



Technical Due Diligence Survey of Nickel Product Unit

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OBJECTIVES

- At a time when nickel was becoming an important resource, the client wanted to acquire an NPI production unit to enter the nickel industry, so the client worked with SMM to conduct technical due diligence on the unit it wanted to acquire to assist the client in making an investment decision.

PROCESS

- Methodology
 - ▶ In-depth understanding of equipment operation and production of production unit through field research with industry experts
 - ▶ Track the flow of nickel ore resources near the production unit to ensure the feedstock supply of the NPI of the production unit
 - ▶ Check the third party environmental monitoring report, and combined with field research, in-depth analysis of the EHS management of the production unit
- Sample Size
 - ▶ Laterite Ore (10), NPI (10), Stainless Steel (3), Equipment Supplier (5), EHS (8)
- Project Time
 - ▶ 8 weeks

DELIVERABLES

- Nickel Ore Supply Stability Analysis
- Operation & Equipment Assessment
 - ▶ Reliability analysis on china produced facilities regarding durability aspect
- EHS Status Assessment
 - ▶ Fire management, equipment management, chemical management, waste management and health management treatment of the target
 - ▶ Shortcomings in EHS management and suggestions for improvement

Risk Identification Control and Management Methods

Evaluation Methods		Application Condition	Description	Implementation
Risk Identification	Job Safety Analysis (JSA)	<ul style="list-style-type: none"> For dynamic operation activities 	<ul style="list-style-type: none"> Identify the hazards of each production unit from the four aspects of people, things, environment and management 	<ul style="list-style-type: none"> Relevant systems have been improved, the implementation has been relatively good
	Safety Check List (SCL)	<ul style="list-style-type: none"> For static equipment and facilities 	<ul style="list-style-type: none"> Targeted checklist design for equipment and systems, based on safety laws and regulations and information on past accidents, to identify risks 	
	Hazard and Operability Study (HAZOP)	<ul style="list-style-type: none"> Involving hazardous energy Production processes or equipment with high requirements for operating process parameters* 	<ul style="list-style-type: none"> Formation of a group covering relevant professionals, clarification of the parameters of each module by means of group meetings, and use of parameters and guide words to describe deviations and the possible consequences, as well as recommended measures 	
Risk Assessment	Risk matrix (LS)	<ul style="list-style-type: none"> All risk factors 	<ul style="list-style-type: none"> According to the R value, the risk is divided into four levels: major risk (Level 1), High Risk (Level 2), Normal Risk (Level 3) and Low Risk (Level 4) <p>Formula</p> <div style="border: 1px dashed black; padding: 10px; display: inline-block;"> $\text{Risk value} \leftarrow R = L \times S$ <p style="text-align: center;"> Likelihood ↑ Severity </p> </div>	

*Deviations may lead to process accidents such as leaks, fires, explosions, human poisoning, etc.

Risk Assessment Summary

		Risk Matrix				
		5	4	3	2	1
Severity	Likelihood	Very Likely	Likely	Possible	Unlikely	Very Unlikely
	5	Extreme				
4	Major					
3	Moderate			H, M	K, N	
2	Minor		A, B, I, J	C	D, O	
1	Negligible		G		L, P	E, F

Risk value $R = L \times S$

- **R=20-25: Significant risk (Level 1)**, need to stop operation immediately; restart operation after the risk is effectively controlled
- **R=12-16: Higher risk (Level 2)**, which needs to be reduced; control measures must be taken immediately, and the department manager will follow up the control effect
- **R=5-10: General risk (level 3)**, risk that needs attention; complete control measures within the deadline
- **R=1-4: Low risk (Level 4)**, acceptable or tolerable risk, take necessary measures according to the company's situation

- According to the LS assessment method, SMM has classified the possible risks of the park into four levels, and the risks are concentrated in level 2 and level 3, which are at medium level.
- Overall there are no risk factors that may generate significant risks, and the risk army is within the controllable range.

Risk Assessment Process - Policy Compliance

No.	Risks	Possible Consequences	Likelihood	Severity	X	Likelihood	=	Risk value
				S		L		R
A	Sewage discharge exceeds the standard	There are some indicators that do not meet the requirements in the daily monitoring, but meet the requirements in the third party testing report and require attention	Unlikely	X		X		X
B	Noise exceeds then standard	There are some indicators that do not meet the requirements in the daily monitoring, but meet the requirements in the third party testing report and require attention	Unlikely	X		X		X
C	Ambient air quality exceeds the standard	There are some indicators that do not meet the requirements in the daily monitoring, but meet the requirements in the third party testing report and require attention	Unlikely	X		X		X
D	River & seawater quality exceeds the standard	Although the inspection from third-party meet the standard, the daily monitoring occasionally exceeds the standard, which requires continuous attention	Unlikely	X		X		X
E	B3 waste storage and disposal exceeds standard	Does not meet government regulation limits and is required to rectify	Very unlikely	X		X		X
F	Some tests do not meet the standard	The height of the chimney and the position of the emission detection point do not meet the requirements. It is currently being rectified and requires continuous attention	Very unlikely	X		X		X

Equipment Maintenance Analysis

Core Equipment		Non-core Equipment				
<ul style="list-style-type: none"> Rotary Kiln Submerged Arc Furnace 		<ul style="list-style-type: none"> Crusher Drying Kiln 				
Core Equipment		Non-core Equipment				
60 MVA		42/48 MVA				
60 MVA		42/48 MVA				
Operation	Equipment Service Life	Planned	X years	X years	X years	X years
		Actual	X years	X years	X years	X years
	Warranty Period		X year	X year	X year	X year
Cost Analysis	Fixed		X USD/MT Ni	X USD/MT Ni	X USD/MT Ni	X USD/MT Ni
	Consumable Replacement		X USD/MT Ni	X USD/MT Ni	X USD/MT Ni	X USD/MT Ni
Cost Analysis	Mean Time Between Failure		X months	X months	X months	X months
	Frequency of Maintenance		X times/year	X times/year	X times/ year	X times/ year
	Mean Time to Repair		X days/time	X days/time	X days / time	X days / time

Mean Time Between Failure
MTBF is the predicted elapsed time between inherent failures of a mechanical or electronic system, during normal system operation.


