HIDRA II – Closing Remarks

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Second Plenary Meeting of the Second Phase International Project on Human Intrusion in the Context of Disposal of Radioactive Waste (HIDRA) - TM-55074

January 27, 2017

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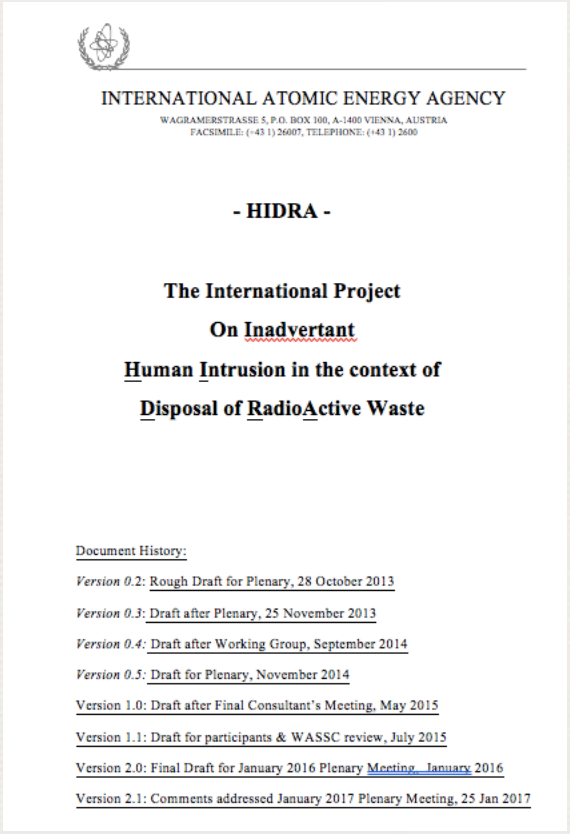
International Atomic Energy Agency

HIDRA II Objectives

- Share experience and practical considerations for the development and regulatory control of activities to consider potential IHI during development of the safety case
- Develop hypothetical working examples to test and illustrate practical application of the approaches identified in the HIDRA project and identify changes and refinements to the HIDRA approaches
- Provide recommendations to WASSC for future updates of safety standards.



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- HIDRA -

The International Project
On Inadvertant
Human Intrusion in the context of
Disposal of RadioActive Waste

Document History:

