

DOT PHMSA R&D Forums - 2022

Design and Construction

IA Questions

- In 2020 DOT PHMSA changed the inspection process from the forms to the IA question set
- Standardizes with a *.P, *.R, and *.O for each topic
- Experience with a handful of projects going through it
- Similar issues across multiple projects and different contractors

IA Questions

- Example:
 - Siting in Subpart B does not require any procedures in 49 CFR Part 193.

▼ Subpart B Siting Requirements

193.2051 – 193.2073

§ 193.2051 Scope.

§ 193.2055 [Reserved]

§ 193.2057 Thermal radiation protection.

§ 193.2059 Flammable vapor-gas dispersion protection.

§§ 193.2061-193.2065 [Reserved]

§ 193.2067 Wind forces.

§§ 193.2069-193.2073 [Reserved]

IA Questions

- Example:
 - However, there are *.P questions related to siting
 - Many projects did not have a procedure to satisfy this question, even though they had the record to show they were fully compliant with code (*.R and *.O complete)
 - The procedure was created solely to answer a question

IA Questions

- PHMSA tried to standardize each code requirement into *.P, *.R, and *.O questions
- Legally, projects need to follow 49 CFR Part 193. The questions may be PHMSA's way of checking a topic, but some of the questions do not have a foundation in 49 CFR Part 193.
- Companies should not have to create documentation which has no foundation in 49 CFR Part 193.

IA Questions

- Potential RD Topic:
 - Have personnel who have gone through the IA Question process provide comments and feedback on what questions are not appropriate to help refine the IA Question list.

HAZOP/ LOPA

- A HAZOP (Hazard and Operability Review) is a systematic process where a facility is broken down into nodes and analyzed for how it handles process deviations to ensure appropriate safeguards are in place to reduce risk
- A LOPA (Layer of Protection Assessment) is a technique that is used by many projects as part of the HAZOP process to further quantify the safeguards in the process and quantify the additional mitigation measures needed to be added to the design to reduce risk

HAZOP/ LOPA

- Example:
 - A cause/consequence pair in a HAZOP may be qualitatively ranked a 4 or 5 severity and then further evaluated with LOPA
 - Numerical values are assigned to the initiating event and safeguards and then compared to risk criteria to help define the level of mitigation needed
 - I.E. initiating event is a $1E-1$, current safeguards are a $1E-2$, and acceptable risk criteria is $1E-4$, meaning there is a $1E-1$ gap in safeguards which needs to be added.

HAZOP/ LOPA

- PHMSA sponsored a RD Project by GTI which looked at the differences and gaps between PSM and 49 CFR Part 193.
- HAZOPs are not required by 49 CFR Part 193 but are an excellent safety practice
- Management of Change is not explicitly required in 49 CFR Part 193, but is an excellent safety practice and many MOC processes require evaluating if a change requires to be HAZOP'd.
- Many large projects perform HAZOPs, however some small projects don't because its not a requirement

HAZOP/ LOPA

- Potential RD Topic:
 - Not all HAZOPs/LOPAs are created equal
 - Should a HAZOP be required?
 - Should a LOPA be required?
 - Should there be guidance to standardize methodology?
 - Should there be guidance to refer to good codes and standards for performing HAZOP/LOPA?
 - Are we being unsafe by not requiring all LNG facilities to perform PHAs?

Fire and Cryo Protection

- 49 CFR Part 193 IBR's NFPA 59A (2001)
- Section 6.4 states:

6.4 Pipe Supports.

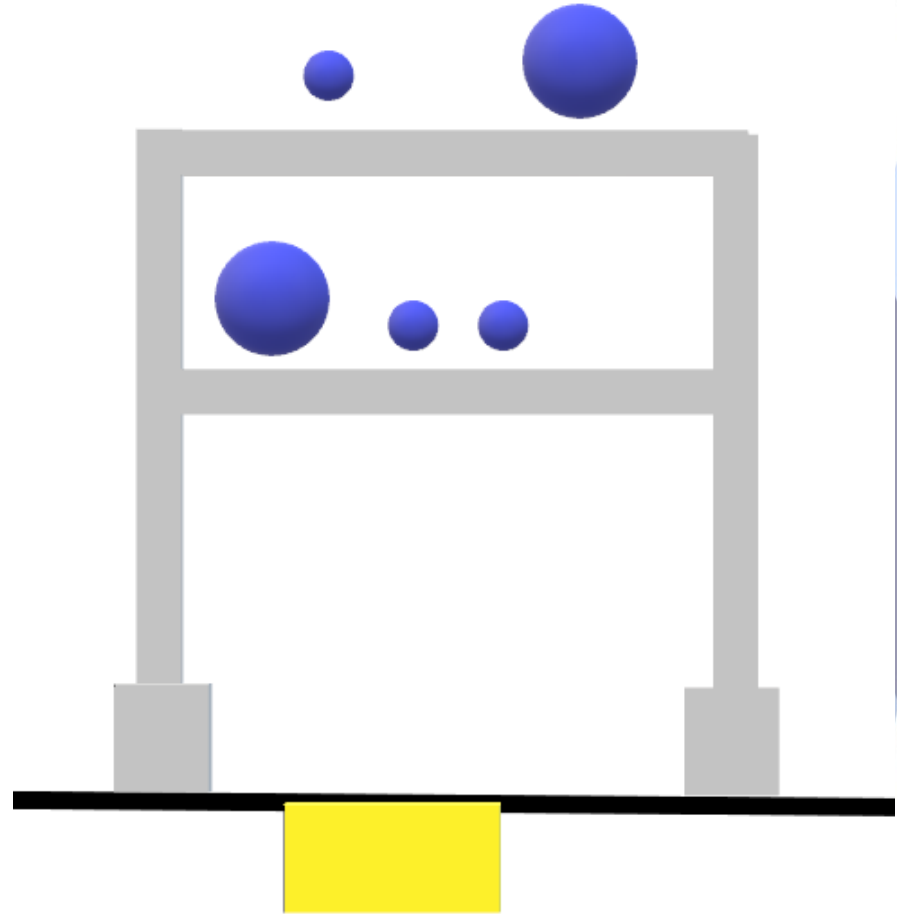
6.4.1 Pipe supports, including any insulation systems used to support pipe whose stability is essential to plant safety, shall be resistant to or protected against fire exposure, escaping cold liquid, or both, if they are subject to such exposure.

6.4.2 Pipe supports for cold lines shall be designed to prevent excessive heat transfer, which can result in piping restraints caused by ice formations or embrittlement of supporting steel. The design of supporting elements shall conform to ASME B 31.3, *Process Piping*, Section 321.

- What does this mean??

