

TECH TIP



CalARP Program 4 - Hierarchy of Control Analysis (HCA)

WHAT is Hierarchy of Hazard Control Analysis (HCA)?

California Code of Regulations (CCR) Title 8, Section 5189.1 (c) defines Hierarchy of Hazard Control Analysis (HCA) as “Hazard prevention and control measures, in priority order, to eliminate or minimize a hazard. Hazard prevention and control measures ranked from most effective to least effective are: First Order Inherent Safety, Second Order Inherent Safety, and passive, active and procedural protection layers.”

WHEN does the HCA needs to be performed? HCA must be performed every 5 years as part of a Process Hazard Analysis (PHA) or as a standalone analysis for existing processes and all recommendations associated with PHA consequences developed for a potential major incident. Additionally, HCA must be conducted during design of a new process/facility, Management of Change (MOC) and all recommendations from incident investigation (II) of major incidents. The length of HCA will be dependent upon the complexity of the process and may vary based on how hazardous the material used in the process are.

WHO needs to be a part of HCA? An HCA must be performed for program 4 facilities in California by a team consisting of an engineer and an operator experienced with the process and a member

knowledgeable in HCA methodology. Additional subject matter experts can be consulted, as necessary.

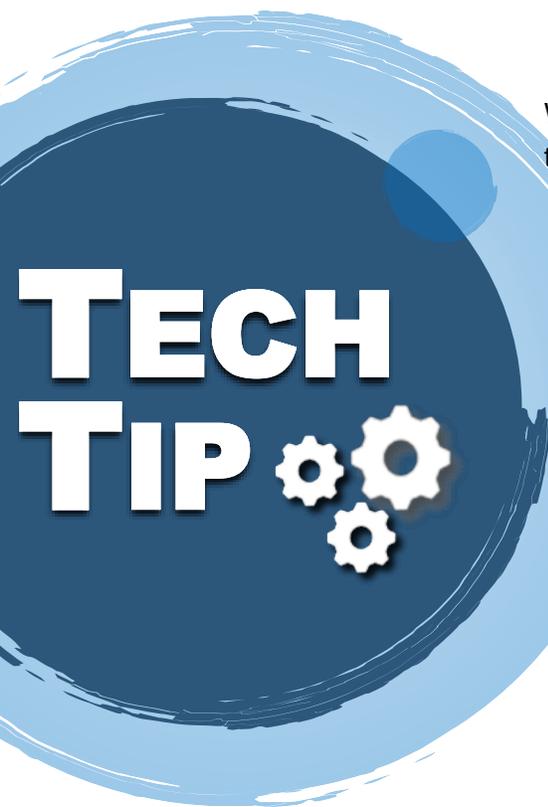
HOW to perform the HCA?

While performing an HCA, the Team **shall**:

- Include all risk relevant data for each process or recommendation
- Identify, characterize, and prioritize each process safety hazard
- Identify, analyze, and document all inherent safety measures and safeguards, or their combination, to reduce each hazard to the greatest extent feasible.

While developing recommendations to eliminate hazards to the greatest extent feasible, the Team **shall** identify first order inherent safety measures, second inherent safety measures, passive safeguards, active safeguards, and finally procedural safeguards. For recommendation closure, efforts should be made to first incorporate the first order inherent safety measures, if this is not feasible, then the second inherent safety measures following the progression until procedural safeguards.





What are first and second order inherent safety measures? The following table summarizes these definitions as described in 8 CCR §5189.1 (c)

Name	Definition	Example
First Order Inherent Safety Measure	Measure that eliminates a hazard.	Substituting a toxic chemical with a non-toxic one.
Second Order Inherent Safety Measure	Reduce a risk by reducing a hazard or likelihood of release (w/o safety devices).	Redesign of a high pressure/high temperature system to operate at ambient conditions.
Passive Safeguards	Design features that minimize a hazard by reducing either its frequency or consequence, without the active functioning of any device.	Diked area around a storage tank.
Active Safeguards	A device or system that is used to detect and respond to deviations from normal process operation.	A pump trip initiated by a high-level switch.
Procedural Safeguards	Management approaches used to prevent incidents or to minimize the effects of an incident.	Hot work procedures and emergency response procedures

HCA DOCUMENTATION: The report **shall** be completed within 90 calendar days after developing recommendations. All HCA reports must be retained for the life of each process.

The HCA team’s findings and **recommendations** are required to be completed within 2.5 years after completion of the HCA analysis, unless the implementation of the finding or recommendation would require a process shutdown.

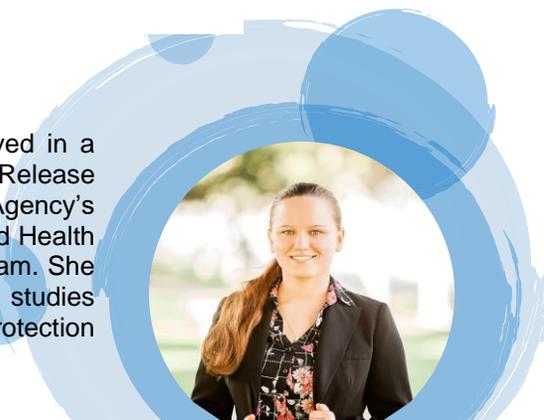
For more information, join RMP’s “Process That!” segment on CalARP Program 4 Requirements, where I will be joining Senior Engineer, Carine Black, to discuss various components associated with CalARP Program 4 requirements and how to successfully implement them. Visit RMP’s [LinkedIn](#) page for dates and details.

Resources

https://www.dir.ca.gov/title8/5189_1.html

About the Author:

Ms. Mandziuk is a Project Engineer and has been involved in a variety of activities associated with the California Accidental Release Prevention Program (CalARP), Environmental Protection Agency’s Risk Management Plan (RMP) and Occupational Safety and Health Administration’s Process Safety Management (PSM) Program. She specializes in facilitating Process Hazard Analysis (PHA) studies using the Hazard and Operability (HAZOP) and Layer of Protection Analysis (LOPA) methodologies.



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