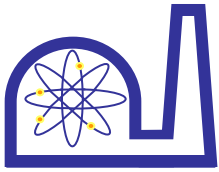


50.59 Process at the MITR

T. Newton
MIT Nuclear Reactor Laboratory

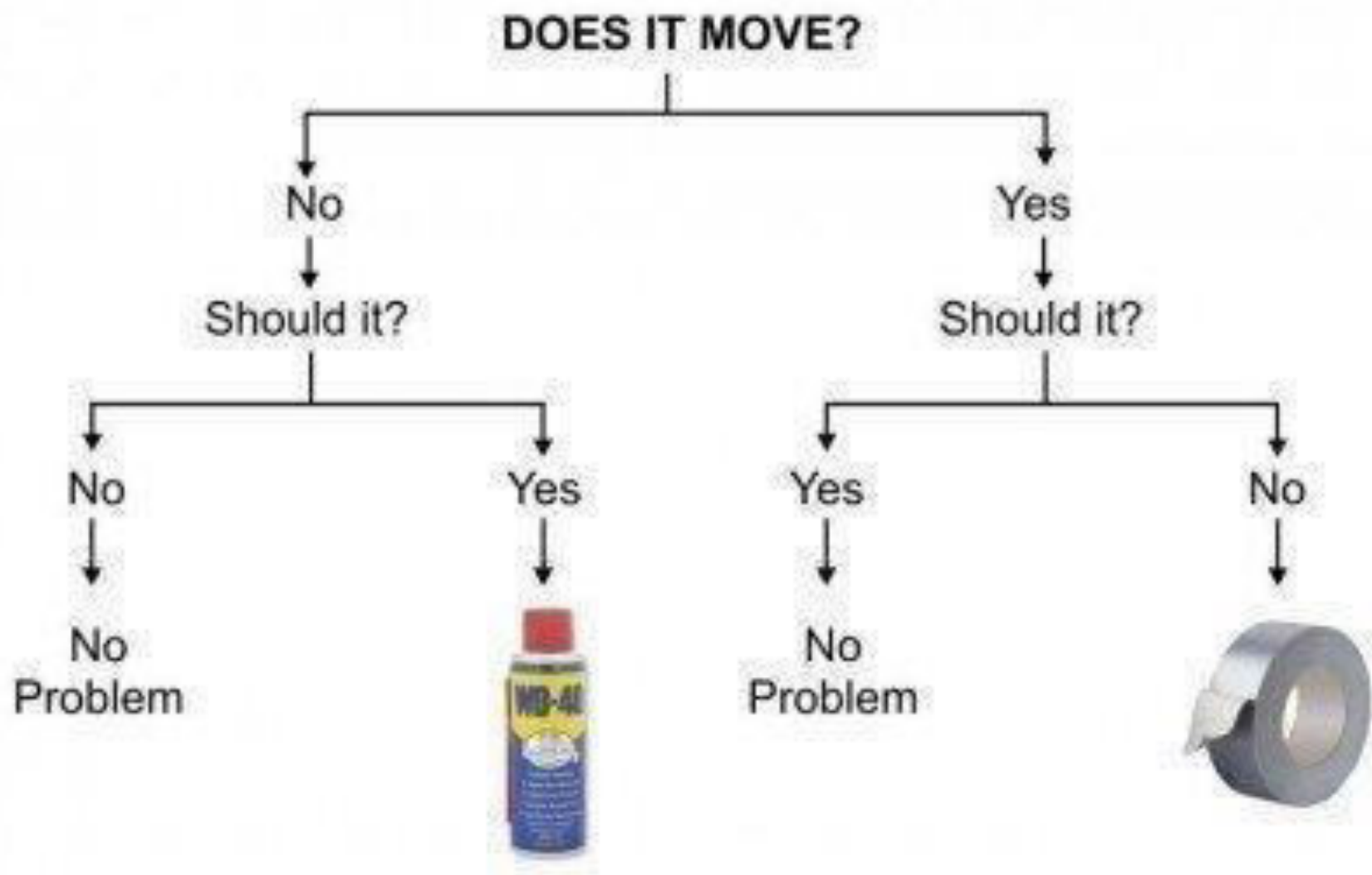
2013 TRTR Meeting
St. Louis, MO

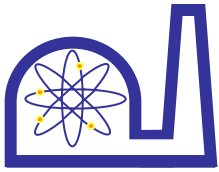


Outline

- Equipment change classifications
- Safety Review process
- Digital communications
- Issues

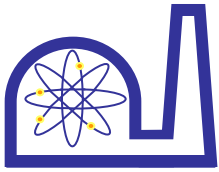
Engineering Flowchart





Classification

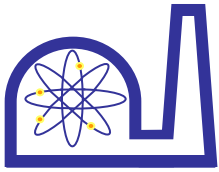
- All MITR equipment and procedures classified into three categories:
 - Class A
 - Class B
 - Class C



