

APRIL 4, 2024 – NEW & ADVANCED REACTORS: CODES & STANDARDS

# DOE LABORATORY STUDIES ON ADV RX NEEDS – REVIEW OF SODIUM SPECIFIC CONSENSUS STANDARDS

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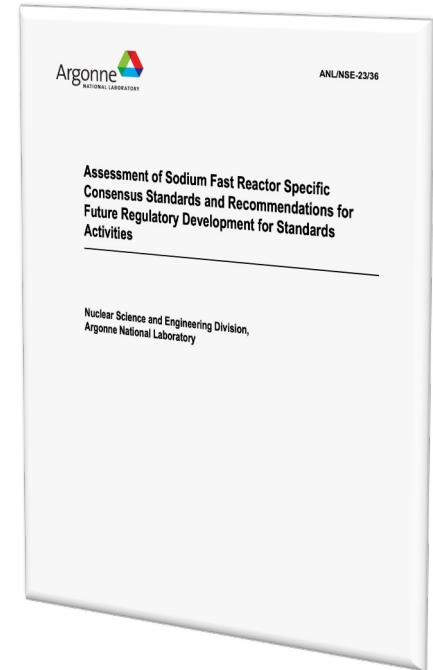
U.S. DEPARTMENT OF  
**ENERGY**

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# REVIEW OF SODIUM-SPECIFIC CONSENSUS STANDARDS (ANS STANDARDS)

- June 2023, the Argonne National Laboratory report “Assessment of Sodium Fast Reactor Specific Consensus Standards and Recommendations for Future Regulatory Development for Standards Activities,” ANL/NSE-23/36, was published.
- Reviewed previous American Nuclear Society (ANS) SFR specific consensus standards (and standards development efforts) to identify and document which, if any, were good candidates for revival based on their relevance and importance to advanced reactor licensing stakeholders



**ANL/NSE-23/36**

# ANS SFR/LMFBR STANDARDS

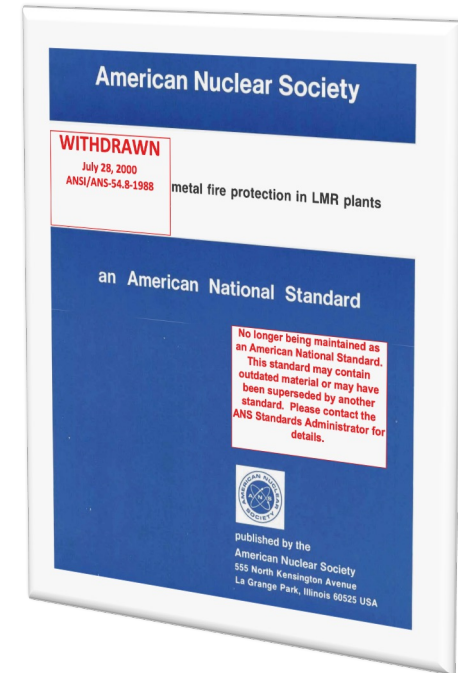
ANS #	Title	Status
54.1	Nuclear Safety Criteria And Design Process For Sodium Fast Reactor Nuclear Power Plants	Active
54.2	Design Bases for Facilities for LMFBR Spent Fuel Storage in Liquid Metal Outside the Primary Coolant Boundary	Withdrawn standard
54.3	Principal Design Criteria for LMFBR Containments	Inactive – no draft
54.4	Nonmetallic Thermal Insulation for Austenitic Stainless Steel in LMFBRs	Inactive – no draft
54.5	Requirements for Sustaining Safe Shutdown in Liquid Metal Cooled Fast Reactors	Inactive – draft completed
54.6	LMFBR Safety Classification and Related Requirements	Inactive – draft issued for trial use
54.7	Source Terms to be Used in Evaluation of Radiological Site Suitability for LMFBR Power Plants	Inactive – draft completed
54.8	Liquid Metal Fire Protection in LMR Plants	Withdrawn standard
54.9	Environmental Qualification of Safety Related Equipment in LMFBRs	Inactive – no draft
54.10	Risk Limit Criteria for LMFBR Design	Inactive – draft completed
54.11	Application of Risk Limit Criteria for LMFBR Design	Inactive – no draft
54.12	Event Categorization Guidelines for LMFBR Design	Inactive – no draft
54.13	Requirements for Evaluating the Potential Radiological Consequences of LMFBR Radioactive Gas Process and Storage System Failures	Inactive – draft completed

LMFBR – Liquid Metal Fast Breeder Reactor  
 LMR – Liquid Metal Reactor

# SODIUM FIRE PROTECTION STANDARD

## ANSI/ANS-54.8-1988 Liquid Metal Fire Protection in LMR Plants (Withdrawn)

- The purpose of this standard was to establish guidelines and requirements to ensure that the functional performance of liquid-metal fire protection systems were adequate to protect the public health and safety, plant personnel, and minimize or limit economic loss in the event of a sodium/NaK leak.
- Withdrawn on July 28, 2000 due to lack of support and interest in SFR development
- Surveyed SFR vendors agreed that having a sodium fire standard would be useful for facility design support and during licensing interactions
- Efforts to revive and update are currently on-going



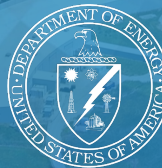
**ANSI/ANS-54.8-1988**

# ADDITIONAL RELEVANT SFR STANDARDS

## Department of Energy Reactor Development and Technology Standards

- The DOE and its predecessors developed their own standards providing best practices and processes for reactors, including SFRs, called the Reactor Development and Technology (RDT) standards
- 328 standards which were mostly developed prior to 1980 and were the result of a lack of consensus standards being developed by professional societies and ANSI
- Cover specific issues and topics such as testing of components, use of materials in certain applications, measurement techniques, handling of sodium, nondestructive examination, and welding techniques
- The RDT standards program was terminated by the DOE in the early 1990s and all 328 RDT standards are currently in a canceled status
- Reviewing the RDT standards was outside of the scope of the efforts summarized in ANL/NSE-23/36

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