Table 1: Key CalSim II No Action Alternative, H3, H4, BA H3+ and CWF H3+ Scenario Inputs and Assumptions

	No Action Alternative (NAA)	**H3**	**H4**	**BA H3+ and FEIRS Alternative 4A**	**CWF H3+**
Planning horizon[a]	Year 2030	Same as NAA	Same as NAA	Same as NAA	Same as NAA
Inflows/ Supplies	Historical with modifications for operations upstream of rim reservoirs and with changed climate at Year 2030	Same as NAA	Same as NAA	Same as NAA	Same as NAA
Facilities					
North Delta Diversion Intakes	Not included	9,000 cfs north Delta diversion intake on the Sacramento River at Hood	Same as H3	Same as H3	Same as H3

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
Head of Old River Gate	Temporary Head of Old River Barrier installed in the fall months	Permanent Head of Old River Gate	Same as H3	Same as H3	Same as H3
North Delta Diversion Operations Criteria					
North Delta Diversion Bypass Flows	Not included	Sacramento River bypass flow requirements downstream of the proposed intakes as described in Table 2 below. In addition, a constraint on the potential diversion at the north Delta intakes, to account for the fish	Same as H3	Same as H3	Same as H3

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
		screen sweeping velocity criteria of 0.4 fps. The constraint was derived based on resulting diversions from the DSM2 modeling.			
Minimum flow near Rio Vista	SWRCB D-1641	Same as NAA with additional minimum flow requirement of 3,000 cfs from January to August.	Same as H3	Same as H3	Same as H3
South Delta Export Restrictions					

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
South Delta exports (Jones PP and Banks PP)	SWRCB D-1641. Vernalis flow-based export limits Apr 1 – May 31 as required by NMFS BiOp (Jun, 2009) Action IV.2.1 (additional 500 cfs allowed for Jul – Sep for reducing impact on SWP)	SWRCB D-1641. Pumping at the south Delta intakes are preferred during the July through September months up to a total pumping of 3,000 cfs to minimize potential water quality degradation in the south Delta channels. No specific intake preference is assumed beyond 3,000 cfs.	Same as H3	Same as H3	Same as H3
Combined Flow in Old	FWS BiOp (Dec 2008) Actions 1	New OMR criteria in Table 3 below or same	Same as H3	Same as H3	Oct and Nov: Same as NAA

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
and Middle River (OMR)	through 3 and NMFS BiOp (Jun 2009) Action IV.2.3	as the NAA, whichever results in less negative OMR flows			Other months: Same as H3
Head of Old River Barrier/Gate	Head of Old River Barrier (HORB) is only installed in the fall months per FWS Delta Smelt BiOp Action 5; it is assumed to be not installed in April or May.	HOR gate operations assumptions (% OPEN) Oct 50%, Nov 100%, Dec 100%, Jan 50%, Feb - Jun 15th 50%, Jun 16-30 100%, Jul - Sep 100%; HOR gate will be open 100% whenever flows are greater than 10,000 cfs at Vernalis.; Oct-Nov: Before the D-1641	Same as H3	Same as H3	Same as H3

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
		pulse = HOR gate open, During the D-1641 pulse = for 2 weeks HOR gate closed; After D-1641 pulse: HORB open 50% for 2 weeks			
Delta Outflow Requirements					
Delta Outflow Index (Flow and Salinity)	SWRCB D-1641 and USFWS BiOp (Dec 2008) Action 4 (Fall X2 Requirement)	Same as NAA	Same as NAA; In addition, enhanced spring Delta outflow required during the Mar-May period. Mar-May average outflow requirement is determined based on	March, April, May: maintain the March–May average Delta outflow that would occur with existing facilities under the operational criteria described in the	March, April, May: Maintain spring (March–May) outflow that would occur with existing facilities under the operational criteria described in the 2008 USFWS