Version 0.2: Rough Draft for Plenary, 28 October 2013

Version 0.3: Draft after Plenary, 25 November 2013

Version 0.4: Draft after Working Group, September 2014

Version 0.5: Draft for Plenary, November 2014

Version 1.0: Draft after Final Consultant's Meeting, May 2015

Version 1.1: Draft for participants & WASSC review, July 2015

Version 2.0: Final Draft for January 2016 Plenary Meeting, January 2016

Version 2.1: Comments addressed January 2017 Plenary Meeting, 25 Jan 2017

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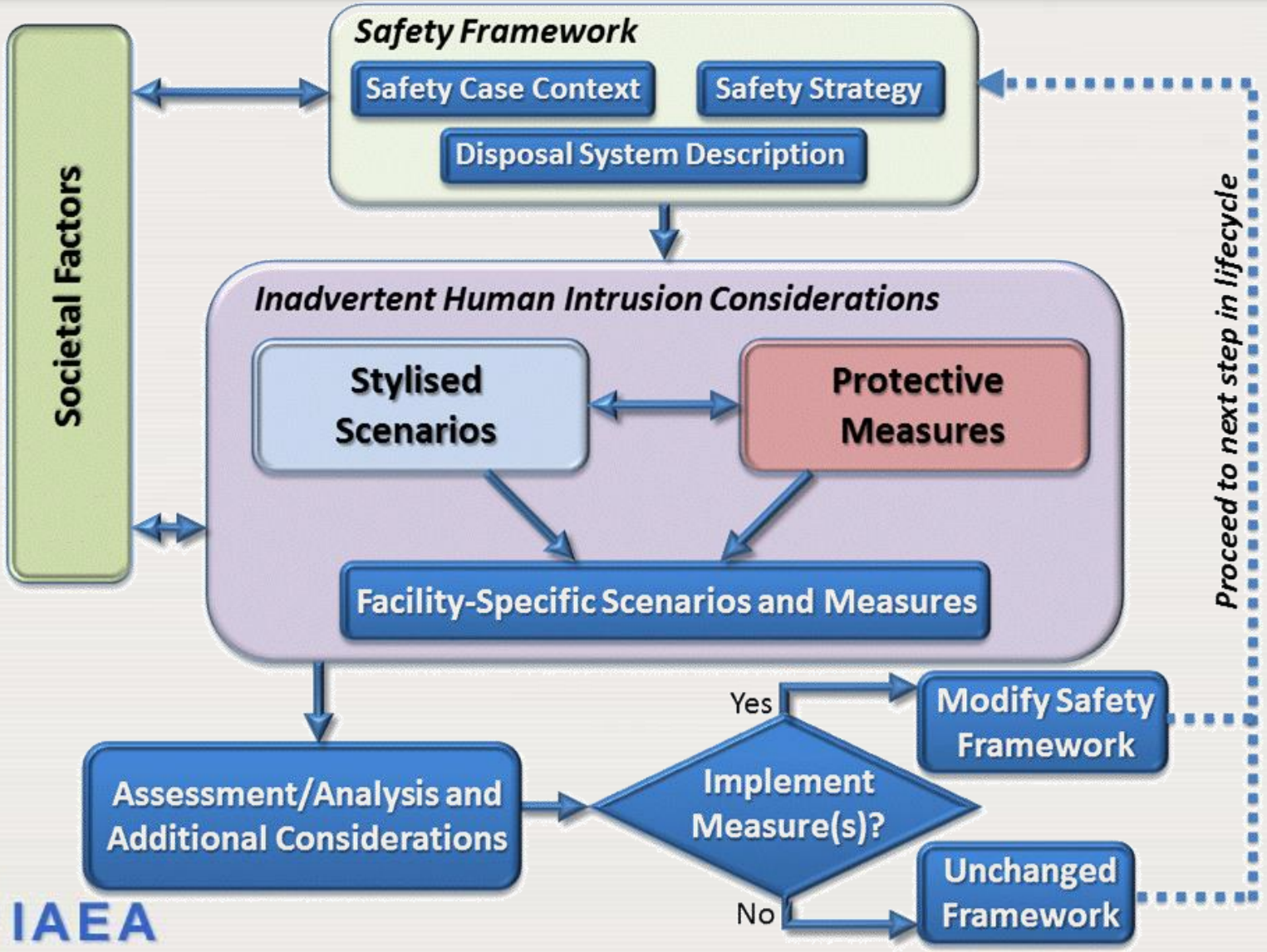
General HIDRA Approach



HIDRA II Draft Report Structure

1. INTRODUCTION
2. CONTEXT FOR INADVERTENT HUMAN INTRUSION
3. RESULTS FROM HIDRA PHASE I
4. PROJECT DESCRIPTION
5. GEOLOGIC DISPOSAL
6. NEAR-SURFACE DISPOSAL
7. TOPICAL QUESTIONS AND ISSUES
8. COMAPARE/CONTRAST IHI FOR GEOLOGIC AND NEAR-SURFACE DISPOSAL
9. SUMMARY/CONCLUSIONS
10. REFERENCES

ANNEX I. GEOLOGIC DISPOSAL WORKING GROUP REPORT

ANNEX II. NEAR-SURFACE DISPOSAL WORKING GROUP REPORT

Working Groups

- Near-Surface (Richard McLeod, Amelie de Hoyos)
  - Generic examples for surface and near-surface facilities
  - Role of quantitative calculations, measures influencing timing
  - Prescriptive and non-prescriptive regulatory framework
- Geological (Thomas Hjerpe, Eva Andersson)
  - Generic example for facility in a clay formation
  - Focus on evaluation of measures rather than quantitative calculations
- Both groups - emphasis on documentation of basis for decisions when selecting scenarios and approach

