U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Presentation to the NWTRB: Examination and Transportation of Damaged Spent Nuclear Fuel

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Future Transportation of Damaged Spent Nuclear Fuel (SNF)

- The Department of Energy (DOE) Environmental Management (EM) Baseline states that all spent nuclear fuel (SNF) will be packaged in the DOE Standardized Canister for transportation out of Idaho.
- The standardized canister is a robust container. (Refer to Standardized Canister Presentation, Summer Board Meeting morning session)
- The Idaho Spent Fuel Facility is planned to provide SNF packaging in standardized canisters and cask loading for SNF shipment out of Idaho.

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Receipt of Domestic and Foreign Research Reactor SNF

- Examination to prepare for interim storage, packaging, and future transportation for disposition
  - 1998 DOE directed use of technically based criteria for receipt of FRR SNF
  - Criteria were based on National Spent Nuclear Fuel Program, Foreign Research Reactor Fuel Acceptance Criteria – Failed Fuel Report
  - Material control and accountability compliance requires verification of unique identifier for each SNF element.
  - The receipt facility at the Idaho Nuclear Technology Engineering Center (INTEC) cannot readily handle individual fuel elements to examine SNF at time of receipt. (CPP-603)

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Receipt of Domestic and Foreign Research Reactor SNF cont.

- Required shipper data packages describing the proposed SNF for shipment are prepared by the reactor site
- A physical fuel examination by DOE contractor employees is completed at the reactor site.
  - On-site visual examination with the use of cameras is the method used to identify SNF that should be canned (360°, full length).
  - Each SNF element is inspected, videotaped and a written record of the visual inspection is completed (length, instrumentation, unusual attachments, as well as any damage).
  - The unique fuel identifier is verified in addition to verification completed by the reactor site fuel handlers; tied to the fuel fabrication data

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Receipt of Domestic and Foreign Research Reactor SNF cont.

- Based on defects viewed at the examination, SNF identified as posing a future risk to the receipt facility (at unloading or in the future i.e. 2035) is canned prior to loading. to prevent contamination of storage facilities, exposure to current and future workers and control during future characterization and packaging processes

- Criteria for receipt for interim storage is a projection of the fuel condition to avoid future handling problems.
- Facility receipt criteria is more stringent than the transportation requirement to package failed fuel.
- Normal reactor operations and fuel handling can result in damage to SNF that may cause a release of radioactive contamination or fuel handling issues at receipt facility in the future.

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Elements of SNF Examination for Dry Storage

- Iterative process with rector operators necessary for authorization basis compliance calculations.
- Required Shippers Data review and final approval is required prior to shipment.
- Tamper indicating device fixed, attached, verified and removed at receipt, baskets unloaded from cask.
- Shipment is made in a leased NAC LWT cask in compliance with the cask certificate of compliance
- Documented damage to some aluminum and stainless steel clad SNF received from Foreign Research Reactors (FRR) since 1997 and Domestic Research Reactors (DRR) since 2003 including corrosion, cuts, bulges, dents, and scratches that require canning.

