

# ioMosaic<sup>®</sup>

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## PHAs and PSM Audits Using Remote Technology

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# Gemma Dunjó, Ph.D. – Director, PSM Practice Lead ioMosaic Corporation



- ▶ Ph.D. in Environmental Sciences (King's College London, UK)
- ▶ B.S. in Environmental Sciences
- ▶ Expertise in process safety and risk management, quality management systems and management systems compliance and integration
- ▶ Technical expertise includes:
  - ▶ Process Safety and Risk Management
  - ▶ OSHA PSM; EPA RMP; RBPS Auditing; ISO 9001:2015, ISO 17025:2017
  - ▶ Process Hazard Analysis (PHA)
  - ▶ PSM GAP assessment and implementation
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# Agenda

- ▶ Objectives
- ▶ Catastrophic Events
- ▶ OSHA Inspections
- ▶ From in-person to virtual
- ▶ Conducting Remote PHAs
- ▶ Conducting Remote Audits
- ▶ Final Thoughts
- ▶ Q&A

# Objectives



# What are the Specific Objectives of this Presentation?

- ▶ To provide **insights** for successfully and effectively conducting PHAs and PSM compliance audits using remote technology – based on the experience and skills of an **in-house team** of PSM professionals
- ▶ To provide a summary of the necessary **tools, ground rules and guidelines** to conduct virtual PHAs and compliance audits
- ▶ To achieve the **same results** conducting these studies remotely as if the work was conducted in person

# Catastrophic Events



# Too many major accidents have taken place in the industry over the last 40 years

| Location             | Date     | Company   | Process   | Major Incident  | Fatalities (F)/Injuries (I)                                      |
|----------------------|----------|---|---|---|--|
| Flixborough (UK)     | 6/1/74   | Nypro (UK) Ltd                                    | Production of caprolactam                       | Explosion in oxidation of cyclohexane process               | F: 28 workers<br>I: 36 on-site, 53 off-site                      |
| Seveso (Italy)       | 7/10/76  | Industrie Chimiche Meda Societa Azionara (ICMESA) | Batch production of 2,4,5-trichlorophenol (TCP) | Toxic release of TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) | F: 0<br>I: 477 people reported skin injuries (burns & chloracne) |
| Bhopal (India)       | 12/3/84  | Union Carbide India Ltd.                          | Production of Sevin                             | Toxic release of methyl isocyanate (MIC)                    | F: 3,787+ workers and near-by Residents                          |
| Piper Alpha (UK)     | 7/6/88   | Occidental Petroleum (Caledonia) Ltd.             | Offshore oil and gas processing                 | Oil platform explosion and fire                             | F: 167 workers   |
| Pasadena (USA)       | 10/23/89 | Phillips 66                                       | Polyethylene production                         | Polyethylene plant explosion and fire                       | F: 23 workers<br>I: 130 to 300                                   |
| Longford (Australia) | 9/25/98  | Esso Australia Resources Ltd.                     | Gas and crude oil processing                    | Gas plant explosion and fire                                | F: 2 workers<br>I: 8   |
| Texas City (USA)     | 3/23/05  | BP  | Oil refinery                                    | Isomerisation unit explosion                                | F: 15 workers<br>I: 180  |

Source: ioMosaic Corporation

# The OSHA Process Safety Management (PSM) Standard – 29 CFR 1910.119

- ▶ Performance-based management system regulation
  - ▶ To prevent or minimize catastrophic releases of hazardous chemicals (HHC)
  - ▶ PSM covered process if it uses, stores, manufactures, handles, or moves HHC onsite above the Threshold Quantity (TQ)
    - ▶ **Oct 27th 2020 - OSHA PSM Standard applicability expanded to interconnected processes – even without HHC**
  - ▶ Focuses on threats to onsite employees and contractors
- ▶ OSHA has implemented several National Emphasis Programs (NEPs):
  - ▶ 2007 and 2009 Petroleum Refinery
  - ▶ 2011 and 2017 PSM Covered Chemical Facilities



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# Process Safety Management compliance is an ongoing challenge for most companies