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
			90% forecast of Mar-May Eight River Index (8RI). For modeling purposes, the Mar-May 8RI was forecasted based on a correlation between the Jan-Feb 8RI and Mar-May 8RI at ELT. Each year in March, Delta outflow target for the Mar-May period is determined based on the forecasted Mar-May 8RI value and its exceedance probability, from the	2008 USFWS BiOp and 2009 NMFS BiOp. The 2009 NMFS BiOp Action IV.2.1 (San Joaquin River i-e ratio) will be used to constrain Apr–May total Delta exports under CWF to meet March–May Delta outflow requirement per current operational practices.	BiOp and 2009 NMFS BiOp, including current climate conditions. March: Eight River Index based outflow targets shown in Table 6 to be achieved to the extent possible through total Delta export curtailments such that exports do not fall below 1,500 cfs; April and May: same

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
			Table 5 below, linearly interpolating for values in-between. This additional spring outflow is not considered as an "in-basin use" for CVP-SWP Coordinated Operations. This outflow requirement is met first by curtailing Delta exports at Banks and Jones Pumping Plants by an amount needed to meet the outflow target, such that the minimum exports		as FEIRS/BA H3+ criteria, except restriction apply only up to a maximum outflow target of 44,500 cfs.

	No Action Alternative (NAA)	H3	H4	BA H3+ and FEIRS Alternative 4A	CWF H3+
			are at least 1,500 cfs. In wetter years (< 50% exceedance), if the outflow target is not achieved by export curtailments, then the additional flow needed to meet the outflow target is released from the Oroville reservoir as long as its projected end-of-May storage is at or above 2 MAF.		

Table 2: North Delta Diversion Bypass Flow Criteria (Same as DWR-515 Table 2)

North Delta Diversion Bypass Flows These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of hydrologic conditions and fish presence/movement
Low-Level Pumping (Dec-Jun) Diversions of up to 6% of total Sacramento River flow such that bypass flow never falls below 5,000 cfs. No more than 300 cfs can be diverted at any one intake.
Initial Pulse Protection Low level pumping will be maintained through the initial pulse period. For modeling, the initiation of the pulse is defined by the following criteria: (1) Sacramento River flow at Wilkins Slough increasing by more than 45% within a five-day period and (2) flow on the fifth day greater than 12,000 cfs. The pulse (and low-level pumping) continues until either (1) Sacramento River flow at Wilkins Slough returns to pre-pulse flow level (flow on first day of pulse period), or (2) Sacramento River flow at Wilkins Slough decreases for 5 consecutive days, or (3) Sacramento River flow at Wilkins Slough is greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). If the initial pulse period begins and ends before Dec 1st in the modeling, then any second pulse that may occur before the end of June will receive the same protection, i.e., low level pumping.
Post-Pulse Operations After initial pulse(s), allowable diversion will go to Level I Post-Pulse Operations (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs occur. Then allowable diversion will go to the Level II Post-Pulse Operations until 30 total days of

bypass flows above 20,000 cfs occur. Then allowable diversion will go to the Level III Post-Pulse Operations.

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Implement following bypass flow requirements sufficient to minimize any increase in the upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to minimize any increase in upstream transport toward the proposed intakes or into Georgiana Slough. Allowable diversion will be greater of the low-level pumping or the diversion allowed by the following bypass flow rules.

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
If Sacramento River flow is over...	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**	**If Sacramento River flow is over...**	**But not over...**	**The bypass is...**
Dec–Apr								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low-level pumping

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs

5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low-level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Jun								
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low-level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs

20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Bypass flow requirements in other months:								
If Sacramento River flow is over...			**But not over...**			**The bypass is...**		
Jul–Sep								
0 cfs			5,000 cfs			100% of the amount over 0 cfs		
5,000 cfs			No limit			A minimum of 5,000 cfs		
Oct–Nov								
0 cfs			7,000 cfs			100% of the amount over 0 cfs		
7,000 cfs			No limit			A minimum of 7,000 cfs		

Table 3: Old and Middle River Flow Criteria under H3, H4 and H3+ (Same as DWR-515 Table 3)

