

**THE EFFECTIVENESS OF HEARING CONSERVATION FOR
OFFSHORE WORKERS IN AN OFFSHORE OIL AND GAS
PLATFORM ENVIRONMENT**

By

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Abstract of project to the Senate of Universiti Putra Malaysia
In fulfillment of the requirements for the Master of Science

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July 2001

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Co-Supervisor: Dr. Mohamed Daud

Noise has long been recognized as one of the most prevalent workplace hazards. Noise induced hearing loss progression (NIHL), however, is insidious, in that it developed over a period of time, and the impairment can reach the handicapping stage before an individual is aware of what has happened. Once the damage is done, it is irrecoverable and not curable.

All of the producing oil and gas fields in Malaysia are mainly located offshore. Offshore platforms and facilities are generally very costly to install and to maintain. Additional costs are incurred by using barges and marine support vessels. Hence, the design tend to maximize the valuable space available to house all necessary equipment and machinery whereby noise generation can be significant. Staff working offshore is, therefore, exposed to such noise.

The paper analyses how noise management is carried out to manage noise risks exposure to the staff working offshore working on a 2 weeks ON 2 weeks OFF work cycle and to evaluate its effectiveness using oil platform D35 complex off Miri as a case study.

The methodology applied in this study was by using questionnaire and observation, which confirmed on non-compliance to the wearing of hearing protectors in high noise area, which is the main cause of NIHL. The questionnaire survey revealed that some 12% non-compliance to the hearing conservation and as high as 22% having varying degree of potential socioculus related noise exposure. ACT (Accident Control Technique) observations showed there were some 6% hearing protection violations in high noise level area.

Abstrak projek yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Sarjana Sains

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Oleh

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Hingar adalah antara bahaya di tempat kerja yang telah lama dikenalpasti. Hingar boleh menyebabkan hilangnya upaya pendengaran secara progresif (NIHL) jika terdedah kepadanya dalam jangka masa yang tertentu dan ia boleh mencapai ke tahap kecacatan sebelum seseorang individu dapat mengesannya. Jika kecacatan ini sudah berlaku maka ia tidaklah dapat dirawat ataupun pulih ke keadaan asal.

Hampir kesemua medan penghasilan minyak dan gas di Malaysia berlokasi jauh dari pantai. Pelantar minyak luar pantai serta kemudahannya adalah sangat mahal kosnya dari segi pemasangannya dan penyelenggaraannya. Kos tambahan yang agak membebankan terhasil daripada penggunaan tongkang dan kapal marin. Oleh itu, rekabentuk tertumpu pada aspek mengoptimalkan ruang yang ada untuk memasang peralatan dan mesin yang diperlukan, yang mana kadar hingar yang dihasilkan adalah penting. Oleh itu, pekerja yang bekerja di pelantar berkenaan adalah terdedah kepada hingar yang sedemikian.

Kertas kerja ini menganalisis bagaimana pengurusan hingar dilakukan untuk mengurus risiko hingar yang terdedah kepada staf platform luar pantai yang bekerja shif “2 minggu kerja 2 minggu cuti” dan keberkesannya dikaji dengan menggunakan Komplek Platform Minyak D35 di Miri sebagai kajian kes.

Cara analisis yang digunakan dalam kajian ini adalah dengan menggunakan “borang soalselidik” dan teknik pemerhatian. Keputusan mengesahkan penggunaan tidak sepenuhnya pelindung pendengaran di kawasan berhingar tinggi, iaitu merupakan sebab utama NIHL (hilang upaya pendengaran secara progresif). Pemerhatian ACT (Teknik Mengawal Kemalangan) menunjukkan bahawa terdapat sebanyak 6% penyalahgunaan pelindung pendengaran di kawasan berhingar tinggi.

GLOSSARY / ABBREVIATIONS

2ON/2OFF	2 weeks ON/2 weeks OFF work cycle
DEP	Design and Engineering Practice
DOSH	Department of Occupational Safety and Health
EEMUA	Engineering Equipment and Materials Users Association
FMA	Factories and Machinery Act
FMD	Factories and Machinery Department
HSE-MAS	SSB/SSPC Medical Services Department
HSE-MOH	SSB/SSPC Medical Occupational Health Service
Leq	Equivalent continuous sound level
NIHL	Noise Induced Hearing Loss
OSHA	Occupational Safety and Health Act
OTs	Operations Technicians
PCSB	Petronas Carigali Sendarian. Berhad
PETRONAS	Petroleum Nasional Sendarian Berhad
PPE	Personal Protective Equipment
PSC	Production Sharing Contract
SSB/SSPC	Sarawak Shell Berhad/Sabah Shell Petroleum Company Limited
SIPM	Shell Internationale Petroleum Maatschappij
SOHO	Senior Occupational Health Officer
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