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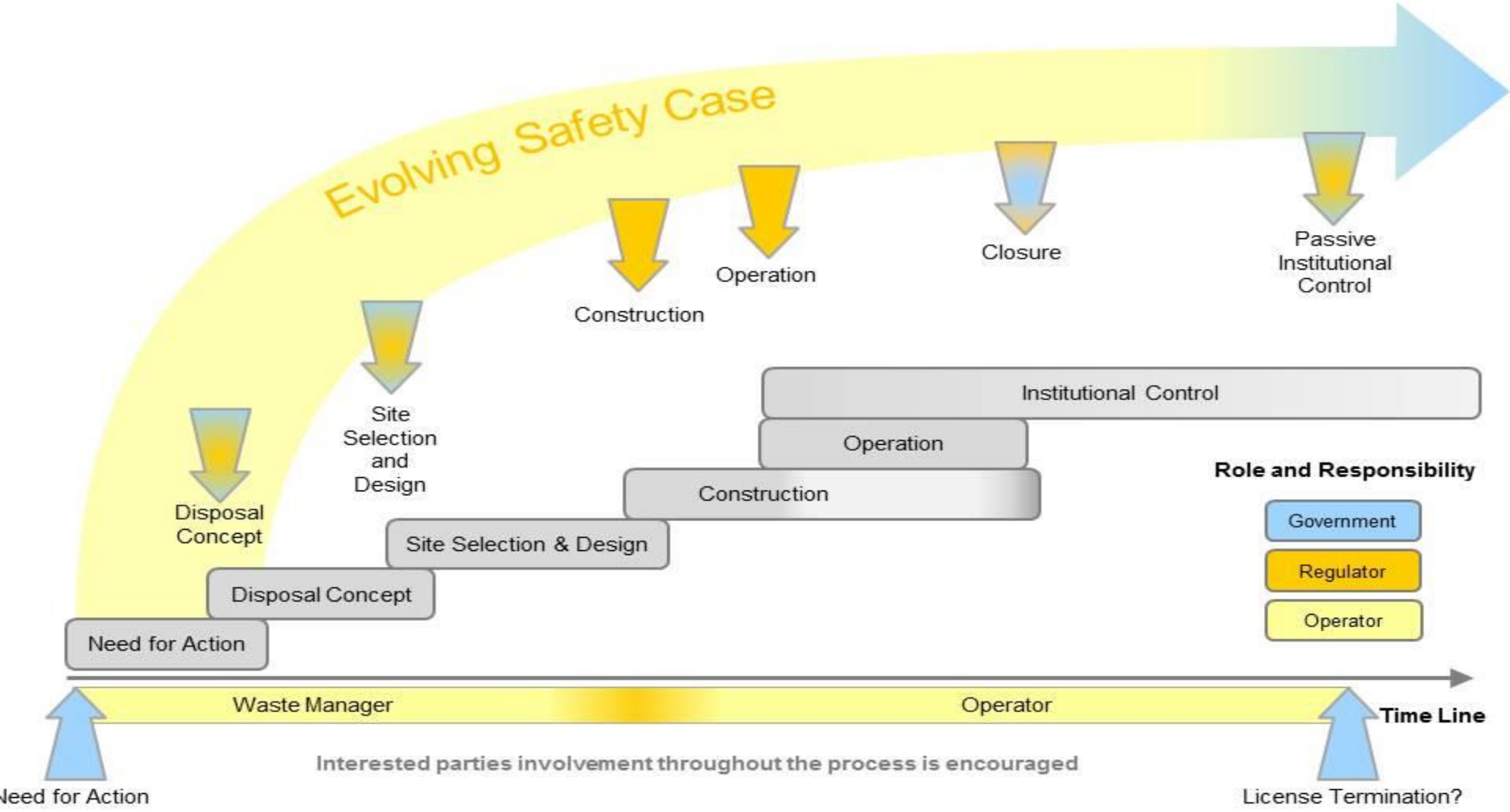
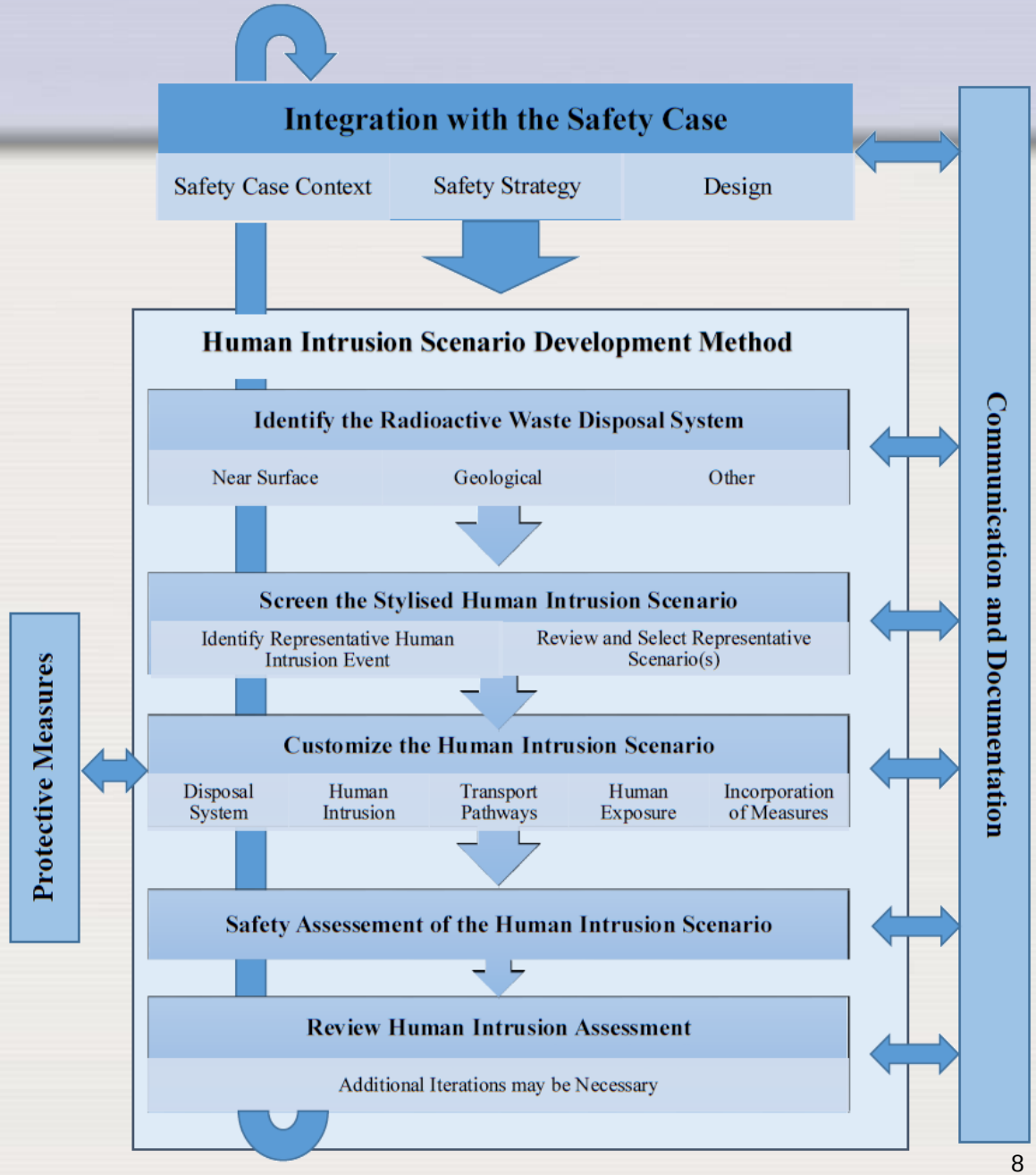
HIDRA II Approach

