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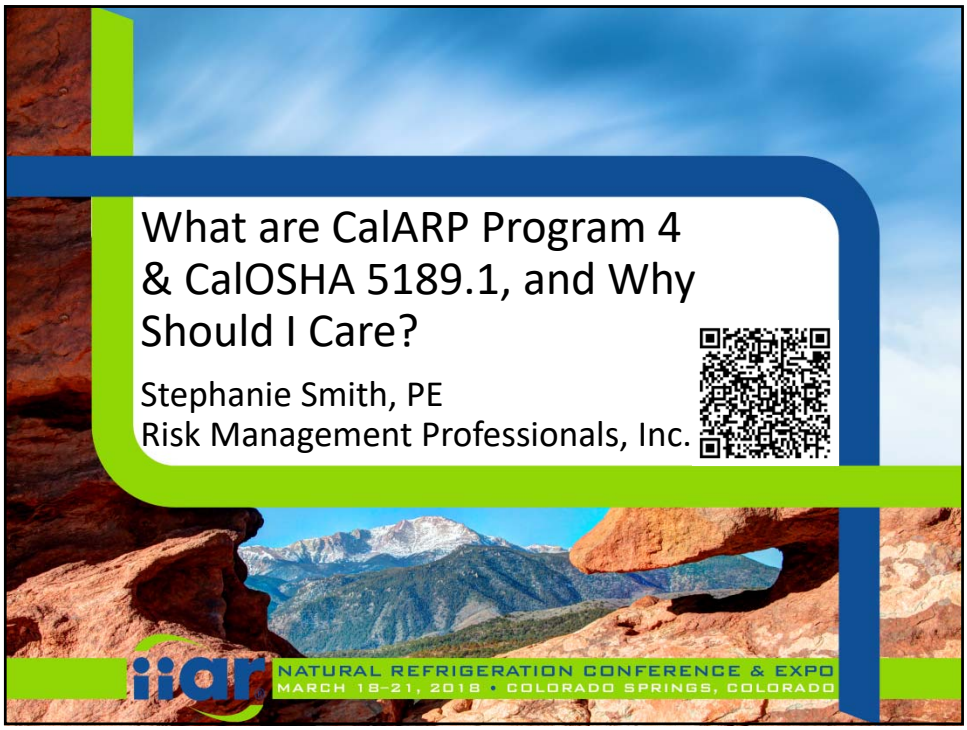
What are CalARP Program 4 & CalOSHA 5189.1, and Why Should I Care?
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2.) Complete a Course Evaluation.

3.) Send your PDH Recording Form to IIAR or fill it out on the IIAR Annual Conference app.

Learning Objectives

After viewing this presentation, participants will be able to:

- Understand the recent changes to CalARP and CalOSHA regulations,
- Comprehend why facilities in other states and other industries need to be attentive of these changes, and
- Address the needs of their facility and what may be applicable from these new regulations (RAGAGEP).

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Overview

- Introduction
- What has changed?
- What are CalARP Program 4 and CalPSM-R?
- Why should I care?
- What should I do next?
- Questions

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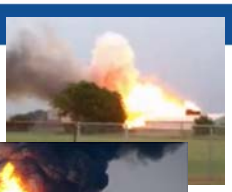
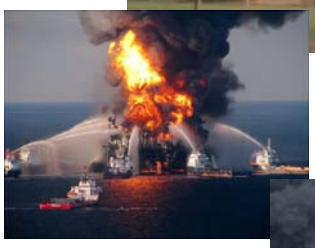
Recent Incidents

- 2013, April 17: West Fertilizer Explosion and Fire, West, Texas
- 2012, August 6: Chevron Refinery Fire, Richmond, California
- 2010, August 23: Millard Refrigerated Services Ammonia Release, Theodore, Alabama
- 2010, April 20: Deepwater Horizon Explosion and Fire, Gulf of Mexico
- 2009, June 9: ConAgra Natural Gas Explosion and Ammonia Release, Garner, North Carolina

Why Should I Care?

