SONGS UNIT 2 SINGLE-SIDED

Operating License & Technical Specification/Licensee Controlled Specification
Unit 2 TS Amend. 213, B08-001 and B08-002
Unit 2 LCS L08-001 and L08-002
PCN 556 Supp. 2

Revise Unit 2 Operating License by removing pages and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and/or dates and contain marginal/lines indicating the areas of change. **Please direct any questions regarding filing of information to: (949) 368-6972 or email CDM Controlled Manuals Desk.**

REMOVE:	INSERT:
VOLUME 1	**VOLUME 1**
BEHIND: List of Effective Pages-"Blue Tab"	**BEHIND: List of Effective Pages-"Blue Tab"**
List of Effective Pages Pages 1-12 Rev. 0 Amd. 215 12/12/07	List of Effective Pages Pages 1-12 Rev. 1 Amd. 215 03/05/08
BEHIND: "Blue Tab" 3.7 Plant Systems	**BEHIND: "Blue Tab" 3.7 Plant Systems**
Page 3.7-30 Amd. 127	Page 3.7-30 Amd. 213
Page 3.7-32 Amd. 131	Page 3.7-32 Amd. 213
Page 3.7-33 Amd. 131	Page 3.7-33 Amd. 213
Page 3.7-34 Amd. 131	Page 3.7-34 Amd. 213
Nothing to Pull	Page 3.7-34a Amd. 213 (new page)
Nothing to Pull	Page 3.7-34b Amd. 213 (new page)
BEHIND: "Blue Tab" 4.0 Design Features	**BEHIND: "Blue Tab" 4.0 Design Features**
Page 4.0-4 Amd. 131	Page 4.0-4 Amd. 213
Nothing to Pull	Page 4.0-4a Amd. 213 (new page)
VOLUME 3	**VOLUME 3**
BEHIND: "Blue Tab" B 3.4	**BEHIND: "Blue Tab" B 3.4**
B 3.4-75a Amd. 127 09/24/98	(deleting page)
BEHIND: : "Blue Tab" B 3.7	**BEHIND: "Blue Tab" B 3.7**
Page B 3.7-71 Amd. 127 04/29/03	Page B 3.7-71 Amd. 127 03/05/08
Page B 3.7-72 Amd. 127	Page B 3.7-72 Amd, 127 03/05/08
Page B 3.7-73 Amd. 127	Page B 3.7-73 Amd. 127 03/05/08
Page B 3.7-74 Amd. 127 04/29/03	Page B 3.7-74 Amd. 127 03/05/08
Page B 3.7-75 Amd. 127 04/29/03	Page B 3.7-75 Amd. 127 03/05/08
Nothing to Pull	Page B 3.7-75a Amd. 127 03/05/08 (new page)

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SONGS UNIT 2 SINGLE-SIDED

Operating License & Technical Specification/Licensee Controlled Specification
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REMOVE:			INSERT:		
VOLUME 3			**VOLUME 3**		
BEHIND: "Blue Tab"	**B 3.8**		**BEHIND: "Blue Tab"**	**B 3.8**	
Page B 3.8-83	Amd. 127	01/11/07	Page B 3.8-83	Amd. 127	03/05/08
LCS BOOK			**LCS BOOK**		
BEHIND: "White Tab"	**List of Effective Pages**		**BEHIND: "White Tab"**	**List of Effective Pages**	
Pages 1 - 5	Rev. 0	12/12/07	Pages 1 - 6	Rev. 1	03/05/08
BEHIND: "Blue Tab"	**3.7 Plant Systems**		**BEHIND: "Blue Tab"**	**3.7 Plant Systems**	
Page 3.7.116-1	Rev. 3	03/26/01	Page 3.7.116-1	Rev. 4	03/05/08
Page 3.7.116-2	Rev.2	03/26/01	Page 3.7.116-2	Rev. 3	03/05/08
BEHIND: "Blue Tab"	**4.0 Design Features**		**BEHIND: "Blue Tab"**	**4.0 Design Features**	
Page 4.0-100-1	Rev. 1	12/01/97	Page 4.0-100-1	Rev. 2	09/27/07
Page 4.0-100-2	Rev. 1	12/01/97	Page 4.0-100-2	Rev. 2	09/27/07
Page 4.0-100-3	Rev. 1	12/01/97	Page 4.0-100-3	Rev. 2	09/27/07
Nothing to Pull			4.0-100-4 through 4.0-100-63 (new pages)	Rev. 2	09/27/07

SONGS UNIT 2 SINGLE-SIDED

Operating License & Technical Specification/Licensee Controlled Specification
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Filing Instructions Reviewed & Approved:

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APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
LOEP-1	1	215	03/05/08	2.0-1	1	207
LOEP-2	1	208	01/25/07	2.0-2	1	207
LOEP-3	1	214		3.0-1	1	127
LOEP-4	1	215		3.0-2	1	127
LOEP-4a	1	168		3.0-3	1	127
LOEP-5	1	207	12/21/06	3.0-4	1	186
LOEP-6	1	200	11/18/05	3.0-5	1	127
LOEP-7	1	197	07/19/05	3.1-1	1	200
LOEP-8	1	208	12/05/06	3.1-2	1	200
LOEP-9	1	204	09/19/06	3.1-3	1	200
LOEP-10	1	212	12/12/07	3.1-4	1	127
LOEP-11	1	211	03/05/08	3.1-5	1	127
LOEP-12	1	193	03/05/08	3.1-6	1	127
ii	1	127		3.1-7	1	200
iii	1	208		3.1-8	1	200
iv	1	208		3.1-9	1	127
v	1	197		3.1-10	1	127
vi	1	127		3.1-11	1	127
vii	1	208		3.1-12	1	200
viii	1	208		3.1-13	1	127
1.1-1	1	127		3.1-14	1	200
1.1-2	1	127		3.1-15	1	200
1.1-3	1	188		3.1-16	1	200
1.1-4	1	204		3.1-17	1	127
1.1-5	1	203		3.1-18	1	127
1.1-6	1	200		3.1-19	1	127
1.1-7	1	127		3.1-20	1	127
1.2-1	1	127		3.1-21	1	163
1.2-2	1	127		3.1-22	1	175
1.2-3	1	127		3.1-23	1	127
1.3-1	1	127		3.1-24	1	127
1.3-2	1	127		3.1-25	1	127
1.3-3	1	127		3.1-26	1	127
1.3-4	1	127		3.1-27	1	127
1.3-5	1	127		3.1-28	1	127
1.3-6	1	127		3.1-29	1	127
1.3-7	1	127		3.2-1	1	127
1.3-8	1	127		3.2-2	1	127
1.3-9	1	127		3.2-3	1	127
1.3-10	1	127		3.2-4	1	127
1.3-11	1	127		3.2-5	1	127
1.3-12	1	127		3.2-6	1	127
1.3-13	1	127		3.2-7	1	127
1.4-1	1	127		3.2-8	1	127
1.4-2	1	127		3.2-9	1	200
1.4-3	1	127		3.2-10	1	127
1.4-4	1	127		3.2-11	1	127
				3.2-12	1	127

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
3.3-1	1	127		3.3-50	1	127
3.3-2	1	127		3.3-51	1	175
3.3-3	1	127		3.3-52	1	127
3.3-4	1	127		3.4-1	1	149
3.3-5	1	127		3.4-2	1	149
3.3-6	1	147		3.4-3	1	149
3.3-7	1	133		3.4-4	1	127
3.3-8	1	150		3.4-5	1	203
3.3-9	1	150		3.4-6	1	203
3.3-10	1	127		3.4-7	1	203
3.3-11	1	127		3.4-8	1	203
3.3-12	1	133		3.4-9	1	203
3.3-13	1	147		3.4-10	1	203
3.3-14	1	127		3.4-11	1	203
3.3-15	1	127		3.4-12	1	203
3.3-16	1	133		3.4-13	1	127
3.3-17	1	127		3.4-14	1	197
3.3-18	1	127		3.4-15	1	127
3.3-19	1	127		3.4-16	1	175
3.3-20	1	133		3.4-17	1	175
3.3-21	1	127		3.4-18	1	203
3.3-22	1	157		3.4-19	1	175
3.3-23	1	157		3.4-20	1	127
3.3-24	1	157		3.4-21	1	175
3.3-25	1	157		3.4-22	1	203
3.3-26	1	127		3.4-23	1	175
3.3-27	1	127		3.4-24	1	175
3.3-28	1	127		3.4-25	1	175
3.3-29	1	133		3.4-26	1	161
3.3-30	1	127		3.4-27	1	155
3.3-31	1	127		3.4-28	1	156
3.3-32	1	127		3.4-29	1	156
3.3-33	1	127		3.4-30	1	203
3.3-34	1	196		3.4-31	1	203
3.3-35	1	132		3.4-32	1	127
3.3-36	1	132		3.4-33	1	203
3.3-37	1	132		3.4-34	1	143
3.3-38	1	132		3.4-35	1	203
3.3-39	1	132		3.4-36	1	127
3.3-40	1	175		3.4-37	1	204
3.3-41	1	160		3.4-38	1	204
3.3-42	1	208	01/25/07	3.4-39	1	127
3.3-43	1	208	01/25/07	3.4-40	1	127
3.3-44	1	127		3.4-41	1	127
3.3-45	1	194		3.4-42	1	127
3.3-46	1	194		3.4-43	1	127
3.3-47	1	194		3.4-44	1	127
3.3-48	1	127		3.4-45	1	127
3.3-49	1	127				

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date	Page No.	Volume	Amendment/Date
3.4-46	1	127	3.7-6	1	127
3.4-47	1	127	3.7-7	1	127
3.4-48	1	127	3.7-8	1	127
3.4-49	1	127	3.7-9	1	127
3.4-50	1	127	3.7-10	1	127
3.4-51	1	204	3.7-11	1	164
3.4-52	1	204	3.7-12	1	127
3.5-1	1	139	3.7-13	1	127
3.5-2	1	135	3.7-14	1	191
3.5-3	1	127	3.7-15	1	147
3.5-4	1	139	3.7-16	1	162
3.5-5	1	127	3.7-17	1	127
3.5-6	1	190	3.7-18	1	127
3.5-7	1	127	3.7-19	1	127
3.5-8	1	127	3.7-19a	1	129
3.5-9	1	127	3.7-19b	1	129
3.5-10	1	127	3.7-19c	1	129
3.5-11	1	127	3.7-20	1	127
3.6-1	1	127	3.7-21	1	127
3.6-2	1	144	3.7-22	1	181
3.6-3	1	127	3.7-23	1	127
3.6-4	1	127	3.7-24	1	214
3.6-5	1	127	3.7-25	1	214
3.6-6	1	144	3.7-26	1	214
3.6-7	1	127	3.7-27	1	208 01/25/07
3.6-8	1	127	3.7-28	1	208 01/25/07
3.6-9	1	127	3.7-29	1	127
3.6-10	1	127	3.7-30	1	213
3.6-11	1	127	3.7-31	1	127
3.6-12	1	165	3.7-32	1	213
3.6-13	1	201	3.7-33	1	213
3.6-14	1	201	3.7-34	1	213
3.6-15	1	127	3.7-34a	1	213
3.6-16	1	127	3.7-34b	1	213
3.6-17	1	127	3.7-35	1	127
3.6-18	1	171	3.8-1	1	141
3.6-19	1	127	3.8-2	1	141
3.6-20	1	127	3.8-3	1	127
3.6-21	1	127	3.8-4	1	127
3.6-22	1	127	3.8-5	1	179
3.6-23	1	159	3.8-6	1	211
3.6-24	1	159	3.8-7	1	158
3.6-25	1	127	3.8-8	1	179
3.6-26	1	127	3.8-9	1	158
3.7-1	1	212	3.8-10	1	158
3.7-2	1	127	3.8-11	1	158
3.7-3	1	212	3.8-12	1	158
3.7-4	1	212	3.8-13	1	169
3.7-5	1	127	3.8-14	1	179

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date
3.8-15	1	158
3.8-16	1	127
3.8-17	1	127
3.8-18	1	175
3.8-19	1	127
3.8-20	1	211
3.8-21	1	211
3.8-22	1	127
3.8-23	1	127
3.8-24	1	127
3.8-25	1	127
3.8-26	1	127
3.8-27	1	175
3.8-28	1	127
3.8-29	1	127
3.8-30	1	127
3.8-31	1	127
3.8-32	1	127
3.8-33	1	127
3.8-34	1	127
3.8-35	1	127
3.8-36	1	175
3.8-37	1	127
3.8-38	1	127
3.8-39	1	127
3.8-40	1	175
3.8-41	1	127
3.9-1	1	127
3.9-2	1	175
3.9-3	1	127
3.9-4	1	193
3.9-5	1	127
3.9-6	1	175
3.9-6a	1	175
3.9-7	1	153
3.9-8	1	153
3.9-9	1	175
3.9-9a	1	153
3.9-10	1	134
4.0-1	1	199
4.0-2	1	127
4.0-3	1	127
4.0-4	1	213
4.0-4a	1	213
4.0-5	1	131
5.0-1	1	207
5.0-2	1	207
5.0-3	1	207
5.0-4	1	207
5.0-5	1	207
5.0-6	1	184
5.0-7	1	127
5.0-8	1	207
5.0-9	1	178
5.0-10	1	127
5.0-11	1	170
5.0-12	1	178
5.0-13	1	204
5.0-14	1	204
5.0-15	1	206
5.0-15a	1	215
5.0-16	1	215
5.0-17	1	208
5.0-18	1	204
5.0-19	1	204
5.0-20	1	204
5.0-20a	1	198
5.0-20b	1	214
5.0-20c	1	214
5.0-21	1	127
5.0-22	1	127
5.0-23	1	195
5.0-24	1	127
5.0-25	1	127
5.0-26	1	200
5.0-27	1	203
5.0-27a	1	203
5.0-28	1	204
5.0-29	1	204
5.0-30	1	197
5.0-31	1	207

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date
Bibliographic Data Sheet	1	dated February 17, 1982
Appendix B	1	dated February 17, 1982
Unit 2 Environmental Protection Plan	1	dated February 17, 1982
1-1	1	dated February 17, 1982
2-1	1	dated February 17, 1982
2-2	1	dated February 17, 1982
3-1	1	dated February 17, 1982
3-2	1	168
4-1	1	168
4-2	1	dated February 17, 1982
Appendix C Anti Trust Conditions	1	
Appendix C	1	dated February 17, 1982
2	1	dated February 17, 1982
3	1	dated February 17, 1982

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 2.0-1	2	192	07/19/04	B 3.1-27	2	127	
B 2.0-2	2	127		B 3.1-28	2	200	11/18/05
B 2.0-3	2	207	12/21/06	B 3.1-29	2	200	11/18/05
B 2.0-3a	2	192	07/19/04	B 3.1-30	2	200	11/18/05
B 2.0-4	2	207	12/21/06	B 3.1-31	2	127	
B 2.0-5	2	207	12/21/06	B 3.1-32	2	127	05/02/97
B 2.0-6	2	127		B 3.1-33	2	127	
B 2.0-7	2	127		B 3.1-34	2	127	05/02/97
B 2.0-8	2	207	12/21/06	B 3.1-35	2	127	
B 2.0-9	2	207	12/21/06	B 3.1-36	2	127	
B 3.0-1	2	127		B 3.1-37	2	200	11/18/05
B 3.0-2	2	127		B 3.1-38	2	200	11/18/05
B 3.0-3	2	127		B 3.1-39	2	127	
B 3.0-4	2	207	12/21/06	B 3.1-40	2	127	
B 3.0-5	2	127		B 3.1-41	2	127	
B 3.0-6	2	127		B 3.1-42	2	127	
B 3.0-7	2	127		B 3.1-43	2	200	11/18/05
B 3.0-8	2	127		B 3.1-43a	2	200	11/18/05
B 3.0-9	2	127		B 3.1-44	2	200	11/18/05
B 3.0-10	2	127		B 3.1-45	2	127	
B 3.0-11	2	127		B 3.1-46	2	200	11/18/05
B 3.0-12	2	127	12/01/98	B 3.1-47	2	127	
B 3.0-13	2	186	10/25/02	B 3.1-48	2	127	
B 3.0-14	2	186	05/08/02	B 3.1-49	2	127	
B 3.0-15	2	186	05/08/02	B 3.1-50	2	127	
B 3.1-1	2	200	11/18/05	B 3.1-51	2	127	
B 3.1-2	2	200	11/18/05	B 3.1-52	2	127	
B 3.1-3	2	200	11/18/05	B 3.1-53	2	127	
B 3.1-4	2	200	11/18/05	B 3.1-54	2	127	08/03/01
B 3.1-5	2	200	11/18/05	B 3.1-55	2	127	08/03/01
B 3.1-6	2	200	11/18/05	B 3.1-56	2	127	08/03/01
B 3.1-7	2	200	11/18/05	B 3.1-57	2	127	08/03/01
B 3.1-8	2	200	11/18/05	B 3.1-58	2	127	08/03/01
B 3.1-9	2	200	11/18/05	B 3.1-58a	2	127	08/03/01
B 3.1-10	2	200	11/18/05	B 3.1-58b	2	127	08/03/01
B 3.1-11	2	200	11/18/05	B 3.1-59	2	200	11/18/05
B 3.1-12	2	200	11/18/05	B 3.1-60	2	127	11/05/96
B 3.1-13	2	127		B 3.1-61	2	127	05/03/00
B 3.1-14	2	127		B 3.1-62	2	175	12/20/00
B 3.1-15	2	200	11/18/05	B 3.1-63	2	175	05/21/02
B 3.1-16	2	127		B 3.1-63a	2	175	12/20/00
B 3.1-17	2	200	11/18/05	B 3.1-64	2	127	
B 3.1-18	2	127		B 3.1-65	2	127	
B 3.1-19	2	127	01/03/02	B 3.1-66	2	127	
B 3.1-20	2	127		B 3.1-67	2	127	
B 3.1-21	2	127	01/03/02	B 3.1-68	2	127	
B 3.1-22	2	127	05/30/97	B 3.1-69	2	127	
B 3.1-23	2	127		B 3.1-70	2	127	
B 3.1-24	2	127		B 3.1-71	2	127	
B 3.1-25	2	127	05/02/97	B 3.1-72	2	127	
B 3.1-26	2	127	07/29/99				

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.1-73	2	127		B 3.3-2	2	127	07/17/97
B 3.1-74	2	127		B 3.3-3	2	127	
B 3.1-75	2	127		B 3.3-4	2	127	
B 3.1-76	2	127		B 3.3-5	2	127	
B 3.1-77	2	127	05/29/97	B 3.3-6	2	127	
B 3.1-78	2	127	05/29/97	B 3.3-7	2	127	
B 3.1-79	2	127		B 3.3-8	2	127	
B 3.1-80	2	127		B 3.3-9	2	127	
B 3.2-1	2	127		B 3.3-10	2	127	
B 3.2-2	2	127		B 3.3-11	2	127	
B 3.2-3	2	127		B 3.3-12	2	127	03/12/99
B 3.2-4	2	192	07/19/04	B 3.3-13	2	127	
B 3.2-5	2	127		B 3.3-14	2	127	
B 3.2-6	2	127		B 3.3-15	2	127	
B 3.2-7	2	127		B 3.3-16	2	127	07/17/97
B 3.2-8	2	127		B 3.3-17	2	127	09/16/03
B 3.2-9	2	127		B 3.3-18	2	127	03/12/99
B 3.2-10	2	127		B 3.3-19	2	127	
B 3.2-11	2	127		B 3.3-20	2	127	
B 3.2-12	2	192	07/19/04	B 3.3-21	2	127	03/12/99
B 3.2-13	2	127		B 3.3-22	2	127	03/12/99
B 3.2-14	2	127		B 3.3-23	2	127	03/12/99
B 3.2-15	2	127		B 3.3-24	2	127	
B 3.2-16	2	127		B 3.3-25	2	127	12/30/96
B 3.2-17	2	127		B 3.3-26	2	127	12/30/96
B 3.2-18	2	127		B 3.3-26a	2	127	12/30/96
B 3.2-19	2	192	07/19/04	B 3.3-27	2	127	
B 3.2-20	2	127		B 3.3-28	2	127	
B 3.2-21	2	127		B 3.3-29	2	127	
B 3.2-22	2	127		B 3.3-30	2	127	05/29/97
B 3.2-23	2	127		B 3.3-31	2	127	05/02/97
B 3.2-24	2	127		B 3.3-32	2	127	03/12/99
B 3.2-25	2	127		B 3.3-33	2	127	03/12/99
B 3.2-26	2	127		B 3.3-34	2	127	03/12/99
B 3.2-27	2	127		B 3.3-35	2	127	03/12/99
B 3.2-28	2	127		B 3.3-36	2	127	03/12/99
B 3.2-29	2	192	07/19/04	B 3.3-37	2	188	
B 3.2-30	2	200	11/18/05	B 3.3-37a	2	188	09/16/03
B 3.2-31	2	127		B 3.3-38	2	127	
B 3.2-32	2	127		B 3.3-39	2	127	07/17/97
B 3.2-33	2	127		B 3.3-40	2	127	09/25/98
B 3.2-34	2	127		B 3.3-41	2	127	09/25/98
B 3.2-35	2	127		B 3.3-42	2	127	
B 3.2-36	2	127		B 3.3-43	2	127	
B 3.2-37	2	127		B 3.3-44	2	127	12/30/96
B 3.2-38	2	192	07/19/04	B 3.3-45	2	127	12/30/96
B 3.2-39	2	127		B 3.3-46	2	127	12/30/96
B 3.2-40	2	127		B 3.3-47	2	127	12/30/96
B 3.2-41	2	127		B 3.3-48	2	127	09/18/98
B 3.3-1	2	127		B 3.3-49	2	127	09/18/98

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.3-50	2	127	09/18/98	B 3.3-100	2	197	07/19/05
B 3.3-51	2	127	02/11/02	B 3.3-101	2	127	10/06/99
B 3.3-52	2	127		B 3.3-102	2	127	10/06/99
B 3.3-53	2	127	07/17/97	B 3.3-103	2	127	10/06/99
B 3.3-54	2	127		B 3.3-103a	2	188	
B 3.3-55	2	127		B 3.3-103b	2	157	09/16/03
B 3.3-56	2	127		B 3.3-103c	2	188	
B 3.3-57	2	127		B 3.3-104	2	127	
B 3.3-58	2	127		B 3.3-105	2	127	
B 3.3-59	2	127		B 3.3-106	2	127	
B 3.3-60	2	127	09/18/98	B 3.3-107	2	127	
B 3.3-61	2	127	09/18/98	B 3.3-108	2	127	
B 3.3-62	2	127	09/18/98	B 3.3-109	2	127	
B 3.3-63	2	127		B 3.3-110	2	127	
B 3.3-64	2	127	07/17/97	B 3.3-111	2	127	
B 3.3-65	2	127		B 3.3-112	2	127	
B 3.3-66	2	127		B 3.3-113	2	127	
B 3.3-67	2	127		B 3.3-114	2	127	
B 3.3-68	2	127		B 3.3-115	2	127	
B 3.3-69	2	127		B 3.3-116	2	127	
B 3.3-70	2	127		B 3.3-117	2	127	
B 3.3-71	2	127		B 3.3-118	2	127	
B 3.3-72	2	127	12/30/96	B 3.3-119	2	127	12/30/96
B 3.3-73	2	127	12/30/96	B 3.3-120	2	127	12/30/96
B 3.3-74	2	127	12/30/96	B 3.3-121	2	127	12/30/96
B 3.3-75	2	127	05/28/97	B 3.3-122	2	127	12/30/96
B 3.3-76	2	127	12/30/96	B 3.3-123	2	127	05/28/97
B 3.3-77	2	127	07/17/97	B 3.3-124	2	127	05/28/97
B 3.3-78	2	127		B 3.3-125	2	127	05/28/97
B 3.3-79	2	127		B 3.3-126	2	127	
B 3.3-80	2	127		B 3.3-127	2	127	
B 3.3-81	2	127		B 3.3-128	2	127	
B 3.3-82	2	127		B 3.3-129	2	127	09/06/00
B 3.3-83	2	127		B 3.3-130	2	127	
B 3.3-84	2	127		B 3.3-131	2	127	09/06/00
B 3.3-85	2	127		B 3.3-132	2	127	05/29/97
B 3.3-86	2	127		B 3.3-133	2	127	07/13/99
B 3.3-87	2	127	02/24/99	B 3.3-134	2	174	12/14/00
B 3.3-88	2	127	07/17/97	B 3.3-135	2	127	05/28/97
B 3.3-89	2	127		B 3.3-136	2	127	06/09/00
B 3.3-90	2	127		B 3.3-137	2	127	05/28/97
B 3.3-91	2	127		B 3.3-138	2	127	05/28/97
B 3.3-92	2	127		B 3.3-139	2	127	05/28/97
B 3.3-93	2	127		B 3.3-140	2	127	05/28/97
B 3.3-94	2	127		B 3.3-141	2	127	05/28/97
B 3.3-95	2	127	10/06/99	B 3.3-142	2	127	05/28/97
B 3.3-96	2	127	10/06/99	B 3.3-143	2	127	05/28/97
B 3.3-97	2	127	10/06/99	B 3.3-144	2	127	05/28/97
B 3.3-98	2	127	07/18/01	B 3.3-145	2	127	06/27/97
B 3.3-99	2	127	10/06/99	B 3.3-146	2	127	03/19/98

APPENDIX A TO LICENSE NO. NPF-10

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.3-147	2	127	06/27/97	B 3.4-12	3	127	
B 3.3-148	2	175	12/20/00	B 3.4-13	3	127	
B 3.3-149	2	175	12/20/00	B 3.4-14	3	127	
B 3.3-150	2	127	08/20/01	B 3.4-15	3	203	
B 3.3-151	2	127	06/27/97	B 3.4-16	3	203	
B 3.3-152	2	208	12/05/06	B 3.4-17	3	197	07/19/05
B 3.3-153	2	208	12/05/06	B 3.4-18	3	197	07/19/05
B 3.3-154	2	208	12/05/06	B 3.4-19	3	127	
B 3.3-155	2	208	12/05/06	B 3.4-20	3	197	07/19/05
B 3.3-156	2	208	12/05/06	B 3.4-21	3	197	07/19/05
B 3.3-157	2	208	12/05/06	B 3.4-22	3	127	
B 3.3-158	2	127	12/17/98	B 3.4-23	3	127	
B 3.3-159	2	127	06/08/00	B 3.4-24	3	204	
B 3.3-160	2	127	06/23/99	B 3.4-25	3	127	
B 3.3-161	2	127	05/30/97	B 3.4-26	3	127	
B 3.3-162	2	127	05/30/97	B 3.4-27	3	127	
B 3.3-163	2	130	05/30/97	B 3.4-28	3	204	
B 3.3-164	2	127	05/30/97	B 3.4-29	3	175	12/20/00
B 3.3-165	2	127	05/30/97	B 3.4-30	3	175	12/20/00
B 3.3-166	2	194	04/25/05	B 3.4-31	3	127	
B 3.3-167	2	127	05/30/97	B 3.4-32	3	204	
B 3.3-168	2	127	12/02/99	B 3.4-33	3	127	
B 3.3-169	2	127	05/30/97	B 3.4-34	3	175	12/20/00
B 3.3-170	2	127		B 3.4-35	3	175	12/20/00
B 3.3-171	2	194	04/25/05	B 3.4-36	3	127	
B 3.3-172	2	194	04/25/05	B 3.4-37	3	175	12/20/00
B 3.3-173	2	127	05/30/97	B 3.4-38	3	175	07/15/05
B 3.3-174	2	127	05/30/97	B 3.4-38a	3	175	04/03/06
B 3.3-175	2	127	03/06/06	B 3.4-39	3	204	
B 3.3-176	2	127	10/30/98	B 3.4-40	3	175	12/20/00
B 3.3-177	2	127	10/30/98	B 3.4-41	3	127	
B 3.3-178	2	127		B 3.4-42	3	127	
B 3.3-179	2	127	04/24/01	B 3.4-43	3	175	12/20/00
B 3.3-180	2	127	04/24/01	B 3.4-44	3	175	04/03/06
B 3.3-181	2	127	07/29/96	B 3.4-45	3	175	12/20/00
B 3.3-182	2	175	12/20/00	B 3.4-46	3	127	05/30/00
B 3.3-183	2	175	12/20/00	B 3.4-47	3	155	05/30/00
B 3.3-184	2	175	12/20/00	B 3.4-48	3	161	05/15/02
B 3.3-185	2	175	12/20/00	B 3.4-49	3	127	05/30/00
B 3.4-1	3	127	02/24/99	B 3.4-50	3	127	05/30/00
B 3.4-2	3	127	02/24/99	B 3.4-51	3	156	03/22/01
B 3.4-3	3	127		B 3.4-52	3	156	03/22/01
B 3.4-4	3	127		B 3.4-53	3	156	03/22/01
B 3.4-5	3	127	02/24/99	B 3.4-54	3	156	04/27/05
B 3.4-6	3	127		B 3.4-55	3	203	
B 3.4-7	3	127		B 3.4-56	3	203	
B 3.4-8	3	127		B 3.4-57	3	203	
B 3.4-9	3	203		B 3.4-58	3	203	
B 3.4-10	3	127		B 3.4-59	3	203	
B 3.4-11	3	127		B 3.4-60	3	203	

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.4-61	3	203		B 3.5-11	3	127	03/03/00
B 3.4-62	3	203		B 3.5-12	3	127	03/03/00
B 3.4-63	3	203		B 3.5-13	3	127	03/03/00
B 3.4-64	3	203		B 3.5-14	3	127	03/03/00
B 3.4-65	3	203		B 3.5-15	3	127	03/03/00
B 3.4-66	3	203		B 3.5-16	3	197	07/19/05
B 3.4-67	3	203		B 3.5-17	3	127	03/03/00
B 3.4-68	3	203		B 3.5-18	3	127	03/14/02
B 3.4-69	3	203		B 3.5-19	3	127	03/14/02
B 3.4-70	3	127		B 3.5-20	3	127	07/17/01
B 3.4-71	3	204		B 3.5-20a	3	127	03/03/00
B 3.4-72	3	204		B 3.5-21	3	127	
B 3.4-73	3	204		B 3.5-22	3	127	
B 3.4-74	3	204		B 3.5-23	3	127	
B 3.4-75	3	204		B 3.5-24	3	127	
B 3.4-76	3	127		B 3.5-25	3	127	
B 3.4-77	3	127		B 3.5-26	3	127	
B 3.4-78	3	127		B 3.5-27	3	127	
B 3.4-79	3	127		B 3.5-28	3	127	
B 3.4-80	3	127	09/06/00	B 3.5-29	3	127	
B 3.4-81	3	127	09/06/00	B 3.5-30	3	127	
B 3.4-82	3	127		B 3.5-31	3	127	
B 3.4-83	3	127		B 3.5-32	3	127	
B 3.4-84	3	127		B 3.5-33	3	127	
B 3.4-85	3	127		B 3.5-34	3	127	
B 3.4-86	3	127		B 3.6-1	3	127	12/01/98
B 3.4-87	3	127		B 3.6-2	3	182	04/29/03
B 3.4-88	3	127	05/13/02	B 3.6-3	3	127	12/01/98
B 3.4-89	3	127	05/13/02	B 3.6-4	3	127	04/29/03
B 3.4-90	3	127		B 3.6-5	3	127	12/01/98
B 3.4-91	3	127		B 3.6-6	3	182	02/11/02
B 3.4-92	3	127		B 3.6-7	3	127	
B 3.4-93	3	204		B 3.6-8	3	127	
B 3.4-94	3	204		B 3.6-9	3	127	
B 3.4-95	3	204		B 3.6-10	3	127	
B 3.4-96	3	204		B 3.6-11	3	127	12/01/98
B 3.4-97	3	204		B 3.6-12	3	127	04/29/03
B 3.4-98	3	204		B 3.6-13	3	127	07/29/99
B 3.4-99	3	204		B 3.6-14	3	127	
B 3.4-100	3	204		B 3.6-15	3	127	
B 3.5-1	3	127		B 3.6-16	3	127	04/29/03
B 3.5-2	3	127		B 3.6-17	3	127	
B 3.5-3	3	127		B 3.6-18	3	127	06/09/00
B 3.5-4	3	127	05/05/03	B 3.6-19	3	127	
B 3.5-5	3	127	05/30/97	B 3.6-20	3	127	
B 3.5-6	3	127		B 3.6-21	3	127	04/29/03
B 3.5-7	3	127	07/15/98	B 3.6-22	3	127	10/24/01
B 3.5-8	3	197	07/19/05	B 3.6-23	3	201	12/12/05
B 3.5-9	3	127	07/15/98	B 3.6-24	3	201	12/12/05
B 3.5-10	3	127	07/15/98	B 3.6-24a	3	201	12/12/05
B 3.5-10a	3	197	07/19/05	B 3.6-25	3	127	04/29/03

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.6-26	3	127	04/29/03	B 3.7-20	3	127	06/02/04
B 3.6-27	3	182	07/11/02	B 3.7-21	3	127	06/02/04
B 3.6-28	3	182	02/11/02	B 3.7-22	3	127	06/02/04
B 3.6-29	3	127		B 3.7-23	3	127	07/29/99
B 3.6-30	3	127	04/29/03	B 3.7-24	3	127	12/14/00
B 3.6-31	3	182	05/02/02	B 3.7-25	3	127	
B 3.6-32	3	127		B 3.7-26	3	127	02/28/01
B 3.6-33	3	127		B 3.7-27	3	127	02/28/01
B 3.6-34	3	127		B 3.7-28	3	127	03/03/00
B 3.6-35	3	182	02/11/02	B 3.7-29	3	127	03/03/00
B 3.6-36	3	182	02/11/02	B 3.7-30	3	127	03/03/00
B 3.6-37	3	197	07/19/05	B 3.7-31	3	191	11/25/03
B 3.6-38	3	197	07/19/05	B 3.7-32	3	191	11/25/03
B 3.6-39	3	127	10/06/00	B 3.7-33	3	191	11/25/03
B 3.6-40	3	127	10/06/00	B 3.7-34	3	127	03/03/00
B 3.6-41	3	127	10/06/00	B 3.7-35	3	127	07/31/00
B 3.6-42	3	127	04/29/03	B 3.7-36	3	127	07/31/00
B 3.6-43	3	127		B 3.7-37	3	127	08/13/01
B 3.6-44	3	127		B 3.7-38	3	127	08/01/01
B 3.6-45	3	127		B 3.7-39	3	127	06/23/99
B 3.6-46	3	127		B 3.7-40	3	127	
B 3.6-47	3	127		B 3.7-41	3	127	04/03/06
B 3.6-48	3	159	10/29/99	B 3.7-42	3	127	
B 3.6-49	3	159	10/29/99	B 3.7-43	3	127	
B 3.6-50	3	159	10/29/99	B 3.7-43a	3	127	05/29/97
B 3.6-51	3	159	10/29/99	B 3.7-43b	3	127	
B 3.6-52	3	159	10/29/99	B 3.7-43c	3	129	
B 3.6-53	3	159	10/06/00	B 3.7-43d	3	129	08/09/96
B 3.6-54	3	159	10/06/00	B 3.7-43e	3	129	
B 3.6-55	3	159	10/29/99	B 3.7-43f	3	129	
B 3.6-56	3	159	10/29/99	B 3.7-43g	3	129	
B 3.6-57	3	159	10/29/99	B 3.7-43h	3	129	
B 3.7-1	3	212	06/21/07	B 3.7-43i	3	129	
B 3.7-2	3	127	08/18/98	B 3.7-43j	3	129	
B 3.7-3	3	212	06/21/07	B 3.7-44	3	127	
B 3.7-4	3	212	06/21/07	B 3.7-45	3	127	
B 3.7-5	3	212	06/21/07	B 3.7-46	3	127	
B 3.7-6	3	212	06/21/07	B 3.7-47	3	127	05/30/97
B 3.7-7	3	127	04/16/99	B 3.7-48	3	127	
B 3.7-8	3	127	06/23/99	B 3.7-49	3	127	10/17/01
B 3.7-9	3	127		B 3.7-50	3	197	03/07/07
B 3.7-10	3	127		B 3.7-50a	3	197	03/07/07
B 3.7-11	3	127		B 3.7-51	3	127	04/08/07
B 3.7-12	3	127		B 3.7-52	3	127	10/17/01
B 3.7-13	3	127		B 3.7-53	3	127	04/12/01
B 3.7-14	3	127	04/16/99	B 3.7-54	3	127	04/12/01
B 3.7-15	3	127		B 3.7-55	3	127	03/07/07
B 3.7-16	3	127		B 3.7-55a	3	127	03/07/07
B 3.7-17	3	127	06/02/04	B 3.7-56	3	127	12/12/07
B 3.7-18	3	127		B 3.7-57	3	127	12/12/07
B 3.7-19	3	127		B 3.7-58	3	127	12/12/07

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.7-59	3	128	12/12/07	B 3.8-29	3	127	06/18/01
B 3.7-60	3	127	12/12/07	B 3.8-29a	3	169	06/18/01
B 3.7-61	3	128	12/12/07	B 3.8-29b	3	169	06/18/01
B 3.7-62	3	128	12/12/07	B 3.8-29c	3	169	06/18/01
B 3.7-63	3	208	12/12/07	B 3.8-29d	3	169	06/18/01
B 3.7-64	3	208	12/12/07	B 3.8-29e	3	169	06/18/01
B 3.7-65	3	208	12/12/07	B 3.8-29f	3	169	06/18/01
B 3.7-66	3	208	12/12/07	B 3.8-30	3	127	
B 3.7-67	3	208	12/12/07	B 3.8-31	3	127	
B 3.7-68	3	127	06/23/99	B 3.8-32	3	127	
B 3.7-69	3	127	10/13/98	B 3.8-33	3	127	
B 3.7-70	3	127	10/13/98	B 3.8-34	3	175	12/20/00
B 3.7-71	3	127	03/05/08	B 3.8-35	3	175	12/20/00
B 3.7-72	3	127	03/05/08	B 3.8-36	3	211	04/05/07
B 3.7-73	3	127	03/05/08	B 3.8-37	3	127	01/21/98
B 3.7-74	3	127	03/05/08	B 3.8-38	3	211	04/05/07
B 3.7-75	3	127	03/05/08	B 3.8-39	3	211	04/05/07
B 3.7-75a	3	127	03/05/08	B 3.8-40	3	127	01/21/98
B 3.7-76	3	127	05/13/02	B 3.8-41	3	211	04/05/07
B 3.7-77	3	127		B 3.8-42	3	127	03/25/02
B 3.7-78	3	127		B 3.8-43	3	127	
B 3.7-79	3	127		B 3.8-44	3	127	03/25/02
B 3.8-1	3	127	10/06/99	B 3.8-45	3	127	
B 3.8-2	3	127	10/06/99	B 3.8-46	3	127	05/03/00
B 3.8-3	3	127	10/06/99	B 3.8-47	3	127	01/22/99
B 3.8-4	3	127	10/06/99	B 3.8-47a	3	127	01/22/99
B 3.8-5	3	127	10/06/99	B 3.8-48	3	127	
B 3.8-6	3	127	10/06/99	B 3.8-49	3	127	01/22/99
B 3.8-7	3	197	07/19/05	B 3.8-50	3	127	
B 3.8-7a	3	127	12/10/99	B 3.8-51	3	127	
B 3.8-8	3	127	10/06/99	B 3.8-52	3	127	
B 3.8-9	3	127	11/29/07	B 3.8-53	3	127	01/22/99
B 3.8-10	3	197	07/19/05	B 3.8-54	3	127	08/05/98
B 3.8-11	3	127	10/06/99	B 3.8-55	3	127	08/30/04
B 3.8-12	3	127	10/06/99	B 3.8.55a	3	127	08/05/98
B 3.8-13	3	127	10/06/99	B 3.8-56	3	127	
B 3.8-14	3	127	10/06/99	B 3.8-57	3	127	
B 3.8-15	3	127	10/06/99	B 3.8-58	3	175	12/20/00
B 3.8-16	3	127	06/18/01	B 3.8-59	3	175	12/20/00
B 3.8-17	3	127	06/18/01	B 3.8-60	3	127	
B 3.8-18	3	211	04/05/07	B 3.8-61	3	127	
B 3.8-19	3	127	06/18/01	B 3.8-62	3	127	
B 3.8-20	3	127	11/29/07	B 3.8-63	3	127	
B 3.8-21	3	127	06/18/01	B 3.8-64	3	127	
B 3.8-22	3	127	06/18/01	B 3.8-65	3	127	
B 3.8-23	3	127	06/18/01	B 3.8-66	3	127	07/31/00
B 3.8-24	3	127	06/18/01	B 3.8-67	3	127	
B 3.8-25	3	127	06/18/01	B 3.8-68	3	127	
B 3.8-26	3	127	06/18/01	B 3.8-69	3	127	
B 3.8-27	3	127	06/18/01	B 3.8-70	3	127	
B 3.8-28	3	127	06/18/01				

SAN ONOFRE UNIT 2 TECHNICAL SPECIFICATIONS (NUREG-0741)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
B 3.8-71	3	127				
B 3.8-72	3	127				
B 3.8-73	3	175	12/20/00			
B 3.8-74	3	175	12/20/00			
B 3.8-75	3	127				
B 3.8-76	3	127				
B 3.8-77	3	127				
B 3.8-78	3	127				
B 3.8-79	3	127				
B 3.8-80	3	127				
B 3.8-81	3	127				
B 3.8-82	3	127				
B 3.8-83	3	127	03/05/08			
B 3.8-84	3	127				
B 3.8-85	3	127				
B 3.8-86	3	175	12/20/00			
B 3.8-87	3	175	12/20/00			
B 3.9-1	3	127				
B 3.9-2	3	127				
B 3.9-3	3	175	12/20/00			
B 3.9-4	3	127				
B 3.9-5	3	127				
B 3.9-6	3	175	12/20/00			
B 3.9-7	3	127				
B 3.9-8	3	127				
B 3.9-9	3	127	12/01/98			
B 3.9-10	3	193	02/18/05			
B 3.9-11	3	127	10/10/97			
B 3.9-12	3	127	10/10/97			
B 3.9-13	3	193	02/18/05			
B 3.9-13a	3	193	02/18/05			
B 3.9-14	3	127	10/10/97			
B 3.9-15	3	127	10/10/97			
B 3.9-16	3	127				
B 3.9-17	3	127	07/15/05			
B 3.9-17a	3	127	04/03/06			
B 3.9-18	3	175	07/15/05			
B 3.9-19	3	175	12/20/00			
B 3.9-20	3	127				
B 3.9-21	3	127	05/30/97			
B 3.9-22	3	127	07/15/05			
B 3.9-23	3	127	04/03/06			
B 3.9-24	3	175	12/20/00			
B 3.9-24a	3	175	12/20/00			
B 3.9-25	3	127	05/30/97			
B 3.9-26	3	127	10/13/98			
B 3.9-27	3	127	10/13/98			

3.7 PLANT SYSTEMS

3.7.17 Fuel Storage Pool Boron Concentration

LCO 3.7.17 The fuel storage pool boron concentration shall be ≥ 2000 ppm.

APPLICABILITY: Whenever any fuel assembly is stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel storage pool boron concentration not within limit.	----------NOTE---------- LCO 3.0.3 is not applicable. ----------	
	A.1 Suspend movement of fuel assemblies in the fuel storage pool.	Immediately
	AND	
	A.2 Initiate action to restore fuel storage pool boron concentration to within limit.	Immediately

3.7 PLANT SYSTEMS

3.7.18 Spent Fuel Assembly Storage

LCO 3.7.18 The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region I shall be within the acceptable burnup domain of Figure 3.7.18-1 or Figure 3.7.18-2, or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region II shall be within the acceptable burnup domain of Figure 3.7.18-3 or Figure 3.7.18-4, or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Technical Specification 4.3.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 --------NOTE--------- LCO 3.0.3 is not applicable. ---------- Initiate action to bring the noncomplying fuel assembly into compliance.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.18.1	Verify by administrative means the initial enrichment, burnup, and cooling time of the fuel assembly are in accordance with LCO 3.7.18, or Design Features 4.3.1.1, or LCS 4.0.100. Rev 2, dated 09/27/07.	Prior to moving a fuel assembly to any spent fuel pool storage location.

