

**Study Report on Safety Management
on
On-going Japanese ODA Loan Project
in Malaysia**

May 2013

Japan International Cooperation Agency (JICA)

IPM Services co., Ltd.

Katahira & Engineers International

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JR
13-129

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Glossary

ADB	: Asian Development Bank
BQ	: Bill of Quantity
C&C	: Cut and Cover
CIDB	: Construction Industry Development Board
CSR	: Corporate Social Responsibility
DOSH	: Department of Occupational Safety and Health
JICA	: Japan International Cooperation Agency
GDP	: Gross Domestic Product
HS	: Health and Safety
KeTTHA	: Kementerian Tenaga, Teknologi Hijau Dan Air
KL	: Kuala Lumpur
LGH-JV	: Loh & Loh -George Kent -Hazama Joint Venture
L&L	: Loh & Loh Construction SDN BHD
MEGTW	: Ministry of Energy, Green Technology and Water
MEWC	: Ministry of Energy, Water and Communication
MS	: Management System
NATM	: New Austrian Tunneling Method
NPD	: Non- Permanent Disability
OSH	: Occupational Safety and Health
OSH-MP 15	: Occupational Safety and Health Master Plan for Malaysia 2015
PDCA	: Plan-Do-Check-Action
PPE	: Personal Protective Equipment
PQ	: Prequalification
SNUI-JV	: SHIMIZU-NISHIMATSU-UEBM-IJM Joint Venture
SHO	: Safety and Health Officer
TBM	: Tunnel Boring Machine
TEPSCO	: Tokyo Electric Power Services Co. Ltd
Face	: Tunnel face means the area under excavation
Overburden	: The soil cover above the tunnel
Rock Burst	: A phenomenon in which the surrounding rock to be rapidly destroyed and scattered rock pieces.

Chapter 1 Outline of the Study

1.1 Background and objective of the study

This study is initiated based on the recommendation made by the committee deployed by Ministry of Foreign Affairs, Japan, in order to discuss the measures to prevent re-occurrence of the similar accident as that of Can Tho Bridge in Vietnam in September 2007.

As recommended by the committee, JICA has carried out interim reviews in respect of on-going five projects since 2008. Of the five projects, two were in Vietnam, three were in Turkey, Uzbekistan and Philippines respectively.

The main objectives of this study can be summarized as follows.

- (1) To conduct a survey of up-to-date information on occupational safety and health laws and regulations of Malaysia, and a review for safety management on Pahang-Selangor Raw Water Transfer Project .
- (2) To encourage stakeholders to make greater efforts towards the reduction and prevention of occupational accidents and public accidents by feeding back the findings to stakeholders.
- (3) To make recommendations for improvement, if any, and check the status of implementation of safety management and compliance of laws and regulations through visiting the project sites.

1.2 Study team member

Team leader/ Safety specialist: Hiroaki TOMITA(IPM services)

Civil work specialist 1 Yasuhiro MIZUNO(IPM services secondment)

Civil work specialist 1 Seiichi SATO(IPM Services) (Domestic work only)

Civil work specialist 2 Katsuaki MITANI(KATAHIRA & ENGINEERS INTERNATIONAL)

(Domestic work only)

1.3 Activity record in Malaysia

From January 27th through February 9th, 2013

Date		Activities
27	Sun	Departure Narita/Tokyo 11:30 (JL723) –Arrival Kuala Lumpur (KL) 18:30
28	Mon	08:00-09:15 Travelling from hotel to Karak Engineer office 09:15-10:30 Briefing of Project Summary at Karak Engineer office 10:30-10:45 Travelling from Karak Engineer office to Lot 1-3A 10:45-12:30 Site Visit at Lot 1-3A Semantan Intake and Pumping Station 12:30-13:30 Travelling from Lot 1-3A site to LGH-JV office 13:30-16:30 Meeting with LGH-JV and document review 16:30-18:30 Travelling from LGH-JV Karak office to hotel 18:30-19:00 Coordination schedule with a rent-a-car driver
29	Tue	08:30-08:40 Travelling from hotel to JICA Malaysia office 09:00-10:00 Meeting at JICA Malaysia office 10:00-11:00 Meeting with JICA Malaysia staff for detailed schedule 11:00-11:40 Travelling from JICA Malaysia office to hotel 11:40-12:00 Coordinating schedule with a rent-a-car driver 12:00-19:00 Data compilation
30	Wed	06:45-07:45 Travelling from hotel to Karak Engineer office 08:00-08:45 Travelling from Karak Engineer office to Lot1-2 Kelau Dam 08:45-09:30 Site Visit at Lot 1-2 Kelau Dam 09:30-11:30 Document review and hearing at Lot1-2 L&L office 11:30-13:00 Travelling from Lot1-2 Kelau Dam L&L office to Bentong 13:00-14:00 Lunch 14:00-16:00 Hearing at Lot1-2 L&L Bentong office 16:00-17:30 Travelling from Lot1-2 L&L Bentong office to hotel
31	Thu	05:15-06:20 Travelling from hotel to Karak Engineer office 06:30-07:30 Travelling to Lot1-1 Adit 2 and attended Tool Box Meeting 07:30-10:30 Site visit at Lot1-1 a face of TBM-1 Tunnel 10:30-12:00 Adit 2 & Adit 1 NATM Tunnel - Inlet Conduit - Engineer office 12:00-13:00 Lunch 13:00-16:40 Document review and hearing at Lot1-1 SNUI-JV office 16:40-17:30 Travelling from Lot1-1 SNUI-JV Karak office to hotel
01	Fri	06:30-07:30 Travelling from hotel to Karak Engineer office 07:30-12:00 Site visit at Lot1-3B, Semantan Pipeline, (IJM-JAKS JV) 12:00-13:00 Lunch 13:00-14:20 Data compilation at Karak Engineer office 14:20-16:40 Hearing at Lot1-3B IJM-JAKS JV Karak office 16:40-18:00 Travelling from Lot1-3B IJM-JAKS JV Karak office to hotel

Date		Activities
02	Sat	08:00-19:00 Compilation of collected data and preparation for report
03	Sun	08:00-19:00 Compilation of collected data and preparation for report
04	Mon	06:00-06:30 Travelling from hotel to Lot1-1 SNUI-JV Langat portal 06:30-07:30 Attended at Tool Box Meeting 07:30-10:30 Site Visit: Lot 1-1 Adit-4 to a face of TBM-3 & Outlet 10:30-11:00 Hulu Langat engineer office 11:00-12:30 Hearing at Lot1-1 SNUI-JV Hulu Langat office 12:30-13:45 Travelling from Lot1-1 SNUI-JV Hulu Langat office to hotel 13:45-21:00 Data compilation
05	Tue	07:30-08:30 Travelling from hotel to KeTTHA office at Cyberjaya 09:00-10:30 Hearing at KeTTHA office at Cyeberjaya 10:30-11:00 Travelling from KeTTHA office to Putrajaya 11:00-15:00 Data compilation 15:00-16:30 Hearing at DOSH office at Putrajaya 16:30-17:30 Travelling from DOSH office to hotel
06	Wed	08:30-09:00 Travelling from hotel to Engineer office at Mid Valley 09:00-12:00 Document review & hearing at Engineer office 12:00-13:00 Lunch 13:00-13:40 Travelling from Engineer office at Mid Valley to hotel 13:40-14:30 Internal Meeting 14:30-19:00 Data compilation and preparation for Interim Study Report
07	Thu	08:00-11:00 Meeting at rent-a-car office, Data compilation 11:00-11:30 Travelling from hotel to Engineer office at Mid-Valley 11:30-14:00 Preparation work for meeting of Interim Study Report 14:00-15:10 Meeting of Interim Study Report at Engineer office 15:10-16:30 Works at the Engineer office at Mid-Valley 16:30-17:30 Travelling from Engineer office to hotel
08	Fri	09:30-11:00 Travelling from hotel to KeTTHA office at Cyberjaya 11:00-11:45 Meeting of Interim Study Report at KeTTHA 11:45-13:00 Travelling from KeTTHA office to hotel 14:00-19:30 Data compilation, monetary settlement at rent-a-car office 19:30-21:00 Travelling from hotel to Kuala Lumpur International Airport 22:50- Departure from Kuala Lumpur International Airport (JL724)
09	Sat	-06:10 Arrival at Narita International Airport in Japan

1.4 List of interviewees and meeting

< Project Stakeholders in Malaysia >

- (1) JICA Malaysia office
 - Kunihiko SATO (Chief Representative)
 - Kyoko OKUBO (Senior Representative)
 - Syariza Shariff (Senior Program Manager)
- (2) Ministry of Energy, Green Technology and Water (MEGTW)
[Kementerian Tenaga, Teknologi Hijau Dan Air (KeTTHA)]
 - Zullkefle Bin Nordin (Project Director)
 - Arshad Bin Abdul Rashid (Deputy Project Director, Lot1-1)
 - Jayawant a/l Vithal (Deputy Project Director, Lot1-2)
 - Suhaimi Bin Hj.Mohd Zain (Deputy Project Director, Lot1-3A & 1-3B)
 - Neo Boon Huat (Deputy Project Director, Mechanical & Electrical)
 - Noor Ezzuddin Ghazai Azmi (Deputy Project Director)
 - Others
- (3) Department of Occupational Safety and Health(DOSH), Ministry of Human Resources
 - Johari Basri (Director General)
 - HJ. Zahrim Bin Osman (Director)
 - Syed Abd Hamid(DOSH HQ)
 - Mohtar Musri(DOSH HQ)
- (4) Tokyo Electric Power Services Co., Ltd.(TEPSCO) in Association with SMEC International Pty. Ltd.(SMEC) and SMHB Sdn. Bhd.(SMHB)
 - Hiroyuki UKON (Project Manager)
 - Manabu ONUKI (Deputy Project Manager)
 - Testuro TSURI (Senior Tunnel Engineer)
 - Katsutoshi KUBOTA (Senior Dam Engineer)
 - Yuki IWASHITA (Civil Engineer)
 - Naoya MOCHIZUKI (Tunnel Engineer TBM)
- (5) SHIMIZU-NISHIMATSU-UEMB-IJM JV
 - Takashi KAWATA (Project Manager)
 - Takayuki MATSUMOTO (Deputy Project Manager)
 - Yasunari HONDA (Chief Engineer)
 - Akira MITO (Chief Engineer)
 - Zulkarnain Zainal Abidin (Safety & Health Manager)

Mohd Aziz Khariruddin (HS Officer)

Norhisnan B. Norhashimi (HS Officer)

Harirunizam Haris (Safety Supervisor)

Norhaqimi Nordin (Safety Supervisor)

Mohd Rozaini B. Roslan(safety Supervisor)

Others

(6) LOH & LOH Construction SDN BHD

Chee Lian Chai (Senior Project Manager)

Mahmud Bin Mohd Tahar (Senior Safety Officer)

Others

(7) LOH & LOH- GEORGE KENT-HAZAMA JV

Toh Peng (Project Manager)

Hiroyuki TAKEUCHI (Deputy Project Manager)

Suah Choo Heang (Deputy Project Manager)

Others

(8) IJM Construction-JAKS SDN BHD JV

Cheng Park Leong (Project Manager)

Tony Wah Ah kong (Assistant Project Manage)

Jasnizan B.Mehat (Safety & Health officer)

Sharmila Binti Ahmad (QA/QC Engineer)

Chapter 2 Occupational safety in Malaysia

2.1 Occupational injury and fatality

Malaysian Economy has grown to 2.7 times in GDP for the past 10 years. Population has increased 18% during this period. The urban population ratio also has rapidly increased from 62% in 2000 to 71.3% in 2009.

Vision 2020 that they are aiming to achieve the object of developing Malaysia into a fully developed country by the year 2020 has been implemented as National Policy.

In order to achieve the object, the strong community, the steady growth of industry, and the orderly development of infrastructure are essential, and the safety and security of those who would involve in achieving this object should properly be secured.

Malaysia is a multi-ethnic country, where each ethnic group has diversified values in terms of culture, religion, languages and life style. Compared to Japan where the majority of the people speak the same language and share the same culture, greater efforts might be required in Malaysia to make policy and put it in action.

However, it is observed in our study that Malaysia government is promoting wide range of policies by setting up the aggressive target for the occupational safety and health as one of the national projects.

Table 2.1-1 GDP and population trend in Malaysia

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
GDP (Billion US\$)*1	552	554	577	609	655	701	1343	1528	1584	1474
GDP (Growth rate)*2	8.7	0.5	5.4	5.8	6.8	5.3	5.8	6.3	4.6	-1.7
Population (Million)*3	23.3	23.8	24.3	24.7	25.2	25.6	26.1	26.6	27.0	27.5
Urban population ratio*4	62					67.6				71.3

*1,2,4 : The study for national land policy in Malaysia, reported by Ministry of Land, Infrastructure, Transport and Tourism, Land Planning Bureau of Japan, March 2011.

*3: www.jinko-watch.com/kuni/013.html

The rates of occurrence of occupational accidents and fatalities between 1996 and 2007 was reported by the Ministry of Human Resources of Malaysia.

Table 2.1-2 Rates of occurrence of occupational accidents and fatalities

Year	Accidents /1000 workers	Fatalities /100,000 workers
1996	13	15.5
1997	10	15.9
1998	10	13.3
1999	11	11.4
2000	11	11.8
2001	9.2	10.4
2002	8.8	9.5
2003	8.2	10.9
2004	7.8	12.9
2005	7.0	12.9
2006	6.5	12.8
2007	6.1	12.4

Source : Occupational Safety and Health Master Plan, Ministry of Human Resources, Malaysia

The frequency rate of occurrence of occupational accidents has steadily been dropping from 11.0 accidents per 1,000 workers in 2000 to 6.1 accidents per 1,000 workers in 2007.

While the frequency of occurrence of occupational fatalities appears to have been dropping from year 1996 to year 2002. It has more or less been stagnating around the 12-13 per 100,000 workers range over the period year 2004 through to year 2007.

Figure 2.1-1 shows occupational accidents by sector for the category of NPD until Dec.2012.

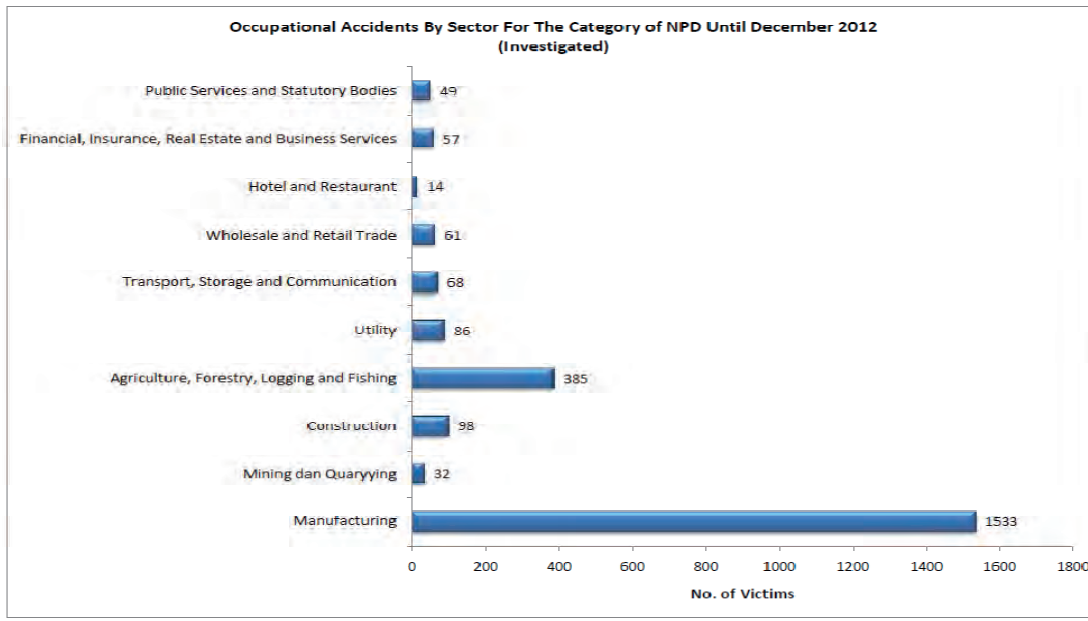
Figure 2.1-2 shows occupational accidents by sector for the category of death until Dec. 2012.