	Combined Old and Middle River Flows to be No Less than Values Below [a] (cfs)				
Month	**Wet Water Year**	**Above Normal Water Year**	**Below Normal Water Year**	**Dry Water Year**	**Critical Dry Water Year**
January	0	-3,500	-4,000	-5,000	-5,000
February	0	-3,500	-4,000	-4,000	-4,000
March	0	0	-3,500	-3,500	-3,000
April[b]	see Table 4	see Table 4	see Table 4	see Table 4	see Table 4
May[b]	see Table 4	see Table 4	see Table 4	see Table 4	see Table 4
June[b]	see Table 4	see Table 4	see Table 4	see Table 4	see Table 4
July	N/A	N/A	N/A	N/A	N/A
August	N/A	N/A	N/A	N/A	N/A
September	N/A	N/A	N/A	N/A	N/A
October [c]	Based on State Water Board D-1641 pulse trigger.	Based on State Water Board D-1641 pulse trigger.	Based on State Water Board D-1641 pulse trigger.	Based on State Water Board D-1641 pulse trigger.	Based on State Water Board D-1641 pulse trigger.
November [c]	Based on State Water Board D-	Based on State Water Board D-1641 pulse	Based on State Water Board D-1641	Based on State Water Board D-	Based on State Water Board D-

	1641 pulse trigger.	trigger.	pulse trigger.	1641 pulse trigger.	1641 pulse trigger.
December [d]	-5,000	-5,000	-5,000	-5,000	-5,000

[a] Values are monthly average for use in modeling. The model compares these minimum allowable OMR values to 2008 USFWS BiOp RPA OMR requirements and uses the less negative flow requirement.

[b] Based on San Joaquin inflow relationship to OMR provided Table 6.

[c] Two weeks before the D-1641 pulse (assumed to occur October 16-31 in the modeling), No OMR restrictions (for modeling purposes an OMR requirement of -5,000 cfs was assumed during this 2-week period). Two weeks during the D-1641 pulse, no south Delta exports. Two weeks after the D-1641 pulse, -5,000 cfs OMR requirement (through November).

[d] OMR restriction of -5,000 cfs for Sacramento River winter-run Chinook salmon when North Delta initial pulse flows are triggered or OMR restriction of -2,000 cfs for delta smelt when triggered. For modeling purposes (to compute a composite Dec allowable OMR), remaining days were assumed to have an allowable OMR of -8000 cfs.

Table 4: San Joaquin Inflow Relationship to Old and Middle River Flow Criteria under H3, H4 and H3+ (Same as DWR-515 Table 4)

April and May		June	
If San Joaquin River flow at Vernalis is (cfs):	**Minimum Average OMR flows (interpolated linearly between values) (cfs)**	**If San Joaquin flow at Vernalis is the following (cfs):**	**Average OMR flows would be at least the following (no interpolation) (cfs):**
≤ 5,000	-2,000	≤ 3,500	-3,500
6,000	+1000	3,501 to 10,000	0
10,000	+2000		
15,000	+3000	10,001 to 15,000	+1000
≥30,000	+6000	>15,000	+2000

Table 5: Enhanced Spring Delta Outflow Criteria under H4 (High Outflow Scenario criteria) (Same as DWR-515 Table 7)

Percent Exceedance of Forecasted Mar-May 8RI:	10%	20%	30%	40%	50%	60%	70%	80%	90%
Proposed Mar-May Delta Outflow Target (cfs):	44,500	44,500	35,000	32,000	23,000	17,200	13,300	11,400	9,200

Table 6: March Delta Outflow Goals under CWF H3+ Scenario

March Eight River Index (TAF)	0	545	1,488	1,911	2,140	2,421	2,575	3,104	3,492	>= 4,217
March monthly NDOI target (cfs)	0	6,200	8,800	12,700	17,100	20,000	25,200	35,000	43,700	44,500

Note: NDOI targets are linearly interpolated for 8RI values falling between those shown in the table.

