



UNITED STATES NUCLEAR REGULATORY COMMISSION ADVISORY COMMITTEE ON REACTOR SAFEGUARDS WASHINGTON, D.C. 20555-0001

Dec. 30, 2001

To:

Apostolakis, Bonaca, Larkins, Bahadur, Savio, Larson

From:

August W. Cronenberg, ACRS Senior Fellow

Subject:

1st Quarter FY-2002 Fellow Activities Report

Attached is an updated "table-of-activities" which summarizes my ACRS fellow efforts to date, including efforts this quarter. All primary activities are listed since my joining ACRS in June-95. Efforts this quarter (at ½-time FTE) include:

Activities Current Quarter: Oct. 1, 2001 through Dec. 30, 2001

<u>Memo-AWC-110.2001:</u> Memo containing two DRAFT paper submitted to ASME for ICONE conference peer review and circulated within NRC for in-house review. The papers are entitled:

- a) Operational Events Noted for Power Uprated Plants and Potential Safety Implications, with Powers and Savio (Paper #: ICONE10-22123)
- B) Margin Impact Estimates for Re-Licensed/Upated Plants: Hatch Case Study with Bonaca and Wallis (Paper #: ICONE10-22141)

Memo-AWC-111.2001: The memo compares the FINAL and DRAFT SERs for the Duane Arnold Uprate. The review stems from ACRS concerns noted in its Oct 17, 2001 letter to the Commission on the adequacy of the staff review process and documentation of that review. The staff responded that ACRS concerns would be addressed in the FINAL-SER for Duane Arnold. A brief audit of the FINAL-SER was thus initiated, to assess the manner in which ACRS concerns were addressed. Results indicate little new supporting documentation of staff conclusions. Comparative examples of DRAFT and FINAL staff conclusions were provided to illustrate this observation.

Report-AWC-101.2002 (Work in Progress): This <u>draft report</u>, entitled "An Assessment of the Power Uprate Application and Review Process for PWRs: Farley Case Study", stems form ACRS concerns regarding safety implications of significant PWR uprates and adequacy of analysis methods to support such uprates, where supporting methodologies for PWR uprates appear much less developed than provided by the GE Extended Power Uprate program. This report was initiated in response to that concern and centers on an evaluation of the 1997 4.7-% uprate for the Joseph Farley-PWR plant, which the NRC staff has indicated will serve as a template to review future significant PWR uprates.

Anticipated Activities Next Quarter: Finalize report AWC-101.2002 (Assessment of the Power Uprate Application and Review Process for PWRs: Farley Case Study) and two ICONE10 papers.

ACRS FELLOW STATUS REPORT August W. Cronenberg

Project Description	Effort	Report	ACRS Use
Performance Period: 4th-Qt FY2002: July 1/2002 to Sept. 30/2002, 1/2-	time @ 6 F1	E work weeks	
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Performance Period: 3rd-Qt FY2002: April 1/2002 to June 30/2002, 3	⁄₂-time @ 6 F	TE work weeks	
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Performance Period: 1**-Qt FY2002: Oct. 1/2001 to Dec.30/2001, 1/2-ti	ime @ 6 FTE	work weeks	
1) 2 DRAFT Papers: ICONE-10 Mtg (Ap. 2002); a) Review of Events for Power Uprates & Safety Issues; b) Margin Estimates: Hatch Plant	1.5 wk	AWC-110.2001	ACRS & Staff
Memo: Comparison of FINAL and DRAFT SERs for Duane Arnold-BWR Uprate	1.5 wk	AWC-111.2001	ACRS & Staff
Work in Progress: Assessment of Uprate Application and Review Process for PWRs: Joseph Farley Case Study	3 wk	AWC-101.2002 (Draft)	ACRS & Staff

