



**UNIVERSITI PUTRA MALAYSIA**

**MODELING OF OIL SPILL DISPERSION TO IMPROVE MANAGEMENT  
SYSTEM FOR ENVIRONMENTAL PROTECTION OF  
PORT RAJEE, IRAN**

**MEHRNAZ FARZINGOHAR**

**FPAS 2014 5**



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SYSTEM FOR ENVIRONMENTAL PROTECTION OF  
PORT RAJEE, IRAN**

**By**

**MEHRNAZ FARZINGOHAR**

**Thesis submitted to the School of Graduate Studies, University Putra Malaysia,  
in Fulfillment of the Requirements for the Degree of Doctor of Philosophy**

**May 2014**

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**This Thesis is dedicated to**

**My Daughter, Melissa**

**The Most Efficient Person  
for My PhD**



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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

**MODELING OF OIL SPILL DISPERSION TO IMPROVE MANAGEMENT SYSTEM FOR ENVIRONMENTAL PROTECTION OF PORT RAJEE, IRAN**

By

**Mehrnaz Farzingohar**

**May 2014**

**Chair: Associate Professor. Zelina Zaiton Ibrahim, PhD**

**Faculty: Environmental Studies**

In the transfer of oil products from tanker to terminal the oil may spill from ruptured pipes, corroded valves and connectors and old equipment which may pollute water and air. Rajae Port in the Persian Gulf is an important terminal for the Bandar Abbas Oil Refining Company (BAORCO). The major goals of this study are the identification of risk areas from trajectory and fate of the oil spills to the management system for contingency plans to protect the local environment. Two models are used. The General NOAA Oil Modeling Environment (GNOME) model is used for oil spill pollution in the sea and the Areal Location Of Hazardous Atmosphere (ALOHA) is applied to identify the trajectory of the evaporated oil spill through the air. The results from both models were analysed to determine the location of risk areas through the water and air around the spill. Previous studies of water and sediment samples analysis were compared and used to verify and validate the model results. The North east of Qeshm Island and the east of Rajae Port were identified as the high risk areas. The results are used to improve plans which are implemented by BAORCO in order to reduce the negative environmental impacts.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PEMODELAN TUMPAHAN MINYAK SERAKAN MENCARUM DENGAN  
SISTEM PENGURUSAN UNTUK PERLINDUNGAN ALAM SEKITAR PADA  
RAJAE PELABUHAN, IRAN**

Oleh

**Mehrnaz Farzingohar**

Mei 2014

**Pengerusi: Professor Madya. Zelina Zaiton Ibrahim, PhD**

**Fakulti: Pengajian Alam Sekitar**

Dalam pemindahan produk minyak daripada kapaltangki ke terminal, minyak mungkin akan tertumpah dari paip pecah, injap dan penyambung yang berkarat, dan peralatan lama, yang boleh mencemarkan air dan udara. Pelabuhan Rajae di Teluk Parsi adalah sebuah terminal penting bagi syarikat minyak Bandar Abbas (BAORCO). Matlamat utama kajian ini adalah untuk mengenalpasti kawasan berisiko tinggi menggunakan trajektori dan takdir tumpahan dan penyambungan kepada system. Pengurusan untuk pelan luar jangkaan dalam melindungi alam sekitar tempatan. Dua model digunakan. Model General NOAA Oil Modeling Environment (GNOME) digunakan untuk pencemaran tumpahan minyak di laut manakala Areal Location Of Hazardous Atmosphere (ALOHA) digunakan untuk mengenal pasti trajektori tumpahan minyak sejat melalui udara. Keputusan daripada kedua-dua model telah dianalisis untuk menentukan lokasi kawasan risiko melalui air dan udara di sekeliling tumpahan. Analisis sampel air kajian lalu dan sedimen dari telah dibandingkan dengan kajian ini dan digunakan untuk mengesahkan keputusan model. Kawasan timur laut Pulau Qeshm dan kawasan Pelabuhan Rajae dikenalpasti sebagai kawasan berisiko tinggi. Keputusan adalah digunapakai untuk memandu dan menambahbaila pelan luar jangka yang digunakan oleh BAORCO untuk mengurangkan kesan negative alam sekitar. Dalam pemindahan produk minyak daripada kapaltangki ke terminal, minyak mungkin akan tertumpah dari paip pecah, injap dan penyambung yang berkarat, dan peralatan lama, yang boleh mencemarkan air dan udara. Pelabuhan Rajae di Teluk Parsi adalah sebuah terminal penting bagi syarikat minyak Bandar Abbas (BAORCO). Matlamat utama kajian ini adalah untuk mengenalpasti kawasan berisiko tinggi menggunakan trajektori dan takdir tumpahan dan penyambungan kepada system. Pengurusan untuk pelan luar jangkaan dalam melindungi alam sekitar tempatan. Dua model digunakan. Model General NOAA Oil Modeling Environment (GNOME) digunakan untuk pencemaran tumpahan minyak di laut manakala Areal Location Of Hazardous Atmosphere (ALOHA) digunakan untuk mengenal pasti trajektori tumpahan minyak sejat melalui udara. Keputusan daripada kedua-dua model telah dianalisis untuk menentukan lokasi

kawasan risiko melalui air dan udara di sekeliling tumpahan. Analisis sampel air kajian lalu dan sedimen dari telah dibandingkan dengan kajian ini dan digunakan untuk mengesahkan keputusan model. Kawasan timur laut Pulau Qeshm dan kawasan Pelabuhan Rajaee dikenalpasti sebagai kawasan berisiko tinggi. Keputusan adalah digunapakai untuk memandu dan menambahbaila pelan luar jangka yang digunakan oleh BAORCO untuk mengurangkan kesan negative alam sekitar.



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I certify that a Thesis Examination Committee has met on 26 May 2014 to conduct the final examination of Mehrnaz Farzingohar on her thesis entitled "Modeling of Oil Spill Dispersion to Improve Management System for Environmental Protection of Port Rajee, Iran" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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