FIGURE 3.7.18-1

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION I RACKS

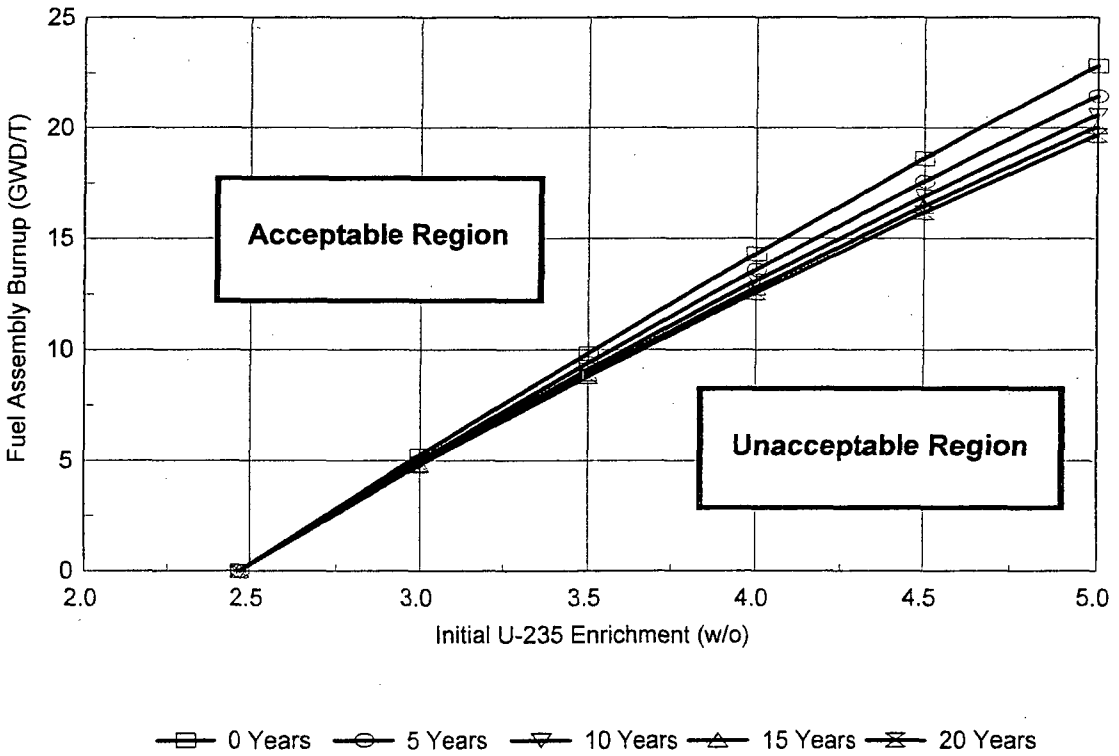


FIGURE 3.7.18-2

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION I RACKS

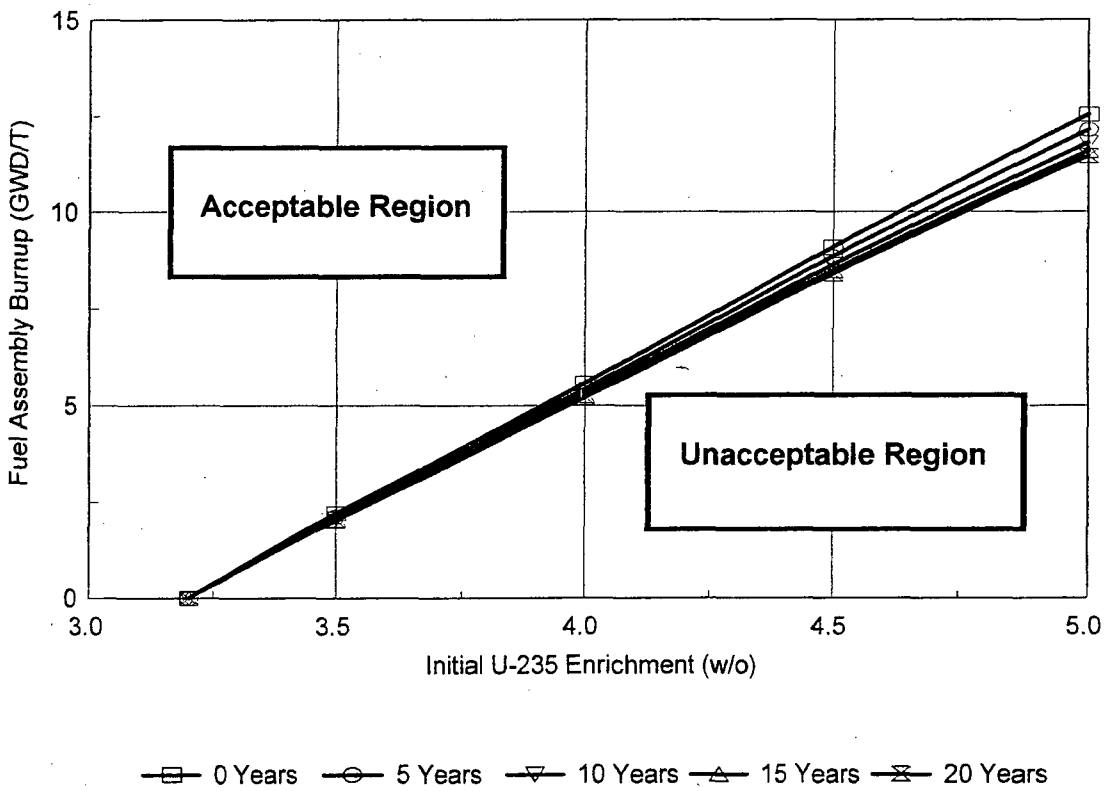


FIGURE 3.7.18-3

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION II RACKS

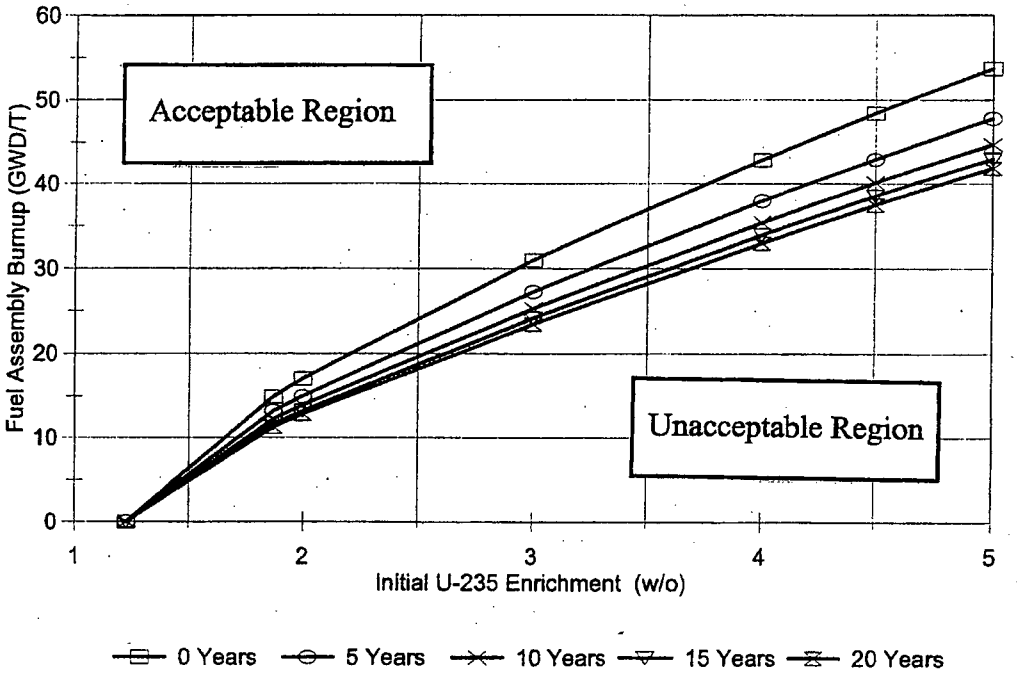
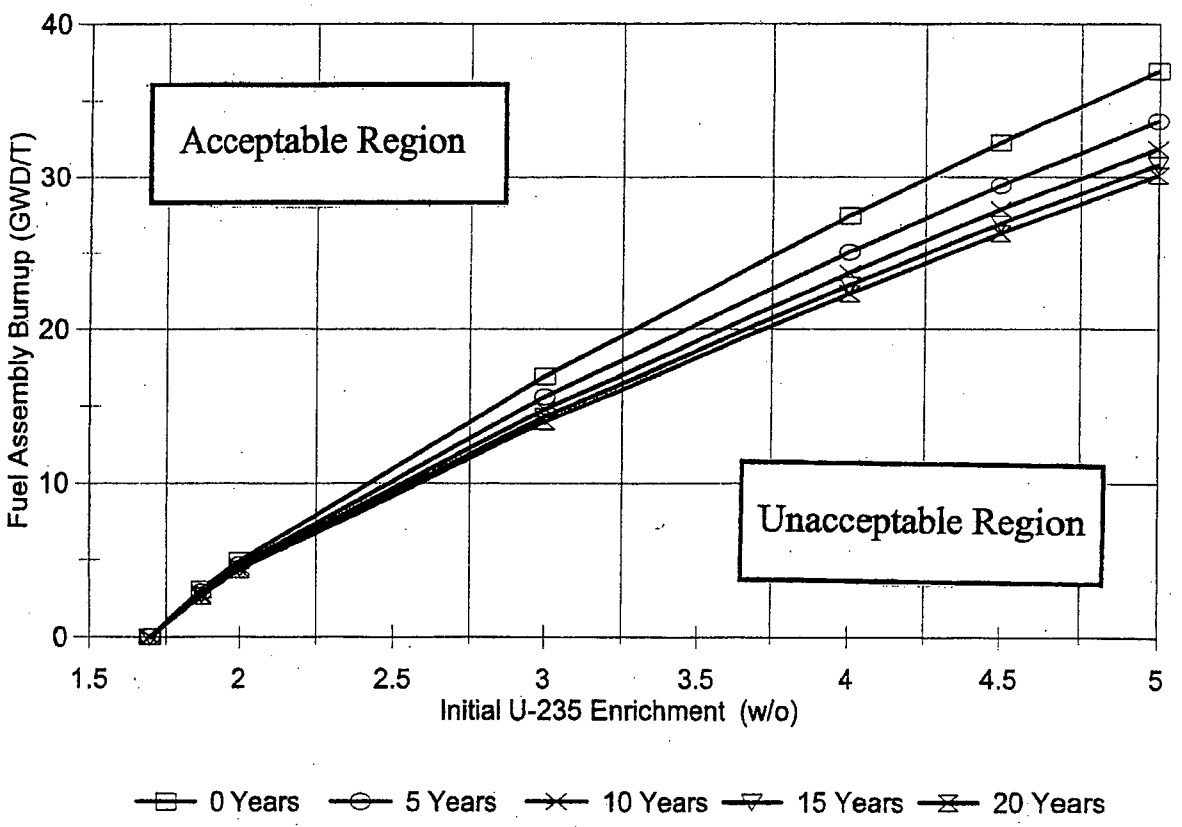


FIGURE 3.7.18-4

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION II RACKS



4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} \leq$ < 1.0 if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.95$ if fully flooded with water borated to 1700 ppm, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

d. Three or five Borated stainless steel guide tube inserts (GT-Insert) may be used. When three Borated stainless steel guide tube inserts are used, they will be installed in an assembly's center guide tube, the guide tube associated with the serial number, and the diagonally opposite guide tube. Fuel containing GT-Inserts may be placed in either Region I or Region II. However, credit for GT-Inserts is only taken for Region II storage.

A five-finger CEA may be installed in an assembly. Fuel containing a five-finger CEA may be placed in either Region I or Region II. Credit for inserted 5-finger CEAs is taken for both Region I and Region II.

e. A nominal 8.85 inch center to center distance between fuel assemblies placed in Region II;

f. A nominal 10.40 inch center to center distance between fuel assemblies placed in Region I;

(continued)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

h. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-1 are allowed unrestricted storage in Region I;

i. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-2 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region I;

j. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-3 are allowed unrestricted storage in Region II;

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

l. Units 2 and 3 fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-4 will be stored in compliance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 09/27/07; and

m. Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 09/27/07.

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.17 Fuel Storage Pool Boron Concentration

BASES

BACKGROUND

As described in LCO 3.7.18, "Spent Fuel Assembly Storage," fuel assemblies are stored in the spent fuel racks in accordance with criteria based on initial enrichment, discharge burnup, and cooling time (plutonium decay). Although the water in the spent fuel pool is normally borated to ≥ 2000 ppm, the criteria that limit the storage of a fuel assembly to specific rack locations is conservatively developed without taking credit for boron while maintaining K_{eff} < 1.0. Credit for boron is taken to maintain K_{eff} ≤ 0.95.

APPLICABLE SAFETY ANALYSES

Soluble boron in the spent fuel pool is credited in criticality analyses for normal and accident conditions. The relevant accidents are 1) Fuel Assembly Dropped Horizontally On Top of the Racks, 2) Fuel Assembly Dropped Vertically Into a Storage Location Already Containing a Fuel Assembly, 3) Fuel Assembly Dropped to the SFP Floor, and 4) Fuel Misloading in either Region I or Region II. The limiting accident is Fuel Misloading in either Region I or Region II.

A fuel assembly could be inadvertently loaded into a spent fuel rack location not allowed by LCO 3.7.18 (e.g., an un-irradiated fuel assembly or an insufficiently depleted fuel assembly). This accident is analyzed assuming the misloading of one fresh assembly with the maximum permissible enrichment. However, the negative reactivity effect of the soluble boron compensates for the increased reactivity caused by the postulated accident scenario.

Under normal, non-accident conditions, the soluble boron needed to maintain K_{eff} less than or equal to 0.95, including uncertainties, is 970 ppm. Under accident conditions, the soluble boron needed to maintain K_{eff} less than or equal to 0.95, including uncertainties, is 1700 ppm. A SFP boron dilution analysis shows that dilution from 2000 ppm to below 1700 is not credible. Therefore, the minimum required soluble boron concentration is 2000 ppm.

The concentration of dissolved boron in the fuel pool satisfies Criterion 2 of the NRC Policy Statement.

(continued)

BASES (continued)

LCO

The specified concentration of 2000 ppm dissolved boron in the fuel pool preserves the assumptions used in the analyses described above. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the spent fuel pool.

APPLICABILITY

This LCO applies whenever fuel assemblies are stored in the spent fuel pool.

ACTIONS

A.1 and A.2

The Required Actions are modified by a Note indicating that LCO 3.0.3 does not apply.

When the concentration of boron in the spent fuel pool is less than required 2000 ppm, immediate action must be taken to preclude an accident from happening or to mitigate the consequences of an accident in progress. This is most efficiently achieved by immediately suspending the movement of fuel assemblies. This does not preclude the movement of fuel assemblies to a safe position. In addition, action must be immediately initiated to restore boron concentration to the required 2000 ppm.

If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, inability to suspend movement of fuel assemblies is not sufficient reason to require a reactor shutdown.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.17.1

This SR verifies that the concentration of boron in the spent fuel pool is within the required limit. As long as this SR is met, the analyzed incidents are fully addressed. The 7 day Frequency is appropriate because no major replenishment of pool water is expected to take place over a short period of time.

REFERENCES

1. UFSAR, Section 9.1.

B 3.7 PLANT SYSTEMS

B 3.7.18 Spent Fuel Assembly Storage

BASES

BACKGROUND

The spent fuel storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The storage pool is sized to store 1542 fuel assemblies. Two types/sizes of spent fuel storage racks are used (Region I and Region II). The two Region I racks each contain 156 storage locations each spaced 10.40 inches on center in a 12x13 array. Four Region II storage racks each contain 210 storage locations in a 14x15 array. The remaining two Region II racks each contain 195 locations in a 13x15 array. All Region II locations are spaced 8.85 inches on center.

To maintain $K_{eff} \leq 0.95$ for spent fuel of maximum enrichment up to 4.8 w/o, (1) soluble boron is credited, and (2) the following storage patterns and borated stainless steel guide tube inserts are used as needed:

(1) unrestricted storage, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(2) SFP Peripheral storage, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(3) 2x2 storage patterns, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(4) 3x3 storage patterns, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(5) credit for inserted Control Element Assemblies (CEAs),

(6) credit for erbia in fresh assemblies,

(7) credit for cooling time (Pu-241 decay), and,

(8) credit for borated stainless steel guide tube inserts.

(continued)

BASES (continued)

BACKGROUND (continued)

When soluble boron is credited, the following acceptance criteria apply:

(1) Under normal conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than 1.0 when flooded with unborated water, and,

(2) Under normal and accident conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than or equal to 0.95 when flooded with borated water.

APPLICABLE SAFETY ANALYSES

The spent fuel storage facility is designed for noncriticality by use of adequate spacing, neutron absorbing stainless steel cans, borated water with a minimum soluble boron concentration of 970 ppm, and storage of fuel assemblies in accordance with the administrative controls in LCO 3.7.18 and LCS 4.0.100, "Fuel Storage Patterns".

The spent fuel assembly storage satisfies Criterion 2 of the NRC Policy Statement.

LCO

The restrictions on the placement of fuel assemblies within the spent fuel pool, in the accompanying LCO, ensure that the K_{eff} of the spent fuel pool will always remain < 1.00 under normal, non-accident conditions assuming the pool to be flooded with unborated water. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under normal, non-accident conditions assuming the pool to be flooded with borated water with a minimum soluble boron concentration of 970 ppm. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under accident conditions assuming the pool to be flooded with borated water with a minimum soluble boron concentration of 1700 ppm. The restrictions are consistent with the criticality safety analysis performed for the spent fuel pool.

(continued)

BASES (continued)

APPLICABILITY

This LCO applies whenever any fuel assembly is stored in Regions I and II of the spent fuel pool.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply.

When the configuration of fuel assemblies stored in Regions I and II of the spent fuel pool is not in accordance with LCO 3.7.18, immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance.

If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, in either case, inability to move fuel assemblies is not sufficient reason to require a reactor shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.7.18.1

This SR verifies by administrative means that the fuel assembly is stored in accordance with LCO 3.7.18, or Design Features 4.3.1.1, or LCS 4.0.100. For fuel assemblies not stored in accordance with LCO 3.7.18, performance of this SR will ensure compliance with Specification 4.3.1.1.

This surveillance is performed prior to the initial storage of a fuel assembly in a spent fuel pool location and prior to each subsequent movement to a new location.

REFERENCES

UFSAR, Section 9.1.2.2.

BASES (continued)

Table B 3.8.9-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	TRAIN A		TRAIN B	
AC safety buses	4160 V 480 V	ESF Bus A04 Load Center B04		ESF Bus A06 Load Center B06	
DC buses(3)	125 V	TRAIN A	TRAIN C	TRAIN B	TRAIN D
		Bus D1 from battery B007 and charger B001 (4)	Bus D3 from battery B009 and charger B003 (4)	Bus D2 from battery B008 and charger B002 (5)	Bus D4 from battery B010 and charger B004 (5)
AC vital buses	120 V	TRAIN A	TRAIN C	TRAIN B	TRAIN D
		Bus Y01 from inverter Y001 connected to bus D1	Bus Y03 from inverter Y003 connected to bus D3	Bus Y02 from inverter Y002 connected to bus D2	Bus Y04 from inverter Y004 connected to bus D4

NOTES: (1) Each train of the AC, DC, and AC vital bus electrical power distribution systems is a subsystem.

(2) If a support system (e.g., charger or inverter) is declared inoperable and it has its own LCO, entry into LCO 3.8.9 is not required. Only entry into its LCO is required.

(3) An OPERABLE Class 1E battery bank B00X may replace any battery B007 through B010 to allow battery maintenance (including replacement) activities.

(4) Swing Charger B021 may be aligned as the OPERABLE charger in place of B001 or B003.

(5) Swing Charger B022 may be aligned as the OPERABLE charger in place of B002 or B004.

SAN ONOFRE UNIT 2 LICENSEE CONTROLLED SPECIFICATIONS

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
LOEP-1		03/05/08	3.1-103-2	0	04/24/96
LOEP-2		08/29/07	3.1-103-3	0	04/24/96
LOEP-3		12/12/07	3.1-104-1	4	12/02/02
LOEP-4		03/05/08	3.1-104-2	2	02/12/99
LOEP-5		09/27/07	3.1-104-3	2	02/12/99
LOEP-6		11/30/07	3.1-104-4	2	11/18/99
i	7	09/07/06	3.1-105-1	1	11/12/98
ii	9	09/07/06	3.1-105-2	0	07/29/96
iii	6	09/07/06	3.1-105-3	1	02/19/97
iv	3	06/27/00	3.1-105-4	1	02/19/97
v	1	09/07/06	3.1-105-5	2	02/19/97
2.0-100-1	8	05/25/00	3.1-105-6	1	02/19/97
2.0-100-2	0	04/24/96	3.1-105-7	0	07/29/96
2.0-100-3	1	05/25/00	3.1-105-8	0	07/29/96
2.0-100-4	0	04/24/96	3.1-105-9	1	12/02/96
2.0-100-5	5	03/29/99	3.1-106-1	3	05/25/00
2.0-100-6	3	03/29/99	3.1-106-2	3	05/25/00
2.0-100-7	2	03/29/99	3.1-106-3	1	05/31/97
2.0-100-8	3	03/29/99	3.1-106-4	2	05/17/99
2.0-100-9	3	03/29/99	3.1-106-5	0	05/17/99
2.0-100-10	1	03/29/99	3.1-106-6	1	05/25/00
2.0-100-11	2	05/12/00	3.1-107-1	0	11/18/05
2.0-100-12	3	05/12/00	3.1-107-2	0	11/18/05
2.0-100-13	2	05/12/00	3.1-107-3	0	11/18/05
2.0-100-14	0	03/29/99	3.1-107-4	0	11/18/05
2.0-100-15	0	03/29/99	3.1-107-5	0	11/18/05
2.0-100-16	0	03/29/99	3.1-108-1	1	07/20/06
2.0-100-17	0	03/29/99	3.1-108-2	0	11/18/05
2.0-100-18	1	05/25/00	3.1-108-3	0	11/18/05
3.0-1	1	05/25/00	3.1-108-4	0	11/18/05
3.0-1a	0	05/25/00	3.1-108-5	0	11/18/05
3.0-2	1	03/14/02	3.2-100-1	3	02/15/06
3.0-3	1	03/14/02	3.2-100-2	0	04/24/96
3.0-4	0	03/14/02	3.2-100-3	0	04/24/96
3.0-5	0	03/14/02	3.2-101-1	2	02/19/99
3.0-6	0	03/14/02	3.2-101-2	2	02/19/99
3.1-100-1	2	11/12/98	3.2-101-3	2	06/22/98
3.1-100-2	2	05/13/97	3.2-101-4	2	02/19/99
3.1-100-3	1	01/15/97	3.2-101-5	1	02/19/97
3.1-101-1	2	05/25/00	3.2-101-6	1	02/19/97
3.1-101-2	0	04/24/96	3.2-102-1	4	04/16/99
3.1-101-3	1	04/16/99	3.2-102-2	2	04/16/99
3.1-101-4	2	04/16/99	3.3-100-1	8	08/29/07
3.1-101-5	1	05/25/00	3.3-100-2	0	08/01/96
3.1-102-1	2	02/12/99	3.3-100-3	0	04/24/96
3.1-102-2	1	02/12/99	3.3-100-4	3	08/29/07
3.1-102-3	1	02/12/99	3.3-100-5	5	08/29/07
3.1-103-1	1	11/12/98	3.3-100-6	8	08/29/07

SAN ONOFRE UNIT 2 LICENSEE CONTROLLED SPECIFICATIONS

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.3-100-7	2	01/28/05	3.3-108-6	0	10/05/00
3.3-101-1	5	08/29/07	3.3-109-1	5	02/20/07
3.3-101-2	2	08/29/07	3.3-109-1a	0	02/20/07
3.3-101-3	4	08/29/07	3.3-109-2	5	02/20/07
3.3-102-1	6	04/19/04	3.3-109-3	3	02/20/07
3.3-102-2	5	04/19/04	3.3-109-4	0	02/20/07
3.3-102-2a	0	04/19/04	3.3-109-5	0	02/20/07
3.3-102-2b	0	04/19/04	3.3-109-6	0	02/20/07
3.3-102-3	0	04/24/96	3.3-110-1	0	07/23/01
3.3-102-4	4	01/05/01	3.3-110-2	0	07/02/01
3.3-102-5	4	01/05/01	3.3-110-3	0	07/02/01
3.3-102-6	0	01/05/01	3.3-110-4	0	07/02/01
3.3-102-7	0	01/05/01	3.3-110-5	0	07/23/01
3.3-102-8	1	04/19/04	3.3-111-1	5	02/05/01
3.3-102-8a	0	04/19/04	3.3-111-2	3	03/06/98
3.3-102-8b	0	04/19/04	3.3-111-3	3	03/06/98
3.3-102-9	0	01/05/01	3.3-111-4	5	02/05/01
3.3-102-10	0	01/05/01	3.3-111-5	4	02/05/01
3.3-102-11	0	01/05/01	3.3-112-1	2	12/05/06
3.3-103-1	1	05/25/00	3.3-112-2	2	12/05/06
3.3-103-2	0	04/24/96	3.3-112-3	2	12/05/06
3.3-103-3	1	05/25/00	3.3-112-4	1	12/05/06
3.3-104-1	4	05/25/00	3.3-112-5	0	12/05/06
3.3-104-2	2	05/25/00	3.3-112-6	0	12/05/06
3.3-104-3	2	12/14/00	3.3-112-7	0	12/05/06
3.3-104-4	3	01/29/99	3.3-112-8	0	12/05/06
3.3-104-5	3	05/25/00	3.3-112-9	0	12/05/06
3.3-105-1	1	05/25/00	3.3-113-1	2	10/27/03
3.3-105-2	0	04/24/96	3.3-113-2	1	03/19/03
3.3-105-3	1	05/25/00	3.3-113-3	1	03/19/03
3.3-106-1	6	06/07/01	3.3-113-4	2	10/27/03
3.3-106-2	2	04/23/01	3.3-113-5	2	10/27/03
3.3-106-3	3	03/29/99	3.3-113-6	0	03/19/03
3.3-106-4	1	03/29/99	3.3-113-7	1	10/27/03
3.3-106-5	1	05/30/97	3.3-114-1	2	10/27/03
3.3-106-6	2	05/30/97	3.3-114-2	1	03/19/03
3.3-106-7	2	05/30/97	3.3-114-3	1	03/19/03
3.3-106-8	4	06/07/01	3.3-114-4	1	03/19/03
3.3-106-9	3	06/07/01	3.3-114-5	2	10/27/03
3.3-106-10	4	04/23/01	3.3-114-6	1	03/19/03
3.3-107-1	2	08/22/00	3.3-114-7	1	10/27/03
3.3-107-2	0	04/24/96	3.3-115-1	0	04/25/05
3.3-107-3	1	05/25/00	3.3-115-2	0	04/25/05
3.3-108-1	2	10/05/00	3.3-115-3	0	04/25/05
3.3-108-2	0	04/24/96	3.3-115-4	0	04/25/05
3.3-108-3	2	10/05/00	3.4-101-1	3	05/25/00
3.3-108-4	0	10/05/00	3.4-101-2	3	05/25/00
3.3-108-5	0	10/05/00	3.4-101-2a	0	05/25/00

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.4-101-3	0	04/24/96	3.6-101-2	2	02/23/04
3.4-101-4	1	04/28/97	3.6-101-3	0	04/24/96
3.4-101-5	2	07/12/99	3.6-101-4	1	12/27/96
3.4-101-6	2	07/12/99	3.6-101-5	2	02/23/04
3.4-101-7	0	07/12/99	3.6-101-6	0	04/24/96
3.4-101-8	1	05/25/00	3.6-101-7	0	04/24/96
3.4-101-9	0	07/12/99	3.6-101-8	3	02/23/04
3.4-102-1	3	02/11/03	3.7-101-1	1	12/18/02
3.4-102-2	1	05/25/00	3.7-101-2	0	09/21/02
3.4-102-3	1	01/21/98	3.7-101-3	0	09/21/02
3.4-102-4	2	02/11/03	3.7-101-4	1	12/18/02
3.4-103-1	1	12/12/07	3.7-101-5	0	09/21/02
3.4-103-2	1	12/12/07	3.7-101-6	1	12/18/02
3.4-103-3	1	12/12/07	3.7-101-7	0	09/21/02
3.4-103-4	1	12/12/07	3.7-101-8	1	12/18/02
3.4-103-5	1	12/12/07	3.7-101-9	0	09/21/02
3.4-103-6	1	12/12/07	3.7-101-10	0	09/21/02
3.4-103-7	1	12/12/07	3.7-101-11	0	09/21/02
3.4-103-8	1	12/12/07	3.7-101-12	0	09/21/02
3.4-106-1	1	12/12/07	3.7-102-1	8	04/23/01
3.4-106-2	1	12/12/07	3.7-102-2	4	04/23/01
3.4-106-3	1	12/12/07	3.7-102-3	1	11/21/97
3.4-107-1	1	12/12/07	3.7-102-4	1	11/21/97
3.4-107-2	1	12/12/07	3.7-102-5	3	05/24/00
3.4-107-3	1	12/12/07	3.7-102-6	2	11/21/97
3.4-112.1-1	1	12/12/07	3.7-102-7	6	04/23/01
3.4-112.1-2	1	12/12/07	3.7-103-1	7	04/12/07
3.4-112.1-3	1	12/12/07	3.7-103-2	3	04/12/07
3.4-112.2-1	1	12/12/07	3.7-103-3	2	07/29/99
3.4-112.2-2	1	12/12/07	3.7-103-4	0	04/24/96
3.4-112.2-3	1	12/12/07	3.7-103-5	0	04/24/96
3.5-100-1	0	04/24/96	3.7-103-6	1	05/09/97
3.5-100-2	0	04/24/96	3.7-103-7	2	08/20/98
3.5-101-1	1	12/23/99	3.7-103-8	5	04/12/07
3.5-101-2	0	04/24/96	3.7-104-1	5	07/16/04
3.5-101-3	0	04/24/96	3.7-104-2	3	05/25/00
3.5-101-4	1	12/23/99	3.7-104-3	2	07/16/04
3.6-100-1	4	02/11/02	3.7-104-4	4	07/16/04
3.6-100-2	1	02/02/01	3.7-104-5	2	07/16/04
3.6-100-3	3	02/11/02	3.7-105-1	13	05/29/07
3.6-100-4	1	02/02/01	3.7-105-2	5	05/09/01
3.6-100-5	2	02/02/01	3.7-105-3	3	05/09/01
3.6-100-6	3	02/02/01	3.7-105-4	5	06/30/03
3.6-100-7	2	02/02/01	3.7-105-5	4	11/14/06
3.6-100-8	2	02/02/01	3.7-105-6	3	05/09/01
3.6-100-9	1	02/02/01	3.7-105-7	3	05/09/01
3.6-100-10	1	02/02/01	3.7-105-8	4	10/29/04
3.6-101-1	5	02/23/04	3.7-105-9	5	07/21/05

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.7-105-10	3	05/29/07	3.7-112-2	0	04/24/96
3.7-105-11	1	05/09/01	3.7-112-3	1	05/25/00
3.7-105-12	2	05/29/07	3.7-113-1	20	12/21/06
3.7-105-13	2	06/30/03	3.7-113-2	4	06/27/00
3.7-105-14	3	06/30/03	3.7-113-3	5	05/16/01
3.7-105-15	3	05/29/07	3.7-113-4	10	09/20/05
3.7-105-16	2	05/29/07	3.7-113-5	3	05/16/01
3.7-105-17	1	05/09/01	3.7-113-6	2	06/27/00
3.7-105-18	2	05/29/07	3.7-113-7	3	11/13/03
3.7-105-19	2	06/30/03	3.7-113-8	2	03/28/05
3.7-105-20	3	06/30/03	3.7-113-9	3	06/27/00
3.7-105-21	1	05/09/01	3.7-113-10	5	05/16/01
3.7-105-22	1	05/09/01	3.7-113-11	2	03/28/05
3.7-105-23	5	07/21/05	3.7-113-12	3	07/13/05
3.7-106-1	2	10/28/02	3.7-113-13	2	06/27/00
3.7-106-2	0	12/18/98	3.7-113-14	3	12/21/06
3.7-106-3	1	05/25/00	3.7-113-15	2	06/27/00
3.7-106-4	0	12/18/98	3.7-113-16	1	06/27/00
3.7-106-5	1	10/28/02	3.7-113-17	2	06/27/00
3.7-106-6	1	10/28/02	3.7-113-18	2	06/27/00
3.7-106-7	1	10/28/02	3.7-113-19	1	06/27/00
3.7-106-8	2	10/28/02	3.7-113-20	3	07/13/05
3.7-106-9	2	10/28/02	3.7-113-21	4	12/21/06
3.7-106-10	0	10/28/02	3.7-113-22	3	07/13/05
3.7-107-1	2	05/25/00	3.7-113-23	2	12/21/06
3.7-107-2	0	04/24/96	3.7-113-24	7	06/27/00
3.7-107-3	0	04/24/96	3.7-113-25	1	06/27/00
3.7-107-4	1	05/25/00	3.7-113-26	2	06/27/00
3.7-108-1	5	06/28/02	3.7-114-1	1	05/25/00
3.7-108-2	1	10/04/00	3.7-114-2	0	08/14/96
3.7-108-3	1	10/19/98	3.7-114-3	1	05/25/00
3.7-108-4	1	10/19/98	3.7-115-1	1	05/25/00
3.7-108-5	1	11/27/96	3.7-115-2	0	08/27/96
3.7-108-6	0	04/24/96	3.7-115-3	1	05/25/00
3.7-108-7	1	06/28/02	3.7-116-1	4	03/05/08
3.7-108-8	1	05/09/97	3.7-116-2	3	03/05/08
3.7-108-9	4	06/28/02	3.7-117-1	2	06/12/02
3.7-108-10	1	10/04/00	3.7-117-2	2	06/12/02
3.7-109-1	2	05/25/00	3.7-118-1	2	12/05/06
3.7-109-2	1	07/29/99	3.7-118-2	2	12/05/06
3.7-109-3	1	05/25/00	3.7-118-3	0	12/05/06
3.7-110-1	3	05/23/01	3.7-118-4	0	12/05/06
3.7-110-2	0	04/24/96	3.7-118-5	0	12/05/06
3.7-110-3	2	02/28/01	3.7-118-6	0	12/05/06
3.7-111-1	1	05/25/00	3.8-100-1	9	04/25/05
3.7-111-2	0	04/24/96	3.8-100-2	3	03/28/05
3.7-111-3	1	05/25/00	3.8-100-3	1	03/06/01
3.7-112-1	1	05/25/00	3.8-100-4	1	05/28/97

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.8-100-5	1	11/22/99	3.9-107-2	1	05/25/00
3.8-100-6	1	05/28/97	3.9-107-3	0	12/21/00
3.8-100-7	1	11/22/99	3.9-107-4	0	12/21/00
3.8-100-8	4	11/22/99	4.0-100-1	2	09/27/07
3.8-100-9	2	11/22/99	4.0-100-2	2	09/27/07
3.8-100-10	2	11/22/99	4.0-100-3	2	09/27/07
3.8-100-11	1	05/28/97	4.0-100-4	2	09/27/07
3.8-100-12	1	05/28/97	4.0-100-5	2	09/27/07
3.8-100-13	1	04/25/05	4.0-100-6	2	09/27/07
3.8-100-14	2	03/06/01	4.0-100-7	2	09/27/07
3.8-100-15	3	03/12/02	4.0-100-8	2	09/27/07
3.8-100-16	1	03/12/02	4.0-100-9	2	09/27/07
3.8-100-17	1	03/12/02	4.0-100-10	2	09/27/07
3.8-100-18	0	03/12/02	4.0-100-11	2	09/27/07
3.8-101-1	3	05/27/05	4.0-100-12	2	09/27/07
3.8-101-2	1	05/27/05	4.0-100-13	2	09/27/07
3.8-101-3	0	04/24/96	4.0-100-14	2	09/27/07
3.8-101-4	0	04/24/96	4.0-100-15	2	09/27/07
3.8-101-5	0	04/24/96	4.0-100-16	2	09/27/07
3.8-101-6	1	05/28/97	4.0-100-17	2	09/27/07
3.8-101-7	2	05/28/97	4.0-100-18	2	09/27/07
3.8-101-8	1	05/25/00	4.0-100-19	2	09/27/07
3.8-102-1	0	01/03/00	4.0-100-20	2	09/27/07
3.8-102-2	0	01/03/00	4.0-100-21	2	09/27/07
3.8-102-3	0	01/03/00	4.0-100-22	2	09/27/07
3.8-102-4	0	01/03/00	4.0-100-23	2	09/27/07
3.8-102-5	0	01/03/00	4.0-100-24	2	09/27/07
3.8-102-6	0	01/03/00	4.0-100-25	2	09/27/07
3.8-102-7	0	01/03/00	4.0-100-26	2	09/27/07
3.8-102-8	0	01/03/00	4.0-100-27	2	09/27/07
3.8-102-9	0	01/03/00	4.0-100-28	2	09/27/07
3.9-100-1	3	11/18/05	4.0-100-29	2	09/27/07
3.9-100-2	1	11/18/05	4.0-100-30	2	09/27/07
3.9-100-3	3	11/18/05	4.0-100-31	2	09/27/07
3.9-101-1	1	05/25/00	4.0-100-32	2	09/27/07
3.9-101-2	1	05/25/00	4.0-100-33	2	09/27/07
3.9-102-1	2	05/25/00	4.0-100-34	2	09/27/07
3.9-102-2	2	05/25/00	4.0-100-35	2	09/27/07
3.9-103-1	2	05/25/00	4.0-100-36	2	09/27/07
3.9-103-2	2	05/09/97	4.0-100-37	2	09/27/07
3.9-103-3	1	05/25/00	4.0-100-38	2	09/27/07
3.9-104-1	2	05/25/00	4.0-100-39	2	09/27/07
3.9-104-2	2	05/25/00	4.0-100-40	2	09/27/07
3.9-104-3	2	05/25/00	4.0-100-41	2	09/27/07
3.9-106-1	1	05/25/00	4.0-100-42	2	09/27/07
3.9-106-2	0	04/24/96	4.0-100-43	2	09/27/07
3.9-106-3	1	05/25/00	4.0-100-44	2	09/27/07
3.9-107-1	2	12/21/00			

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
4.0-100-45	2	09/27/07			
4.0-100-46	2	09/27/07			
4.0-100-47	2	09/27/07			
4.0-100-48	2	09/27/07			
4.0-100-49	2	09/27/07			
4.0-100-50	2	09/27/07			
4.0-100-51	2	09/27/07			
4.0-100-52	2	09/27/07			
4.0-100-53	2	09/27/07			
4.0-100-54	2	09/27/07			
4.0-100-55	2	09/27/07			
4.0-100-56	2	09/27/07			
4.0-100-57	2	09/27/07			
4.0-100-58	2	09/27/07			
4.0-100-59	2	09/27/07			
4.0-100-60	2	09/27/07			
4.0-100-61	2	09/27/07			
4.0-100-62	2	09/27/07			
4.0-100-63	2	09/27/07			
5.0-100-1	3	08/29/06			
5.0-100-2	3	08/29/06			
5.0-100-3	1	08/29/06			
5.0-100-4	1	09/24/03			
5.0-101-1	0	04/24/96			
5.0-103-1	5	11/30/07			
5.0-103-2	2	11/30/07			
5.0-103-3	0	04/24/96			
5.0-103-4	5	02/28/01			
5.0-103-5	0	04/24/96			
5.0-103-6	1	11/06/06			
5.0-104-1	1	02/14/97			
5.0-104-2	1	02/14/97			
5.0-105-1	2	03/21/06			
5.0-105-2	2	03/21/06			

(LCS 3.7.116 deleted upon implementation of Amendment 213)

(LCS 3.7.116 deleted upon implementation of Amendment 213)

4.0 DESIGN FEATURES

LCS 4.0.100 Fuel Storage Patterns

NOTE 1:

This Licensee Controlled Specification is listed by revision number and data in Technical Specification 4.3.1. All changes to pages 1 through 61 Rev. 2 dated 09/27/2007 of this LCS (i.e., excluding the Bases pages) must be approved by the NRC via the amendment application process in conjunction with an associated change to Technical Specification 4.3.1.

NOTE 2:

Prior to using the storage criteria in 4.0.100.1, 4.0.100.2, and 4.0.100.4 below, the following uncertainties shall be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 fuel assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

VALIDITY STATEMENT: Rev. 2 effective upon NRC approval, to be implemented within 180 days.

4.0.100 New or burned fuel (which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery) may be stored in Region I or Region II in accordance with the allowable Storage Patterns described in this LCS.

4.0.100.1 Region I = Region I Storage Patterns are given in Tables I-1 through I-8 and Figures I-1 through I-9.

4.0.100.2 Region II = Region II Storage Patterns are given in Tables II-1 through II-15 and Figures II-1 through II-22.

4.0.100.3 SONGS Unit 1 Fuel shall not be stored in Region I Racks.

4.0.100.4 The burnup of each SONGS Unit 1 uranium dioxide spent fuel assembly stored in Region II shall meet the following criteria:

(continued)

4.0.100.4.1 SONGS Unit 1 nominal 3.40 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 25,000 MWD/T, and
the cooling time is greater than 5 years.

4.0.100.4.2 SONGS Unit 1 nominal 4.00 w/0 assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 26,300 MWD/T, and
the cooling time is greater than 20 years.

the burnup is greater than 27,100 MWD/T, and
the cooling time is greater than 15 years.

the burnup is greater than 28,200 MWD/T, and
the cooling time is greater than 10 years.

4.0.100.4.3 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (SFP periphery) if:

the burnup is greater than 20,000 MWD/T, and
the cooling time is greater than 0 years.

4.0.100.5 Design Requirements For Guide Tube Inserts

(i) GT-Inserts shall be 0.75 inches O.D. minimum, completely cover the active fuel region (150 inches), and have a minimum boron content of 0.02434 grams of B-10 per cm^3.

(ii) Three (3) or 5 GT-Inserts are allowed. The orientation of every fuel assembly with 3 guide tube inserts shall be the same (Figure II-23).

(iii) A 5-finger, full length Control Element Assembly (CEA) may be used in place of borated stainless steel or aluminum guide tube inserts.

4.0.100.6 Design requirements For Erbia

Assemblies containing 40 or 80 erbia rods shall have the erbia rods distributed per Figures II-24 and II-25. The minimum initial nominal erbia loading shall be 2.0 w/o Er203.

4.0.100.7 The Failed Fuel Rod Storage Basket (FFRSB)

The Failed Fuel Rod Storage Basket (FFRSB) shall be treated as if it were an assembly with enrichment and burnup of the rod in the basket with the most limiting combination of enrichment and burnup.

(continued)

4.0.100.8 Non-Fuel Components

Neutron sources and non-fuel bearing assembly components (thimble plugs, CEAs, etc) may be stored in fuel assemblies without affecting the storage requirements of these assemblies. A storage basket containing no fissile material can be stored in any storage location, and can be used as a storage cell blocker for reactivity control.

4.0.100.9 Fuel Assembly Reconstitution Station

A fuel assembly reconstitution station is a special case of a checkerboard pattern. A reconstitution station is permitted anywhere in the Region I racks. The empty cells in the checkerboard pattern do not need to be blocked. A reconstitution station is permitted anywhere in the Region II racks provided that empty cells in the checkerboard pattern are blocked to make it impossible to misload a fuel assembly during reconstitution activities.

(continued)

Table I-1

REGION I

Category I-1 Fuel
(Unrestricted Storage)

Initial Enrichment (w/o	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	22.84	21.47	20.59	20.04	19.67
4.50	18.61	17.57	16.89	16.45	16.17
4.00	14.30	13.58	13.09	12.78	12.57
3.50	9.84	9.40	9.11	8.92	8.79
3.00	5.24	5.02	4.91	4.84	4.79
2.47	0.00	0.00	0.00	0.00	0.00

Category I-1	Category I-1
Category I-1	Category I-1

Note: Category I-1 and fresh fuel with full-length 5-finger CEAs (Table I-5) may be stored together with no restrictions.

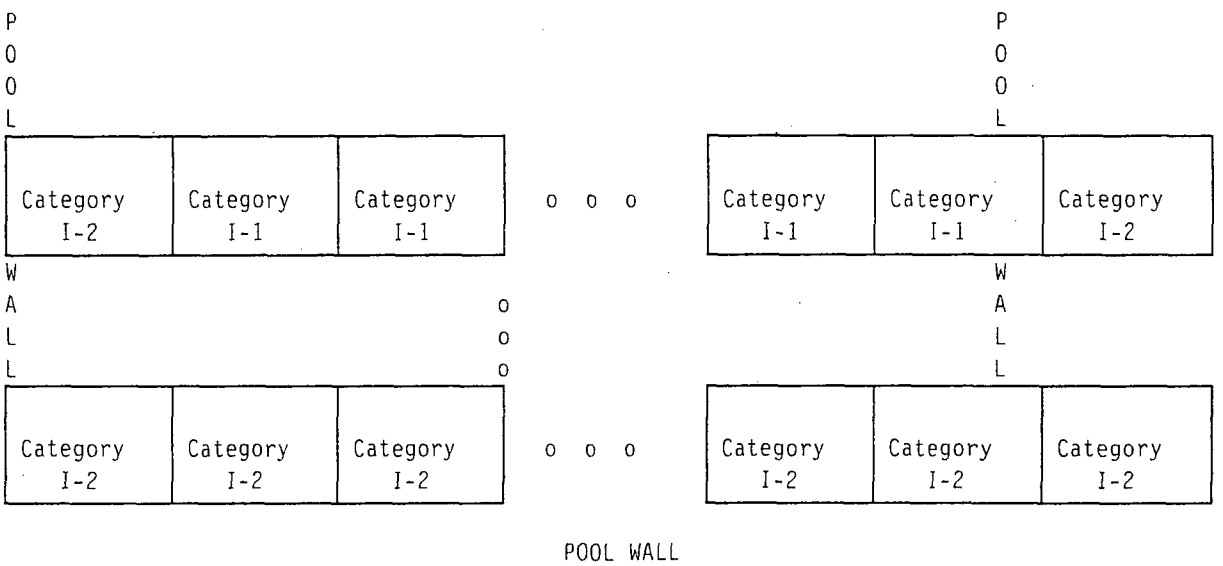
(continued)

Table I-2

REGION I

Category I-2 Fuel
(SFP Peripheral Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	12.55	12.15	11.82	11.61	11.47
4.50	9.09	8.85	8.63	8.49	8.40
4.00	5.58	5.43	5.33	5.25	5.21
3.50	2.22	2.13	2.09	2.05	2.03
3.20	0.00	0.00	0.00	0.00	0.00



(continued)

Table I-3

REGION I

Category I-3 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/T) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	39.99	36.28	34.27	33.04	32.22
4.50	34.95	31.71	29.94	28.84	28.12
4.00	29.71	26.99	25.46	24.51	23.89
3.50	24.22	22.03	20.79	20.02	19.52
3.00	18.37	16.84	15.91	15.34	14.97
2.50	12.21	11.30	10.72	10.37	10.13
2.00	5.28	5.05	4.85	4.72	4.62
1.71	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Category I-3
Category I-3	Category I-3

(continued)

Table I-4

REGION I

4.80 w/o Fresh Fuel
Checkerboard Pattern

Initial Enrichment (w/o)	Minimum Burnup (GWD/T)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Empty
Empty	4.80 Fresh

(continued)

Table I-5

REGION I

4.8 w/o Fresh Fuel With Full-Length, 5-Finger CEA
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh With CEA	4.80 Fresh With CEA
4.80 Fresh With CEA	4.80 Fresh With CEA

Note: Category I-1 and fresh fuel with full-length 5-finger CEAs (Table I-5) may be stored together with no restrictions.