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Performance Period: 4th Quarter FY2000 (July 1-Sept. 30/2	200 ½-tim	ne at 6 FTE work weel	<u>(S)</u>
1) Comments on J. Sorensen paper: Safety Culture	2 dy	AWC-107.2000	Sorensen, Powers
2) Continuation of Spent Fuel Pool report/basis for prior exemptions for decommissioned plants	3wk	AWC-108.2000	Kress
3) Papers/Reports on MOX and Safety Issues	3 dy	AWC-109.2000	Savio/Larkins
4) Summary: Beaver Valley Uprate & Licensee Renewal	1 dy	AWC-110.2000	ACRS Members & Staff
5) Summary: Duane Arnold Uprate Status Mtg.	1 dy	AWC-111.2000	ACRS Members & Staff
6) Draft of Fuels Section for ACRS Research Report	1 wk	AWC-112.2000	ACRS Members & Staff
Performance Period: 3rd Quarter FY2000 (Ap. 1-June 30/2	000, ½-tim	e at 6 FTE work week	<u>s)</u>
1) Travel Report: ANS San Diego Mtg	1 wk	AWC-105.2000	ACRS Members & Staff
Memo on Central Issues Related to Staff Review of Requests for Power Uprate	4 dy	AWC-106.2000	ACRS Members & Staff
DRAFT: Report in preparation on technical issues and uncertainties in risk for Spent Fuel Pools	4 wk	AWC-101.2000 (Partial DRAFT)	Powers, Apostolakis, Savio Larkins, Larson, Sorensen
Performance Period: 2nd Quarter FY2000 (Jan. 1-Mar. 31/	2000, ½-tin	ne at 6 FTE work wee	ks)
Outline of Work Scope for FY2000: Assessment of Uncertainties in Spent Fuel Pool LOCA Analysis	1 wk	AWC-101.2000	ACRS Members & Staff
2) Central Observations from Power Uprate Review	1 dy	AWC-102.2000	ACRS Members & Staff
3) Status of Power Uprate Standard Review Plan	1 dy	AWC-103.2000	ACRS Members & Staff
Observations from Review of Staff Risk Assessment on Spent Fuel Pool Accidents for Decommissioned Plants	3 wk	AWC-104.2000	ACRS Members & Staff
5) Other: a) Attend ACRS Retreat: b) Presentations to ACRS (- Assessment of Power Uprate Reviews, Spent Fuel Pool Work Scope	2 wk	Slides on File	
Performance Period: 1st Quarter FY-2000 (Oct. 1/99-Dec.	30/99, ½-ti	me at 6 FTE work we	<u>eks)</u>
Revisions to Power Uprate Report per ACRS comments (Uhrig, Powers, Savio, Peralta, Sorensen), and submittal to NRR staff for review	3 wk	AWC-106.99	Savio to pass on to NRR Staff
Draft-ANS Summary: Synergistic Safety Issues Related to Reactor Power Uprates	2 day	AWC-107.99	Savio, Larkins, Powers, Apostolakis, Sorensen
3) International Programs for ACRS Research Report	3 day	AWC-108.99	ACRS Members & Staff
4) Finalized Power Uprate Report and ANS Summary	1.5 wk	AWC-109.99	ACRS Members & Staff

Project Description	Effort	Report	ACRS Use
Performance Period: 4th Quarter FY99 (July 1/99-Sept. 30/	99, %-time	at 6 FTE work weeks	J
1) Memo: Closure Plan for Power Uprate Review Effort	2 day	AWC-105.99	Apostolakis, Powers, Uhrig, Larkins,Savio, Peralta, Sorenson
2) DRAFT: ANS Summary on Power Uprates	1 wk	Draft form	Apostolakis, Powers Larkins, Savio, Sorensen
3) DRAFT: Conference Paper on Power Uprates	2 wk	Draft form	Apostolakis, Powers Larkins, Savio, Sorensen
4) Other: 2-Day ADAMS Course Gather Reports on International Research	1 wk		Savio
Performance Period: 3rd Quarter FY99 (Ap. 1/99-June 30/5	99, ½-time a	t 6 FTE work weeks	
Report: Review of Power Uprate Applications & Potential Synergistic Safety Issues	5.5 wk	AWC-101.99	ACRS & Staff
2) Other: ADAMS Survey Course NR&C News Article-July Issue	0.5 wk		
Performance Period: 2 nd Quarter FY99 (Jan. 1/99-Mar. 31/6	9; 1⁄2-time a	t 6-FTE work weeks	
Progress Report: Work-in-progress report entitled Review of Power Uprate Applications and Potential Synergistic Safety Issues	3 wk	AWC-101.99	ACRS & Staff
Memo: Response to Saito Questions to the National Advisory Committees Working Group on High Burnup Fuel	4 day	AWC-102.99	ACRS & Staff
3) Memo: Response to Charter Questions for the National Advisory Committee Group on High Burnup Fuels	3 day	AWC-103.99	ACRS & Staff
4) Memo: Assist R. Uhrig in several working revisions of the ACRS Research Report	1.5 wk	AWC-104.99	Uhrig, Savio, Larkins
Performance Period: 1st Quarter FY99 (Oct. 1/98-Dec. 30/9	8, ½-time at	t 6 FTE work weeks)	
Memo: Travel Report, Intrn. Mtg. Safety Operating Reactors, paper description and discussion of sessions.	2 dy	AWC-111.98	ACRS & Staff
2) Memo: Response to Beal on Japan Aging Paper	2 dy	AWC-112.98	Shack, Seale, Powers, Savio, Dudley, Larkins
3) Memo: Draft Research Report to Commission 5 focus areas (PRA, Fuels, I&C, T-H, and Plant Life Extensions).	3.5 wk	AWC-113.98	ACRS & Staff
4) Paper: At ANS Mtg. On Safety of Operating Reactors	3 dy		