RAGAGEP
Reasonably And Generally Accepted Good Engineering Practices

General Duty Clause

Safety Culture

Professional / Personal Responsibility

Business Success

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Changes to the Regulatory Environment
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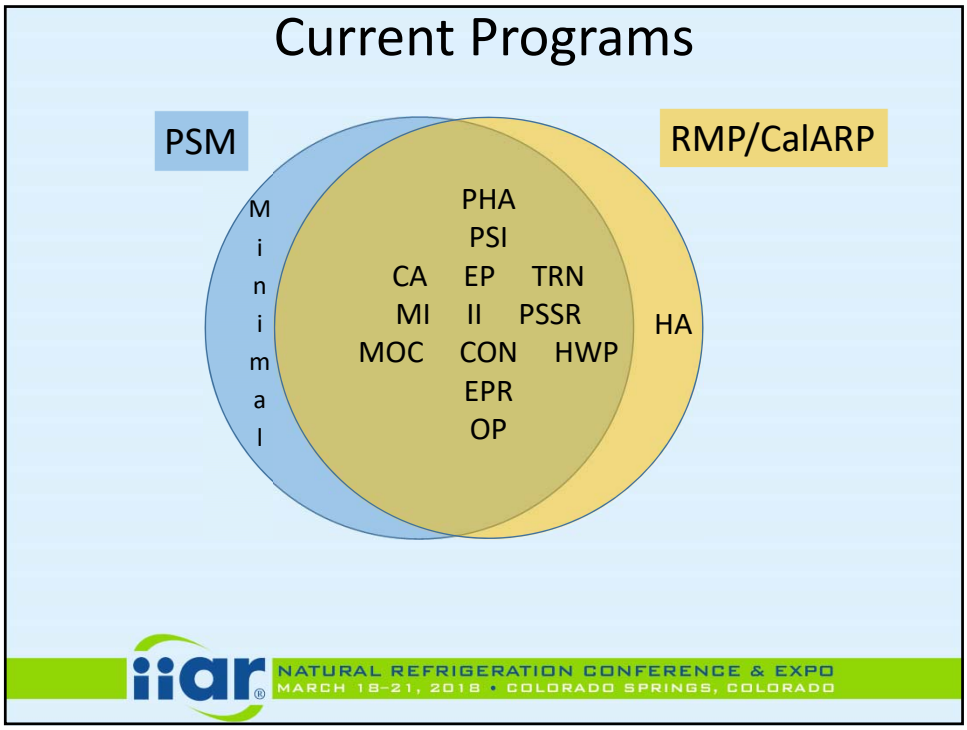
Current Programs
PSM
RMP/CalARP
Minimal
PHA
PSI
CA
EP
TRN
MI
II
PSSR
HA
MOC
CON
HWP
EPR
OP
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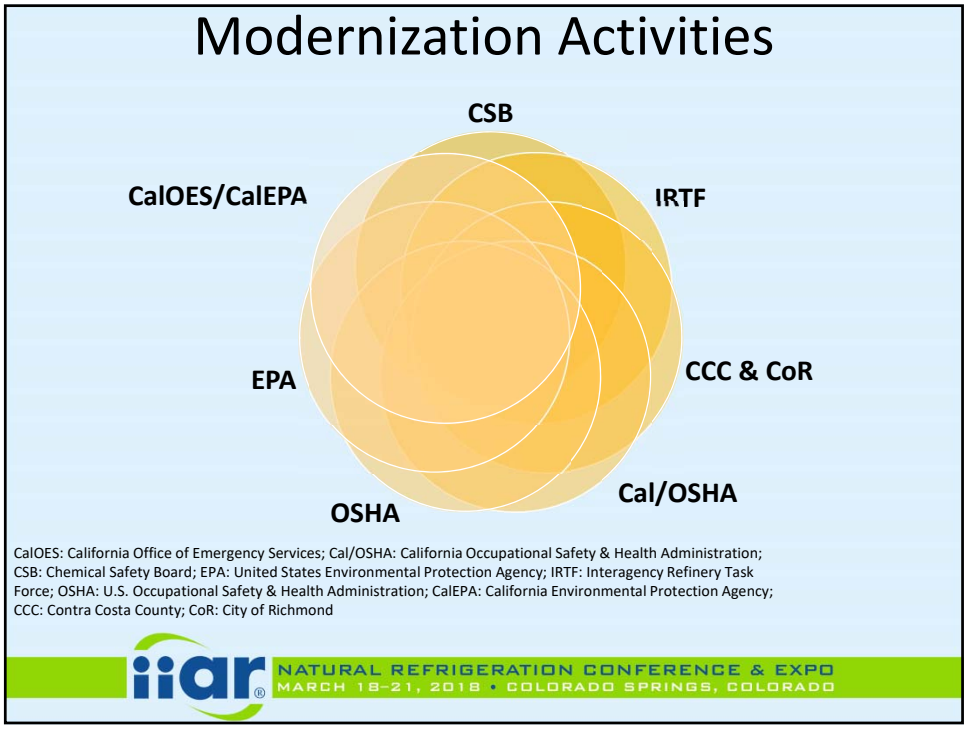
Modernization Activities
CSB
CalOES/CalEPA
IRTF
EPA
CCC & CoR
Cal/OSHA
OSHA
CalOES: California Office of Emergency Services; Cal/OSHA: California Occupational Safety & Health Administration; CSB: Chemical Safety Board; EPA: United States Environmental Protection Agency; IRTF: Interagency Refinery Task Force; OSHA: U.S. Occupational Safety & Health Administration; CalEPA: California Environmental Protection Agency; CCC: Contra Costa County; CoR: City of Richmond
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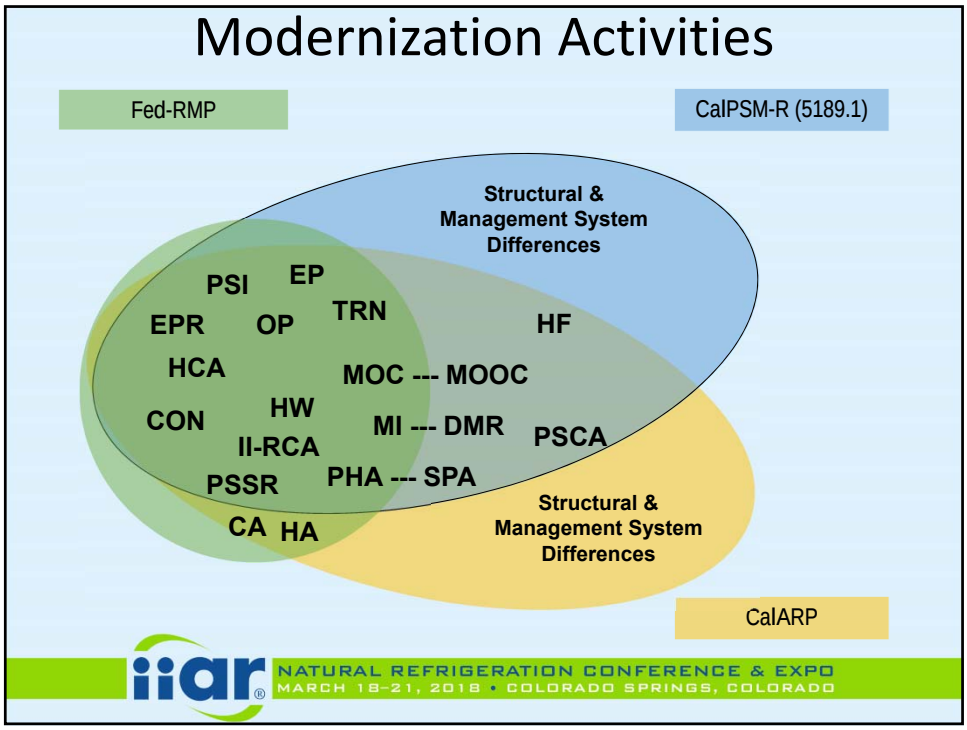
Modernization Activities
Fed-RMP
CalPSM-R (5189.1)
Structural & Management System Differences
PSI
EP
EPR
OP
TRN
HF
HCA
MOC --- MOOC
CON
HW
MI --- DMR
PSCA
II-RCA
PSSR
PHA --- SPA
CA
HA
Structural & Management System Differences
CalARP
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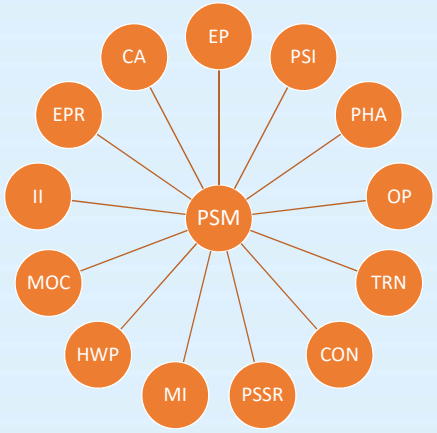
Current PSM Elements



