

MINING COMPANY

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A Comparative Analysis between Integrated Occupational Safety and Health Management System in a Support Mining Company and the Indonesian Mining Safety Management System

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ABSTRACT

A support mining company implements the main company's Occupational Safety and Health Management System (OSH-MS) called "FRESH" Management System. Meanwhile, the current management system of the Indonesian Mining Safety Management System has to be fulfilled by all mining company, regardless main or support or sub-contractor company.

This research aimed to analyze the fulfillment of the existing integrated Occupational Safety and Health Management System toward the Indonesian Mining Safety Management System.

The approach of this action research was a qualitative design. The subject of this research was the Occupational Safety and Health Management System of a supporting company called "X". Data was gathered from the implementation of the Hazard Identification Risk Assessment and Determination Control (HIRADC) as well as the existing integrated Occupational Safety and Health Management System included the person in charge as to be matched with the Indonesian Mining Safety Management System

This study resulted in a new format of standardized elements of Occupational Safety and Health Management System for the company X in accordance with the Government Regulation of Republic Indonesia Mining Safety Management System. The result indicated that a positive feedback from the company's top management to make a pilot project using the new format standard of the supporting company "X." In conclusion the new design from this study is implemented.

Keywords: Occupational Safety Health Management System, Mining Safety Management System, Design.

INTRODUCTION

In 2014, the Government of the Republic of Indonesia established the Regulation of the Minister of Energy and Mineral Resources MINERBA No. 38 concerning Mining Safety Management System.¹ The

regulation was established to ensure the availability of an integrated system in controlling the risk of occupational safety and health in mining operations. The legal basis of the establishment of the Regulation of Minister of Energy and Mineral Resources is the Constitution of 1945, Act No. 13 year 2003 concerning Manpower and Government Regulation No. 50 Year 2012 concerning the Implementation of Occupational Safety and Health Management System.

PT.X is a company of Power Plant and Distribution Transmission operating in the mining environment of PT. Y. Located on the same site, the company is a supporting company specialized in power supply to the mining area of PT. Y. PT. X applies similar management system to its parent company, known as FRESH (Freeport Safety Health Management System). The elements of FRESH are:

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1. Premises and Housekeeping
2. Mechanical, Electrical, and Personal Safeguarding
3. Management of Fire and other Emergency Risk
4. Incident Recording and Investigation
5. Organizational Management

FRESH is based on National Occupational Safety Association (NOSA) CMB 150N, Regulation of Minister of Energy and Mineral Resources No. 555 Year 1995, Mine Safety Health Association (MSHA), Occupational Safety Health Association (OSHA) and Occupational Health and Safety Assessment Series (OHSAS) 18001. PT. X responded to the Regulation of the Minister of Energy and Mineral Resources MINERBA No. 38 concerning Mining Safety Management System by reorganizing current OSH-MS.

RESEARCH METHODOLOGY

The research was a qualitative research with inductive approach.² Sample of the research was managerial staffs acting as the member of Occupational Safety and Health Committee (OSH Committee), who master the implementation of Mining Safety Management System, consisting of General Manager as the Chief of the committee (1 person), OSH as Secretary (2 persons), and General Superintendent as committee members (6 persons).

RESULT

Assessing the Implementation of Hazard Identification Risk Assessment and Determination Control (HIRADC) in PT. X: From the implementation of Hazard Identification Risk Assessment and Determination Control (HIRADC) in PT. X, a manager in steam-electric power plant

Based on the response, it can be concluded that the implementation of HIRADC in PT.X is as expected, which has been done thoroughly and profoundly on all aspects of work. The highest risks observed in PT.X were:

1. Electricity Shock
2. Failure in Energy Isolating
3. Lifting operation failure
4. Falls from Height
5. Hand or Body Injury
6. Spinal Injury/Low Back Pain
7. Traffic Collision
8. Exposure to Toxic Gases
9. Hearing loss
10. Financial loss

The identified hazards and risks are already included in hazard control so that the risk can be mitigated at an acceptable level. From the interview, it was clear that PT.X had committed to prioritize the safety and health of its assets, which are the employees.