Project Description	Effort	Report Status	ACRS Use
Perfermence Period: 4th Quarter FY98 (July 1/98-Sept. 30)	/98, ½ time	6 FTE work week	<u>s)</u>
Memo: Paper On Nuclear Plant Ageing for the Japan Quadru-Partite Meeting.	2.5 wk	AWC-107.98	ACRS & Staff
2) Memo : Final edit of prior draft paper on High Burn-up and Other Fuel Related Safety Issues (AWC-106.98), for the Japan Quadru-Partite Meeting	0.5 wk	AWC-108.98	ACRS & Staff
3) Viewgraphs: Viewgraphs for Dr. Seale's presentation of Nuclear Plant Ageing in Japan.	1.0 wk	AWC-109.98	ACRS & Staff
4) Memo: FY99 Fellow Topics. Suggestions included safety issues for power upgrades, lessons learned from shutdown LERs, and water hammer in auxiliary systems	1.0 wk	AWC-110.98	ACRS & Staff
Performance Period: 3rd Quarter FY98 (April 1/98-June 30/	98, ½ time	at 6 FTE work weeks) The state of the
Memo: draft for comment, paper on Insights into GSIs from Operating Events, sent to NRC staff and ACRS	2 wk	AWC-104.98	ACRS & Staff, Limited NRC Staff
2) Memo: Final paper on <i>Insights on Generic Safety Issues Noted from Licensee Operating Events</i> ", for Oct. Topical Mtg. Safety of Operating Reactors, San Francisco	1 wk	AWC-105.98	ACRS & Staff
3) Memo: draft for comment, ACRS Review of High Burn- up Fuel Issues, paper for Quadru-partite Japan Mtg.	2.5 wk	AWC-106.98	ACRS & Staff
4) ACRS Fuels Subcommittee, Ap 23-24/98	0.5 wk		
Performance Period: 2 nd Quarter FY98 (Jan. 1/98-March 3	1/98, ½ tim	e at 6 FTE work wee	<u>ks)</u>
Memo: Summary of AHP Prioritization effort for research project ranking based on RES and NRR inputs.	1.5 wk	AWC-101.98	ACRS & Staff
2) Memo: Follow up memo AWC-101.98, where arguments are made for use of single (safety significance) criteria when using AHP method	1.5 wk	AWC-102.98	ACRS & Staff
Memo: Proposal for FY98 Fellow activities on fuel issues (high-burn-up, MOX, and Li-Al targets for tritium)	2.5 wk	AWC-103.98	ACRS & Staff
Support of ACRS Letter of Mar.16/98: Mechanisms for Addressing Generic Safety Issues	0.5 wk		
Performance Period: 1st Quarter FY 98 (Oct. 1/97 to Dec. 3	<u>30/97)</u>		
Memo: ACRS Fellow Input for ACRS Research Letter to Congress (Outline of Responsibilities)	2 dy	AWC-117.97	ACRS & Staff
Memo: ACRS Fellow Input: "NRC Research Needs For a Deregulated Nuclear Power Industry"	1 wk	AWC-118.97	ACRS & Staff
3) Memo: Agency Activities on MOX Fuel	1.5 wk	AWC-119.97	ACRS & Staff
Memo: Travel Report & Presentation at Albuquerque- ANS Meeting (time includes attendance at Meeting)	2 wk	AWC-120.97	ACRS & Staff