- Employee Participation
- Process Safety Information
- Process Hazard Analysis
- Operating Procedures
- Training
- Contractors
- Pre-Startup Safety Review
- Mechanical Integrity
- Hot Work Permit
- Management of Change
- Incident Investigation
- Emergency Planning & Response
- Compliance Audits

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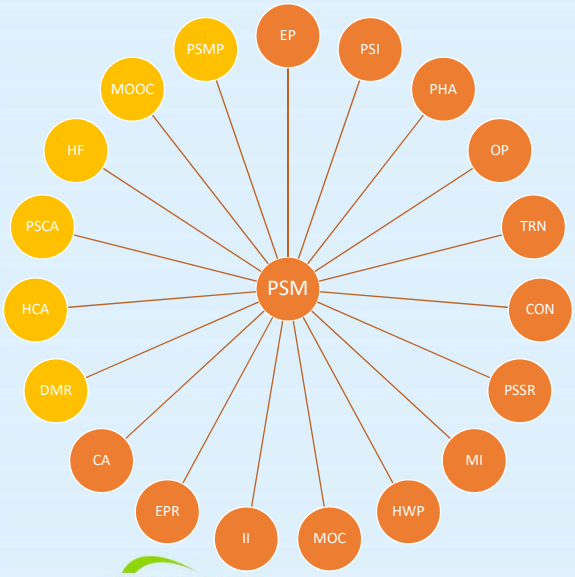
CalPSM-R Elements



- Process Safety Information (PSI)
- Process Hazard Analysis (PHA)
- Operating Procedures (OP)
- Training (TRN)
- Contractors (CON)
- Pre-Startup Safety Review (PSSR)
- Mechanical Integrity (MI)
- Damage Mechanism Review (DMR)
- Hierarchy of Hazard Control Analysis (HCA)
- Hot Work Permit (HWP)
- Management of Change (MOC)
- Incident Investigation – RCA (II)
- Emergency Planning & Response (EPR)
- Employee Participation (EP)
- Process Safety Culture Assessment (PSCA)
- Human Factors (HF)
- Management of Organizational Change (MOOC)
- Compliance Audits (CA)
- Process Safety Management Program (PSMP)

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CalARP Program 4 & CalPSM-R

New Requirements

Between 2015 and 2017, several changes were made specifically targeting oil refineries. These changes, however, are important to everyone.

Applicability Changes

- Program 4 applicability determined by NAICS code; other NAICS codes can / may be integrated later.
- RAGAGEP for other industries?
- General Duty Clause
- Responsibility of the facility to do more?