Classification

Class A changes

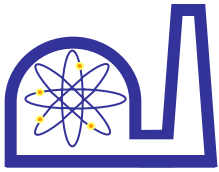
Procedures and Plans:	Equipment:
Standard Operating Procedures	Any equipment not meeting 50.59 criteria (unreviewed safety question)
Emergency Plan and Procedures	
Operator Requalification Program	
Security Plan	



Classification

Class B changes

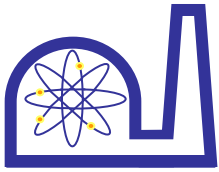
Procedures and Plans:	Equipment:
Administrative Procedures	Core housing and core tank
Operating Procedures Checklists	Primary and reflector systems
Abnormal Operating Procedures	Control blades and mechanisms
Technical Specification Tests	Containment building and ventilation
Maintenance and special Procedures involving nuclear safety	Neutron and coolant safety channels
Preoperational tests of class A or B equipment	Effluent and area radiation monitors
	Engineered safety features (e.g. ECCS)
	Fuel and structures



Classification

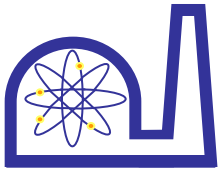
Class C changes

Procedures and Plans:	Equipment:
Scram Tests	Any equipment not described in the SAR but listed in other MITR documents
Interlock tests	
Alarm tests	
Respiratory procedures	
Maintenance and special Procedures not involving nuclear safety	
Preoperational tests of class C equipment	



Classification

	Class A change		Class B change		Class C change	
	permanent	temporary	permanent	temporary	permanent	temporary
Q/A checklist			As needed		√	
Safety Review (includes 50.59 review)	√	√	√			
Staff member				1	1	1
SRO	2	2	2	1	1	1
RRPO (if relevant)	√	√	√			
Director of Reactor Operations	√	√	√			
Reactor Safeguards Committee approval	√					
NRC (notification or approval, as appropriate)	√					



Safety Review Form No. _____

Item:

Submitted by _____ Date _____

Q/A number (required for all equipment changes) _____

	<u>Yes*</u>	<u>No</u>
Does the item change or contradict the Technical Specifications?	—	—
Does the item contradict the SAR?	—	—

*Attach explanation

Description of Change (Attach extra pages if necessary):

Safety Evaluation (Attach extra pages if necessary):

Summary of Review:

a) Does the proposal:	<u>Yes</u>	<u>No</u>
i) require a license amendment (10CFR50.59(c)(2))	—	—
ii) decrease scope of requalification program (10CFR50.54(i-1))	—	—
iii) decrease effectiveness of security plan (10CFR50.54(p))	—	—
iv) decrease effectiveness of emergency plan (10CFR50.54(q))	—	—

b) Reviewer's Comments:

Reviewer _____ Date _____

Reviewer _____ Date _____

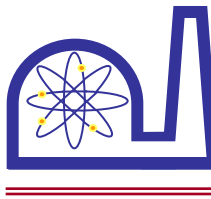
Reviewer _____ Date _____
(Reactor Radiation Protection Officer)

Approved _____ Date _____
(Director of Reactor Operations)

Date of MITRSC approval if required _____ Date of NRC approval if required _____

List of Communications containing MITRSC additional conditions:

10 CFR 50.59 & 50.54 (p and q) changes included in Annual Report to NRC, Fiscal Year _____



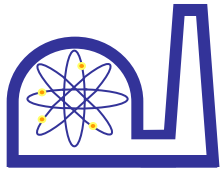
Evaluation of SR#-O-13-25 under 50.59 Requirements

The licensee must obtain a license amendment if the change, test, or experiment would:

- 1) result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the SAR: The change involves update of three Abnormal Operating Procedures to reflect current conditions. There is no change in the expected frequency of accident occurrence.
- 2) result in more than a minimal increase in the likelihood of occurrence of a malfunction important to safety: As stated in 1) above, there is no increase in the likelihood of occurrence of a such a malfunction.
- 3) result in more than a minimal increase in the consequences of an accident previously evaluated in the SAR: As stated in 1) above, no increase in the consequences will occur.
- 4) result in more than a minimal increase in the consequences of a malfunction of a structure, system or component (SSC) important to safety: As stated in 3) above, the updated AOPs do not increase any consequences.
- 5) create a possibility for an accident of a different type than any previously evaluated: No accident of a different type will be created.
- 6) create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated: No SSC will be affected by the update.
- 7) result in a design basis limit for a fission product barrier being exceed or altered: No design basis limit will be challenged or affected.
- 8) result in a departure from a method of evaluation used in establishing the design bases or in the safety analyses: This modification does not affect the method of evaluation for design bases.

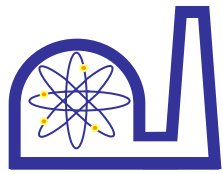
ALARA Determination for SR#-O-13-25

This change will have no impact on ALARA.