4) District and a second of the second of th	2 wk	.	A\A(C	-112.97	ACD	C 0 Ctaff	
Slides/presentation for 442nd ACRS Mtg. on AP600 Containment Spray Policy Issues	2 WK	`	7		ACR	S & Staff	
2) Memo: Pros/Cons on Job Sharing ACRS-Fellow	1 wk	k				Powers, Savio, Larki <u>ns</u>	
3) Memo: GSI-87: Reliability of MOVs in BWR Reactor Water Cleanup Systems	5 wk	5 wk AWC-114.97 A		ACR	ACRS & Staff		
4) Memo: Fellow Contributions to ACRS Review of RES	1 wk	1 wk AWC-115.97		ACR	ACRS & Staff		
5) Memo: Review of RES Programs by Fellows	3 wk	k	AWC	-116.97	ACRS & Staff		
6) Courses: WordPerfect for Windows	2 hr						
Performance Period: 3rd Quarter FY97 (April 1/97 to June 3	<u>10/97)</u>			4 4 4 4 4 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	() ²		
Memo: AP600 Design Certification Issues & Schedule for ACRS Hearings	2 wk		AWC	C-107.97	ACR	S Members & Staff	
Memo: Response to Dave Williams Letter on Resolution of Direct Containment Heating Issues	4 wk		AWC-108.97		Kress, Seale, Larkins, Savio Sherry		
Memo: on Overview of AP600 Containment Spray Policy Issues	3 wk		AWC-109.97		ACRS Members & Staff		
Paper Summary: for ANS-Albuquerque Mtg: Insights into Generic Issues from Operational Events	0.5 w	vk	AWC-110.97		Powers, Sherry Larkins, Savio		
5) Memo: Overview of High Burn-up Fuels Issues for ACRS Fuels Subcommittee	3.5 w	vk	AWC-111.97		ACRS & Staff		
Performance Period: 2 nd Quarter FY97 (Jan. 1/97 to Mar. 3	30/97)).s	, .	g (Plansking)			
1) Memo: Comments on Power's memo on High Burn-up F	uel	1 <u>wk</u>		AWC-101.97		ACRS	
2) Memo: Comments on INPO Report on operational		2 wk		AWC-102.97		ACRS & Fuels	
problems with high burn-up cores		2 WA		AVIC-102.97		Subcommittee	
	-	1 wk		AWC-103.97		Subcommittee ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions	\dashv						
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low		1 wk		AWC-103.97		ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from Operational Events		1 wk		AWC-103.97		ACRS & Staff ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from Operational Events 6) Memo: Safety Issues on Tritium Production		1 wk 1 wk 8 wk		AWC-103.97 AWC-104.97 AWC-105.97		ACRS & Staff ACRS & Staff ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from Operational Events 6) Memo: Safety Issues on Tritium Production Performance Period: 1st Quarter FY97 (Oct. 1/96 to Dec.30)	/96)	1 wk 1 wk 8 wk	A	AWC-103.97 AWC-104.97 AWC-105.97		ACRS & Staff ACRS & Staff ACRS & Staff ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from Operational Events 6) Memo: Safety Issues on Tritium Production Performance Period: 1st Quarter FY97 (Oct. 1/96 to Dec.30) 1) Travel Report: PSA-96 Topical Mtg.	/96)	1 wk 1 wk 8 wk	-	AWC-103.97 AWC-104.97 AWC-105.97	A	ACRS & Staff ACRS & Staff ACRS & Staff ACRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from	<u>//96)</u>	1 wk 1 wk 8 wk 2 wk	A	AWC-103.97 AWC-104.97 AWC-105.97 AWC-106.97	A	ACRS & Staff ACRS & Staff ACRS & Staff ACRS & Staff CRS & Staff	
problems with high burn-up cores 3) Memo: Comments on ACRS Draft Letter on Risk for Low Power & Shutdown Conditions 4) Memo: ACRS Annual Report to Congress 5) Memo: Insights into the Generic Issues Program from Operational Events 6) Memo: Safety Issues on Tritium Production Performance Period: 1st Quarter FY97 (Oct. 1/96 to Dec.30 1) Travel Report: PSA-96 Topical Mtg. 2) Memo: Concerns per EPRI Letter on AP600 Policy Issue 3) Memo: NRR Resolution per EPRI Letter on AP600 Policy	/96)	1 wk 1 wk 8 wk 2 wk 1 wk 2 wk	A	AWC-103.97 AWC-104.97 AWC-105.97 AWC-106.97 WC-109.96 WC-110.96	A	ACRS & Staff ACRS & Staff ACRS & Staff ACRS & Staff CRS & Staff CRS & Staff	

