

# Overview of Management Systems for Uranium Mining & Processing

IAEA - INT2019

Interregional Workshop on Case Study of Conventional  
Uranium Production: from Exploration to Closure  
October 14 to 18<sup>th</sup>, 2019, Prague, Czech Republic

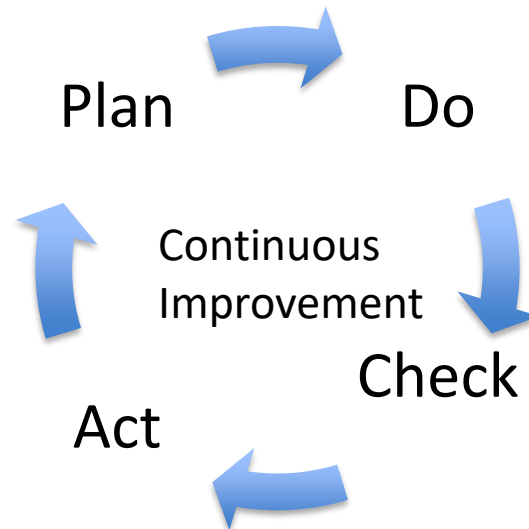


# Management Systems (MS): Agenda

- Formal and informal systems
- Relationship between organizational results, workforce experience and process/(MS)
- Key considerations when developing/implementing a formal management system

# Informal and Formal Management Systems

- All business have management systems (MS) either formal or informal, it is how work gets done
- There are many good examples of successful formal and informal (MS) (and likely just as many bad examples)
- Management Systems are based on the Plan, Do, Act, Check, Continuous improvement model

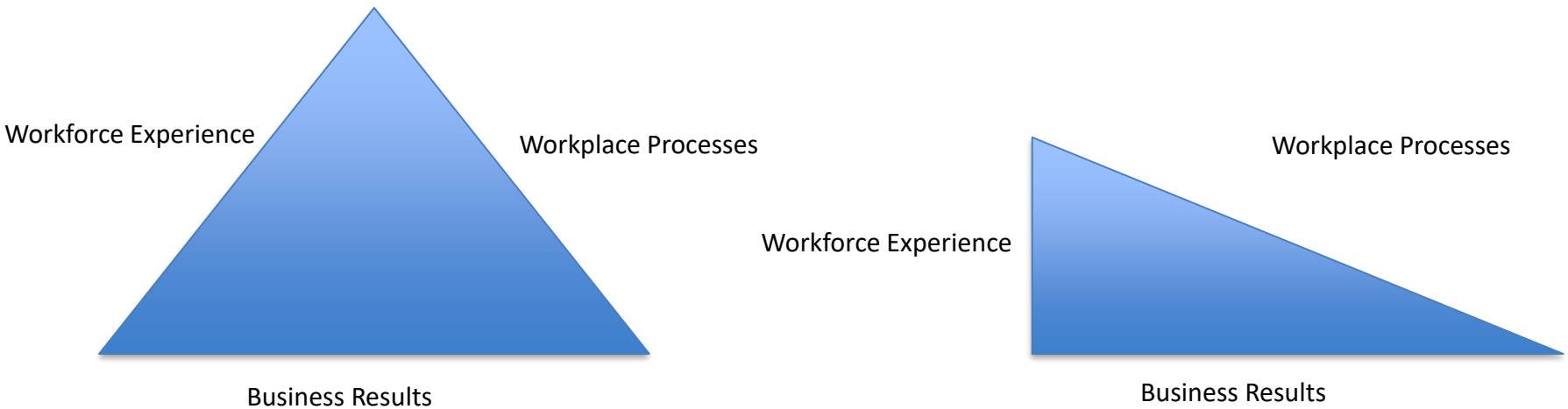


# Key Elements of Common Management Systems

- Plan – Setting goals and objectives for the organization
- Do – Execute work in accordance with established processes and procedures.
- Check – Monitor performance and audit, “say what you are going to do and then do what you said”
- Act – apply corrective actions to continually improve the organization’s performance

# Relationship between organizational results, workforce experience and process

- Work force productivity is impacted when additional processes are required due to lack of experience or higher risk worker activity, like the Nuclear industry



# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Understand and define what you really need in a Management System
- Fully leverage the experience you have in your workforce
- Carefully define critical tasks in the organization, so start small
- Develop a corrective action system that covers entire organization
- Sponsor audits that truly drive business results

# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Understand and define what you really need in a Management System

For the Uranium industry, (related to mines and mills), either a Quality Management System or as a minimum a Health & Safety, Radiation and Environmental Protection Management.

