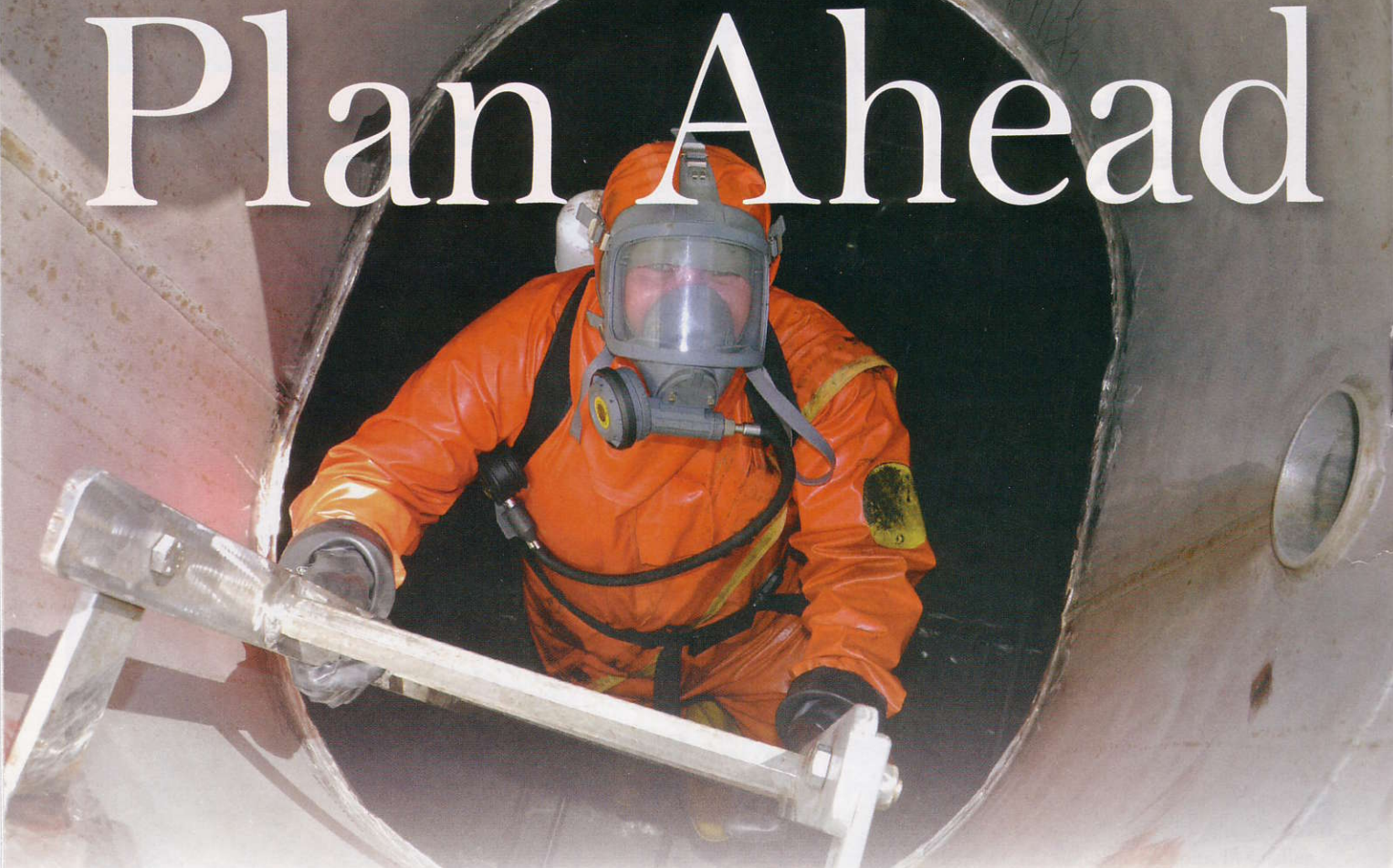


# Plan Ahead



By Joel Levitt

## Lean safety means managing risks at all shutdown stages

**L**ean safety is safety that is effective and adds the least possible overhead to the job. There is an overriding rule that the safest environment is one where safety is involved at all stages of the job — starting with conception and planning. Interestingly, that is also the way to deliver Lean safety. Tacked-on safety is fatter than planned-in safety.

I want to address how to bring safety to your shutdowns at the planning stage.