(continued)

Table I-6

REGION I

Category I-4 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	26.57	24.71	23.59	22.90	22.44
4.50	22.12	20.62	19.73	19.17	18.80
4.00	17.54	16.46	15.78	15.35	15.07
3.50	12.84	12.12	11.66	11.37	11.18
3.00	7.95	7.56	7.31	7.15	7.05
2.50	2.76	2.64	2.56	2.50	2.46
2.27	0.00	0.00	0.00	0.00	0.00

4.80 Fresh 80 Erbia	Category I-4
Category I-4	Category I-4

(continued)

Table I-7

REGION I

Category I-5 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	30.81	28.40	27.00	26.14	25.57
4.50	26.17	24.17	22.99	22.26	21.78
4.00	21.32	19.77	18.84	18.27	17.88
3.50	16.32	15.22	14.55	14.13	13.85
3.00	11.11	10.45	10.05	9.79	9.61
2.50	5.55	5.30	5.14	5.04	4.98
2.07	0.00	0.00	0.00	0.00	0.00

4.80 Fresh 40 Erbia	Category I-5
Category I-5	Category I-5

(continued)

Table I-8

REGION I

Checkerboard Pattern

Category I-6 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.82	18.84	18.12	17.67	17.37
4.50	15.83	15.11	14.58	14.24	14.01
4.00	11.75	11.28	10.92	10.69	10.54
3.50	7.56	7.23	7.04	6.91	6.83
3.00	3.28	3.15	3.07	3.03	2.99
2.65	0.00	0.00	0.00	0.00	0.00

Category I-4 Fuel
(Checkerboard Partner For Category I-6 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	26.57	24.71	23.59	22.90	22.44
4.50	22.12	20.62	19.73	19.17	18.80
4.00	17.54	16.46	15.78	15.35	15.07
3.50	12.84	12.12	11.66	11.37	11.18
3.00	7.95	7.56	7.31	7.15	7.05
2.50	2.76	2.64	2.56	2.50	2.46
2.27	0.00	0.00	0.00	0.00	0.00

Category I-4	Category I-6
Category I-6	Category I-4

Table II-1

(continued)

REGION II

Category II-1 Fuel
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	53.76	47.77	44.75	43.00	41.86
4.50	48.43	42.93	40.15	38.52	37.47
4.00	42.91	37.94	35.40	33.92	32.96
3.00	30.99	27.26	25.30	24.16	23.43
2.00	17.05	14.97	13.90	13.25	12.83
1.87	14.93	13.23	12.26	11.68	11.31
1.23	0.00	0.00	0.00	0.00	0.00

Category II-1	Category II-1
Category II-1	Category II-1

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

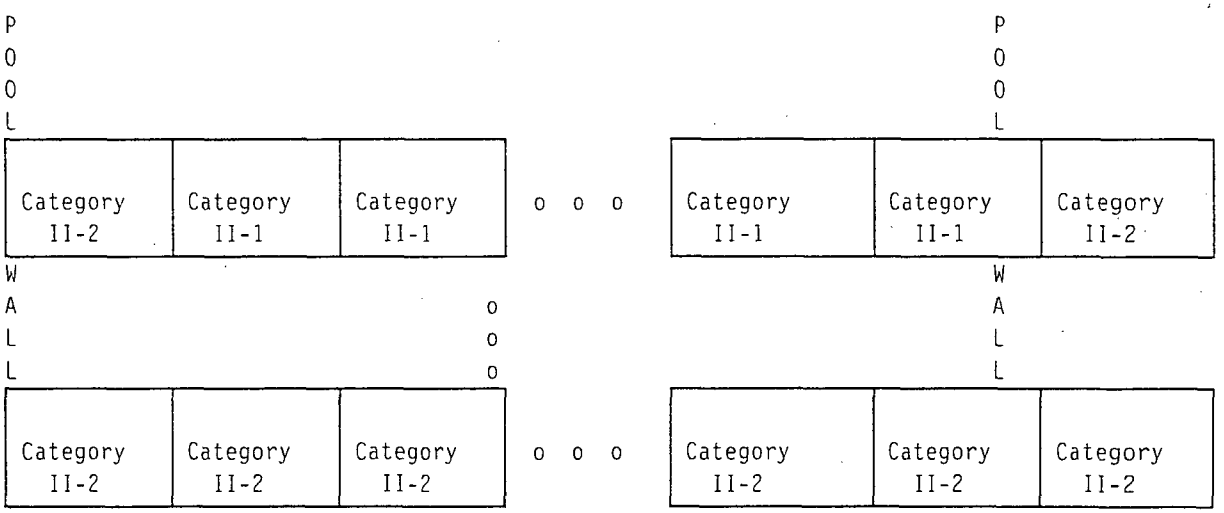
(continued)

Table II-2

REGION II

Category II-2 Fuel
(SFP Peripheral Storage)

Initial Enrichment (w/o)	Minimum Burnup GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	36.95	33.68	31.89	30.81	30.10
4.50	32.29	29.44	27.87	26.91	26.28
4.00	27.44	25.04	23.70	22.88	22.35
3.00	16.95	15.62	14.83	14.34	14.03
2.00	4.93	4.67	4.52	4.42	4.35
1.87	3.04	2.87	2.76	2.69	2.64
1.70	0.00	0.00	0.00	0.00	0.00



(continued)

Table II-3

REGION II

Checkerboard Storage

Category II-3 Fuel
(Checkerboard Partner For Category II-4 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	41.18	37.27	35.18	33.93	33.12
4.50	36.34	32.87	31.01	29.88	29.15
4.00	31.29	28.31	26.69	25.70	25.06
3.00	20.32	18.50	17.47	16.84	16.42
2.00	7.81	7.25	6.91	6.71	6.58
1.87	5.90	5.53	5.30	5.17	5.09
1.56	0.00	0.00	0.00	0.00	0.00

Category II-4 Fuel
(Checkerboard Partner For Category II-3 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	75.42	61.90	56.85	54.18	52.60
4.50	68.08	56.12	51.65	49.25	47.76
4.00	60.74	50.35	46.44	44.19	42.78
3.00	46.06	38.80	35.41	33.52	32.31
2.00	31.38	25.71	23.12	21.65	20.71
1.87	29.19	23.83	21.34	19.91	19.08
0.94	0.00	0.00	0.00	0.00	0.00

Category II-4	Category II-3
Category II-3	Category II-4

Table II-4

(continued)

REGION II

Checkerboard Storage

Category II-5 Fuel
(Checkerboard Partner For Category II-6 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.50	42.58	40.03	38.53	37.55
4.50	42.40	37.95	35.64	34.26	33.37
4.00	37.10	33.16	31.10	29.86	29.06
3.00	25.64	22.89	21.40	20.52	19.95
2.00	12.29	11.10	10.42	10.01	9.75
1.87	10.24	9.35	8.80	8.46	8.25
1.38	0.00	0.00	0.00	0.00	0.00

Category II-6 Fuel
(Checkerboard Partner For Category II-5 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	62.37	53.95	50.33	48.25	46.91
4.50	56.21	48.90	45.51	43.56	42.31
4.00	50.04	43.67	40.54	38.73	37.57
3.00	37.71	32.56	29.97	28.52	27.58
2.00	23.30	19.80	18.13	17.14	16.50
1.87	21.11	18.02	16.42	15.48	14.88
1.08	0.00	0.00	0.00	0.00	0.00

Category II-6	Category II-5
Category II-5	Category II-6

(continued)

Table II-5

REGION II

Checkerboard Storage

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Empty (Blocked)
Empty (Blocked)	4.80 Fresh

(continued)

Table II-6

REGION II

Category II-7 Fuel
(3 Out Of 4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	34.20	31.35	29.74	28.76	28.12
4.50	29.67	27.21	25.82	24.97	24.41
4.00	24.94	22.92	21.75	21.05	20.59
3.00	14.79	13.76	13.13	12.73	12.47
2.00	3.16	3.00	2.90	2.83	2.79
1.87	1.21	1.14	1.09	1.06	1.04
1.80	0.00	0.00	0.00	0.00	0.00

Category II-7	Empty (Blocked)
Category II-7	Category II-7

(continued)

4.0 DESIGN FEATURES (continued)

Table II-7

REGION II

Category II-8 Fuel
(Fuel With 5 GT-Inserts)
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	37.68	34.53	32.72	31.61	30.88
4.50	32.61	29.90	28.33	27.36	26.72
4.00	27.33	25.10	23.78	22.97	22.43
3.00	15.86	14.76	14.06	13.61	13.32
2.00	2.04	1.97	1.89	1.84	1.81
1.90	0.00	0.00	0.00	0.00	0.00

Category II-8	Category II-8
Category II-8	Category II-8

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

(continued)

Table II-8

REGION II

Category II-9 Fuel
(Fuel With 3 GT-Inserts)
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	44.16	39.95	37.68	36.31	35.42
4.50	38.99	35.25	33.22	31.99	31.18
4.00	33.61	30.38	28.60	27.52	26.81
3.00	21.92	19.86	18.72	18.01	17.56
2.00	8.28	7.72	7.34	7.11	6.96
1.87	6.18	5.83	5.58	5.43	5.34
1.59	0.00	0.00	0.00	0.00	0.00

Category II-9	Category II-9
Category II-9	Category II-9

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

(continued)

Table II-9

REGION II

Category II-10 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial	Minimum Burnup (GWD/MTU)				
(w/o)	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	80.09	65.66	60.12	57.45	55.68
4.50	72.13	59.43	54.55	52.02	50.33
4.00	64.18	53.19	48.98	46.58	44.98
3.00	48.27	40.72	37.16	35.03	33.75
2.00	32.35	26.59	23.79	22.25	21.25
1.03	0.00	0.00	0.00	0.00	0.00

Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)
Category II-10 (GT-Inserts)	4.80 Fresh	Category II-10 (GT-Inserts)
Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)

(continued)

Table II-10

REGION II

Category II-11 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.04	42.52	40.05	38.57	37.60
4.50	41.62	37.58	35.36	34.02	33.14
4.00	35.97	32.46	30.50	29.32	28.54
3.00	23.70	21.42	20.09	19.31	18.79
2.00	9.17	8.54	8.09	7.81	7.62
1.59	0.00	0.00	0.00	0.00	0.00

Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)
Category II-11 (GT-Inserts)	4.80 Fresh 5 Inserts	Category II-11 (GT-Inserts)
Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)

(continued)

Table II-11

REGION II

Category II-12 Fuel
(Filler Assembly With 3 GT-Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	54.33	48.48	45.46	43.67	42.51
4.50	48.81	43.45	40.67	39.02	37.95
4.00	43.07	38.24	35.72	34.22	33.26
3.00	30.65	27.11	25.18	24.05	23.33
2.00	16.01	14.23	13.22	12.62	12.22
1.87	13.82	12.35	11.47	10.94	10.60
1.32	0.00	0.00	0.00	0.00	0.00

Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)
Category II-12 (GT-Inserts)	4.80 Fresh 5 Inserts	Category II-12 (GT-Inserts)
Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)

(continued)

Table II-12

REGION II

Category II-13 Fuel
(Filler Assembly With No GT-Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	64.24	55.51	51.59	49.41	48.03
4.50	57.99	50.23	46.73	44.67	43.38
4.00	51.75	44.94	41.71	39.79	38.59
3.00	39.25	33.75	31.05	29.48	28.50
2.00	24.76	20.95	19.07	18.01	17.33
1.87	22.64	19.10	17.38	16.37	15.72
1.05	0.00	0.00	0.00	0.00	0.00

Category II-13	Category II-13	Category II-13
Category II-13	4.80 Fresh 5 Inserts	Category II-13
Category II-13	Category II-13	Category II-13

(continued)

Table II-13

REGION II

Category II-14 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.59	18.61	17.96	17.54	17.27
4.50	15.93	15.17	14.68	14.36	14.15
4.00	12.18	11.64	11.29	11.07	10.93
3.00	4.28	4.12	4.05	4.00	3.98
2.51	0.00	0.00	0.00	0.00	0.00

Category II-13 Fuel
(Filler Assembly For Category II-14 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	64.24	55.51	51.59	49.41	48.03
4.50	57.99	50.23	46.73	44.67	43.38
4.00	51.75	44.94	41.71	39.79	38.59
3.00	39.25	33.75	31.05	29.48	28.50
2.00	24.76	20.95	19.07	18.01	17.33
1.87	22.64	19.10	17.38	16.37	15.72
1.05	0.00	0.00	0.00	0.00	0.00

Category II-13	Category II-13	Category II-13
Category II-13	Category II-14	Category II-13
Category II-13	Category II-13	Category II-13

(continued)

Table II-14

REGION II

Category II-14 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.59	18.61	17.96	17.54	17.27
4.50	15.93	15.17	14.68	14.36	14.15
4.00	12.18	11.64	11.29	11.07	10.93
3.00	4.28	4.12	4.05	4.00	3.98
2.51	0.00	0.00	0.00	0.00	0.00

Category II-11 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.04	42.52	40.05	38.57	37.60
4.50	41.62	37.58	35.36	34.02	33.14
4.00	35.97	32.46	30.50	29.32	28.54
3.00	23.70	21.42	20.09	19.31	18.79
2.00	9.17	8.54	8.09	7.81	7.62
1.59	0.00	0.00	0.00	0.00	0.00

Category II-11 (5 Inserts)	Category II-11 (5 Inserts)	Category II-11 (5 Inserts)
Category II-11 (5 Inserts)	Category II-14	Category II-11 (5 Inserts)
Category II-11 (5 Inserts)	Category II-11 (5 Inserts)	Category II-11 (5 Inserts)

(continued)

Table II-15

REGION II

Category II-15 Fuel
(Fuel With 5 Finger Full Length CEA)
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	29.24	27.24	26.00	25.22	24.70
4.50	24.44	22.84	21.81	21.17	20.75
4.00	19.41	18.26	17.49	17.00	16.68
3.00	8.83	8.47	8.19	8.02	7.90
2.30	0.00	0.00	0.00	0.00	0.00

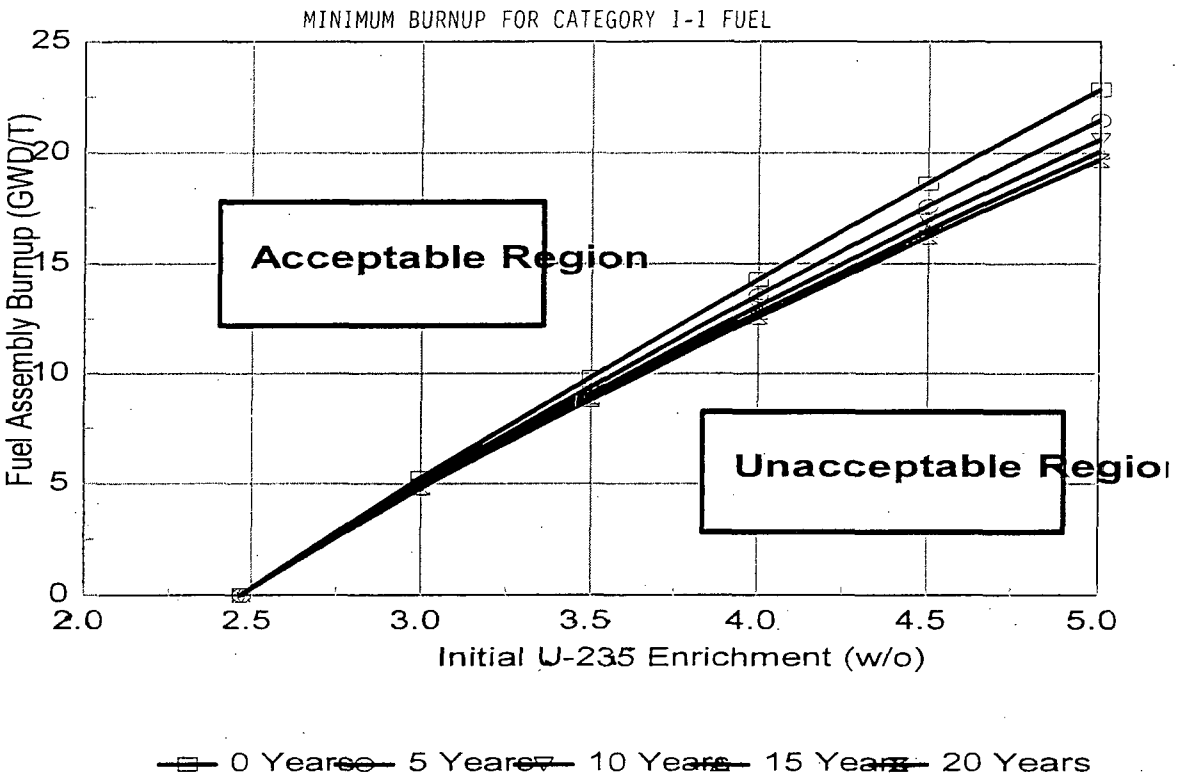
Category II-15	Category II-15
Category II-15	Category II-15

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

(continued)

Figure I-1

REGION I

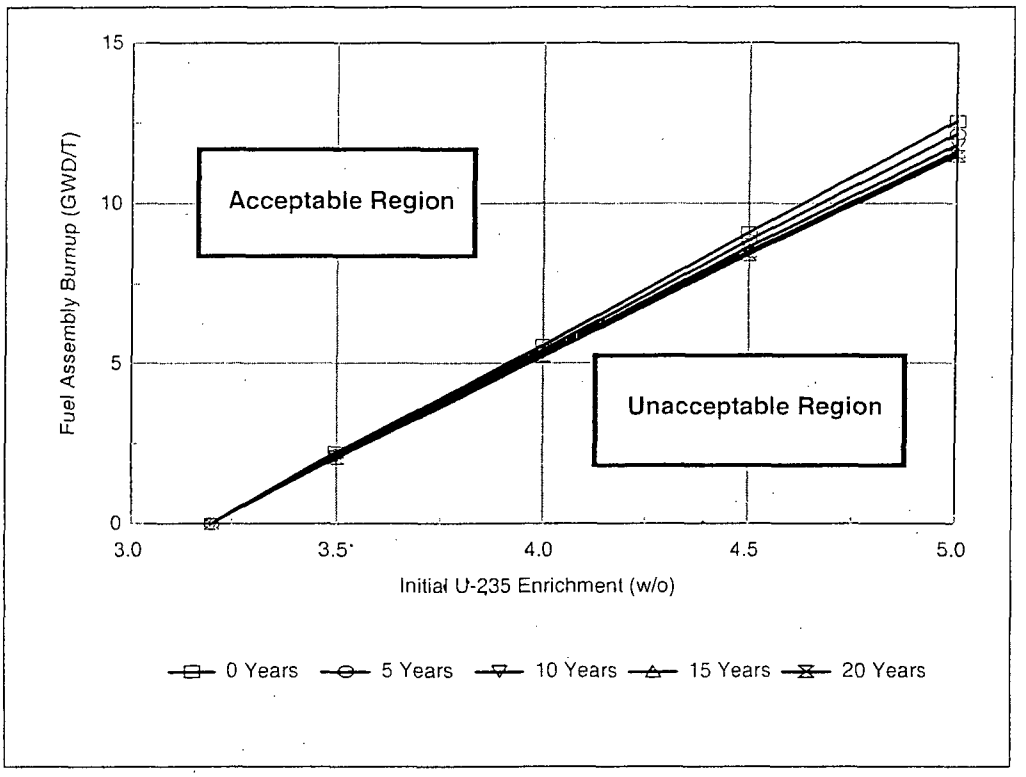


(continued)

Figure I-2

REGION I

MINIMUM BURNUP FOR CATEGORY I-2 FUEL



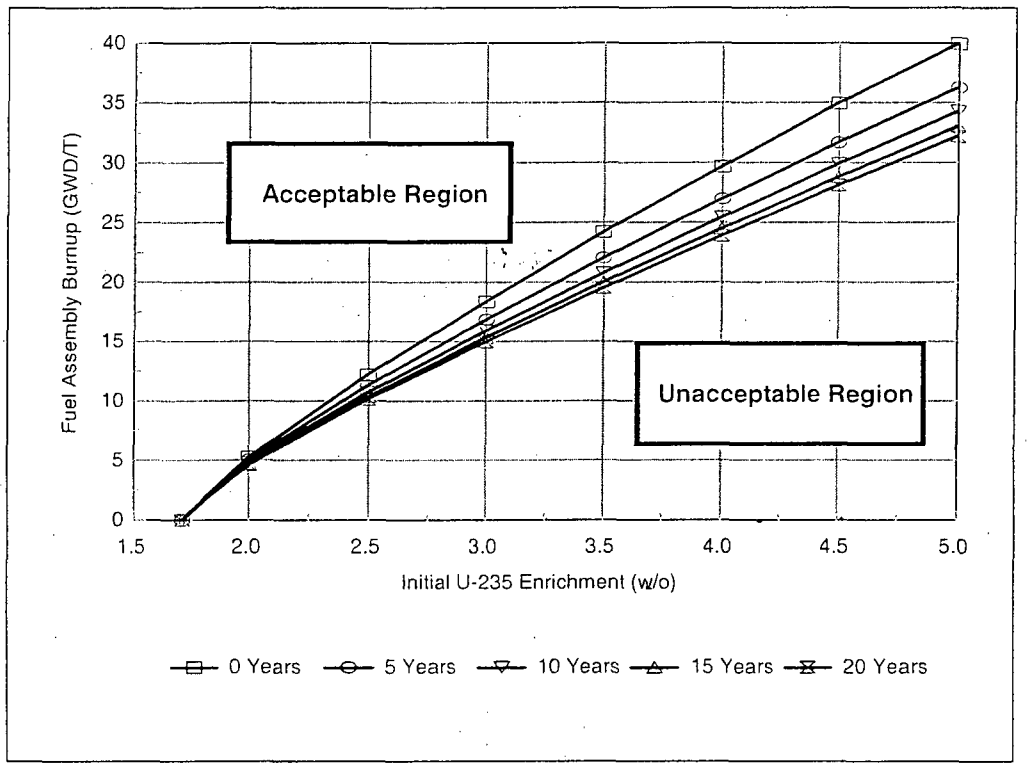
(continued)

4.0 DESIGN FEATURES (continued)

Figure I-3

REGION I

MINIMUM BURNUP FOR CATEGORY I-3 FUEL



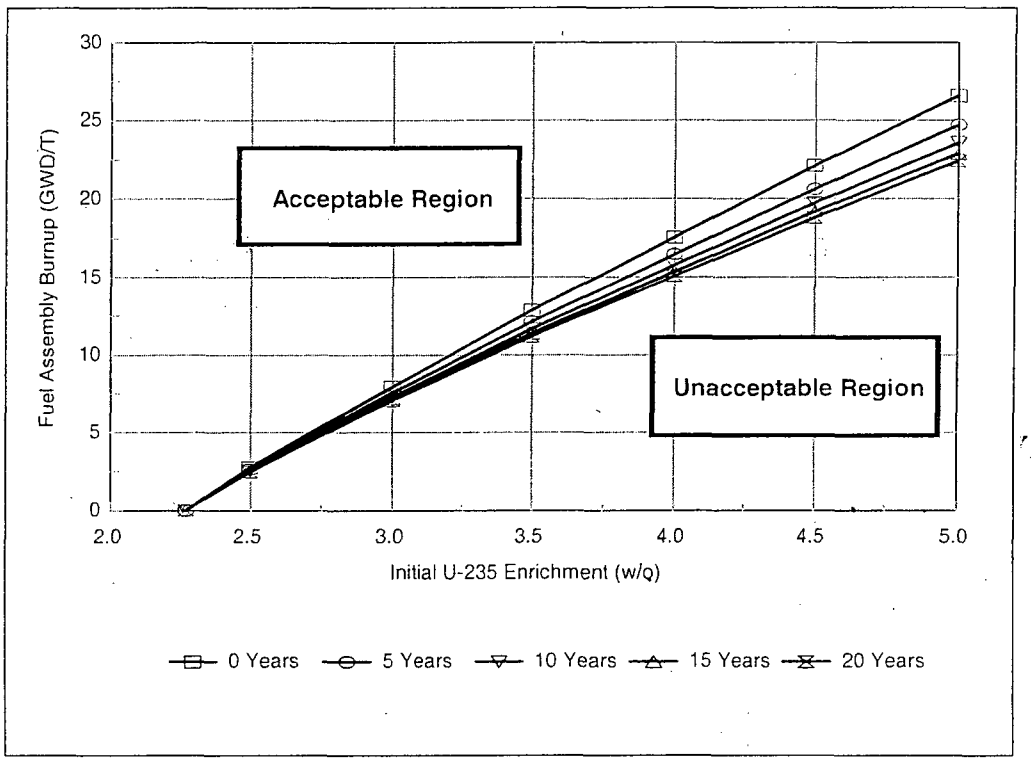
(continued)

4.0 DESIGN FEATURES (continued)

Figure I-4

REGION I

MINIMUM BURNUP FOR CATEGORY I-4 FUEL

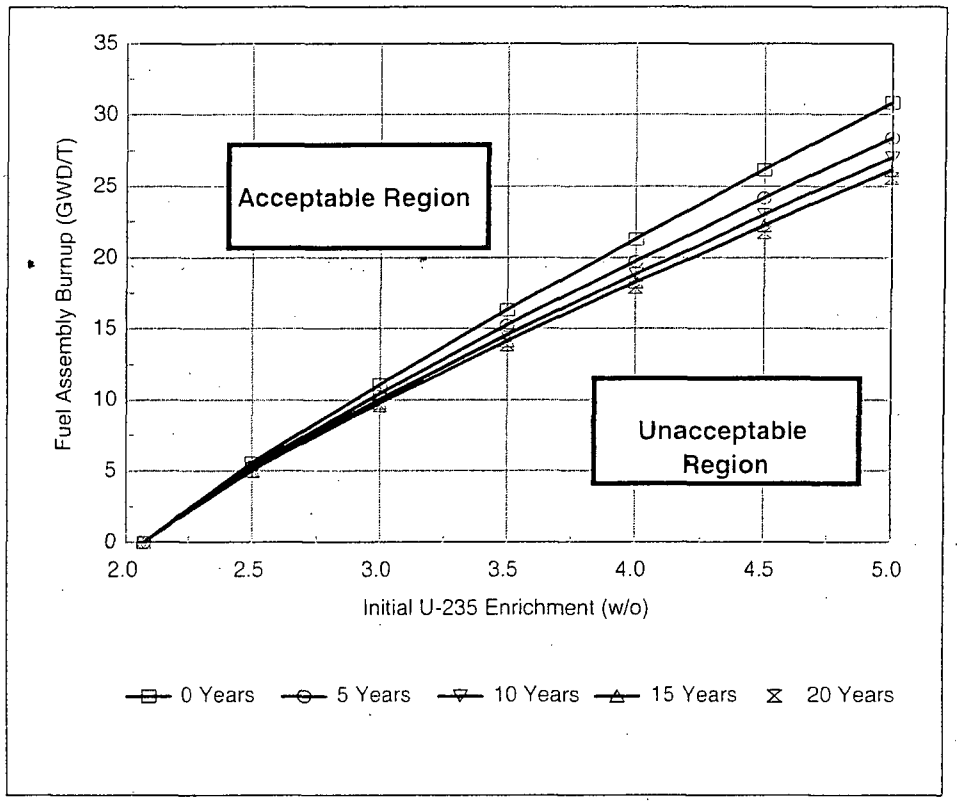


(continued)

Figure I-5

REGION I

MINIMUM BURNUP FOR CATEGORY I-5 FUEL



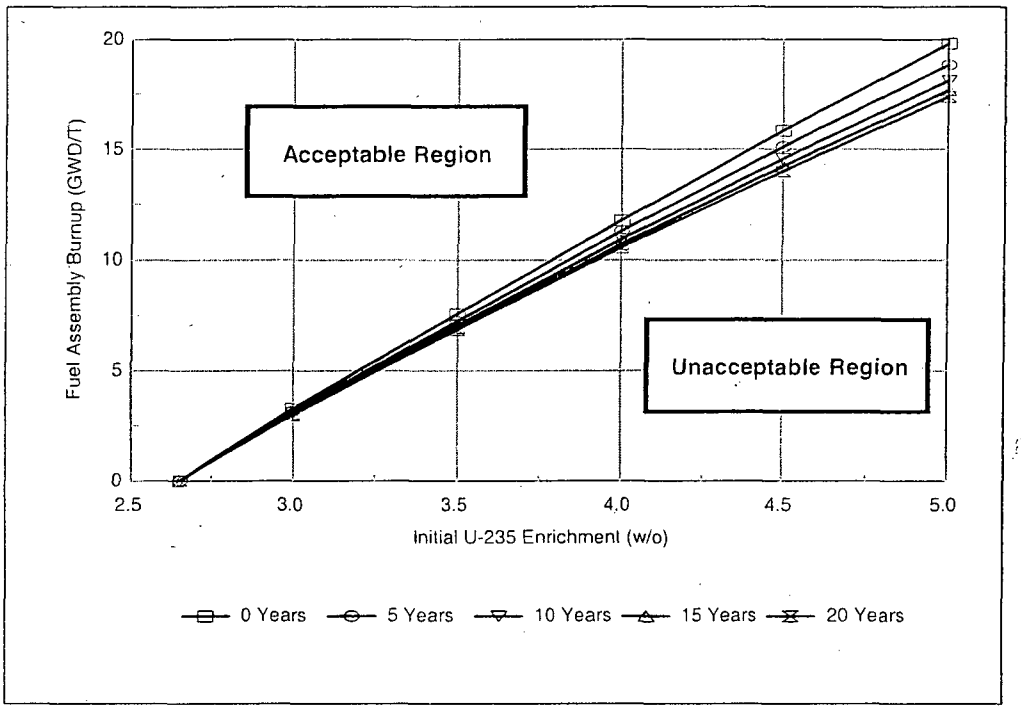
(continued)

4.0 DESIGN FEATURES (continued)

Figure I-6

REGION I

MINIMUM BURNUP FOR CATEGORY I-6 FUEL



(continued)

4.0 DESIGN FEATURES (continued)

Figure 1-7

REGION I

Boundary Between Unrestricted Storage And Checkerboard Storage

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	Empty	I-1	I-1	I-1	I-1
Empty	4.80	Empty	I-1	I-1	I-1
4.80	Empty	I-1	I-1	I-1	I-1

Interface

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-4	I-1	I-1	I-1	I-1
I-4	I-6	I-4	I-1	I-1	I-1
I-6	I-4	I-1	I-1	I-1	I-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.
(2) It is acceptable to replace an assembly with an empty cell.

(continued)

4.0 DESIGN FEATURES (continued)

Figure I-8

REGION I

Boundary Between Unrestricted Storage And 1 Out Of 4 Storage

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-3	I-3	I-3	I-1	I-1	I-1
I-3	4.80	I-3	I-1	I-1	I-1
I-3	I-3	I-3	I-1	I-1	I-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

(continued)

Figure I-9

REGION I

Boundary Between Checkerboard Storage And 1 Out Of 4 Storage

4.80	Empty	4.80	Empty	4.80	Empty
Empty	4.80	Empty	4.80	Empty	4.80
4.80	Empty	4.80	Empty	4.80	Empty
Empty	I-3	Empty	4.80	Empty	4.80
I-3	4.80	I-3	Empty	4.80	Empty
I-3	I-3	Empty	4.80	Empty	4.80

Interface

I-6	I-4	I-6	I-4	I-6	I-4
I-4	I-6	I-4	I-6	I-4	I-6
I-6	I-4	I-6	I-4	I-6	I-4
I-3	I-3	I-3	I-6	I-4	I-6
I-3	4.80	I-3	I-4	I-6	I-4
I-3	I-3	I-3	I-6	I-4	I-6

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

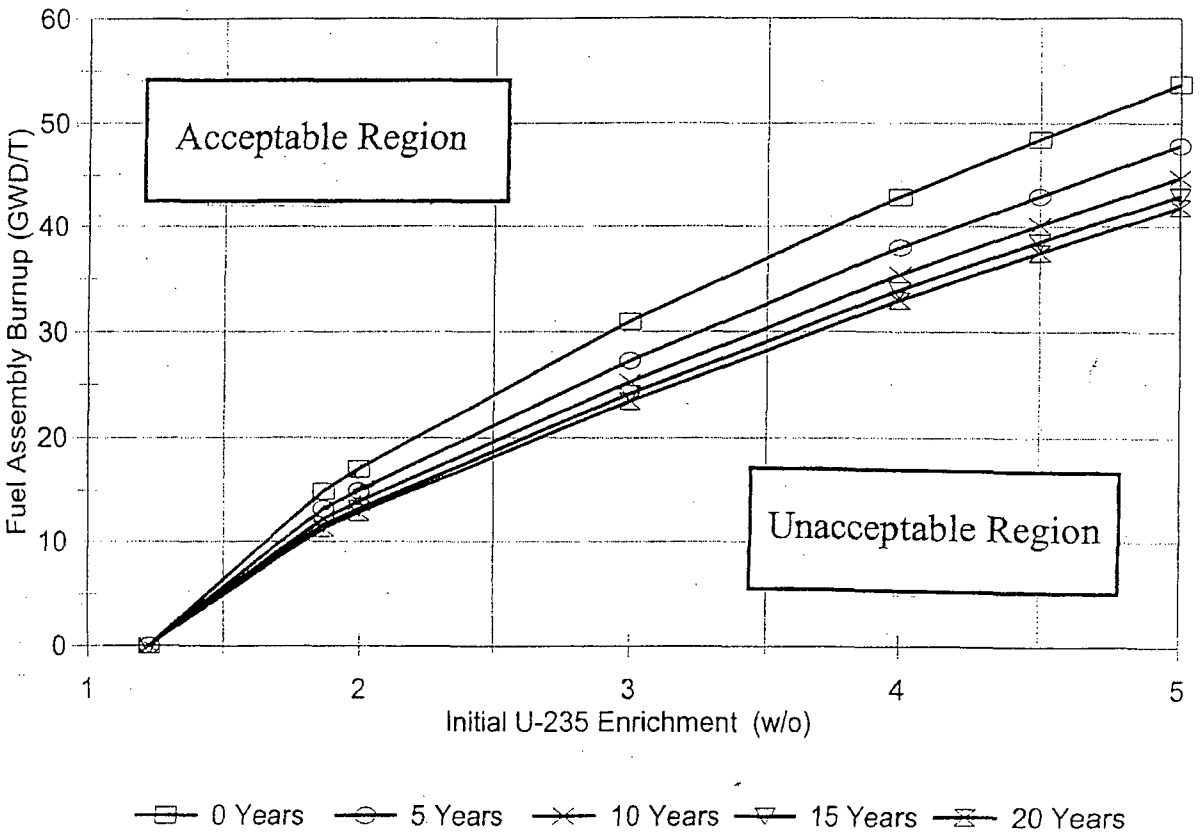
(2) It is acceptable to replace an assembly with an empty cell.

(continued)

Figure II-1

REGION II

MINIMUM BURNUP FOR CATEGORY II-1 FUEL

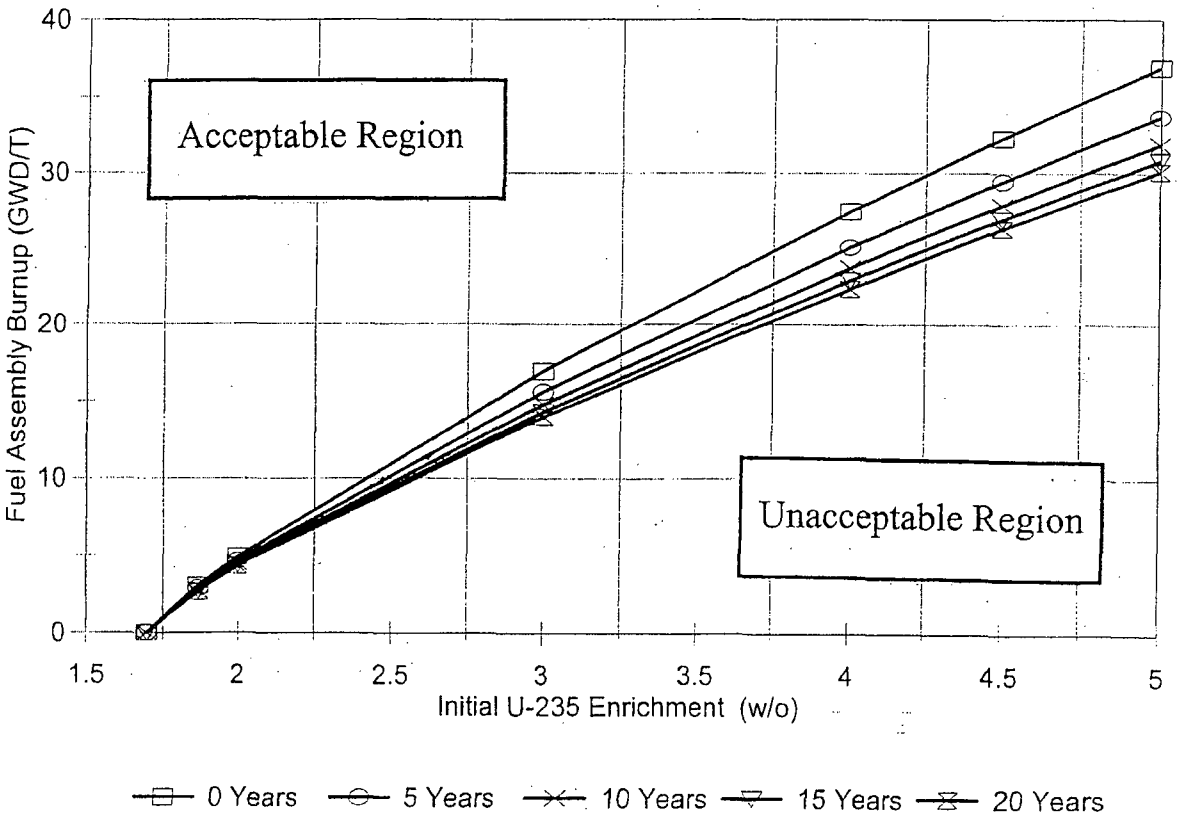


(continued)

Figure II-2

REGION II

MINIMUM BURNUP FOR CATEGORY II-2 FUEL

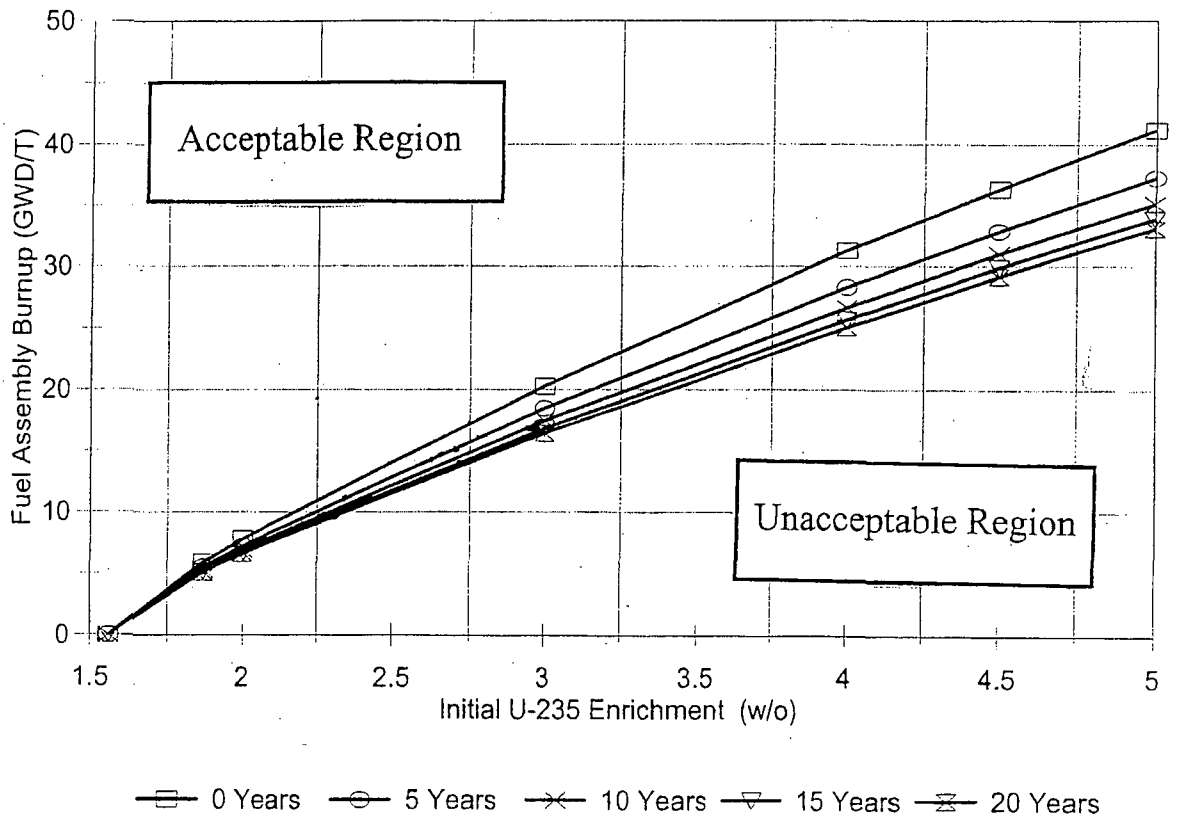


(continued)

Figure II-3

REGION II

MINIMUM BURNUP FOR CATEGORY II-3 FUEL



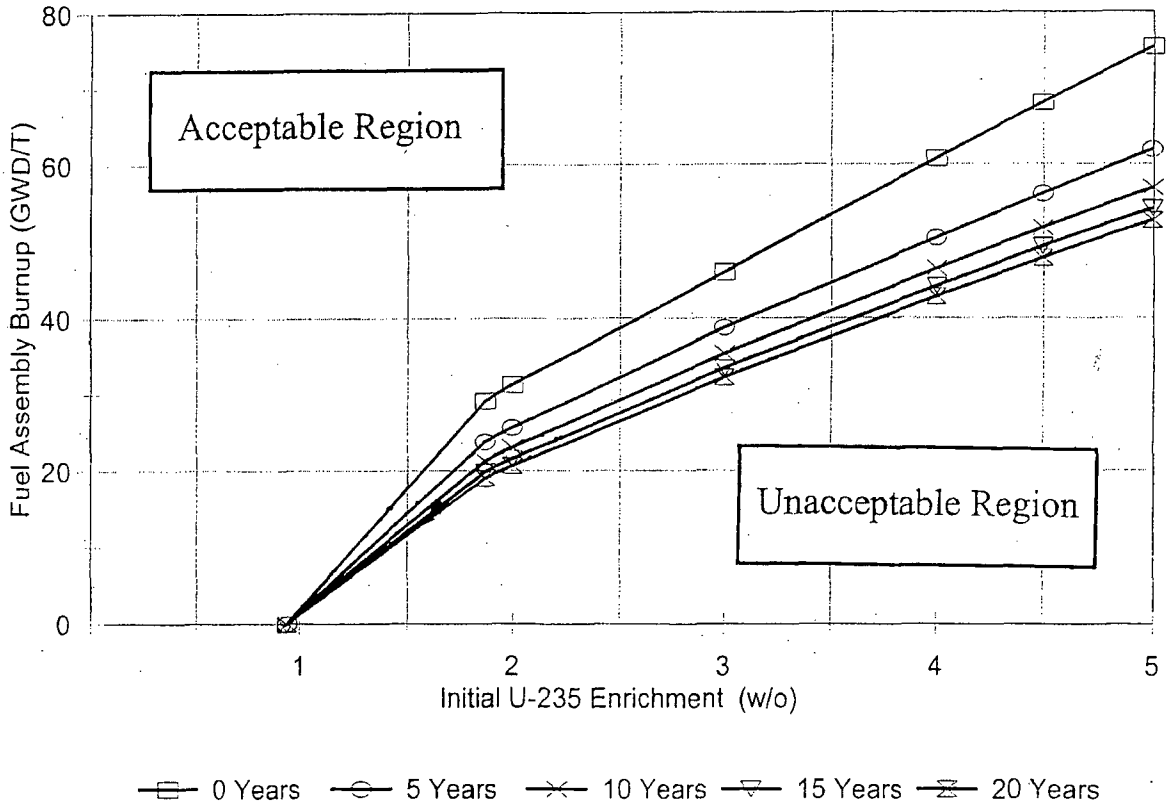
(continued)

4.0 DESIGN FEATURES (continued)

Figure II-4

REGION II

MINIMUM BURNUP FOR CATEGORY II-4 FUEL

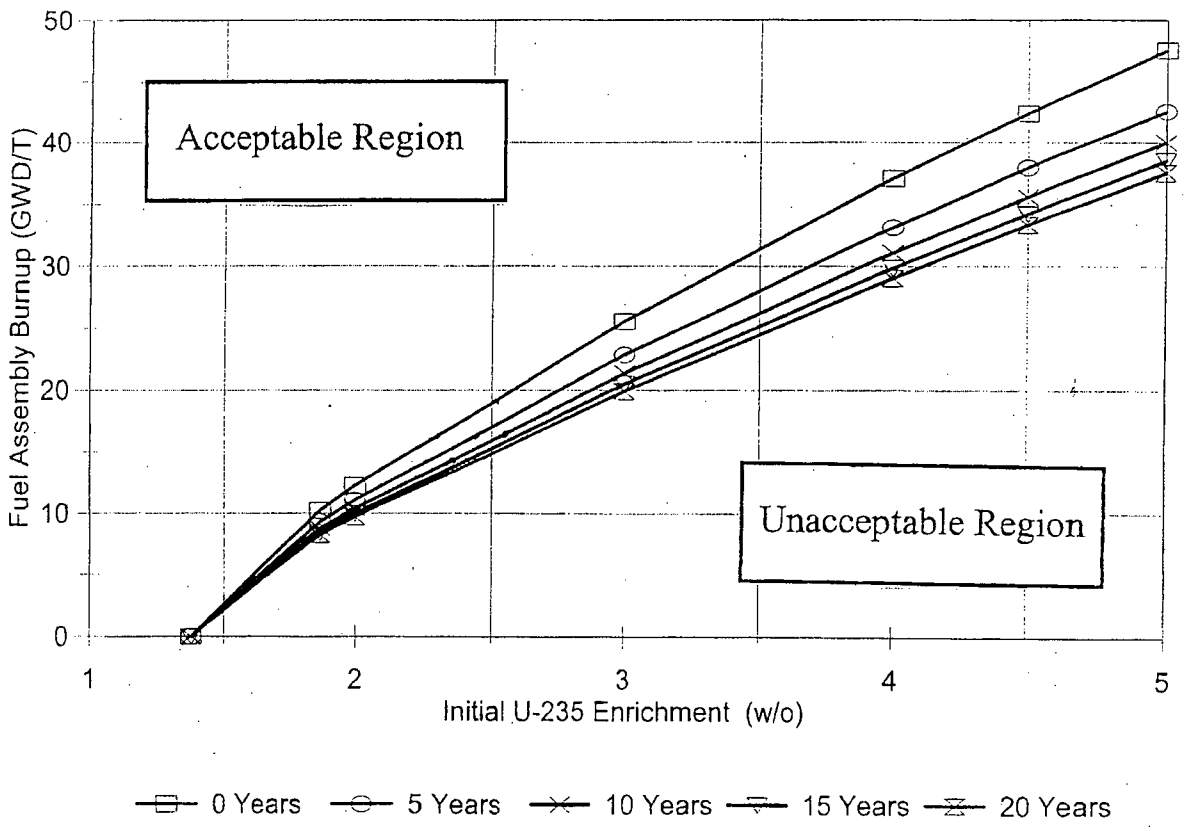


(continued)

