Background and Status of Safety Culture Initiatives

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Objective and Scope of Safety Culture Initiatives

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Safety Culture Public Meeting

November 29, 2005

Background

- Commission Staff Requirements Memorandum (SRM-SECY-04-0111, August 30, 2004)

- Davis-Besse Lessons Learned Recommendations

- General Accounting Office (GAO) Recommendation

- Congressional encouragement

Status

- SECY-05-0187 "Status of Safety Culture Initiatives and Schedule for Near-Term Deliverables," dated October 19, 2005, was issued

- Follow-up activities post-October 26, 2005, Public Meeting:

  Fresh start

    - Reviewed current NRC Programs to identify features that have a bearing on safety culture
    - Reviewed approaches discussed at the October public meeting

Objectives

- To provide better opportunities for the NRC staff to diagnose safety culture weaknesses and take appropriate actions before they result in a degraded cornerstone

- To provide the NRC staff with a structured process to determine the need to specifically evaluate a licensee's safety culture after performance problems have resulted in a degraded cornerstone

- To provide the NRC staff with a systematic safety culture evaluation process and a tool to review a licensee's self-assessment

Scope of Safety Culture Initiatives

- Enhancements will be within the structure of the ROP and consistent with its principles

- "Disapproved" in SRM-SECY-04-0111

  - Revise the 1989 Policy Statement on the Conduct of Operations to broaden its focus

  - Emphasize the 1989 Policy Statement by encouraging licensee self-assessment of safety culture through the development of a guidance document on safety culture similar to the guidance developed for safety conscious work environment (SCWE)

Scope of Safety Culture Initiatives

"Disapproved" in SRM-SECY-04-0111

- Develop an inspection process for systematically assessing safety culture to result in additional agency actions

- Use NRC surveys of licensee personnel

- Proactively work with the international community to develop objective performance indicators

Scope of Safety Culture Initiatives

"Disapproved" in SRM-SECY-04-0111

– Engage the industry to develop an industry process to assess safety culture with NRC oversight (along the lines of INPO training model)

– Develop criteria/possible intervention strategies for the NRC to take when downward trends in the area of SCWE and safety culture exist and licensee has failed to take appropriate action

Discussion

Objectives?

Scope?

Definitions and Components of Safety Culture

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Safety Culture Public Meeting
November 29, 2005

Definitions of Safety Culture

That assembly of **characteristics and attitudes** in **organizations and individuals** which establishes that, as an **overriding priority, nuclear plant safety issues** receive the attention warranted by their significance – **INSAG-4**, 1991

- What – characteristics and attitudes
- Who – organizations and individuals
- Why – overriding priority is safety

Definitions of Safety Culture

An organization's **values and behaviors** – modeled by its **leaders** and internalized by its **members** – that serve to make **nuclear safety the overriding priority** – **INPO**, 2004

- What – values and behaviors
- Who – leaders and members
- Why – overriding priority is nuclear safety

Definitions of Safety Culture

The entirety of **attitudes and activities** of various **organizations and individuals** ensuring an **overall priority of safety** related questions and guarantees their appropriate handling - **Hungarian Regulation**

- What – attitudes and activities
- Who – organizations and individuals
- Why – overall priority of safety

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Definitions of Safety Culture

The sum of all safety-related **assumptions and norms** that are shared by the majority of an **organization's members**, and which find their expression in **the way safety is actually dealt with** in all areas of the organization (Müller, Brauner, Grote & Künzler, 1998, p. 25) – **Swiss HSK**

- What – assumptions and norms
- Who – organization's members
- Why – the way safety is actually dealt with

Comparison of Definitions

- What –   characteristics and *attitudes* (INSAG)

  values and behaviors (INPO)

  attitudes and activities (Hungarian)

  assumptions and norms (Swiss)

- Who –   organizations and individuals (INSAG, Hungarian)

  leaders and members (INPO)

  organization's members (Swiss)

- Why –   overriding priority is safety (INSAG, INPO)

  overall priority of safety (Hungarian)

  the way safety is actually dealt with (Swiss)