Although the construction industry is ranked third in terms of the category of NPD, following manufacturing industry and agriculture-forestry-logging-fishing industry, it is ranked the worst in terms of the category of death in the year 2012.

In Malaysia, the large scale infrastructure projects such as road, rail, power, water, sewerage, building and so on have been implemented and the demand of contractors and workers also have been increased dramatically.

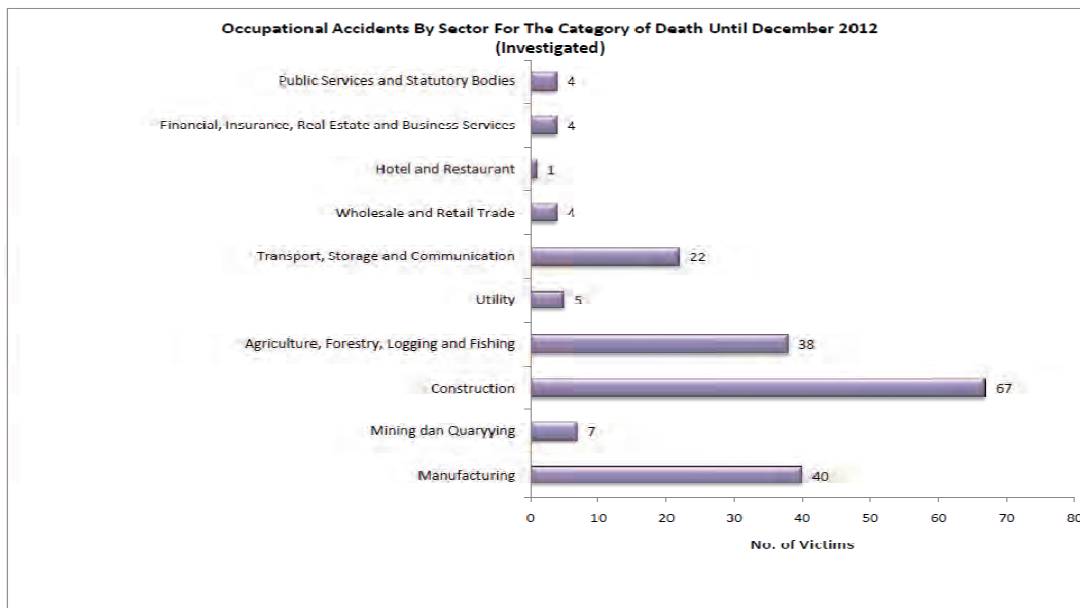
Although Malaysian government has taken various actions to implement the occupational safety and health policy, they may be aware that its implementation would not directly linked to the decrease in fatal accidents.

The government has been enforcing the self-regulation for occupational safety and health on the community, industry, workplace and workers to reduce the occupational accidents .



Department of Occupational Safety and Health

Figure 2.1-1 Occupational accidents by sector for the category of NPD until Dec. 2012



Department of Occupational Safety and Health

(Source : Statics, Ministry of Human Resources, Malaysia)

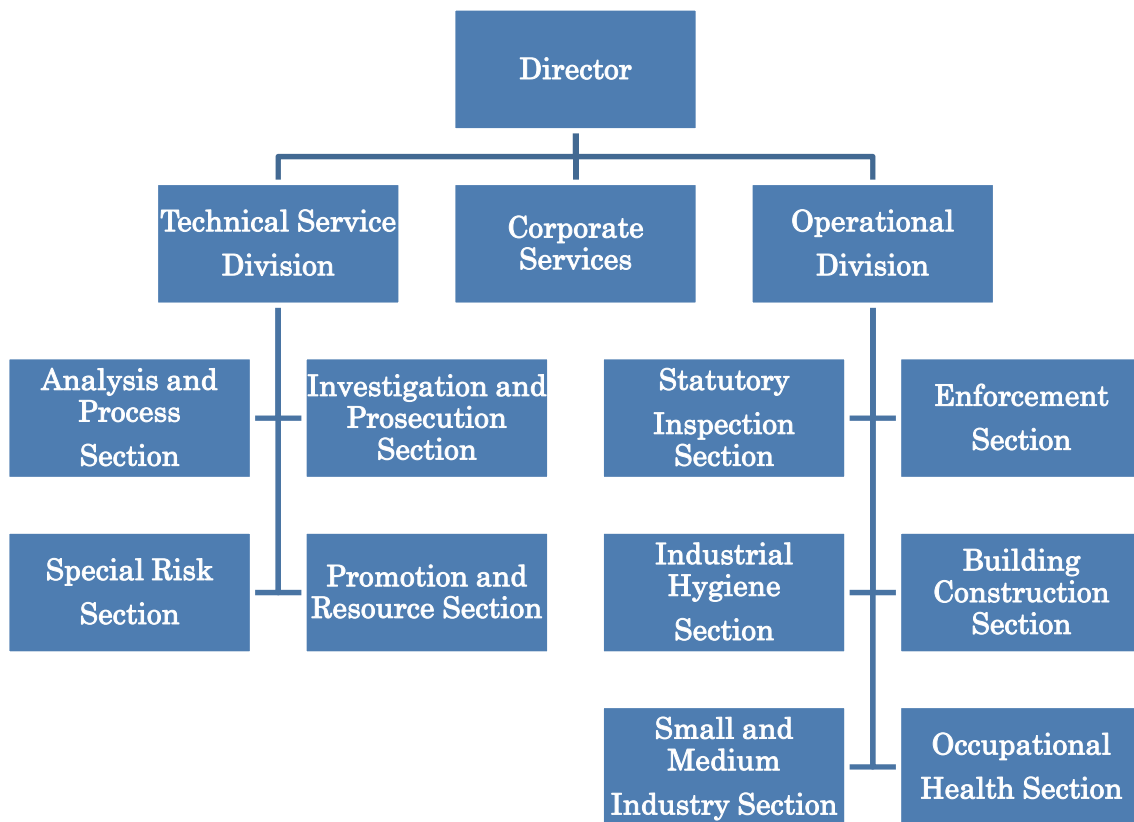
Figure 2.1-2 Occupational accidents by sector for the category of death until Dec. 2012

2.2 Occupational safety and health administrative organization

Department of Occupational Safety and Health(DOSH) of the Ministry of Human Resources is responsible for the occupational safety and health in Malaysia.

Each state office is under the jurisdiction of 15 states in Malaysia.

Pahang-Selangor Raw Water Transfer Project is under the management and supervision of the state office having 125 staffs of Selangor state.



(Source : Questionnaire for safety control/management for DOSH)

Figure 2.2-1 DOSH state office (Selangor) organization chart

2.3 Occupational safety and health legislation

DOSH conducts enforcement activities covered by the following Acts:

- Occupational Safety and Health Act 1994 (Act514)
- Factories and Machinery Act 1967 (Act139)
- Petroleum Act (Safety Measures) Act 1984 (Act302)

<Occupational Safety and Health Act 1994(Act514)>

- Act 514 is one of Laws of Malaysia enacted on 25 February 1994.
- The Act to make further provisions for securing the safety, health and welfare of persons at work, for protecting others against risks to safety or health in connection with the activities of persons at work, to establish the National Council for Occupational Safety and Health, and for matters connected therewith.
- In the event of any conflict or inconsistency between the provisions of the Act and that of any other written law pertaining to occupational safety and health, the provisions of this Act shall prevail.
- The objects of the Act are-
 1. to secure the safety, health and welfare of persons at work against risks to safety or health arising out of the activities of persons at work;
 2. to protect persons at a place of work other than persons at work against risks to safety or health arising out of the activities of persons at work;
 3. to promote an occupational environment for persons at work which is adapted to their physiological and psychological needs;
 4. to provide the means whereby the associated occupational safety and health legislations may be progressively replaces by system of regulations and approved industry codes of practice operating in combination with the provisions of this Act designed to maintain or improve the standards of safety and health.

Before 1994 when the Act was enacted, the laws and regulations are prescriptive. After 1994 the trend of the laws and regulations are to build and sustain a culture of self-regulation. Nowadays, the focus is to create a preventive culture in all workplaces.

2.4 Long term vision for OSH in Malaysia

DOSH established Long Term Vision For OSH in Malaysia consists of 3 stages such as First stage(2005-2010), Second stage(2010-2015), Third stage(2015-2020).

Policy and activities of each stage are as follows.

(1) First stage (2005-2010)

- Enhance competencies of officers & OSH practitioners
- Strategic alliance
- Increase enforcement activities
- Focus on critical sectors
- Conduct R & D
- Enhancing leadership (government)
- Regulate OSH MS(Management System)

(2) Second stage (2010-2015)

- National policy framework on OSH
- Promote preventive culture
- New skill & competencies are acquired & developed
- Strategic alliance at regional level
- Increase enforcement activities
- Focus on soft issue, ergonomic, stress & etc.
- R&D – structured & defined
- Enhancing leadership (employers/Union)
- OSH MS(Management System) in place

(3) Third stage (2015-2020)

- Enhance public awareness on OSH
- Self-regulation become a practice
- Notional policy & framework on OSH established
- Promote preventive culture & well practice
- Create an expert group in various field & skill
- Strategic alliance at international level
- Focus on new emerging hazards
- R&D – research outcomes driven
- Enhancing leadership (social partners & public)
- OSH MS(Management System) as part of business

2.5 Occupational safety and health master plan for Malaysia 2015

It is expected that by end 2015 that DOSH will be ready to enter the stage of preventative culture.

In the longer term scheme of things, OSH-MP 15 is essentially the middle stage of a series of three consecutive 5-year action plans that began in 2005. The first stage which will end in 2010 was targeted towards spreading out OSH ownership to all Key Stakeholders(Government) and Social Partners(employer, workers, insurance industry, higher learning institutions). OSH-MP 15, as second stage, will focus on building and sustaining the culture of self-regulation. By end 2015, self-regulation would have been fully ingrained into the working culture of all workplaces.

The specific objectives of OSH-MP 15 are:

- (1) To increase awareness and knowledge in OSH and commitment to OSH in all undertakings both big and small business;
- (2) To reduce the rates of workplace injuries and associated fatalities;
- (3) To reduce the number of occupational lung diseases, occupational noise induced hearing loss and occupational skin diseases;
- (4) To minimize their adverse impacts on efficiency, productivity and business performance.

There are four key strategies in the OSH Master Plan 15

- Government leadership and practices
- Preventive workplace culture
- Industry leadership and community engagement
- Strong partnership locally and internationally

DOSH is focused on the following PR activities related to improvement of OSH.

- Talks and briefings related to OSH
- Campaigns and exhibitions related to OSH
- Expert services in OSH for public and private agencies, associations of employees and also of professional groups
- Collection and preparation of informative materials related to OSH for reference and distribution.

Chapter 3 Site reconnaissance and observation in Malaysia

-Pahang-Selangor Raw Water Transfer Project-

3.1 Project outline

- (1) Project Name : Pahang-Selangor Raw Water Transfer Project
- (2) L/A : Date of L/A March 31, 2005
Amount of L/A 82,040 Million Yen
Condition Special Japanese ODA loan (general untied)
- (3) Project aim : This project aims to convey raw water from the Semantan River in Pahang state through a transfer tunnel to Selangor state and Kuala Lumpur region for domestic and industrial uses to mitigate future water shortages due to the area's rapidly growing population.
- (4) Location : Pahang state and Selangor state in Malaysia
- (5) Employer : Ministry of Energy, Green Technology and Water (MEGTW)
[Former Ministry of Energy, Water and Communication (MEWC)]
- (6) Engineer : Tokyo Electric Power Services Co. Ltd (TEPSCO), SMEC international PTY Ltd, SMHB Sdn Bhd JV
- (7) Demarcation : 1) Lot 1-1 Water Transfer Tunnel and Related Works
2) Lot 1-2 Kelau Dam and Related Works
3) Lot 1-3A Semantan Intake, Pumping and Related Works
4) Lot 1-3B Semantan Pipeline and Related Works
- (8) Contractors : 1) Lot 1-1 Shimizu(30%)-Nishimatsu(30%)-UEMB(20%)-IJM(20%) JV (SNUI JV)
2) Lot 1-2 Loh & Loh (L&L)
3) Lot 1-3A Loh & Loh+George Kent(75%), Hazama(25%) JV (LGH JV)
4) Lot 1-3B IJM-JAKS JV
- (9) Construction Period : 1) Lot 1-1 1st June 2009 - 30th May 2014 (5 years: 1,825 days)
2) Lot 1-2 1st May 2011 - 30th May 2014
3) Lot 1-3A 1st August 2010 - 30th May 2014
4) Lot 1-3B 1st January 2011 - 30th May 2014
- (10) Dimensional data & works volume

- Lot 1-1 Transfer Tunnel

Transfer tunnel	Tunnel total length 44.6 km (Include C&C tunnel)	
	detail	TBM1 11.774 km
		TBM2 11.824 km
		TBM3 11.369 km
		NATM1 1.927 km
		NATM2 1.927 km
		NATM3 2.055 km
		NATM4 2.850 km
Adit tunnel	Adit1 tunnel	653 m
	Adit2 tunnel	440 m
	Adit3 tunnel	860 m
	Adit4 tunnel	550 m
Access road	Access road total length	15.9 km
	Connection road for inlet	580 m
	Connection to Adit1 & Adit2	10,500 m
	Connection to Adit3	2,660 m
	Connection to Adit4	1,350 m
	Connection to outlet	600 m

- Lot 1-2 Kelau Dam

Kelau Dam & Saddle Dam	Dam type	Earth Fill Dam
	Dam height	30 m
	Dam length	345 m
	Saddle dam A height	18 m
	Saddle dam A length	360 m
	Saddle dam B height	9 m
	Saddle dam B length	432 m
	Dam crest elevation	EL.89 m
Kelau Reservoir	Reservoir Surface Area	24 km ²
	Effective Storage Capacity	135,500,000 m ³

