OIL SPILL MODELLING RESULTS

INTRODUCTION

Purpose of the Study: the oil spill modelling is to identify the consequences of different unwanted spill scenarios in case of **VERY UNLIKELY** accident, during drilling an exploration well.

The model identified the probability of oil impacting the surface water, the coastline or nearshore receptors and will **support the planning of avoidance, reduction and mitigation actions**.

Study completed by:
Michael Fichera, William Schew and Shwet Prakash, Environmental Resources Management

THRESHOLDS APPLIED TO MODELLING

- **Significant slick thickness:** 1 µm minimum thickness threshold for smothering of aquatic organisms and wildlife
- **Significant shoreline mass flux:** 100 g oil/m² threshold for shoreline oiling, provides a lower-limit to delineate significance for injuring wildlife making contact with shoreline deposits
- **Dissolved Aromatic Hydrocarbon (DAH):** highly conservative 5 parts per billion (ppb) threshold, indicates that there is no observable effects on organisms in terms of narcosis from aromatic hydrocarbons content within an oil spill.
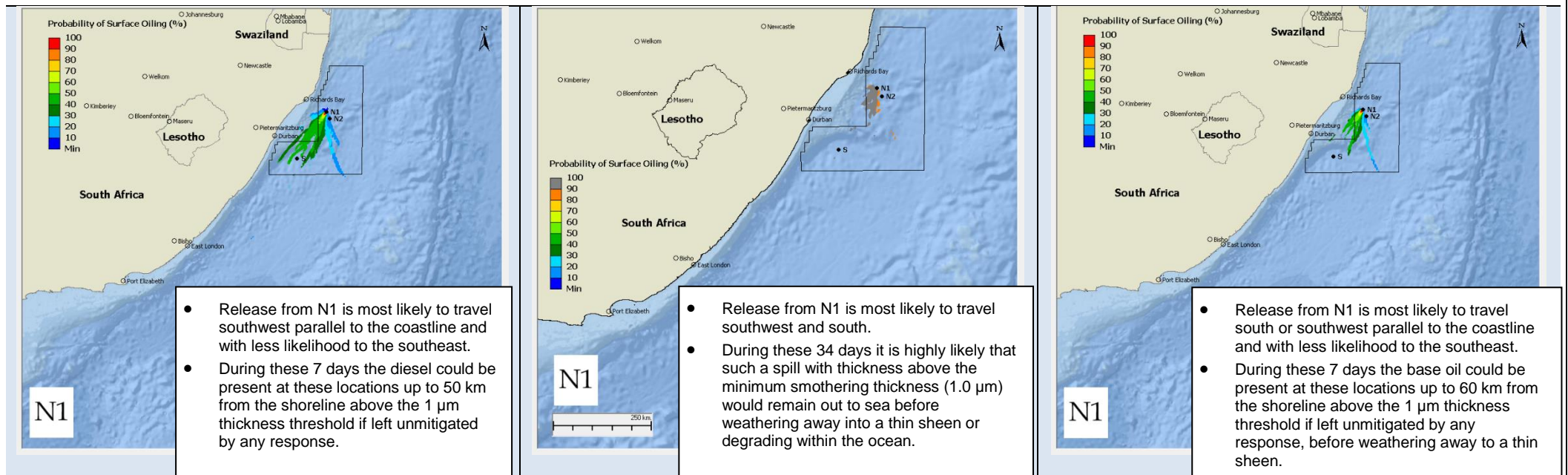
RISK OF A SPILL

The probability of a blowout is **very low** where the frequency of occurrence is 2.5×10^{-4}, **1 case in 4,000 drilled wells** (OGP Report, 2010).

Eni has implemented the following measures to reduce the risk associated with geological factors, tools reliability and human errors

- Well design
- Adopting mitigation and preventing actions and procedures.
- Advanced planning and development of contingency plan
- Use of performance tools, real time monitoring technologies. This is necessary to significantly reduce the risk associated with geological factors, tools reliability and human errors.

Eni's adoption of top industry and development of new technologies, the adherence and respect of international best practice, standard and procedures, **reduces the risk of the blowout frequency** from 10^{-4} down to 10^{-6}, risk associated with geological factors, tools reliability and human errors.

OIL SPILL MODELLING SCENARIOS AND RESULTS OF THE NORTHERN WELL

- Release from N1 is most likely to travel southwest parallel to the coastline and with less likelihood to the southeast.
- During these 7 days the diesel could be present at these locations up to 50 km from the shoreline above the 1 µm thickness threshold if left unmitigated by any response.

- Release from N1 is most likely to travel southwest and south.
- During these 34 days it is highly likely that such a spill with thickness above the minimum smothering thickness (1.0 µm) would remain out to sea before weathering away into a thin sheen or degrading within the ocean.

- Release from N1 is most likely to travel south or southwest parallel to the coastline and with less likelihood to the southeast.
- During these 7 days the base oil could be present at these locations up to 60 km from the shoreline above the 1 µm thickness threshold if left unmitigated by any response, before weathering away to a thin sheen.

Scenario 1: Vessel Collision Diesel Spill

The figure shows the probability of oil being present at a location on the water surface from a very unlikely diesel oil spill due to a vessel collision.

Scenario 2b: 20-Day Crude Oil Blowout

The figure shows the probability of oil being present at a location on the water surface from a very unlikely crude oil spill due to a blowout being stopped by the installation of a capping system after 20 days of release.

Scenario 3: NADF Mud Release

The figure shows the probability of oil being present at a location on the water surface a very unlikely oil spill due to a riser disconnect and No Aqueous Drilling Fluid (NADF) dispersion.

The colored contours depict the probability of oil's presence at a location at least once out of 120 spill simulations with spill release dates starting twice monthly over a five years period.

This is an **unrealistic condition based on no intervention measures being undertaken**.
By adopting standard intervention measures after the spill event, the probability is expected to be significantly reduced.