NRC Definition of Safety Culture

Discussion

Given the similarity among the definitions, the NRC proposes to use the INSAG-4 definition of safety culture, which was endorsed by the Commission in 1989

Components and Subcomponents of Safety Culture

INPO, the IAEA, and other countries further describe safety culture at two additional levels of detail

- "Principles," "characteristics," and "criteria" – the **components** of safety culture
- "Attributes" – the **subcomponents** of safety culture

IAEA* Components: Safety Culture Characteristics

- Safety is a clearly recognized value
- Leadership for safety is clear
- Accountability for safety is clear
- Safety is learning-driven
- Safety is integrated into all activities

*From the Safety Culture Assessment Review Team (SCART) Draft Guidelines

INPO Components:
Principles of Safety Culture

1. Everyone is personally responsible for nuclear safety
2. Leaders demonstrate commitment to safety
3. Trust permeates the organization
4. Decision-making reflects safety first
5. Nuclear technology is recognized as special and unique
6. A questioning attitude is cultivated
7. Organizational learning is embraced
8. Nuclear safety undergoes constant examination

Proposed NRC Safety Culture Components

- Organizational safety accountability
- Safety conscious work environment (SCWE)
- Organizational learning
- Work planning and human performance

Comparison of NRC, INPO, IAEA at the Component Level

Each NRC component and subcomponent is related to a corresponding component or subcomponent from INPO or IAEA; some terminology differs

- Example of consistency
  - NRC's proposed component, "Organizational learning"
  - INPO's principle 7, "Organizational learning is embraced"
  - IAEA's characteristic, "Safety is learning-driven"

- Example of apparent inconsistency
  - INPO: leadership selection and development processes
  - IAEA: leadership skills are systematically developed
  - NRC: no related component/sub-component

Subcomponents of Safety Culture

Each "principle," "characteristic," or "criterion" identified by INPO, IAEA, and other countries is further described in terms of more detailed "attributes" – the **subcomponents** of safety culture

– INPO describes 56 attributes

– IAEA describes 44 attributes

– NRC proposes 16 subcomponents

Proposed NRC Components and Subcomponents

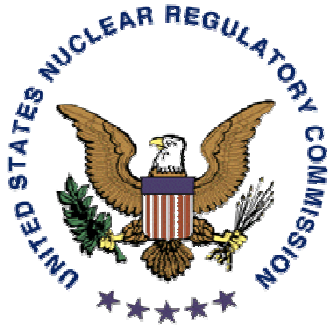| Work Planning & Human Performance	Organizational Learning	SCWE	Organizational Safety Accountability
• Work control	• Internal & external operating experience	• SCWE policies	• Safety policies
• Systematic decision-making	• Self-assessment	• Willingness to raise concerns	• Accountability & incentive programs
• Conduct of work	• Problem identification & resolution/CAP	• Alternative process for raising concerns	• Adequate resources
• Questioning attitude	• Continuous learning environment	• Preventing & detecting retaliation	• Organizational change management

Comparison of NRC Subcomponents to INPO and IAEA Attributes for Safety Conscious Work Environment

NRC Safety Culture Subcomponent	Related INPO Attribute	Related IAEA Attribute
Safety conscious work environment (SCWE) policies	People are treated with dignity and respect.	Management shows a continuous effort to strive for openness and good communication throughout the facility.
Willingness to raise concerns	Employees are expected and encouraged to offer innovative ideas to help solve problems.	An open reporting of deviations and errors is encouraged.
Alternative process for raising concerns	Differing opinions are welcomed and respected. When needed, fair and objective methods are used to resolve conflict and unsettled differing professional opinions.	Management has the ability to resolve conflicts as necessary.
Preventing and detecting retaliation	Personnel can raise nuclear safety concerns without fear of retribution and have confidence their concerns will be addressed.	Relationship between management and staff is built on trust.