No effective changes to most of the existing elements. Focus on the new elements…

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Mechanical Integrity (MI)

- Inspections
  - Procedures must meet or exceed RAGAGEP
  - Not just "documentation" → certification required
- Quality assurance is expanded - emphasis on RAGAGEP

Compliance Audits (CA)

- Audit needs to be certified
- Report must document qualifications of persons performing audit

Employee Participation (EP)

- "Effective participation…"
- Nothing is considered proprietary or trade secret

Incident Investigation (II) – Root Cause Analysis (RCA)

- Must provide effective methods to conduct a root cause analysis
- Establishes team experience requirements
- DMR should be reviewed
- Recommendations
  - Should include interim actions until final actions can be implemented
  - After a major incident, Hierarchy of Hazard Control Analysis (HCA) shall be performed
- A report shall be submitted to the Unified Program Agency (UPA) within 90 days
- Final report is due within five (5) months

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Incident Investigation (II) – Root Cause Analysis (RCA)

- Report requirements
  - Causes determined by root cause analysis (direct, indirect, and root causes)
  - DMR(s), PHA(s), HCA(s), & SPA(s) reviewed as part of investigation
  - Interim and permanent corrective actions
  - Retained for the life of the process
- UPA may choose to perform the following independently
  - Process Safety Culture Assessment (PSCA)
  - Incident Investigation
  - Evaluation of management system or Human Factors Analysis

Safeguard Protection Analysis (SPA)

- Objectives
  - Assess effectiveness of existing safeguards for each failure scenario identified in the PHA
  - Assure that safeguards are independent of the initiating event and each other (Independent Protection Layers [IPLs])
- Must be done for each PHA scenario where a major incident may occur
- Must use a quantitative or semi-quantitative method (e.g., LOPA)
- Complete within 6 months of PHA
- Experienced and knowledgeable team
- SPA shall be appended to the PHA report
- Must follow the corrective action work process
- Documentation must be maintained for the life of the process

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Damage Mechanism Review (DMR)

- Updated every 5 years
- Must be reviewed as part of Incident Investigation
- Must be available to PHA team
- Team must be knowledgeable in the covered process and DMR process
- DMR to include:
  - Inspection history / materials of construction assessment
  - Previous DMR data
  - Review of industry-wide experience,
  - Applicable standards, codes, and practices
- Examples of damage mechanisms:
  - Mechanical loading failures
  - Erosion / Corrosion / Thermal-related failures

Damage Mechanism Review (DMR)

- Report must be provided to operating, maintenance, and other pertinent personnel
- Correction action tracking is similar to other program elements (e.g., PHA, II, CA, etc.)
- Shall be retained for the life of the process
- Approach / Guidance
  - Conduct DMR in conjunction with PHA and integrate reports
  - Review materials of construction within scenarios of HAZOP
  - Develop additional nodes and scenarios within PHA
  - Address high-priority improvements

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Hierarchy of Hazard Control Analysis (HCA)

- Essentially Inherently Safer Technologies assessment
- HCA must be conducted for
  - PHA recommendations for scenario resulting in major incident
  - As part of MOC & II process, for major incidents
  - During design and review of new processes
- Updated every five (5) years, in conjunction with PHA
- Team expertise requirements
- HCA team shall
  - Include risk-relevant data for each process
  - Identify, characterize, and prioritize each process safety hazard
  - Identify, analyze, and document all inherent safety measures and safeguards

Hierarchy of Hazard Control Analysis (HCA)

- Recommendations
  - Must eliminate hazards to the greatest extent feasible using 1st order inherent safety measures
  - Remaining recommendations may utilize 2nd order inherent safety measures
- Report complete within 90 days following the development of the recommendations
- Report kept for the life of the process
- Implementation
  - Minimize / substitute / moderate / simplify
  - Use established guidance documents
  - Timing is key (as early as possible during design and operation)

Process Safety Culture Assessment (PSCA)

- Updated every five (5) years
- Evaluation of owner / operator's:
  - Hazard reporting program
  - Response to reports of hazards
  - Procedures ensuring incentive programs do not discourage hazard reporting
  - Procedures ensuring process safety is prioritized during upset or emergency conditions
  - Management commitment and leadership
- Team experience