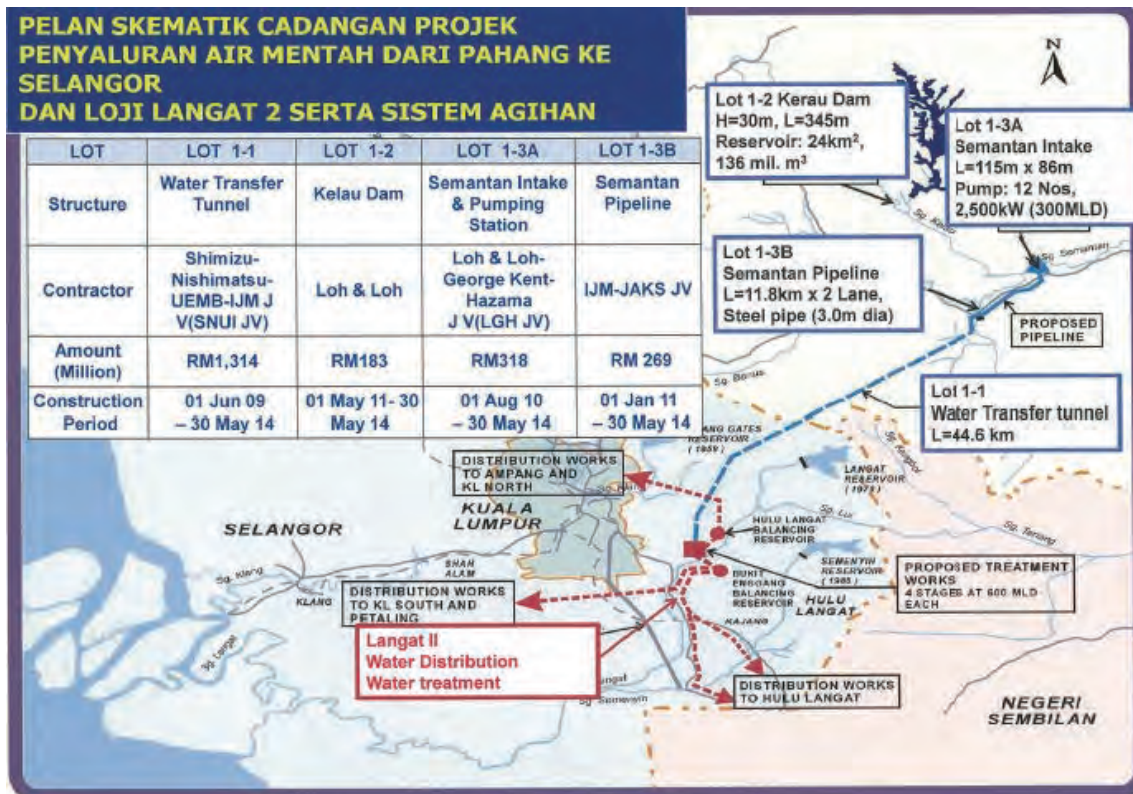
- Lot 1-3A Semantan Intake, Pumping

Intake Weir	Gated weir	total length	71 m
	Fixed weir	total length	130 m
Intake, Pumping Station	Pumping station	115 m(length) x 85.875 m(width)	
	Pumps & Motors	12 nos(2,500kW)	
Surge Tanks	Steel	diameter	16 m x Height 32 m

- Lot 1-3B Pipeline

Pipeline	2 lanes pipeline	
	Pipeline total length	11.8 km
	Diameter of pipe	3.0 m
	Thickness of steel	22 mm
Pipe Bridge	Numbers of bridges	4nos
	Max. span length	48 m
	Thickness of steel	26 mm

- Site location map



3.2 Stakeholder's safety obligations

Stakeholders of Pahang-Selangor Raw Water Transfer Project are as follows.

- Employer : Ministry of Energy, Green Technology and Water (MEGTW)
Department : PPAMPS
- Bank : Japan International Cooperation Agency(JICA)
- Engineer : TEPSCO-SMEC-SMHB JV
- Contractor : SNUI JV
- Contractor : L&L
- Contractor : LGH JV
- Contractor : IJM-JAKS JV

Each stakeholder's obligation or responsibilities in respect of the safety are stipulated in the FIDIC Conditions of Contract for Works of Civil Engineering Construction Fourth Edition 1987 and reprinted 1992 with further amendments, and General Specification as follows.

(1) The Employer

There is no provision stipulating the Employer's responsibilities except ensuring the Employer's personnel and the Employer's other contractors on the Site.

(2) The Bank

No provision stipulating obligations and responsibilities of the Bank.

(3) The Engineer

- (a) Review and approve the safety program submitted by the Contractor.
- (b) The Engineer shall carry out his duties according to the contract documents such as the Conditions of Contract, Specifications, Drawings and so on.

(4) The Contractor

In the Conditions of Contract, there are many clauses stipulating the Contractor's obligation to ensure the site safety. The major obligations are as follows.

- (a) The Contractor have full regard for the safety of all persons entitled to be upon the Site.
- (b) The Contractor shall comply with any accident prevention regulations and any safety regulations published by the Government.
- (c) The Contractor has obligation of reporting to the Engineer about accidents.
- (d) The Contractor shall furnish his Company's Safety and Health Policy which shall comply with Malaysian Laws or International Standards for construction sites, and appoint a qualified safety personnel.

Compared with the Employer and the Engineer, as mentioned above, the Contractor undertakes more extensive and significant responsibilities to ensure a safety working

environment at the construction site.

And The Contractor shall appoint a Chief Safety Inspector. The Chief Safety Inspector shall report directly to the Contractor’s company director responsible for implementing the Health and Safety Policy. The Safety Officer assumed responsibility for implementing the day-to-day safety activities.

During the hearing of his review, the Employer has replied that “we generally leave the overall safety matters to the Contractor”, while the Engineer has remarked that “we have instructed the Contractor to suspend the works whenever we deemed it necessary for safety reasons.”

3.3 Safety management system

Each Contractor has established safety management system on the site in accordance with the Contract requirements and related safety laws of Malaysia, and executed in accordance with the Safety management plan that has been approved by the Engineer.

Each Contractor’s safety management system are including the following items.

- (1) Health, safety and environment policy and target
- (2) Safety organization
- (3) Safety management plan
- (4) Safety promotion and training
- (5) Routine safety activity
- (6) Incentive and penalty scheme
- (7) Emergency response plan

- (1) Health, safety and environment policy and target

- (a) Safety policy

Safety policies of each contractor are as follows.

Lot & Contractor	Safety policy
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • Complying with all legal and other requirements, • Prevention of pollution at work place, • Prevention of accidents and incidents at works place, • Striving for continual implement, • Providing the necessary resources in pursuing this objective.
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • Continual improvement in order to achieve zero accident and incident, • Comply with applicable statutory and regulatory requirements,

Lot & Contractor	Safety policy
	<ul style="list-style-type: none"> • Take reasonable and practicable measures to prevent and eliminate risk of injuries and occupational illness and pollution, • Take proactive steps towards the conservation and preservation of the environment, • Responsibility for health, safety and environment are shared.
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • To conduct business possible manner consistent with the Occupational Health & Safety Act, applicable regulations and good construction practices.
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • Commitment of the continuous improvement of health, safety and environment practices with objectives.

(b) Safety target

Lot & Contractor	Safety target
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • Zero incident involving fatality, • Reduce serious illness and major incident not more than 1 case, • Zero case involving occupational health to all workers, • 100% staff and workers attending safety and health sessions.
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • Management accepts the responsibility for leadership, visible involvement, continual improvement, and the effectiveness of its safety, health and environmental program, • Managers and executives are responsible for executing the safety, health & environmental policy, program and in developing pertinent knowledge and skills for those under their supervision, • All employees are expected to look after the safety & health of themselves, their colleagues and to participate, cooperate and abide by L&L Constructions Sdn Bhd's safety, health and environmental program.
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • Promote excellence in health and safety management, • Continually improve current health and safety performance, • Provide a safe and health work environment, • Identify and control actual and potential hazards, • Establish and maintain communication on health and safety, • Support employees' participation in health and safety matters, • Identify needs and provide training on health and safety, • Demonstrate a commitment to the accurate reporting and recording of health and safety matters, • Comply with legal and organizational obligations.

Lot & Contractor	Safety target
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • Prevent accidents, • Prevent occupational illness, • Prevent environment pollution.

(2) Project safety organization

Each Contractor assigned the safety personnel in accordance with the safety management plan.

Lot & Contractor	Safety personnel	Number
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • Safety manager • Safety officer • Safety supervisor • Environment officer • Environment engineer 	1 2 4 1 1
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • Safety and health officer • Environment officer 	1 1
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • Safety and health officer • Environment officer 	1 1
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • Safety officer • Safety supervisor • Environmental office • Environmental supervisor 	1 1 1 1

Each Contractor defined the role, responsibility, authority and so on for the safety personnel in Safety management plan.

(3) Project management plan

Lot & Contractor	Safety management plan
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • 22 Clauses • 8 Appendices
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • 10 Clauses • 24 Attachment
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • 8 Clauses • 7 Appendices
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • 18 Clauses • 10 Tables • 7 Appendices

It regulates obligations of all parties concerned in order to ensure the site safety and to follow relevant safety legislations of Malaysia.

(4) Safety education & training

The primary objectives of safety promotion and training are to raise an individual's safety awareness, and to improve an individual's safety know-how. To achieve these objectives, each Contractor has been implementing various efforts.

Lot & Contractor	Safety education & training
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • There are several objectives to be achieved in training programs as per Clause 8 of their HSE plan. • SNUI-JV has established HSE programs to improve the HSE condition at site and also to promote workers' awareness in HSE matters as stated in Clause 9 of HSE plan.
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • Clause 4.0 "Safety program" of safety & health plan describes safety promotion and training aspects.
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • Clause 2.0 HSE program of HSE plan states about safety promotion and training.
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • Project health and safety plan has Clause 11. "training, awareness and competence".

(5) Routine safety activities

- Each Contractor has implemented various safety activities to reduce accidents risks in the site and also has held various meetings to ensure smooth communication inside and outside of the project site.

Safety personnel and supervisor should attend routine safety activities and its details should be reported to the Employer and the Engineer.

Lot1-1 Transfer Tunnel

Routine safety activities	Daily	Weekly	Monthly
Safety Walk	X	X(joint)	X(joint)
Safety Assembly	X	X(joint)	X(joint)
Tool Box Meeting	X		
Machine Operation Checking	X	X(by Law & operation manual)	X(by Law & operation manual)
Construction Meeting	X		
Subcontractor Coordination Meeting	X		
Weekly Progress Meeting		X	
Monthly Progress Meeting			X
Health and Safety Committee Meeting			X
Quality Council Meeting			X
Monthly Environment Monitoring Report			X
Monthly Safety Report			X
Monthly Progress Report			X
Monitoring of Noise & Water Quality Submit			X

- Safety walk has been held on a daily basis with the participation of all staffs and workers at each site. Joint safety walk was conducted weekly, monthly basis.
- Tool Box Meeting has been held on a daily basis with the participation of all staff and workers.
- Construction meeting is being conducted on a daily basis with the participation of project engineers, supervisors and safety officers.

Lot 1-2 kelau Dam

Routine safety activities	Daily	Weekly	Monthly
Safety Walk		X	
Tool Box Meeting		X	
Machine Operation Checking	X		
Construction Meeting		X	
Subcontractor Coordination Meeting		X	
Project Management Meeting			2times/month
Weekly Progress Meeting		X	
Monthly Progress Meeting			X
Health and Safety Committee Meeting			X
Quality Council Meeting			1time/year
Monthly Environment Monitoring Report			X
Monthly Safety Report			X
Monthly Progress Report			X
Quarterly Environment Monitoring Report			quarterly

- Safety walk is been conducted on a weekly basis with the participation of safety officer and environment officer.
- Tool Box Meeting is been conducted on a weekly basis with the participation of safety.
- Construction meeting chaired by project manager and construction manager is been conducted on a weekly basis.

Lot 1-3A Intake & Pumping Station

Routine safety activities	Daily	Weekly	Monthly
Safety Walk		X	
Safety Assembly			X
Tool Box Meeting	X	X	
Machine Operation Checking	X		
Construction Meeting	X		
Subcontractor Coordination Meeting		X	
Weekly Progress Meeting		X	
Monthly Progress Meeting			X
Health and Safety Committee Meeting			X
Quality Council Meeting			X
Monthly Environment Monitoring Report			X
Monthly Safety Report			X
Monthly Progress Report			X
Quarterly Environment Monitoring Report			quarterly

- Safety walk lead jointly by on a weekly basis responsible as project manager and construction manager is conducted on a weekly basis.
- Tool Box Meeting chaired by supervisor is conducted every day.
- Construction meeting chaired by construction manager is conducted every day.

Lot 1-3B Pipeline

Routine safety activities	Daily	Weekly	Monthly
Safety Walk			X
Safety Assembly			X
Tool Box Meeting		X	
Construction Meeting		X	
Machine Operation Checking	X		
Subcontractor Coordination Meeting		X	
Weekly Progress Meeting		X	
Monthly Progress Meeting			X
Health and Safety Committee Meeting			X
Quality Council Meeting			quarterly
Monthly Environment Monitoring Report			X
Monthly Safety Report			X
Monthly Progress Report			X
Monitoring of Noise & Water Quality			X
Submit			

- Safety walk is conducted on a weekly basis with the participation of project manager, construction manager, quality control manager, safety officer and environment officer, project engineers and supervisors.
- Tool Box Meeting is been conducted on a weekly basis with the participation of safety officer and environment officer and supervisors.
- Construction meeting chaired by project manager is conducted on a weekly basis.

Observation for routine safety activities

1. At Lot1-1 and Lot1-3A project site, Tool Box Meeting is conducted on a daily basis.

Since with progress of the Works site conditions are changing day by day, it is quite important to monitor the health condition of individual worker in order to reduce an accident involving the worker in poor health condition. Study team recommends that Tool Box Meeting should be held on a daily basis, and also that the staff of the Contractor should, at every morning, walk through the site to inspect its hazard and then should give appropriate instructions to the Sub-contractor.

2. Document control for safety management is good each Contractor.
3. Knowledge and awareness of safety management for the Contractor has not been sufficiently penetrated up to individual workers of the Sub-contractor.

(6) Incentive and penalty Scheme

Each Contractor motivates its sub-contractors to improve their standard through various incentive and penalty schemes.

Lot & Contractor	Incentive & Penalty
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none">• HSE incentive scheme describes Clause 9.4 of HSE plan.• Penalty scheme describes Clauses 11.0 of HSE control measures-disciplinary & penalty scheme.
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none">• Clause 4.0 "Safety programme" of Safety & health plan describes safety promotion and training aspects.
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none">• Clause 1.5 "HSE committee" stated the committee would organize activities related Incentive Scheme.• LGH-JV explained HSE committee is authorized to make decision on penalty to their subcontractors.
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none">• Project health and safety plan has Clause 18. "Penalty scheme".

- SNUI-JV grants, on a quarterly basis, Health, Safety and Environment Award to sub-contractors and/or its workers with good performance at safety. On the other hand, those sub-contractors and/or its workers who violate the HSE rules have been removed from the site. Study team highly evaluates that SNUI-JV's incentive and penalty schemes are going well for the time being.

(7) Emergency response plan

All contractors have obtained the Engineer's approval for "Emergency Response Plan(ERP)" as specified in the Contract and they keep ERP updated from time to time for the improvement. The ERP includes the following items.

- Emergency response general instruction
- Fire
- Spill of hazard materials
- Leakage of noxious gas and fuel
- Landslide
- Flooding
- Silt trap rupture
- Structure collapse such as tunnel
- Rock Burst in tunnel
- Traffic hazard
- Thunder
- Medical emergency
- Terrorist/Bomb threat

3.4 Current situation of the project

(1) Current status

Lot & Contractor	Commencement date & work progress as of end of 2012
Lot1-1 Transfer Tunnel SNUI-JV	<ul style="list-style-type: none"> • Commencement date: June 2009 • Work progress: 72.8% (Plan 72.6%)
Lot 1-2 kelau Dam L&L	<ul style="list-style-type: none"> • Commencement date: May 2011 • Work progress: 31.0% (Plan 59.0%)
Lot 1-3A Intake & Pumping Station LGH-JV	<ul style="list-style-type: none"> • Commencement date: August 2010 • Work progress: 69.2% (Plan 70.4%)
Lot 1-3B Pipeline IJM-JAKS JV	<ul style="list-style-type: none"> • Commencement date: January 2011 • Work progress: 73.2% (Plan 68.4%)

- The work of each Contractors is generally on schedule except Lot1-2. In Lot1-2, Extension of Time has been granted against the delay of the site clearance work for protective forest inside the site.
- Major accidents involving loss of life have not been reported.
- No major accident affecting progress of the Works have occurred.