Gap Analysis between OSH-MS of PT.X and Mining Safety Management System: The result shows that OSH-MS of PT.X has achieved 85% compliance to Indonesian

Mining Safety Management System. From al 555 elements (including sub-elements and sub sub-elements) of Indonesian Mining Safety Management System, all of which has been implemented by PT.X, yet the implementation has not met the terms as required. Some of the elements as well as its sub-elements were identified as impossible to be implemented since the elements are not compatible with the operational of PT.X.

There were no significant or critical differences from seven elements of Indonesian Mining Safety Management System to five elements of OSH-MS implemented by PT.X, which means that urgent actions are not necessary. The element with the lowest compliance was Management Review. PT.X has just implemented the element after the establishment of Indonesian Mining Safety Management System. The following tables present compliance percentage from each element.

Table 1: Compliance of OSH-MS to Mining Safety Management System

No.	Elements	Max Points	Compliance Point	Percentage (%)
1.	Policy	200	171	85%
2.	Planning	200	146	71%
3.	Organization and Personnel	150	142	94%
4.	Implementation	200	156	78%
5.	Evaluation and Follow-up	150	115	77%

Conted...

6.	Documentation	50	30	60%
7.	Review from Management	50	28	57%
TOTAL		1000	852	85%

Design of Standard Elements of OSH-MS of PT.X:

The model of OSH-MS design based on the following description is suitable to be apply into the power generation and transmission distribution company in mining operation.

There are seven standard elements, which are in line with standard elements of Indonesian Mining Safety Management System. Those elements are:

1. Policy
2. Planning
3. Organization and Personnel
4. Implementation
5. Evaluation
6. Documentation
7. Management Review

The concept of Indonesian Mining Safety Management System is more specific compared with other concepts of OSH-MS elements.

Table 2: Design of Element 1 (Policy) and Element 2 (Planning)

No.	Description of Standard Elements	Article No.
1. POLICY		
1.1	Policy of Occupational Safety and Health (OSH) and Operational Safety (OS)	Article 6
2. PLANNING		
³ 2.1	Hazard Identification Risk Assessment and Determination Control (HIRADC)	Article 7a,7b
2.2	Management of Change	Article 7a,7b
2.3	Regulatory Compliance	Article 7.c
2.4	Goals, Objectives, and Programs	Article 7.d
2.5	Work plan and Budget of OSH and OS	Article 7.e

Element 3 “Organization and Personnel” that was listed in elements of Indonesian Mining Safety

Management System should be carefully designed for mining company since there are specific role in OSH committee, like Chief of Mining Engineering or Operational Responsible Person. Another element, that is Element 6 or Documentation, should be also considered since the element provide a method to provide an aspect of ease to manage documents and mining company has many documents to be managed.

Table 3: Design of Element 3 (Organization and Personnel)

No.	Description of Standard Elements	Article No.
III. ORGANIZATION AND PERSONNEL		
1.	Organizational Structure	Article 8.a
2.	Appointment of Operations Responsible Person	Article 8.c
3.	Organizational Structure of OSH and OS Section	Article 8.d
4.	Appointment of Operational and Technical Supervisor	Article 8.e
5.	Safety Accountability Program for Supervisors	Article 8.e
6.	Appointment of Specialized Technical Personnel	Article 8.f
7.	OSH and OS Committee	Article 8.g
8.	Emergency Response Team	Article 8.h
9.	Selection and Placement of Personnel	Article 8.i
10.	OSH and OS Representatives	Article 8.i
11.	OSH and OS Education, Training, and Competence	Article 8.j
12.	OSH and OS Communication	Article 8.k
13.	OSH and OS Administration	Article 8.l
14.	OSH and OS Participation, Consultation, Motivation And Awareness	Article 8.m

Substandard elements in Mining Safety Management System were designed according to articles in the Regulations of Ministry of Energy and Mineral Resources by adjusting previous OSH-MS

standards through the result of analysis on HIRADC implementation and the result of gap analysis between the standard and substandard elements of Mining Safety Management System and previous OSH-MS.