Figure II-5

REGION II

MINIMUM BURNUP FOR CATEGORY II-5 FUEL

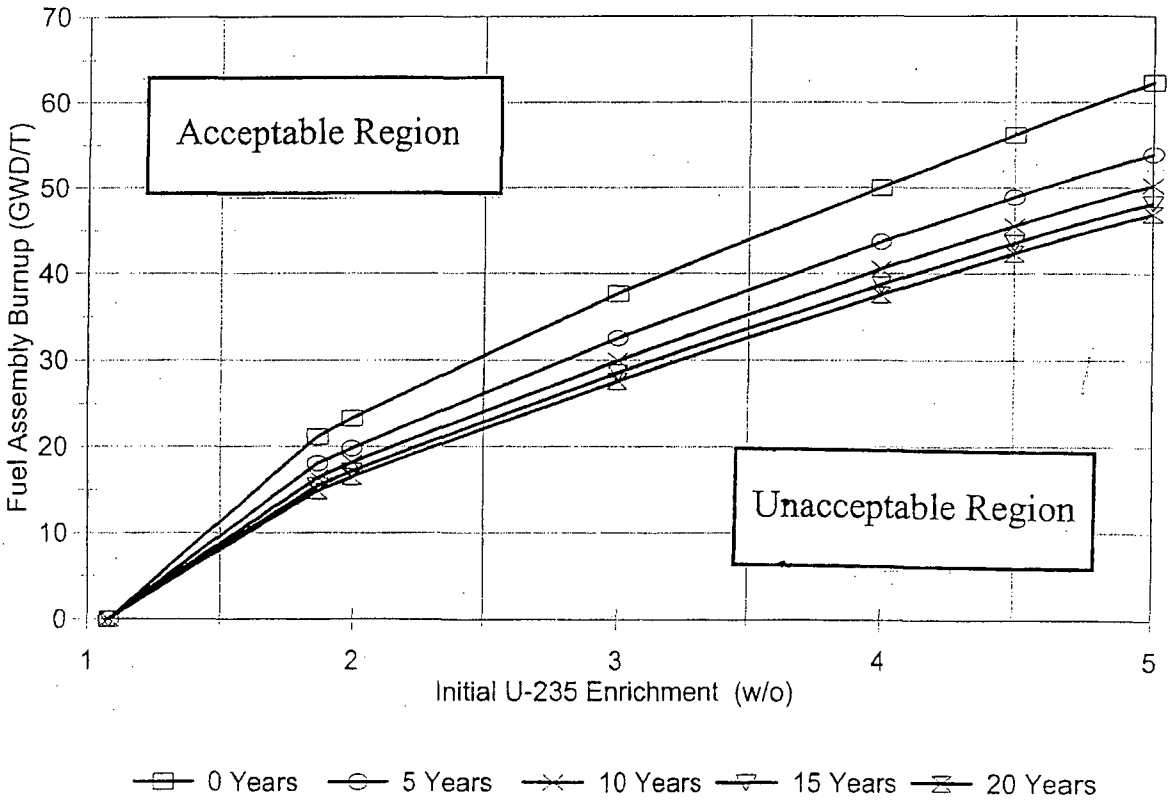


(continued)

Figure II-6

REGION II

MINIMUM BURNUP FOR CATEGORY II-6 FUEL

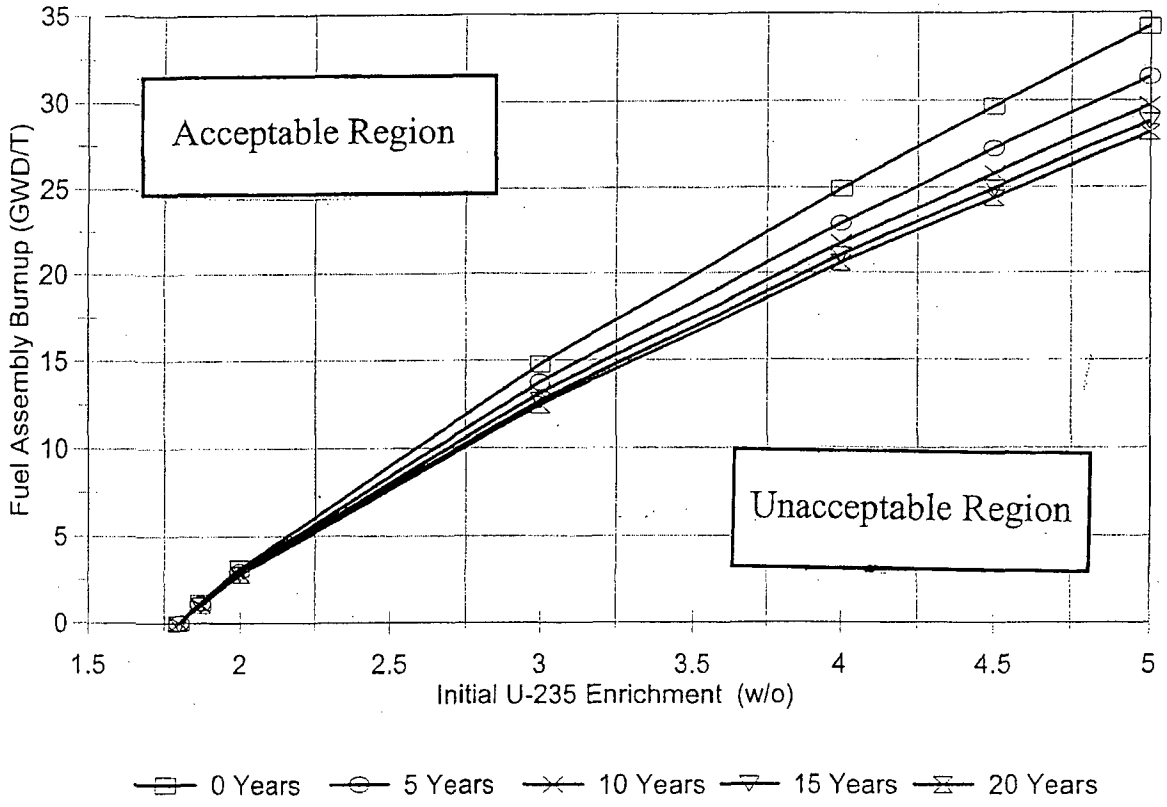


(continued)

Figure II-7

REGION II

MINIMUM BURNUP FOR CATEGORY II-7 FUEL



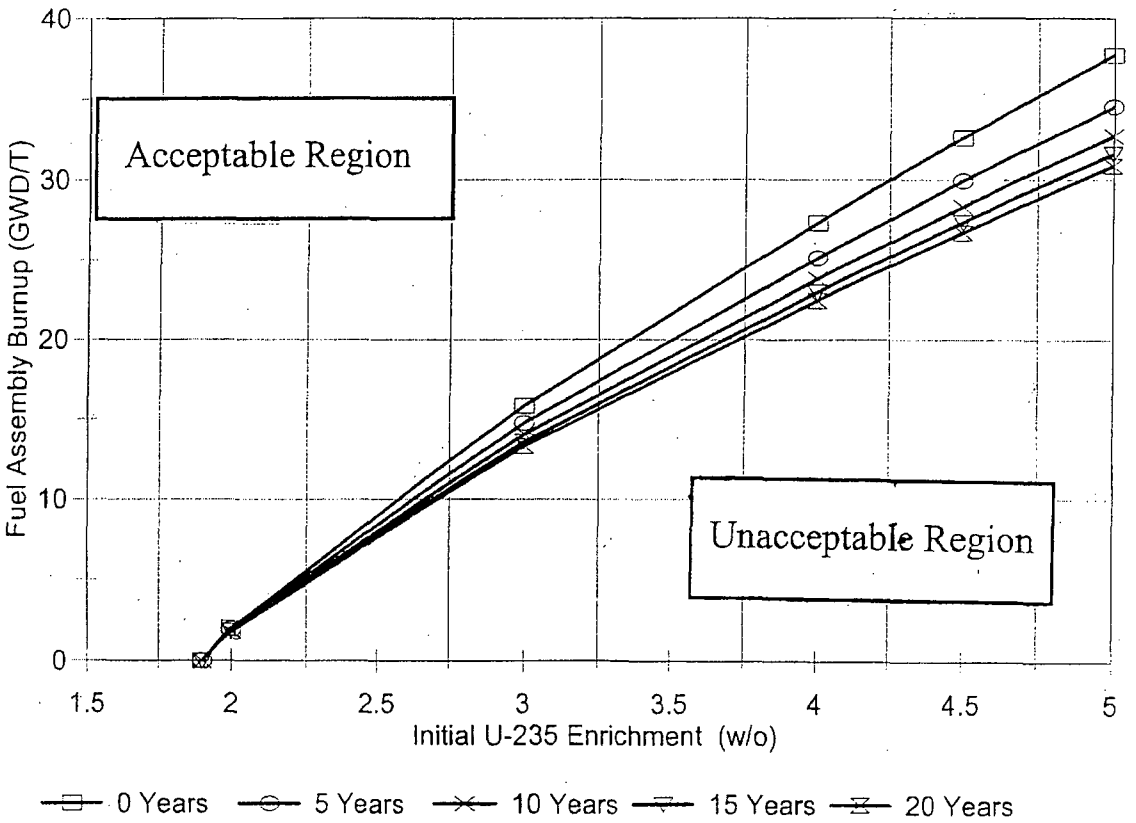
(continued)

4.0 DESIGN FEATURES (continued)

Figure II-8

REGION II

MINIMUM BURNUP FOR CATEGORY II-8 FUEL

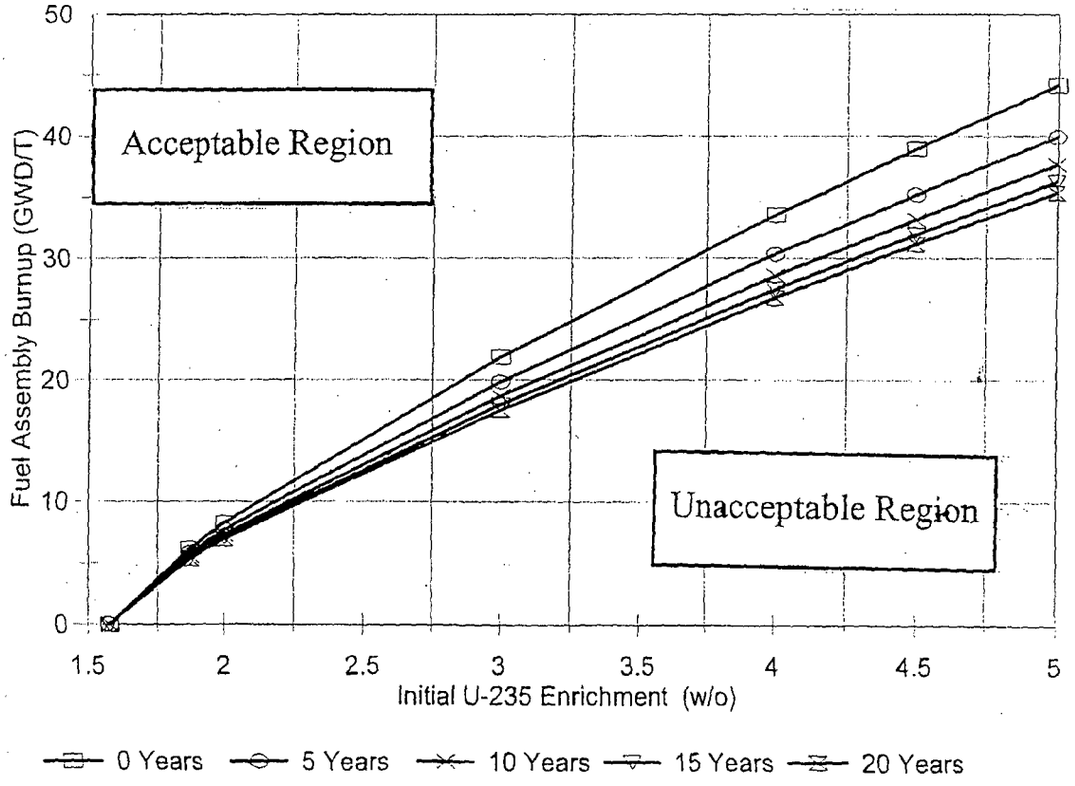


(continued)

Figure II-9

REGION II

MINIMUM BURNUP FOR CATEGORY II-9 FUEL

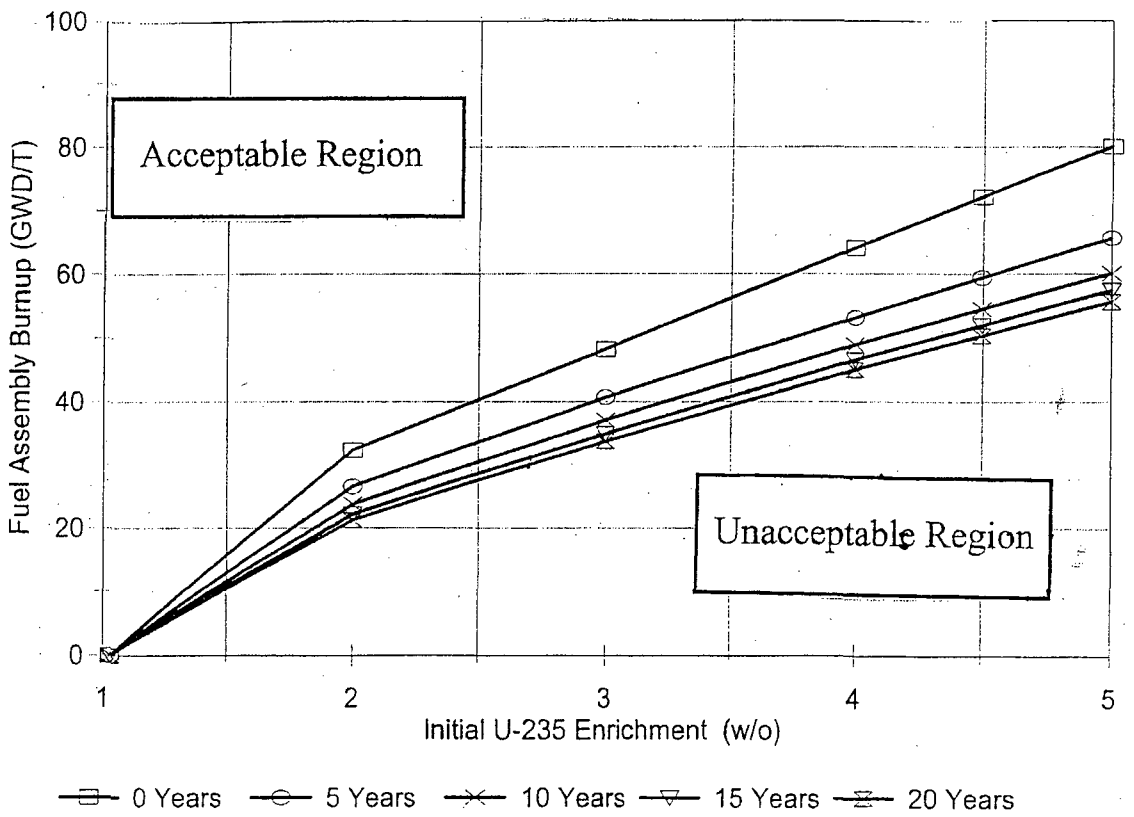


(continued)

Figure II-10

REGION II

MINIMUM BURNUP FOR CATEGORY II-10 FUEL

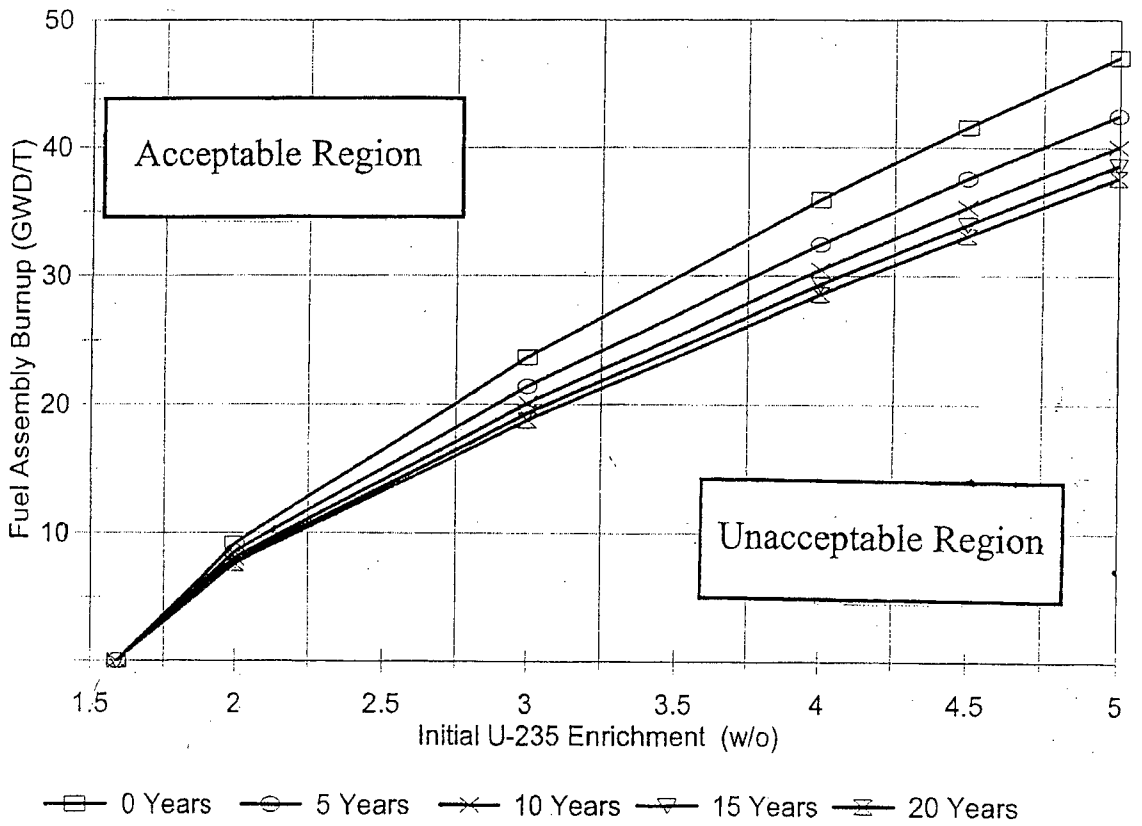


(continued)

Figure II-11

REGION II

MINIMUM BURNUP FOR CATEGORY II-11 FUEL

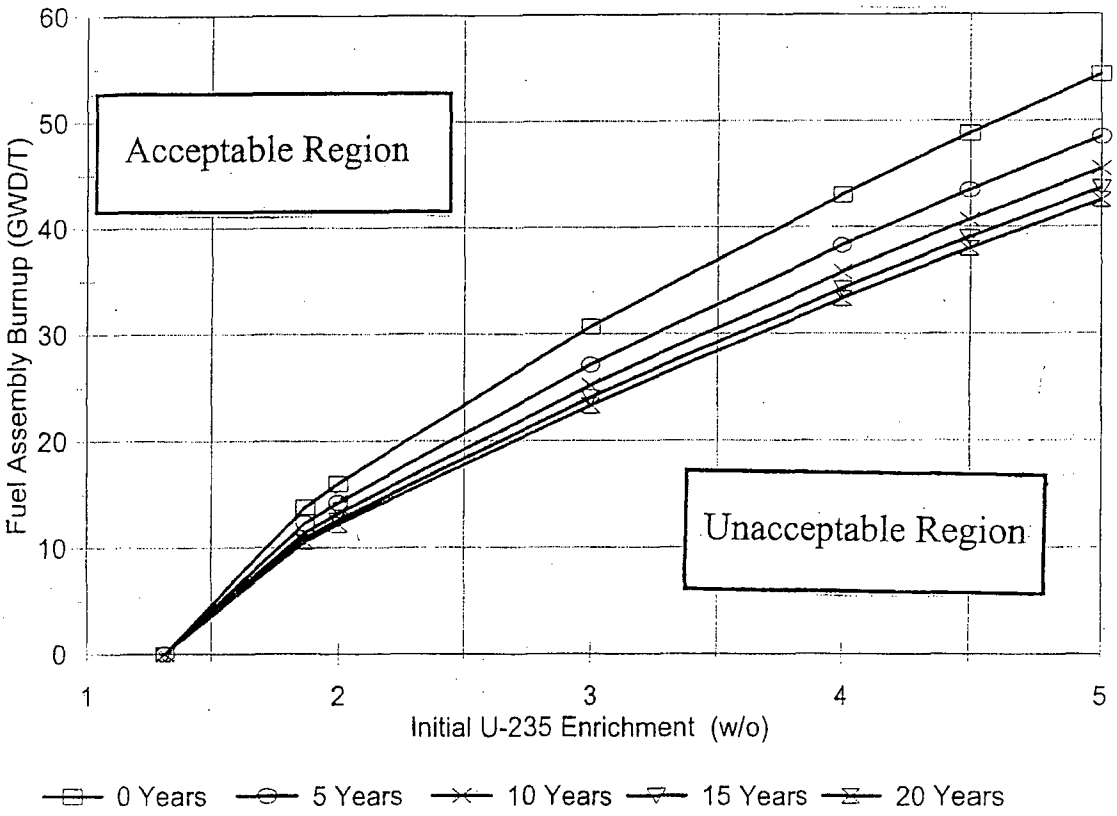


(continued)

Figure II-12

REGION II

MINIMUM BURNUP FOR CATEGORY II-12 FUEL

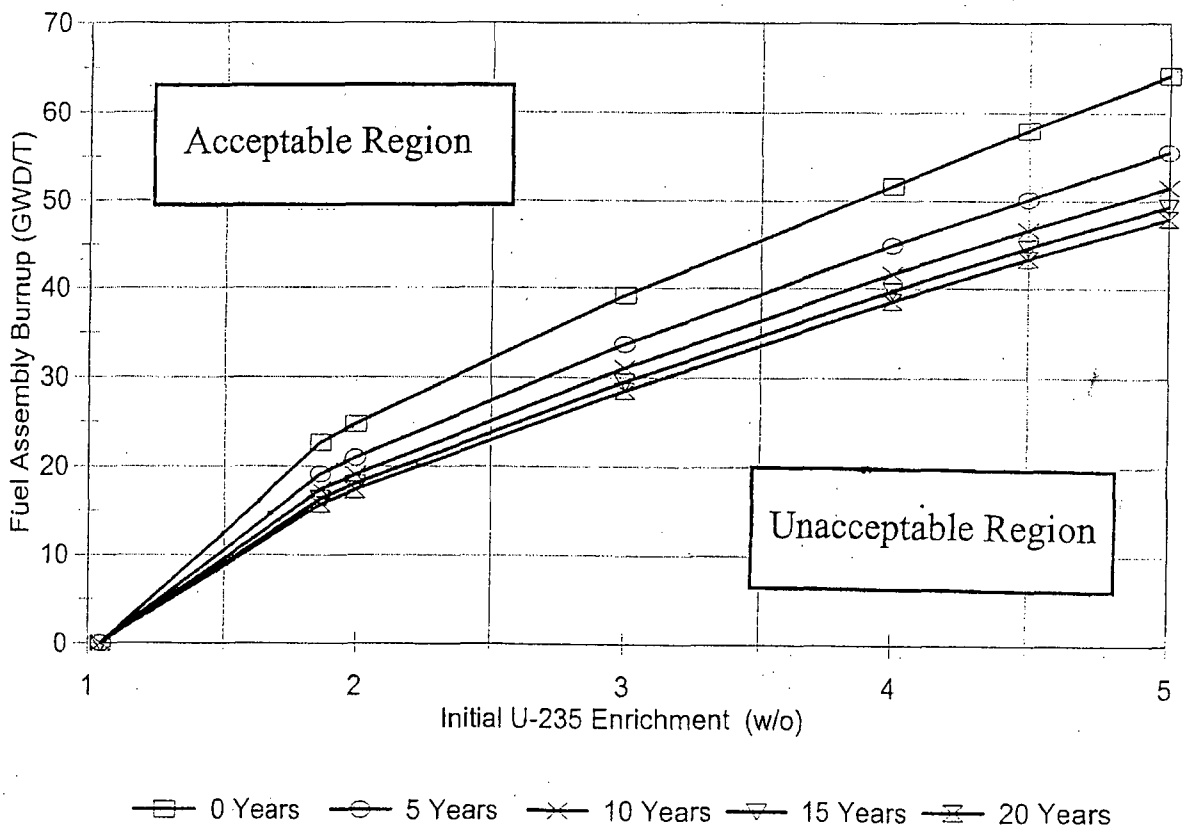


(continued)

Figure II-13

REGION II

MINIMUM BURNUP FOR CATEGORY II-13 FUEL



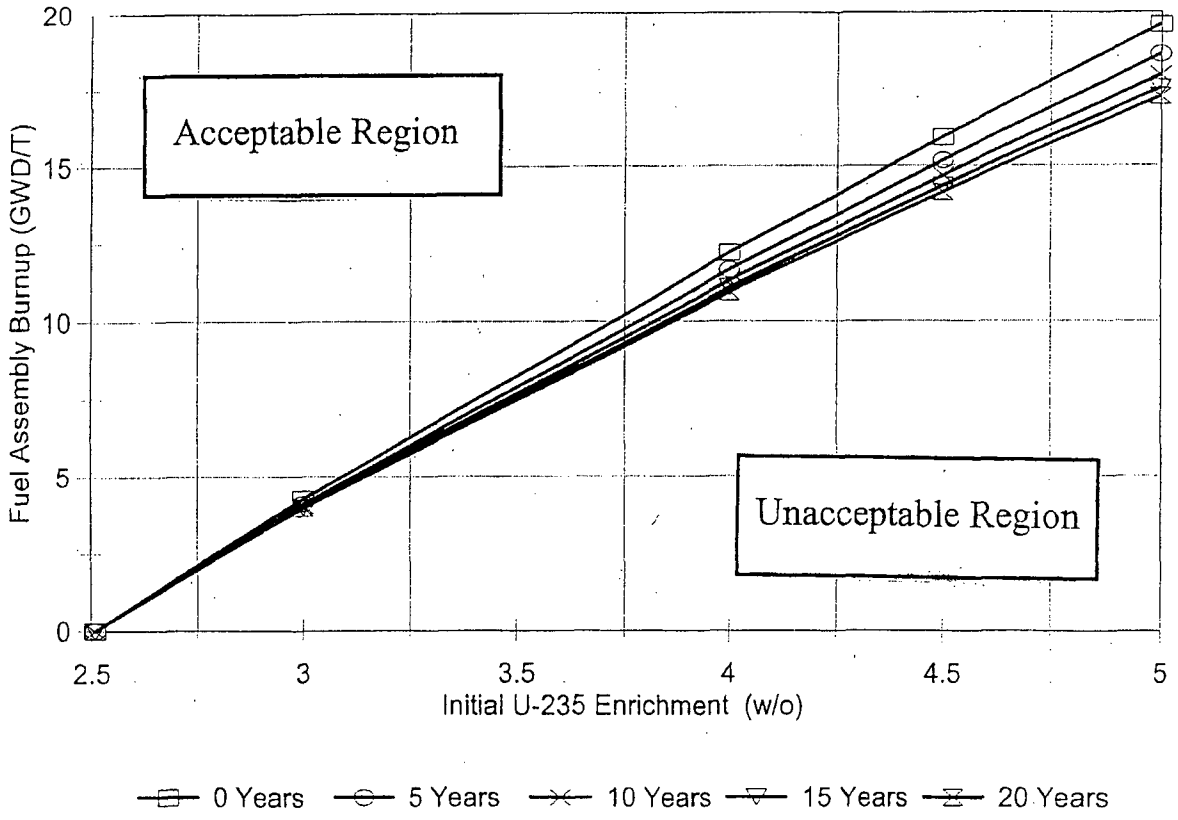
(continued)

4.0 DESIGN FEATURES (continued)

Figure II-14

REGION II

MINIMUM BURNUP FOR CATEGORY II-14 FUEL

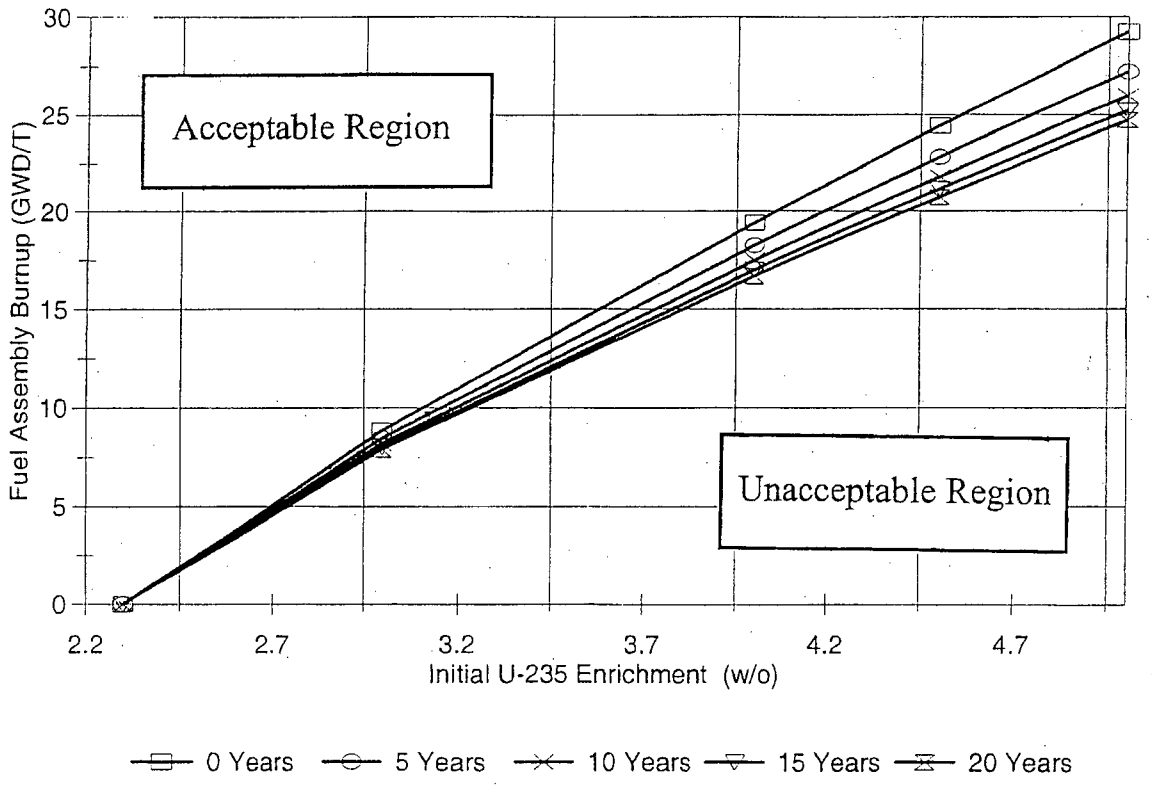


(continued)

Figure II-15

REGION II

MINIMUM BURNUP FOR CATEGORY II-15 FUEL



(continued)

Figure II-16

REGION II

Boundary Between Unrestricted Storage And Checkerboard Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	Blocked	II-1	II-1	II-1	II-1
Blocked	4.80	Blocked	II-1	II-1	II-1
4.80	Blocked	II-1	II-1	II-1	II-1

Interface

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-4	II-1	II-1	II-1	II-1
II-4	II-3	II-4	II-1	II-1	II-1
II-3	II-4	II-1	II-1	II-1	II-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

(continued)

Figure II-17

REGION II

Boundary Between Unrestricted Storage And 3 Out Of 4 Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
Blocked	II-1	Blocked	II-1	II-1	II-1
II-7	II-7	II-1	II-1	II-1	II-1
Blocked	II-7	Blocked	II-1	II-1	II-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

(continued)

Figure II-18

REGION II

Boundary Between Checkerboard Storage And 3 Out Of 4 Storage

II-7	Blocked	II-7	Blocked	II-7	Blocked
II-7	II-7	II-7	II-7	II-7	II-7
II-7	Blocked	II-7	Blocked	II-7	Blocked
Blocked	II-7	Blocked	II-7	II-7	II-7
4.80	Blocked	II-7	Blocked	II-7	Blocked
Blocked	4.80	Blocked	II-7	II-7	II-7

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

(continued)

Figure II-19

REGION II

Boundary Between 1-Out-Of-9 Storage And Unrestricted Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
Filler	Filler	Filler	II-1	II-1	II-1
Filler	A	Filler	II-1	II-1	II-1
Filler	Filler	Filler	II-1	II-1	II-1

Interface

Where:
(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

(continued)

4.0 DESIGN FEATURES (continued)

Figure II-20

REGION II

Boundary Between 1-Out-Of-9 Storage And Checkerboard Storage

II-4	II-3	II-4	II-3	II-4	II-3
II-3	II-4	II-3	II-4	II-3	II-4
II-4	II-3	II-4	II-3	II-4	II-3
Filler	Filler	Filler	II-4	II-3	II-4
Filler	A	Filler	II-3	II-4	II-3
Filler	Filler	Filler	II-4	II-3	II-4

Interface

Where:

(1)	If A = 4.80 w/o + 0 Inserts,	Filler = Category II-10
(2)	If A = 4.80 w/o + 5 Inserts,	Filler = Category II-11
(3)	If A = 4.80 w/o + 5 Inserts,	Filler = Category II-12
(4)	If A = 4.80 w/o + 5 Inserts,	Filler = Category II-13
(5)	If A = Category II-14,	Filler = Category II-13
(6)	If A = Category II-14,	Filler = Category II-11

(continued)

4.0 DESIGN FEATURES (continued)

Figure II-21

REGION II

Boundary Between 1-Out-Of-9 Storage And Checkerboard Storage

Blocked	4.80	Blocked	4.80	Blocked	4.80
4.80	Blocked	4.80	Blocked	4.80	Blocked
Blocked	4.80	Blocked	4.80	Blocked	4.80
Filler	Blocked	Filler	Blocked	4.80	Blocked
Filler	A	Blocked	4.80	Blocked	4.80
Filler	Filler	Filler	Blocked	4.80	Blocked

Interface

Where:

(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

(continued)

Figure II-22

REGION II

Boundary Between 1-Out-Of-9 Storage And 3-Out-Of-4 Storage

II-7	Blocked	II-7	Blocked	II-7	Blocked
II-7	II-7	II-7	II-7	II-7	II-7
II-7	Blocked	II-7	Blocked	II-7	Blocked
Filler	Filler	Filler	II-7	II-7	II-7
Filler	A	Filler	Blocked	II-7	Blocked
Filler	Filler	Filler	II-7	II-7	II-7

Interface

Where:

(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

(continued)

Figure II-23
Orientation Of 3 Guide Tube Inserts

```
 -------------------------------------      Fuel Assembly
|                                 yyy | <--- Serial
|                                   y |      Number
|                                   y |
|      00                    XX       |
|      00                    XX       |
|                                     |
|                                     |
|                                     |
|                 XX                  |
|                 XX                  |
|                                     |
|                                     |
|                                     |
|      XX                    00       |
|      XX                    00       |
|                                     |
|                                     |
|                                     |
 -+-----------------------------------
```

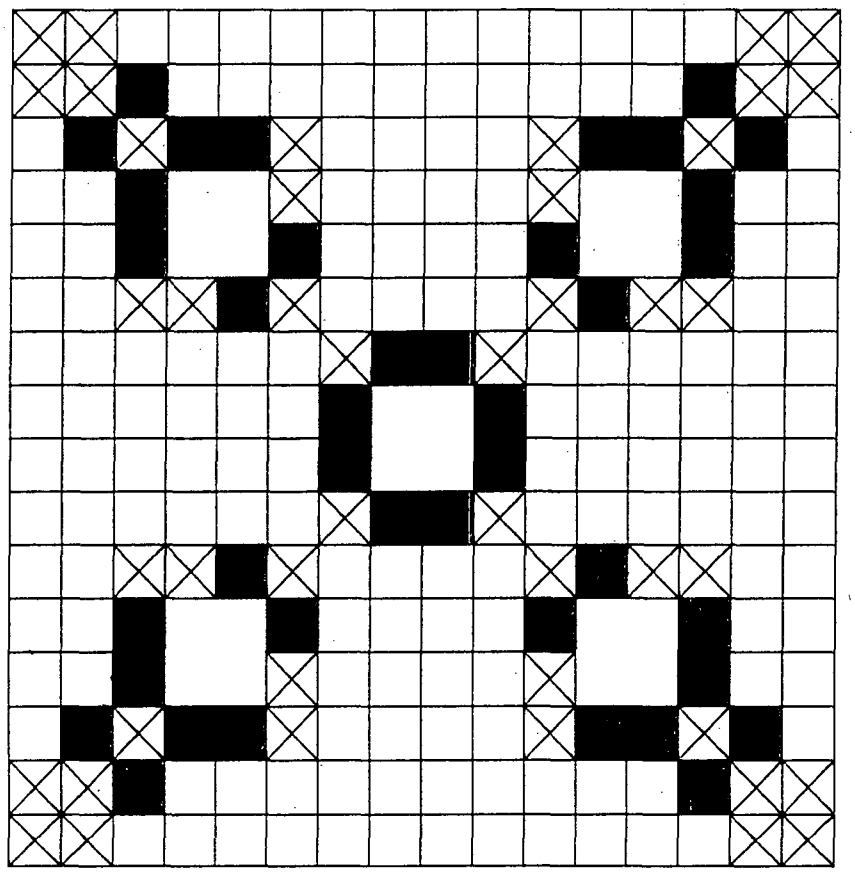
XX = Guide Tube With Insert
XX

OO = Empty Guide Tube
OO

(continued)

Figure II-24

SONGS UNITS 2 AND 3 FUEL ASSEMBLY WITH 40 ERBIA RODS



40 Erbia Rods

High Enriched Fuel Rod

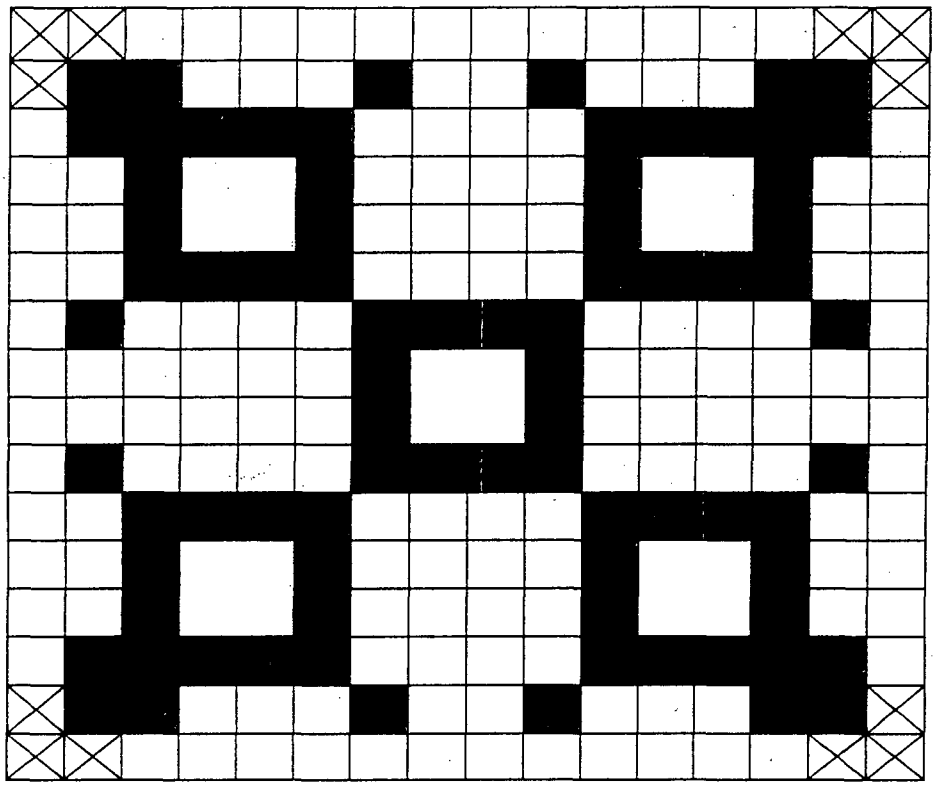
Low Enriched Fuel Rod

Erbia Fuel Rod

(continued)

Figure II-25

SONGS UNITS 2 AND 3 FUEL ASSEMBLY WITH 80 ERBIA RODS



80 Erbia Rods

High Enriched Fuel Rod

Low Enriched Fuel Rod

Erbia Fuel Rod

(continued)

B LCS 4.0.100 Fuel Storage Patterns

BASES

BACKGROUND

The spent fuel storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The storage pool is sized to store 1542 fuel assemblies. Two types/sizes of spent fuel storage racks are used (Region I and Region II). The two Region I racks each contain 156 storage locations each spaced 10.40 inches on center in a 12x13 array. Four Region II storage racks each contain 210 storage locations in a 14x15 array. The remaining two Region II racks each contain 195 locations in a 13x15 array. All Region II locations are spaced 8.85 inches on center.

As described in LCS 4.0.100, "Fuel Storage Patterns" fuel assemblies are stored in the spent fuel racks in accordance with criteria based on initial enrichment, discharge burnup, and cooling time (plutonium decay).

Additionally, LCS 4.0.100 allows the following storage options:

- 2x2 storage patterns,
- 3x3 storage patterns,
- credit for erbia in fresh assemblies, inserted CEAs, and borated stainless steel guide tube inserts (GT-Inserts).

The effect of these storage options is to reduce the required discharge burnup of irradiated assemblies and add flexibility in storing fresh assemblies containing erbia.

Finally, credit for boron is taken to maintain $K_{eff} \leq 0.95$.

The storage options allowed by LCS 4.0.100 and credit for soluble boron are needed because the boraflex is assumed to be completely absent. Boraflex erosion/dissolution is an industry problem, and SONGS Units 2 and 3 are affected. Taking no credit for boraflex for SONGS Units 2 and 3

(continued)

BACKGROUND (continued)

eliminates any boraflex concerns and monitoring programs to ensure that an adequate amount of boraflex is present will not be needed.

APPLICABLE SAFETY ANALYSIS

When soluble boron is credited, the following acceptance criteria apply:

(1) Under normal conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than 1.0 when flooded with unborated water, and,

(2) Under normal and accident conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than or equal to 0.95 when flooded with borated water.

The storage options allowed by LCS 4.0.100 meet acceptance criterion 1 above. Under normal, non-accident conditions, K_{eff} is less than 1.00 with 0 ppm.

The storage options allowed by LCS 4.0.100 meet acceptance criterion 2 above. Under normal, non-accident conditions, the TS 3.7.17 limit for soluble boron concentration of 2000 ppm will ensure that K_{eff} remains less than or equal to 0.95.

The analytical methods used to demonstrate that the storage options allowed by LCS 4.0.100 meet acceptance criteria 1 and 2 are described in the SONGS Spent Fuel Pool Criticality Analysis (Reference 1).

A fuel assembly could be inadvertently loaded into a spent fuel rack location not allowed by LCS 4.0.100 (e.g., an unirradiated fuel assembly or an insufficiently depleted fuel assembly). However, the negative reactivity effect of the soluble boron compensates for the increased reactivity caused by the postulated accident scenario. For this accident condition, the TS 3.7.17 limit for soluble boron concentration of 2000 ppm will ensure that K_{eff} remains less than or equal to 0.95.

(continued)

BASES (continued)

LCS	The placement of fuel assemblies within the spent fuel pool according to LCS 4.0.100 ensures that the K_{eff} of the spent fuel pool will always remain < 1.00 under normal, non-accident conditions assuming the pool to be flooded with unborated water. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under normal and accident conditions assuming the pool to be flooded with borated water at 2000 ppm.
APPLICABILITY	This LCS applies whenever any fuel assembly is stored in the spent fuel pool.
ACTIONS	See the Bases for LCO 3.7.18 A
SURVEILLANCE REQUIREMENTS	See the Bases for SR 3.7.18.1
REFERENCES	1. Spent Fuel Pool Criticality Analysis, (with no Boraflex and Credit for Soluble Boron), Southern California Edison, San Onofre Nuclear Generating Station Units 2 and 3, Revision 2, April 2007.