(2) Accident records and accident description

(a) Accident records

- Lot 1-1 Transfer Tunnel

As of the end of December 2012, 3years and 7months has passed and total working hours became over 7.83million hours. SNUI-JV submitted monthly safety report every month. Table 3.4-1 shows accident records of project as of the end of December 2012.

Table 3.4-1 Accident records as of the end of December 2012

Total working hours ①	Non-lost time accident	Lost time accident (>4days off) ②	Workdays lost (>4days) (Days) ③	Frequency Rate (>4days) ④	Severity Rate ⑤
7,838,270	40	9	88	1.15	0.01

$$\text{Frequency Rate : } ④ = (② \div ①) \times 1,000,000 = 1.15$$

$$\text{Severity Rate : } ⑤ = (③ \div ①) \times 1,000 = 0.01$$

- Lot1-2 Kelau Dam

As of the end of December 2012, 1years and 8months has passed and total working hours became over 0.47million hours. L&L submitted monthly safety report every month. Table 3.4-2 shows accident records of project as of the end of December 2012.

Table 3.4-2 Accident records as of the end of December 2012

Total working hours ①	Non-lost time accident	Lost time accident (>4days off) ②	Workdays lost (>4days) (Days) ③	Frequency Rate (>4days) ④	Severity Rate ⑤
477,616	0	0	0	0	0

Frequency Rate : ④=(②÷①) x 1,000,000 = 0

Severity Rate : ⑤=(③÷①) x 1,000 = 0

Monthly safety report shows 2 cases of Near-Miss in past.

Note : Near-Miss means the same meaning of “Hiyari- Hatto” in Japanese.

- Lot 1-3A Intake & Pumping Station

As of the end of December 2012, 2years and 5months has passed and total working hours became over 1.00million hours. LGH-JV submitted monthly safety report every month.

Table 3.4-3 shows accident records of project as of the end of December 2012.

Table 3.4-3 Accident records as of the end of December 2012

Total working hours ①	Non-lost time accident	Lost time accident (>4days off) ②	Workdays lost (>4days) (Days) ③	Frequency Rate (>4days) ④	Severity Rate ⑤
1,009,320	0	0	0	0	0

Frequency Rate : ④=(②÷①) x 1,000,000 = 0

Severity Rate : ⑤=(③÷①) x 1,000 = 0

Monthly safety report shows no cases of Near-Miss occurred in the past.

- Lot 1-3B Pipeline

As of the end of January 2013, 2years and 1months has passed and total working hours became over 071million hours. IJM-JAKS JV submitted monthly safety report every month.

Table 3.4-4 shows accident records of project as of the end of January 2013.

Table 3.4-4 Accident records as of the end of January 2013

Total working hours ①	Non-lost time accident	Lost time accident (>4days off) ②	Workdays lost (>4days) (Days) ③	Frequency Rate (>4days) ④	Severity Rate ⑤
719,698	0	0	0	0	0

Frequency Rate : ④=(②÷①) x 1,000,000 = 0

$$\text{Severity Rate} : \textcircled{5} = (\textcircled{3} \div \textcircled{1}) \times 1,000 = 0$$

Monthly safety report did not show description of Near-Miss occurred in the past.

<Observations>

According to the accident records, accidents have been reported only from the contractor undertaking the transfer tunnel work. No accident has been reported from other contractors. The industrial accident rate of the transfer tunnel portion is better than that rate of similar tunnel construction projects in Japan in 2011(Table 3.4-5).

Judging from the monthly safety reports, the overall situation of the site safety is generally very well. However, as in the case with minor accidents, there would be a possibility that workers and sub-contractors have not reported their accidents to the contractors. Therefore the contractors should carefully review the accident reports made by sub-contractors.

Table 3.4-5 Frequency rate and Severity rate in Japan in 2011(Reference)

	Frequency Rate (>4days)	Severity Rate
General Construction	0.49	0.21
Civil works	1.19	0.60
Tunnel works	1.77	0.07
Other civil works	0.67	0.53

Source: Japan Advanced Information Center Safety and Health HP as of 2013(General Construction)

3.5 Site reconnaissance

Study team has conducted site reconnaissance for 5 days (on 28th, 30th, 31st January and 1st, 4th February). Overall project situation, safety activities of the contractors and the study team's comments and impression after site reconnaissance are as follows:

(1) Lot 1-1 Transfer Tunnel

(a) Progress of the works

- As of the end of December 2012, the progress of Lot1-1 is 72.8%, 0.2% ahead of schedule and the progress of each tunnel are as follows.

NATM1,2,3&4 tunnel were all breakthrough and under lining concreting works.

Progress rate of TBM1 tunnel : 71.9% (actual 8,387.9 m/ total length 11,670 m)

Progress rate of TBM2 tunnel: 67.5% (actual 7,881.7 m/total length 11,670 m)

Progress rate of TBM3 tunnel: 90.9% (actual 10,198.4 m/total length 11,218 m)

- Overall total tunnel length 44.6km of Lot1-1 will be 11th longest tunnel in the world once completed. Seikan Tunnel in Japan is 7th longest tunnel in the world.
- The overburden of 1,246m at the TBM2 tunnel portion is ranked 8th in the world. The overburden of Dai-Shimizu, Shin-Shimizu and Kanetsu Tunnel are 1,300m, 1,200m and 1,190m, 7th, 9th and 10th rank respectively in the world.

(b) Safety activities by SNUI- JV

Study team members participated in a morning meeting starting from 7:00 AM in the course of this study. It was very impressive that staff members and workers greet each other quite frequently on the way to the venue of the morning meeting. May it be "Selamat pagi" or "Good Morning", the practice to exchange greeting each another is an very effective way to improve safety management and to ensure smooth communication within a diverse organization consisting of different nationalities. The morning meeting consists of compulsory radio gymnastics, safety briefings by project manager, repeat a slogan "Safety First", followed by a tool box meeting and then ending with a small tool box meeting by each job category (photo 3-1 to 3-3).

- 10 slogans from the project manager are posted on the signboard at the morning meeting venue, of which the 3 slogans, "Greetings", "Punctuality", and "Clean up", are, among others, emphasized. Other signboards on safety policies, safety targets, quality, PDCA, and progress, etc. are also posted together on signboard, and those posting information are an effective way for drawing attention to safety (photo 3-4 & 3-5).
- To exercise supervision over those who has entered each tunnel, a tally board is utilized at the entrance of tunnel. This has become a common practice for safety management at tunnel construction sites (photo 3-6).



photo 3-1



photo 3-2



photo 3-3



photo 3-4

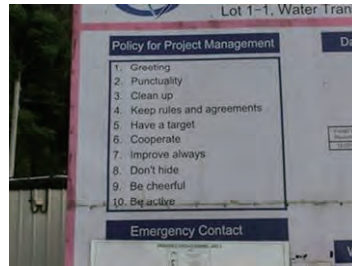


photo 3-5



photo 3-6

- In almost all parts of the tunnel, invert concrete are already placed. As the result the tunnel inside has become brighter and more visible, and safer access to the site is maintained. The materials and equipment inside the tunnel are all properly organized. Although there are water seepage points inside tunnel, its orderliness is effective prevent electrical accidents such as electric leakage caused by electric wires and tools (photo 3-7).
- The Lot1-1 contractor elaborates various safety measures to prevent the workers from heat disorders due to high temperature and humidity inside tunnel. For example, installation of the drinking fountains and ice-making machines at the departure and arrival area of the diesel locomotive, the introduction of a worker-carrier equipped with an air-conditioning system, and cool vest for workers(photo 3-8). Also those workers who are diagnosed with high blood pressure during periodical medical checkups are not allowed to enter the tunnel site.
- There are many signboards, signage, and posters to raise awareness visually. Signage indicating danger points, safety signs, and traffic signs are placed in many places, helping workers, drivers, and operators draw their attention to safety issues. The common injury is often in the case of inexperienced workers, but also in the case of skilled workers when they are carelessness or victim of assumptions due to inertia. In both cases, the most effective way to prevent these injuries is through continual attention calling by the safety officer and by signage in conspicuous places (photo 3-9).



photo 3-7



photo 3-8



photo 3-9

- Other precautions taken are; when the tunnel length gets longer, refuge chamber(safe shelter) is prepared to accommodate unforeseen circumstances near the tunnel face(photo 3-10). Fire extinguishers are equipped for cases of fire(photo 3-11). A specialized video camera is set in the fore end and back end of the diesel locomotive, so that the operator can always drive safely(photo 3-12).

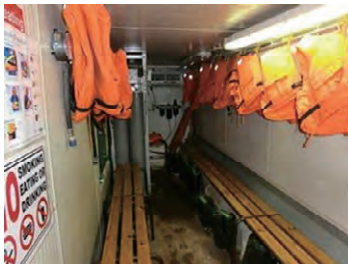


photo 3-10



photo 3-11



photo 3-12

(c) Recommendations after the site reconnaissance

- Maintain current standards of safety management

The current standards of safety management at this site can compare favorably with that of the standards in Japan. From the very beginning of the project, SNUI-JV, based on its past experiences, has exercised ingenuity in employing skilled workers, appointing and inviting specialists, choosing machinery well-suited to the project feature and so on. As for their Tool Box Meeting, they have continually improved on this. For example, now they hold a Small Tool Box Meeting after Tool Box Meeting within each job category to go over the day's work and danger points that may be predicted. They also carry out the policy of "Improve Always", which one of the 10 slogans posted by the project manager. In many cases, safety measures often fall into routine rut as the construction comes near the end. What is important is to keep the level of safety management high through the practice of "Improve Always".

(2) Lot 1-2 Kelau Dam

(a) Progress of project

- As of the end of December 2012, the progress of Lot1-2 is 31.0%, 28.0% behind of schedule.
- The delay caused by site clearance work of protected forest inside works site, however the extension of time was granted.
- Site clearance work inside dam, construction of box culvert at left bank and some works at spillway are ongoing, and embankment work of saddle dam B will start in due course.

(b) Safety activities by L&L

- The coffer-dam, being currently under construction on the left bank surrounding the box culvert, collapsed during the previous flood. The contractor, in consultation with the engineer, promptly raised the height of the coffer-dam(photo 3-13).
- A safety fence on the road shoulder utilizing bamboo cut down during the construction process is installed (photo 3-14).
- Safety signs, traffic signs and so on are posted throughout the site. The DOSH visits the site at least once a year, and leaves comments in the notebook so called “BUKU LOG JKKP” on findings from the on-site inspection(photo 3-15). All staff and workers take a safety induction & training when they first enter the site, and carry the green card of CIDB (Construction Industry Development Board) at all times. This practice has been adopted at all of construction sites in Pahang-Selangor Raw Water Transfer Project.



photo 3-13



photo 3-14



photo 3-15

(c) Recommendations after the site reconnaissance

- Because this construction site is vast, continued efforts in monitoring rainfall (weather forecasts, actual rainfall measurements, and observation of water level changes, etc.) are recommended. There is a need to consider the influx of unwanted materials such as debris from clearing operations and daily commodities from upstream, in addition to rainwater and mud.
- As the embankment of the dam is planned to resume its operation soon, thorough attention must be paid to avoid accidents due to heavy machinery. Also care must be taken to both traffic management and landslides.

- The contractor is aiming no accident for the period of one million accident-working-hours. It is desirable that the contractor should give thorough attention to Near-Miss incidents and first aid cases as they go towards their goal.

(3) Lot 1-3A Intake & Pumping Station

(a) Progress of project

- As of the end of December 2012, the progress of Lot1-3A is 69.2%, 1.2% behind of schedule.
- Construction of pumping station, intake weir, surge tank, installation of manifold pipe and the building for future staff accommodation for the pumping station.

(b) Safety activities by LGH-JV

- An observatory (observation tower) has been built on the hill within the construction site. In this tower the blueprints of this project are displayed, and it is possible to see both the entire construction site and progress of the Works. From the standpoint of safety management, this also helps prevent unsafe behaviors. Fixed-point observation photos, taken from this position are also beneficial to construction management(photo 3-16 & 3-17).
- The permanent hand-rail has already been installed. Though there are some covered over permanent hand rail would be damaged or its surface would be scratched during the construction period, when considering the safety aspects is much safer than the temporary hand rail. All that is necessary is some touch-up paint before the handover. It should be highly valued that the Employer and the Engineer have allowed to use the permanent hand rail at this stage(photo 3-18).
- Construction of a pump station is ongoing. It is notable that they have covered the pump station's workplace with the roof from the early stages, making it possible to work in rain. Though lighting can be blocked out by the roof, they have got over this problem by using the air vents as skylights.
- A pedestrian walkway has been provided for neighborhood residents. Though the construction site is located in a secluded area which is not likely to have third parties trespassing, the access road to the site is an arterial road, then the Contractor has built a pedestrian walkway to prevent accidents involving third parties and also as a part of CSR compliance.



photo 3-16



photo 3-17

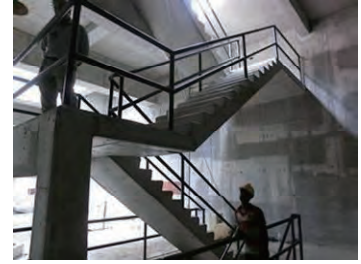


photo 3-18

(c) Observations after the site reconnaissance

- Elimination of the harmful effects of shared liability operation in JV

The site has adopted a shared liability operation in JV(section-by-section). Even in aspects of safety, responses are slightly different in each. Example are; the use of safety belts, the installment of safety rope, the method of using prefabricated scaffolds, the presence and/or absence of lifting equipment, fixation with a jack base, providing bridge batten of foot posts, etc. Study team recommends that JV has more and smooth communication on their safety management.

(4) Lot 1-3B Pipeline

(a) Progress of project

- As of the end of December 2012, the progress of Lot1-3B is 73.2%, 4.8% ahead of schedule.
- Installation of pipeline have been conducting by 3 parties. Progress rate is 85.2% as of the end of November 2012.
- Construction of pipe bridges is concurrently proceeding at 4 places. After the erection of bend pipe, steel pipes of main span will be installed.

(b) Safety activities by IJM-JAKS

- Tool Box Meeting (photo 3-19).
- IJM Corporation, a member of the JV has created a booklet on safety titled "SAFETY GUIDE"(photo 3-20).
- The preparation of necessary check lists and documents, data visualization as in accordance with the project health and safety plan (PSP), is done by safety officer as a leader. A sufficient safety management system is in place, and the recording and documentation of various meetings, reports and data are carried out(photo 3-21).



photo 3-19



photo 3-20



photo 3-21

(c) Observations after the site reconnaissance

- Some works(carried out by workers assigned to reinforcement-bars fixing work and prefabricated scaffolding work) were neither done according to the operation plan nor operation procedures. Therefore thorough compliance of the safety procedures is recommended.
- When safety check inspection is done, the contractor's leader, on-site engineer, and safety officer of the contractor should go all together.