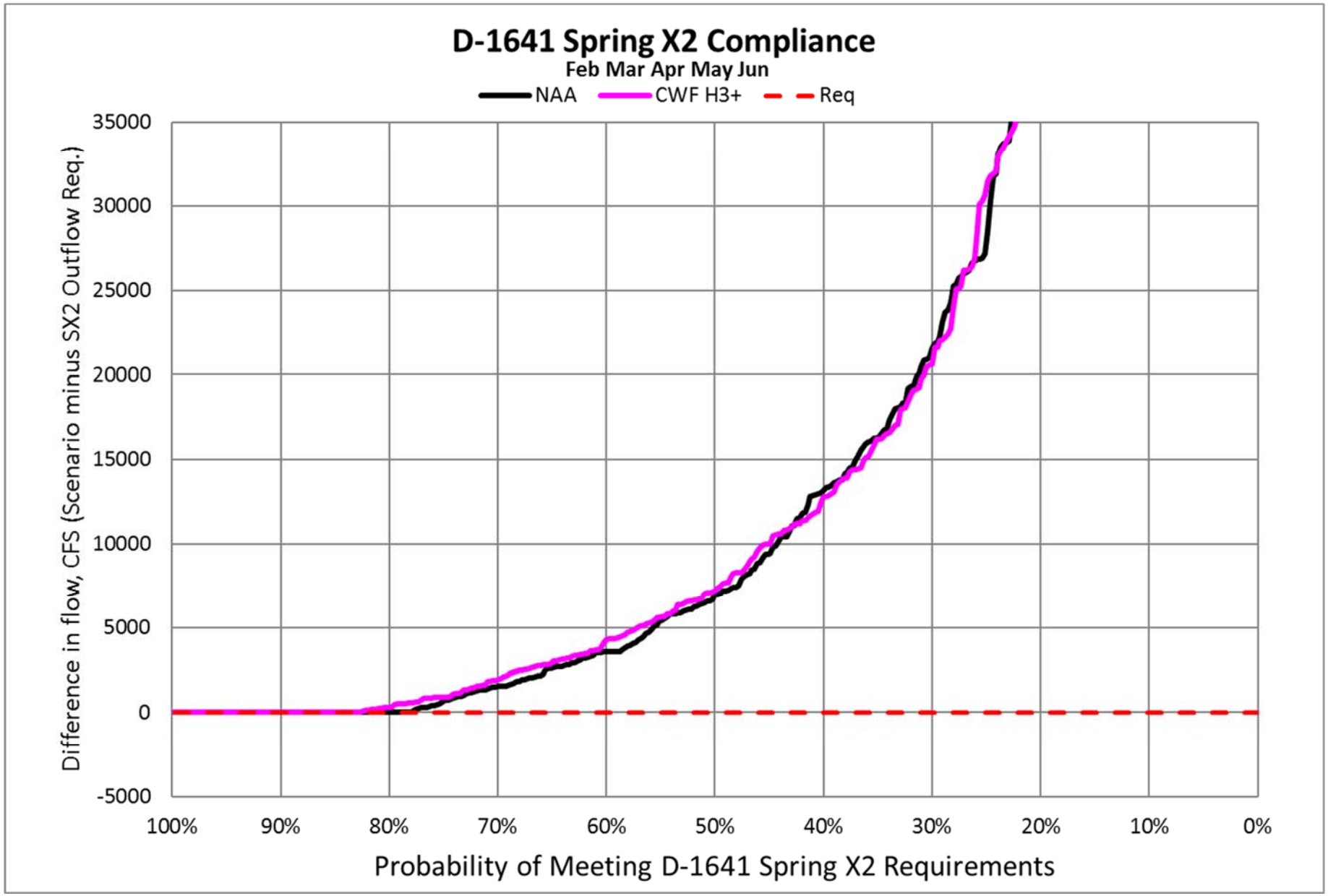


Figure 1: Spring X2 compliance for February-June