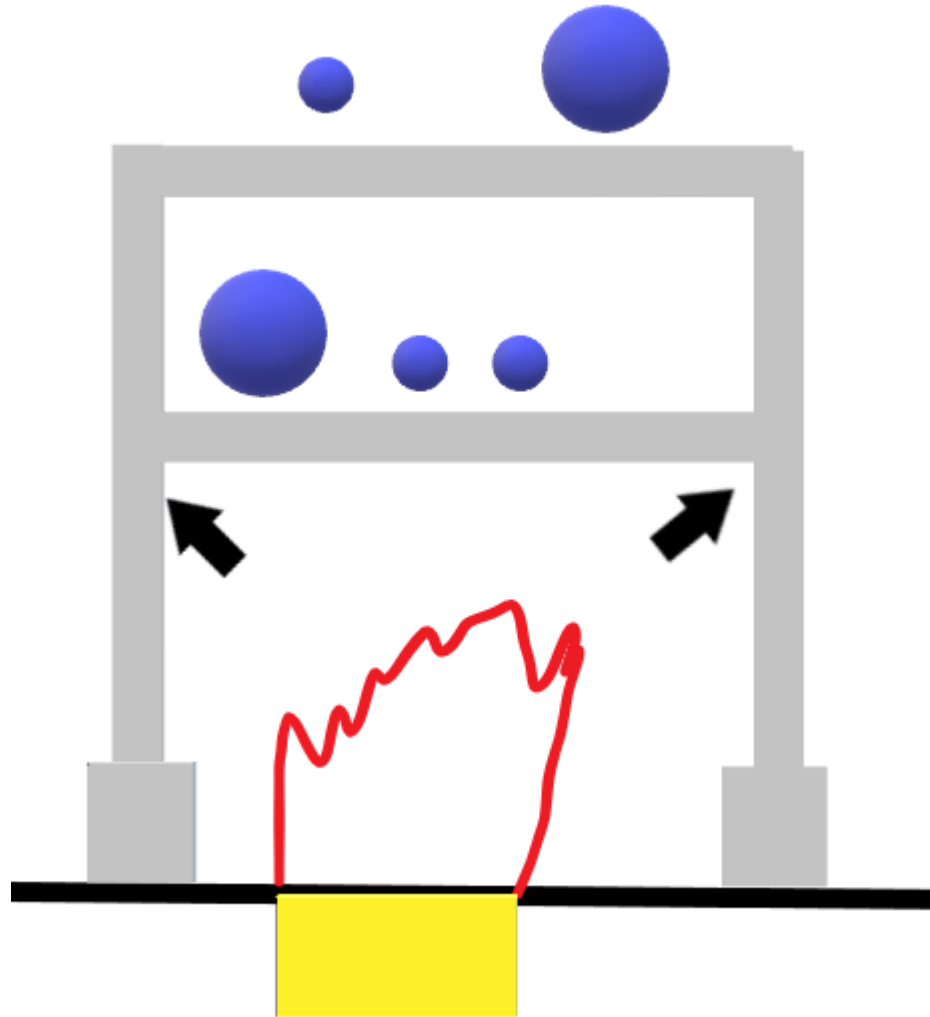
Fire and Cryo Protection

- Typical piperack cross section:
- Vertical supports
- Horizontal supports
 - Piping
- Trench at grade



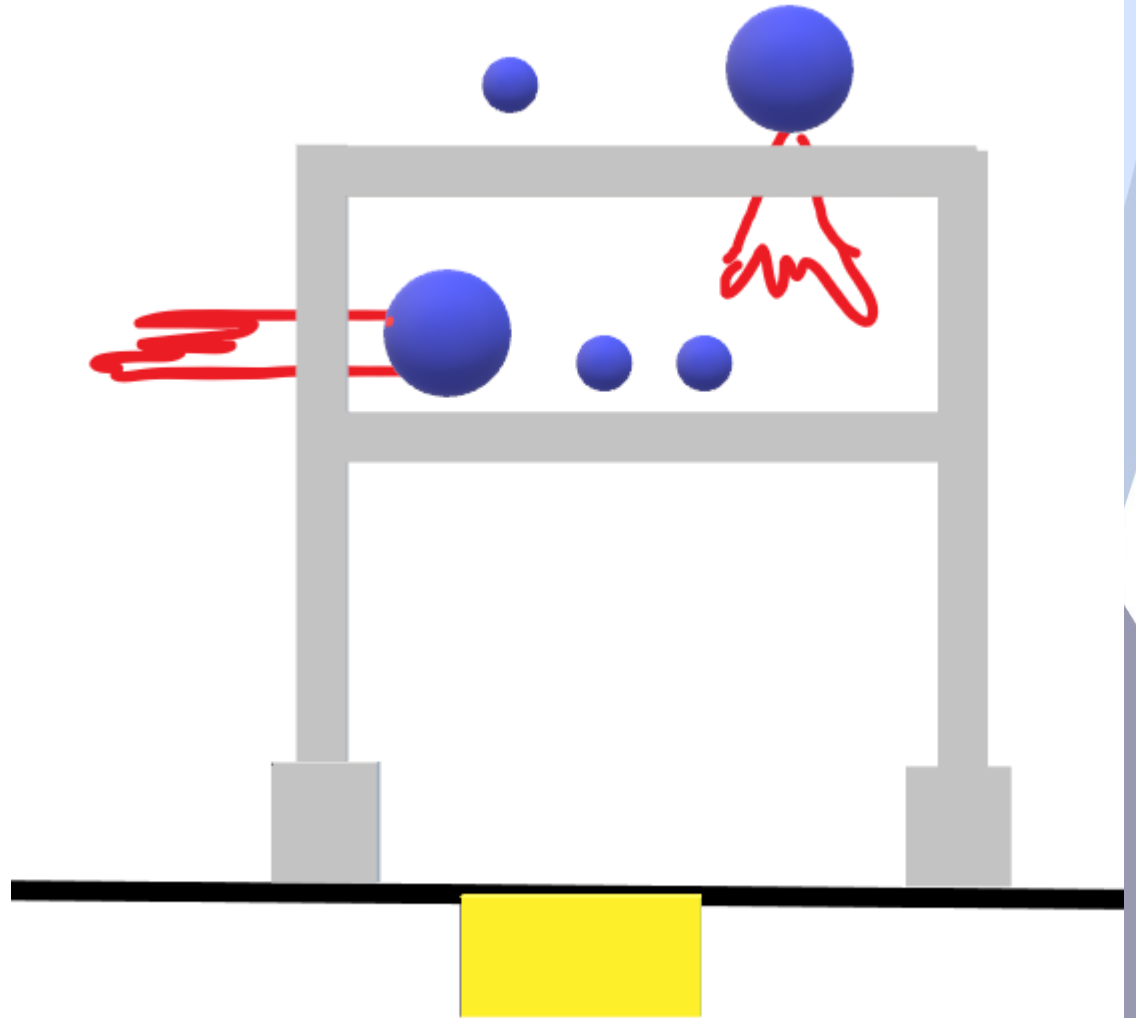
Fire Protection

- Pool fires:
 - Perform trench fire/impoundment fire modeling to evaluate thermal flux on structural support
 - Modeling can identify the flux at various levels and can be used to determine the extent of fire proofing