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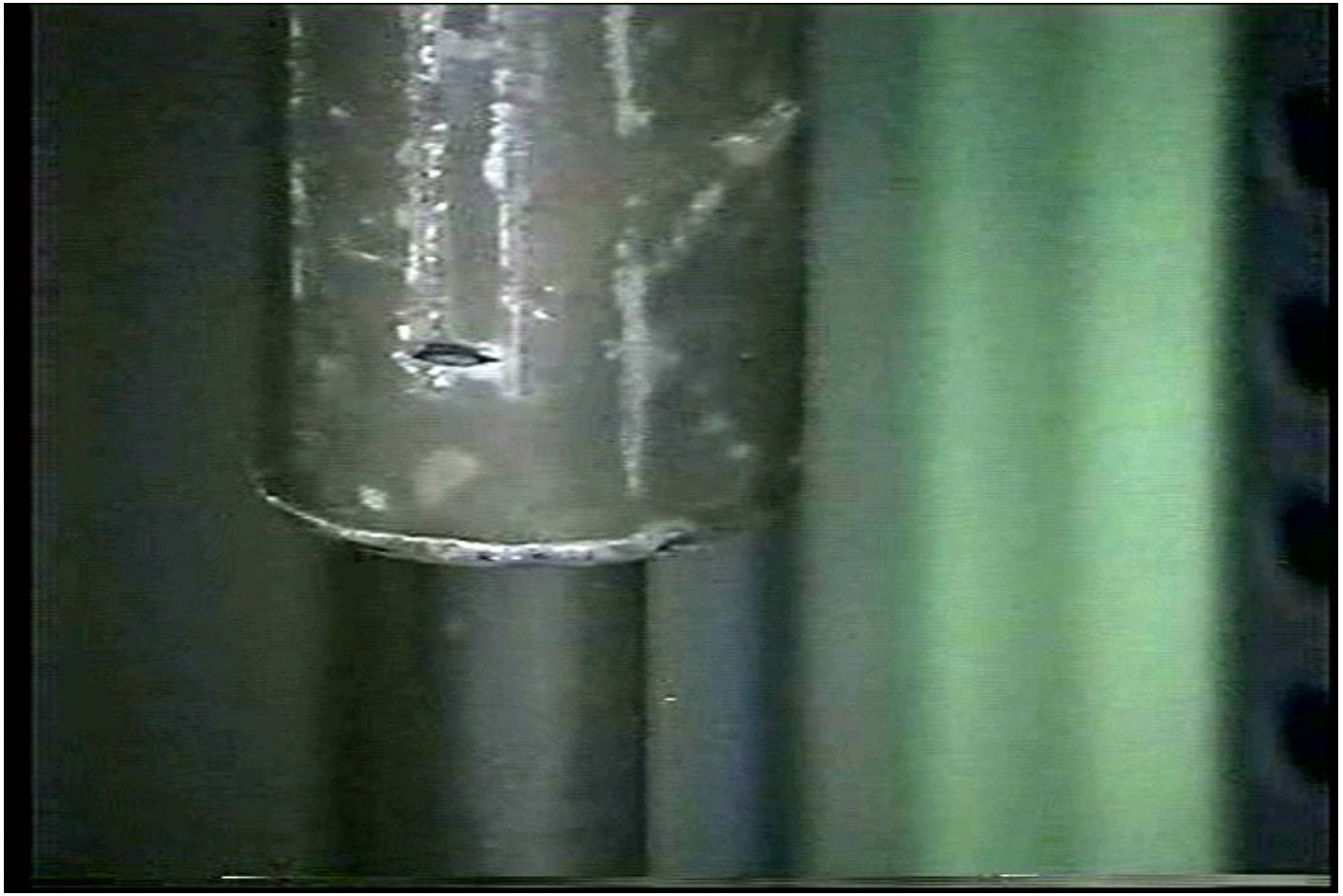
Gouge/Cut



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Damage/ Gouge

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Crack near Bottom of SST Element