Risk management (and, in particular, risk identification) is best done as a team. The reason is that people from different backgrounds will see different potential hazards. Adding the input of millwrights, riggers, operators, engineers as well as safety people to the risk equation can only make it stronger.

The planner breaks jobs down into steps. This process helps identify resources and makes it easier to estimate. One other process made easier by work breakdown is identification of hazards. See Figure 1 — a job to remove and replace a large horizontally mounted pump — as an example.

**FIGURE 1**

<b>Job Plan – Remove and Replace Pump</b>	
<b>Step</b>	<b>Activity</b>
1	Permit, lock out, tag out
2	Shore up discharge section
3	Drain and blind
4	Unbolt, rig and remove spool on suction side (513 pounds)
5	Rig and remove pump with crane (2,350 pounds)
6	Clean base scrape flat
7	Replace pump, bolt down, align
8	Remove blinds
9	Get testing permit, release locks, tags
10	Test and benchmark system
11	Remove shoring and clean area
12	Return to operations and clear all permits



**FIGURE 2**

Safety Risk	How to Eliminate	Example to Show Mitigation
Airborne contaminates	Eliminate contaminates	Respirators
Falls from heights	Do work at ground level	Guard rails, fall protection
Falling objects	Don't allow work below	Hard hats, shelters, better procedures
Entrapment and crushing	Don't allow work where people can get caught or crushed	Improved procedures, safety shoes, proper clothing, improve chocking and blocking
Chemical ingestion, skin exposure, breathing	Eliminate hazardous chemicals	Proper PPE, better procedures, access and understanding MSDS
Fire	Eliminate flammables	Procedures, watch people, pick fewer flammable chemicals
Electrocution	Lock-out, do not allow work on or near energized circuits	Safe procedures, training, lock-out
Explosion	Eliminate one or more of the components of the explosive mixture	Safe procedures, safety blanket gas, training

**Risk Management**

The three steps in the planning process are risk identification, risk quantification and risk response. The first two are sometimes grouped together under risk analysis or risk assessment.

- 1. Risk identification:** Is there a risk here? Address both internal (under the team's control) and external (outside world) risks.
- 2. Risk quantification:** How much money will the event cost? How much time will it delay the completion? What is the likelihood of the risky event happening? How many people will get hurt and how hurt will they get?
- 3. Risk response:** What is the response? How costly is it to re-

spond? How likely will the response eliminate the risk? Can we transfer the risk to someone else (like fixed-price contracts or insurance)? Does the response introduce any unanticipated risk?

Once underway, employ risk vigilance. Ask yourself, "How do we organize our team so that when a risk becomes apparent we find out so we have enough time to respond?" In addition to vigilance, respond to changes in the character of the risks over the span of the project.

A reference hazard table is a list of all known hazards at this (or any) site. There are always three options to deal with risk: to accept it and do nothing; to remove or eliminate the risk; and to mitigate the risk. In Figure 2, there is an example of two of the three options for each hazard.

■ Ask yourself, "How do we **organize our team** so that when a risk becomes apparent we find out so we have **enough time to respond?**"

Job safety analysis (JSA) is the process we use to detect hazards and decide what to do with them. The purpose of a JSA is to ensure that the risk of each step of a task is reduced to ALARP (as low as reasonably practicable). Examine each step and see if any of the hazards from the list are likely, probable or possible (high, medium or low probability). If we take just a few steps from the job plan, as in Figure 3, we can see what risks are present and based on the impact and probability of occurrence we can decide on a course of action.

It is Lean to run a shutdown without killing or hurting someone. Think ahead: safety is less expensive if it is planned into the job rather than tacked on afterward.

So now go forth and have safe shutdowns. ■

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**FIGURE 3**

Job Plan with Hazards and Mitigation			
Step	Activity	Hazard	Steps and PPE to Mitigate
2	Shore up discharge section	Entrapment and crushing, falling objects	Mitigations adequate design, hard hats, steel-toed boots
3	Drain and blind	Airborne contaminants, asphyxiation, chemical ingestion, skin exposure, breathing, eye damage (particle, chemical, flash)	Fresh air, gloves, full body moon suit (if needed), face mask
4	Unbolt, rig and remove spool on suction side	Entrapment and crushing, falling objects	Steel-toed boots, rigging standards, inspection of straps and chokers, etc.
5	Rig and remove pump with crane	Entrapment and crushing, falling objects, asphyxiation	Procedures to clear the lift path, formal lift plan, test air before getting too close, steel-toed boots, rigging standards, inspection of straps and chokers, etc.