

Elements of the Integrated Assessment (IA)

1) Hazard

- Hydrostatic & hydrodynamic loads
- Wave loads
- Debris impact loads
- Erosion and local scour
- Duration of the flood event
- Other factors

2.a) Flood protection: types (see NEI 12-07)

see Appendix A & Appendix C

- Incorporated features
- Exterior features
- Temporary features
- ...the above may have:
- Passive and active functions
- Associated OMAs

2.b) Flood protection: performance factors & criteria

- Availability of protection
- Reliability of action/protection
- Feasibility of action
- Criteria for assessing performance

3) Mitigation

see Appendix B

- Examine protection failure modes
- Associated equipment failures
- Various plant equipment available
- Demonstrate with high confidence that key safety functions can be maintained.

Elements are Folded into the IA Review Process

Hazard
Evaluation

Integrated Assessment Review Process

Evaluate Flood
Protection

Flood protection systems withstand the flood event with adequate margin and high reliability.

Protection fails. Some SSCs important to safety are compromised.

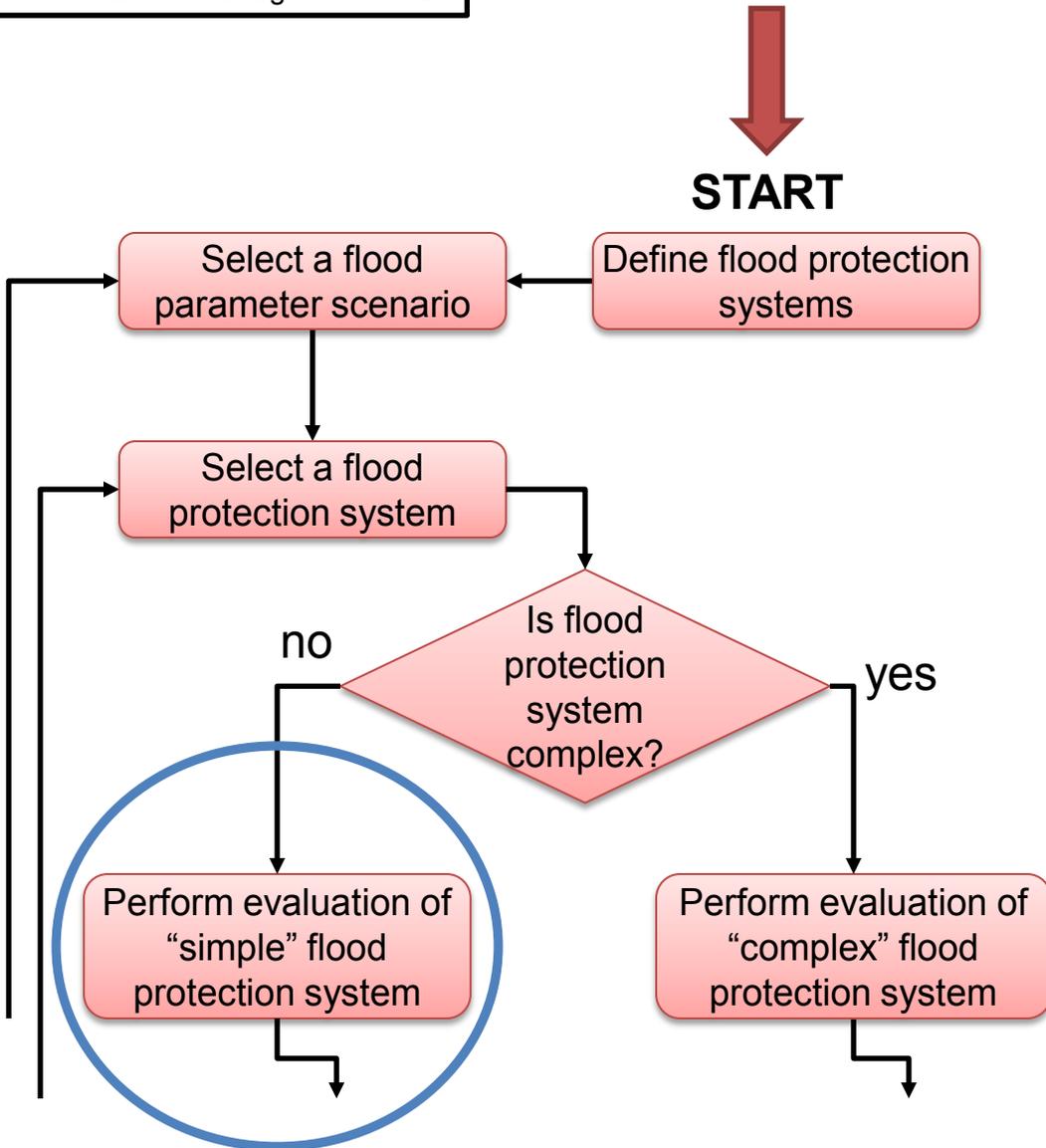
By procedure, flood waters allowed to enter buildings. Some SSCs important to safety are compromised.

Evaluate Mitigation Strategies

Results

Evaluate Flood Protection

Note: subset of a larger flow chart



START

Simple Flood Protection

- Exterior barriers or
- Incorporated barriers
- ...AND must be both
- Permanent
- Passive

Evaluation of
“SIMPLE”
flood protection
system

Evaluation

- Quantitative: all loads using traditional engineering evaluation
- Qualitative: operational requirements (inspection, maintenance, etc.)

Adequate margin & high reliability?