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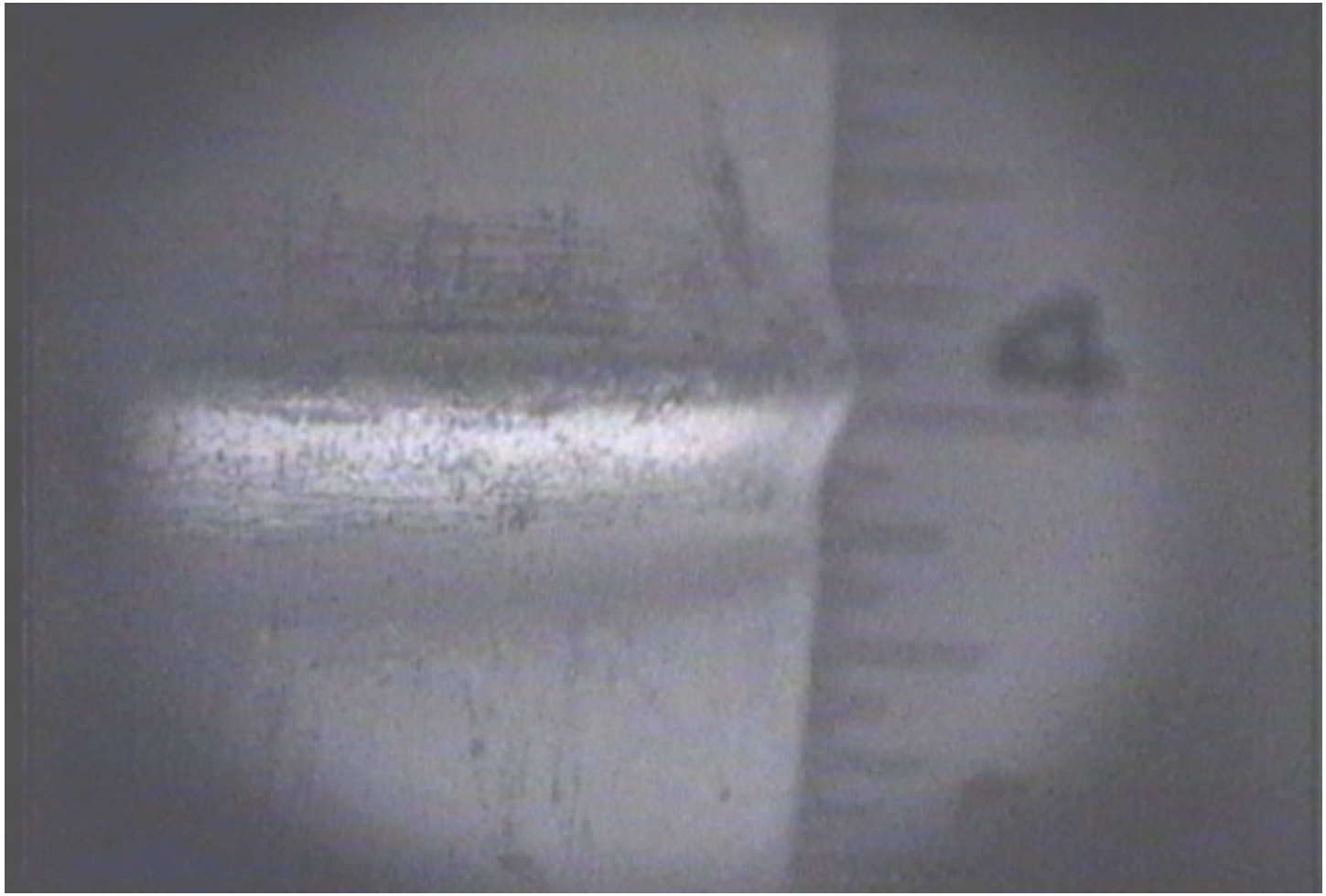
"Bulge" Dropped? (Al)



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Corrosion Suspect Dissimilar Metals of Weld Procedure (SST)

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Cut /Corrosion (Al)