Comparison of NRC Subcomponents to INPO and IAEA Attributes for Work Planning and Human Performance

NRC Safety Culture Subcomponent	Related INPO Attribute	Related IAEA Attribute
Work control	Design and operating margins are carefully guarded and are changed only with great thought and care. Special attention is placed on maintaining fission product barriers and defense-in-depth.	Quality of processes, from planning to implementation and review, is good.
Systematic decision-making	When previous operational decisions are called into question by new facts, the decisions and associated underlying assumptions are reviewed to improve the quality of future decisions.	High priority to safety is evident in all decision-making processes; this includes appropriate communication and documentation.
Conduct of work	Plant activities are governed by comprehensive, high-quality processes and procedures.	There is a high level of compliance with regulations and procedures.
Questioning attitude	Personnel do not proceed in the face of uncertainty.	A questioning attitude prevails at all organizational levels.

Comparison of NRC Subcomponents to INPO and IAEA Attributes for Organizational Learning

NRC Safety Culture Subcomponent	Related INPO Attribute	Related IAEA Attribute
Internal and external operating experience	Individuals are well informed of the underlying lessons learned from significant industry and station events, and they are committed to not repeating these mistakes.	Organizational and operating experience (both internal and external to the facility) is used.
Self-assessment process	A mix of self-assessment and independent oversight reflects an integrated and balanced approach.	Internal and external assessments, including self-assessments, are used.
Problem identification and resolution/corrective action program	Anomalies are recognized, thoroughly investigated, promptly mitigated, and periodically analyzed in the aggregate.	Learning is enabled through the ability of the facility to recognize and diagnose deviations.
Continuous learning environment	The organization avoids complacency and cultivates a continuous learning environment.	There is a systematic development of staff competencies.

Comparison of NRC Subcomponents to INPO and IAEA Attributes for Organizational Safety Accountability

NRC Safety Culture Subcomponent	Related INPO Attribute	Related IAEA Attribute
Safety policies	Leaders recognize that production goals, if not properly communicated, can send mixed signals on the importance of nuclear safety. They are sensitive to detect and avoid these misunderstandings.	The strategic business importance of safety is reflected in the business plan of the nuclear facility.
Accountability and incentive programs	The system of rewards and sanctions is aligned with strong nuclear safety policies and reinforces the desired behaviors and outcomes.	Roles and responsibilities for management and staff are clearly defined and understood.
Adequate resources	Equipment is meticulously maintained well within design requirements.	Safety is a primary consideration in the allocation of resources, including time, equipment, personnel and money.
Organizational change management	The effects of impending changes (such as those caused by sale or acquisition, bargaining unit contract renegotiations, and economic restructuring) are anticipated and managed such that trust in the organization is maintained.	Safety implications are considered in the change management process.

Discussion

Is there sufficient commonality between the NRC, INPO, and IAEA components and subcomponents?

Current Activities Related to Safety Culture

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Safety Culture Public Meeting
November 29, 2005

Current Regulatory Oversight Related to Cross Cutting Aspects

	Existing
INFORMATION SOURCES	• Inspectors complete inspections • Inspectors complete Plant Status activities • Inspectors identify cross-cutting aspects of findings • NRC personnel investigate and/or inspect allegations
DOCUMENTATION	• Document performance issues with identification of cross cutting aspects
ASSESSMENT	In accordance with MC 0305, NRC managers: • Identify substantive cross-cutting issues • Determine the appropriate response for plant performance
FOLLOW-UP	In accordance with MC 0305, NRC staff responds in accordance with: • The staff's evaluation of substantive cross-cutting issues • The Action Matrix

Post Davis-Besse ROP Enhancements

- IP 71152 – CAP screening review

- IP 71152 – Semi-annual trend review

- IP 71111.15 – Operability evaluation review includes deferred modifications

- Training on the Columbia Space Shuttle Accident

- Review of NRC baseline program and plant assessment processes

- Cross-cutting issue guidance

  - 01/2004 - provided follow-up options for substantive cross-cutting issue
  - 12/2004 - clarified criteria and added bins for HP & PI&R
  - 11/2005 - clarified treatment and development of substantive cross-cutting issues

Current NRC Activities Related to Safety Culture

- What does the NRC currently do related to safety culture?
  - NRC assesses plant performance
  - NRC activities evaluate elements of plant performance which provide varying degrees of coverage for each safety culture component

- What does the NRC not currently do regarding the evaluation of safety culture:
  - NRC does not explicitly inspect or assess a plant's safety culture