Table 4: Design of Element 4 (Implementation)

No.	Description of Standard Elements	Articles No.
IV.	IMPLEMENTATION	
1.	Work Procedure	Article 9.a
2.	Working at Height	Article 9.a
3.	Open Hole	Article 9.a
4.	Coal Handling	Article 9.a
5.	Working over or near water	Article 9.a
6.	Work Permit	Article 9.a
7.	Personal Protective Equipment	Article 9.a
8.	Work Environment and Occupational Health Management	Article 9.b, 9c
9.	Work Environment Management – Physical Threats	Article 9.b, 9c
10.	Work Environment Management – Chemical Threats	Article 9.b, 9c
11.	Work Environment Management – Biological and Ergonomic Threats	Article 9.b, 9c
12.	Work Environment Management - Housekeeping	Article 9.b, 9c
13.	Office Safety	Article 9.b, 9c
14.	Hearing Conservation Program	Article 9.b, 9c
15.	Heat Stress	Article 9.b, 9c
16.	Management of work-related fatigue	Article 9.b, 9c
17.	Radioactive Management	Article 9.b, 9c
18.	Occupational Health Management	Article 9.b, 9c
19.	Operational Safety	Article 9.d
20.	LOTOTO	Article 9.d
21.	Boiler, Pressure System and Gas Container	Article 9.d
22.	Moving assets Operational Safety	Article 9.d
23.	Elevator and Crane	Article 9.d
24.	Fixed Asset Management	Article 9.d

Conted...

25.	Warning, Signage, and Traffic Signs	Article 9.d
26.	Safety Barrier	Article 9.d
27.	Stairs and Ladders	Article 9.d
28.	Installation Security	Article 9.d
29.	Electrical Security	Article 9.d
30.	Safety in Transmission and Distribution	Article 9.d
31.	Safety in Generator	Article 9.d
32.	Safety in Distribution Panel, MCC	Article 9.d
33.	Safety in Switchgear	Article 9.d
34.	Safety in Switchyard	Article 9.d
35.	Fire Protection	Article 9.d
36.	Mechanical Safeguarding	Article 9.d
37.	Hand Tool	Article 9.d
38.	Safety in Workshop	Article 9.d
39.	Safety on Boats	Article 9.d
40.	Dangerous Substance Management	Article 9.d
41.	Planning and Engineering Management System	Article 9.f
42.	Purchase System	Article 9.g
43.	OSH of Contractor	Article 9.h
44.	Emergency system Management	Article 9.i
45.	First Aid	Article 9.j
46.	First Aid Kit	Article 9.j
47.	Off-job Safety	Article 9.k

These substandard elements were considered as the additional results of observations on documents and procedures related to the operation of power plants and transmission of electrical distribution, including standard operating procedure based on the result of the focus group discussion and self-administered questionnaire.

Table 5: Design of Element 5 (Evaluation)

No.	Description of Standard Elements	Articles No.
V.	EVALUATION	
1.	Monitoring, Measurement and Evaluation of OHS and OS Performance	Article 10.a
2.	OSH and OS Inspection	Article 10.b

Conted...

3.	Evaluation of Regulatory Compliance	Article 10.c
4.	Incident Management	Article 10.d
5.	Near miss Management	Article 10.d
6.	Fatality Risk Management Program	Article 10.d
7.	Evaluation of OSH and OS Administration	Article 10.e
8.	Internal Audit	Article 10.f
9.	Non-conformance, Preventive and Corrective Action	Article 10.g

Standard elements were arranged based on the Articles number in Mining Safety Management System.