- Consideration of IHI within the PRISM/PRISMA decision-making process and safety case considerations
- Development of the regulatory framework to address IHI (e.g., prescriptive/flexible, criteria, quantitative/qualitative)
- Effective approaches for communication and consultation related to IHI at different steps in the lifecycle
- Role of IHI for decision making during lifecycle (key steps)
- Customization of the representative scenarios from HIDRA for a hypothetical facility and example calculations

Safety case evolution over facility lifetime



Iterative approach for scenario development



HIDRA II Approach (continued)

- Use of the measures database from HIDRA to identify measures for a specific facility and associated customization of IHI scenarios for the hypothetical facility as applicable
- Practical implementation of optimisation to reduce the potential for and/or consequences of IHI using the representative scenarios and measures developed for the hypothetical examples
- Role of passive/in-direct controls/oversight to determine timing of IHI (consideration of ICRP and IAEA terminology)

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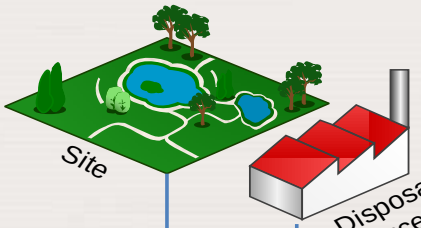
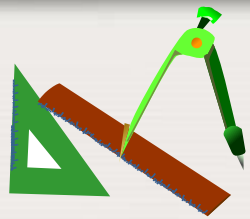
Derivation of protective measures