Examples:

ISO 9001 for Quality; OHSAS 18001 Health & Safety; ISO 14001 Environmental  
ISO 37001 General Management

# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Fully leverage the experience you have in your workforce

The employees doing the work every day can provide the basis for:

- a) Procedures and processes
- b) Help calibrate risks of routine and non-routine tasks
- c) Align how activities are performed currently and implement best practice going forward



# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Carefully define critical tasks in the organization, so start small:
  - a) Trying to encompass all activities of an organization when initially establishing a management system will result in too many processes and procedures, overloading the organization
  - b) So what's important? There are at several questions to ask when determining your critical tasks for your management system

# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

What is Important/critical to the organization:

- a) Does the process present high risk to the employees, the public, the environment or the primary stakeholders?\*
- b) What are the short and long term risks?\*
- c) What type of incidents have actually occurred within your organization or other similar organizations? (Calibration based on experience).
- d) Do the employees responsible for the process agree that it is a critical task? Reassessment of what is important/critical to the organization.

\*a risk assessment tool/chart is required

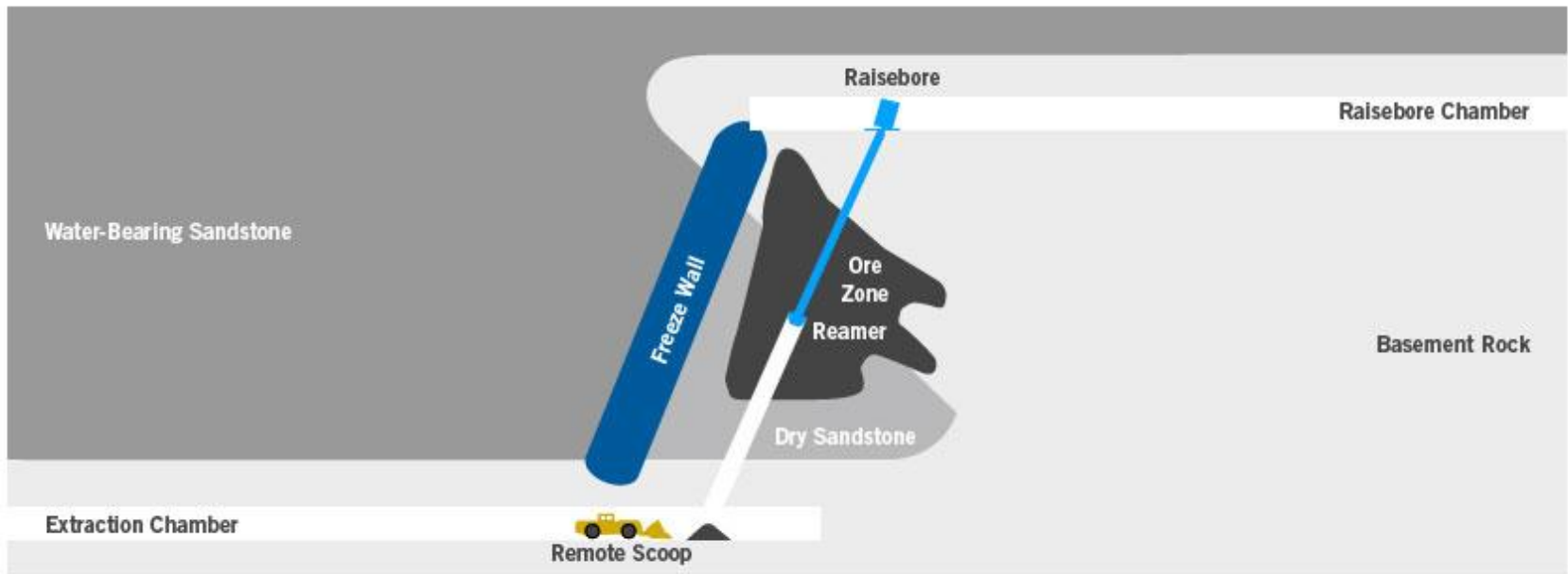
# Typical Risk Assessment Tool

Frequency		Consequences				
5	<b>Very Likely</b> Expected to occur more than once a year (> 1:1 or 100% chances of occurrence/year)	5	10	20	40	60
4	<b>Quite Likely</b> Expected to occur several times during lifetime of facility (1:3 or 10% to 30 % chances of occurrence/year)	4	8	16	32	48
3	<b>Somewhat Likely</b> Expected to occur once during lifetime of facility (<1:10 or 1% to 10% chances of occurrence/year)	3	6	12	24	36
2	<b>Unlikely</b> Not expected to occur once during lifetime of facility (1:1000 or 0.1% to 1% chances of occurrence/year)	2	4	8	16	24
1	<b>Extremely Unlikely</b> Extremely unlikely to occur once during lifetime of facility (<1:1000 or <0.1% chances of occurrence/year)	1	2	4	8	12
		<b>1 Insignificant</b>	<b>2 Minor</b>	<b>4 Moderate</b>	<b>8 Major</b>	<b>12 Catastrophic</b>
<b>Measures of Success</b>	Safe, Healthy and Rewarding Workplace	First-aid injury, area radiation level exceeds administrative level	Medical-aid injury, radiation dose exceeds administrative level	Lost-time injury with recovery, radiation dose exceeds action level	Fatality, permanent disability, radiation exceeds dose limit	Multiple fatalities, exceeding emergency dose limits
	Clean Environment	Negligible	Incident exceeds company standard and/or internal administrative level	Reportable incident, regulatory action limit exceeded	Localized or reversible environmental damage	Wide spread environmental contamination
	Financial Performance	\$10k to < \$100k	\$100k to < \$1M	\$1M to < \$10M	\$10M to < \$100M	>\$100M