Determine the Current NRC Activities Related to Safety Culture

Objective

- Determine the extent to which NRC's current activities are related to safety culture components and subcomponents

Assumptions

- Safety culture components and subcomponents
- Levels of coverage

Determine the Current NRC Activities Related to Safety Culture

Methodology

- Perform a detailed review of the following elements of the NRC's oversight activities:

  - Reactor Oversight Process (ROP) baseline inspection program
  - ROP supplemental inspections
  - Reactive special inspection activities (MD 8.3 - SI, AIT, and IIT)
  - Plant status activities (MC 2515, Appendix D)
  - Allegation Program

- Infrequently performed inspections (MC 2515, Appendix C) were not included in the review

Determine the Current NRC Activities Related to Safety Culture

Work Planning & Human Performance	Organizational Learning	SCWE	Organizational Safety Accountability
• Work control	• Internal & external operating experience	• SCWE policies	• Safety policies
• Systematic decision-making	• Self-assessment	• Willingness to raise concerns	• Accountability & incentive programs
• Conduct of work	• Problem identification & resolution/CAP	• Alternative process for raising concerns	• Adequate resources
• Questioning attitude	• Continuous learning environment	• Preventing & detecting retaliation	• Organizational change management

Determine the Current NRC Activities Related to Safety Culture

Levels of Coverage

- Direct – Guidance is clear that some aspects related to safety culture are covered during the activity

- Indirect – Guidance mentions at a high level that some aspects related to safety culture are covered or there is a reasonable opportunity to cover some aspects of safety culture during the activity

- No Coverage

Current NRC Activities Related to Safety Culture

Summary of Results

- Most NRC activities can be tied directly or indirectly to one or more of the safety culture components and subcomponents

- Most aspects of safety culture subcomponents are currently covered by NRC activities. The level of coverage varies significantly between subcomponents

Current NRC Activities Related to Safety Culture

- Several subcomponents of safety culture are covered extensively

  - Adequate Resources
  - Problem Identification and Resolution/CAP
  - Conduct of Work

- Several subcomponents of safety culture are covered directly, but to a lesser degree

  - Willingness to Raise Concerns
  - Alternative Process for Raising Concerns
  - Internal and External Operating Experience
  - Self-Assessment Process
  - Work Control

Current NRC Activities Related to Safety Culture

Many subcomponents of safety culture are covered indirectly, to varying degrees

- Safety Policies
- Accountability and Incentive Programs
- Organizational Change Management
- SCWE Policies
- Preventing and Detecting Retaliation
- Continuous Learning Environment
- Systematic Decision Making
- Questioning Attitude
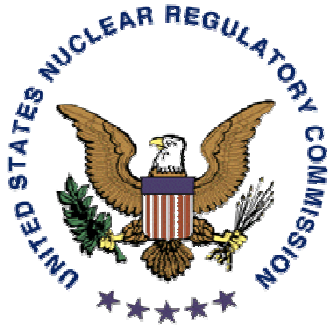
Current Industry Activities Related to Safety Culture

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International Activities Related to Safety Culture

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Safety Culture Public Meeting
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IAEA Safety Culture Services

- Safety Culture Seminars
- Safety Culture Self-Assessment Support
- Peer-Review of Safety Culture Self-Assessments
- Management of Safety and Safety Culture Improvement Support
- Operational Safety Assessment Review Team - OSART
- Safety Culture Enhancement Program Support
- Safety Culture Assessment Review Teams (SCART)

OECD/NEA Activities

CNRA

- Exchange information and experience among regulatory organizations
- Review developments which could affect regulatory requirements
- Review current practices and operating experiences
- "The Role of the Nuclear Regulator in Promoting and Evaluating Safety Culture, 1999

OECD/CSNI Activities

CSNI/Special Expert Group on Human and Organizational Factors (SEGHOF)

- Specialist meetings and workshops addressing specific topics
- State-of-the-Art reports and "situation reports"