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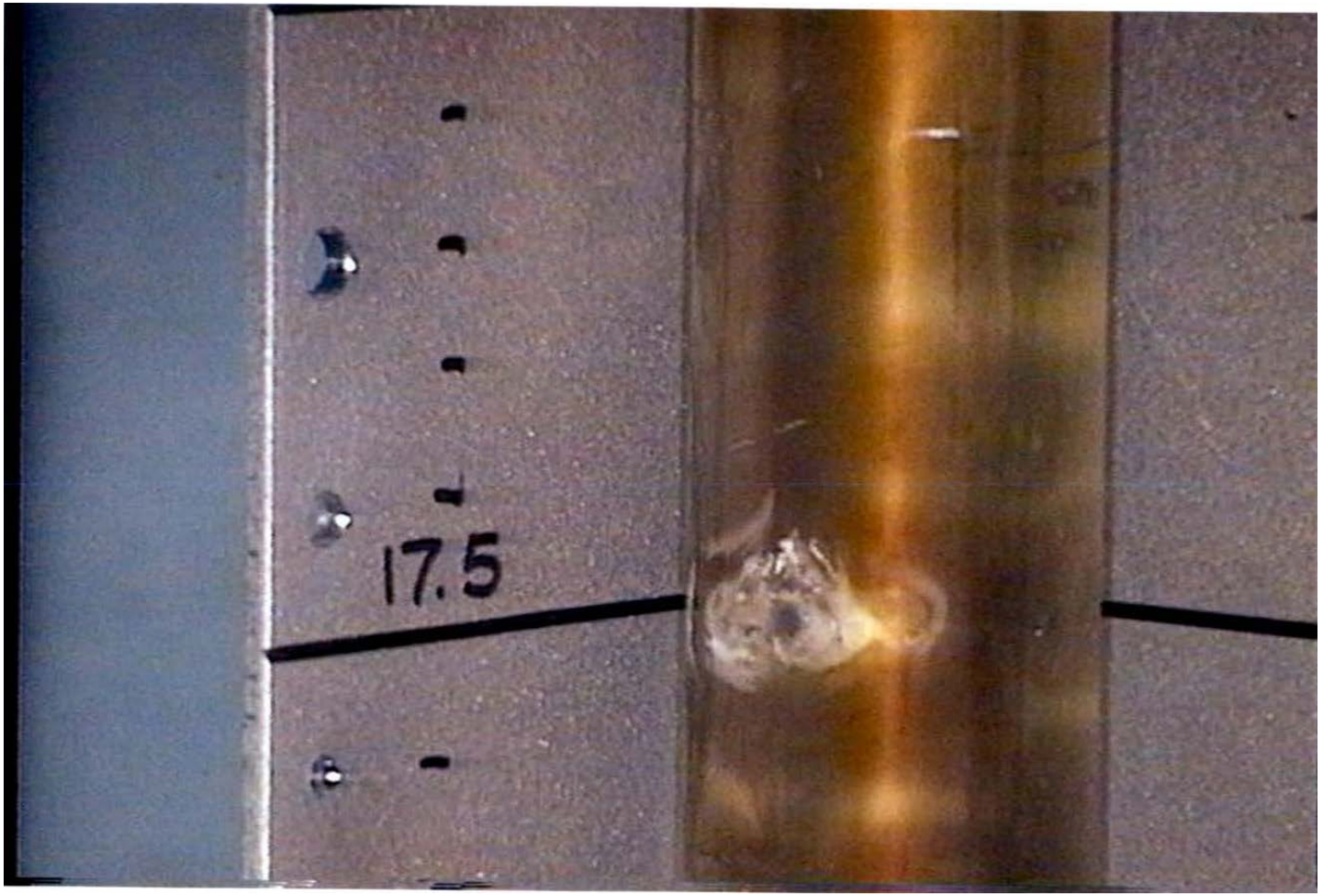
Dent/Corrosion/Pit (SST)



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Benefits for Early Examination At Reactor

- Condition of SNF is known early enough to address any concerns.
- Loading issues can be resolved.
  - SNF is received in CPP-603 in a shipping basket and stored in the basket.
  - SNF is not handled again until the basket is transferred to the future planned Idaho Spent Fuel Facility.
- Special equipment required for receipt can be identified and staged.
- Authorization basis issues can be resolved; SAR changes made and approved.

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Benefits to Early Examination At Reactor cont.

- Receipt procedures can be written to account for and issues unique to this shipment.
- Sufficient cans can be provided for failed/damaged fuel.
- Coordination with shipper.