Mean Time to Repair
MTTR is the average time it takes to repair a system (usually technical or mechanical).

Source: SMM

Solid Waste and Hazardous Treatment



Hazardous Waste Treatment Assessment

Category	Main components	Treatment	Assessment	Photos
Non-B3 Waste	Smelting slag	Transferred by tipper truck to landfill and compacted soil	✓ Reasonable design	 <p>Domestic waste storage management plan</p>
	Domestic waste	Waste treatment plants, incinerators and composting (disposal permit in process)	× Permits is still in process, there are regulatory risks	
B3 Waste	Hydrocarbons, all wastes containing oil, lubricants, fossil fuels or their liquid derivatives	Planning of corresponding temporary storage areas for hazardous waste to be transferred and disposed of by third parties	✓ XX	
	Objects contaminated with toxic and harmful substances such as used oil/paint cans/bottles, rags, dust, spilled contaminated soil, aerosol bottles, etc.			
	Hazardous chemicals such as paints/varnishes, pesticide residues, industrial cleaners, acids, used batteries, etc.			
	Hospital clinical residues such as used needles, used bandages, expired medication, blood, swabs, cotton balls, etc.			
	Electronic waste, such as old circuit boards, old electronic equipment, toner cartridges, old ink cartridges, etc.			

Staff Training System

3-Level Safety Training System

- Company conducts basic safety knowledge, regulations, and legal education etc.

Company level



Department Level



- The rules and regulations and discipline education conducted by project department are organized by the site.

- The safety education carried out by team is presided over by team leader, or the team officer and designated senior workers. Mainly explain the safety of job overall operation and team safety system and discipline.

Team Level



- The three-level safety training system is a common safety training program used in domestic factories in China. It was implemented on March 1, 2006, by the State Administration of Work Safety of China. According to Article 12 (2015 version) of the Regulations, "Other workers in the production units of processing and manufacturing industries must undergo three-level safety training and education at the factory (mine), workshop (section, area, team), and team levels before taking up their posts." The regulations also specify the content and duration of the training. After years of optimization, the three-level safety training system has become more mature.

Process Emission Requirements in Indonesia

Air Pollution Legislation

Indonesia's air pollution legislation contains emission standards based on removable sources and stationary sources:

Removable Emissions

Regulation

KLH Decree No. KEP-35 / MENLH / 10/1993

Definition

Mobile emissions are defined as non-permanent emissions originating from off-road and on-road transport modes. Removable emission sources include operations and/or activities of the automotive industry, land transport and heavy equipment.

Stationary Emissions

KLH Decree No. KEP-13 / MENLH / 3/1995

Stationary emissions are defined as permanent, non-mobile or stationary sources and include factory stacks, industrial areas, water treatment areas, housing, plantations and forestry.



Type	Emissions	Maximum level (mg/Nm ³)	
Non-metal	Ammonia	NH ₃	0.5
	Chlorine	Cl ₂	10
	Hydrogen chloride	HCl	5
	Hydrogen fluoride	HF	10
	Nitrogen oxides	NO ₂	1000
	Opacity	-	35%
	Total particulate matter	-	350
	Sulfur dioxide	SO ₂	800
	Hydrogen sulfide	H ₂ S	35
	Metal	Mercury	Hg
Arsenic		As	8
Antimony		Sb	8
Cadmium		Cd	8
Zinc		Zn	50
Graphite		Pb	12

The available emission standards are derived from several industries such as: power plants, pulp and paper, cement and steel industries.

Note: The gas volumes are on a dry basis at 25°C and 1 atm.

Comprehensive Evaluation



Conclusion

Judging from the current government policy, environmental protection requirements are not very strict, and risks are controllable. However, due to international pressure or the influence of the new president, it is difficult to reach improvement at short term if the new environmental policy and requirements are issued.



Industrial Policy Compliance

XXX



Site Selection and Planning Compliance

Target production line

XX



Significant Risk Assessment

The main risk accidents of the project are poisoning accidents caused by leakage of furnace gas and fire and explosion accidents caused by leakage of natural gas and high-temperature melt, etc. The chance of accidents occurring in the plant is small with perfect risk prevention measures.



Cleaner Production Analysis

After taking appropriate precautionary measures, the project still has emissions exceeding the standard and noise exceeding the standard...



Environmental Sensitivity

High environmental sensitivity in the xx: xx is designated as a pelagic and demersal fishing zone as well as a potential zone for underwater tourism. XX As an area that includes the coral triangle, coral reefs, mangroves, and living seagrass in XX, there are 1,733.6 ha of living mangroves in XX.



Total Pollutant Emission Control

Wastewater discharge meets policy standards and does not affect microorganisms.

In terms of air pollution emission, XX conduct self-monitoring using manual equipment every week and third-party testing every six months to ensure that emissions in the park meet standards. However, the sampling platform height of the chimney does not comply with Indonesian policy standards (between 2De-8De), and is currently undergoing rectification