

CFR Installation and operation:

Health, safety, maintenance and environmental protection guidelines

CFR INSTALLATION AND OPERATION:

HEALTH, SAFETY, MAINTENANCE AND ENVIRONMENTAL PROTECTION GUIDELINES

March 2010

Published by **ENERGY INSTITUTE, LONDON**

The Energy Institute (EI) is the leading chartered professional membership body supporting individuals and organisations across the energy industry. With a combined membership of over 13 500 individuals and 300 companies in 100 countries, it provides an independent focal point for the energy community and a powerful voice to engage business and industry, government, academia and the public internationally.

As a Royal Charter organisation, the EI offers professional recognition and sustains personal career development through the accreditation and delivery of training courses, conferences and publications and networking opportunities. It also runs a highly valued technical work programme, comprising original independent research and investigations, and the provision of IP technical publications to provide the international industry with information and guidance on key current and future issues.

The EI promotes the safe, environmentally responsible and efficient supply and use of energy in all its forms and applications. In fulfilling this purpose the EI addresses the depth and breadth of energy and the energy system, from upstream and downstream hydrocarbons and other primary fuels and renewables, to power generation, transmission and distribution to sustainable development, demand side management and energy efficiency. Offering learning and networking opportunities to support career development, the EI provides a home to all those working in energy, and a scientific and technical reservoir of knowledge for industry.

This publication has been produced as a result of work carried out within the Technical Team of the Energy Institute (EI), funded by the EI's Technical Partners. The EI's Technical Work Programme provides industry with cost-effective, value-adding knowledge on key current and future issues affecting those operating in the energy sector, both in the UK and internationally.

For further information, please visit http://www.energyinst.org

The EI gratefully acknowledges the financial contributions towards the scientific and technical programme from the following companies

BG Group Maersk Oil North Sea UK Limited

BP Exploration Operating Co Ltd Murco Petroleum Ltd

BP Oil UK Ltd Nexen
Centrica Saudi Aramco

Chevron Shell UK Oil Products Limited

ConocoPhillips Ltd Shell U.K. Exploration and Production Ltd

EDF Energy Statoil Hydro

ENI Talisman Energy (UK) Ltd
E. ON UK Total E&P UK plc
ExxonMobil International Ltd Total UK Limited

Kuwait Petroleum International Ltd

Copyright © 2010 by the Energy Institute, London: The Energy Institute is a professional membership body incorporated by Royal Charter 2003. Registered charity number 1097899, England All rights reserved

No part of this book may be reproduced by any means, or transmitted or translated into a machine language without the written permission of the publisher.

ISBN 978 0 85293 551 4

Published by the Energy Institute

The information contained in this publication is provided as guidance only and while every reasonable care has been taken to ensure the accuracy of its contents, the Energy Institute cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The Energy Institute shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

Further copies can be obtained from Portland Customer Services, Commerce Way, Whitehall Industrial Estate, Colchester CO2 8HP, UK. Tel: +44 (0) 1206 796 351 e: sales@portland-services.com

Electronic access to EI and IP publications is available via our website, **www.energyinstpubs.org.uk**.

Documents can be purchased online as downloadable pdfs or on an annual subscription for single users and companies. For more information, contact the EI Publications Team.

e: pubs@energyinst.org

CONTENTS

Fo	Pa preword	age . ∨
۸.	dra avula desamante	
AC	knowledgements	. VI
1	Introduction, scope and application	. 1
	1.1 Introduction	
	1.2 Scope	
	1.3 Application	. 1
2	Laboratory design, safety and maintenance recommendations	. 2
	2.1 Laboratory site	. 2
	2.2 Laboratory construction	. 2
	2.3 Foundation and floor drainage	
	2.4 Soundproofing	
	2.5 Lighting	
	2.6 Telecommunications	
	2.7 Toilet, washing and changing facilities	
	2.8 Benching, racking and storage	
	2.9 Concrete plinths	
	2.10 Air extraction	
	2.11 Fume hoods	
	2.12 Heating and air conditioning	
	2.13 Reference fuel dispensing and test sample storage	
	2.14 Refrigeration	
	2.15 Lifting equipment	
	2.16 Security and access	
	2.17 Signage	
	2.18 Fire protection and equipment	. 9
3	Installation safety recommendations	
	3.1 General	
	3.2 Electrical	
	3.3 Water supply	
	3.4 Compressed air	
	3.5 Drainage	
	3.6 Work equipment	
	3.7 Crankcase ventilation	
	3.8 Exhaust system	
	3.9 Safety devices	14