(continued)

SONGS UNIT 3 SINGLE-SIDED
Operating License & Technical Specification/Licensee Controlled Specification
AMD 205, B08-001, B08-002, L08-001, L08-002
PCN 556 Supp. 2

Revise Unit 3 Operating License by removing pages and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and/or dates and contain marginal/lines indicating the areas of change. **Please direct any questions regarding filing of information to: (949) 368-6972or email CDM Controlled Manuals Desk.**

REMOVE:	INSERT:
VOLUME 1	**VOLUME 1**
BEHIND: "Blue Tab" List of Effective Pages	**BEHIND: "Blue Tab" List of Effective Pages**
List of Effective Pages 1-12 REV 0 AMD 207 12/12/07	List of Effective Pages 1-12 Rev 1 AMD 207 03/05/08
BEHIND: "Blue Tab" 3.7 Plant Systems	**BEHIND: "Blue Tab" 3.7 Plant Systems**
3.7-30 AMD 116	3.7-30 AMD 205
3.7-32 AMD 120	3.7-32 AMD 205
3.7-33 AMD 120	3.7-33 AMD 205
3.7-34 AMD 120	3.7-34 AMD 205
nothing to pull	3.7-34a AMD 205 (new page)
nothing to pull	3.7-34b AMD 205 (new page)
BEHIND: "Blue Tab" 4.0 Design Features	**BEHIND: "Blue Tab" 4.0 Design Features**
4.0-4 AMD 120	4.0-4 AMD 205
nothing to pull	4.0-4 a AMD 205 (new page)
VOLUME 3	**VOLUME 3**
BEHIND: "Blue Tab" B 3.4	**BEHIND: "Blue Tab" B 3.4**
B 3.4-75a AMD 116 09/24/98	(deleting page)
BEHIND: "Blue Tab" B 3.7	**BEHIND: "Blue Tab" B 3.7**
B 3.7-71 AMD 116 04/29/03	B 3.7-71 AMD 116 03/05/08
B 3.7-72 AMD 116	B 3.7-72 AMD 116 03/05/08
B 3.7-73 AMD 116	B 3.7-73 AMD 116 03/05/08
B 3.7-74 AMD 116 04/29/03	B 3.7-74 AMD 116 03/05/08
B 3.7-75 AMD 116 04/29/03	B 3.7-75 AMD 116 03/05/08
nothing to pull	B 3.7-75a AMD 116 03/05/08 (new page)
BEHIND: "Blue Tab" B 3.8	**BEHIND: "Blue Tab" B 3.8**
B 3.8-83 AMD 116 01/11/07	B 3.8-83 AMD 116 03/05/08
LCS BOOK	**LCS BOOK**
BEHIND: White Tab List of Effective Pages	**BEHIND: White Tab List of Effective Pages**
List of Effective Pages 1-5 REV 0 12/12/07	List of Effective Pages 1-6 REV 1 03/05/08

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REMOVE:	**INSERT:**
LCS BOOK	**LCS BOOK**
BEHIND: "Blue Tab" 3.7 Plant Systems	**BEHIND: "Blue Tab" 3.7 Plant Systems**
3.7-116-1 REV 3 03/26/01	3.7-116-1 REV 4 03/05/08
3.7-116-2 REV 2 03/26/01	3.7-116-2 REV 3 03/05/08
BEHIND: "Blue Tab" 4.0 Design Features	**BEHIND: "Blue Tab" 4.0 Design Features**
4.0-100-1 REV 1 12/01/97	4.0-100-1 REV 2 09/27/07
4.0-100-2 REV 1 12/01/97	4.0-100-2 REV 2 09/27/07
4.0-100-3 REV 1 12/01/97	4.0-100-3 REV 2 09/27/07
Nothing to pull	4.0-100-4 thru 4.0-100-63 REV 2 09/27/07 (new pages)

SONGS UNIT 3 SINGLE-SIDED
Operating License & Technical Specification/Licensee Controlled Specification
AMD 205, B08-001, B08-002, L08-001, L08-002
PCN 556 Supp. 2

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Filing Instructions Reviewed & Approved:

JE Rowe FOR TWRAIDT 3/19/08
Signature/NRA Date

Robert Elartridge Anderson 3/19/08
Signature/CDM Processor Date

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
LOEP-1	1	207	03/05/08	2.0-1	1	199
LOEP-2	1	200	01/25/07	2.0-2	1	199
LOEP-3	1	206		3.0-1	1	116
LOEP-4	1	207		3.0-2	1	116
LOEP-4a	1	159		3.0-3	1	116
LOEP-5	1	199	12/21/06	3.0-4	1	177
LOEP-6	1	191	11/18/05	3.0-5	1	116
LOEP-7	1	188	07/19/05	3.1-1	1	191
LOEP-8	1	200	12/05/06	3.1-2	1	191
LOEP-9	1	196	09/19/06	3.1-3	1	191
LOEP-10	1	204	12/12/07	3.1-4	1	116
LOEP-11	1	203	03/05/08	3.1-5	1	116
LOEP-12	1	184	03/05/08	3.1-6	1	116
ii	1	116		3.1-7	1	191
iii	1	200		3.1-8	1	191
iv	1	200		3.1-9	1	116
v	1	188		3.1-10	1	116
vi	1	116		3.1-11	1	126
vii	1	200		3.1-12	1	191
viii	1	200		3.1-13	1	116
1.1-1	1	116		3.1-14	1	191
1.1-2	1	116		3.1-15	1	191
1.1-3	1	179		3.1-16	1	191
1.1-4	1	196		3.1-17	1	116
1.1-5	1	195		3.1-18	1	116
1.1-6	1	191		3.1-19	1	116
1.1-7	1	116		3.1-20	1	116
1.2-1	1	116		3.1-21	1	154
1.2-2	1	116		3.1-22	1	166
1.2-3	1	116		3.1-23	1	116
1.3-1	1	116		3.1-24	1	116
1.3-2	1	116		3.1-25	1	116
1.3-3	1	116		3.1-26	1	116
1.3-4	1	116		3.1-27	1	116
1.3-5	1	116		3.1-28	1	116
1.3-6	1	116		3.1-29	1	116
1.3-7	1	116		3.2-1	1	116
1.3-8	1	116		3.2-2	1	116
1.3-9	1	116		3.2-3	1	116
1.3-10	1	116		3.2-4	1	116
1.3-11	1	116		3.2-5	1	116
1.3-12	1	116		3.2-6	1	116
1.3-13	1	116		3.2-7	1	116
1.4-1	1	116		3.2-8	1	116
1.4-2	1	116		3.2-9	1	191
1.4-3	1	116		3.2-10	1	116
1.4-4	1	116		3.2-11	1	116
				3.2-12	1	116
				3.3-1	1	116

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
3.3-2	1	116		3.3-51	1	166
3.3-3	1	116		3.3-52	1	116
3.3-4	1	116		3.4-1	1	141
3.3-5	1	116		3.4-2	1	141
3.3-6	1	139		3.4-3	1	141
3.3-7	1	122		3.4-4	1	116
3.3-8	1	142		3.4-5	1	195
3.3-9	1	142		3.4-6	1	195
3.3-10	1	116		3.4-7	1	195
3.3-11	1	116		3.4-8	1	195
3.3-12	1	122		3.4-9	1	195
3.3-13	1	139		3.4-10	1	195
3.3-14	1	116		3.4-11	1	195
3.3-15	1	116		3.4-12	1	195
3.3-16	1	122		3.4-13	1	116
3.3-17	1	116		3.4-14	1	188
3.3-18	1	116		3.4-15	1	116
3.3-19	1	116		3.4-16	1	166
3.3-20	1	122		3.4-17	1	166
3.3-21	1	116		3.4-18	1	195
3.3-22	1	148		3.4-19	1	166
3.3-23	1	148		3.4-20	1	116
3.3-24	1	148		3.4-21	1	166
3.3-25	1	148		3.4-22	1	195
3.3-26	1	116		3.4-23	1	166
3.3-27	1	116		3.4-24	1	166
3.3-28	1	116		3.4-25	1	166
3.3-29	1	122		3.4-26	1	152
3.3-30	1	116		3.4-27	1	146
3.3-31	1	116		3.4-28	1	147
3.3-32	1	116		3.4-29	1	147
3.3-33	1	116		3.4-30	1	195
3.3-34	1	187		3.4-31	1	195
3.3-35	1	121		3.4-32	1	116
3.3-36	1	121		3.4-33	1	195
3.3-37	1	121		3.4-34	1	134
3.3-38	1	121		3.4-35	1	195
3.3-39	1	121		3.4-36	1	116
3.3-40	1	166		3.4-37	1	196
3.3-41	1	151		3.4-38	1	196
3.3-42	1	200	01/25/07	3.4-39	1	116
3.3-43	1	200	01/25/07	3.4-40	1	116
3.3-44	1	116		3.4-41	1	116
3.3-45	1	185		3.4-42	1	116
3.3-46	1	185		3.4-43	1	116
3.3-47	1	185		3.4-44	1	116
3.3-48	1	116		3.4-45	1	116
3.3-49	1	116				
3.3-50	1	116				

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date	Page No.	Volume	Amendment/Date
3.4-46	1	116	3.7-6	1	116
3.4-47	1	116	3.7-7	1	116
3.4-48	1	116	3.7-8	1	116
3.4-49	1	116	3.7-9	1	116
3.4-50	1	116	3.7-10	1	116
3.4-51	1	196	3.7-11	1	155
3.4-52	1	196	3.7-12	1	116
3.5-1	1	131	3.7-13	1	116
3.5-2	1	124	3.7-14	1	182
3.5-3	1	116	3.7-15	1	139
3.5-4	1	131	3.7-16	1	153
3.5-5	1	116	3.7-17	1	116
3.5-6	1	181	3.7-18	1	116
3.5-7	1	116	3.7-19	1	116
3.5-8	1	116	3.7-19a	1	118
3.5-9	1	116	3.7-19b	1	118
3.5-10	1	116	3.7-19c	1	118
3.5-11	1	116	3.7-20	1	116
3.6-1	1	116	3.7-21	1	116
3.6-2	1	135	3.7-22	1	172
3.6-3	1	116	3.7-23	1	116
3.6-4	1	116	3.7-24	1	206
3.6-5	1	116	3.7-25	1	206
3.6-6	1	135	3.7-26	1	206
3.6-7	1	116	3.7-27	1	200 01/25/07
3.6-8	1	116	3.7-28	1	200 01/25/07
3.6-9	1	116	3.7-29	1	116
3.6-10	1	116	3.7-30	1	205
3.6-11	1	116	3.7-31	1	116
3.6-12	1	156	3.7-32	1	205
3.6-13	1	192	3.7-33	1	205
3.6-14	1	192	3.7-34	1	205
3.6-15	1	116	3.7-34a	1	205
3.6-16	1	116	3.7-34b	1	205
3.6-17	1	116	3.7-35	1	116
3.6-18	1	162	3.8-1	1	133
3.6-19	1	116	3.8-2	1	133
3.6-20	1	116	3.8-3	1	116
3.6-21	1	116	3.8-4	1	149
3.6-22	1	116	3.8-5	1	170
3.6-23	1	150	3.8-6	1	203
3.6-24	1	150	3.8-7	1	149
3.6-25	1	116	3.8-8	1	170
3.6-26	1	116	3.8-9	1	149
3.7-1	1	204	3.8-10	1	149
3.7-2	1	116	3.8-11	1	149
3.7-3	1	204	3.8-12	1	149
3.7-4	1	204	3.8-13	1	160
3.7-5	1	116	3.8-14	1	170

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date
3.8-15	1	149
3.8-16	1	116
3.8-17	1	116
3.8-18	1	166
3.8-19	1	116
3.8-20	1	203
3.8-21	1	203
3.8-22	1	116
3.8-23	1	116
3.8-24	1	116
3.8-25	1	116
3.8-26	1	116
3.8-27	1	166
3.8-28	1	116
3.8-29	1	116
3.8-30	1	116
3.8-31	1	116
3.8-32	1	116
3.8-33	1	116
3.8-34	1	116
3.8-35	1	116
3.8-36	1	166
3.8-37	1	116
3.8-38	1	116
3.8-39	1	116
3.8-40	1	166
3.8-41	1	116
3.9-1	1	116
3.9-2	1	166
3.9-3	1	116
3.9-4	1	184
3.9-5	1	116
3.9-6	1	166
3.9-6a	1	166
3.9-7	1	144
3.9-8	1	144
3.9-9	1	166
3.9-9a	1	144
3.9-10	1	123
4.0-1	1	190
4.0-2	1	116
4.0-3	1	116
4.0-4	1	205
4.0-4a	1	205
4.0-5	1	120
5.0-1	1	199
5.0-2	1	199
5.0-3	1	199
5.0-4	1	199
5.0-5	1	199
5.0-6	1	175
5.0-7	1	116
5.0-8	1	199
5.0-9	1	169
5.0-10	1	116
5.0-11	1	161
5.0-12	1	169
5.0-13	1	196
5.0-14	1	196
5.0-15	1	198
5.0-15a	1	207
5.0-16	1	207
5.0-17	1	200
5.0-18	1	196
5.0-19	1	196
5.0-20	1	196
5.0-20a	1	189
5.0-20b	1	206
5.0-20c	1	206
5.0-21	1	116
5.0-22	1	116
5.0-23	1	186
5.0-24	1	116
5.0-25	1	116
5.0-26	1	191
5.0-27	1	195
5.0-27a	1	195
5.0-28	1	196
5.0-29	1	196
5.0-30	1	188
5.0-31	1	199

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date
Bibliographic Data Sheet		
Appendix B		dated Nov. 15, 1982
Environmental Protection Plan		dated Nov. 15, 1982
1-1	1	dated Nov. 15, 1982
2-1	1	dated Nov. 15, 1982
2-2	1	dated Nov. 15, 1982
3-1	1	dated Nov. 15, 1982
3-2	1	159
4-1	1	159
4-2	1	dated Nov. 15, 1982
Appendix C	1	dated Nov. 15, 1982
Page 2	1	dated Nov. 15, 1982
Page 3	1	dated Nov. 15, 1982

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 2.0-1	2	183	07/19/04	B 3.1-27	2	116	
B 2.0-2	2	116		B 3.1-28	2	191	11/18/05
B 2.0-3	2	199	12/21/06	B 3.1-29	2	191	11/18/05
B 2.0-3a	2	183	07/19/04	B 3.1-30	2	191	11/18/05
B 2.0-4	2	199	12/21/06	B 3.1-31	2	116	
B 2.0-5	2	199	12/21/06	B 3.1-32	2	116	05/02/97
B 2.0-6	2	116		B 3.1-33	2	116	
B 2.0-7	2	116		B 3.1-34	2	116	05/02/97
B 2.0-8	2	199	12/21/06	B 3.1-35	2	116	
B 2.0-9	2	199	12/21/06	B 3.1-36	2	116	
B 3.0-1	2	116		B 3.1-37	2	191	11/18/05
B 3.0-2	2	116		B 3.1-38	2	191	11/18/05
B 3.0-3	2	116		B 3.1-39	2	116	
B 3.0-4	2	199	12/21/06	B 3.1-40	2	116	
B 3.0-5	2	116		B 3.1-41	2	116	
B 3.0-6	2	116		B 3.1-42	2	116	
B 3.0-7	2	116		B 3.1-43	2	191	11/18/05
B 3.0-8	2	116		B 3.1-43a	2	191	11/18/05
B 3.0-9	2	116		B 3.1-44	2	191	11/18/05
B 3.0-10	2	116		B 3.1-45	2	116	
B 3.0-11	2	116		B 3.1-46	2	191	11/18/05
B 3.0-12	2	116	12/01/98	B 3.1-47	2	116	
B 3.0-13	2	177	10/25/02	B 3.1-48	2	116	
B 3.0-14	2	177	05/08/02	B 3.1-49	2	116	
B 3.0-15	2	177	05/08/02	B 3.1-50	2	116	
B 3.1-1	2	191	11/18/05	B 3.1-51	2	116	
B 3.1-2	2	191	11/18/05	B 3.1-52	2	116	
B 3.1-3	2	191	11/18/05	B 3.1-53	2	116	
B 3.1-4	2	191	11/18/05	B 3.1-54	2	116	08/03/01
B 3.1-5	2	191	11/18/05	B 3.1-55	2	116	08/03/01
B 3.1-6	2	191	11/18/05	B 3.1-56	2	116	08/03/01
B 3.1-7	2	191	11/18/05	B 3.1-57	2	116	08/03/01
B 3.1-8	2	191	11/18/05	B 3.1-58	2	116	08/03/01
B 3.1-9	2	191	11/18/05	B 3.1-58a	2	116	08/03/01
B 3.1-10	2	191	11/18/05	B 3.1-58b	2	116	08/03/01
B 3.1-11	2	191	11/18/05	B 3.1-59	2	191	11/18/05
B 3.1-12	2	191	11/18/05	B 3.1-60	2	116	11/05/96
B 3.1-13	2	116		B 3.1-61	2	116	05/03/00
B 3.1-14	2	116		B 3.1-62	2	166	12/20/00
B 3.1-15	2	191	11/18/05	B 3.1-63	2	166	05/21/02
B 3.1-16	2	116		B 3.1-63a	2	166	12/20/00
B 3.1-17	2	191	11/18/05	B 3.1-64	2	116	
B 3.1-18	2	116		B 3.1-65	2	116	
B 3.1-19	2	116	01/03/02	B 3.1-66	2	116	
B 3.1-20	2	116		B 3.1-67	2	116	
B 3.1-21	2	116	01/03/02	B 3.1-68	2	116	
B 3.1-22	2	116	05/30/97	B 3.1-69	2	116	
B 3.1-23	2	116		B 3.1-70	2	116	
B 3.1-24	2	116		B 3.1-71	2	116	
B 3.1-25	2	116	05/02/97	B 3.1-72	2	116	
B 3.1-26	2	116	07/29/99				

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.1-73	2	116		B 3.3-2	2	116	07/17/97
B 3.1-74	2	116		B 3.3-3	2	116	
B 3.1-75	2	116		B 3.3-4	2	116	
B 3.1-76	2	116		B 3.3-5	2	116	
B 3.1-77	2	116	05/29/97	B 3.3-6	2	116	
B 3.1-78	2	116	05/29/97	B 3.3-7	2	116	
B 3.1-79	2	116		B 3.3-8	2	116	
B 3.1-80	2	116		B 3.3-9	2	116	
B 3.2-1	2	116		B 3.3-10	2	116	
B 3.2-2	2	116		B 3.3-11	2	116	
B 3.2-3	2	116		B 3.3-12	2	116	03/12/99
B 3.2-4	2	183	07/19/04	B 3.3-13	2	116	
B 3.2-5	2	116		B 3.3-14	2	116	
B 3.2-6	2	116		B 3.3-15	2	116	
B 3.2-7	2	116		B 3.3-16	2	116	07/17/97
B 3.2-8	2	116		B 3.3-17	2	116	09/16/03
B 3.2-9	2	116		B 3.3-18	2	116	03/12/99
B 3.2-10	2	116		B 3.3-19	2	116	
B 3.2-11	2	116		B 3.3-20	2	116	
B 3.2-12	2	183	07/19/04	B 3.3-21	2	116	03/12/99
B 3.2-13	2	116		B 3.3-22	2	116	03/12/99
B 3.2-14	2	116		B 3.3-23	2	116	03/12/99
B 3.2-15	2	116		B 3.3-24	2	116	
B 3.2-16	2	116		B 3.3-25	2	116	12/30/96
B 3.2-17	2	116		B 3.3-26	2	116	12/30/96
B 3.2-18	2	116		B 3.3-26a	2	116	12/30/96
B 3.2-19	2	183	07/19/04	B 3.3-27	2	116	
B 3.2-20	2	116		B 3.3-28	2	116	
B 3.2-21	2	116		B 3.3-29	2	116	
B 3.2-22	2	116		B 3.3-30	2	116	05/29/97
B 3.2-23	2	116		B 3.3-31	2	116	05/02/97
B 3.2-24	2	116		B 3.3-32	2	116	03/12/99
B 3.2-25	2	116		B 3.3-33	2	116	03/12/99
B 3.2-26	2	116		B 3.3-34	2	116	03/12/99
B 3.2-27	2	116		B 3.3-35	2	116	03/12/99
B 3.2-28	2	116		B 3.3-36	2	116	03/12/99
B 3.2-29	2	183	07/19/04	B 3.3-37	2	179	
B 3.2-30	2	191	11/18/05	B 3.3-37a	2	179	09/16/03
B 3.2-31	2	116		B 3.3-38	2	116	
B 3.2-32	2	116		B 3.3-39	2	116	07/17/97
B 3.2-33	2	116		B 3.3-40	2	116	12/09/98
B 3.2-34	2	116		B 3.3-41	2	116	12/09/98
B 3.2-35	2	116		B 3.3-42	2	116	
B 3.2-36	2	116		B 3.3-43	2	116	
B 3.2-37	2	116		B 3.3-44	2	116	12/30/96
B 3.2-38	2	183	07/19/04	B 3.3-45	2	116	12/30/96
B 3.2-39	2	116		B 3.3-46	2	116	12/30/96
B 3.2-40	2	116		B 3.3-47	2	116	12/30/96
B 3.2-41	2	116		B 3.3-48	2	116	09/18/98
B 3.3-1	2	116		B 3.3-49	2	116	09/18/98

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date	
B 3.3-50	2	116	09/18/98
B 3.3-51	2	116	02/11/02
B 3.3-51a	2	116	09/18/98
B 3.3-52	2	116	
B 3.3-53	2	116	07/17/97
B 3.3-54	2	116	
B 3.3-55	2	116	
B 3.3-56	2	116	
B 3.3-57	2	116	
B 3.3-58	2	116	
B 3.3-59	2	116	
B 3.3-60	2	116	09/18/98
B 3.3-61	2	116	09/18/98
B 3.3-62	2	116	09/18/98
B 3.3-63	2	116	
B 3.3-64	2	116	07/17/97
B 3.3-65	2	116	
B 3.3-66	2	116	
B 3.3-67	2	116	
B 3.3-68	2	116	
B 3.3-69	2	116	
B 3.3-70	2	116	
B 3.3-71	2	116	
B 3.3-72	2	116	12/30/96
B 3.3-73	2	116	12/30/96
B 3.3-74	2	116	12/30/96
B 3.3-75	2	116	05/28/97
B 3.3-76	2	116	12/30/96
B 3.3-77	2	116	07/17/97
B 3.3-78	2	116	
B 3.3-79	2	116	
B 3.3-80	2	116	
B 3.3-81	2	116	
B 3.3-82	2	116	
B 3.3-83	2	116	
B 3.3-84	2	116	
B 3.3-85	2	116	
B 3.3-86	2	116	
B 3.3-87	2	116	02/24/99
B 3.3-88	2	116	07/17/97
B 3.3-89	2	116	
B 3.3-90	2	116	
B 3.3-91	2	116	
B 3.3-92	2	116	
B 3.3-93	2	116	
B 3.3-94	2	116	
B 3.3-95	2	116	10/06/99
B 3.3-96	2	116	10/06/99
B 3.3-97	2	116	10/06/99
B 3.3-98	2	116	07/18/01
B 3.3-99	2	116	10/06/99
B 3.3-100	2	188	07/19/05
B 3.3-101	2	116	10/06/99
B 3.3-102	2	116	10/06/99
B 3.3-103	2	116	10/06/99
B 3.3-103a	2	179	
B 3.3-103b	2	148	09/16/03
B 3.3-103c	2	179	
B 3.3-104	2	116	
B 3.3-105	2	116	
B 3.3-106	2	116	
B 3.3-107	2	116	
B 3.3-108	2	116	
B 3.3-109	2	116	
B 3.3-110	2	116	
B 3.3-111	2	116	
B 3.3-112	2	116	
B 3.3-113	2	116	
B 3.3-114	2	116	
B 3.3-115	2	116	
B 3.3-116	2	116	
B 3.3-117	2	116	
B 3.3-118	2	116	
B 3.3-119	2	116	12/30/96
B 3.3-120	2	116	12/30/96
B 3.3-121	2	116	12/30/96
B 3.3-122	2	116	12/30/96
B 3.3-123	2	116	05/28/97
B 3.3-124	2	116	05/28/97
B 3.3-125	2	116	05/28/97
B 3.3-126	2	116	
B 3.3-127	2	116	
B 3.3-128	2	116	
B 3.3-129	2	116	09/06/00
B 3.3-130	2	116	
B 3.3-131	2	116	09/06/00
B 3.3-132	2	116	05/29/97
B 3.3-133	2	116	07/13/99
B 3.3-134	2	165	12/14/00
B 3.3-135	2	116	05/28/97
B 3.3-136	2	116	06/09/00
B 3.3-137	2	116	05/28/97
B 3.3-138	2	116	05/28/97
B 3.3-139	2	116	05/28/97
B 3.3-140	2	116	05/28/97
B 3.3-141	2	116	05/28/97
B 3.3-142	2	116	05/28/97
B 3.3-143	2	116	05/28/97
B 3.3-144	2	116	05/28/97
B 3.3-145	2	116	06/27/97
B 3.3-146	2	116	03/19/98

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.3-147	2	116	06/27/97	B 3.4-12	3	116	
B 3.3-148	2	166	12/20/00	B 3.4-13	3	116	
B 3.3-149	2	166	12/20/00	B 3.4-14	3	116	
B 3.3-150	2	116	08/20/01	B 3.4-15	3	195	
B 3.3-151	2	116	06/27/97	B 3.4-16	3	195	
B 3.3-152	2	200	12/05/06	B 3.4-17	3	188	07/19/05
B 3.3-153	2	200	12/05/06	B 3.4-18	3	188	07/19/05
B 3.3-154	2	200	12/05/06	B 3.4-19	3	116	
B 3.3-155	2	200	12/05/06	B 3.4-20	3	188	07/19/05
B 3.3-156	2	200	12/05/06	B 3.4-21	3	188	07/19/05
B 3.3-157	2	200	12/05/06	B 3.4-22	3	116	
B 3.3-158	2	116	12/17/98	B 3.4-23	3	116	
B 3.3-159	2	116	06/08/00	B 3.4-24	3	196	
B 3.3-160	2	116	06/23/99	B 3.4-25	3	116	
B 3.3-161	2	116	05/30/97	B 3.4-26	3	116	
B 3.3-162	2	116	05/30/97	B 3.4-27	3	116	
B 3.3-163	2	119	05/30/97	B 3.4-28	3	196	
B 3.3-164	2	116	05/30/97	B 3.4-29	3	166	12/20/00
B 3.3-165	2	116	05/30/97	B 3.4-30	3	166	12/20/00
B 3.3-166	2	185	04/25/05	B 3.4-31	3	116	
B 3.3-167	2	116	05/30/97	B 3.4-32	3	196	
B 3.3-168	2	116	12/02/99	B 3.4-33	3	116	
B 3.3-169	2	116	05/30/97	B 3.4-34	3	166	12/20/00
B 3.3-170	2	116		B 3.4-35	3	166	12/20/00
B 3.3-171	2	185	04/25/05	B 3.4-36	3	116	
B 3.3-172	2	185	04/25/05	B 3.4-37	3	166	12/20/00
B 3.3-173	2	116	05/30/97	B 3.4-38	3	166	07/15/05
B 3.3-174	2	116	05/30/97	B 3.4-38a	3	166	04/03/06
B 3.3-175	2	116	03/06/06	B 3.4-39	3	196	
B 3.3-176	2	116	10/30/98	B 3.4-40	3	166	12/20/00
B 3.3-177	2	116	10/30/98	B 3.4-41	3	116	
B 3.3-178	2	116		B 3.4-42	3	116	
B 3.3-179	2	116	04/24/01	B 3.4-43	3	166	12/20/00
B 3.3-180	2	116	04/24/01	B 3.4-44	3	166	04/03/06
B 3.3-181	2	116	07/29/96	B 3.4-45	3	166	12/20/00
B 3.3-182	2	166	12/20/00	B 3.4-46	3	116	05/30/00
B 3.3-183	2	166	12/20/00	B 3.4-47	3	146	05/30/00
B 3.3-184	2	166	12/20/00	B 3.4-48	3	152	05/15/02
B 3.3-185	2	166	12/20/00	B 3.4-49	3	116	05/30/00
B 3.4-1	3	116	02/24/99	B 3.4-50	3	116	05/30/00
B 3.4-2	3	116	02/24/99	B 3.4-51	3	147	03/22/01
B 3.4-3	3	116		B 3.4-52	3	147	03/22/01
B 3.4-4	3	116		B 3.4-53	3	147	03/22/01
B 3.4-5	3	116	02/24/99	B 3.4-54	3	147	04/27/05
B 3.4-6	3	116		B 3.4-55	3	195	
B 3.4-7	3	116		B 3.4-56	3	195	
B 3.4-8	3	116		B 3.4-57	3	195	
B 3.4-9	3	195		B 3.4-58	3	195	
B 3.4-10	3	116		B 3.4-59	3	195	
B 3.4-11	3	116		B 3.4-60	3	195	

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.4-61	3	195		B 3.5-11	3	116	03/03/00
B 3.4-62	3	195		B 3.5-12	3	116	03/03/00
B 3.4-63	3	195		B 3.5-13	3	116	03/03/00
B 3.4-64	3	195		B 3.5-14	3	116	03/03/00
B 3.4-65	3	195		B 3.5-15	3	116	03/03/00
B 3.4-66	3	195		B 3.5-16	3	188	07/19/05
B 3.4-67	3	195		B 3.5-17	3	116	03/03/00
B 3.4-68	3	195		B 3.5-18	3	116	03/14/02
B 3.4-69	3	195		B 3.5-19	3	116	03/14/02
B 3.4-70	3	116		B 3.5-20	3	116	07/17/01
B 3.4-71	3	196		B 3.5-20a	3	116	03/03/00
B 3.4-72	3	196		B 3.5-21	3	116	
B 3.4-73	3	196		B 3.5-22	3	116	
B 3.4-74	3	196		B 3.5-23	3	116	
B 3.4-75	3	196		B 3.5-24	3	116	
B 3.4-76	3	116		B 3.5-25	3	116	
B 3.4-77	3	116		B 3.5-26	3	116	
B 3.4-78	3	116		B 3.5-27	3	116	
B 3.4-79	3	116		B 3.5-28	3	116	
B 3.4-80	3	116	09/06/00	B 3.5-29	3	116	
B 3.4-81	3	116	09/06/00	B 3.5-30	3	116	
B 3.4-82	3	116		B 3.5-31	3	116	
B 3.4-83	3	116		B 3.5-32	3	116	
B 3.4-84	3	116		B 3.5-33	3	116	
B 3.4-85	3	116		B 3.5-34	3	116	
B 3.4-86	3	116		B 3.6-1	3	116	12/01/98
B 3.4-87	3	116		B 3.6-2	3	173	08/06/03
B 3.4-88	3	116	05/13/02	B 3.6-3	3	116	08/06/03
B 3.4-89	3	116	05/13/02	B 3.6-4	3	116	04/29/03
B 3.4-90	3	116		B 3.6-5	3	116	12/01/98
B 3.4-91	3	116		B 3.6-6	3	173	02/11/02
B 3.4-92	3	116		B 3.6-7	3	116	
B 3.4-93	3	196		B 3.6-8	3	116	
B 3.4-94	3	196		B 3.6-9	3	116	
B 3.4-95	3	196		B 3.6-10	3	116	
B 3.4-96	3	196		B 3.6-11	3	116	12/01/98
B 3.4-97	3	196		B 3.6-12	3	116	04/29/03
B 3.4-98	3	196		B 3.6-13	3	116	07/29/99
B 3.4-99	3	196		B 3.6-14	3	116	
B 3.4-100	3	196		B 3.6-15	3	116	
B 3.5-1	3	116		B 3.6-16	3	116	04/29/03
B 3.5-2	3	116		B 3.6-17	3	116	
B 3.5-3	3	116		B 3.6-18	3	116	06/09/00
B 3.5-4	3	116	05/05/03	B 3.6-19	3	116	
B 3.5-5	3	116	05/30/97	B 3.6-20	3	116	
B 3.5-6	3	116		B 3.6-21	3	116	04/29/03
B 3.5-7	3	116	07/15/98	B 3.6-22	3	116	10/24/01
B 3.5-8	3	188	07/19/05	B 3.6-23	3	192	12/12/05
B 3.5-9	3	116	07/15/98	B 3.6-24	3	192	12/12/05
B 3.5-10	3	116	07/15/98	B 3.6-24a	3	192	12/12/05
B 3.5-10a	3	188	07/19/05	B 3.6-25	3	116	04/29/03

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.6-26	3	116	04/29/03	B 3.7-20	3	116	06/02/04
B 3.6-27	3	173	07/11/02	B 3.7-21	3	116	06/02/04
B 3.6-28	3	173	02/11/02	B 3.7-22	3	116	06/02/04
B 3.6-29	3	116		B 3.7-23	3	116	01/05/01
B 3.6-30	3	116	04/29/03	B 3.7-24	3	116	12/14/00
B 3.6-31	3	173	05/02/02	B 3.7-25	3	116	
B 3.6-32	3	116		B 3.7-26	3	116	02/28/01
B 3.6-33	3	116		B 3.7-27	3	116	02/28/01
B 3.6-34	3	116		B 3.7-28	3	116	03/03/00
B 3.6-35	3	173	02/11/02	B 3.7-29	3	116	03/03/00
B 3.6-36	3	173	02/11/02	B 3.7-30	3	116	03/03/00
B 3.6-37	3	188	07/19/05	B 3.7-31	3	182	11/25/03
B 3.6-38	3	188	07/19/05	B 3.7-32	3	182	11/25/03
B 3.6-39	3	116	10/06/00	B 3.7-33	3	182	11/25/03
B 3.6-40	3	116	10/06/00	B 3.7-34	3	116	03/03/00
B 3.6-41	3	116	10/06/00	B 3.7-35	3	116	03/02/01
B 3.6-42	3	116	04/29/03	B 3.7-36	3	116	07/31/00
B 3.6-43	3	116		B 3.7-37	3	116	08/13/01
B 3.6-44	3	116		B 3.7-38	3	116	08/01/01
B 3.6-45	3	116		B 3.7-39	3	116	06/23/99
B 3.6-46	3	116		B 3.7-40	3	116	
B 3.6-47	3	116		B 3.7-41	3	116	04/03/06
B 3.6-48	3	150	10/29/99	B 3.7-42	3	116	
B 3.6-49	3	150	10/29/99	B 3.7-43	3	116	
B 3.6-50	3	150	10/29/99	B 3.7-43a	3	116	05/29/97
B 3.6-51	3	150	10/29/99	B 3.7-43b	3	116	
B 3.6-52	3	150	10/29/99	B 3.7-43c	3	118	
B 3.6-53	3	150	10/06/00	B 3.7-43d	3	118	07/29/96
B 3.6-54	3	150	10/06/00	B 3.7-43e	3	118	
B 3.6-55	3	150	10/29/99	B 3.7-43f	3	118	
B 3.6-56	3	150	10/29/99	B 3.7-43g	3	118	
B 3.6-57	3	150	10/29/99	B 3.7-43h	3	118	
B 3.7-1	3	204	06/21/07	B 3.7-43i	3	118	
B 3.7-2	3	116	08/18/98	B 3.7-43j	3	118	
B 3.7-3	3	204	06/21/07	B 3.7-44	3	116	
B 3.7-4	3	204	06/21/07	B 3.7-45	3	116	
B 3.7-5	3	204	06/21/07	B 3.7-46	3	116	
B 3.7-6	3	204	06/21/07	B 3.7-47	3	116	05/30/97
B 3.7-7	3	116	04/16/99	B 3.7-48	3	116	
B 3.7-8	3	116	06/23/99	B 3.7-49	3	116	10/17/01
B 3.7-9	3	116		B 3.7-50	3	188	03/07/07
B 3.7-10	3	116		B 3.7-50a	3	188	03/07/07
B 3.7-11	3	116		B 3.7-51	3	116	04/08/07
B 3.7-12	3	116		B 3.7-52	3	116	10/17/01
B 3.7-13	3	116		B 3.7-53	3	116	04/12/01
B 3.7-14	3	116	04/16/99	B 3.7-54	3	116	04/12/01
B 3.7-15	3	116		B 3.7-55	3	116	03/07/07
B 3.7-16	3	116		B 3.7-55a	3	116	03/07/07
B 3.7-17	3	116	06/02/04	B 3.7-56	3	116	12/12/07
B 3.7-18	3	116		B 3.7-57	3	116	12/12/07
B 3.7-19	3	116		B 3.7-58	3	116	12/12/07

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date	
B 3.7-59	3	117	12/12/07	B 3.8-29	3	116	06/18/01
B 3.7-60	3	116	12/12/07	B 3.8-29a	3	160	06/18/01
B 3.7-61	3	117	12/12/07	B 3.8-29b	3	160	06/18/01
B 3.7-62	3	117	12/12/07	B 3.8-29c	3	160	06/18/01
B 3.7-63	3	200	12/12/07	B 3.8-29d	3	160	06/18/01
B 3.7-64	3	200	12/12/07	B 3.8-29e	3	160	06/18/01
B 3.7-65	3	200	12/12/07	B 3.8-29f	3	160	06/18/01
B 3.7-66	3	200	12/12/07	B 3.8-30	3	116	
B 3.7-67	3	200	12/12/07	B 3.8-31	3	116	
B 3.7-68	3	116	10/13/98	B 3.8-32	3	116	
B 3.7-69	3	116	10/13/98	B 3.8-33	3	116	
B 3.7-70	3	116	10/13/98	B 3.8-34	3	166	12/20/00
B 3.7-71	3	116	03/05/08	B 3.8-35	3	166	12/20/00
B 3.7-72	3	116	03/05/08	B 3.8-36	3	203	04/05/07
B 3.7-73	3	116	03/05/08	B 3.8-37	3	116	01/21/98
B 3.7-74	3	116	03/05/08	B 3.8-38	3	203	04/05/07
B 3.7-75	3	116	03/05/08	B 3.8-39	3	203	04/05/07
B 3.7-75a	3	116	03/05/08	B 3.8-40	3	116	01/21/98
B 3.7-76	3	116	05/13/02	B 3.8-41	3	203	04/05/07
B 3.7-77	3	116		B 3.8-42	3	116	03/25/02
B 3.7-78	3	116		B 3.8-43	3	116	
B 3.7-79	3	116		B 3.8-44	3	116	03/25/02
B 3.8-1	3	116	10/06/99	B 3.8-45	3	116	
B 3.8-2	3	116	10/06/99	B 3.8-46	3	116	05/03/00
B 3.8-3	3	116	10/06/99	B 3.8-47	3	116	01/22/99
B 3.8-4	3	116	10/06/99	B 3.8-47a	3	116	01/22/99
B 3.8-5	3	116	10/06/99	B 3.8-48	3	116	
B 3.8-6	3	116	10/06/99	B 3.8-49	3	116	01/22/99
B 3.8-7	3	188	07/19/05	B 3.8-50	3	116	
B 3.8-7a	3	116	12/10/99	B 3.8-51	3	116	
B 3.8-8	3	116	10/06/99	B 3.8-52	3	116	
B 3.8-9	3	116	11/29/07	B 3.8-53	3	116	01/22/99
B 3.8-10	3	188	07/19/05	B 3.8-54	3	116	08/05/98
B 3.8-11	3	116	10/06/99	B 3.8-55	3	116	08/30/04
B 3.8-12	3	116	10/06/99	B 3.8-55a	3	116	08/05/98
B 3.8-13	3	116	10/06/99	B 3.8-56	3	116	
B 3.8-14	3	116	10/06/99	B 3.8-57	3	116	
B 3.8-15	3	116	10/06/99	B 3.8-58	3	166	12/20/00
B 3.8-16	3	116	06/18/01	B 3.8-59	3	166	12/20/00
B 3.8-17	3	116	06/18/01	B 3.8-60	3	116	
B 3.8-18	3	203	04/05/07	B 3.8-61	3	116	
B 3.8-19	3	116	06/18/01	B 3.8-62	3	116	
B 3.8-20	3	116	11/29/07	B 3.8-63	3	116	
B 3.8-21	3	116	06/18/01	B 3.8-64	3	116	
B 3.8-22	3	116	06/18/01	B 3.8-65	3	116	
B 3.8-23	3	116	06/18/01	B 3.8-66	3	116	07/31/00
B 3.8-24	3	116	06/18/01	B 3.8-67	3	116	
B 3.8-25	3	116	06/18/01	B 3.8-68	3	116	
B 3.8-26	3	116	06/18/01	B 3.8-69	3	116	
B 3.8-27	3	116	06/18/01	B 3.8-70	3	116	
B 3.8-28	3	116	06/18/01	B 3.8-71	3	116	

APPENDIX A TO LICENSE NO. NPF-15

SAN ONOFRE UNIT 3 TECHNICAL SPECIFICATIONS (NUREG-0952)
LIST OF EFFECTIVE PAGES

Page No.	Volume	Amendment/Date		Page No.	Volume	Amendment/Date
B 3.8-72	3	116				
B 3.8-73	3	166	12/20/00			
B 3.8-74	3	166	12/20/00			
B 3.8-75	3	116				
B 3.8-76	3	116				
B 3.8-77	3	116				
B 3.8-78	3	116				
B 3.8-79	3	116				
B 3.8-80	3	116				
B 3.8-81	3	116				
B 3.8-82	3	116				
B 3.8-83	3	116	03/05/08			
B 3.8-84	3	116				
B 3.8-85	3	116				
B 3.8-86	3	166	12/20/00			
B 3.8-87	3	166	12/20/00			
B 3.9-1	3	116				
B 3.9-2	3	116				
B 3.9-3	3	166	12/20/00			
B 3.9-4	3	116				
B 3.9-5	3	116				
B 3.9-6	3	166	12/20/00			
B 3.9-7	3	116				
B 3.9-8	3	116				
B 3.9-9	3	116	12/01/98			
B 3.9-10	3	184	02/18/05			
B 3.9-11	3	116	10/10/97			
B 3.9-12	3	116	10/10/97			
B 3.9-13	3	184	02/18/05			
B 3.9-13a	3	184	02/18/05			
B 3.9-14	3	116	10/10/97			
B 3.9-15	3	116	10/10/97			
B 3.9-16	3	116				
B 3.9-17	3	116	07/15/05			
B 3.9-17a	3	116	04/03/06			
B 3.9-18	3	166	07/15/05			
B 3.9-19	3	166	12/20/00			
B 3.9-20	3	116				
B 3.9-21	3	116	05/30/97			
B 3.9-22	3	116	07/15/05			
B 3.9-23	3	116	04/03/06			
B 3.9-24	3	166	12/20/00			
B 3.9-24a	3	166	12/20/00			
B 3.9-25	3	116	05/30/97			
B 3.9-26	3	116	10/13/98			
B 3.9-27	3	116	10/13/98			

3.7 PLANT SYSTEMS

3.7.17 Fuel Storage Pool Boron Concentration

LCO 3.7.17 The fuel storage pool boron concentration shall be ≥ 2000 ppm.

APPLICABILITY: Whenever any fuel assembly stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Fuel storage pool boron concentration not within limit.	----------NOTE---------- LCO 3.0.3 is not applicable. ----------	
	A.1 Suspend movement of fuel assemblies in the fuel storage pool.	Immediately
	AND	
	A.2 Initiate action to restore fuel storage pool boron concentration to within limit.	Immediately

3.7 PLANT SYSTEMS

3.7.18 Spent Fuel Assembly Storage

LCO 3.7.18 The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region I shall be within the acceptable burnup domain of Figure 3.7.18-1 or Figure 3.7.18-2, or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

The combination of initial enrichment and burnup of each SONGS 2 and 3 spent fuel assembly stored in Region II shall be within the acceptable burnup domain of Figure 3.7.18-3 or Figure 3.7.18-4, or the fuel assembly shall be stored in accordance with Technical Specification 4.3.1.1.

Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Technical Specification 4.3.1.1.

APPLICABILITY: Whenever any fuel assembly is stored in the fuel storage pool.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Requirements of the LCO not met.	A.1 --------NOTE--------- LCO 3.0.3 is not applicable. ---------- Initiate action to bring the noncomplying fuel assembly into compliance.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.18.1	Verify by administrative means the initial enrichment, burnup, and cooling time of the fuel assembly are in accordance with LCO 3.7.18, or Design Features 4.3.1.1, or LCS 4.3.100. Rev 2, dated 09/27/07.	Prior to moving a fuel assembly to any spent fuel pool storage location.