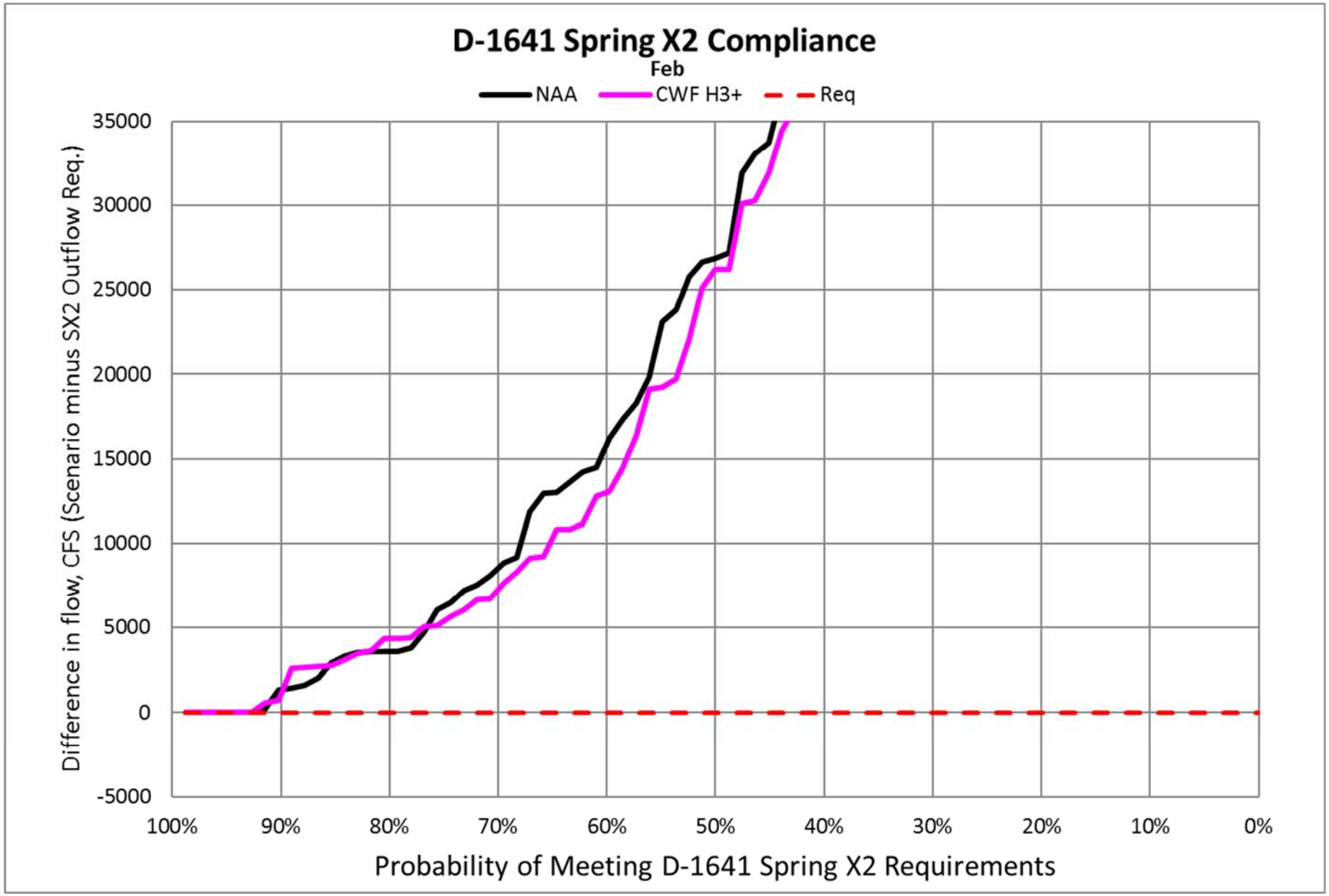


Figure 2: Spring X2 Compliance for February