Table 6: Design of Element 6 (Documentation) and Element 7 (Management Review)

No.	Description of standard Elements	Article No.
VI. DOCUMENTATION		
6.1	Manual of OSH-MS	Article 11.a
6.2	Document and Record Control	Article 11b,c,d
VII. MANAGEMENT REVIEW		
7.1	Management review	Article 12

DISCUSSION

Implementation of Hiradc in PT.X: Evaluation on HIRADC applied by PT.X has resulted in the level of dangers in the company’s work environment. The level of dangers and risks in PT. X was categorized as HIGH, because or risk factors related to electricity. The steps to manage accidents are in line with the number of accidents because of shift system³. The highest risk level in PT.X shows that the dangers and risks are related with the core business of the company i.e. electricity. The effectiveness of controls conducted by PT.X was measured by percentage of the activity, yet the controls should be developed in accordance with scientific methods.

Gap between OSH-MS and Mining Safety Management System: Gap analysis was conducted to assess the compliance to Indonesian Mining Safety Management System. The evaluation was based the Indonesian Mining Safety Management System assessment method which refers to Attachment II of the Regulation of Ministry of Energy and Mineral Resources

No. 38 Year 2014 and compared to Relative Importance method to describe the level of priority in compliance to regulations.⁴

From the observation on Indonesian Mining Safety Management System compared to OSH-MS PT.X, there was 85% gap, which meant that PT.X was in need to follow up the non-conformities that occur from the core elements to sub-elements.

Design of Standard Elements Of OSH-MS of PT.X: Overall, Operational Safety was the most important and significant aspect in Indonesian Mining Safety Management Program.

Policy and Planning: Work plan and budget of OSH and OS are the only elements that should be designed since the element has not been listed in the previous OSH-MS. The preparation was in line with Indonesian Mining Safety Management System, article 7e, on work plan and budget of mining safety system.¹

Article 10 Section 4 Point C stated that occupational health and safety planning implementation should be supported with adequate budget⁵.

Organization and Personnel

Organizational Structure: Organizational structure has been listed on Indonesian Mining Safety Management System, article 8a, on planning and establishment of organizational structure, duties, responsibilities, and authority¹.

In line with Major Labor Laws No. 13 Year 2003, Article 87 section 1, OSH-MS is part of company management system, which comprises of organizational structure, planning, implementation, responsibilities, procedure, process, and resources. These elements are needed for policy development, compliance, analysis, and maintenance on occupational health and safety to control risks related to work activities in order to establish a safe, efficient, and productive workplace.⁶

According to Government Regulation No. 50 Article 12, section e, continued in Article 13, it is stated that OSH information should be made available for every employee. To achieve that, a clear organizational structure is needed.⁵

Appointment of Operational Responsible Person: Appointment for Operational Responsible Person has

been listed on Indonesian Mining Safety Management System, article 8c. It is in line with OHSAS Clause 4, element 4.4, and sub element 4.4.2 stating that setting the role, responsibilities, and accountability to facilitate the effectiveness of management system can be accomplished by appointing Operational Responsible Person, which is necessary in Mining Safety System⁷.

Organizational Structure of OSH and OS Section: Organizational Structure of OSH and OS Section has been listed on Indonesian Mining Safety Management System, article 8d, on formation and appointment of OSH and OS of Mining. It is in line with OSH-MS, article 10 section 4a stating that organization/units are responsible for their OSH. Related to Operational Safety, OSH-MS article 10, section 4c has listed standard operation procedure, as well as information, reporting and documentation procedure.¹

Appointment of Operational Superintendent and Technical Superintendent: Appointment of Operational Superintendent and Technical Superintendent has been listed on Indonesian Mining Safety Management System, article 8e on appointment of operational superintendent and technical superintendent. It is in line with OSH-MS Article 14 section 1 stating that employers are required to supervise and evaluate OSH in their company

Appointment of operational superintendent and technical superintendent is necessary to be included in Mining Safety Management System.

