science and operational advancements?”*

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Extended Abstract

Technical advances are often made through key industry-academic alliances in a diverse range of engineering, medical and scientific disciplines. Oil spill response studies are no stranger to research programmes and have advanced our knowledge, understanding and capability over the last 50 years.

Typically, oil spill response personnel focus on the overarching operational considerations that maximise effectiveness when selecting techniques which together comprise the response strategy to mitigate any given spill scenario. Research scientists conversely may focus in on a much more detailed aspect of the spill which may have limited immediate operational relevance to the clean-up effort. Bridging this gap between operational relevance and the scientific focus can be enabled by linking response scientists with the academic research programme to inject an element of “operational realism” with the aim of producing outputs of direct relevance and application to push the boundaries of future spill response techniques and capability.

Oil Spill Response, Ltd. (OSRL) and some of its key member companies have been working on a global outreach programme into academia over the last 5-6 years to help explain how the existing response “toolbox,” i.e., mechanical containment and recovery, in situ burn, dispersant use, shoreline clean-up, and monitor and evaluate, feeds into recognized Net Environmental Benefit Analysis (NEBA) justifications and to highlight how lab-based research and experimentation, if done appropriately, can support a response strategy (IPIECA-IOGP, 2015). This is consistent with the concept and intention of *“Bridging Research to Response.”* by focussing on science-based discussions with real world applicability to spill response, post spill monitoring and restoration. Our outreach is also aimed at identifying additional areas with potential to leverage and influence future research programs; OSRL has developed a statement that links its existing Mission and Vision to this research engagement:

“By engaging the scientific community, we can communicate the key TPR & NEBA messages for response strategy development into academic teaching programs, R&D projects and support the development of cutting-edge science-driven solutions, techniques and knowledge through partnerships with leading research institutes. OSRL’s Mission is bolstered by these

relationships in ensuring a key stakeholder community is leveraged to aid us in responding efficiently and effectively to oil spills on a global basis. “

Bridging Research to Response has been primarily carried out by building on existing linkages and developing new relationships with targeted research groups who work in areas of mutual interest. Many oil industry groups have scientifically trained staff (many to PhD level) who are being utilised in this bridging activity to leverage their credibility and existing technical networks to represent the knowledge and needs of the spill response community to academic researchers who are relatively new to the area to outline industry focus points. Technical discussion areas identified were focussed around the following areas:

- Marine Oil Dispersants – action, chemistry, toxicity impacts, and environmentally relevant exposures for lab research
- Environmental impacts / ecotoxicology of oil and oil-dispersant exposure and associated phenomena, e.g., Marine Oil Snow
- Use of autonomous systems & sensor development
- Surveillance, modelling and visualisation including “big data management”

In addition to research discussions several other activities have been undertaken to bolster and engage the academic community including undergraduate, graduate and post-doctoral seminars, workshops, research topic brainstorming and fieldwork. Disseminating the outcomes of these activities and building new associations has been a key focus area and is being undertaken via conference papers / posters, social media channels and websites, and ongoing regular communications.

Industry has always had valued interactions with the academic community and in recent years the directed and purposed engagement with those stakeholders has proved time and time again that it should be maintained and pursued. Through this effort the preconceived ideas of many students and researchers over many response techniques / impacts have been worked through and assumptions recalculated through a NEBA-based decision framework. In addition, many potential joint research proposals have been formulated and moved to solid proposal stage attracting funding from established research bodies (e.g., NERC, CONCAWE) thus solidifying strong collaborative links between the two communities.

Ecotoxicology as a science has increased significantly over the last 50 years and has direct application to oil spill impact assessment and post-spill monitoring. The University of Exeter is no exception, and its marine ecotoxicology group was identified as a potential collaborative partner for spill response in 2018. A consortium was put together of oil industry researchers at Shell, BP, ExxonMobil & Chevron alongside CONCAWE (www.concawe.eu), CEFAS (www.cefas.co.uk) and Exeter University and a robust PhD proposal put together and awarded funding. The research aimed to explore how the toxicity of oil to marine organisms could potentially be predicted from laboratory-based toxicity tests (using commercial test kits) against the measured concentration of dissolved oil hydrocarbons in the water column.

This PhD program bridged a gap between industry, government and academia and is a textbook example of how combining expertise can strengthen a research project's aim and objectives. Over the four-year period (2017-2021), the results have been disseminated in scientific publications (Colvin *et al.*, 2020; Colvin *et al.*, 2021) and conferences. Dr Kat Colvin is now a Senior Environmental Toxicologist at BP, proving the value of such collaboration.

Another example of direct engagement is that teaming up of OSRL with the University of Essex's marine microbiological research group on a PhD research studentship project to further investigate the Marine Oil Snow topic. Much discussion has taken place in both the academic and response communities on this topic (reviewed by Brakstad *et al.*, 2019) such that it warrants further investigation. A review paper was also published in 2021 by Essex researchers with OSRL and ExxonMobil as co-authors (Gregson *et al.*, 2021); a good example of working together and leveraging internal University funding to enable the review to be carried out.

OSRL and its Members continue to extend their outreach to the academic community and are seeing the value of the engagement in tangible outputs and relationship building.

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