	Supportive Communities	Negligible impact on reputation and support of stakeholders; legal action threatened; regulatory warning.	Brief local negative attention; somewhat unresponsive stakeholders; civil action commenced; regulatory directive.	Brief regional negative attention; unresponsive stakeholders; criminal action threatened; regulatory stop work order; temporary operational shutdown.	Brief international negative media attention; prolonged regional negative attention; overtly unresponsive stakeholders with public expression of lack of support; criminal lawsuit commenced against organization/or officers/directors; regulatory charge; operational shutdown for extended period of time.	Prolonged international negative attention; stakeholders lose faith in Cameco; license withdrawn; jail term for director or officer.

# Example of Risk Delegation of Authority

Residual Risk Range	Management Response
≥ 40	ERM Risk: senior vice-president accountable and risk reported to Board.
≥ 30	ERM Risk: vice-president accountable and risk reported to senior vice- president.
≥ 20	ERM Risk: general manager/corporate director accountable and risk reported to vice-president.
≥ 12	Appropriate business unit manager accountable and risk reported to general manager/corporate director.
≥ 4	Controls assessed and monitored through normal management systems.
< 4	Tolerable risk

# Example of a Poorly Defined Critical Process Incorrectly Applied



# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Develop a corrective action system that covers entire organization
  - a) Determine reporting criteria, usually can become more focused with time, corrective action backlog is a good measure of the corrective action process effectiveness.
  - b) Does the corrective action satisfy the Organization's needs and risk tolerance?
  - c) Standardize incident reporting and levels of investigation required

# Key considerations when developing/implementing a formal management system for Uranium Mines and Mills

- Sponsor audits that truly drive the organization's business results:
  - a) Too large of scope for audits become burdensome and lengthens the time between audit findings and corrective actions
  - a) Audits that are weakly linked to critical processes within the organization often will not add value to the organization's goals and objectives, taking time from managing higher risk activities

# Summary

- Developing a formal management system will, (in time), improve the overall success of an organization
- When developing a management system start small, initially defining critical processes and the procedures so as to not overwhelm the organizations capacity for change
- A risk assessment process and inclusion of highly experienced personnel in the development of the procedures for a given critical process is most important when setting a base line for the system
- Audits and Corrective Actions will “fill out” your management system and should eliminate repeat incidents, accidents, and nonconformance within the organization