(5) Findings on unsafe behavior and carelessness (negligence)

Accidents caused by human can be divided into two cases, namely an accident due to unsafe behavior and due to carelessness (negligence). Unsafe behavior is to take on risky behavior while they know it is "dangerous". This can be prevented by improving their safety awareness and implementing safety education. On the other hand, carelessness (negligence) is mainly due to "ignorance", "unskilled worker", "fatigue", and "misperception (assumptions)". When associated with other factors, it has the possibility of progressing into a severe disaster. To educate and raise awareness for safety, education upon employment (foreign workers in particular), hazard prediction training, worker management to decrease overwork employees, and adopting double checking system (i.e., doing a task with two people instead of one) are important. Also it is important to take precautions based on the fact that "humans are apt to commit negligence resulting in accident".

Chapter 4 Recommendations

Based on the result of safety study on the Project site, recommendations on safety management are summarized in the following Table.

<Pahang - Selangor Raw Water Transfer Project>

Items	Issues identified	Recommendations
The knowledge and awareness on safety at site	Each contractor had an ability to prepare, update and maintain safety management manual. It was found that the level of the knowledge and awareness for safety amongst the sub-contractors and workers differs considerably. Their involvements with self-regulation for site safety are required.	<ul style="list-style-type: none"> • Project manager and safety officer should patrol on the site regularly, in order to find unsafe behaviors of workers, inadequacy and defects of facilities, and instruct the sub-contractors and workers to rectify. • Close communications are to be strengthened in site organization and information on work contents, work procedures and so on are to be commoditized using the above communication. • Induction training for new comers of subcontractors and their workers is to be continued. • The accident and hazards predictive training is to be made at daily tool box meeting. • Thorough instruction on proper method for wearing Personal Protective Equipment is to be provided.
All stakeholders should involve in safety management	All stakeholders and workers are requested to have sufficient knowledge and awareness on occupational safety and to conduct the self-regulation. However, that has not yet reached a reasonable level, speaking about sub-contractor's staff and workers.	Monitoring of outcome of safety measures by stakeholders is to be carried out and by using PDCA (Plan-Do-Check-Act) cycle, quality of safety management is to be improved. (Action by initiative of contractors and by all stakeholders)

<Procedures for tender and contract in general>

Items	Issues identified	Recommendations
Current Tender system	It is hard to eliminate those tenderers who have not properly implemented the safety management.	In pre-qualification stage, documents regarding objectives, system and organization of safety management are to be submitted as PQ documents, in order to evaluate the safety performance of applicants for PQ. (Action by the Employer and JICA)
	Costs for safety management had considerable difference among contractors. In some case, the cost of safety	When the prices of safety management are included within unit price in the Bill of Quantities (BQ), it is hard to figure out the actual prices in safety measures. Therefore

Items	Issues identified	Recommendations
	<p>management was intentionally underestimated by tender in order to be the lowest price tenderer.</p>	<p>study team recommends that an independent item on safety prices is mandated in BQ, and the consistency with the safety management plan is cross-checked.</p> <p>Sample or standard templates, which incorporate separate items for safety management, for BQ and Specifications are to be made for convenience of both tenderers and the Employer.</p> <p>At the tender evaluation, prices other than that for safety management are used for first screening. Then the contents and prices for safety management are to be evaluated for deciding awardee of the Contract.</p> <p>(Action by the Employer, the Engineer and JICA)</p>
	<p>As this study was done solely on JICA project, the study does not cover safety requirements of other institutional donors.</p>	<p>It is advisable to research the safety requirements on other institutional donors, such as World Bank, Asian Development Bank etc.</p> <p>(Action by JICA)</p>

Appendix-1: Minutes

Memorandum at Interim study report meeting	
Date	7th February 2013, 14:00 - 15:10
Place	Engineer office at Mid Valley
Attendees	<p>Engineer Project Manager Deputy Project Manager Senior Tunnel Engineer</p> <p>Contractors</p> <p>Lot1-1 Project Manager Lot1-1 Deputy Project Manager Lot1-2 Senior Project Manager Lot1-2 Senior Safety Officer Lot1-3A Project Manager Lot1-3A Deputy Project Manager Lot1-3A Safety officer Lot1-3B Safety & Health officer</p> <p>Study team</p>
Subject	Interim study report to Engineer and Contractors, Opinion exchange meeting
<p>Record:</p> <ol style="list-style-type: none"> 1. Re-explanation of the object of this safety study. 2. Explanation of occupational accidents in Japan. <ul style="list-style-type: none"> Construction industry: in 1991 1,047accidents <li style="padding-left: 100px;">in 2011 342accidents JICA Projects : in 2009 32accidents 35 death toll <li style="padding-left: 100px;">in 2010(8months) 29accidents 49 death toll 3. QCDSE <p>In project management, its key elements are Q(Quality), C(Cost), D(Duration), S(safety) and E(Environment), and each of these elements should be given equal weighting. However it seems that the reality is a little different for the contractors and the Employer. Therefore it is quite important for the Employer, the Engineer, the Contractor and the Sub-contractor to clearly declare that “the safety should be above everything else”.</p> 4. Interim Safety Study Report <p>Frequency rate and Severity rate were calculated based on the formula shown in Japan Advanced Information Centre of Safety and Health. Study team was very impressed by the remarkable safety performance of Lot1-1 contractor who has been carrying out the lengthy</p> 	

transfer tunnel construction with 44.6km. Other contractors have recorded zero for both Frequency and Severity rate, which also is impressed. However as in the case with minor accidents, there would be a possibility that workers and sub-contractors have not reported their accidents to the contractors. Therefore the contractors should carefully review the accident reports made by sub-contractors.

Of ten slogans expressed by project manager of Lot1-1, three slogans such as “Greetings”, “Punctuality”, and “Clean up” are, among others, should be essential for safety.

Free discussion among all participants

- As for the Tool Box Meeting, SNUI-JV has continually improved on this. For example, now they hold a Small Tool Box Meeting after Tool Box Meeting within each job category to go over the day’s work and danger points that may be predicted. Managers of JV realize that safety awareness of individual worker has been improved and also recognize that is very effective to hold daily Small Tool Box Meeting and to explain importance of safety to workers continuously.
- SNUI-JV is aiming to improve safety awareness by having weekly safety walk with foreman etc.
- Safety officer conducts safety meeting with site staffs every week, then site staffs draw safety attention to sub-contractor’s workers .
- There are “Communication Gap” and “Language Gap” within a multi-ethnic organization consisting of different nationalities. Therefore firstly safety officer educates supervisors with regard to safety, and then supervisors convey safety-knowledge acquired to workers.
- For the large-scale projects like Pahang-Selangor Raw Water Transfer project, the safety education or seminar should be carried out under the leadership of the Employer or JICA, in order to standardize safety practice. The Contractors make the necessary arrangement for an education facility, and the Employer or JICA conducts the safety education and training.
- General specification describes that “no separate payment will be made for complying with the provisions for security, safety, health controls, etc., outlined herein, and all costs thereto shall be deemed to be included in the unit rates and lump sum prices stated in the Bill of Quantities.” Costs for safety management had considerable difference among tenderers. In existing tendering method, there might be high possibility that the contract is awarded to a contractor who underestimates his costs for safety management. It is quite difficult for that contractor to meet safety requirement.
- A contractor, referring to the current tender system, suggested that the cost related to

safety should be a fixed price or certain percentage against the tender price or direct cost. Or the cost related to the safety should be treated as Provisional Sum item. The Employers or institutional donors such as World Bank, ADB might have the database for the cost related to the safety, therefore they could evaluate the appropriate amount of the cost related to the safety against the construction amount. The safety improvement cannot be achieved only by the contractor's own effort.

- Safety management is primarily the responsibility of the contractor. However the safety management also need to be addressed by all of the stakeholders together.
- There are no shortcuts to safety. Safety education to workers must be conducted repeatedly. Staffs of the contractor are day-by-day considering how to conduct the safety education to workers. It is important for the contractor's staff to instruct workers to correct their unsafe behavior whenever they are doing. Daily safety education at the site is effective to raise safety awareness of workers. Staffs are always seeking the best way to conduct safety education.
- Difference in safety awareness and behavior between local contractors and Japanese contractors is evident, for instance, it occasionally happens that sub-contractor's worker has not followed the Engineer's instruction to correct the unsafe behavior. In addition, difference in safety awareness and behaviour between the main contractor and sub-contractor is so big, therefore it is very important for main contractors' staff to look around the site, since it sometimes happens that no supervisory staff of the main contractor can be found at the site.
- Documentation for safety management is properly handled by the contractors. However concerning the site safety, the contractors shall satisfy the requirements specified in safety management plan. It is important for the main contractors' staff to improve safety awareness and behavior of sub-contractors' workers.
- The organization of the Engineer consists of Japanese, Australian and Malaysian. There is a difference of the safety awareness between experienced staff and less-experienced staff. The Engineer instructs the contractor to suspend the works whenever he deemed it necessary for safety reasons, also the Engineer leaves it to the individual capacity of the Engineer's staff how to deal with daily safety issues.

Memorandum at Interim study report meeting	
Date	8th February 2013, 11:00 - 11:45
Place	KeTTHA(PPAMPS) office at Cyberjaya
Attendees	KeTTHA Project Director Deputy Project Director Deputy Project Director Deputy Project Director Deputy Project Director JICA Project Manager Study team
Subject	Interim study report to the Employer and JICA
<ul style="list-style-type: none"> • Briefing of 2-week safety study. • To reduce occupational casualties in Malaysia strong leadership by Malaysian public sectors are highly required. • Regarding to Frequency rate and Severity rate, accidents were only reported in the transfer tunnel project. In all other construction projects, the number of accidents has been reported as zero. There may be a possibility that workers and sub-contractors have not reported the accidents to the contractors. • Safety team has not found any defects in respect of safety that required urgent response during this safety study. • In a workplace, whenever there is one accident that causes a major injury, there are 29 accidents that causes minor injury, and there are 300 accidents that causes no injuries. Because many accidents share common root causes, addressing more commonplace accidents that cause no injuries can prevent accidents that cause injuries. • The project director instructed deputy project directors to inform the above comment at the monthly progress meeting. 	

Appendix-2: Questionnaires and answers

Note: Personnel information such as name, mail-address and telephone number is intentionally deleted.

Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Name for in charge of answer:

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
1. Organization charts	<p>1.Current Organization charts with those roles and obligations of Department of Occupational Safety and Health. Please provide it.</p> <p>2.Which department/section in your organization is relation with Pahang-Selangor Raw Water Transfer Project?</p> <p>3.Who is the person in charge for above department/section? Name, Position, Number of staffs</p> <p>4.Which kind of power or authorization has above the person in charge?</p>	<p>1.The organization charts are as attached in Appendix 1.</p> <p>2.Building Construction Section of DOSH Selangor.</p> <p>3. Director of DOSH Selangor. Number of staff are 125.</p> <p>4.Director of DOSH Selangor.</p>
2. Laws, various standards and regulations related to safety and quality control	<p>Availability of laws, various standards and regulations related to safety and quality control, as well as the names of those laws and contents of related provisions/clauses.</p> <p>(1) Names of laws</p> <p>(2) Contents of related provisions/clauses.</p>	<p>The department conducts enforcement activities covered by the following Acts:</p> <ul style="list-style-type: none"> • Occupational Safety and Health Act 1994 (Act 514) • Factories and Machinery Act 1967 (Act 139) • Petroleum Act (Safety Measures) Act 1984 (Act 302)

Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Name for in charge of answer:

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
3. History/trend of transition of Laws, various standards and regulations	<ol style="list-style-type: none"> 1. 1980's. 2. 2000's 3. 2013 	<ol style="list-style-type: none"> 1- Before 1994-The laws and regulations are prescriptive. 2- After 1994 – The trend of the laws and regulations are to build and sustain a culture of self-regulation. 3- 2013- The focus is to create a preventive culture in all workplaces.
4. Feature of Laws, Standards and regulations compared with ASEAN countries	1. Which kind of action or plan are you aiming to improve safety and health standards?	<p>There are four key strategies in the OSH Master Plan 15 to improve the safety and health standards in Malaysia as listed below-</p> <ul style="list-style-type: none"> • Government leadership and practices • Preventive workplace culture • Industry leadership and community engagement • Strong partnership locally and internationally
5. PR(public relations) , Training system and Statistic Data	1. Please explain the PR activities related to improvement of Safety and Health in DOSH.	<p>1.The PR activities carried out by DOSH are-</p> <ul style="list-style-type: none"> • Talks and briefings related to OSH • Campaigns and exhibitions related to OSH

Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Name for in charge of answer:

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
	<p>2. Please introduce any training activities which DOSH may have related to Safety and Health.</p> <p>3. Any statistic Data related to site accidents at construction industry in Malaysia.</p>	<ul style="list-style-type: none"> • Expert services in OSH for public and private agencies, associations of employees and also of professional groups • Collection and preparation of informative materials related to OSH for reference and distribution. <p>2. The National of Occupational Safety and Health (NIOSH) is responsible for OSH training and education, OSH promotion and OSH R&D. This is to complement the enforcement efforts of DOSH. However, DOSH also provides compliance support program and collaboration programs such as Malaysian Technical Cooperation Program (MTCP) and Third Party Training Program (TCTP).</p> <p>3. Statistic data related to site accidents at construction industry in Malaysia are as attached in Appendix 2.</p>
6. Others		-

Questionnaire for Safety Control/Management for DOSH

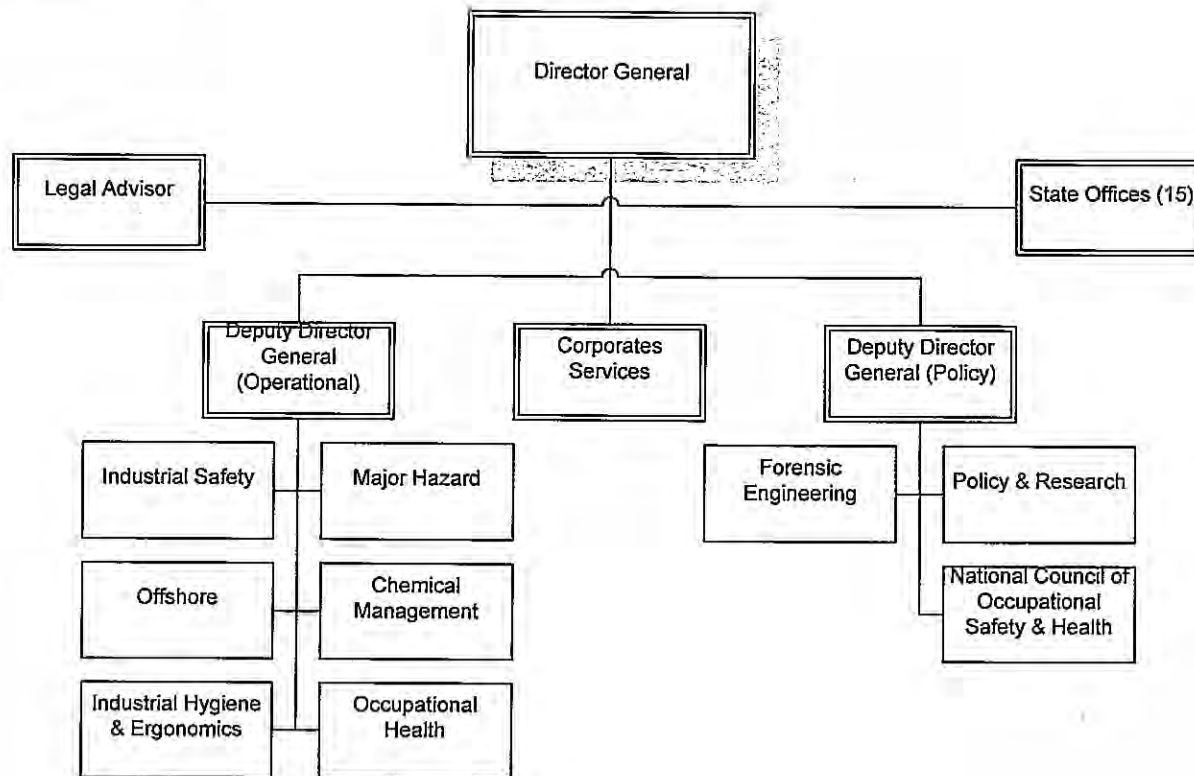
Country: Malaysia

Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:

Appendix 1

Organization Chart for DOSH Headquarters

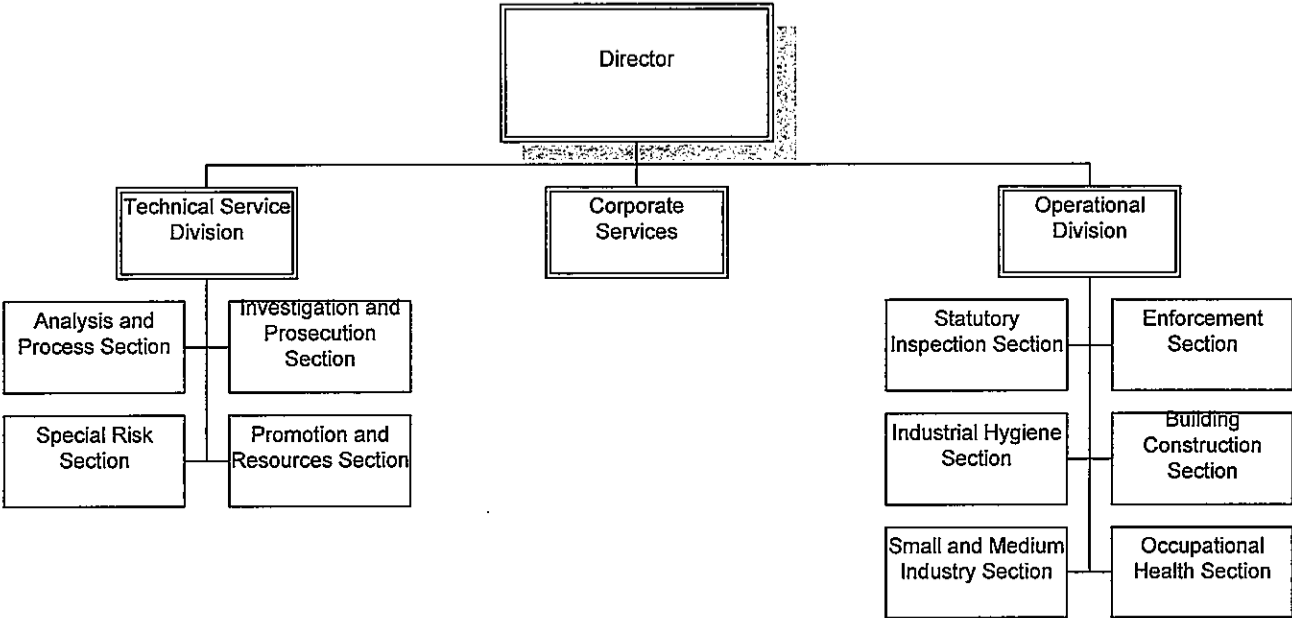


Questionnaire for Safety Control/Management for DOSH

Country: Malaysia
Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:

Organization Chart for DOSH State Office (Selangor)



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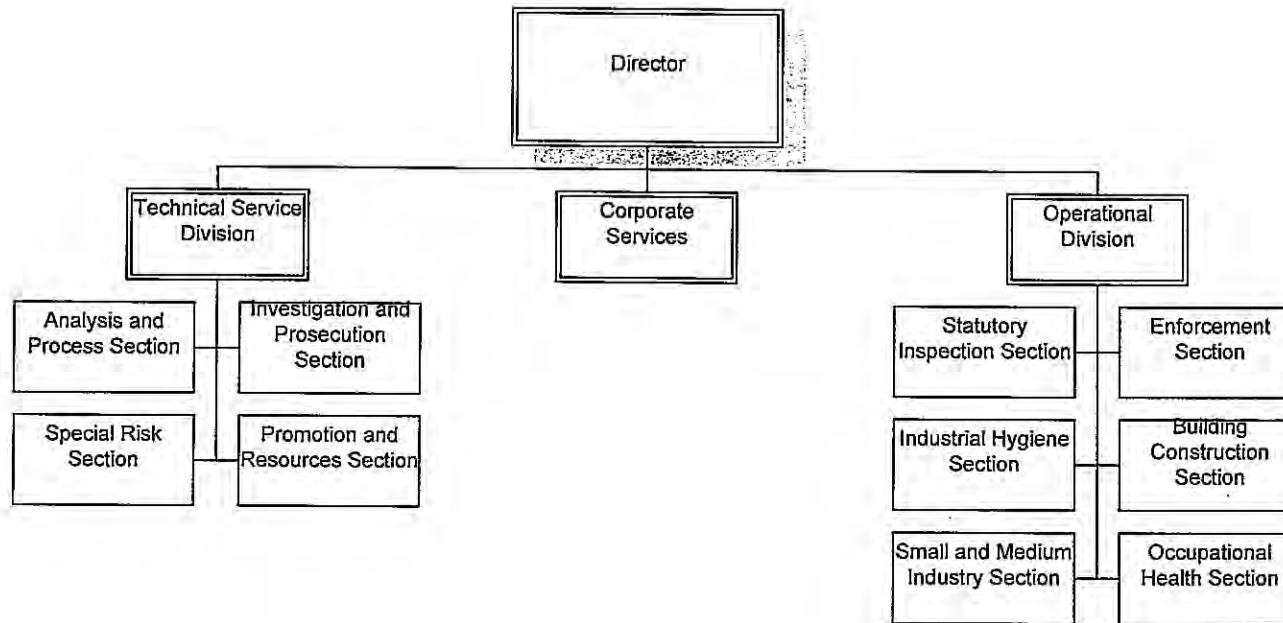
Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:

Organization Chart for DOSH State Office (Pahang)



Questionnaire for Safety Control/Management for DOSH

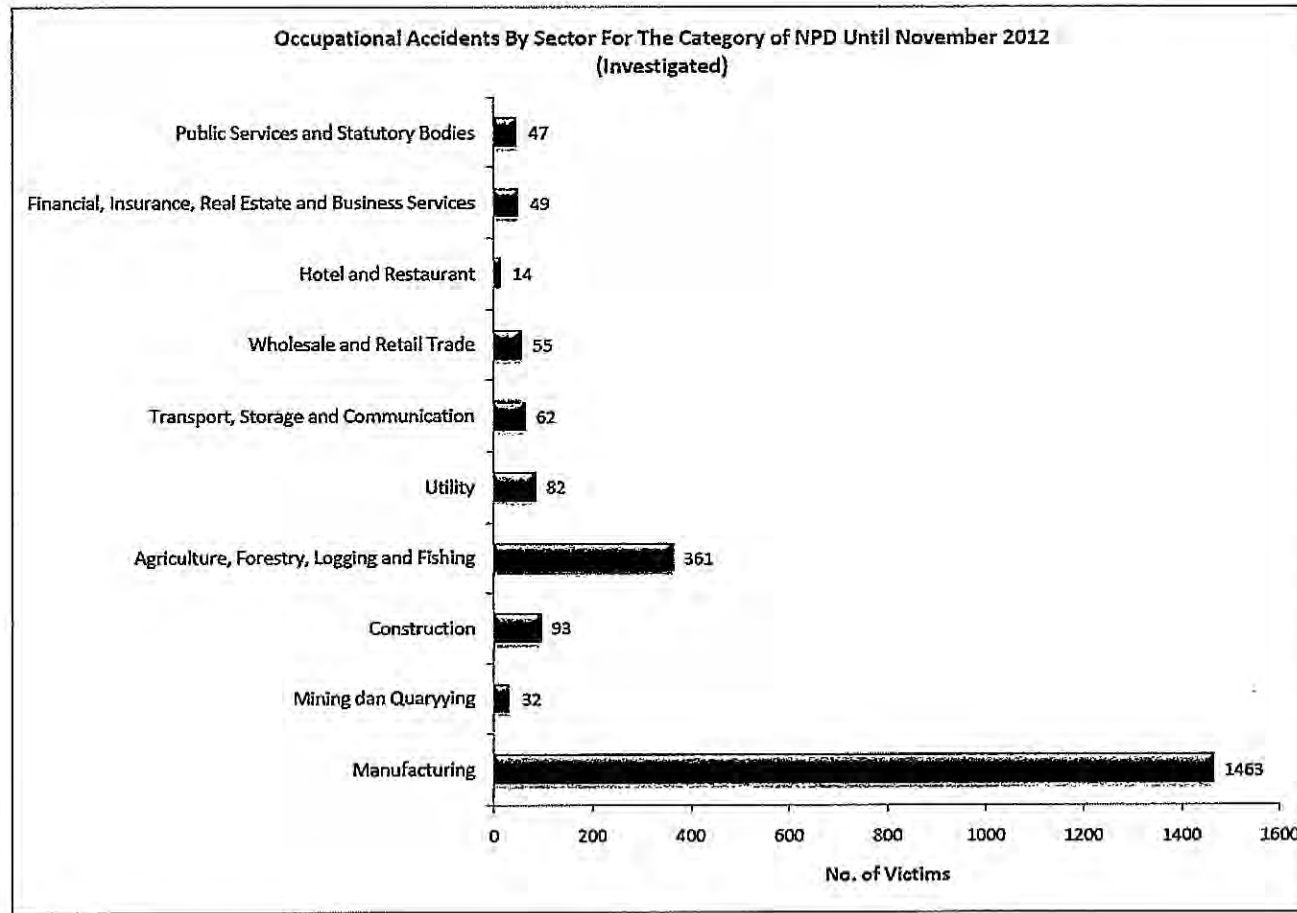
Country: Malaysia

Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:

Appendix 2

(Source: <http://www.dosh.gov.my>)

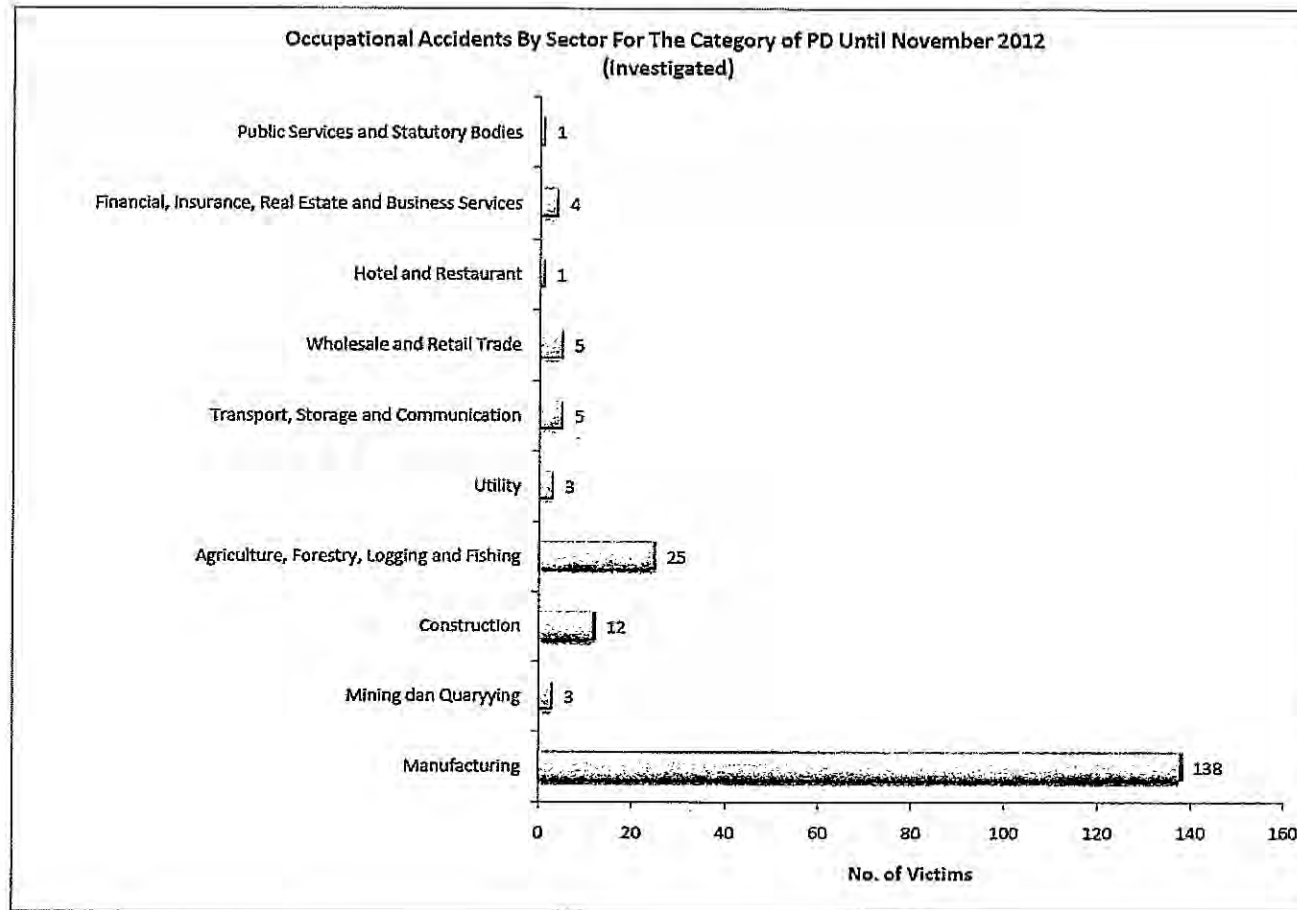



Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:



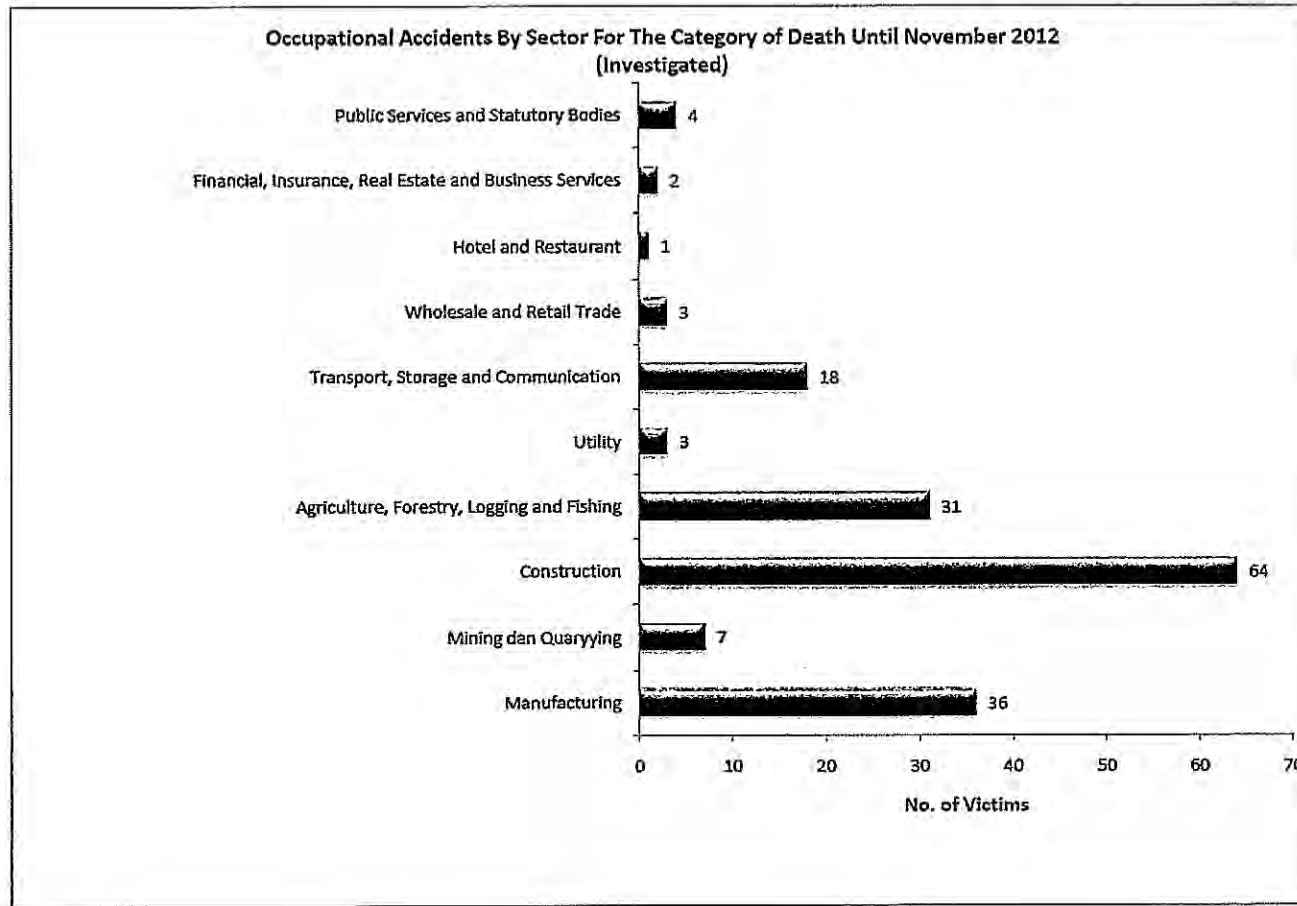
 Department of Occupational Safety and Health

Questionnaire for Safety Control/Management for DOSH

Country: Malaysia

Project Name: Pahang-Selangor Raw Water Transfer Project

Name for in charge of answer:



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Questionnaire for Safety Control/Management for Consultant

Country: Malaysia

Name for in charge of answer, Hiroyuki UKON

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
<p>1. Confirmation of the contact person in this safety confirmation survey.</p>	<p>1. Name and job title of the staffs in charge of Safety Control/Management. Please provide two persons names (main and substitute) just in case.</p> <p>2. Contact:</p> <p style="margin-left: 20px;">1) Email address:</p> <p style="margin-left: 20px;">2) Telephone(Mobile Phone)</p> <p style="margin-left: 20px;">3) Office address</p>	<p>B-9-1 Level 9, Tower B, Northpoint Offices, Mid Valley, No.1 Medan Syed Putra Utara, 59200, Kuala Lumpur</p> <p>(019) 265-0042 Km 1.0, Jalan Karak Mancis, 28600 Karak, Pahang Darul Makmur</p>
<p>2. Confirmation of the contact person on the safety management. [If the person is same as above question, you can omitted this Item]</p>	<p>1. Names and job title of the staffs in charge of Safety Control/Management. Please provide two persons (main and substitute) names just in case.</p> <p>2. Contact:</p> <p style="margin-left: 20px;">1)Email address:</p> <p style="margin-left: 20px;">2)Telephone (Mobile Phone)</p> <p style="margin-left: 20px;">3)Office address</p>	<p>Same as above</p>

Questionnaire for Safety Control/Management for Consultant

Country: Malaysia

Name for in charge of answer, Hiroyuki UKON

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
<p>3. The position in your organization and in your external relation what is the above mentioned safety personnel,</p>	<p>1. <u>Site organization chart</u>. Please provide it by means of Email or hard copy at site, if you may offer.</p> <p>2. <u>Emergency contact network</u>. Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. <u>Site organization chart</u> Refer to Organization chart attached.</p> <p>2. <u>Emergency contact network</u> Refer to mobile phone number list.</p>
<p>4. Safety plan.</p>	<p>1. <u>Safety Policy or something similar</u> Please provide it by means of Email or hard copy at site.</p> <p>2. <u>Safety Management Plan</u> Please provide it by means of Email or hard copy at site.</p> <p>3. <u>Safety Target or something similar</u> If the Safety Targets are defined as numbers in different with above mentioned Safety Policy, please provide.</p> <p>4. <u>Safety Record or something similar</u> Please provide sample format for Safety Record by means of Email. Or May we take a look your Safety Records at your site?</p>	<p>The Consultant prepared no safety plan. The Contractor has approved Health, Safety and Environmental Plan (HSE Plan).</p> <p>The Contractor reported safety record in the Monthly Coordination Meeting.</p>

Questionnaire for Safety Control/Management for Consultant

Country: Malaysia

Name for in charge of answer, Hiroyuki UKON

Project Name: Pahang-Selangor Raw Water Transfer Project

Items	Points to be Clarified	Answer
<p>5. Safety Control Management</p> <p>5.1. <u>Contract</u></p> <p>Regarding description for Safety Control, which clauses are stipulated in Contract.</p>	<p>1. <u>The Clauses Number in Contract</u> Please provide Clause Numbers if any.</p> <p>2. <u>Contents/Detail in those Clauses</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>There is no related Clause in the Agreement for Engineering Consultancy Services.</p> <p>In the Contract Document, Chapter 6 in the General Specification specifies the Contractor's security, safety and health control.</p>
<p>5.2. <u>Construction Method</u></p> <p>Regarding description for Safety Control, Any description written in your method of construction statement.</p>	<p>1. <u>Do you have this kind of method of statement?</u></p> <p>2. <u>If yes,</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>The Consultant prepared no method statement.</p>
<p>5.3. <u>Laws and Regulations for Safety in Construction</u></p>	<p>1. If there are any laws and regulations that you are using at the site office, please provide the name of laws and regulations, incorporated with its name of government agencies. It may be useful for us to have a Lists of Laws and Regulation.</p> <p>2. Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>Occupational Health and Safety Act 1994 Please download from following site. http://www.agc.gov.my/Akta/Vol.%2011/Act%20514.pdf</p>
<p>5.4 <u>Others</u></p>		

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-1

Items	Points to be Clarified	Answer
<p>1. Confirmation of the contact person in this safety confirmation survey.</p>	<p>1. Name and job title of the staffs in charge of Safety Control/Management. Please provide two persons names (main and substitute) just in case.</p> <p>2. Contact:</p> <p>1) Email address:</p> <p>2) Telephone(Mobile Phone)</p> <p>3) Office address</p>	<p>1.</p> <p>2.</p> <p>1)</p> <p>2)</p> <p>3) 23-B, Jalan Langat, Ceria4, Taman Langat Ceria, Batu10 43100 Hulu Langat, Selangor, Malaysia</p>
<p>2. -confirmation of the contact person on the safety management. [If the person is same as above question, you can omitted this Item]</p>	<p>1. Names and job title of the staffs in charge of Safety Control/Management. Please provide two persons(main and substitute) names just in case.</p> <p>2. Contact:</p> <p>1)Email address:</p> <p>2)Telephone(Mobile Phone)</p> <p>3)Office address</p>	<p>Safety Officer</p> <p>1)</p> <p>2)</p> <p>3) Jalan Langat, Ceria4, Taman Langat Ceria, Batu10 43100 Hulu Langat, Selangor, Malaysia1</p>
<p>3. The position in your organization and in your external relation what is the above mentioned safety</p>	<p>1. <u>Site organization chart</u> . Please provide it by means of Email or hard copy at site, if you may offer.</p> <p>2. <u>Emergency contact network</u> Please provide it by means of Email or hard copy at site,</p>	<p>Refer to the following document (We will show you during audit)</p> <p>1. Safety management plan</p> <p>2. Monthly Progress Report</p> <p>3. Monthly Safety Report</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-1

Items	Points to be Clarified	Answer
personnel,	If you may offer.	4. Emergency Response Plan
4. Safety plan.	<p>1. <u>Safety Policy or something similar</u> Please provide it by means of Email or hard copy at site.</p> <p>2. <u>Safety Management Plan</u> Please provide it by means of Email or hard copy at site.</p> <p>3. <u>Safety Target or something similar</u> If the Safety Targets are defined as numbers in different with above mentioned Safety Policy, please provide.</p> <p>4. <u>Safety Record or something similar</u> Please provide sample format for Safety Record by means of Email. Or May we take a look your Safety Records at your site?</p>	<p>Refer to the following document (We will show you during audit)</p> <p>1. Safety management plan 2. Monthly Progress Report 3. Monthly Safety Report 4. Emergency Response Plan</p>
5. Safety Control Management (A) Contract	<p>1. <u>The Clauses Number in Contract</u> Please provide Clause Numbers if any.</p> <p>2. <u>Contents/Detail in those Clauses</u></p>	<p>Clause 19.1 of General Conditions ("GoC"), Chapter 6 and 3.1 to 3.2 of Technical Specifications("TS")</p> <p>1. Clause 19.1 of GoC : The obligation to keep the safety of</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-1

Items	Points to be Clarified	Answer
Regarding description for Safety Control, which clauses are stipulated in Contract?	Please provide it by means of Email or hard copy at site, If you may offer.	all personnel. Chapter 6 of TS; Safety and Security Control, requirement of safety facilities, rescue team. Clause 3.2 of TS: safety Requirement of underground excavation
(1) <u>Construction Method</u> Regarding description for Safety Control, Any description written in your method of construction statement.	1. <u>Do you have this kind of method of statement?</u> 2. <u>If yes,</u> Please provide it by means of Email or hard copy at site, If you may offer.	Refer to the following document (We will show you during audit) 1. Construction methods Statement for each work 2. Safety management plan 3. Monthly Progress Report 4. Monthly Safety Report 5. Emergency Repons Plan
5.3. <u>Laws and Regulations</u> for Safety in Construction	1. If there are any laws and regulations that you are using at the site office, please provide the name of laws and regulations, incorporated with its name of government agencies. It may be useful for us to have a Lists of Laws and Regulation. 2. Please provide it by means of Email or hard copy at site, If you may offer.	Occupational Safety and Health Act 514,1994 Safety and Health Committee Regulation 1996 Safety and Health Officer Regulations and Order, 1997 Code of Practice for Safe Working in Confined Space Guidelines of Occupational Safety and Health in Tunnel Construction, 1988

Questionnaire for Safety Control/Management **for Contractor**

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-1

Items	Points to be Clarified	Answer
5.4 <u>Others</u>	List of sub-contractors and their scope of works.	Major subcontractors is as follows; Bernas Kinta: TBM and NATM works OTA: NATM works Spring Energy: Earth work and road works Dig Cast: The bridge and construction of conduit Paskhus: Construction of power supply facilities and supply of electrical facilities Robbins: Supervision of E&M work relating to TBM Unibase: The supply of invert segment

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Mahmud Bin Tahar (Loh & Loh Constructions Sdn Bhd),

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-2

Items	Points to be Clarified	Answer
<p>1. Confirmation of the contact person in this safety confirmation survey.</p>	<p>1. Name and job title of the staffs in charge of Safety Control/Management. Please provide two persons names (main and substitute) just in case.</p> <p>2. Contact:</p> <p>1) Email address:</p> <p>2) Telephone(Mobile Phone)</p> <p>3) Office address</p>	<p>1)</p> <p>i) Email :</p> <p>ii) Tel (Mobile) :</p> <p>iii) Site Office Address :</p> <p style="padding-left: 40px;">P24 Atas, Jalan Desa Damai 34, Taman Desa Damai, 28700 Bentong Pahang Darul Makmur.</p> <p>2)</p> <p>i) Email :</p> <p>ii) Tel (Mobile) :</p> <p>iii) Site Office Address : Same as above.</p>
<p>2. Confirmation of the contact person on the safety management.</p> <p>[If the person is same as above question, you can omitted this item]</p>	<p>1. Names and job title of the staffs in charge of Safety Control/Management. Please provide two persons(main and substitute) names just in case.</p> <p>2. Contact:</p> <p>1)Email address:</p> <p>2)Telephone(Mobile Phone)</p> <p>3)Office address</p>	<p>Same as above.</p> <p>Same as above.</p>
<p>3. The position in your organization and in</p>	<p>1. <u>Site organization chart.</u></p> <p>Please provide it by means of Email or hard copy at site,</p>	<p>1) Site organization chart</p> <p>Please find enclosed latest Organization Chart.</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Mahmud Bin Tahar (Loh & Loh Constructions Sdn Bhd),

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-2

Items	Points to be Clarified	Answer
<p>your external relation what is the above mentioned safety personnel,</p>	<p>if you may offer.</p> <p>2. <u>Emergency contact network</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>2) Emergency contact network Please find enclosed list for your review.</p>
<p>4. Safety plan.</p>	<p>1. <u>Safety Policy or something similar</u> Please provide it by means of Email or hard copy at site.</p> <p>2. <u>Safety Management Plan</u> Please provide it by means of Email or hard copy at site.</p> <p>3. <u>Safety Target or something similar</u> If the Safety Targets are defined as numbers in different with above mentioned Safety Policy, please provide.</p> <p>4. <u>Safety Record or something similar</u> Please provide sample format for Safety Record by means of Email. Or May we take a look your Safety Records at your site?</p>	<p>1) Safety Policy Please find enclosed safety policy.</p> <p>2) Safety Management Plan Please find enclosed Safety Management Plan.</p> <p>3) Safety Target or similar To provide equivalent / similar items.</p> <p>4) Safety Record or similar A sample format of Safety Record will provided.</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-2

Mahmud Bin Tahar (Loh & Loh Constructions Sdn Bhd),

Items	Points to be Clarified	Answer
<p>5. Safety Control Management</p> <p>5.1. <u>Contract</u></p> <p>Regarding description for Safety Control, which clauses are stipulated in Contract.</p>	<p>1. <u>The Clauses Number in Contract</u> Please provide Clause Numbers if any.</p> <p>2. <u>Contents/Detail in those Clauses</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p><u>Condition Of Contract</u></p> <p>a) Sub-clause 8.2; Site Operations and method of construction</p> <p>b) Sub-clause 19.1; Safety, Security and Protection of Environment</p> <p>c) Sub-clause 32.1; Contractor to keep site clear</p> <p><u>General Specification</u></p> <p>a) GS 4.3 – Risk Management System</p> <p>b) GS 4.6 – Monthly Equipment Report</p> <p>c) GS 7 – Security, Safety and Health Control</p> <p>Above documents will provide in softcopy format.</p>
<p>5.2. <u>Construction Method</u></p> <p>Regarding description for Safety Control, Any description written in your method of construction statement.</p>	<p>1. <u>Do you have this kind of method of statement?</u></p> <p>2. <u>If yes,</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1) Yes.</p> <p>2) We will provide the Method of statement in softcopy format.</p>