Examples of Specific Country Initiatives

- Finland
  - formal regulation
  - inspections performed every two years
    - Assess the development and level of management activities, personnel development and continuous learning, fulfilment of safety regulations, co-operation with regulatory body, safety culture issues
- Switzerland
  - HSK considers safety culture as an important issue in the oversight of the nuclear safety in nuclear installations but refrains from directly regulating and assessing safety culture
  - HSK addresses those concrete activities and arrangements made to ensure and foster safety and to integrate them into the structure and processes of their organization, i.e. their safety management.
  - Regulatory guideline on "Organization of Nuclear Power Plants," HSK-R-17,2002
  - Currently preparing a regulatory guideline on safety culture and inspection manual on safety management
  - Special circumstance at Leibstadt NPP

Examples of Specific Country Initiatives

- Spain
  - 2000 – develop assessment and improvement programs on safety management systems
  - 2002 – implement self-assessment and CAP programs
  - 2005 – implement a safety culture program including third party evaluation (Spanish Parliament order)

- Canada
  - organization and management approach baseline
  - audits and inspections identify areas for improvement

Discussion

Enhancements needed?

- – Routine inspections (baseline)

- – Follow-up inspections (supplemental)

- – Assessment

- – Other

Summary of Highlights
of Today's Meeting

Possible Approaches to Address Safety Culture Enhancements

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Region II

Safety Culture Public Meeting
November 30, 2005

The October 26 Meeting Identified 10 Approaches

(1) <u>Full Diagnostic</u>

NRC staff inspects safety culture while visiting sites

(2) <u>Training Model</u>

NRC oversees safety culture like oversight of training

(3) <u>Short Survey</u>

NRC oversees safety culture surveys

(4) <u>Revise Individual Inspection Procedures</u>

NRC inspects safety culture like PI&R

(5) <u>Survey by Senior Resident Inspectors (SRIs)</u>

SRIs conduct safety culture surveys

The October 26 Meeting Identified 10 Approaches

(6) <u>ROP Findings</u>

NRC looks for safety culture aspects while developing ROP findings

(7) <u>Post Identifying Cross-Cutting Aspects</u>

NRC inspects safety culture only for substantive cross-cutting issues

(8) <u>Safety Culture Insights by Walking Around</u>

Inspectors gain safety culture insights while walking around

(9) <u>Establish set of Performance Indicators</u>

New PIs for safety culture, reported and assessed like other PIs

(10) <u>Safety Culture Topical Report</u>

NRC audits safety culture-related plant activities

Several Approaches Appear Inconsistent with Commission Direction

(1) Full Diagnostic

(2) Training Model

(3) Short Survey

(5) Survey by Senior Resident Inspectors

(10) Safety Culture Topical Report

These approaches were not considered further.

Several Were Retained
for Further Consideration

(4) Revise Individual Inspection Procedures

(9) Establish set of Performance Indicators

(6) ROP Findings (renamed "Cross-Cutting Areas")

(7) Post Identifying Cross-Cutting Aspects

(8) Safety Culture Insights by Walking Around

(X) Greater-than-Green (proposed after the October public meeting)

Evaluation Strategy

1. Identify possible approaches
   - Described in correspondence from stakeholders
   - Mentioned during this public meeting
2. Eliminate those not consistent with Commission Direction
3. Characterize each approach in general detail
4. Discuss pros and cons

Evaluation Strategy

5. Iterate as necessary
   - Characterize each remaining approach in more detail
   - Evaluate approaches against more-detailed criteria
   - If possible, identify a preferred approach based on the latest iteration
   - If not, iterate again
6. Develop revisions as needed to implement the approach

Adopted Conventions to Facilitate Consideration

- Focus on essential details of the implemented options

- In the first iteration, keep it simple:

    - Avoid implementation considerations

- Refer to "Options" A, B, C, ...

    - Identify pros and cons

Discussion

Is this evaluation strategy appropriate?