Yes

Document and justify flood protection integrity

No

Yes

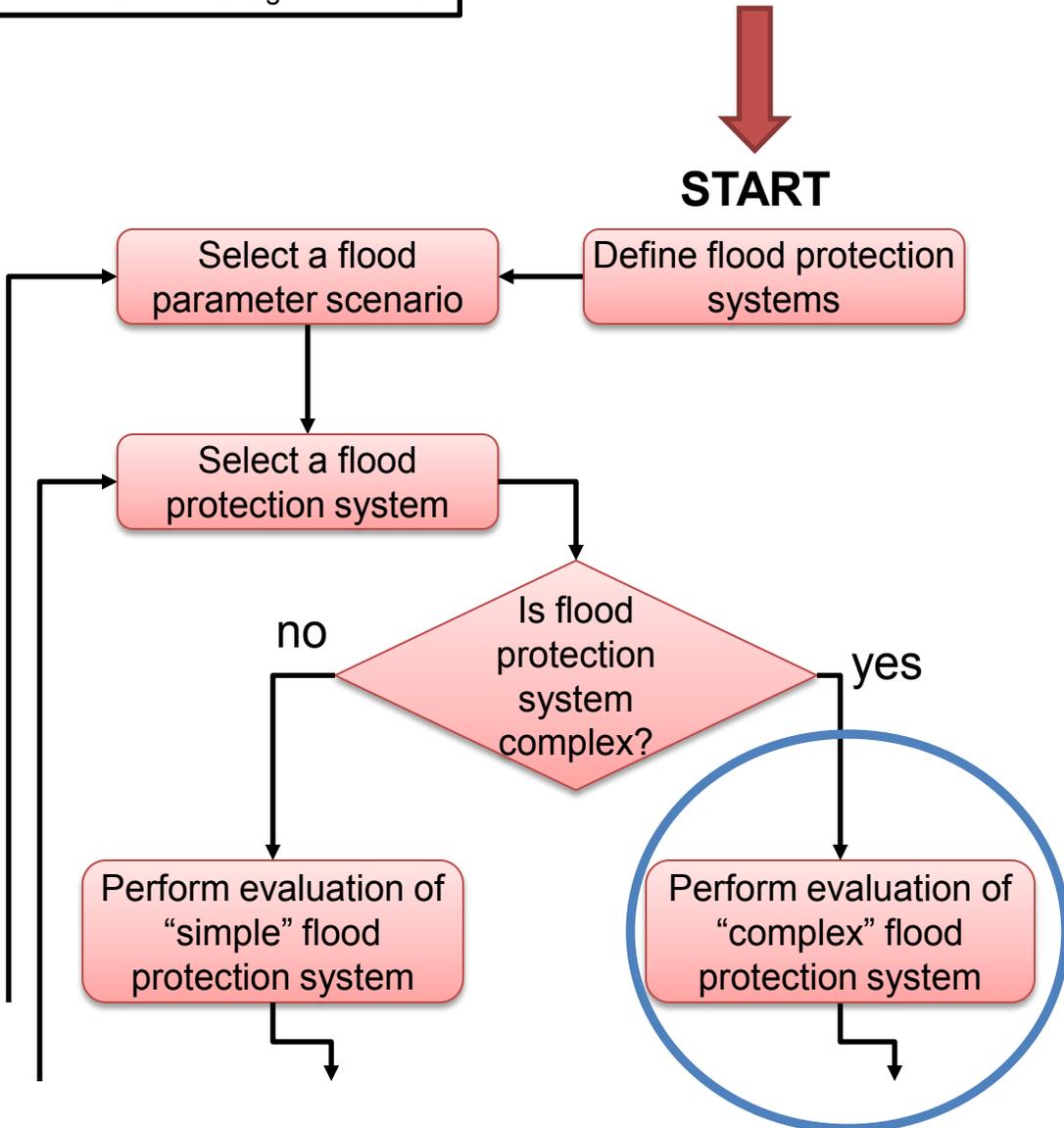
Modify protection system?

No

- Protection fails
- Document failure mode(s)
- Proceed to evaluating mitigation strategies

Evaluate Flood Protection

Note: subset of a larger flow chart



START

Evaluation of
“**COMPLEX**”
flood protection
system

Complex Flood Protection
• All non-simple flood
protection systems

Evaluation

Quantitative (as appropriate):

- All loads using traditional engineering evaluation
- Reliability of active features
- OMAs using HRA concepts & approaches (App. C)
- Logic models of protection systems

Qualitative (as appropriate):

- OMAs via conservative assumptions
- Operational requirements
- Logic models of protection systems

Adequate
margin &
high
reliability?

Yes

Document and justify
flood protection integrity

No

Yes

Modify
protection
system?

No

• Protection fails
• Document failure
mode(s)
• Proceed to
evaluating mitigation
strategies

Elements are Folded into the IA Review Process

Hazard Evaluation

Integrated Assessment Review Process

Evaluate Flood Protection

Flood protection systems withstand the flood event with adequate margin and high reliability.

Protection fails. Some SSCs important to safety are compromised.

By procedure, flood waters allowed to enter buildings. Some SSCs important to safety are compromised.

Evaluate Mitigation Strategies

Results

Mitigation evaluation

START



Select a flood parameter scenario

Select a credible flood protection failure mode(s)

Specify direct consequences of flood protection failure mode(s)

Specify equipment affected by direct consequences and define plant conditions

Decision:
Choose method

“Scenario-Based” evaluation

- Define key safety functions that must be maintained
- Demonstrate with high confidence that CCDP is low

“Margins-Type” evaluation

- Compute CCDP
- Compute CLERP

“PRA-Based” evaluation

Perform in accordance with ASME/ANS and RG 1.200 PRA guidance

Repeat for other flood scenarios and failure modes.
When complete, proceed to Results.