Source: ioMosaic Corporation

# OSHA Inspections



# OSHA regulatory fines are based on number and type of violations found (Jan 15<sup>th</sup> 2021)

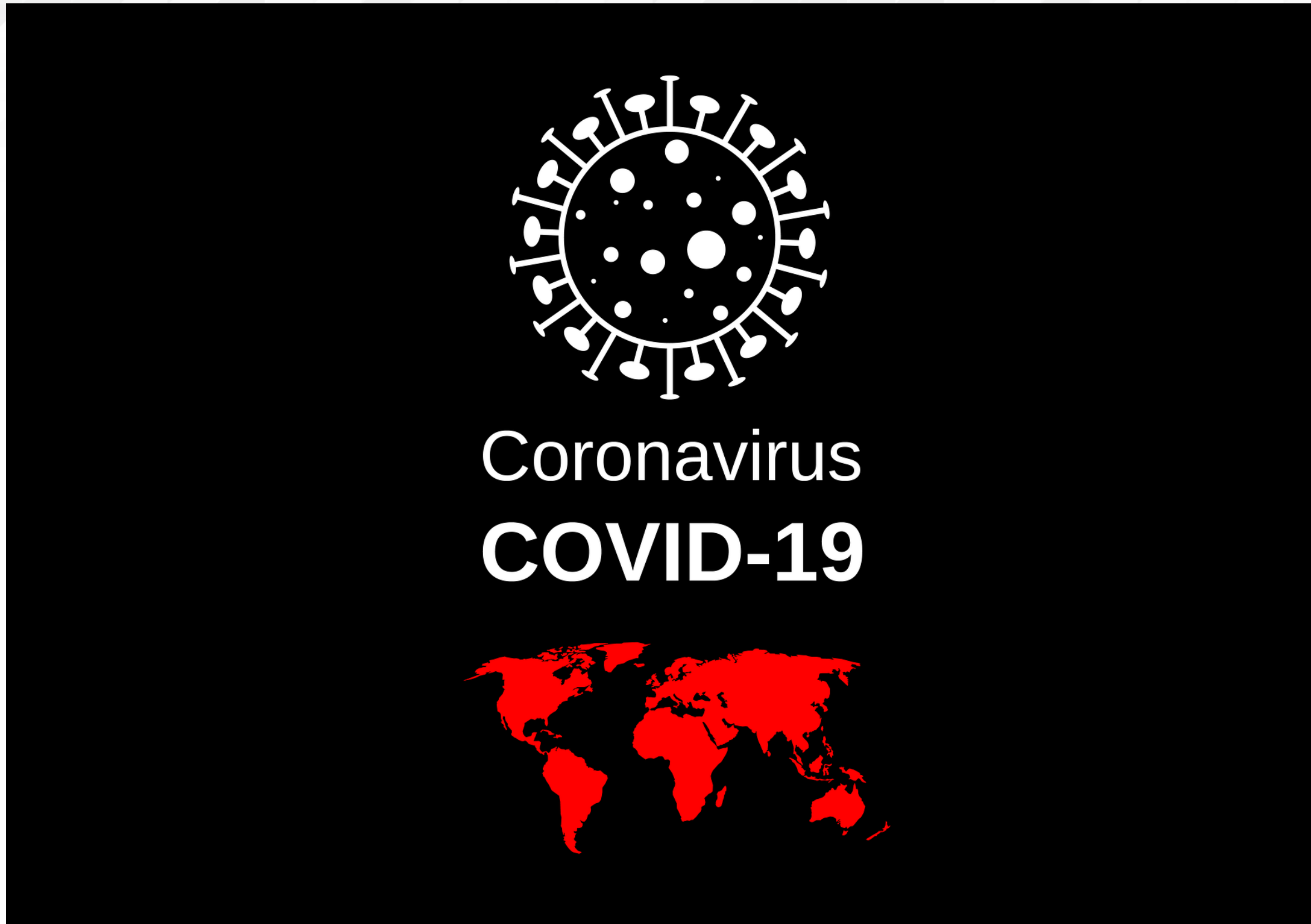
| Type of Violation                                     | Maximum Penalties                      |
|---|--|
| Serious<br>Other-Than-Serious<br>Posting Requirements | \$13,653 per violation                 |
| Failure to Abate                                      | \$13,653 per day beyond abatement date |
| Willful or Repeated                                   | \$136,532 per violation                |

Source: OSHA - <https://www.osha.gov/penalties>

# Information you will need if OSHA comes to the site

- ▶ List of PSM covered processes
- ▶ List of PSM covered equipment
- ▶ **PHAs for the covered processes**
- ▶ **Last two PSM audit reports**
- ▶ Mechanical / asset integrity inspections
- ▶ Training records
- ▶ OSHA will conduct interviews with employees

# But what about in times of COVID?



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# Despite the COVID-19 pandemic, all the OSHA PSM Standard requirements remain in effect without any waivers