FIGURE 3.7.18-1

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION I RACKS

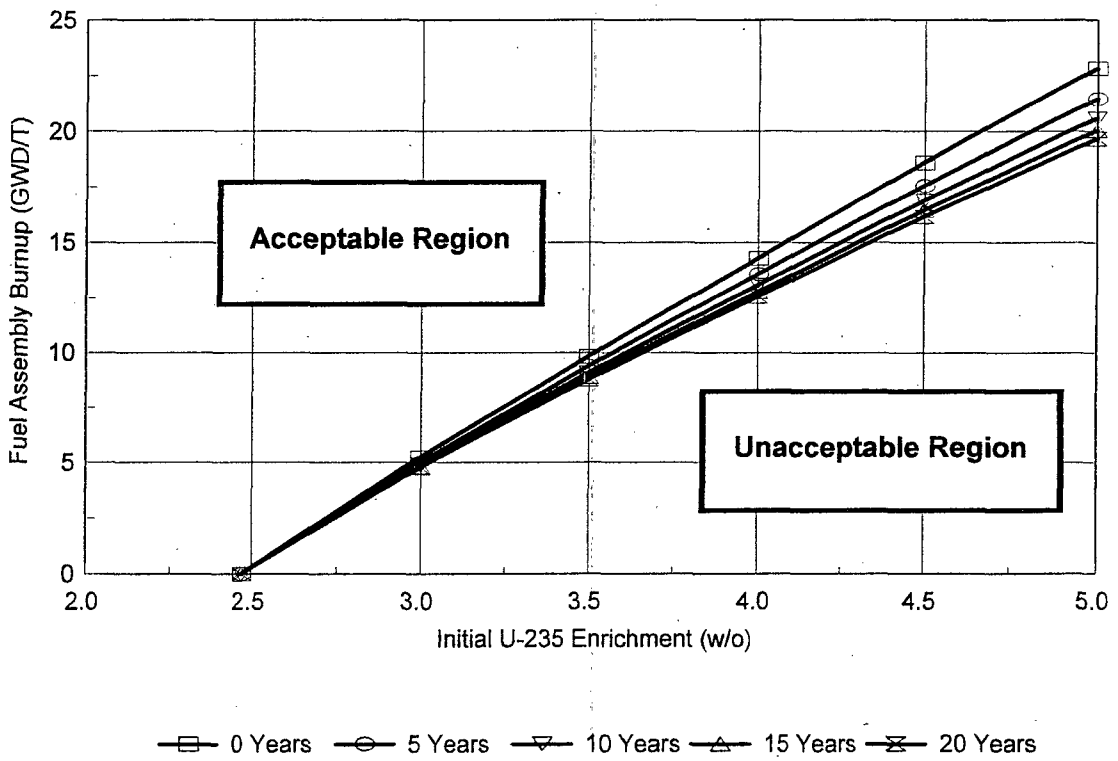


FIGURE 3.7.18-2

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION I RACKS

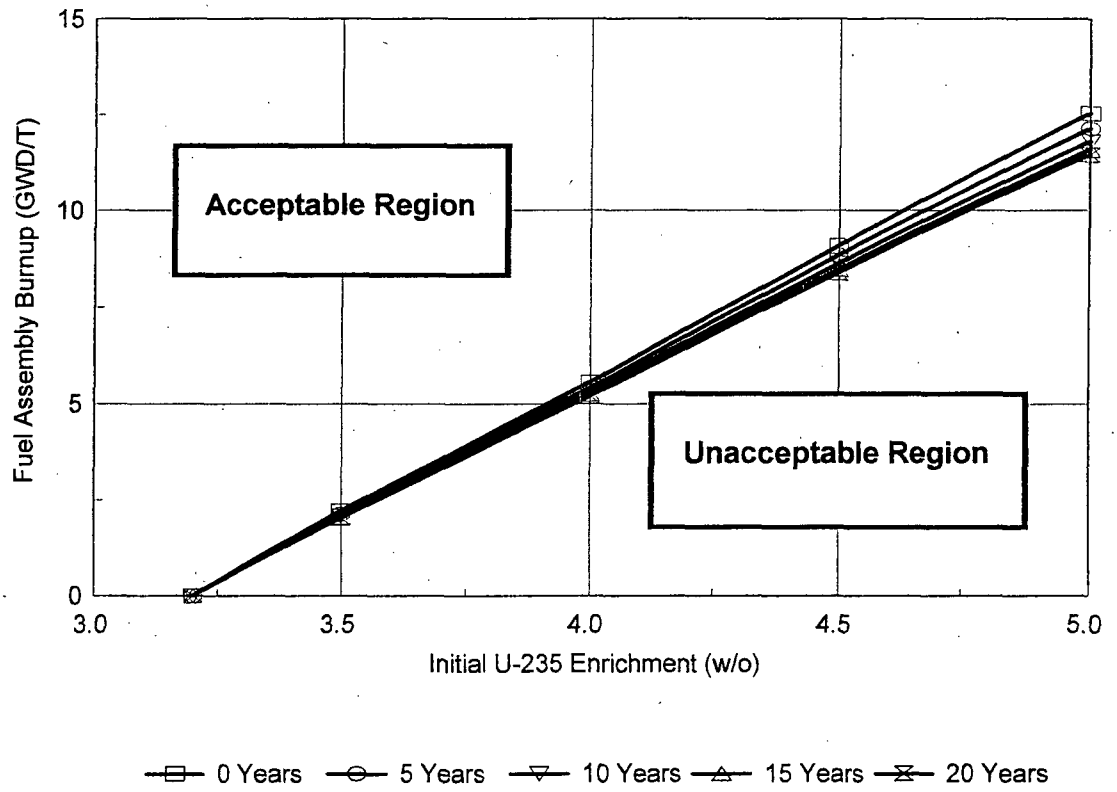


FIGURE 3.7.18-3

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
UNRESTRICTED PLACEMENT OF SONGS 2 AND 3 FUEL
IN
REGION II RACKS

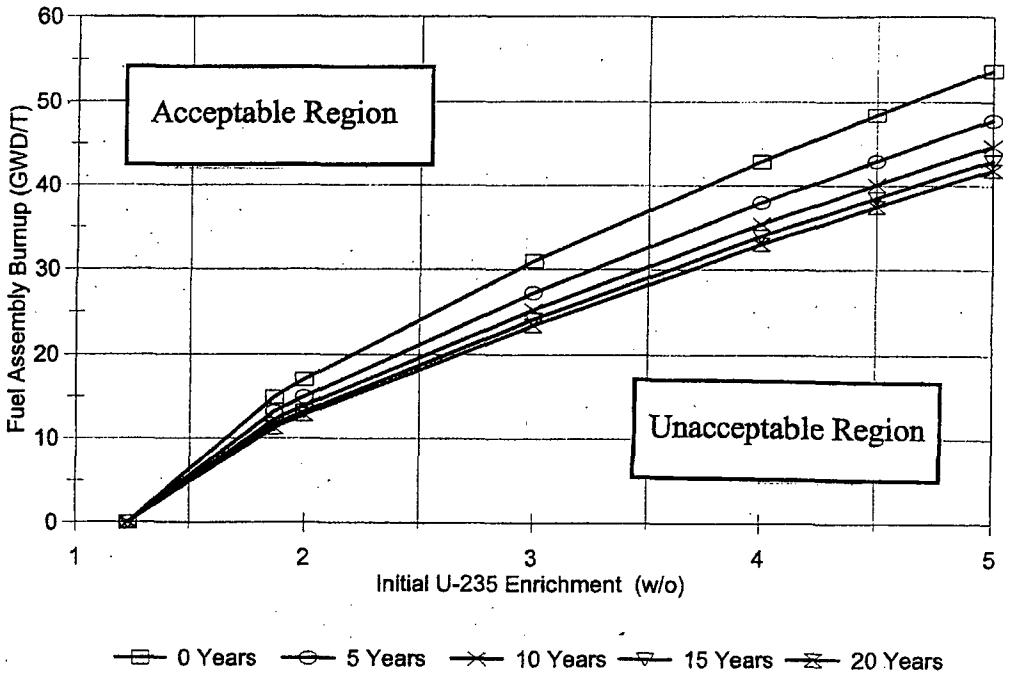
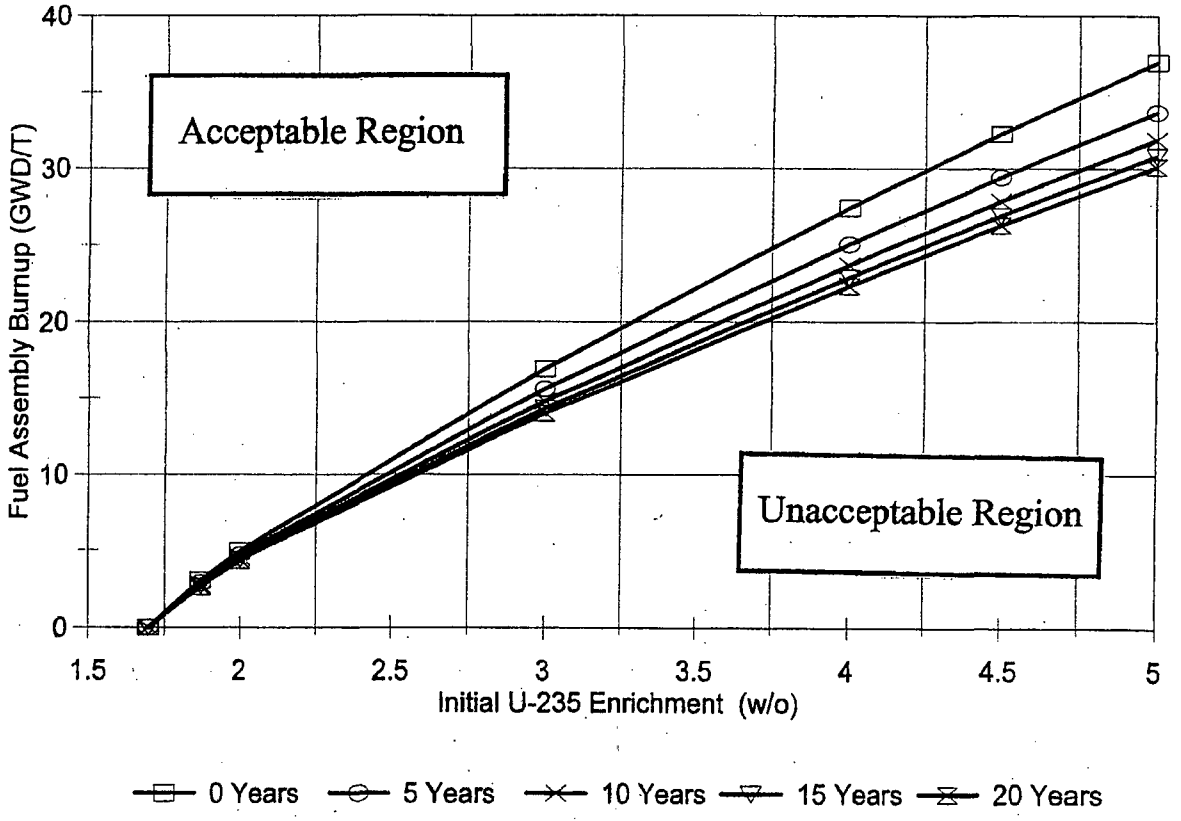


FIGURE 3.7.18-4

MINIMUM BURNUP AND COOLING TIME VS. INITIAL ENRICHMENT
FOR
PLACEMENT OF SONGS 2 AND 3 FUEL IN PERIPHERAL POOL LOCATIONS
IN
REGION II RACKS



4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. Fuel assemblies having a maximum U-235 enrichment of 4.8 weight percent;

b. $K_{eff} < 1.0$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

c. $K_{eff} \leq 0.95$ if fully flooded with water borated to 1700 ppm, which includes an allowance for uncertainties as described in Section 9.1 of the UFSAR;

d. Three or five Borated stainless steel guide tube inserts (GT-Inserts) may be used. When three Borated stainless steel guide tube inserts are used, they will be installed in an assembly's center guide tube, the guide tube associated with the serial number, and the diagonally opposite guide tube. Fuel containing GT-Inserts may be placed in either Region I or Region II. However, credit for GT-Inserts is only taken for Region II storage.

   A five-finger CEA may be installed in an assembly. Fuel containing a five-finger CEA may be placed in either Region I or Region II. Credit for inserted 5-finger CEAs is taken for both Region I and Region II.

e. A nominal 8.85 inch center to center distance between fuel assemblies placed in Region II;

f. A nominal 10.40 inch center to center distance between fuel assemblies placed in Region I;

(continued)

4.0 DESIGN FEATURES (continued)

4.3.1 Criticality (continued)

g. Prior to using the storage criteria of LCO 3.7.18 and LCS 4.0.100, the following uncertainties will be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

h. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-1 are allowed unrestricted storage in Region I;

i. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-2 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region I;

j. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-3 are allowed unrestricted storage in Region II;

k. Units 2 and 3 fuel assemblies with a burnup in the "acceptable range" of Figure 3.7.18-4 are allowed unrestricted storage in the peripheral pool locations with 1 or 2 faces toward the spent fuel pool walls of Region II;

l. Units 2 and 3 fuel assemblies with a burnup in the "unacceptable range" of Figure 3.7.18-1, Figure 3.7.18-2, Figure 3.7.18-3, and Figure 3.7.18-4 will be stored in compliance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 09/27/07; and

m. Each SONGS 1 uranium dioxide spent fuel assembly stored in Region II shall be stored in accordance with Licensee Controlled Specification 4.0.100 Rev. 2, dated 09/27/07.

(continued)

B 3.7 PLANT SYSTEMS

B 3.7.17 Fuel Storage Pool Boron Concentration

BASES

BACKGROUND

As described in LCO 3.7.18, "Spent Fuel Assembly Storage," fuel assemblies are stored in the spent fuel racks in accordance with criteria based on initial enrichment, discharge burnup, and cooling time (plutonium decay). Although the water in the spent fuel pool is normally borated to ≥ 2000 ppm, the criteria that limit the storage of a fuel assembly to specific rack locations is conservatively developed without taking credit for boron while maintaining $K_{eff} < 1.0$. Credit for boron is taken to maintain $K_{eff} \leq 0.95$.

APPLICABLE SAFETY ANALYSES

Soluble boron in the spent fuel pool is credited in criticality analyses for normal and accident conditions. The relevant accidents are 1) Fuel Assembly Dropped Horizontally On Top of the Racks, 2) Fuel Assembly Dropped Vertically Into a Storage Location Already Containing a Fuel Assembly, 3) Fuel Assembly Dropped to the SFP Floor, and 4) Fuel Misloading in either Region I or Region II. The limiting accident is Fuel Misloading in either Region I or Region II.

A fuel assembly could be inadvertently loaded into a spent fuel rack location not allowed by LCO 3.7.18 (e.g., an unirradiated fuel assembly or an insufficiently depleted fuel assembly). This accident is analyzed assuming the misloading of one fresh assembly with the maximum permissible enrichment. However, the negative reactivity effect of the soluble boron compensates for the increased reactivity caused by the postulated accident scenario.

Under normal, non-accident conditions, the soluble boron needed to maintain K_{eff} less than or equal to 0.95, including uncertainties, is 970 ppm. Under accident conditions, the soluble boron needed to maintain K_{eff} less than or equal to 0.95, including uncertainties, is 1700 ppm. A SFP boron dilution analysis shows that dilution from 2000 ppm to below 1700 is not credible. Therefore, the minimum required soluble boron concentration is 2000 ppm.

The concentration of dissolved boron in the fuel pool satisfies Criterion 2 of the NRC Policy Statement.

(continued)

BASES (continued)

LCO

The specified concentration of 2000 ppm dissolved boron in the fuel pool preserves the assumptions used in the analyses described above. This concentration of dissolved boron is the minimum required concentration for fuel assembly storage and movement within the spent fuel pool.

APPLICABILITY

This LCO applies whenever fuel assemblies are stored in the spent fuel pool.

ACTIONS

A.1 and A.2

The Required Actions are modified by a Note indicating that LCO 3.0.3 does not apply.

When the concentration of boron in the spent fuel pool is less than required 2000 ppm, immediate action must be taken to preclude an accident from happening or to mitigate the consequences of an accident in progress. This is most efficiently achieved by immediately suspending the movement of fuel assemblies. This does not preclude the movement of fuel assemblies to a safe position. In addition, action must be immediately initiated to restore boron concentration to the required 2000 ppm.

If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, inability to suspend movement of fuel assemblies is not sufficient reason to require a reactor shutdown.

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.17.1

This SR verifies that the concentration of boron in the spent fuel pool is within the required limit. As long as this SR is met, the analyzed incidents are fully addressed. The 7 day Frequency is appropriate because no major replenishment of pool water is expected to take place over a short period of time.

REFERENCES

1. UFSAR, Section 9.1.

B 3.7 PLANT SYSTEMS

B 3.7.18 Spent Fuel Assembly Storage

BASES

BACKGROUND

The spent fuel storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The storage pool is sized to store 1542 fuel assemblies. Two types/sizes of spent fuel storage racks are used (Region I and Region II). The two Region I racks each contain 156 storage locations each spaced 10.40 inches on center in a 12x13 array. Four Region II storage racks each contain 210 storage locations in a 14x15 array. The remaining two Region II racks each contain 195 locations in a 13x15 array. All Region II locations are spaced 8.85 inches on center.

To maintain $K_{eff} \leq 0.95$ for spent fuel of maximum enrichment up to 4.8 w/o, (1) soluble boron is credited, and (2) the following storage patterns and borated stainless steel guide tube inserts are used as needed:

(1) unrestricted storage, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(2) SFP Peripheral storage, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(3) 2x2 storage patterns, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(4) 3x3 storage patterns, minimum discharge burnup and cooling time requirements vs. initial enrichment,

(5) credit for inserted Control Element Assemblies (CEAs),

(6) credit for erbia in fresh assemblies,

(7) credit for cooling time (Pu-241 decay), and,

(8) credit for borated stainless steel guide tube inserts.

(continued)

BASES (continued)

BACKGROUND (continued)

When soluble boron is credited, the following acceptance criteria apply:

(1) Under normal conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than 1.0 when flooded with unborated water, and,

(2) Under normal and accident conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than or equal to 0.95 when flooded with borated water.

APPLICABLE SAFETY ANALYSES

The spent fuel storage facility is designed for noncriticality by use of adequate spacing, neutron absorbing stainless steel cans, borated water with a minimum soluble boron concentration of 970 ppm; and storage of fuel assemblies in accordance with the administrative controls in LCO 3.7.18 and LCS 4.0.100, "Fuel Storage Patterns".

The spent fuel assembly storage satisfies Criterion 2 of the NRC Policy Statement.

LCO

The restrictions on the placement of fuel assemblies within the spent fuel pool, in the accompanying LCO, ensure that the K_{eff} of the spent fuel pool will always remain < 1.00 under normal, non-accident conditions assuming the pool to be flooded with unborated water. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under normal, non-accident conditions assuming the pool to be flooded with borated water with a minimum soluble boron concentration of 970 ppm. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under accident conditions assuming the pool to be flooded with borated water with a minimum soluble boron concentration of 1700 ppm. The restrictions are consistent with the criticality safety analysis performed for the spent fuel pool.

(continued)

BASES (continued)

APPLICABILITY

This LCO applies whenever any fuel assembly is stored in Regions I and II of the spent fuel pool.

ACTIONS

A.1

Required Action A.1 is modified by a Note indicating that LCO 3.0.3 does not apply.

When the configuration of fuel assemblies stored in Regions I and II of the spent fuel pool is not in accordance with LCO 3.7.18, immediate action must be taken to make the necessary fuel assembly movement(s) to bring the configuration into compliance.

If moving irradiated fuel assemblies while in MODE 5 or 6, LCO 3.0.3 would not specify any action. If moving irradiated fuel assemblies while in MODE 1, 2, 3, or 4, the fuel movement is independent of reactor operation. Therefore, in either case, inability to move fuel assemblies is not sufficient reason to require a reactor shutdown.

SURVEILLANCE REQUIREMENTS

SR 3.7.18.1

This SR verifies by administrative means that the fuel assembly is stored in accordance with LCO 3.7.18, or Design Features 4.3.1.1, or LCS 4.0.100. For fuel assemblies not stored in accordance with LCO 3.7.18, performance of this SR will ensure compliance with Specification 4.3.1.1.

This surveillance is performed prior to the initial storage of a fuel assembly in a spent fuel pool location and prior to each subsequent movement to a new location.

REFERENCES

UFSAR, Section 9.1.2.2.

Table B 3.8.9-1 (page 1 of 1)
AC and DC Electrical Power Distribution Systems

TYPE	VOLTAGE	TRAIN A		TRAIN B	
AC safety buses	4160 V 480 V	ESF Bus A04 Load Center B04		ESF Bus A06 Load Center B06	
DC buses[3]	125 V	TRAIN A	TRAIN C	TRAIN B	TRAIN D
		Bus D1 from battery B007 and charger B001 [4]	Bus D3 from battery B009 and charger B003 [4]	Bus D2 from battery B008 and charger B002 [5]	Bus D4 from battery B010 and charger B004 [5]
AC vital buses	120 V	TRAIN A	TRAIN C	TRAIN B	TRAIN D
		Bus Y01 from inverter Y001 connected to bus D1	Bus Y03 from inverter Y003 connected to bus D3	Bus Y02 from inverter Y002 connected to bus D2	Bus Y04 from inverter Y004 connected to bus D4

NOTES: (1) Each train of the AC, DC, and AC vital bus electrical power distribution systems is a subsystem.

(2) If a support system (e.g., charger or inverter) is declared inoperable and it has its own LCO, entry into LCO 3.8.9 is not required. Only entry into its LCO is required.

(3) An OPERABLE Class 1E battery bank B00X may replace any battery B007 through B010 to allow battery maintenance (including replacement) activities.

(4) Swing Charger B021 may be aligned as the OPERABLE charger in place of B001 or B003.

(5) Swing Charger B022 may be aligned as the OPERABLE charger in place of B002 or B004.

SAN ONOFRE UNIT 3 LICENSEE CONTROLLED SPECIFICATIONS

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
LOEP-1		03/05/08	3.1-103-2	0	04/24/96
LOEP-2		08/29/07	3.1-103-3	0	04/24/96
LOEP-3		12/12/07	3.1-104-1	4	12/02/02
LOEP-4		03/05/08	3.1-104-2	2	05/04/99
LOEP-5		09/27/07	3.1-104-3	2	05/04/99
LOEP-6		11/30/07	3.1-104-4	2	11/18/99
i	7	09/07/06	3.1-105-1	2	04/16/99
ii	9	09/07/06	3.1-105-2	0	07/29/96
iii	6	09/07/06	3.1-105-3	2	04/16/99
iv	3	06/27/00	3.1-105-4	2	04/16/99
v	1	09/07/06	3.1-105-5	2	06/12/97
2.0-100-1	7	05/25/00	3.1-105-6	1	06/12/97
2.0-100-2	0	04/24/96	3.1-105-7	0	07/29/96
2.0-100-3	1	05/25/00	3.1-105-8	0	07/29/96
2.0-100-4	0	04/24/96	3.1-105-9	1	12/02/96
2.0-100-5	5	03/29/99	3.1-106-1	3	05/25/00
2.0-100-6	3	03/29/99	3.1-106-2	3	05/25/00
2.0-100-7	2	03/29/99	3.1-106-3	1	05/31/97
2.0-100-8	4	03/29/99	3.1-106-4	2	05/17/99
2.0-100-9	3	03/29/99	3.1-106-5	0	05/17/99
2.0-100-10	1	03/29/99	3.1-106-6	1	05/25/00
2.0-100-11	2	05/12/00	3.1-107-1	0	11/18/05
2.0-100-12	4	05/12/00	3.1-107-2	0	11/18/05
2.0-100-13	2	05/12/00	3.1-107-3	0	11/18/05
2.0-100-14	0	03/29/99	3.1-107-4	0	11/18/05
2.0-100-15	0	03/29/99	3.1-107-5	0	11/18/05
2.0-100-16	0	03/29/99	3.1-108-1	1	07/20/06
2.0-100-17	0	03/29/99	3.1-108-2	0	11/18/05
2.0-100-18	1	05/25/00	3.1-108-3	0	11/18/05
3.0-1	1	05/25/00	3.1-108-4	0	11/18/05
3.0-1a	0	05/25/00	3.1-108-5	0	11/18/05
3.0-2	1	03/14/02	3.2-100-1	1	05/11/00
3.0-3	1	03/14/02	3.2-100-2	0	04/24/96
3.0-4	0	03/14/02	3.2-100-3	0	04/24/96
3.0-5	0	03/14/02	3.2-101-1	2	04/16/99
3.0-6	0	03/14/02	3.2-101-2	2	06/01/00
3.1-100-1	2	11/12/98	3.2-101-3	2	06/22/98
3.1-100-2	1	05/13/97	3.2-101-4	2	04/16/99
3.1-100-3	1	05/13/97	3.2-101-5	1	06/12/97
3.1-101-1	2	05/25/00	3.2-101-6	0	06/12/97
3.1-101-2	0	04/24/96	3.2-102-1	3	04/16/99
3.1-101-3	1	04/16/99	3.2-102-2	2	04/16/99
3.1-101-4	2	04/16/99	3.3-100-1	8	08/29/07
3.1-101-5	1	05/25/00	3.3-100-2	0	08/01/96
3.1-102-1	2	02/12/99	3.3-100-3	0	08/01/96
3.1-102-2	1	02/12/99	3.3-100-4	4	08/29/07
3.1-102-3	1	02/12/99	3.3-100-5	5	08/29/07
3.1-103-1	1	11/12/98	3.3-100-6	8	08/29/07

SAN ONOFRE UNIT 3 LICENSEE CONTROLLED SPECIFICATIONS

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.3-100-7	2	01/28/05	3.3-108-6	0	10/05/00
3.3-101-1	5	08/29/07	3.3-109-1	3	02/20/07
3.3-101-2	2	08/29/07	3.3-109-1a	0	02/20/07
3.3-101-3	4	08/29/07	3.3-109-2	3	02/20/07
3.3-102-1	7	04/19/04	3.3-109-3	2	02/20/07
3.3-102-2	5	04/19/04	3.3-109-4	0	02/20/07
3.3-102-2a	0	04/19/04	3.3-109-5	0	02/20/07
3.3-102-2b	0	04/19/04	3.3-109-6	0	02/20/07
3.3-102-3	0	04/24/96	3.3-110-1	0	07/23/01
3.3-102-4	4	01/05/01	3.3-110-2	0	07/02/01
3.3-102-5	4	01/05/01	3.3-110-3	0	07/02/01
3.3-102-6	0	01/05/01	3.3-110-4	0	07/02/01
3.3-102-7	1	11/13/03	3.3-110-5	0	07/23/01
3.3-102-8	1	04/19/04	3.3-111-1	5	02/05/01
3.3-102-8a	0	04/19/04	3.3-111-2	3	03/06/98
3.3-102-8b	0	04/19/04	3.3-111-3	3	03/06/98
3.3-102-9	0	01/05/01	3.3-111-4	5	02/05/01
3.3-102-10	0	01/05/01	3.3-111-5	4	02/05/01
3.3-102-11	0	01/05/01	3.3-112-1	2	12/05/06
3.3-103-1	1	05/25/00	3.3-112-2	2	12/05/06
3.3-103-2	0	04/24/96	3.3-112-3	2	12/05/06
3.3-103-3	1	05/25/00	3.3-112-4	1	12/05/06
3.3-104-1	4	05/25/00	3.3-112-5	0	12/05/06
3.3-104-2	2	05/25/00	3.3-112-6	0	12/05/06
3.3-104-3	2	12/14/00	3.3-112-7	0	12/05/06
3.3-104-4	3	01/29/99	3.3-112-8	0	12/05/06
3.3-104-5	3	05/25/00	3.3-112-9	0	12/05/06
3.3-105-1	1	05/25/00	3.3-113-1	2	10/27/03
3.3-105-2	0	04/24/96	3.3-113-2	1	03/19/03
3.3-105-3	1	05/25/00	3.3-113-3	1	03/19/03
3.3-106-1	7	06/07/01	3.3-113-4	2	10/27/03
3.3-106-2	2	04/23/01	3.3-113-5	2	10/27/03
3.3-106-3	3	03/29/99	3.3-113-6	0	03/19/03
3.3-106-4	1	03/29/99	3.3-113-7	1	10/27/03
3.3-106-5	4	05/04/99	3.3-114-1	2	10/27/03
3.3-106-6	3	01/02/99	3.3-114-2	1	03/19/03
3.3-106-7	2	05/30/97	3.3-114-3	1	03/19/03
3.3-106-8	4	06/07/01	3.3-114-4	1	03/19/03
3.3-106-9	3	06/07/01	3.3-114-5	2	10/27/03
3.3-106-10	4	04/23/01	3.3-114-6	1	03/19/03
3.3-107-1	2	08/22/00	3.3-114-7	1	10/27/03
3.3-107-2	0	04/24/96	3.3-115-1	0	04/25/05
3.3-107-3	1	05/25/00	3.3-115-2	0	04/25/05
3.3-108-1	2	10/05/00	3.3-115-3	0	04/25/05
3.3-108-2	0	04/24/96	3.3-115-4	0	04/25/05
3.3-108-3	2	10/05/00	3.4-101-1	3	05/25/00
3.3-108-4	0	10/05/00	3.4-101-2	3	05/25/00
3.3-108-5	0	10/05/00	3.4-101-2a	0	05/25/00

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.4-101-3	0	04/24/96	3.6-101-2	3	05/28/04
3.4-101-4	1	04/28/97	3.6-101-3	0	04/24/96
3.4-101-5	2	07/12/99	3.6-101-4	0	04/24/96
3.4-101-6	2	07/12/99	3.6-101-5	2	05/28/04
3.4-101-7	0	07/12/99	3.6-101-6	0	04/24/96
3.4-101-8	1	05/25/00	3.6-101-7	0	04/24/96
3.4-101-9	0	07/12/99	3.6-101-8	3	05/28/04
3.4-102-1	3	02/11/03	3.7-101-1	1	12/18/02
3.4-102-2	1	05/25/00	3.7-101-2	0	09/21/02
3.4-102-3	1	01/21/98	3.7-101-3	0	09/21/02
3.4-102-4	2	02/11/03	3.7-101-4	1	12/18/02
3.4-103-1	1	12/12/07	3.7-101-5	0	09/21/02
3.4-103-2	1	12/12/07	3.7-101-6	1	12/18/02
3.4-103-3	1	12/12/07	3.7-101-7	0	09/21/02
3.4-103-4	1	12/12/07	3.7-101-8	1	12/18/02
3.4-103-5	1	12/12/07	3.7-101-9	0	09/21/02
3.4-103-6	1	12/12/07	3.7-101-10	0	09/21/02
3.4-103-7	1	12/12/07	3.7-101-11	0	09/21/02
3.4-103-8	1	12/12/07	3.7-101-12	0	09/21/02
3.4-106-1	1	12/12/07	3.7-102-1	8	04/23/01
3.4-106-2	1	12/12/07	3.7-102-2	4	04/23/01
3.4-106-3	1	12/12/07	3.7-102-3	1	11/21/97
3.4-107-1	1	12/12/07	3.7-102-4	2	05/24/00
3.4-107-2	1	12/12/07	3.7-102-5	2	11/21/97
3.4-107-3	1	12/12/07	3.7-102-6	2	11/21/97
3.4-112.1-1	1	12/12/07	3.7-102-7	6	04/23/01
3.4-112.1-2	1	12/12/07	3.7-103-1	6	04/12/07
3.4-112.1-3	1	12/12/07	3.7-103-2	2	04/12/07
3.4-112.2-1	1	12/12/07	3.7-103-3	2	07/29/99
3.4-112.2-2	1	12/12/07	3.7-103-4	0	04/24/96
3.4-112.2-3	1	12/12/07	3.7-103-5	0	04/24/96
3.5-100-1	0	04/24/96	3.7-103-6	1	05/09/97
3.5-100-2	0	04/24/96	3.7-103-7	2	08/20/98
3.5-101-1	1	12/23/99	3.7-103-8	5	04/12/07
3.5-101-2	0	04/24/96	3.7-104-1	5	07/16/04
3.5-101-3	0	04/24/96	3.7-104-2	3	05/25/00
3.5-101-4	1	12/23/99	3.7-104-3	2	07/16/04
3.6-100-1	4	02/11/02	3.7-104-4	4	07/16/04
3.6-100-2	1	02/02/01	3.7-104-5	2	07/16/04
3.6-100-3	2	02/11/02	3.7-105-1	13	05/29/07
3.6-100-4	1	02/02/01	3.7-105-2	5	05/09/01
3.6-100-5	3	02/02/01	3.7-105-3	3	05/09/01
3.6-100-6	2	02/02/01	3.7-105-4	5	06/30/03
3.6-100-7	2	02/02/01	3.7-105-5	4	11/14/06
3.6-100-8	2	02/02/01	3.7-105-6	3	05/09/01
3.6-100-9	1	02/02/01	3.7-105-7	3	05/09/01
3.6-100-10	1	02/02/01	3.7-105-8	4	10/29/04
3.6-101-1	5	05/28/04	3.7-105-9	5	07/21/05

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.7-105-10	3	05/29/07	3.7-112-2	0	04/24/96
3.7-105-11	1	05/09/01	3.7-112-3	1	05/25/00
3.7-105-12	2	05/29/07	3.7-113-1	20	12/21/06
3.7-105-13	2	06/30/03	3.7-113-2	4	06/27/00
3.7-105-14	3	06/30/03	3.7-113-3	5	05/16/01
3.7-105-15	3	05/29/07	3.7-113-4	10	09/20/05
3.7-105-16	2	05/29/07	3.7-113-5	3	05/16/01
3.7-105-17	1	05/09/01	3.7-113-6	3	07/30/03
3.7-105-18	2	05/29/07	3.7-113-7	3	11/13/03
3.7-105-19	2	06/30/03	3.7-113-8	2	03/28/05
3.7-105-20	3	06/30/03	3.7-113-9	3	06/27/00
3.7-105-21	1	05/09/01	3.7-113-10	5	05/16/01
3.7-105-22	1	05/09/01	3.7-113-11	3	03/28/05
3.7-105-23	5	07/21/05	3.7-113-12	4	07/13/05
3.7-106-1	3	02/19/04	3.7-113-13	2	06/27/00
3.7-106-2	0	12/18/98	3.7-113-14	3	12/21/06
3.7-106-3	2	02/19/04	3.7-113-15	2	06/27/00
3.7-106-4	0	12/18/98	3.7-113-16	1	06/27/00
3.7-106-5	1	10/28/02	3.7-113-17	2	06/27/00
3.7-106-6	1	10/28/02	3.7-113-18	2	06/27/00
3.7-106-7	1	10/28/02	3.7-113-19	1	06/27/00
3.7-106-8	2	10/28/02	3.7-113-20	3	07/13/05
3.7-106-9	2	10/28/02	3.7-113-21	4	12/21/06
3.7-106-10	0	10/28/02	3.7-113-22	3	07/13/05
3.7-107-1	2	05/25/00	3.7-113-23	2	12/21/06
3.7-107-2	0	04/24/96	3.7-113-24	8	06/27/00
3.7-107-3	0	04/24/96	3.7-113-25	1	06/27/00
3.7-107-4	1	05/25/00	3.7-113-26	2	06/27/00
3.7-108-1	5	06/28/02	3.7-114-1	1	05/25/00
3.7-108-2	1	10/04/00	3.7-114-2	0	08/14/96
3.7-108-3	1	10/19/98	3.7-114-3	1	05/25/00
3.7-108-4	1	10/19/98	3.7-115-1	1	05/25/00
3.7-108-5	1	11/27/96	3.7-115-2	0	08/27/96
3.7-108-6	0	04/24/96	3.7-115-3	1	05/25/00
3.7-108-7	1	06/28/02	3.7-116-1	4	03/05/08
3.7-108-8	1	05/09/97	3.7-116-2	3	03/05/08
3.7-108-9	4	06/28/02	3.7-117-1	3	02/19/04
3.7-108-10	1	10/04/00	3.7-117-2	2	06/12/02
3.7-109-1	2	05/25/00	3.7-118-1	2	12/05/06
3.7-109-2	1	07/29/99	3.7-118-2	2	12/05/06
3.7-109-3	1	05/25/00	3.7-118-3	0	12/05/06
3.7-110-1	3	05/23/01	3.7-118-4	0	12/05/06
3.7-110-2	0	04/24/96	3.7-118-5	0	12/05/06
3.7-110-3	2	02/28/01	3.7-118-6	0	12/05/06
3.7-111-1	1	05/25/00	3.8-100-1	10	11/07/06
3.7-111-2	0	04/24/96	3.8-100-2	3	03/28/05
3.7-111-3	1	05/25/00	3.8-100-3	1	03/06/01
3.7-112-1	1	05/25/00	3.8-100-4	2	11/07/06

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
3.8-100-5	2	11/07/06	3.9-107-2	1	05/25/00
3.8-100-6	1	05/28/97	3.9-107-3	0	12/21/00
3.8-100-7	2	11/07/06	3.9-107-4	0	12/21/00
3.8-100-8	4	11/22/99	4.0-100-1	2	09/27/07
3.8-100-9	2	11/22/99	4.0-100-2	2	09/27/07
3.8-100-10	2	11/22/99	4.0-100-3	2	09/27/07
3.8-100-11	1	05/28/97	4.0-100-4	2	09/27/07
3.8-100-12	0	04/24/96	4.0-100-5	2	09/27/07
3.8-100-13	1	04/25/05	4.0-100-6	2	09/27/07
3.8-100-14	3	03/06/01	4.0-100-7	2	09/27/07
3.8-100-15	3	03/12/02	4.0-100-8	2	09/27/07
3.8-100-16	1	03/12/02	4.0-100-9	2	09/27/07
3.8-100-17	1	03/12/02	4.0-100-10	2	09/27/07
3.8-100-18	0	03/12/02	4.0-100-11	2	09/27/07
3.8-101-1	3	05/27/05	4.0-100-12	2	09/27/07
3.8-101-2	1	05/27/05	4.0-100-13	2	09/27/07
3.8-101-3	0	04/24/96	4.0-100-14	2	09/27/07
3.8-101-4	0	04/24/96	4.0-100-15	2	09/27/07
3.8-101-5	0	04/24/96	4.0-100-16	2	09/27/07
3.8-101-6	1	05/28/97	4.0-100-17	2	09/27/07
3.8-101-7	0	04/24/96	4.0-100-18	2	09/27/07
3.8-101-8	1	05/25/00	4.0-100-19	2	09/27/07
3.8-102-1	0	01/03/00	4.0-100-20	2	09/27/07
3.8-102-2	0	01/03/00	4.0-100-21	2	09/27/07
3.8-102-3	0	01/03/00	4.0-100-22	2	09/27/07
3.8-102-4	0	01/03/00	4.0-100-23	2	09/27/07
3.8-102-5	0	01/03/00	4.0-100-24	2	09/27/07
3.8-102-6	0	01/03/00	4.0-100-25	2	09/27/07
3.8-102-7	0	01/03/00	4.0-100-26	2	09/27/07
3.8-102-8	0	01/03/00	4.0-100-27	2	09/27/07
3.8-102-9	0	01/03/00	4.0-100-28	2	09/27/07
3.9-100-1	3	11/18/05	4.0-100-29	2	09/27/07
3.9-100-2	1	11/18/05	4.0-100-30	2	09/27/07
3.9-100-3	3	11/18/05	4.0-100-31	2	09/27/07
3.9-101-1	1	05/25/00	4.0-100-32	2	09/27/07
3.9-101-2	1	05/25/00	4.0-100-33	2	09/27/07
3.9-102-1	2	05/25/00	4.0-100-34	2	09/27/07
3.9-102-2	2	05/25/00	4.0-100-35	2	09/27/07
3.9-103-1	2	05/25/00	4.0-100-36	2	09/27/07
3.9-103-2	2	05/09/97	4.0-100-37	2	09/27/07
3.9-103-3	1	05/25/00	4.0-100-38	2	09/27/07
3.9-104-1	2	05/25/00	4.0-100-39	2	09/27/07
3.9-104-2	2	05/25/00	4.0-100-40	2	09/27/07
3.9-104-3	2	05/25/00	4.0-100-41	2	09/27/07
3.9-106-1	1	05/25/00	4.0-100-42	2	09/27/07
3.9-106-2	1	05/09/97	4.0-100-43	2	09/27/07
3.9-106-3	1	05/25/00	4.0-100-44	2	09/27/07
3.9-107-1	2	12/21/00			

SAN ONOFRE UNIT 3 LICENSEE CONTROLLED SPECIFICATIONS

LIST OF EFFECTIVE PAGES

Page No.	Rev.	Date	Page No.	Rev.	Date
4.0-100-45	2	09/27/07			
4.0-100-46	2	09/27/07			
4.0-100-47	2	09/27/07			
4.0-100-48	2	09/27/07			
4.0-100-49	2	09/27/07			
4.0-100-50	2	09/27/07			
4.0-100-51	2	09/27/07			
4.0-100-52	2	09/27/07			
4.0-100-53	2	09/27/07			
4.0-100-54	2	09/27/07			
4.0-100-55	2	09/27/07			
4.0-100-56	2	09/27/07			
4.0-100-57	2	09/27/07			
4.0-100-58	2	09/27/07			
4.0-100-59	2	09/27/07			
4.0-100-60	2	09/27/07			
4.0-100-61	2	09/27/07			
4.0-100-62	2	09/27/07			
4.0-100-63	2	09/27/07			
5.0-100-1	3	08/29/06			
5.0-100-2	3	08/29/06			
5.0-100-3	1	08/29/06			
5.0-100-4	1	09/24/03			
5.0-101-1	0	04/24/96			
5.0-103-1	5	11/30/07			
5.0-103-2	2	11/30/07			
5.0-103-3	0	04/24/96			
5.0-103-4	5	02/28/01			
5.0-103-5	0	04/24/96			
5.0-103-6	1	11/06/06			
5.0-104-1	1	02/14/97			
5.0-104-2	1	02/14/97			
5.0-105-1	2	03/21/06			
5.0-105-2	2	03/21/06			

(LCS 3.7.116 deleted upon implementation of Amendment 205)

(LCS 3.7.116 deleted upon implementation of Amendment 205)

4.0 DESIGN FEATURES

LCS 4.0.100 Fuel Storage Patterns

NOTE 1:

This Licensee Controlled Specification is listed by revision number and data in Technical Specification 4.3.1. All changes to pages 1 through 61 Rev. 2 dated 09/27/2007 of this LCS (i.e., excluding the Bases pages) must be approved by the NRC via the amendment application process in conjunction with an associated change to Technical Specification 4.3.1.

NOTE 2:

Prior to using the storage criteria in 4.0.100.1, 4.0.100.2, and 4.0.100.4 below, the following uncertainties shall be applied:

(1) The calculated discharge burnup of San Onofre Units 2 and 3 fuel assemblies will be reduced by 6.6%.

(2) The calculated discharge burnup of San Onofre Unit 1 fuel assemblies will be reduced by 10.0%.

VALIDITY STATEMENT: Rev. 2 effective upon NRC approval, to be implemented within 180 days.

4.0.100 New or burned fuel (which does not meet the criteria of LCO 3.7.18 for unrestricted storage or storage at the pool periphery) may be stored in Region I or Region II in accordance with the allowable Storage Patterns described in this LCS.

4.0.100.1 Region I = Region I Storage Patterns are given in Tables I-1 through I-8 and Figures I-1 through I-9.

4.0.100.2 Region II = Region II Storage Patterns are given in Tables II-1 through II-15 and Figures II-1 through II-22.

4.0.100.3 SONGS Unit 1 Fuel shall not be stored in Region I Racks.

4.0.100.4 The burnup of each SONGS Unit 1 uranium dioxide spent fuel assembly stored in Region II shall meet the following criteria:

4.0.100.4.1 SONGS Unit 1 nominal 3.40 w/o assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 25,000 MWD/T, and
the cooling time is greater than 5 years.

4.0.100.4.2 SONGS Unit 1 nominal 4.00 w/0 assemblies can be stored in the Region II Racks (unrestricted) if:

the burnup is greater than 26,300 MWD/T, and
the cooling time is greater than 20 years.

the burnup is greater than 27,100 MWD/T, and
the cooling time is greater than 15 years.

the burnup is greater than 28,200 MWD/T, and
the cooling time is greater than 10 years.

4.0.100.4.3 SONGS Unit 1 nominal 4.00 w/o assemblies can be stored in the Region II Racks (SFP periphery) if:

the burnup is greater than 20,000 MWD/T, and
the cooling time is greater than 0 years.

4.0.100.5 Design Requirements For Guide Tube Inserts

(i) GT-Inserts shall be 0.75 inches O.D. minimum, completely cover the active fuel region (150 inches), and have a minimum boron content of 0.02434 grams of B-10 per cm^3.

(ii) Three (3) or 5 GT-Inserts are allowed. The orientation of every fuel assembly with 3 guide tube inserts shall be the same (Figure II-23).

(iii) A 5-finger, full length Control Element Assembly (CEA) may be used in place of borated stainless steel or aluminum guide tube inserts.

4.0.100.6 Design requirements For Erbia

Assemblies containing 40 or 80 erbia rods shall have the erbia rods distributed per Figures II-24 and II-25. The minimum initial nominal erbia loading shall be 2.0 w/o Er203.

4.0.100.7 The Failed Fuel Rod Storage Basket (FFRSB)

The Failed Fuel Rod Storage Basket (FFRSB) shall be treated as if it were an assembly with enrichment and burnup of the rod in the basket with the most limiting combination of enrichment and burnup.

4.0 DESIGN FEATURES (continued)

4.0.100.8 Non-Fuel Components

Neutron sources and non-fuel bearing assembly components (thimble plugs, CEAs, etc) may be stored in fuel assemblies without affecting the storage requirements of these assemblies. A storage basket containing no fissile material can be stored in any storage location, and can be used as a storage cell blocker for reactivity control.

4.0.100.9 Fuel Assembly Reconstitution Station

A fuel assembly reconstitution station is a special case of a checkerboard pattern. A reconstitution station is permitted anywhere in the Region I racks. The empty cells in the checkerboard pattern do not need to be blocked. A reconstitution station is permitted anywhere in the Region II racks provided that empty cells in the checkerboard pattern are blocked to make it impossible to misload a fuel assembly during reconstitution activities.

Table I-1

REGION I

Category I-1 Fuel
(Unrestricted Storage)

Initial Enrichment (w/o	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	22.84	21.47	20.59	20.04	19.67
4.50	18.61	17.57	16.89	16.45	16.17
4.00	14.30	13.58	13.09	12.78	12.57
3.50	9.84	9.40	9.11	8.92	8.79
3.00	5.24	5.02	4.91	4.84	4.79
2.47	0.00	0.00	0.00	0.00	0.00

Category I-1	Category I-1
Category I-1	Category I-1

Note: Category I-1 and fresh fuel with full-length 5-finger CEAs (Table I-5) may be stored together with no restrictions.

4.0 DESIGN FEATURES (continued)

Table I-2

REGION I

Category I-2 Fuel
(SFP Peripheral Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	12.55	12.15	11.82	11.61	11.47
4.50	9.09	8.85	8.63	8.49	8.40
4.00	5.58	5.43	5.33	5.25	5.21
3.50	2.22	2.13	2.09	2.05	2.03
3.20	0.00	0.00	0.00	0.00	0.00

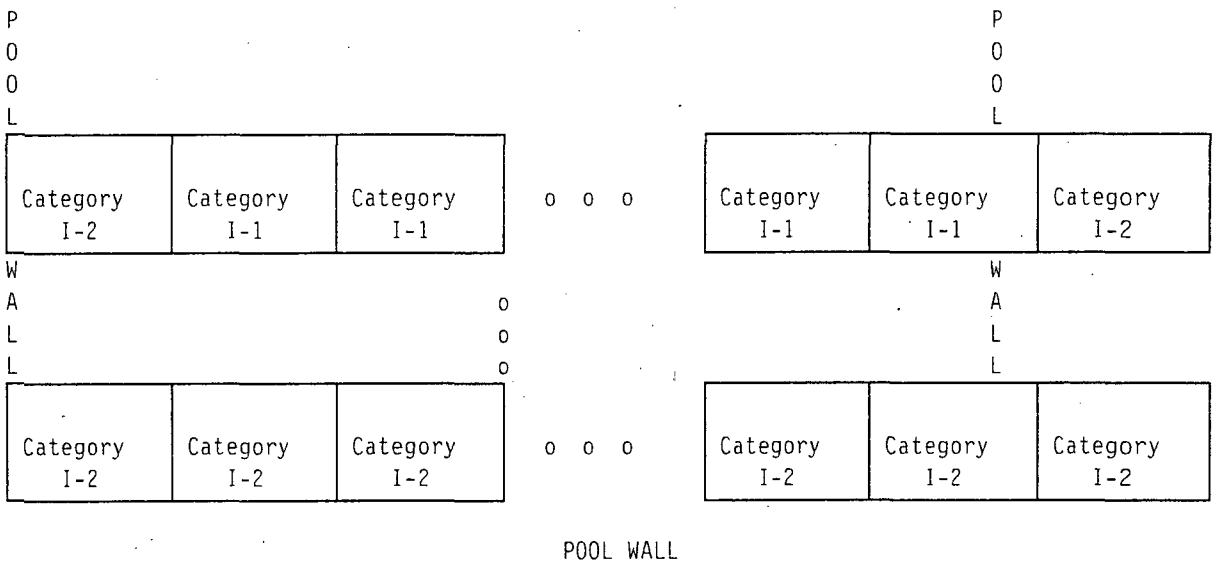


Table I-3

REGION I

Category I-3 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/T) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	39.99	36.28	34.27	33.04	32.22
4.50	34.95	31.71	29.94	28.84	28.12
4.00	29.71	26.99	25.46	24.51	23.89
3.50	24.22	22.03	20.79	20.02	19.52
3.00	18.37	16.84	15.91	15.34	14.97
2.50	12.21	11.30	10.72	10.37	10.13
2.00	5.28	5.05	4.85	4.72	4.62
1.71	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Category I-3
Category I-3	Category I-3

Table I-4

REGION I

4.80 w/o Fresh Fuel
Checkerboard Pattern

Initial Enrichment (w/o)	Minimum Burnup (GWD/T)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Empty
Empty	4.80 Fresh

Table I-5

REGION I

4.8 w/o Fresh Fuel With Full-Length, 5-Finger CEA
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh With CEA	4.80 Fresh With CEA
4.80 Fresh With CEA	4.80 Fresh With CEA

Note: Category I-1 and fresh fuel with full-length 5-finger CEAs (Table I-5) may be stored together with no restrictions.

