

# FSO SAFER: RISK AND IMPACT ASSESSMENT

The coastline of Yemen's Red Sea and of its neighbouring countries is at risk of an environmental disaster that could happen any day – with substantial humanitarian and economic impacts. It is increasingly likely that there could be an immense oil leakage from and/or an explosion of the FSO Safer, a floating storage and offloading unit anchored in the Red Sea, 60km north of the port of Hodeidah. If disaster strikes, the Safer could release four times the amount of crude oil that was spilled in the Exxon Valdez catastrophe of 1989 (UNEP 16/07/2020), which had major impacts on the environment and on people and their livelihoods in affected areas.

## The risk from FSO Safer

The FSO SAFER is a vessel, which was used to store and export oil from Yemen's inland oil fields around Marib. In 2015 the vessel fell under Houthi control and has since been neglected. Requests by the UN for inspection of the vessel been rejected by the Houthis. The lack of maintenance of the SAFER with its estimated cargo of 1.148 million barrels of Marib light crude oil makes two scenarios increasingly likely:

- 1 Oil spill:** corrosion and lack of maintenance of the FSO unit for an extended period of time could lead to some of the oil leaking into the sea. In May 2020, an engine-room leak was discovered and temporarily fixed. A reoccurrence of this leak and water flowing uncontrollably into the engine room could destabilise and potentially sink the entire structure, likely causing a severe oil spill (Mashora Group 08/2020). Satellite images show that the FSO Safer has started moving clockwise since the beginning of October. Small oils spills have been detected around the unit and will be monitored. It is also likely that there are sea mines in the area where the Safer is located, which could hit the moving vessel (ACAPS internal analysis).
- 2 Explosion and a fire on board the FSO unit:** this event could be caused by accidental ignition of gas accumulated in the cargo tanks, and consecutive leakage of most or all of the oil into the sea (UNEP 16/07/2020).

## Development of ACAPS' impact assessment

An impact assessment based on oil spill and atmospheric dispersion modelling was conducted as part of a partnership project between ACAPS and the companies Catapult and Riskaware. In early 2020, Catapult and Riskaware carried out modelling of the geographic coverage, direction, and travel time of a worst-case scenario for an oil spill and atmospheric dispersion of pollutants from a fire on the Safer (Risk Aware forthcoming 01/12/2020). The models used publicly available global datasets of current and historical meteorological data to obtain prevailing weather and current conditions for the four quarters of the year. Worst-case scenarios for the spill or smoke plume (deposition of particulate matter on the ground and near-surface (0-100 meters) particle matter air concentration) for each of these time periods were generated by the model, in which the oil spill and atmospheric dispersion incidents were considered to be independent. The impact assessment presented here is for the scenario in the last quarter of the year, October to December.

To estimate the economic and humanitarian impacts, ACAPS applied indicators that were specifically developed for the task to each of the four scenarios obtained from the modelling. These indicators are based on:

- humanitarian data available from ACAPS' core data set;
- information and analysis of past ecological disasters and conflict events in Yemen;
- consultation with humanitarian experts (health, agriculture, water, and economy experts) in Yemen to test and refine assumptions.

<sup>1</sup> The work was funded by FCDO/UK Government.

## An explosion on the Safer between October to December could lead to...



### Population affected

- Up to 670,000 people's livelihoods could be impacted by the spill and subsequent cleanup operations, through damage to fisheries, marine resources, and coastal industries, and factory and port closures.

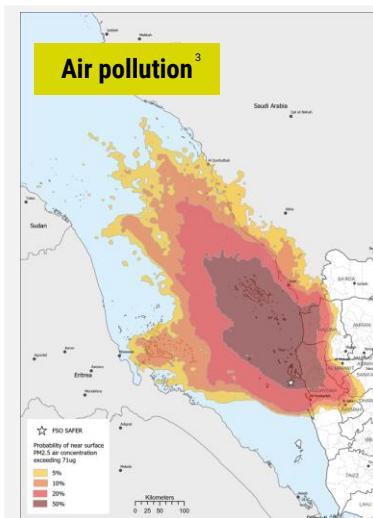
### Economic impact

- Operations of Hodeidah and Saleef ports would be affected. The ports would likely have to close for two to three weeks, limiting fuel and food imports. Shortages in the availability of fuel could occur, impacting electricity production, health services, and transportation provisions across the country. More fuel might be brought in through Aden and Mukalla to offset the shortfall. Food and fuel prices might rise.

<sup>2</sup> This is the modelled probability of worst-case impact of a spill during this period, using three years of historic meteorological and current data. Actual events could unfold very differently depending on actual conditions.

- 50% of fisheries would likely be blocked from fishing by the oil spill.
- Cost to fishing industry: USD150 million – USD300 million per year for five years.
- The livelihoods of 31,500 fishermen would be at risk, and 235,000 workers in the fishing industry could lose their jobs.
- Estimated cost of cleanup: USD20 billion.
- A release of oil into the water would have far greater and longer-lasting impacts than the release of particulates through fire.

## A fire on the Safer between October to December could lead to...



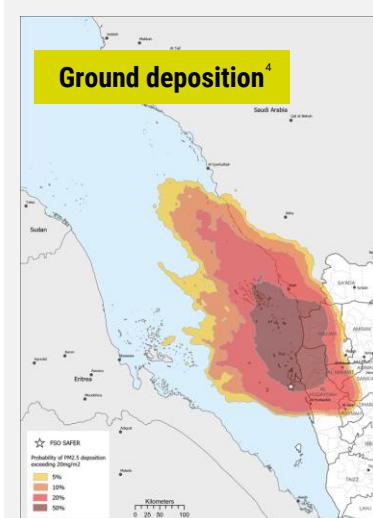
### Population affected

- 6.2 million people in Yemen and 350,000 in the Kingdom of Saudi Arabia could be exposed to very high pollution levels, with harmful effects seen 24–48 hours after a fire starting on the Safer.
- Governorates affected in Yemen are likely to be Hajjah, Al Hodeidah, Dhamar, Sa'dah, Sana'a, Mahwit, and Raymah, as well as Jizan city and Abu Arish in the Kingdom of Saudi Arabia.
- 1 million IDPs are living in areas in Yemen that could be covered by the smoke plume.

### Health impact

- There would be a significant health risk to vulnerable populations (such as adults and children with lung problems and adults with heart problems) and the elderly, with aggravation of pre-existing heart and lung problems likely.

<sup>3</sup> This is the modelled probability of worst-case impact of air pollution during this period, using three years of historic meteorological and current data. Actual events could unfold very differently depending on actual conditions.



### Economic impacts

- An estimated 6.7 million people in Yemen and 350,000 in the Kingdom of Saudi Arabia could face the risk of crop losses as a result of soot deposition.
- Governorates affected in Yemen are likely to be Hajjah, Al Hodeidah, Dhamar, Sa'dah, Sana'a, Mahwit, Amran, and Raymah, as well as Jizan city and Abu Arish in the Kingdom of Saudi Arabia.
- Around 200km<sup>2</sup> of agricultural land in Yemen and 200km<sup>2</sup> in the Kingdom of Saudi Arabia could receive deposition of pollutants that would impair plant growth.

- Around 185,000 farmers might experience crop losses.
- The estimated loss in agricultural production could be USD4 million

### Environmental impacts

- 5,094 water well points could potentially be contaminated.

### Humanitarian impacts

- Up to 60 humanitarian organisations might cut services.

<sup>4</sup> This is the modelled probability of worst-case impact of air pollution during this period, using three years of historic meteorological and current data. Actual events could unfold very differently depending on actual conditions.