

OIL & GAS

Risk Based Siting for Small Scale LNG

A comparison of alternatives

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Historical Way of Managing Siting Risk is Through Exclusion Zones Based on Increasingly Complex Estimates

Siting based on full QRA

- Accounts for full range of risk management options (operational and technological)
- Complex to regulate and varies with practitioner
- Requires definition of “acceptable” fatality limits

Consequence-based exclusion zones

- Accounts for variations in facility size
- Zones are directly related to physical exposure
- Lacks transparency on the frequency of “worst-credible” case

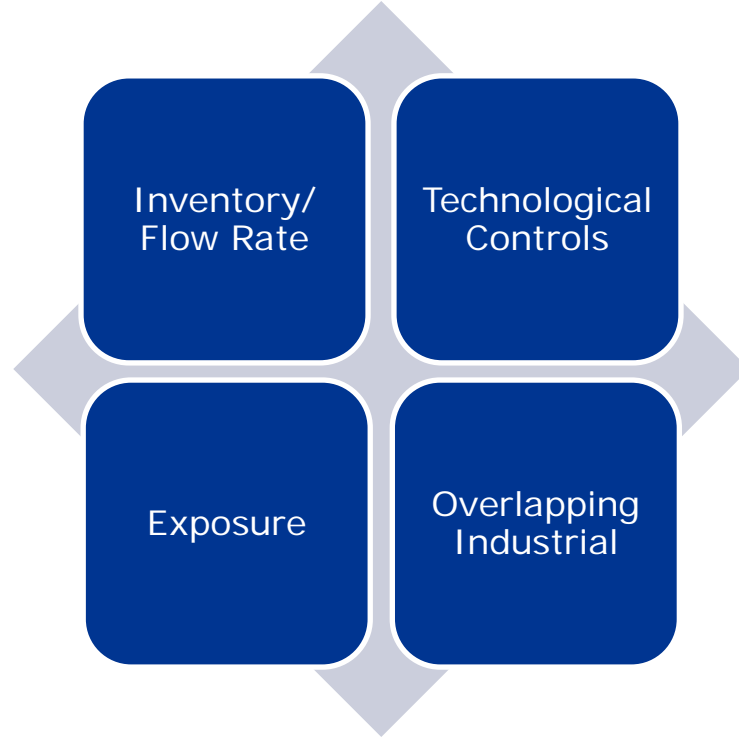
Prescribed exclusion zones

- Easy to enforce/regulate
- Over/under estimate every facility
- Lack transparency in acceptable exposure

Increasing Complexity



Benefits of Risk-Based Exclusion Zones Require a Structure that Considers Four Factors but May not Require a Full QRA



Where the Facility is Placed Matters

Exposure

Inventory/Flow
Rate

Technological
Controls

Overlapping
Industrial

Categorized by both people/public and hazardous material exposure to capture concepts of

- Societal risk
- Potential outrage
- Escalation potential

Categorized by degree of industrialization within a zone specific to operation size to account for variations in

- Ignition probability
- Initiating event from neighboring facility

How the Facility is Operated Matters

Inventory/Flow Rate

Categorized by both storage volume and transfer rate

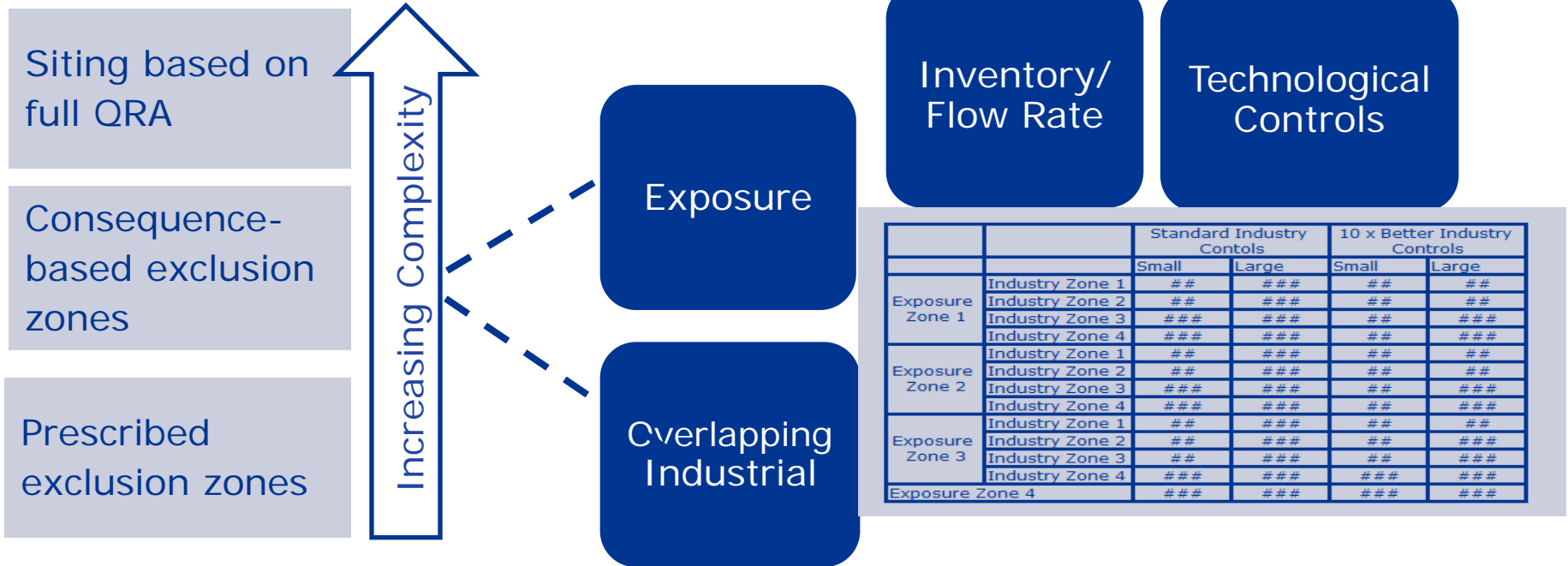
Proxies for size allow a standard set of consequences to form the basis of application across size ranges

Technological Controls

Categorized by demonstrable comparison to a standard industry performance



Four Categories Can be Combined to Develop Risk-Based Exclusion Zones the Work for a Full Range of Facility Sizes



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