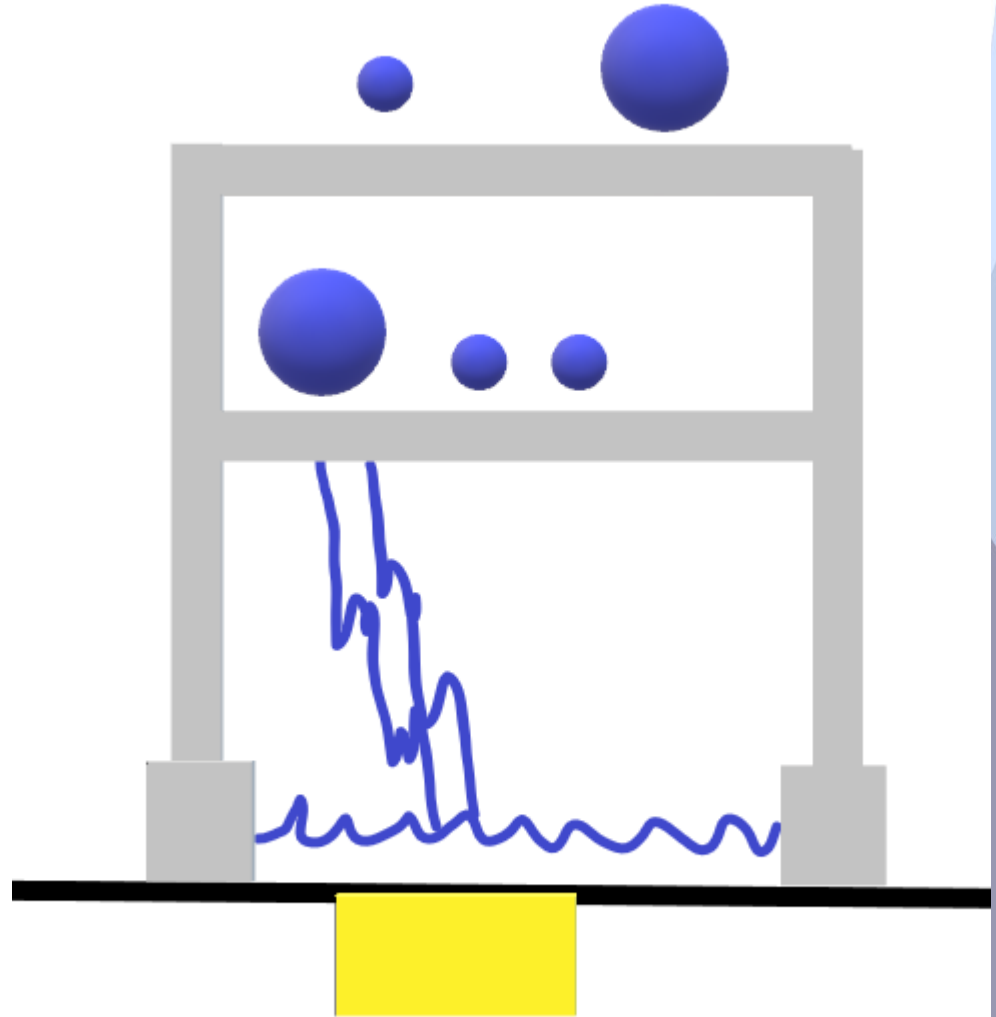
Fire Protection

- Jet fires:
 - What is the criteria for a credible jet fire?
Hole in solid welded piping?
Leaks around flanges?
Small diameter piping?