- ▶ OSHA is exercising temporary enforcement discretion on:
  - ▶ Compliance of some requirements
  - ▶ Assessing the employer's good faith compliance efforts (e.g. recurring audits, training, or assessments) during an inspection
- ▶ References:
  - ▶ <https://www.osha.gov/SLTC/covid-19/standards.html>
  - ▶ <https://www.osha.gov/memos/2020-04-16/discretion-enforcement-when-considering-employers-good-faith-efforts-during>
  - ▶ <https://www.osha.gov/SLTC/covid-19/covid-19-faq.html#:~:text=All%20OSHA%20standards%20remain%20in,OSHA's%20Enforcement%200Memos%20page>

# From In-person to Virtual



# PSM Compliance Audits and PHAs in Times of Travel Restrictions / COVID-19

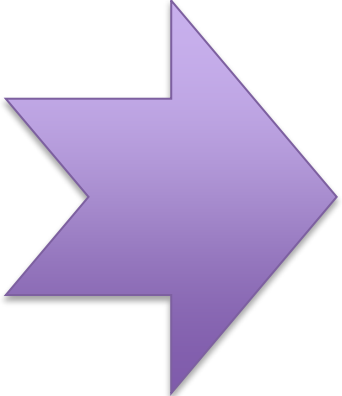
- ▶ Both PHAs and particularly PSM compliance audits **traditionally conducted in-person**
- ▶ The ongoing health emergency and the resulting travel restrictions are largely preventing this face-to-face option
- ▶ Many facilities are currently facing challenges due to the global disruption and threats on process safety resources (materials, funds, contractors, employees, consultants, equipment...), and are exploring the **remote work alternative**



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# Transition from in-person to remote work



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# Technology Challenge - Setting up Meetings for Remote PHAs and Audits

- ▶ Agree on **video conference meeting software** that will be used for remote work (e.g. WebEx, TEAMS, ZOOM, Skype for Business...)
- ▶ Assure that each participant has access and knows how to use the software in advance
  - ▶ Schedule a **trial meeting** to verify proper connection (e.g. Firewall connections issues)
  - ▶ Verify that each participant can **share their screen** if needed

# Conducting Remote PHAs



# Challenges in Conducting Remote PHAs

- ▶ Keeping team members engaged
- ▶ Not able to visit the site to identify possible issues especially for human factors and facility siting discussions
- ▶ Sharing P&IDs with marked up nodes or study sections
- ▶ Sharing process safety information with the team

# Preparation Prior to the PHA Meetings

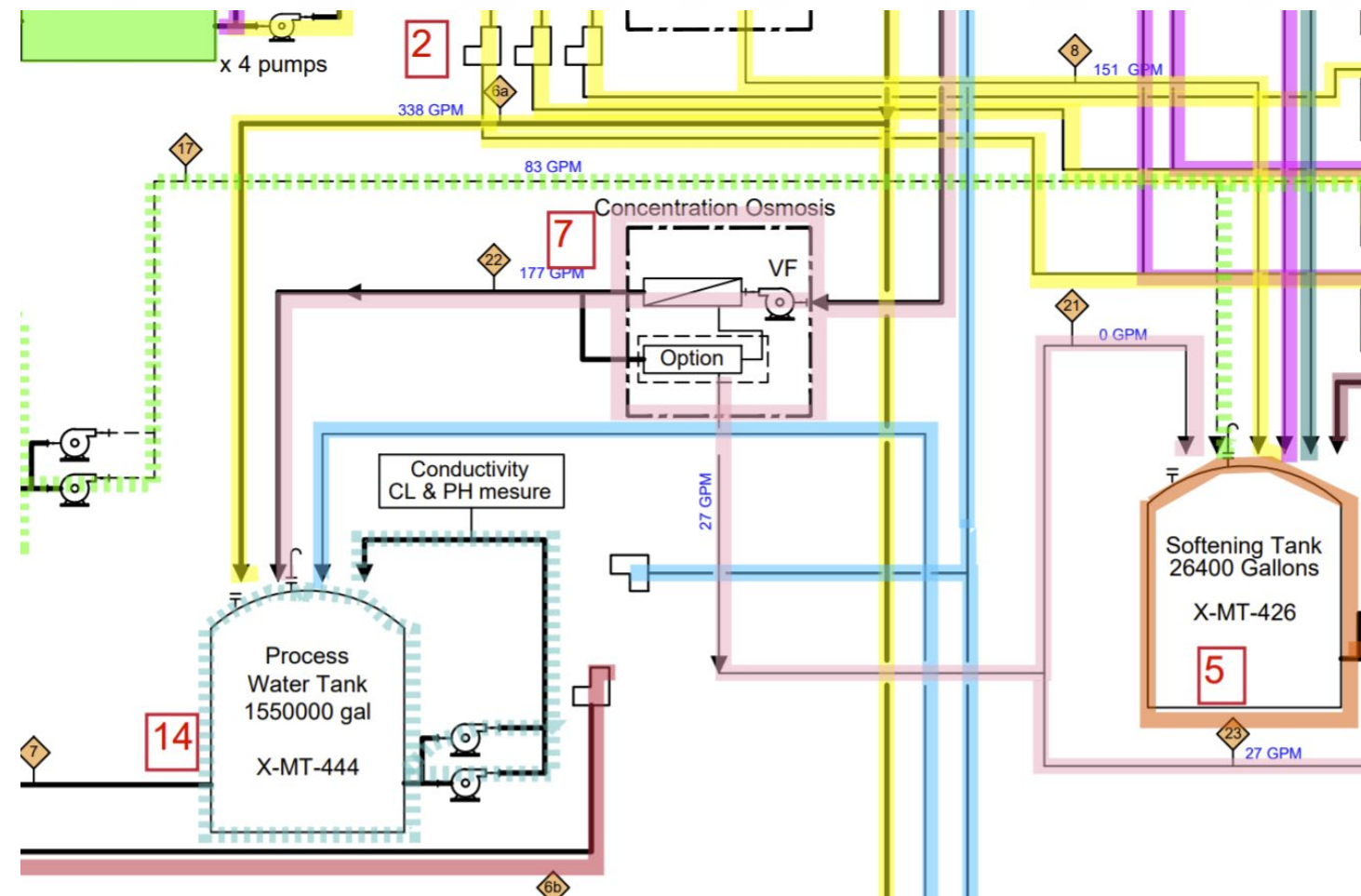
- ▶ Schedule team meetings
  - ▶ Limit meeting length to 4 or 6 hours per day
  - ▶ Take into account possible time differences between participants' locations
  - ▶ Provide pre-determined breaks for the team
- ▶ Ensure that all participants have a copy of:
  - ▶ Risk Matrix, severity (consequence) and frequency (likelihood) criteria
  - ▶ Company PHA procedures