Process Safety Culture Assessment (PSCA)

- Written report within 90 days of the completion of the assessment
- Report requires signatory
- Corrective actions must be completed within 24 months of report completion
- Interim assessment of the corrective action implementation and effectiveness within 3 years of the completed report
- Employees and representatives shall receive the report within 60 days of completion

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Management of Organizational Change (MOOC)

- Procedures to manage organizational changes
- Conduct assessment prior to a variety of employment / staffing changes
- Written report required
- Job functions and descriptions must be current and accurate for all positions potentially affected by the change
- Certification by manager on report
- MOOC assessments must include Human Factors assessment
- Employees must be informed if potentially affected by the change

Human Factors Program

- Evaluates a number of human factors in safety
- Analysis of process controls includes
  - Error proof mechanisms
  - Automatic alerts
  - Automatic system shutdowns
- Schedule for revising operating and maintenance procedures based on Human Factors analysis
- Employee training for those who have process and process equipment responsibilities
- Employee participation required

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Accident Release Prevention (ARP) Program Management System

- Reviewed and updated every 3 years
- Must support continuous improvement
- Shall include
  - Roles and responsibilities
  - Organizational chart with responsibilities
  - Procedures to ensure effective communication
  - Policies to ensure recommendations and corrective actions are communicated to employees and their representatives
  - Policies to ensure employee participation
- All changes shall be tracked

Accident Release Prevention (ARP) Program Management System

- Sets standards for findings and recommendations resulting from PHAs, DMRs, HCAs, incident investigations, compliance audits, and SPAs
- Develop effective Stop Work procedures / policies
- Method for employees to anonymously report hazards
- Performance Indicators
  - Report performance indicator information to CalOES
  - January 1 to December 31 of the prior year; due July
  - Indicators are public information
- Must develop specific list of performance indicators for the facility to evaluate process safety for continuous improvement.

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Process Safety Management Program (PSMP)

- Owner / operator must designate manager as having responsibility
- Written and implemented effective PSM Program
  - Updated every 3 years
  - Includes organizational chart
  - Track and document performance safety indicators

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Applicability to Ammonia Refrigeration

Why Should I Care?

RAGAGEP = Reasonably And Generally Accepted Good Engineering Practices

General Duty Clause

RAGAGEP / General Duty Clause

- Continuous improvement of safety
  - Inherently safer systems
  - Reduction in human error
  - Evaluation of safeguards and protections
- Good safety culture
- Safe workplace
- Reduced cost of business

Applicability to Ammonia Refrigeration

What Should I Do Next?

Application of CalARP P4 and CalOSHA 5189.1

Evaluate the need for additional elements

- Safeguard Protection Analysis
  - Are all the safeguards adequate?
  - Can the analysis be integrated into the next PHA?
  - Are there changes needed in the next PHA to address other areas of improvement?
- Damage Mechanism Review
  - Is this being effectively implemented in existing PHA sessions?
  - Are there additional analyses needed?

Application of CalARP P4 and CalOSHA 5189.1 for RAGAGEP

- Root Cause Analysis (part of the Incident Investigation element)
  - Is there a formal methodology in-place? If not, does there need to be?
  - Do past investigations address root causes? If not, how can improvements be made?
- Hierarchy of Hazard Control Analysis
  - Is the facility assessing the use of inherently safer systems?
  - Should an analysis be conducted?
  - What are other facilities doing?
  - What is common in industry and are there improvements to be made?

Application of CalARP P4 and CalOSHA 5189.1 for RAGAGEP

- Process Safety Culture Assessment
  - Does the facility have a good safety culture?
  - Are methods for anonymous reporting and stop work authority established and communicated?
  - Other areas of improvement?
- Human Factors Program
  - Is staffing adequate? If not, how can this be changed?
  - Has the facility looked at the impact of staffing changes on safety and the safety culture?
- Accidental Release Prevention Program Management System
  - Is an effective management system in-place?

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Questions?
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