Project Description	Effort	Report Status	ACRS Use
Performance Period: 4th Quarter FY96 (July 1/96 to Sept. 30/96			
1) Memo: AP600 Design Review Issues (Memo:AWC-106.96) for AP600 Subcommittee Meeting of 7/19/96	2 wk	AWC-106.96	West-AP600 Subcommittee
2) Memo : Changes to System-80* Design Documentation	2 wk	AWC-107.96	ALWR/Sys-80* Subcommittee
3) Memo: AP600 Aerosol Depletion Considerations, With and Without Sprays	7 wk	AWC-108.96	ACRS & Staff
4) Slides: Overhead-slides for PSA-96 Paper (Park City, Sept 30-Oct 3/96)	1 wk		
5) <u>Courses/Prof. Development</u> - None			
Performance Period: 3 rd Quarter FY96 (Apr. 1/96 to June 30/96	1		
1) Memo: Summary for LWR Fuels Meeting (Portland, Mar- 97): Analysis of High Burn-up Fuel Behavior During LOCA, PCM, and Operational Transients"	1 wk	AWC-102.96	Reactor Fuels Subcommittee
2) Memo: Draft Report: High Burn-up Fuel Behavior During Simulated LOCAs	3 wk	AWC-103.96	Reactor Fuels Subcommittee
3) Paper: "Multiple System Responses and Interaction Issues: Adequacy of Treatment in IPE/IPEEs	2 wk	AWC-104.96	Reactor Fuels Subcommittee
4) Memo: Analysis of Control Rod Insertion Problems Noted in High Burn-up Assemblies	2 wk	AWC-105.96	Reactor Fuels Subcommittee
5) Memo : NRC Staff and Westinghouse Positions on AP600 Design Review Issues	3 wk	AWC-106.96	ALWR/AP600 Subcommittee
6) Courses/Prof. Development - UNIX C, C++, Fortran, 4/15-17 - Ethics Training, 4/22 - Human Reliability, 5/15-17 - Advanced Harvard Graphics, 6/26	3 dy 2 hr 3 dy 1 dy		

Project Description		Effort		Report Status		ACRS Use
Performance Period: 2 nd Quarter FY96 (Jan. 01/96 to Mar.	. 30/96)			a total <u>e</u>		the state of
Memo: Fellow Proposal on Safety Implications of High Burn-up Fuel Performance Under LOCA Conditions		1 wk		AWC-101.96		Reactor Fuels Subcommittee
2) Memo: Observations from Review of Multiple System Responses Program (MSRP)		2 wk		Letter: 12/96		ACRS & Staff
Install/Run FRAPCON & FRAPT6 codes on ACE3-Sun		3 wk				Reactor Fuels Subcommittee
4) Perform test runs with codes to high burn-up (80 MWD/I U) fuel conditions	kg-	4 wk				Reactor Fuels Subcommittee
5) Courses/Prof. Development: - UNIX-Getting Started (Self-paced) - Internet: Fact & Fiction - Applied Statistics - Beginning Federal Service, 2/13 - UNIX The Basics, 3/18-19		2 hr 2 hr 1 wk 1 dy 2 dy				
Performance Period: 1* Quarter FY96 (Oct. 1/95 to Dec. 3				<u> </u>	T	
Review/report to ACRS members on proposed resolution of Multiple System Responses Program (MSRP)	8 wk		Draft		ACRS & Staff	
Draft ACRS letter on MSRP, prepare 22 overhead slides for committee presentation	2 wk		ACRS-Letter (Draft)		ACRS & Staff	
3) Summary: 1000 word summary for conference paper on results of MSRP investigation (PSA-96, Park City, Ut, Sept-96)	1 wk		Summary for Conf. Paper			
4) <u>Courses/Prof. Development</u> - Harvard Graphics for Windows - PRA Basics for Reg. Application	1 dy 3 dy					
Performance Period: 4th Quarter FY95 (June 12/95 to Sep	it. 30/95	<u>)</u>	. 5 -	a Charles	ti x 4 124	A CANADA
Memo: Safety Implications Related to High Burn-up Fuel Performance	8 wk	k AWC-101.95		Reactor Fuels Subcommittee		
Bibliography: Mixed-oxide Fuels (for support of NRC/DOE feasibility studies for burning of weaponsgrade Pu in commercial reactors)	2 wk		AWC-102.95			actor Fuels ocommittee
3) Attend/report on Steam Explosion Review Group Meeting (SERG-2), Annapolis, MD, 6/15-16/95	2 wk	/k Letter: 6/30/95		er: 6/30/95 AC		RS & Staff
4) Memo: Observations from high burn-up fuel contractor (PNL) status meeting of 7/12/95	1/2 wk		AW	C-103.95	AC	RS & Staff
5) Memo: Summary of ACRS office team building efforts	1/2 wk		AW	C-104.95	AC	RS-Staff
6) Courses: - Windows-3.1 - WordPerfect-6.1 Windows	1 dy 1 dy					