# Sharing Process Safety Information (PSI)

- ▶ Make sure that all PSI is available electronically
  - ▶ If information is available on paper only, have it scanned and stored for electronic retrieval
- ▶ Assign specific team members to be prepared to share specific PSI and procedures, i.e.:
  - ▶ Operating procedures
  - ▶ Safety Data Sheets (SDS)
  - ▶ Reactivity information
  - ▶ Alarm and interlock list
  - ▶ Pressure relief device calculation
  - ▶ Equipment information: Size, pressure rating, materials of construction
  - ▶ If it is a Revalidation PHA: List of Past Incident(s), MOC(s) and PHA Worksheets since last PHA
- ▶ Make sure each member has access to information they are assigned to share

# Sharing P&IDs with Marked up Nodes or Study Sections

- ▶ PHA Leader to highlight nodes or study sections on the electronic copy of P&IDs to be able to display for the team (e.g. using Adobe “highlight” function on a PDF) before start of meetings



Source: ioMosaic Corporation

- ▶ Be able to adjust the size of the nodes / study sections during the meeting

# The Advantage of 3D Drawings

- ▶ Some companies might have 3D drawings available
  - ▶ It allows for quick and efficient visualization of the plant layout
  - ▶ Very helpful when deciding what is at risk
  - ▶ The position of the equipment in the plant and the building can be easily visualized



# Conducting Remote PHA Meetings

- ▶ Review meeting rules with the team
  - ▶ Cameras turned on
  - ▶ No phone call during meetings
  - ▶ Return from breaks on time
  - ▶ Muted unless they are talking
- ▶ PHA Leader to **call on people by name** with questions to ensure everyone participates
- ▶ Review:
  - ▶ Risk ranking and matrices to be used during the study
  - ▶ Process description and equipment to be reviewed
  - ▶ Chemicals used and their specific hazards

# Not Able to Visit Site Before Study

- ▶ Team members take pictures (videos / FaceTime) of the equipment and process area to share with the team before and during the study
  - ▶ Assign responsibility to one of the team members
- ▶ For specific questions and issues, ask team members to take pictures during breaks or at the end of the day for team discussion
  - ▶ Go back to review these issues after pictures are available
- ▶ Have an **electronic plot plan** of the site available when reviewing **facility siting issues**

# Conducting Remote Audits



# Remote Audit Challenges

- ▶ Random review of data (sampling strategy)
- ▶ Auditing Hot Work
- ▶ Interviewing personnel
- ▶ Field verification