Acts, rules and guidelines

Database





Design, Layout

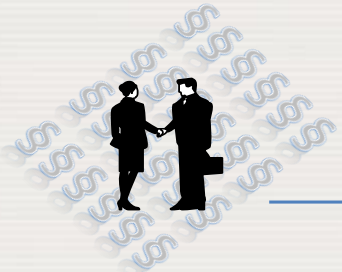
Additional Considerations

1. Definition of the framework

2. Compilation of general measures

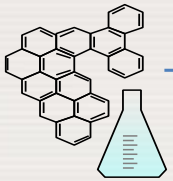
3. Identification of potential/ inherent measures

4. Derivation of protective measures



Agreements, conditions and provisions

Literature, Projects



Waste characterization

HI Scenarios

Analysis

Consulting experts

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HIDRA Report Status

- Initial draft of HIDRA II report is available on server (rough at this point)
- HIDRA II draft includes bullet summary for topical questions/issues
- Country Examples (?)

Topical Questions and Issues

7. TOPICAL QUESTIONS AND ISSUES
   - 7.1 ISOLATION IN THE CONTEXT OF IHI
   - 7.2 STYLISED SCENARIOS
   - 7.3 INADVERTENT AND DELIBERATE INTRUSION
   - 7.4 REGULATORY CONSIDERATIONS
     - 7.4.1 Quantitative or qualitative
     - 7.4.2 Prescriptive or non-prescriptive (extent of stylisation)
     - 7.4.3 Worst case or random, probabilities/likelihood
     - 7.4.4 Role of IHI for siting
     - 7.4.5 Consideration of Radon in IHI assessment
     - 7.4.6 Consideration of water use for IHI
   - 7.5 Controls During Time Frame from 100 – 500 Years (Near-surface disposal)

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Isolation

- Reduce potential for inadvertent access to waste, not absolute (“sufficient”)
- Geologic – passive, Near-surface – some active
- Graded or proportionate approach to isolation based on relative hazard
- Depth, remoteness, presence of natural and engineered barriers
- Retrievability challenges

Concept of Stylised Scenarios

- Acknowledge actual circumstances of IHI is highly uncertain
- What level? (events, chronic/acute, specific scenarios, input parameters) – links to regulatory approach
- Distribution of waste on ground surface is important parameter
- Translate stylised to ”real world” for stakeholders
- Examples (US NRC – waste classification (fully generic stylisation), France – specific scenarios)

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Inadvertent and Deliberate Intrusion

- Distinguish credible from incredible scenarios
- Recommendations to consider current habits, technologies (developing countries?), and ***procedures***
- How to address major public works versus individual home (effectiveness of records and land use controls)?
- When is it reasonable to assume that an intruder would recognize that there is waste (deliberate)
  - similar question to above (public works versus individual home)

Regulatory Considerations

- Quantitative or Qualitative (what criteria, existing exposure/optimisation, background doses)
- Prescriptive or non-prescriptive (extent of sylisation)
- Worst case or random, probabilities/likelihood
- Role of IHI for siting
- Consideration of Radon

Controls During Time Frame from 100-500 Years (Near-Surface)

- Typically some combination of active and passive controls is acceptable to delay intrusion for near-surface facilities
- Time of effectiveness for records, land use, memory (public works vs. individual)
- Effectiveness of barriers and for how long? (concrete/metal barriers, depth, effect of erosion)

General Work Plan

- Project will include 1 more plenary meeting
- Working groups will have independent meetings/teleconference, as needed
- IAEA Secretariat, co-chairs and working group leads will have planning meetings/teleconference in advance of plenary

Tentative Schedule

- Participants provide feedback on bullet lists for Chapter 7, general comments on structure and initial content in HIDRA II report (March)
- First draft of text for Chapter 7 for review (June)
- WG meetings/discussions (Summer)
- Comments/feedback on Chapter 7 (August)
- Updated draft text for WG Appendices (August)
- Co-chairs and WG leads meeting (Fall/Winter 2017) – Teleconference or meeting?
- Third Plenary (29 Jan – 2 Feb 2018)?

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HIDRA File Server

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Password: Environmental33

Concluding Remarks

- Thank you to Javlon for his assistance
- Thank you to Thomas and Richard for volunteering to serve as Working Group Leads
- Thank you to all of the Participants for the active participation and feedback
- We are actively addressing some very challenging issues and specific recommendations that can positively impact disposal programs are being considered

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Thank You