Table I-6

REGION I

Category I-4 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	26.57	24.71	23.59	22.90	22.44
4.50	22.12	20.62	19.73	19.17	18.80
4.00	17.54	16.46	15.78	15.35	15.07
3.50	12.84	12.12	11.66	11.37	11.18
3.00	7.95	7.56	7.31	7.15	7.05
2.50	2.76	2.64	2.56	2.50	2.46
2.27	0.00	0.00	0.00	0.00	0.00

4.80 Fresh 80 Erbia	Category I-4
Category I-4	Category I-4

Table I-7

REGION I

Category I-5 Fuel
(Filler Assembly For 1-out-of-4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	30.81	28.40	27.00	26.14	25.57
4.50	26.17	24.17	22.99	22.26	21.78
4.00	21.32	19.77	18.84	18.27	17.88
3.50	16.32	15.22	14.55	14.13	13.85
3.00	11.11	10.45	10.05	9.79	9.61
2.50	5.55	5.30	5.14	5.04	4.98
2.07	0.00	0.00	0.00	0.00	0.00

4.80 Fresh 40 Erbia	Category I-5
Category I-5	Category I-5

Table I-8

REGION I

Checkerboard Pattern

Category I-6 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.82	18.84	18.12	17.67	17.37
4.50	15.83	15.11	14.58	14.24	14.01
4.00	11.75	11.28	10.92	10.69	10.54
3.50	7.56	7.23	7.04	6.91	6.83
3.00	3.28	3.15	3.07	3.03	2.99
2.65	0.00	0.00	0.00	0.00	0.00

Category I-4 Fuel
(Checkerboard Partner For Category I-6 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	26.57	24.71	23.59	22.90	22.44
4.50	22.12	20.62	19.73	19.17	18.80
4.00	17.54	16.46	15.78	15.35	15.07
3.50	12.84	12.12	11.66	11.37	11.18
3.00	7.95	7.56	7.31	7.15	7.05
2.50	2.76	2.64	2.56	2.50	2.46
2.27	0.00	0.00	0.00	0.00	0.00

Category I-4	Category I-6
Category I-6	Category I-4

Table II-1

REGION II

Category II-1 Fuel
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	53.76	47.77	44.75	43.00	41.86
4.50	48.43	42.93	40.15	38.52	37.47
4.00	42.91	37.94	35.40	33.92	32.96
3.00	30.99	27.26	25.30	24.16	23.43
2.00	17.05	14.97	13.90	13.25	12.83
1.87	14.93	13.23	12.26	11.68	11.31
1.23	0.00	0.00	0.00	0.00	0.00

Category II-1	Category II-1
Category II-1	Category II-1

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

Table II-2

REGION II

Category II-2 Fuel
(SFP Peripheral Storage)

Initial Enrichment (w/o)	Minimum Burnup GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	36.95	33.68	31.89	30.81	30.10
4.50	32.29	29.44	27.87	26.91	26.28
4.00	27.44	25.04	23.70	22.88	22.35
3.00	16.95	15.62	14.83	14.34	14.03
2.00	4.93	4.67	4.52	4.42	4.35
1.87	3.04	2.87	2.76	2.69	2.64
1.70	0.00	0.00	0.00	0.00	0.00

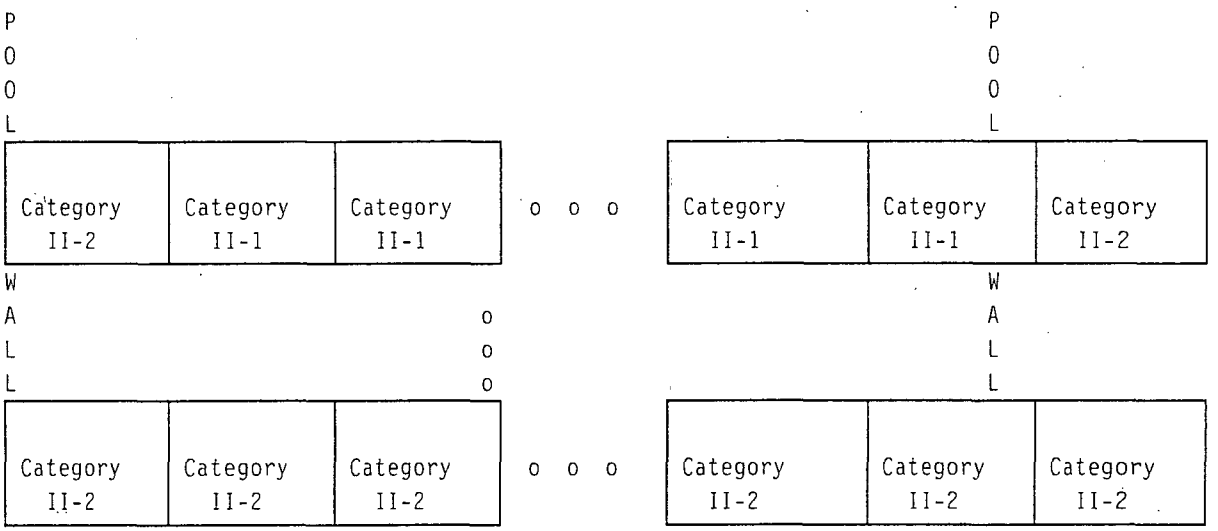


Table II-3

REGION II

Checkerboard Storage

Category II-3 Fuel
(Checkerboard Partner For Category II-4 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	41.18	37.27	35.18	33.93	33.12
4.50	36.34	32.87	31.01	29.88	29.15
4.00	31.29	28.31	26.69	25.70	25.06
3.00	20.32	18.50	17.47	16.84	16.42
2.00	7.81	7.25	6.91	6.71	6.58
1.87	5.90	5.53	5.30	5.17	5.09
1.56	0.00	0.00	0.00	0.00	0.00

Category II-4 Fuel
(Checkerboard Partner For Category II-3 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	75.42	61.90	56.85	54.18	52.60
4.50	68.08	56.12	51.65	49.25	47.76
4.00	60.74	50.35	46.44	44.19	42.78
3.00	46.06	38.80	35.41	33.52	32.31
2.00	31.38	25.71	23.12	21.65	20.71
1.87	29.19	23.83	21.34	19.91	19.08
0.94	0.00	0.00	0.00	0.00	0.00

Category II-4	Category II-3
Category II-3	Category II-4

Table II-4

REGION II

Checkerboard Storage

Category II-5 Fuel
(Checkerboard Partner For Category II-6 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.50	42.58	40.03	38.53	37.55
4.50	42.40	37.95	35.64	34.26	33.37
4.00	37.10	33.16	31.10	29.86	29.06
3.00	25.64	22.89	21.40	20.52	19.95
2.00	12.29	11.10	10.42	10.01	9.75
1.87	10.24	9.35	8.80	8.46	8.25
1.38	0.00	0.00	0.00	0.00	0.00

Category II-6 Fuel
(Checkerboard Partner For Category II-5 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	62.37	53.95	50.33	48.25	46.91
4.50	56.21	48.90	45.51	43.56	42.31
4.00	50.04	43.67	40.54	38.73	37.57
3.00	37.71	32.56	29.97	28.52	27.58
2.00	23.30	19.80	18.13	17.14	16.50
1.87	21.11	18.02	16.42	15.48	14.88
1.08	0.00	0.00	0.00	0.00	0.00

Category II-6	Category II-5
Category II-5	Category II-6

Table II-5

REGION II

Checkerboard Storage

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
4.80	0.00	0.00	0.00	0.00	0.00

4.80 Fresh	Empty (Blocked)
Empty (Blocked)	4.80 Fresh

Table II-6

REGION II

Category II-7 Fuel
(3 Out Of 4 Pattern)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	34.20	31.35	29.74	28.76	28.12
4.50	29.67	27.21	25.82	24.97	24.41
4.00	24.94	22.92	21.75	21.05	20.59
3.00	14.79	13.76	13.13	12.73	12.47
2.00	3.16	3.00	2.90	2.83	2.79
1.87	1.21	1.14	1.09	1.06	1.04
1.80	0.00	0.00	0.00	0.00	0.00

Category II-7	Empty (Blocked)
Category II-7	Category II-7

Table II-7

REGION II

Category II-8 Fuel
(Fuel With 5 GT-Inserts)
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	37.68	34.53	32.72	31.61	30.88
4.50	32.61	29.90	28.33	27.36	26.72
4.00	27.33	25.10	23.78	22.97	22.43
3.00	15.86	14.76	14.06	13.61	13.32
2.00	2.04	1.97	1.89	1.84	1.81
1.90	0.00	0.00	0.00	0.00	0.00

Category II-8	Category II-8
Category II-8	Category II-8

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

Table II-8

REGION II

Category II-9 Fuel
(Fuel With 3 GT-Inserts)
(Unrestricted Storage)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	44.16	39.95	37.68	36.31	35.42
4.50	38.99	35.25	33.22	31.99	31.18
4.00	33.61	30.38	28.60	27.52	26.81
3.00	21.92	19.86	18.72	18.01	17.56
2.00	8.28	7.72	7.34	7.11	6.96
1.87	6.18	5.83	5.58	5.43	5.34
1.59	0.00	0.00	0.00	0.00	0.00

Category II-9	Category II-9
Category II-9	Category II-9

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

Table II-9

REGION II

Category II-10 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	80.09	65.66	60.12	57.45	55.68
4.50	72.13	59.43	54.55	52.02	50.33
4.00	64.18	53.19	48.98	46.58	44.98
3.00	48.27	40.72	37.16	35.03	33.75
2.00	32.35	26.59	23.79	22.25	21.25
1.03	0.00	0.00	0.00	0.00	0.00

Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)
Category II-10 (GT-Inserts)	4.80 Fresh	Category II-10 (GT-Inserts)
Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)	Category II-10 (GT-Inserts)

Table II-10

REGION II

Category II-11 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.04	42.52	40.05	38.57	37.60
4.50	41.62	37.58	35.36	34.02	33.14
4.00	35.97	32.46	30.50	29.32	28.54
3.00	23.70	21.42	20.09	19.31	18.79
2.00	9.17	8.54	8.09	7.81	7.62
1.59	0.00	0.00	0.00	0.00	0.00

Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)
Category II-11 (GT-Inserts)	4.80 Fresh 5 Inserts	Category II-11 (GT-Inserts)
Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)	Category II-11 (GT-Inserts)

Table II-11

REGION II

Category II-12 Fuel
(Filler Assembly With 3 GT-Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	54.33	48.48	45.46	43.67	42.51
4.50	48.81	43.45	40.67	39.02	37.95
4.00	43.07	38.24	35.72	34.22	33.26
3.00	30.65	27.11	25.18	24.05	23.33
2.00	16.01	14.23	13.22	12.62	12.22
1.87	13.82	12.35	11.47	10.94	10.60
1.32	0.00	0.00	0.00	0.00	0.00

Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)
Category II-12 (GT-Inserts)	4.80 Fresh 5 Inserts	Category II-12 (GT-Inserts)
Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)	Category II-12 (GT-Inserts)

Table II-12

REGION II

Category II-13 Fuel
(Filler Assembly With No GT-Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	64.24	55.51	51.59	49.41	48.03
4.50	57.99	50.23	46.73	44.67	43.38
4.00	51.75	44.94	41.71	39.79	38.59
3.00	39.25	33.75	31.05	29.48	28.50
2.00	24.76	20.95	19.07	18.01	17.33
1.87	22.64	19.10	17.38	16.37	15.72
1.05	0.00	0.00	0.00	0.00	0.00

Category II-13	Category II-13	Category II-13
Category II-13	4.80 Fresh 5 Inserts	Category II-13
Category II-13	Category II-13	Category II-13

Table II-13

REGION II

Category II-14 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.59	18.61	17.96	17.54	17.27
4.50	15.93	15.17	14.68	14.36	14.15
4.00	12.18	11.64	11.29	11.07	10.93
3.00	4.28	4.12	4.05	4.00	3.98
2.51	0.00	0.00	0.00	0.00	0.00

Category II-13 Fuel
(Filler Assembly For Category II-14 Fuel)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	64.24	55.51	51.59	49.41	48.03
4.50	57.99	50.23	46.73	44.67	43.38
4.00	51.75	44.94	41.71	39.79	38.59
3.00	39.25	33.75	31.05	29.48	28.50
2.00	24.76	20.95	19.07	18.01	17.33
1.87	22.64	19.10	17.38	16.37	15.72
1.05	0.00	0.00	0.00	0.00	0.00

Category II-13	Category II-13	Category II-13
Category II-13	Category II-14	Category II-13
Category II-13	Category II-13	Category II-13

Table II-14

REGION II

Category II-14 Fuel
(4.80 w/o Assembly Depleted to 18.0 GWD/MTU)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	19.59	18.61	17.96	17.54	17.27
4.50	15.93	15.17	14.68	14.36	14.15
4.00	12.18	11.64	11.29	11.07	10.93
3.00	4.28	4.12	4.05	4.00	3.98
2.51	0.00	0.00	0.00	0.00	0.00

Category II-11 Fuel
(Filler Assembly With 5 Guide Tube Inserts)

Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU) 0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	47.04	42.52	40.05	38.57	37.60
4.50	41.62	37.58	35.36	34.02	33.14
4.00	35.97	32.46	30.50	29.32	28.54
3.00	23.70	21.42	20.09	19.31	18.79
2.00	9.17	8.54	8.09	7.81	7.62
1.59	0.00	0.00	0.00	0.00	0.00

Category II-11 (5 Inserts)	Category II-11 (5 Inserts)	Category II-11 (5 Inserts)
Category II-11 (5 Inserts)	Category II-14	Category II-11 (5 Inserts)
Category II-11 (5 Inserts)	Category II-11 (5 Inserts)	Category II-11 (5 Inserts)

Table II-15

REGION II

Category II-15 Fuel
(Fuel With 5 Finger Full Length CEA)
(Unrestricted Storage)

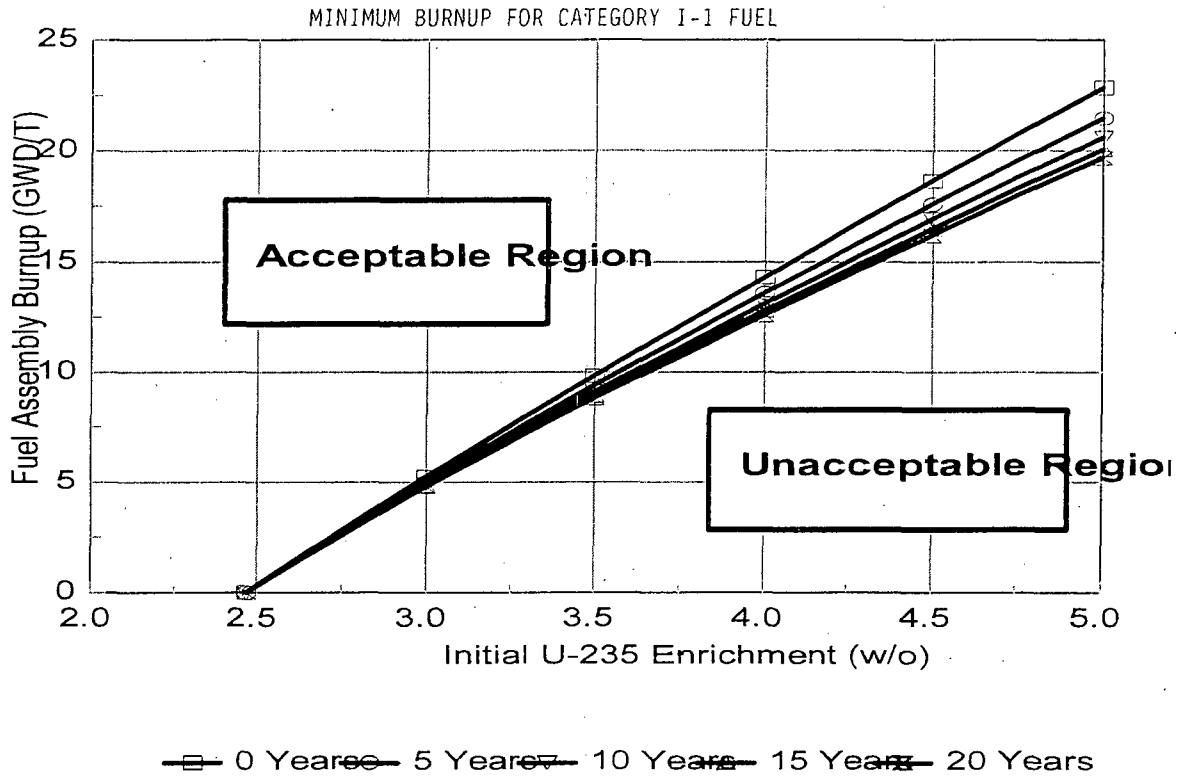
Initial Enrichment (w/o)	Minimum Burnup (GWD/MTU)				
	0 Years Cooling	5 Years Cooling	10 Years Cooling	15 Years Cooling	20 Years Cooling
5.00	29.24	27.24	26.00	25.22	24.70
4.50	24.44	22.84	21.81	21.17	20.75
4.00	19.41	18.26	17.49	17.00	16.68
3.00	8.83	8.47	8.19	8.02	7.90
2.30	0.00	0.00	0.00	0.00	0.00

Category II-15	Category II-15
Category II-15	Category II-15

Note: Category II-1, II-8, II-9, and II-15 may be stored together with no restrictions.

Figure I-1

REGION I

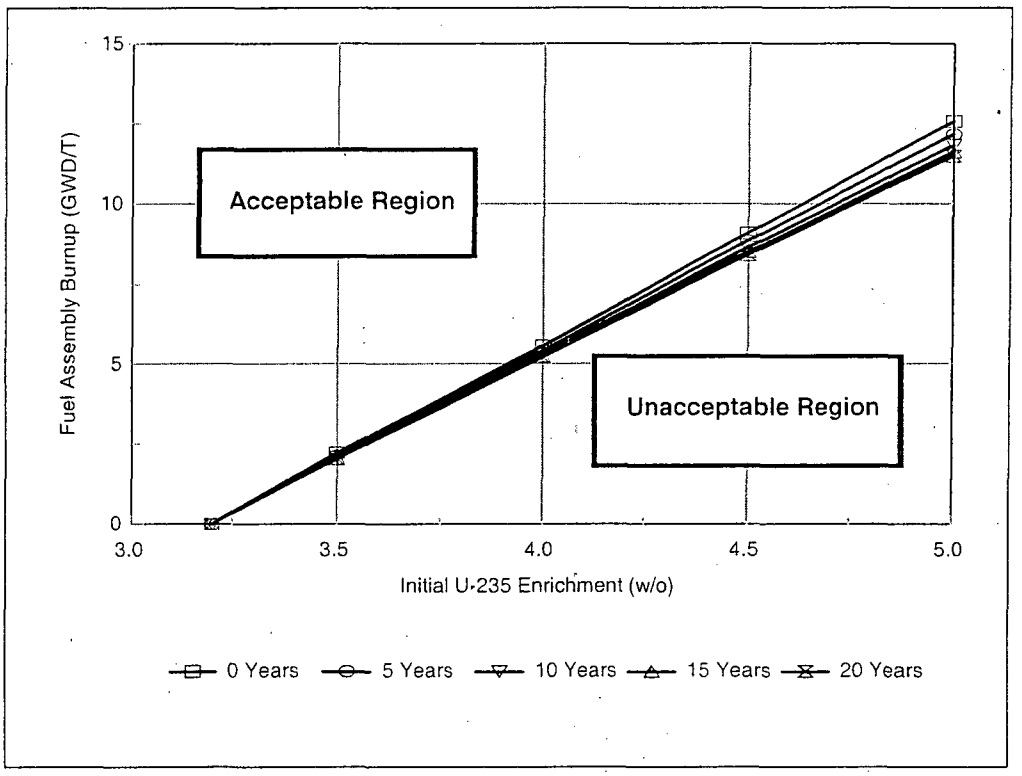


4.0 DESIGN FEATURES (continued)

Figure I-2

REGION I

MINIMUM BURNUP FOR CATEGORY I-2 FUEL

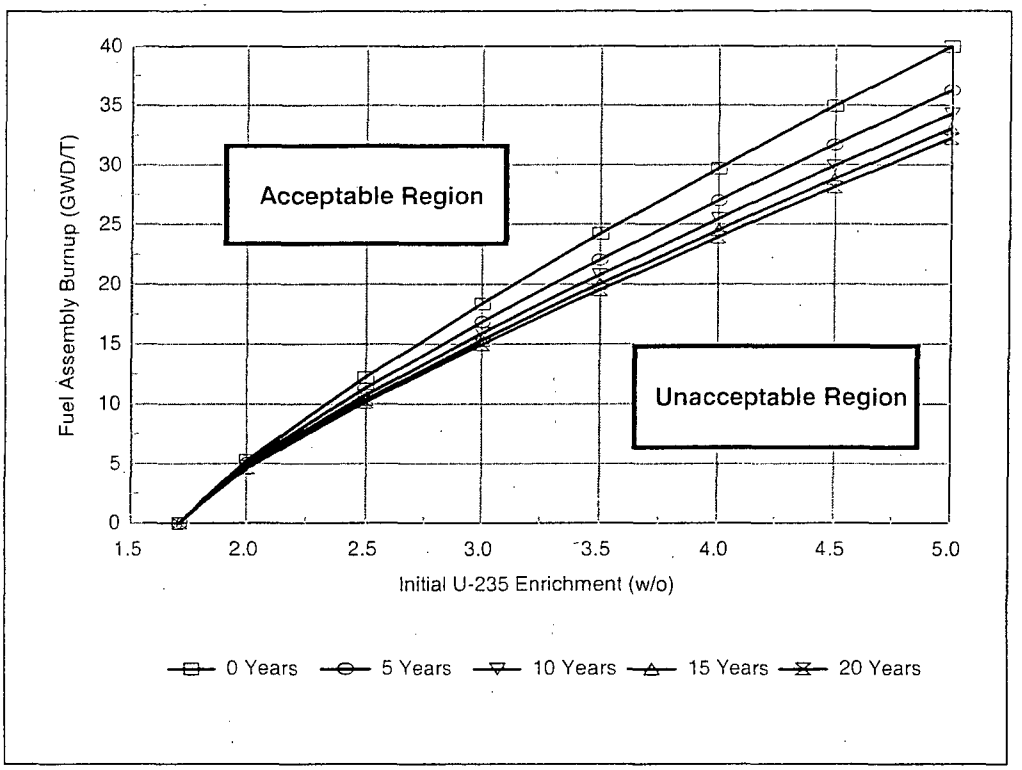


4.0 DESIGN FEATURES (continued)

Figure I-3

REGION I

MINIMUM BURNUP FOR CATEGORY I-3 FUEL



4.0 DESIGN FEATURES (continued)

Figure I-4

REGION I

MINIMUM BURNUP FOR CATEGORY I-4 FUEL

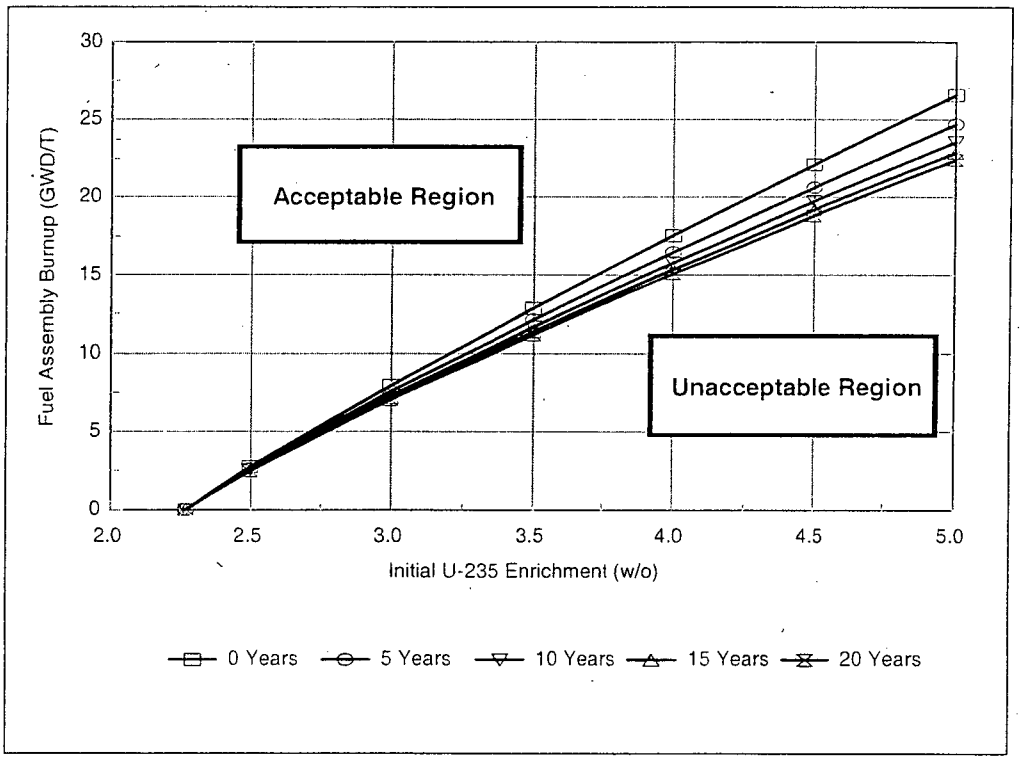
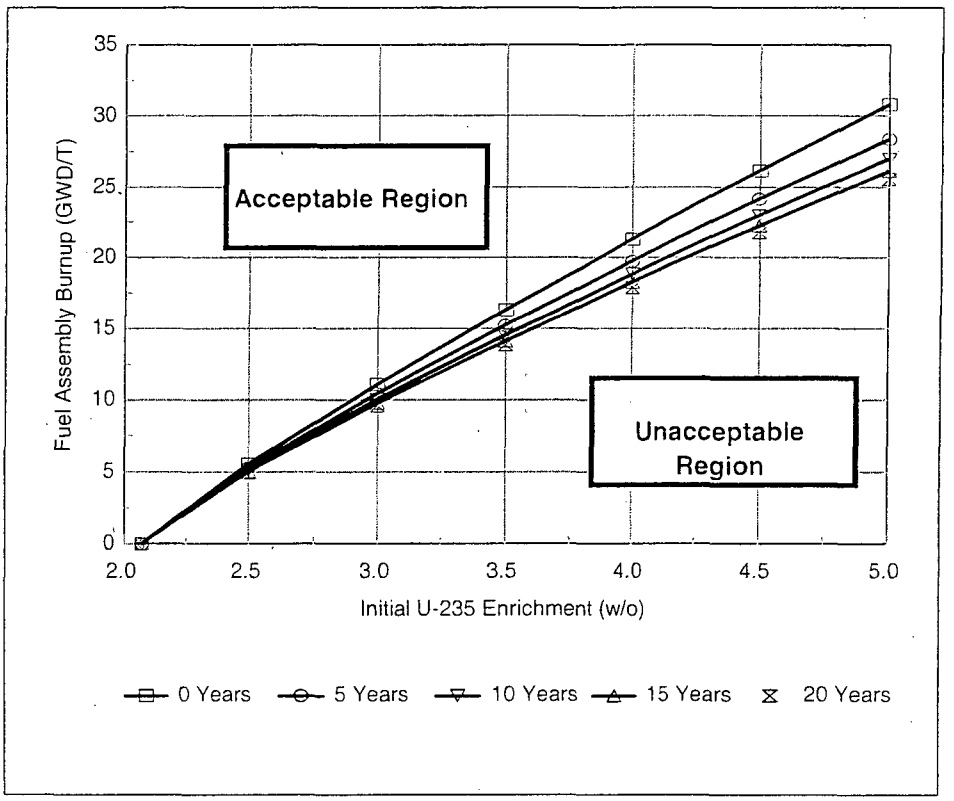


Figure I-5

REGION I

MINIMUM BURNUP FOR CATEGORY I-5 FUEL



4.0 DESIGN FEATURES (continued)

Figure I-6

REGION I

MINIMUM BURNUP FOR CATEGORY I-6 FUEL

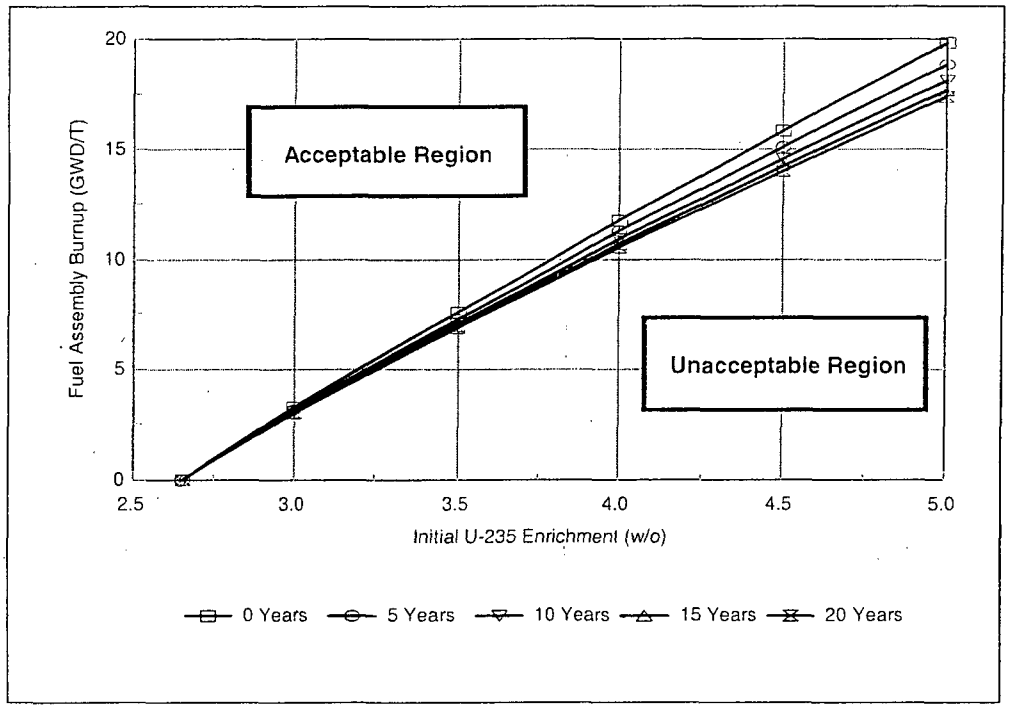


Figure I-7

REGION I

Boundary Between Unrestricted Storage And Checkerboard Storage

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	Empty	I-1	I-1	I-1	I-1
Empty	4.80	Empty	I-1	I-1	I-1
4.80	Empty	I-1	I-1	I-1	I-1

Interface

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-4	I-1	I-1	I-1	I-1
I-4	I-6	I-4	I-1	I-1	I-1
I-6	I-4	I-1	I-1	I-1	I-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

Figure I-8

REGION I

Boundary Between Unrestricted Storage And 1 Out Of 4 Storage

I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-1	I-1	I-1	I-1	I-1	I-1
I-3	I-3	I-3	I-1	I-1	I-1
I-3	4.80	I-3	I-1	I-1	I-1
I-3	I-3	I-3	I-1	I-1	I-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

Figure I-9

REGION I

Boundary Between Checkerboard Storage And 1 Out Of 4 Storage

4.80	Empty	4.80	Empty	4.80	Empty
Empty	4.80	Empty	4.80	Empty	4.80
4.80	Empty	4.80	Empty	4.80	Empty
Empty	I-3	Empty	4.80	Empty	4.80
I-3	4.80	I-3	Empty	4.80	Empty
I-3	I-3	Empty	4.80	Empty	4.80

Interface

I-6	I-4	I-6	I-4	I-6	I-4
I-4	I-6	I-4	I-6	I-4	I-6
I-6	I-4	I-6	I-4	I-6	I-4
I-3	I-3	I-3	I-6	I-4	I-6
I-3	4.80	I-3	I-4	I-6	I-4
I-3	I-3	I-3	I-6	I-4	I-6

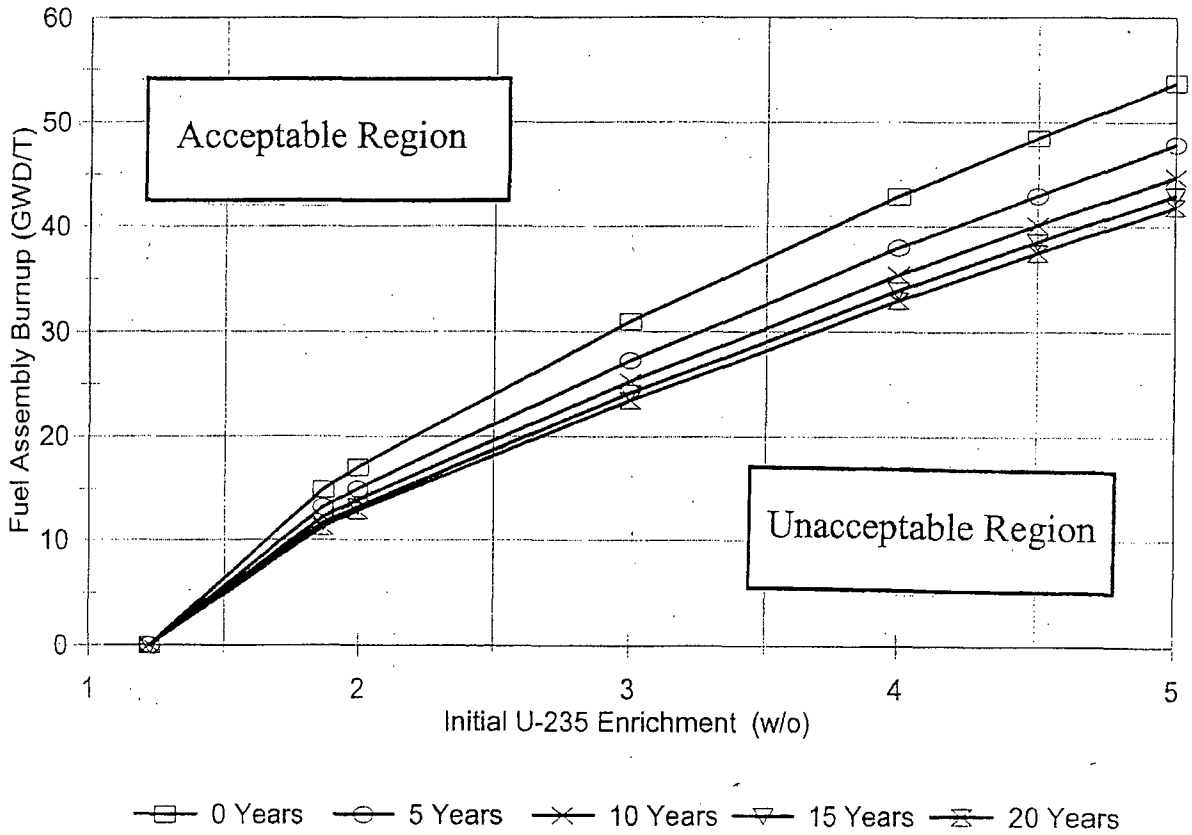
Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.
(2) It is acceptable to replace an assembly with an empty cell.