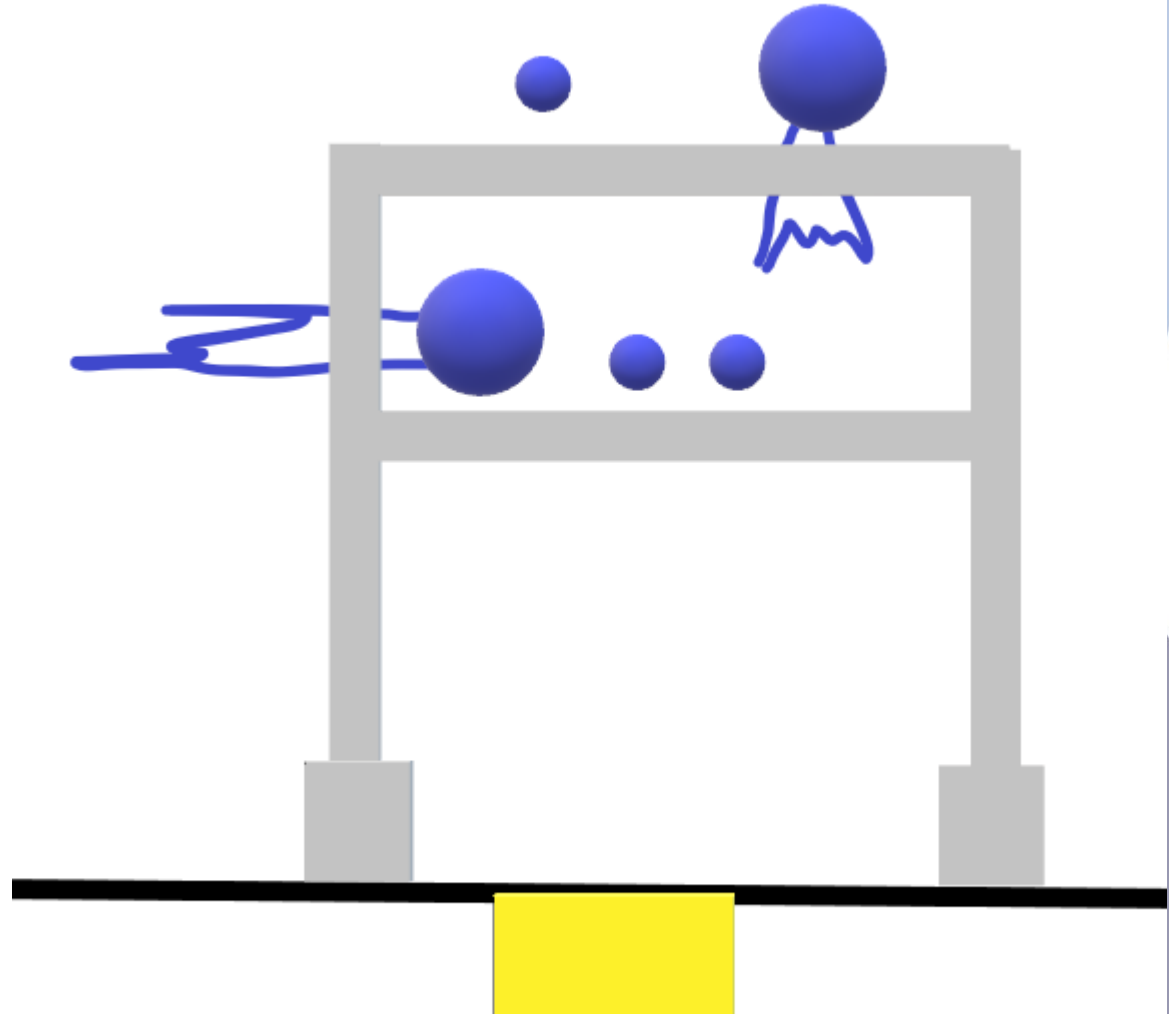
Cryo Protection

- Liquid Pools:
 - Evaluate the height of liquids in sumps and trenches and splashing and make sure structural steel footings are not susceptible to cold splashing or contact
 - Carbon steel supports on concrete “pillars” a few feet above the trench level



Cryo Protection

- Jetting releases:
 - What is the criteria for a credible jet release? Hole in solid welded piping? Leaks around flanges? Small diameter piping?



Fire and Cryo Protection

- Potential RD Topic:
 - Provide guidance and better definition as to what should be protected against fire exposure and cryo exposure
 - What should the scenarios be that define fire and cryo exposure
 - Reference applicable codes and standards
 - Build on Failure Rate RD Project which evaluated different failure scenarios
 - Could serve as the basis for credible scenarios?

UPDATE CODE!

- Brought up in all past RD forums
- Design and construction is still stuck following NFPA 59A (2001), which IBR's even older codes
- PHMSA was very involved in the 2019 and 2022 updates to NFPA 59A.
- Value in doing RD on new technologies if code isn't going to allow them.....?