Questionnaire for Safety Control/Management **for Contractor**

Country: Malaysia

Mahmud Bin Tahar (Loh & Loh Constructions Sdn Bhd),

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-2

Items	Points to be Clarified	Answer
<p><u>5.3.Laws and Regulations</u> for Safety in Construction</p>	<p>1. If there are any laws and regulations that you are using at the site office, please provide the name of laws and regulations, incorporated with its name of government agencies. It may be useful for us to have a Lists of Laws and Regulation.</p> <p>2.Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1) Laws of Malaysia</p> <p style="margin-left: 20px;">i) Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders</p> <p style="margin-left: 20px;">ii) Factories and Machinery (Building Operations and Works of Engineering Construction) (Safety) Regulation 1986</p> <p>The Department of Occupational Safety & Health (DOSH) Malaysia is responsible to monitor and make enforcement for these law and regulation.</p> <p>2) We will provide you the related books for reference at site.</p>
<p><u>5.4 Others</u></p>	<p>List of sub-contractors and their scope of works.</p>	<p>We will provide the list of sub-contractor in softcopy format.</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3A

Name for in charge of answer,

Items	Points to be Clarified	Answer
<p>1. Confirmation of the contact person in this safety confirmation survey.</p>	<p>1. Name and job title of the staffs in charge of Safety Control/Management. Please provide two persons names (main and substitute) just in case.</p> <p>2. Contact:</p> <p>1) Email address:</p> <p>2) Telephone(Mobile Phone)</p> <p>3) Office address</p>	<p>a) (Project Manager)</p> <p>1) Email address:</p> <p>2) Telephone (mobile phone):</p> <p>3) Office address:</p> <p style="padding-left: 20px;">P14 & P14A, Jalan Sentosa 1, Taman Sentosa 28600, Karak, Pahang Darul Makmur. Tel: 09-2311036 / 2311037 Fax: 09-2311040</p> <p>b) (Safety Officer)</p> <p>1) Email address:</p> <p>2) Telephone (mobile phone):</p> <p>3) Office address: Same as above.</p>
<p>2. Confirmation of the contact person on the safety management.</p> <p>[If the person is same as above question, you can omitted this Item]</p>	<p>1. Names and job title of the staffs in charge of Safety Control/Management. Please provide two persons(main and substitute) names just in case.</p> <p>2. Contact:</p> <p>1)Email address:</p> <p>2)Telephone(Mobile Phone)</p>	<p>Same as above.</p> <p>Same as above.</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3A

Name for in charge of answer,

Items	Points to be Clarified	Answer
	3)Office address	
3. The position in your organization and in your external relation what is the above mentioned safety personnel,	<p>1. <u>Site organization chart</u>. Please provide it by means of Email or hard copy at site, if you may offer.</p> <p>2. <u>Emergency contact network</u>. Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. Site organization chart. We will provide you soft copy (CD) and hard copy.</p> <p>2. Emergency contact network. We will provide you soft copy (CD) and hard copy.</p>
4. Safety plan.	<p>1. <u>Safety Policy or something similar</u> Please provide it by means of Email or hard copy at site.</p> <p>2. <u>Safety Management Plan</u> Please provide it by means of Email or hard copy at site.</p> <p>3. <u>Safety Target or something similar</u> If the Safety Targets are defined as numbers in different with above mentioned Safety Policy, please provide.</p> <p>4. <u>Safety Record or something similar</u> Please provide sample format for Safety Record by means of</p>	<p>1. Safety Policy or something similar We will provide you soft copy (CD) and hard copy.</p> <p>2. Safety Management Plan We will provide you soft copy (CD) and hard copy.</p> <p>3. Safety Target or something similar We will provide you soft copy (CD) and hard copy.</p> <p>4. Sample format for Safety Record We will provide you soft copy (CD) and hard copy</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3A

Name for in charge of answer,

Items	Points to be Clarified	Answer
	Email. Or May we take a look your Safety Records at your site?	
5. Safety Control Management 5.1. <u>Contract</u> Regarding description for Safety Control, which clauses are stipulated in Contract.	1. <u>The Clauses Number in Contract</u> Please provide Clause Numbers if any. 2. <u>Contents/Detail in those Clauses</u> Please provide it by means of Email or hard copy at site, If you may offer.	<u>C.O.C = Conditions of Contract</u> C.O.C Sub-Clause 8.2 Site operations and Method of Construction. C.O.C Sub-Clause 19.1 Safety, Security and Protection of environment. C.O.C Sub-Clause 32.1 Contractor to keep site clear <u>General Specification</u> G.S. 4.3 Risk Management System G.S 4.6 Monthly Equipment Report G.S 7 Security, Safety and Health Control We will provide you soft copy (CD) and hard copy.
5.2. <u>Construction Method</u> Regarding description for Safety Control, Any description	1. <u>Do you have this kind of method of statement?</u> 2. <u>If yes,</u> Please provide it by means of Email or hard copy at site,	1. Yes 2. We will provide you all the method of statement by giving you soft copy (CD) and hard copy.

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3A

Items	Points to be Clarified	Answer
written in your method of construction statement.	If you may offer.	
5.3. <u>Laws and Regulations</u> for Safety in Construction	<p>1. If there are any laws and regulations that you are using at the site office, please provide the name of laws and regulations, incorporated with its name of government agencies. It may be useful for us to have a Lists of Laws and Regulation.</p> <p>2. Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. <u>Laws of Malaysia.</u></p> <p>a) Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders.</p> <p>b) Factories and Machinery (Building Operations And Works Of Engineering Construction) (Safety) Regulations 1986.</p> <p>The government agencies responsible to make enforcement for this laws is Department of Occupational Safety and Health (DOSH) Malaysia.</p> <p>2. We can provide you the books related to Law of Malaysia as mentioned above.</p>
5.4 <u>Others</u>	List of sub-contractors and their scope of works.	We will provide you soft copy (CD) and hard copy.

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3B

Items	Points to be Clarified	Answer
<p>1. Confirmation of the contact person in this safety confirmation survey.</p>	<p>1. Name and job title of the staffs in charge of Safety Control/Management. Please provide two persons names (main and substitute) just in case.</p> <p>2. Contact:</p> <p>1) Email address:</p> <p>2) Telephone(Mobile Phone)</p> <p>3) Office address</p>	<p>1 a) (Project Manager)</p> <p>2.1 Email Address :</p> <p>2.2 Telephone :</p> <p>2.3 Office address : P12, Jalan Sentosa 1, Taman Sentosa, 28600 Karak. Tel no. : 09-2311047 & Fax no. : 09-2311038</p> <p>b) (Safety Officer)</p> <p>2.1 Email Address :</p> <p>2.2 Telephone :</p> <p>2.3 Office address : Same as above</p>
<p>2. Confirmation of the contact person on the safety management.</p> <p>[If the person is same as above question, you can omitted this Item]</p>	<p>1. Names and job title of the staffs in charge of Safety Control/Management. Please provide two persons (main and substitute) names just in case.</p> <p>2. Contact:</p> <p>1)Email address:</p> <p>2)Telephone(Mobile Phone)</p> <p>3)Office address</p>	<p>Same as above</p> <p>Same as above</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3B

Items	Points to be Clarified	Answer
<p>3. The position in your organization and in your external relation what is the above mentioned safety personnel,</p>	<p>1. <u>Site organization chart</u>. Please provide it by means of Email or hard copy at site, if you may offer.</p> <p>2. <u>Emergency contact network</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. <u>Site organization chart</u> We will provide you soft copy (CD) and hard copy (Refer Appendix 3)</p> <p>2. <u>Emergency contact network</u> We will provide you soft copy (CD) and hard copy (Refer Appendix 3)</p>
<p>4. Safety plan.</p>	<p>1. <u>Safety Policy or something similar</u> Please provide it by means of Email or hard copy at site.</p> <p>2. <u>Safety Management Plan</u> Please provide it by means of Email or hard copy at site.</p> <p>3. <u>Safety Target or something similar</u> If the Safety Targets are defined as numbers in different with above mentioned Safety Policy, please provide.</p> <p>4. <u>Safety Record or something similar</u> Please provide sample format for Safety Record by means of Email. Or May we take a look your Safety Records at your site?</p>	<p>1. <u>Safety Policy or something similar</u> We will provide you soft copy (CD) and hard copy (Refer Appendix 1)</p> <p>2. <u>Safety Management Plan</u> We will provide you soft copy (CD) and hard copy</p> <p>3. <u>Safety Target or something similar</u> We will provide you soft copy (CD) and hard copy (Refer Table 6 – Table 7 Page 31-33)</p> <p>4. <u>Safety Record or something similar</u> We will provide you soft copy (CD) and hard copy (Refer Table 6 – Table 7 Page 31-33)</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3B

Items	Points to be Clarified	Answer
<p>5. Safety Control Management</p> <p>5.1. <u>Contract</u></p> <p>Regarding description for Safety Control, which clauses are stipulated in Contract.</p>	<p>1. <u>The Clauses Number in Contract</u> Please provide Clause Numbers if any.</p> <p>2. <u>Contents/Detail in those Clauses</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p><u>C.O.C = Conditions of Contract</u></p> <p>C.O.C Sub-Clause 8.2 Site operations and Method of Construction.</p> <p>C.O.C Sub-Clause 19.1 Safety, Security and Protection of environment.</p> <p>C.O.C Sub-Clause 32.1 Contractor to keep site clear</p> <p><u>General Specification</u></p> <p>G.S. 4.3 Risk Management System</p> <p>G.S 4.6 Monthly Equipment Report</p> <p>G.S 7 Security, Safety and Health Control</p> <p>We will provide you soft copy (CD) and hard copy</p>
<p>5.2. <u>Construction Method</u></p> <p>Regarding description for Safety Control, Any description written in your method of construction statement.</p>	<p>1. <u>Do you have this kind of method of statement?</u></p> <p>2. <u>If yes.</u> Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. Yes</p> <p>2. We will provide you all the method of statement by giving you soft copy (CD) and hard copy.</p>

Questionnaire for Safety Control/Management for Contractor

Country: Malaysia

Name for in charge of answer,

Project Name: Pahan-Selangor Raw Water Transfer Project LOT1-3B

Items	Points to be Clarified	Answer
<p>5.3 <u>Laws and Regulations</u> for Safety in Construction</p>	<p>1. If there are any laws and regulations that you are using at the site office, please provide the name of laws and regulations, incorporated with its name of government agencies. It may be useful for us to have a Lists of Laws and Regulation.</p> <p>2. Please provide it by means of Email or hard copy at site, If you may offer.</p>	<p>1. <u>Law of Malaysia</u></p> <p>a) Occupational Safety and Health Act 1994 (Act 514) & Regulations and Orders.</p> <p>b) Factories and Machinery (Building Operations And Works Of Engineering Construction) (Safety) Regulations 1986. The government agencies responsible to make enforcement for this laws is Department of Occupational Safety and Health (DOSH) Malaysia.</p>
<p>5.4 <u>Others</u></p>	<p>List of sub-contractors and their scope of works.</p>	<p>We will provide you soft copy (CD) and hard copy</p>

Questionnaire as of 23rd January 2013

Requirement of safety Management System		Water Transfer Tunnel		Kelau Dam		Semantan Intake & Pumping Station		Semantan Pipeline		
		Lot1-1		Lot1-2		Lot1-3A		Lot1-3B		
		SNUI JV		Loh&Loh		LGH JV		IJM-JAKS JV		
1	1-1	Commitment by top management on Safety and Health Policy and setting objective of Safety and Health are made properly or not?	Yes	Based on Shimizu Corporation's top Management commitment.	Yes	Based on Loh & Loh's top Management commitment	Yes	Hazama is sponser. Policy is based on Loh & Loh top Management	Yes	Based on IJM top management Commitment
	1-2	the stakeholders are kept informed of Policy and Objective, or not?	Yes	Policy and objective are displayed on bulletin board at morning assembly.	Yes		Yes		Yes	
2	2-1	The requirements, i.e. social, regulatory, contractual, internal etc, are made clear and properly documented, or not?	Yes	Those are described in detail in Safety Management Plan.	Yes		Yes		Yes	
3	3-1	The risk assessments (risk and hazard assessment) on site are made and hazards are extracted properly, or not?	Yes	SNUI-JC held a Work shop including third parties at the beginnng.	Yes		Yes	Work shop was conducted 3times. Using Fichtner (independent checking engineer).	Yes	
	3-2	Measures for mitigation of such hazards are reviewed, or not? (Risk Management against Workers' accident risk)	Yes	Review for entire project was done depending on the progress. each work reviews at morning assembly.	Yes	Risk Management Plan is reviewed once in a year	Yes		Yes	
4	4-1	In order to achieve objectives, does preparation, execution, evaluation and improvement of Safety and Health Plan is made, or not?	Yes	Regarding to tunnel, the Plan was made by Laws of Malaysia and Japanese standards and customs.	Yes		Yes	To reiview by Monthly Safety Committee meeting	Yes	Up-dated once in year, it is company policy.
5	5-1	A procedure for collecting opinions of the top management and workers of relevant subcontractor as well as internal staffs, in order to reflect those on Safety and Health Plan, is established, documented and executed accordingly, or not?	Yes	Sharing information mabe by meeting and safety patroll.	Yes		Yes	Hazama HQ came to site twice in ayear. One is top management. The other is safety dept. Monthly safety report to be sent to HQ.	Yes	In March every year.
6	6-1	Training and Education to the engineers and workers are carried out and are documented properly, or not?	Yes	Being performed based on monthly and annual plan.	Yes	Induction Training, Fire drill are conducted, Green Card	Yes	Induction Training, Fire drill and medical are conducted, Green Card.HIV prevention.	Yes	HQ safety Office educate site safety officer. Site officer educate each workers.
7	7-1	Procedures of work which reflects policy and objective are made, or not?	Yes	It is also prepared in English and Malay.	Yes		Yes		Yes	Based on after accident or internal audit
8	8-1	The possible Emergency situation is identified and corresponding procedures are prepared, or not?	Yes	In accordance with Emergency Response Plan	Yes	Submitted to the Engineer	Yes	Fire Drill(photo attached)	Yes	
	8-2	Specific trainings for the above are carried out and are recorded properly, or not?	Yes	As emergency training inside tunnel, fire department and ambulance also were participated.	Yes		Yes		Yes	
9	9-1	Corrective Action procedures for the accidents or Non-conformance prepared, or not?	Yes	Incorporated with the accident information of all other project.	Yes		Yes		Yes	
	9-2	Preventive action procedures also prepared, or not? Corrective actions are taken properly and are documented, or not?	Yes	Preparation of written procedure including preventive measures for each work.	Yes		Yes		Yes	
10	10-1	Procedures for keeping records prepared and implemented, or not? The records are kept properly as per the above procedures, or not?	Yes	Safety management's and Document management's person in charge.	Yes		Yes		Yes	
11	11-1	The continual improvement of Safety Management System are made by applying PDCA cycle and mitigating potential risks, or not?	Yes	Number of accidents has been decreased by Tool Box Meeting.	Yes		Yes		Yes	
12	12-1	The Internal Audit is carried out in respective of Safety Management System, or not?	Yes	By the staff of safety departmentin Japan every 3 monhs.	Yes	Every 6 months	Yes	Every year	Yes	Internal audit has 2type. Notice and without notice(called surprise)
13	13-1	The effectiveness of System is included in the above Internal Audit, or not?	Yes	ex, Safety patrols by all of project managers of Shimizu corporation in Malaysia.	Yes		Yes	Implimentation	Yes	
14	14-1	How the CS Consultant is involved in the Safety Management?	Yes	Participation in safety walk and weekly meeting.	Yes	The Engineer has patrol and give NCR if something is wrong	Yes		Yes	By site walk, warning noitce, Safety council meeting