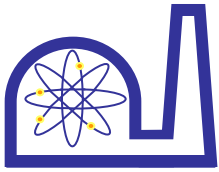
Recent class A changes

- **Emergency Plan Update**
 - EAL changes as a result of relicensing
- **Security Plan changes**
 - LAR submitted to NRC after some debate
- **Digital Nuclear Safety System**
 - Submittal to NRC pending
 - E. Lau talk on Thursday



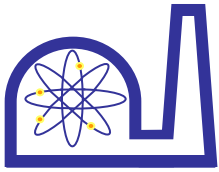
Digital communications policy

- Documents MIT requirements/guidelines for digital equipment and attempt to make them consistent with NRC policy
- Currently in draft form
- Will be included in Safety Review Process/50.59 review



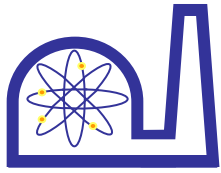
Proposed policy

- Reactor control or reactor safety function
 - configured so as to prevent digital communication to or from a public network.
 - This includes any device capable of scrambling the reactor.



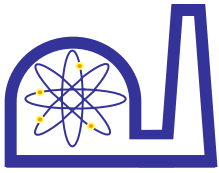
Proposed policy

- Reactor control or reactor safety function
 - configured so as to prevent digital communication to or from a public network.
 - This includes any device capable of scrambling the reactor.
- Any proposed (digital) control room device
 - evaluated to assure that there is no possibility of inappropriate operator actions from an unintended automatic action or display



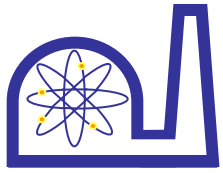
Proposed policy

- Reactor control or reactor safety function
 - configured so as to prevent digital communication to or from a public network.
 - This includes any device capable of scrambling the reactor.
- Any proposed (digital) control room device
 - evaluated to assure that there is no possibility of inappropriate operator actions from an unintended automatic action or display
- Experiment remote control
 - Not public network
 - No control where reactivity greater than 0.1% $\Delta K/K$ could result
 - Control function safety review
 - Ex-core beam control beyond normal operations not permitted

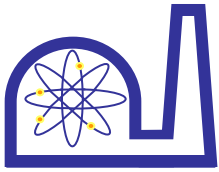


Proposed policy

- Non-public networks physically separate from public networks
- Software/firmware verification and control of source code
- Data storage requirements
 - Stored on fault-tolerant or magnetically insensitive media
 - Storage communications requirements via non-public networks

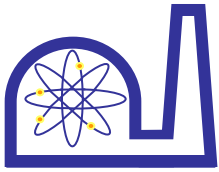


Thoughts



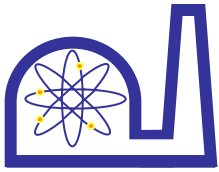
Thoughts

- NRC processes make any licensee 50.59 review proceed at some risk
 - Documentation of justification is essential
 - License Amendment Requests may be advisable if uncertain



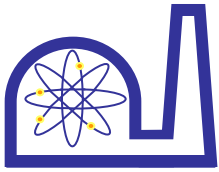
Thoughts

- NRC processes make any licensee 50.59 review proceed at some risk
 - Documentation of justification is essential
 - License Amendment Requests may be advisable if uncertain
- We are all struggling to find the right balance for digital upgrades
 - Power plant regulations may be the most detailed, but should not necessarily be applied to research reactors
 - 50.59(c)(2)(v), “... create a possibility of an accident of different type ...”
 - No language as to minimal probability
 - NRC conservative interpretation necessitates much more scrutiny of digital components than was ever required for analog components
 - May serve to discourage upgrades to more reliable equipment



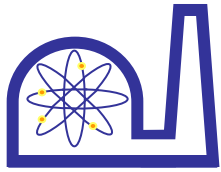
Thoughts (2)

- NRC statements not always consistent:
 - NEI-01-01: “The mere fact that a change converts analog equipment or signals to digital does not cause the change to screen in [to an LAR]. ... other aspects ... must be considered ...”
 - Proposed NUREG 1537, Chapter 7: “... if the safety analysis credits the trip and the upgrade is to a digital I&C system, a LAR would be required.”



Thoughts (2)

- NRC statements not always consistent:
 - NEI-01-01: “The mere fact that a change converts analog equipment or signals to digital does not cause the change to screen in [to an LAR]. ... other aspects ... must be considered ...”
 - Proposed NUREG 1537, Chapter 7: “... if the safety analysis credits the trip and the upgrade is to a digital I&C system, a LAR would be required.”
- Human Systems Interface
 - No HSI standards exist for NPRs using analog components
 - Proposed NUREG-1537 changes seem to suggest that any changes in HSI as a result of use of digital components require an LAR



Concluding remarks

- Technology is outpacing regulatory policy, making 50.59 changes riskier
- Documenting proposed policy for upgrades will hopefully make things easier down the road
- We all need to work together to ensure reasonable and consistent regulatory oversight of upgrades