Appointment of Specialized Technical Staff: Appointment of specialized technical staff has been listed on Indonesian Mining Safety Management System, article 8f, on Appointment of specialized on mining technical staff. It is in line with OSH-MS Article 10 section 3b stating that authorization in OSH should be equipped by work permit from authorized institution.¹

Administration of OSH and OS: Administration of OSH and OS has been listed on Indonesian Mining Safety Management System, article 8l, on Administration Management of OSH and OS. In line with OHSAS element 4.4.4 on documentation, all documents related to occupational safety should be filed. Furthermore, element 4.4.5 mentioned that required documents for OSH-MS and OHSAS standard must be controlled.

Implementation: The design of the element is unique since all the standard elements of electricity especially

power plants and distribution transmissions are listed in the design. The aspects are included in electrical safety aspects, including the dangers of Arc Flash and other electrical aspects⁸.

Open Hole: Open hole has been listed in Indonesian Mining Safety Management Program, Article 9a, on Operation Management Implementation¹.

Open hole is an operational work that must be done in mining area.

That is in line with FCX 01- Open Hole Policy stating that any excavation work resulting in open hole must include a warning sign to inform workers about the excavation work in the area.

Coal Handling: Coal handling has been listed in Indonesian Mining Safety Management Program, Article 9a, on Operation Management Implementation¹.

This in line with OSHA 29CFR 1926.555 and OSHA 49CFR Chapter 2, describing that any work related to coal are hazardous due to the dust and other dangers. It is important to notice any handling such as personal protective equipment, shift change time, as well as operational management to protect workers and work tools⁹.

Occupational Health and Environment Management: Occupational Health and Environment Management has been listed in Indonesian Mining Safety Management Program, Article 9b and 9c, on Occupational Health Management Implementation and Mining Operational Safety Management Implementation¹.

It is in line with Act No. 13 Year 2003 Article 71 section 2 point c stating that work condition and environment should not interfere with physical, mental, social, and learning time in school. Work environment should not restrict occupational health. Occupational health is the responsibility of employers⁶.

Evaluation

Evaluation of Regulatory Compliance: Evaluation of Regulatory Compliance has been listed in Article 10.e. of Indonesian Mining Safety Management System concerning Evaluation of Regulatory Compliance. The evaluation is in line with OHSAS element 4.5.2 concerning evaluation of compliance, or in line with the commitment of organization to comply, the organization should establish, implement and maintain procedures to evaluate their compliance with relevant regulation.

Evaluation of Administration of OSH and OS: Evaluation of Administration of OSH and OS has been listed in Article 10.e. of Indonesian Mining Safety Management System concerning Evaluation of Mining Safety Administration Management ¹.

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Ethical Clearance: The Ethical Clearance was obtained from the Committee of Ethical Research No. 038/EC/FKM/2018 on 25 April 2018.

CONCLUSION

From the research, it can be concluded that:

1. Hazard and risk related to all work in PT.X have been identified and all risk has categorized based on the level of risk. Control measures have been established and performed consistently starting from the highest risk level to the lowest level of risk, so that the design of the standard elements created can be directly integrated to the results of HIRADC process
2. Compliance level of OSH-MS standards implemented by PT.X to Indonesian Mining Safety Management System was 85%, which can be categorized as SATISFACTORY, or based on the regulation of Ministry of Energy and Mineral Resources MINERBA, the compliance level has been certified as SILVER.
3. Design of element and sub-element standard for OSH-MS PT.X is in line with the regulation of Indonesian Mining Safety Management System, from five elements to seven elements. The additional elements were Organization and Personnel (Element 3) and Documentation (Element 6). Several sub-elements were merged into a new element based on the requirements from Indonesian Mining Safety Management System as well as PT.X operation in electricity.

RECOMMENDATION

The design of OSH-MS conforming Mining Safety Management System should be consistently applied and reviewed for its elements and sub-elements along with the conditions of companies operating in mining.

² **Conflict of Interest:** The Authors declare no conflict of interest in this article.

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