The problem and Its Uniqueness

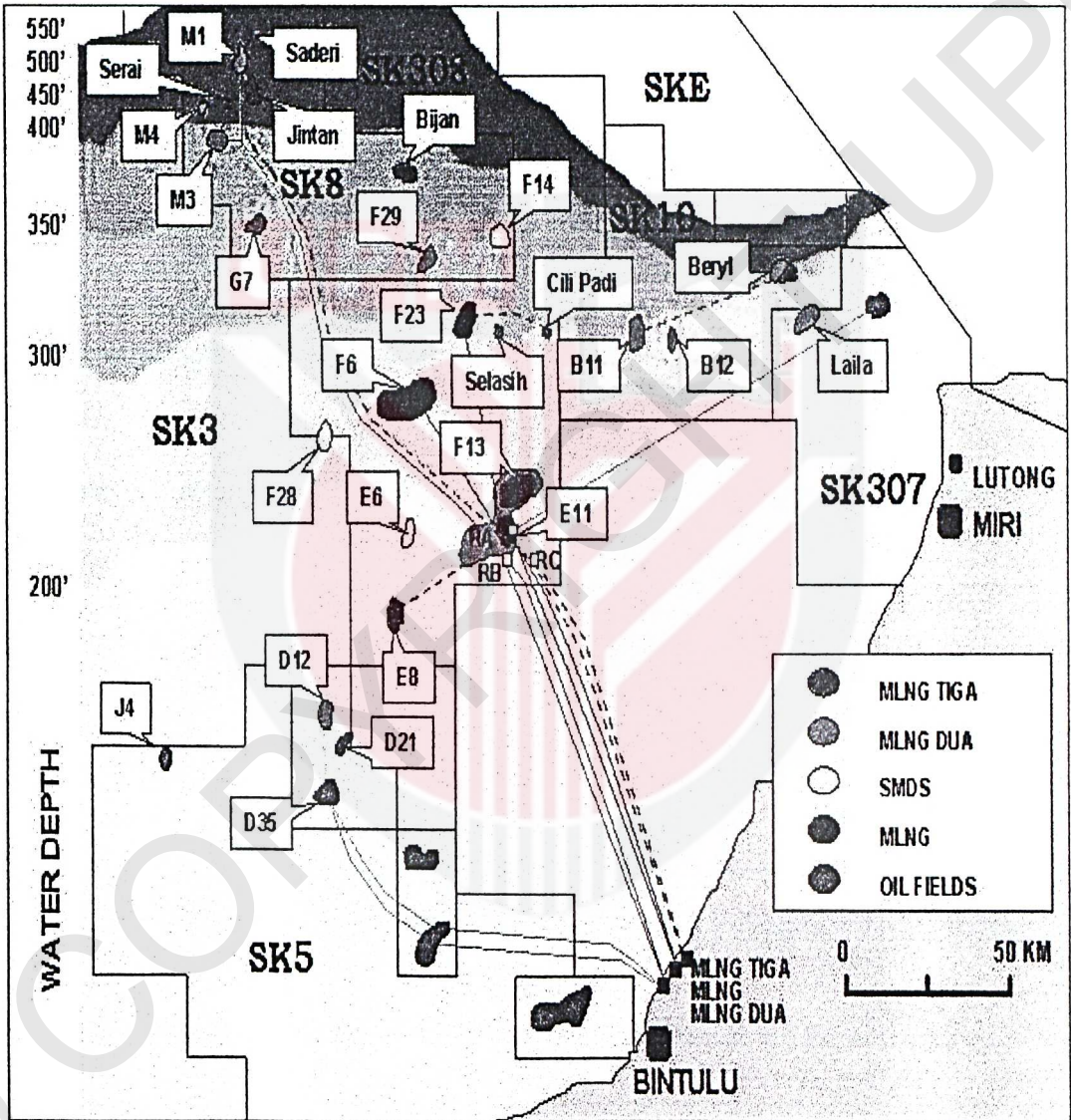
Noise has long been recognised as one of the most prevalent workplace hazards (Suter '94). The National Institutes of Health Consensus Development Conference Statement in January 1990 stated that occupational noise exposure is the most common cause of Noise Induced Hearing Loss (NIH. 1990). Based on a NIOSH study in the 1980s on exposed workers and on the 1992 *Statistical Abstracts of the United States* accounting of production workers, it is thought that there are approximately 30 million American workers are exposed to hazardous noise levels alone or in combination with other ototraumatic agents. One in four will develop a permanent hearing loss as a result of their occupational exposure (NIOSH 1996). NIHL is believed to cost over \$100 million annually in Sweden, several hundred million USD in America, and in British Columbia, Canada alone in 1989 there were roughly 10,000 claims costing C\$20 million (Neitzel R. et al.) While there are numerous number of NIHL studies made in Aviation, Agricultural and industries like construction, mining, etc., relatively little information is available about noise level and hearing conservation in offshore environment. Noise is invisible. Noise induced hearing loss progression, however, is insidious, in that it developed over a period of time, and the impairment can reach the handicapping stage before an individual is aware of what has happened. Once the damage is done, it is irrecoverable. There is no cure.

