



Environmental Impact Assessment of Sulphur Recovery Unit, Ruwais Refinery, Ruwais, UAE

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Abu Dhabi Oil Refining Company Ltd. (TAKREER) has initiated “Environmental Impact Assessment of Sulphur Recovery Unit at the Ruwais Refinery in Ruwais” for the Engineering, Procurement and Construction phases. TAKREER commissioned Dome Oilfield Equipment and Services (Dome), to prepare the report and Dome in turn outsourced the work to Kadam Environmental Consultants (KEC) and report was submitted in January 2005.

The main objectives of this EIA was to identify significant environmental risks/impacts associated with the proposed project, evaluate the proposed FEED engineering design and construction phases in view of any significant environmental impacts, identify/recommend mitigation design measures, for the identified impact/risks and develop EIA report in accordance with ADNOC HSEIA Guidelines.

The basic approach to the EIA comprised the following key elements/tasks:

- Establishment of environmental current baseline conditions; A study area was considered for establishing the baseline status of environmental parameters. This was done as per the ADNOC guidelines.
- Review of project engineering details;
- Carry out scoping study to identify the key environmental issues/aspects;
- Assessment of the significance of the identified impacts in relation to established criteria;
- Assess the need for mitigation/monitoring measures in order to control/minimize impacts/risks.

The proposed SRU project is subject to the laws of the State of the United Arab Emirates (UAE) and various International/Regional protocols and arrangements to which the State is a party.

The impacts were evaluated for the following phases of the proposed project:

- Design/FEED phase (i.e. Phase I)
 - Process design
 - Design of piping and major equipment with associated maintenance problem.
- Construction phase (i.e. Phase II)
 - Preconstruction phase

PROJECT BACKGROUND:

The Ruwais Industrial Complex is located approximately 200 km from Abu Dhabi. The industrial complex contains many units such as Ruwais TAKREER refinery, GASCO Natural Gas Liquefaction plant, FERTIL fertiliser plant, Ruwais Sulphur Handling Terminal, petrochemicals plant and the general utilities plant.

Abu Dhabi Oil refining Company Ltd. (TAKREER) is implementing the replacement of the existing Sulphur Recovery Unit (SRU) with improved air quality having recovery factor of 99% rated at 50-tonne/day liquid sulphur production capacity. This recovery will be achieved by utilizing a combination of Claus Process and Cold Bed Adsorption (CBA) Technology, licensed from BP Amoco Corporation. The processing scheme has been developed by Ortloff Engineers Ltd., USA, for this facility.

The existing unit is having only 95% recovery with high maintenance and operation costs. TAKREER is planning to install a new SRU at the Ruwais Refinery in Ruwais to replace the existing SRU. It is envisaged that the commissioning of this new SRU will convert and recover at least 99.0% of the sulphur contained in the feed streams as elemental sulphur.

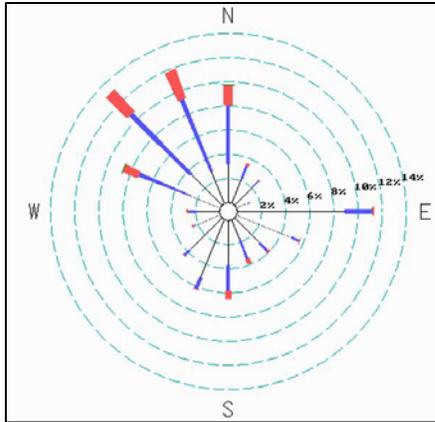


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- Construction of SRU
- Start-up testing and commissioning phase

A comprehensive list of recommendations (i.e. mitigation/control measures and further investigations/studies) has been provided during the subsequent phases of the project in order to control/minimize any residual environmental impacts/risks. For easy implementation and tracking, these recommendations are also included in the form of an Environmental Management Plan.



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The impact assessment covers the following:

- Impacts on the air quality
- Environmental noise impacts
- Impacts on soil, geology and groundwater
- Impacts on seawater and marine ecology
- Impacts on terrestrial ecology
- Impacts from waste management
- Socio-economic impacts

RESULTS OF DISPERSION MODELING:

The only source of emission is stack attached to the Thermal Oxidizer. Tail gas from the sulfur recovery unit containing H_2S , SO_2 , CO , CS_2 , and Elemental sulfur flows to the thermal oxidizer at around $150^{\circ}C$. The sweep air from the sulfur tank and the spent degassing air from the sulfur-degassing reactor (which both contain traces of H_2S and sulfur vapor) are also routed to the thermal oxidizer. In the Thermal Oxidizer, essentially all of the sulfur compounds are incinerated to SO_2 by the high temperature-oxidizing atmosphere created inside the Thermal Oxidizer. Most of the CO in the feed stream is oxidized to CO_2 resulting in very low CO emissions from the Tail gas Thermal Oxidation Unit.

Ambient air quality predictions to assess the impact of stack emissions on the air environment was done through the application of Gaussian Plume Model. Dispersion modelling for the pollutants was carried out using Industrial Source Complex Short Term Model (ISCST3) of USEPA.

Hourly average concentration of pollutants at various distances was computed using dispersion modelling.

Conclusion:

- The maximum 24 hours average Ground Level Concentration observed for pollutants coming out from the Thermal Oxidizer Stack are well within the ADNOC Permissible Limits given to M/s. Abu Dhabi Oil Refinery Company.
- Predicted values, based on above air quality model, are not likely to cause any adverse impact on the environment.

A holistic programme for managing environment covering all the activities are mentioned in the Environment Management Plan incorporating list of potential impacts, actions to be taken, monitoring of actions and timeframe of the actions.