Characterization of Options

- **Information source**

  – *What safety culture-related info would be obtained?*

- **Documentation**

  – *Where would safety culture-related info be documented?*

- **Assessment**

  – *What decisions would be based on safety culture-related info?*

- **Follow-up**

  – *What inspections or actions would result?*

Safety Culture-related Features Identified in Existing Programs

	Existing
INFORMATION SOURCES	• Inspectors complete inspections • Inspectors complete Plant Status activities • Inspectors identify cross-cutting aspects of findings • NRC personnel investigate and/or inspect allegations
DOCUMENTATION	• The NRC issues docketed correspondence
ASSESSMENT	In accordance with MC 0305, NRC managers: • Identify substantive cross-cutting issues • Determine the appropriate response for plant performance
FOLLOW-UP	In accordance with MC 0305, NRC staff responds in accordance with: • The staff's evaluation of substantive cross-cutting issues • The Action Matrix

Discussion

- Already-identified options?
  - Markup handouts
  - Pros and cons

- New options?
  - Structure new options in terms of any or all of the 4 elements; use template if you wish
  - Identify <u>essential</u> features of the implemented option
  - Separately consider implementation details, pros, & cons

Option A: Revise Individual Inspection Procedures

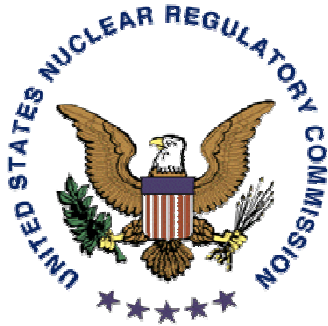|	*Existing*	*New*
INFORMATION SOURCES	• Inspections & Plant Status • Allegations	Also inspect safety culture components during every inspection
DOCUMENTATION	• Docketed correspondence	Also document safety culture observations in inspection reports
ASSESSMENT	• MC 0305 assessment	(Same as existing)
FOLLOW-UP	• MC 0305 response	(Same as existing)

Option B: Establish Set of Performance Indicators

	Existing	New
INFORMATION SOURCES	• Inspections & Plant Status • Allegations	Also: PIs for Safety Culture and/or PI trending in green band
DOCUMENTATION	• Docketed correspondence	(Same as existing)
ASSESSMENT	• MC 0305 assessment	Also: if a PI trend crosses a >green threshold, plan to inspect safety culture aspects of the trend
FOLLOW-UP	• MC 0305 response	Also complete planned safety culture inspections

Option C: Cross-Cutting Areas

	Existing	*New*
INFORMATION SOURCES	• Inspections & Plant Status • Allegations	Also inspect safety culture components associated with non-minor findings
DOCUMENTATION	• Docketed correspondence	Also document safety culture aspects of non-minor findings
ASSESSMENT	• MC 0305 assessment	Also may identify: • a substantive cross-cutting issue in one or more safety culture components • a safety culture cross-cutting issue
FOLLOW-UP	• MC 0305 response	(Same as existing)

Option D: Post Identifying Cross-Cutting Aspects

	Existing	*New*
INFORMATION SOURCES	• Inspections & Plant Status • Allegations	(Same as existing)
DOCUMENTATION	• Docketed correspondence	(Same as existing)
ASSESSMENT	• MC 0305 assessment	(Same as existing)
FOLLOW-UP	• MC 0305 response	Also: if a substantive cross-cutting issue is identified, the NRC completes a focused inspection of safety culture

Option E: Safety Culture Insights by Walking Around

	Existing	*New*
INFORMATION SOURCES	• Inspections & Plant Status • Allegations	Inspectors also routinely verify safety culture components
DOCUMENTATION	• Docketed correspondence	Also, inspection reports include safety culture-related observations
ASSESSMENT	• MC 0305 assessment	Assessment also considers safety culture-related observations
FOLLOW-UP	• MC 0305 response	(Same as existing)

Option F: Greater-Than-Green

	Existing	New
INFORMATION SOURCES	• PI data, Inspections & Plant Status, & Allegations	
DOCUMENTATION	• PI results & docketed correspondence	
ASSESSMENT	• MC 0305 assessment	
FOLLOW-UP	• MC 0305 response	Also: If a PI or finding is >green, inspect whether safety culture problems were a contributing factor. If so: -The licensee submits a plan to correct the problems. - The NRC confirms the plan via a CAL. - After the licensee completes the plan, the NRC repeats the inspection.

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Discussion

Based on previous discussion, most desirable option?

Next Steps

- Needed Actions

- Milestones

- Meetings

Summary of Highlights of Meeting

Closing Remarks