# Specific considerations for remote Audits' meetings

- ▶ Agree on audit schedule: Schedule opening, daily wrap-up and closing meetings
- ▶ Schedule meetings between specific auditor and each element responsible person
- ▶ Meetings should be scheduled in advance, and only for part of the time assigned to a specific element
  - ▶ Provide auditor time to review information, decide on what data to review and develop a list of questions
  - ▶ Person responsible for the element should be available by phone or meeting software to respond to the auditor request during the scheduled time

# Preparation Prior to Starting the Remote Audit

- ▶ **Pre-audit questionnaire** sent in advance to the client
- ▶ Obtain relevant policy / procedures from the auditee
  - ▶ Set up an **electronic file system** for sharing information (e.g. dedicated ioXpress instance)
- ▶ Assign auditors on the team to specific audit elements
  - ▶ Make sure they have electronic access to information provided by the auditee
- ▶ Generate electronic audit file with proper **protocols**

# Conducting Remote Audit

- ▶ Connect with person responsible for the element to be audited:
  - ▶ Determine data to be collected as evidence
  - ▶ If data is available electronically **review it live**
  - ▶ If paper information can be scanned and e-mailed to auditor or if too many documents, review it live
- ▶ Schedule interview with other personnel such as operators, mechanics, contractors and technical personnel not involved in the audit
- ▶ Discuss daily findings at daily wrap-up meetings:
  - ▶ Allow auditee to ask questions and provide additional information
- ▶ Document findings clearly with specific examples

# Random Review of Data

- ▶ Auditor should **review information live** if at all possible when data is electronic
- ▶ Connect live with responsible person and have them **share their screen**
  - ▶ Ask them to display a list of information (i.e. operating procedures, equipment, etc.)
  - ▶ Choose random samples from that list and have them display information on the screen
  - ▶ If needed, you can ask to have the information transferred to the electronic file system at the same time
- ▶ Any **sampling data** selected should be **reviewed on the screen or downloaded** into the electronic system at the time of the discussion



# Auditing Hot Work

- ▶ Hot Work permits are typically **hard copies**. To review at random:
  - ▶ Ask responsible person to collect 6 months (or period that is available) of permits
  - ▶ While talking pick number of permits at random from the stack (i.e. number 3, 5, 10, etc.)
  - ▶ Have responsible person **take picture of the permit** for you review as you select them and send them to you for review
- ▶ Identify any Hot Work that is scheduled during the audit
  - ▶ Ask responsible person to go to the work site after Hot Work permit is issued and take pictures, video or share live (i.e. Facetime) the site
  - ▶ Auditor may want to interview personnel doing the work

# Interviewing Personnel

- ▶ Schedule interviews with personnel that is not directly involved with the audit
- ▶ Obtain list of personnel and select interviewees at random
  - ▶ Operators: Call them in the control room
  - ▶ Contractors: Use phone in a break room or conference room
  - ▶ Technical personnel: Connect using agreed on meeting software

# Field Verification

- ▶ Connect electronically and review the list of MOCs
- ▶ Choose samples at random from the list
- ▶ To verify MOC changes or P&ID accuracy in the field:
  - ▶ Select equipment at random from electronic information
  - ▶ Ask auditee to take pictures or videos of the equipment in the field that shows equipment identification (i.e. pump number, relief device number)



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# Final Thoughts



# Final Thoughts

- ▶ The option of conducting process safety work virtually, will help facilities to **comply timely** with process safety regulations requirements and ultimately, ensure safer operations
- ▶ Conducting this work remotely requires special emphasis on the importance of proper **planning and preparation work prior** to the start of the study as well as on the **continuous engagement** of the participants
- ▶ Proactively managing an effective process safety program regardless of any external challenges displays a high level of **corporate responsibility** and encourages companies to sustain it long-term

**Thank you! Any Questions?**



# About ioMosaic Corporation

Through innovation and dedication to continual improvement, ioMosaic has become a leading provider of integrated process safety and risk management solutions. ioMosaic has expertise in a wide variety of areas, including pressure relief systems design, process safety management, expert litigation support, laboratory services, training, and software development.

ioMosaic offers integrated process safety and risk management services to help you manage and reduce episodic risk. Because when safety, efficiency, and compliance are improved, you can sleep better at night. Our extensive expertise allows us the flexibility, resources, and capabilities to determine what you need to reduce and manage episodic risk, maintain compliance, and prevent injuries and catastrophic incidents.

Our mission is to help you protect your people, plant, stakeholder value, and our planet.

For more information on ioMosaic, please visit: [www.ioMosaic.com](http://www.ioMosaic.com)