Contents Cont		Page	
4	General health and safety control measures 4.1 Personal protection equipment 4.2 Training 4.3 First aid 4.4 Risk assessment 4.5 Emergency shut down and evacuation 4.6 Portable electrical equipment 4.7 Ergonomics 4.8 Computer	16 17 18 18 19	
	4.9 Tools 4.10 Substances hazardous to health 4.10.1 Control 4.10.2 Petroleum products 4.10.3 Tetra ethyl lead	22 22 23	
5	Operation and maintenance hazards and typical control measures 5.1 Hot surfaces 5.2 Manual handling 5.3 Slips, trips and falls 5.4 Moving parts 5.5 Hazardous substances 5.6 Fire and explosion 5.7 Disposal of toxic and chemical waste 5.8 Spillage 5.9 Electrical shock 5.10 Storage and handling of large quantities of flammable liquids 5.11 Lone working 5.12 Compressed air and liquids 5.13 Noise 5.14 Hazardous vapours and micro organisms 5.15 Access	27 28 29 30 32 35 37 38 39 40 42 43 45 46	
Δn	nex A – Abbreviations	49	

FOREWORD

This publication was prepared on behalf of the Energy Institute's TMS SC-B-1 CFR Engines panel.

This document has been written to provide guidance on how to comply with specific health, safety, maintenance and environmental requirements within the CFR installation and operating environment.

This document provides guidance to assist those involved in:

- laboratory design;
- installation and maintenance of CFR engines, and
- operation of CFR engines.

Whilst these guidelines have been written in the context of the United Kingdom (UK) legislation and regulatory framework, the principles set out in this document can similarly be applied to other countries providing national and local statutory requirements are complied with. Where the requirements differ, the more stringent should be adopted. A similar legislative and regulatory framework generally applies elsewhere in the European Communities.

This publication is for guidance only, and while every reasonable care has been taken to ensure the accuracy of its contents, the EI, and the technical representatives listed in the acknowledgements, cannot accept any responsibility for any action taken, or not taken, on the basis of this information. The EI shall not be liable to any person for any loss or damage which may arise from the use of any of the information contained in any of its publications.

The above disclaimer is not intended to restrict or exclude liability for death or personal injury caused by own negligence.

Suggested revisions are invited and should be submitted to the Technical Department, Energy Institute, 61 New Cavendish Street, London, W1G 7AR.

ACKNOWLEDGEMENTS

This publication was prepared by Paul Greenwood (ADL Petroleum Services Ltd) with contributions from the following:

- Brian Logan (ConocoPhillips Ltd.)
- John Phipps, Consultant to the El

The Institute wishes to record its appreciation of the work carried out by them.

1 INTRODUCTION, SCOPE AND APPLICATION

1.1 INTRODUCTION

This EI document has been written with the intention of providing CFR operators with a comprehensive text describing the specific health, safety, maintenance and environmental requirements within the CFR installation and operating environment.

By adhering to the design and operational recommendations detailed in this publication a CFR facility should offer the proper environment in which operators can work safely and engines can function correctly.

Due to the diversity of disciplines required to ensure that a CFR facility is operational, it is likely that some work required, should be provided by certificated professionals; this includes any electrical instruction or installation. As such, any electrical or similar recommendations or suggestions within the document should be verified by a competent individual.

1.2 SCOPE

This publication provides comprehensive guidance starting from the initial requirements to consider when deciding where to locate a CFR facility, through to the mitigation of hazards when operating a CFR engine unit for testing or maintenance purposes.

This publication does not override any manufacturer's or institute's instructions or guidelines.

1.3 APPLICATION

Whilst written in the context of the United Kingdom (UK) legislation and regulatory framework, the principles set out in these guidelines can similarly be applied to other countries providing national and local statutory requirements are complied with. Where the requirements differ, the more stringent should be adopted. A similar legislative and regulatory framework generally applies elsewhere in the European Communities.