Statement of the Problem

All of the producing oil and gas fields in Malaysia are currently located offshore. After exploration and successful discovery, the field will be developed and brought into continuous production for many years until field depletion and eventual abandonment. Offshore platforms and facilities are generally very costly to install with limited deck space. Hence, the design tend to maximise the valuable space available to house all necessary equipment and machinery whereby noise generation can be significant.

Staffs working offshore are, therefore, exposed to such noise. The audiometry survey conducted on company staff working on D35 in 1998 and 1999 showed some 22% and 17% as suspected noise induced hearing loss cases or as NIHL Rate respectively. This is rather alarming.

Figure 1: Map showing location of D35

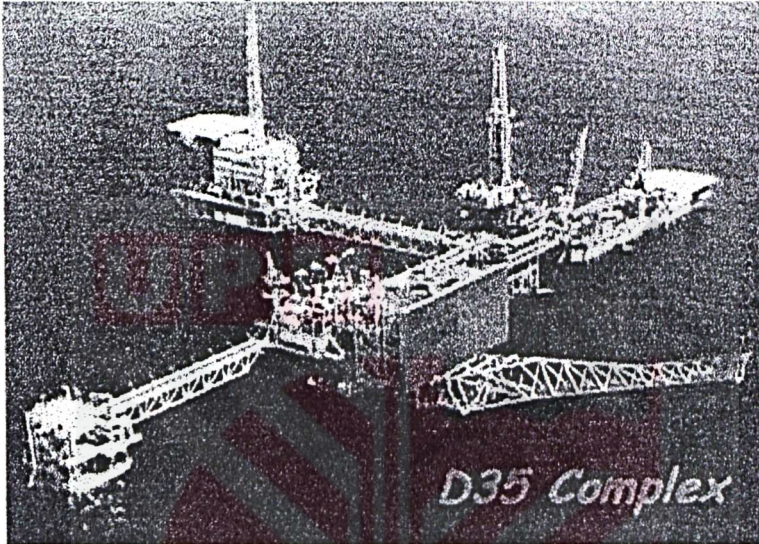


Significance of Study

This project paper will analyse how noise management is carried out to manage risks exposure to the staff working offshore working on a 2 weeks ON 2 weeks OFF work

cycle and evaluate its effectiveness using D35 Complex (photo 1) as a case study. The focus will be on work related occupational noise exposure causing hearing loss but not on socioculus related from social and environmental noises e.g. loud music, power tools and household appliances.

Photo 1: D35 Complex



Objectives

The objectives of this study were to:

- 1) evaluate and analyse how noise hearing loss risks is managed for staff working offshore in Sarawak Shell Berhad D35 Field operations.
- 2) identify the cause of the alarming NIHL cases and identify the short comings with appropriate recommendations.

Scope and Limitations

This study will only focus on work related noise induced hearing loss. The scope of work will be confined to the D35 Complex, which is made up of 4 structures that are inter-

linked by bridges, and the exposure associated with the noise on D35 complex. It must also be recognised that noise is not the only element causing hearing loss. Combined exposures to noise and certain physical or chemical agents (e.g. vibration, organic solvents, carbon monoxide, ototoxic drugs and certain metals) appear to have synergistic effects on hearing loss [Hamernik and Henderson 1976; Brown et al. 1978; Gannon et al. 1979; Hamernik et al. 1980; Pryor et al. 1983; Fechter et al. 1988; Franks and Morata 1996]. However, this paper will only cover on noise associated with work related noise on D35 and not other physical or chemical agents. To comply with legislative requirement, employers will impose rules and regulations as required to manage noise hearing loss during work. Employees will comply for fear of a reprimand. Hence during working hours, staff may adhere to hearing conservation on site but may not necessarily adhere to hearing conservation outside of the working hours and be exposed to high noise from social and recreational activities. Hearing loss caused by exposure to non-occupational noise is collectively called sociocosis. It includes recreational and environmental noises (e.g. loud music, guns, power tools, and household appliances) that affect the ear the same as occupational noise (NIOSH 1998). However, as similar hearing loss will occur resulting from sociocosis, the study will make attempts to determine potential sociocosis influence. The questionnaire survey will be used to determine that possibility.

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- SSB Guidance note 10 Sarawak Shell Berhad’s **Guidance Note No 10 on NOISE, MONITORING and STANDARDS**
<http://sww.ssb.shell.com.my/hse/hguide/gn10noi.htm>

SPIM

Shell Internationale Petroleum Maatschappij's Technical
Specification "Noise Control" DEP 31.10.00.31-Gen July '92.