Figure II-1

REGION II

MINIMUM BURNUP FOR CATEGORY II-1 FUEL

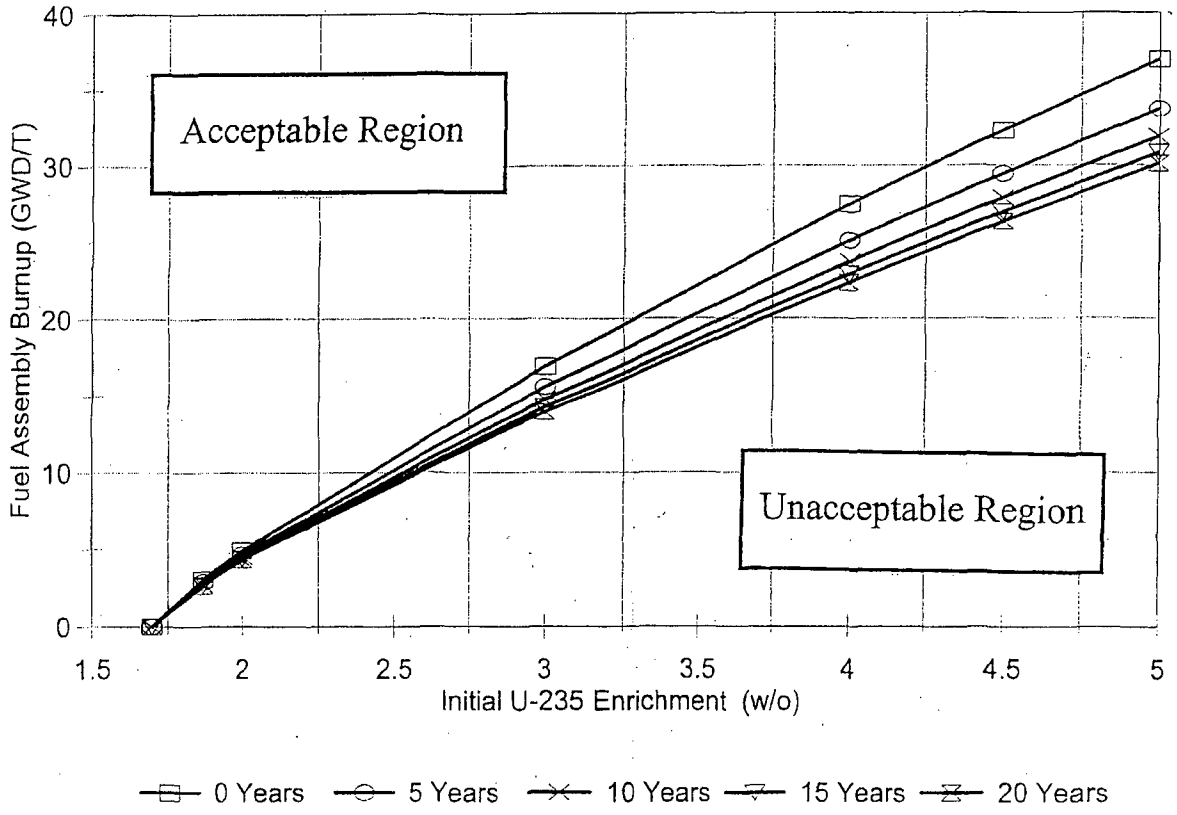


4.0 DESIGN FEATURES (continued)

Figure II-2

REGION II

MINIMUM BURNUP FOR CATEGORY II-2 FUEL

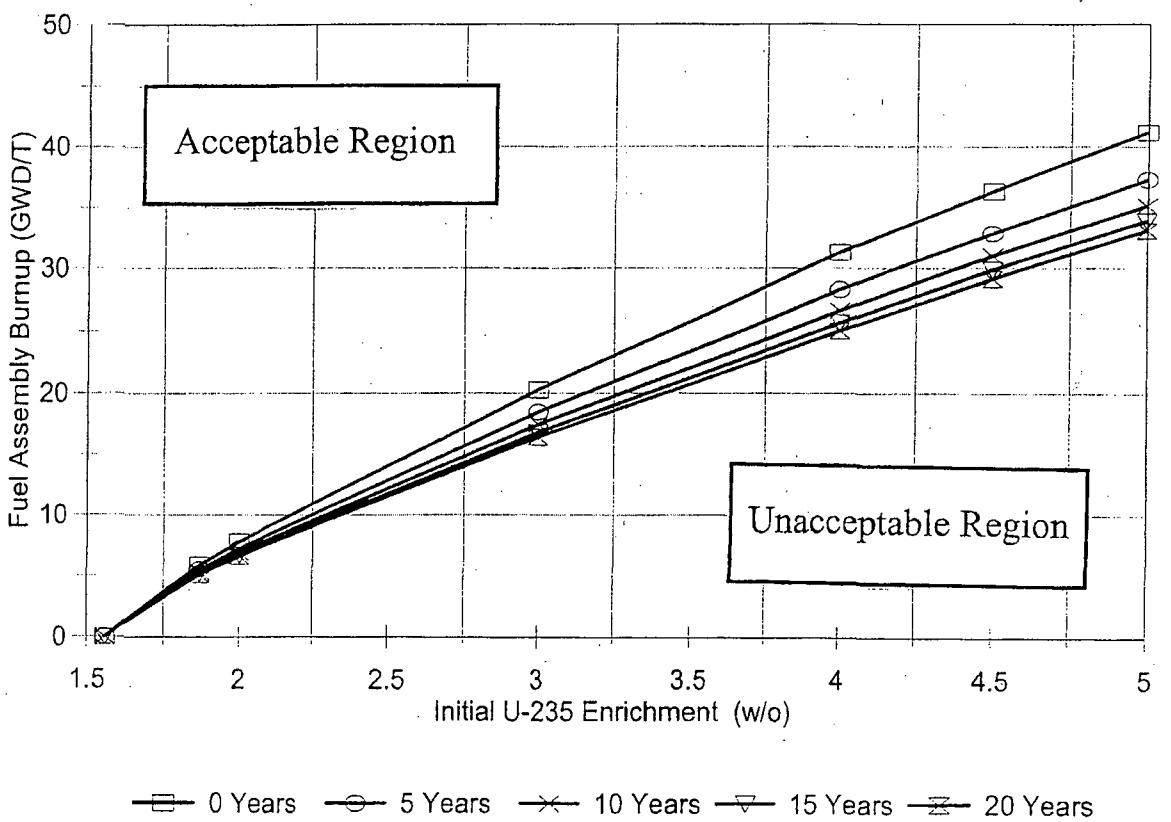


4.0 DESIGN FEATURES (continued)

Figure II-3

REGION II

MINIMUM BURNUP FOR CATEGORY II-3 FUEL

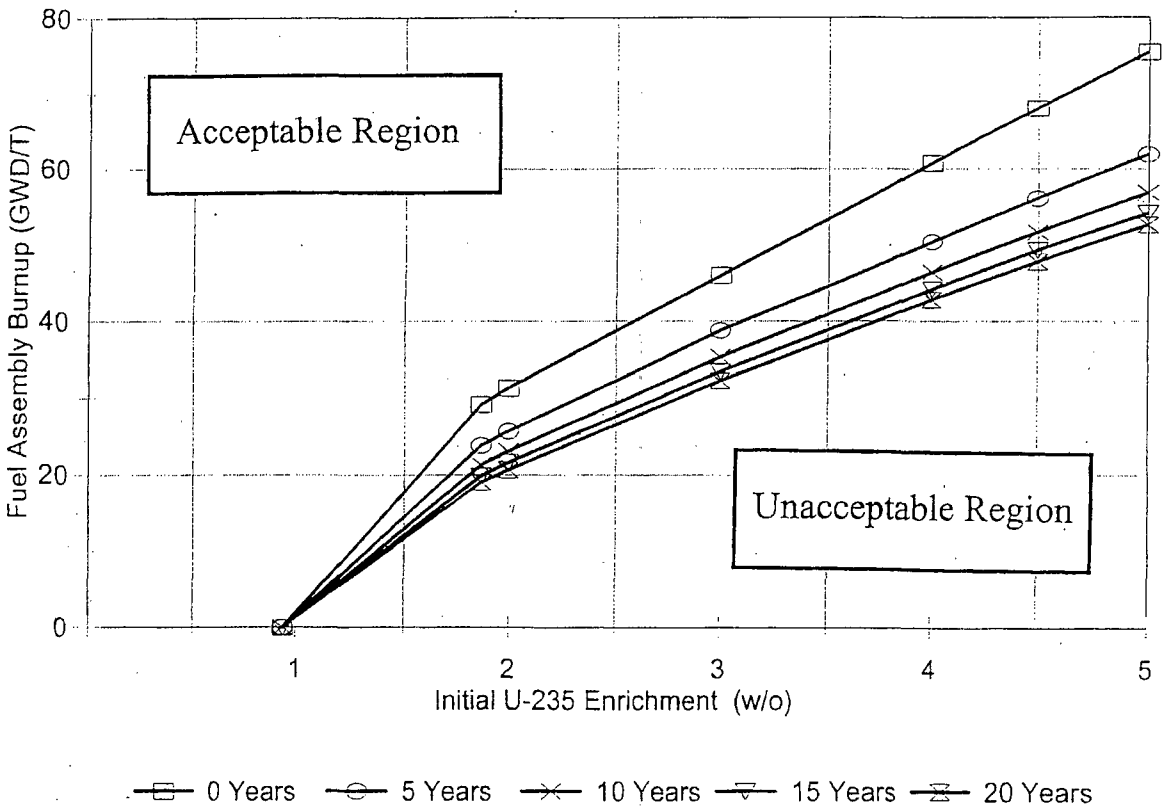


4.0 DESIGN FEATURES (continued)

Figure II-4

REGION II

MINIMUM BURNUP FOR CATEGORY II-4 FUEL

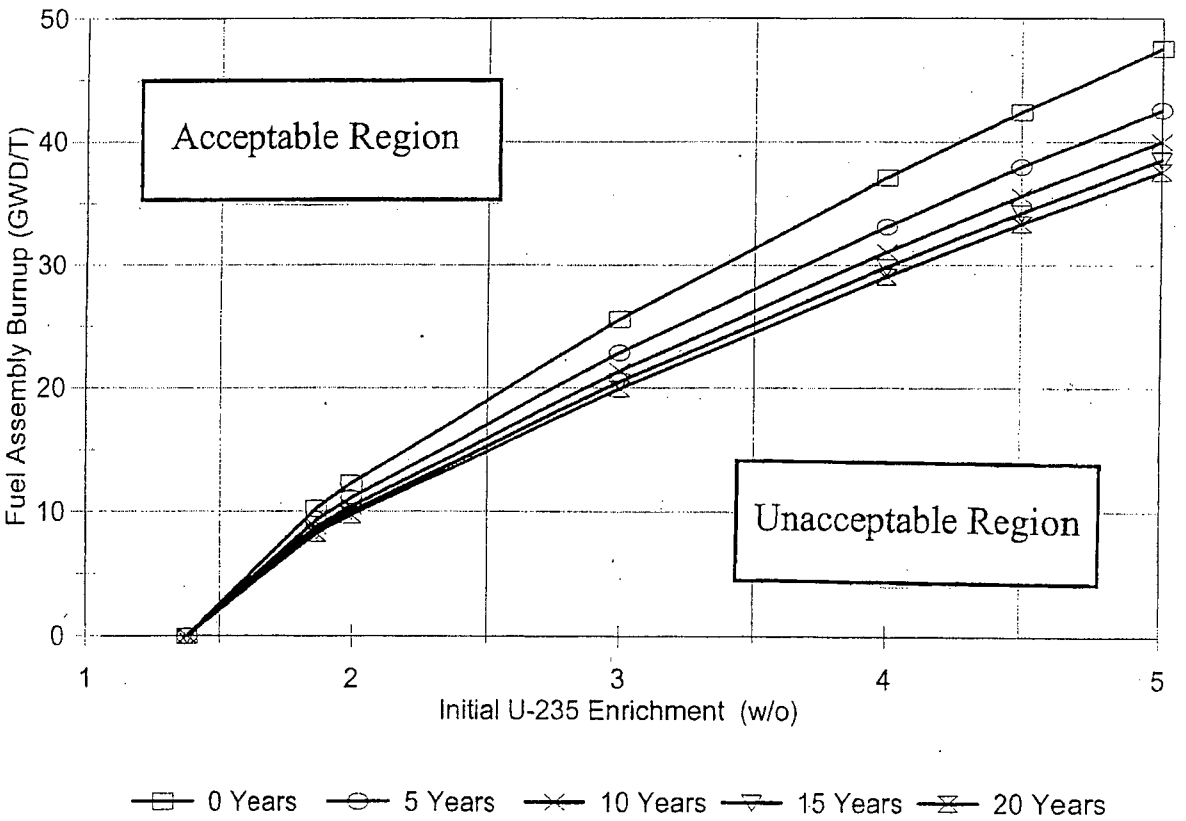


4.0 DESIGN FEATURES (continued)

Figure II-5

REGION II

MINIMUM BURNUP FOR CATEGORY II-5 FUEL



4.0 DESIGN FEATURES (continued)

Figure II-6

REGION II

MINIMUM BURNUP FOR CATEGORY II-6 FUEL

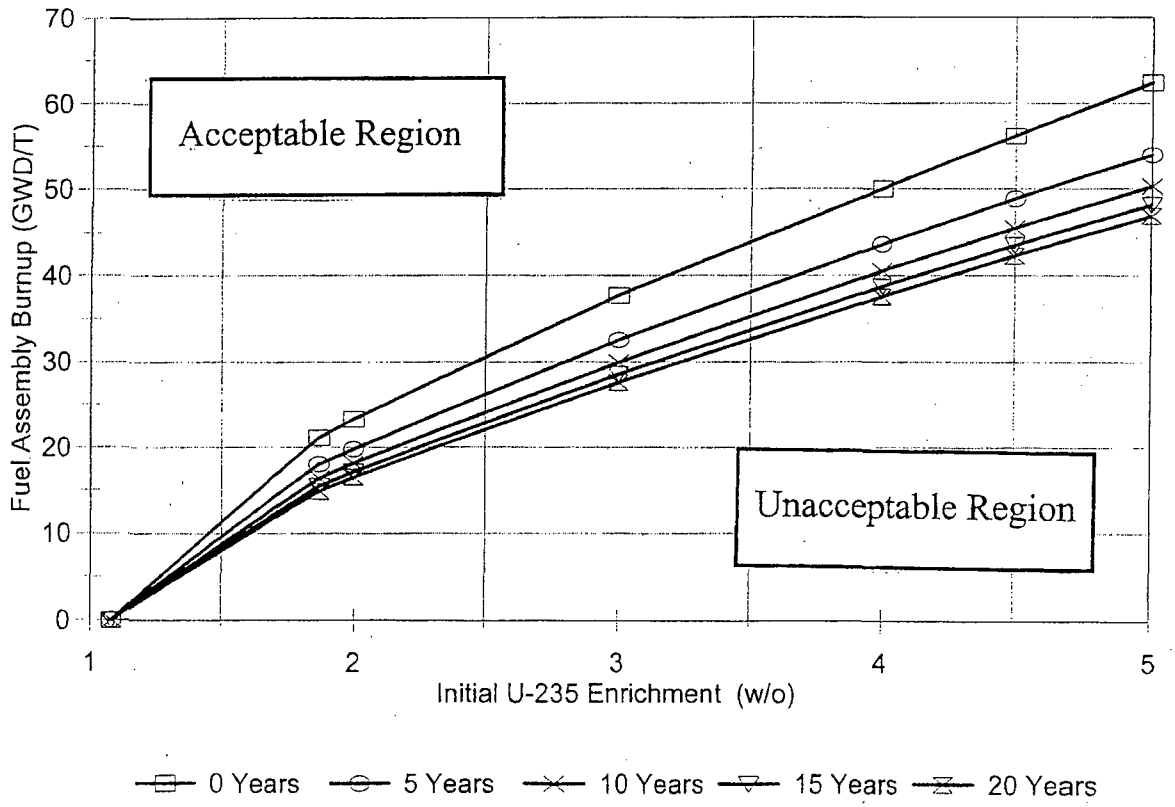


Figure II-7

REGION II

MINIMUM BURNUP FOR CATEGORY II-7 FUEL

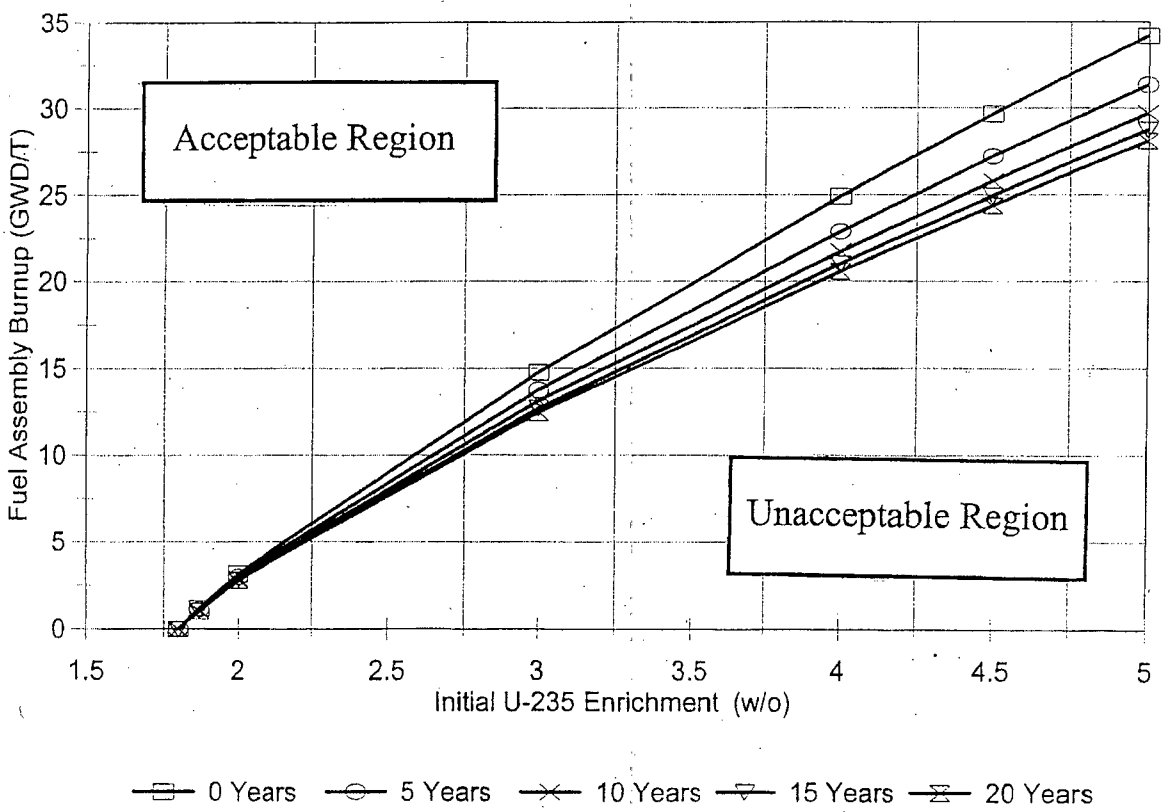


Figure II-8

REGION II

MINIMUM BURNUP FOR CATEGORY II-8 FUEL

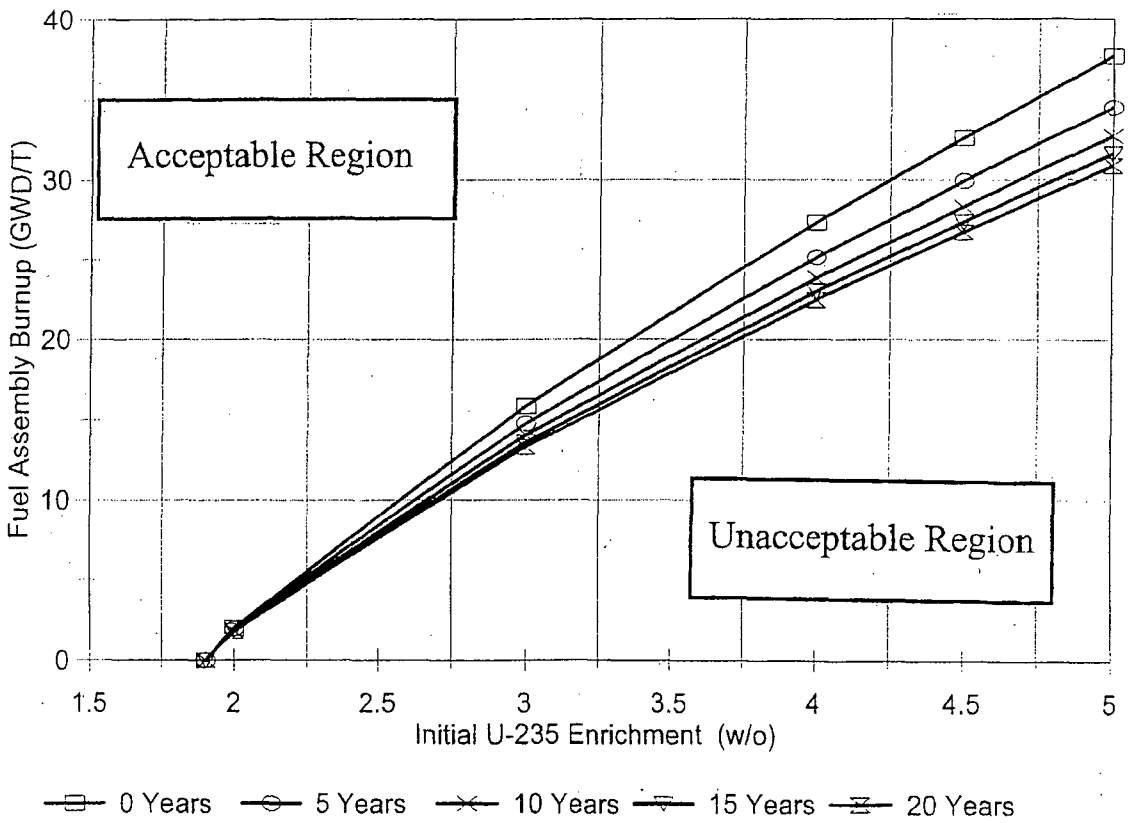


Figure II-9

REGION II

MINIMUM BURNUP FOR CATEGORY II-9 FUEL

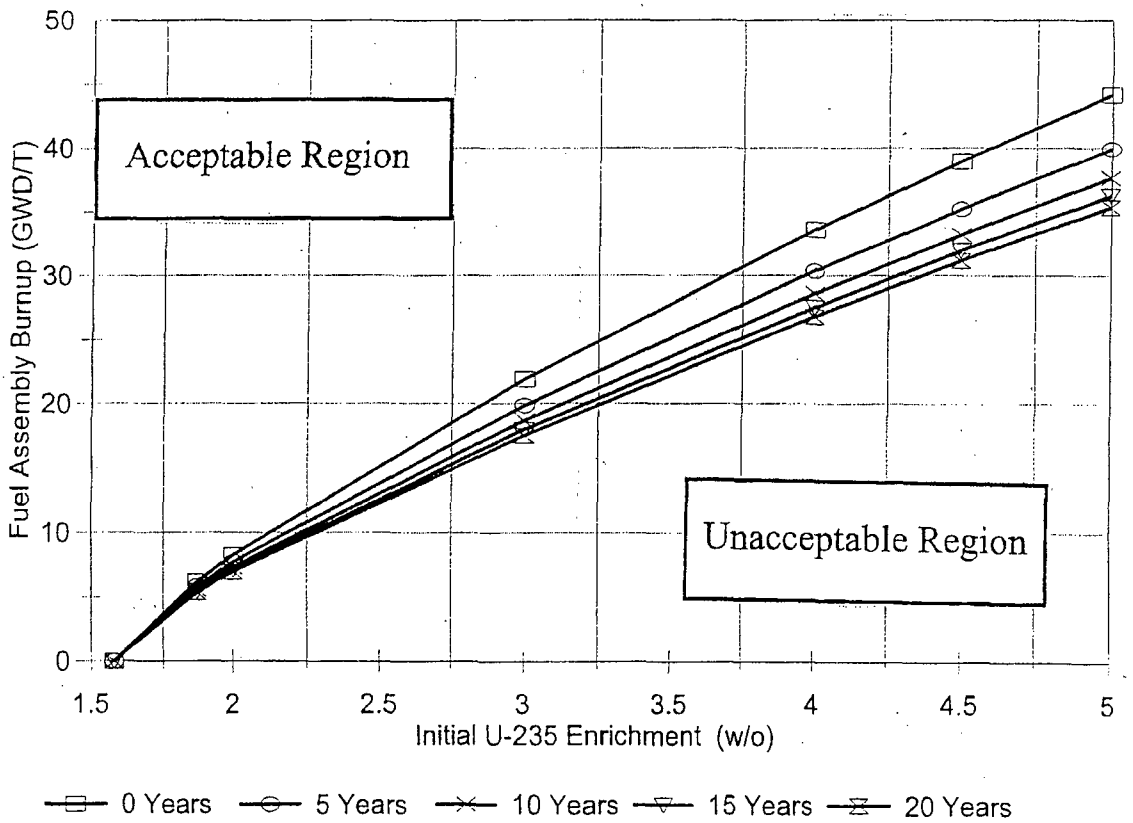
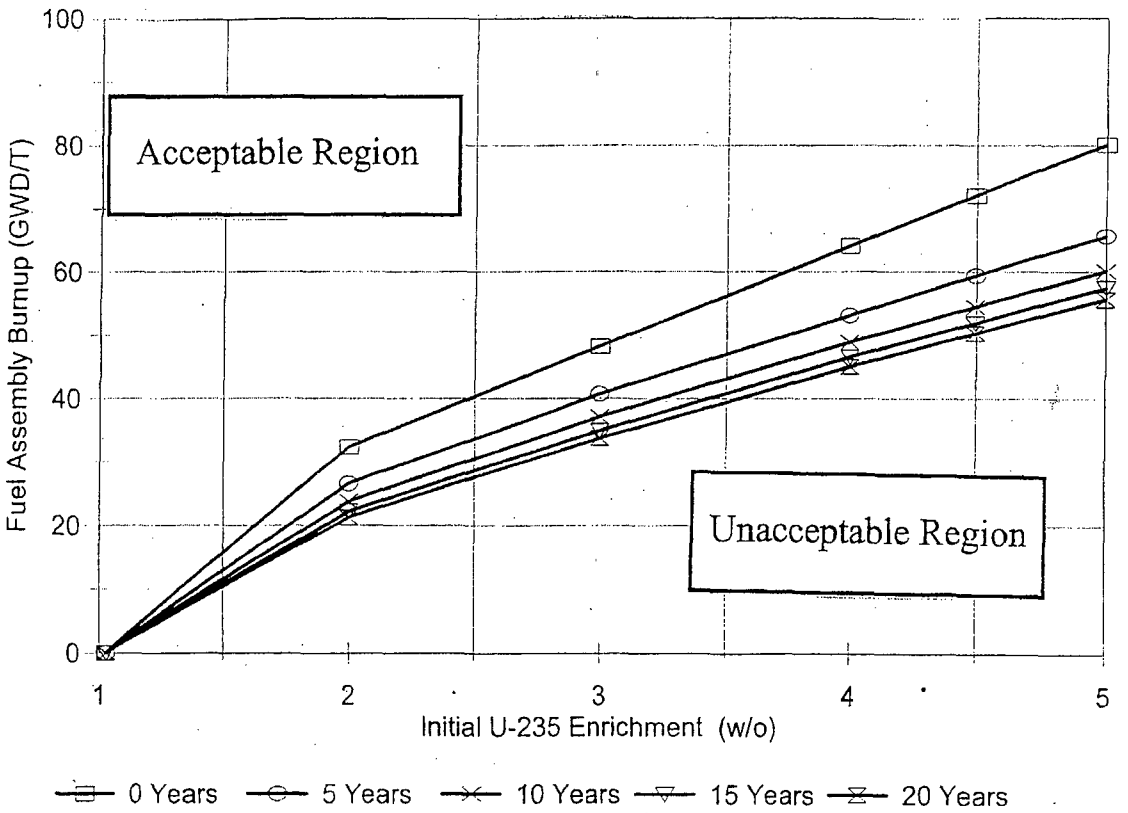


Figure II-10

REGION II

MINIMUM BURNUP FOR CATEGORY II-10 FUEL

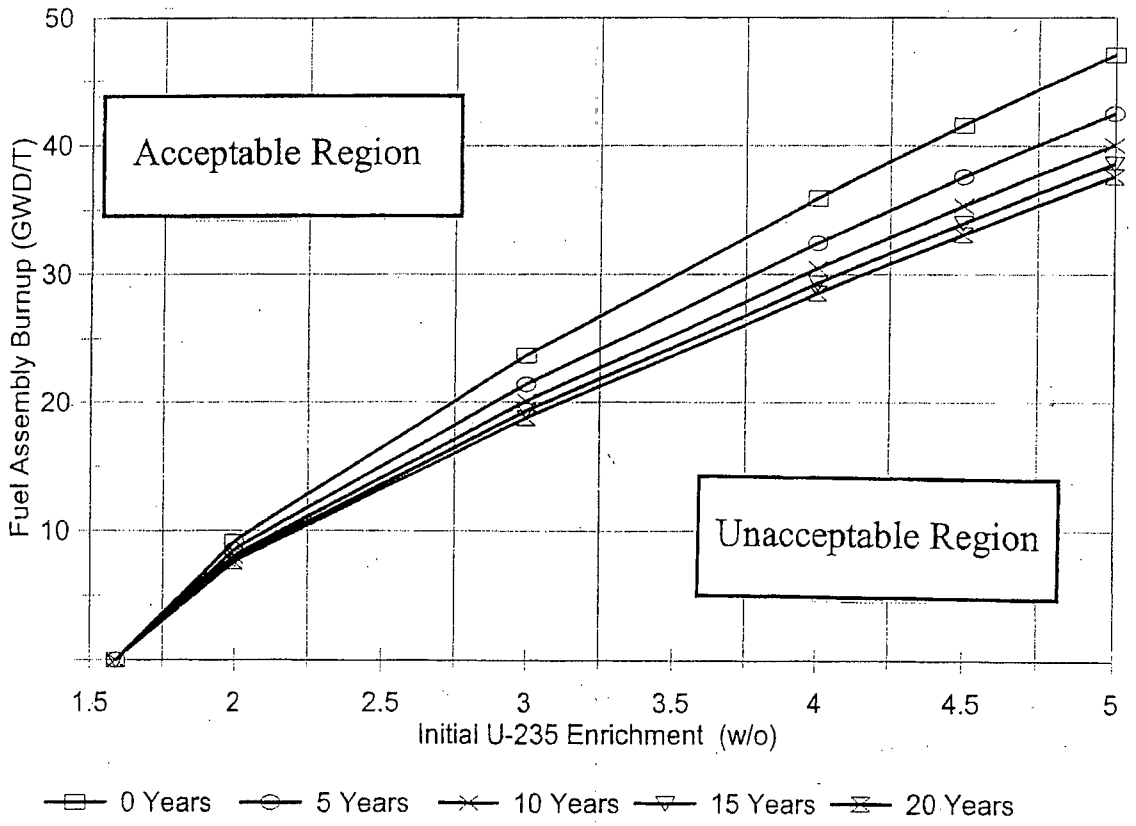


4.0 DESIGN FEATURES (continued)

Figure II-11

REGION II

MINIMUM BURNUP FOR CATEGORY II-11 FUEL



4.0 DESIGN FEATURES (continued)

Figure II-12

REGION II

MINIMUM BURNUP FOR CATEGORY II-12 FUEL

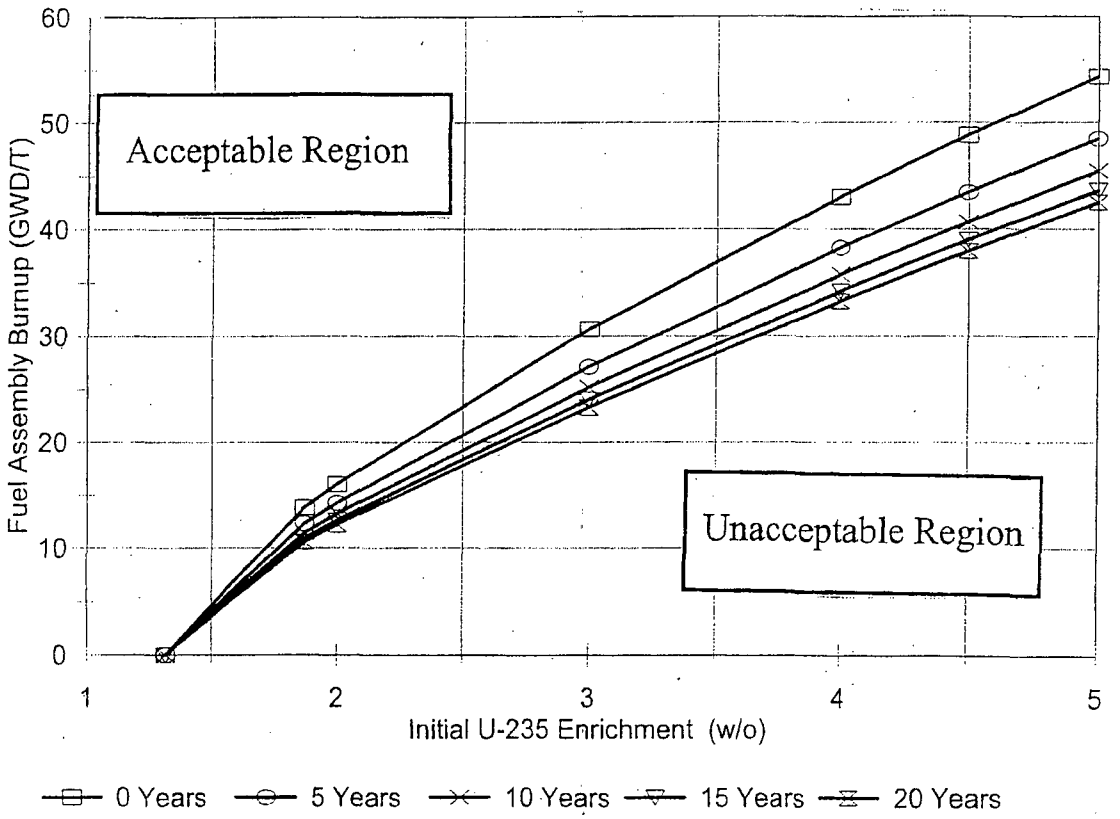


Figure II-13

REGION II

MINIMUM BURNUP FOR CATEGORY II-13 FUEL

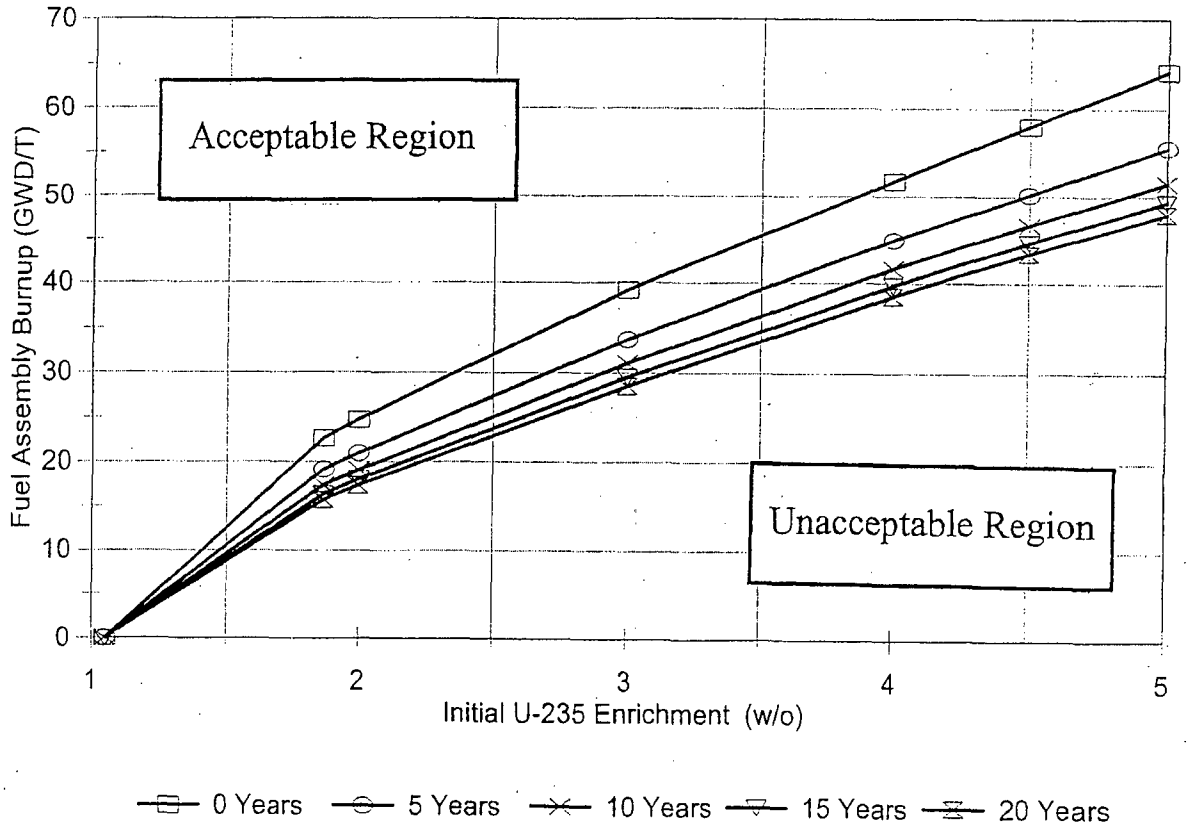


Figure II-14

REGION II

MINIMUM BURNUP FOR CATEGORY II-14 FUEL

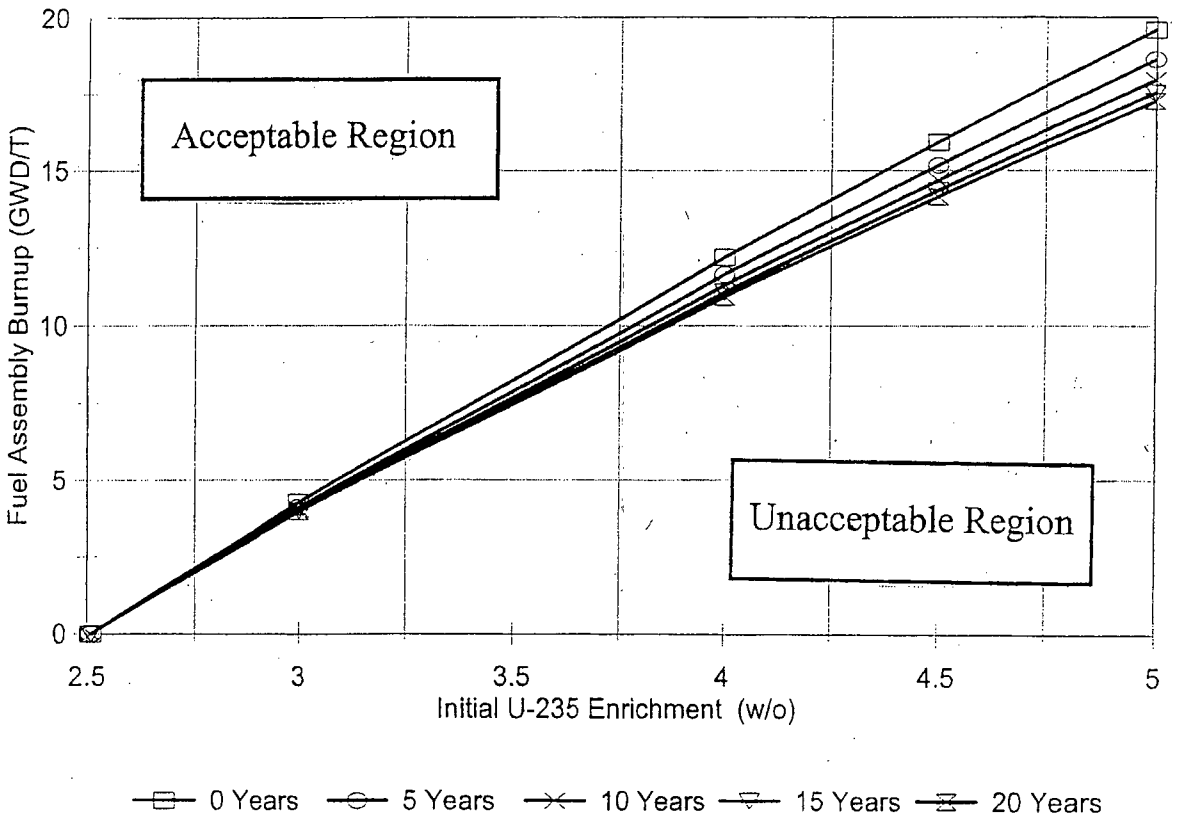


Figure II-15

REGION II

MINIMUM BURNUP FOR CATEGORY II-15 FUEL

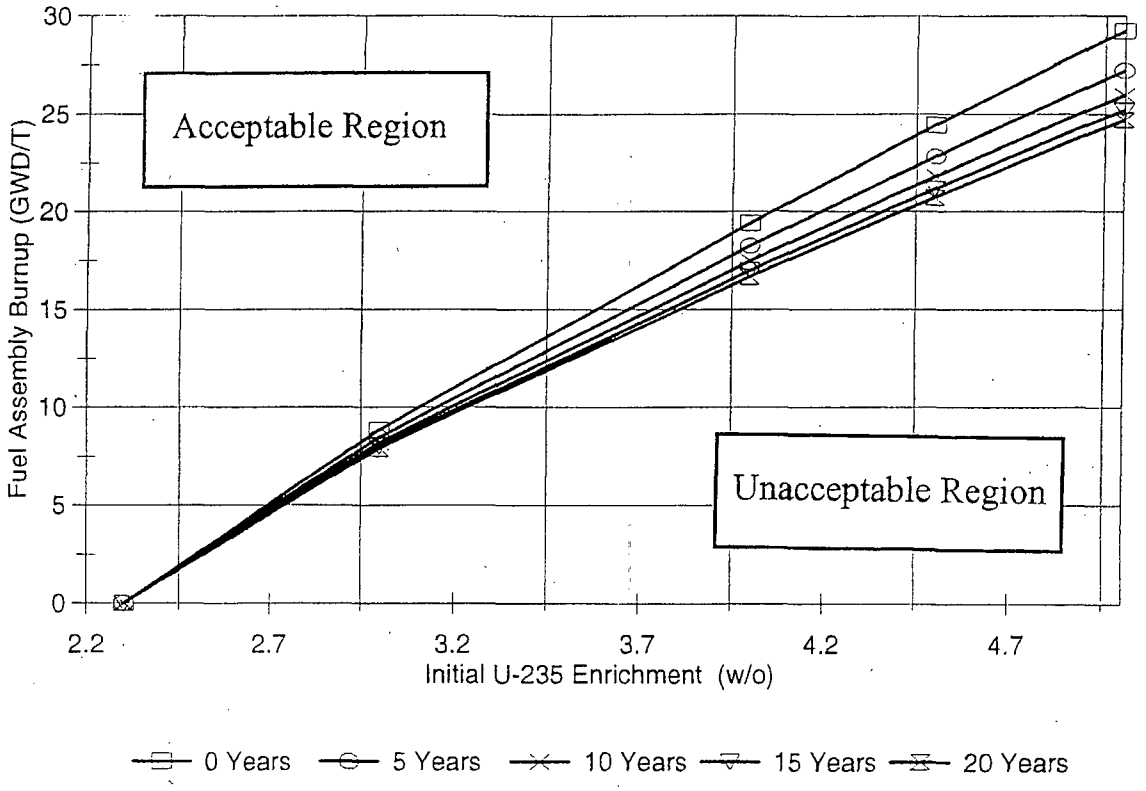


Figure II-16

REGION II

Boundary Between Unrestricted Storage And Checkerboard Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	Blocked	II-1	II-1	II-1	II-1
Blocked	4.80	Blocked	II-1	II-1	II-1
4.80	Blocked	II-1	II-1	II-1	II-1

Interface

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-4	II-1	II-1	II-1	II-1
II-4	II-3	II-4	II-1	II-1	II-1
II-3	II-4	II-1	II-1	II-1	II-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

Figure II-17

REGION II

Boundary Between Unrestricted Storage And 3 Out Of 4 Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
Blocked	II-1	Blocked	II-1	II-1	II-1
II-7	II-7	II-1	II-1	II-1	II-1
Blocked	II-7	Blocked	II-1	II-1	II-1

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

Figure II-18

REGION II

Boundary Between Checkerboard Storage And 3 Out Of 4 Storage

II-7	Blocked	II-7	Blocked	II-7	Blocked
II-7	II-7	II-7	II-7	II-7	II-7
II-7	Blocked	II-7	Blocked	II-7	Blocked
Blocked	II-7	Blocked	II-7	II-7	II-7
4.80	Blocked	II-7	Blocked	II-7	Blocked
Blocked	4.80	Blocked	II-7	II-7	II-7

Interface

Note: (1) A row of empty cells can be used at the interface to separate the configurations.

(2) It is acceptable to replace an assembly with an empty cell.

Figure II-19

REGION II

Boundary Between 1-Out-Of-9 Storage And Unrestricted Storage

II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
II-1	II-1	II-1	II-1	II-1	II-1
Filler	Filler	Filler	II-1	II-1	II-1
Filler	A	Filler	II-1	II-1	II-1
Filler	Filler	Filler	II-1	II-1	II-1

Interface

Where:
(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

Figure II-20

REGION II

Boundary Between 1-Out-Of-9 Storage And Checkerboard Storage

II-4	II-3	II-4	II-3	II-4	II-3
II-3	II-4	II-3	II-4	II-3	II-4
II-4	II-3	II-4	II-3	II-4	II-3
Filler	Filler	Filler	II-4	II-3	II-4
Filler	A	Filler	II-3	II-4	II-3
Filler	Filler	Filler	II-4	II-3	II-4

Interface

Where:

(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

Figure II-21

REGION II

Boundary Between 1-Out-Of-9 Storage And Checkerboard Storage

Blocked	4.80	Blocked	4.80	Blocked	4.80
4.80	Blocked	4.80	Blocked	4.80	Blocked
Blocked	4.80	Blocked	4.80	Blocked	4.80
Filler	Blocked	Filler	Blocked	4.80	Blocked
Filler	A	Blocked	4.80	Blocked	4.80
Filler	Filler	Filler	Blocked	4.80	Blocked

Interface

Where:

(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

Figure II-22

REGION II

Boundary Between 1-Out-Of-9 Storage And 3-Out-Of-4 Storage

II-7	Blocked	II-7	Blocked	II-7	Blocked
II-7	II-7	II-7	II-7	II-7	II-7
II-7	Blocked	II-7	Blocked	II-7	Blocked
Filler	Filler	Filler	II-7	II-7	II-7
Filler	A	Filler	Blocked	II-7	Blocked
Filler	Filler	Filler	II-7	II-7	II-7

Interface

Where:

(1) If A = 4.80 w/o + 0 Inserts, Filler = Category II-10
(2) If A = 4.80 w/o + 5 Inserts, Filler = Category II-11
(3) If A = 4.80 w/o + 5 Inserts, Filler = Category II-12
(4) If A = 4.80 w/o + 5 Inserts, Filler = Category II-13
(5) If A = Category II-14, Filler = Category II-13
(6) If A = Category II-14, Filler = Category II-11

Figure II-23
Orientation Of 3 Guide Tube Inserts

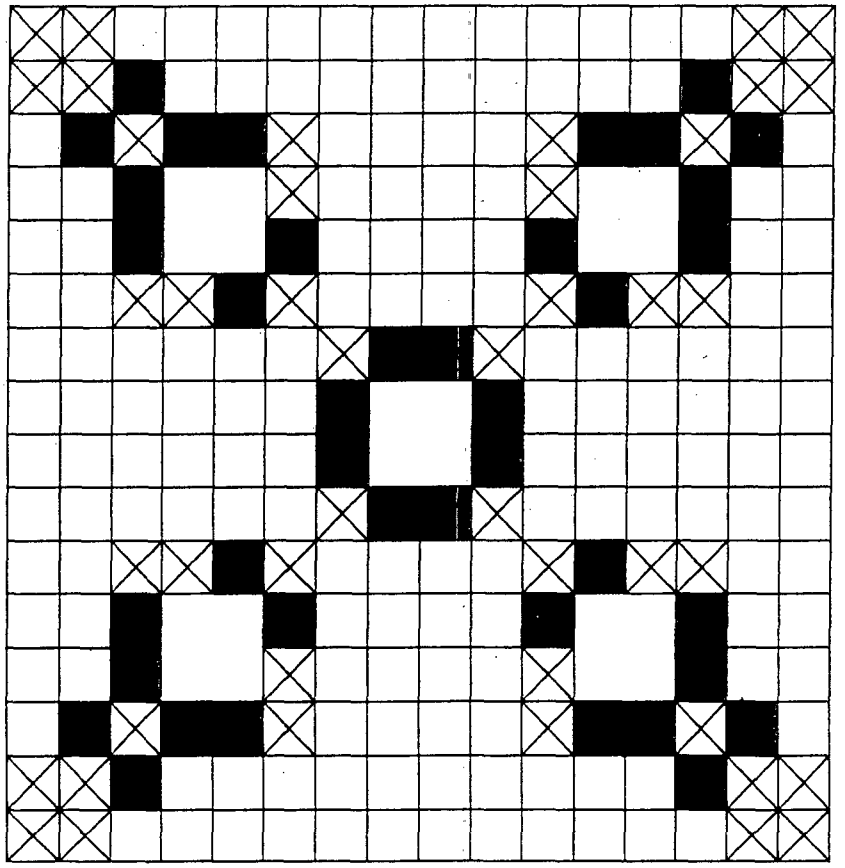
```
 -------------------------------------        Fuel Assembly
|                                 yyy | <--- Serial
|                                   y |      Number
|                                   y |
|       00                    XX      |
|       00                    XX      |
|                                     |
|                                     |
|                                     |
|                  XX                 |
|                  XX                 |
|                                     |
|                                     |
|                                     |
|       XX                    00      |
|       XX                    00      |
|                                     |
|                                     |
|                                     |
 -------------------------------------
```

XX = Guide Tube With Insert
XX

00 = Empty Guide Tube
00

Figure II-24

SONGS UNITS 2 AND 3 FUEL ASSEMBLY WITH 40 ERBIA RODS



40 Erbia Rods

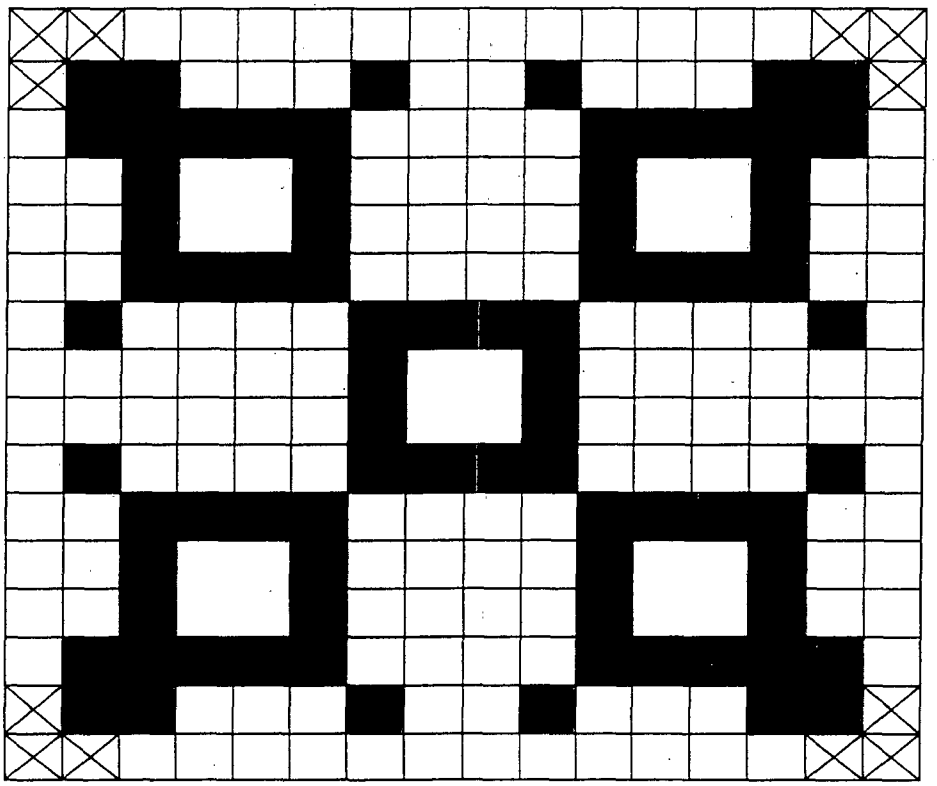
High Enriched Fuel Rod

Low Enriched Fuel Rod

Erbia Fuel Rod

Figure II-25

SONGS UNITS 2 AND 3 FUEL ASSEMBLY WITH 80 ERBIA RODS



80 Erbia Rods

High Enriched Fuel Rod

Low Enriched Fuel Rod

Erbia Fuel Rod

B LCS 4.0.100 Fuel Storage Patterns
BASES

BACKGROUND

The spent fuel storage facility is designed to store either new (nonirradiated) nuclear fuel assemblies, or burned (irradiated) fuel assemblies in a vertical configuration underwater. The storage pool is sized to store 1542 fuel assemblies. Two types/sizes of spent fuel storage racks are used (Region I and Region II). The two Region I racks each contain 156 storage locations each spaced 10.40 inches on center in a 12x13 array. Four Region II storage racks each contain 210 storage locations in a 14x15 array. The remaining two Region II racks each contain 195 locations in a 13x15 array. All Region II locations are spaced 8.85 inches on center.

As described in LCS 4.0.100, "Fuel Storage Patterns" fuel assemblies are stored in the spent fuel racks in accordance with criteria based on initial enrichment, discharge burnup, and cooling time (plutonium decay).

Additionally, LCS 4.0.100 allows the following storage options:

- 2x2 storage patterns,
- 3x3 storage patterns,
- credit for erbia in fresh assemblies, inserted CEAs, and borated stainless steel guide tube inserts (GT-Inserts).

The effect of these storage options is to reduce the required discharge burnup of irradiated assemblies and add flexibility in storing fresh assemblies containing erbia.

Finally, credit for boron is taken to maintain $K_{eff} \leq 0.95$.

The storage options allowed by LCS 4.0.100 and credit for soluble boron are needed because the boraflex is assumed to be completely absent. Boraflex erosion/dissolution is an industry problem, and SONGS Units 2 and 3 are affected. Taking no credit for boraflex for SONGS Units 2 and 3

(continued)

BACKGROUND (continued)

eliminates any boraflex concerns and monitoring programs to ensure that an adequate amount of boraflex is present will not be needed.

APPLICABLE SAFETY ANALYSIS

When soluble boron is credited, the following acceptance criteria apply:

(1) Under normal conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than 1.0 when flooded with unborated water, and,

(2) Under normal and accident conditions, the 95/95 neutron multiplication factor (K_{eff}), including all uncertainties, shall be less than or equal to 0.95 when flooded with borated water.

The storage options allowed by LCS 4.0.100 meet acceptance criterion 1 above. Under normal, non-accident conditions, K_{eff} is less than 1.00 with 0 ppm.

The storage options allowed by LCS 4.0.100 meet acceptance criterion 2 above. Under normal, non-accident conditions, the TS 3.7.17 limit for soluble boron concentration of 2000 ppm will ensure that K_{eff} remains less than or equal to 0.95.

The analytical methods used to demonstrate that the storage options allowed by LCS 4.0.100 meet acceptance criteria 1 and 2 are described in the SONGS Spent Fuel Pool Criticality Analysis (Reference 1).

A fuel assembly could be inadvertently loaded into a spent fuel rack location not allowed by LCS 4.0.100 (e.g., an unirradiated fuel assembly or an insufficiently depleted fuel assembly). However, the negative reactivity effect of the soluble boron compensates for the increased reactivity caused by the postulated accident scenario. For this accident condition, the TS 3.7.17 limit for soluble boron concentration of 2000 ppm will ensure that K_{eff} remains less than or equal to 0.95.

(continued)

BASES (continued)

LCS	The placement of fuel assemblies within the spent fuel pool according to LCS 4.0.100 ensures that the K_{eff} of the spent fuel pool will always remain < 1.00 under normal, non-accident conditions assuming the pool to be flooded with unborated water. The K_{eff} of the spent fuel pool will always remain ≤ 0.95 under normal and accident conditions assuming the pool to be flooded with borated water at 2000 ppm.
APPLICABILITY	This LCS applies whenever any fuel assembly is stored in the spent fuel pool.
ACTIONS	See the Bases for LCO 3.7.18 A
SURVEILLANCE REQUIREMENTS	See the Bases for SR 3.7.18.1
REFERENCES	1. Spent Fuel Pool Criticality Analysis, (with no Boraflex and Credit for Soluble Boron), Southern California Edison, San Onofre Nuclear Generating Station Units 2 and 3, Revision 2, April 2007.

(continued)