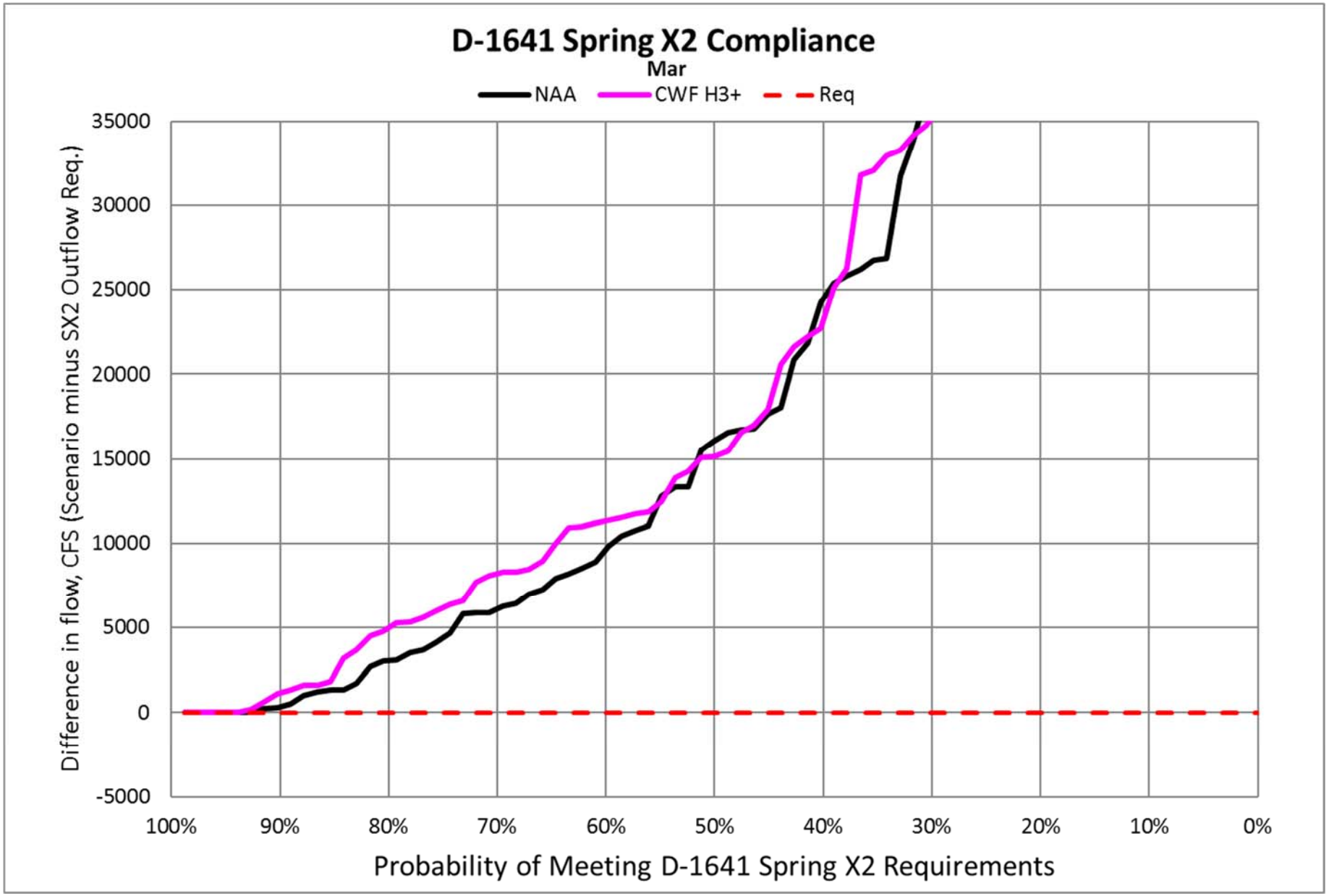


Figure 3: Spring X2 Compliance for March

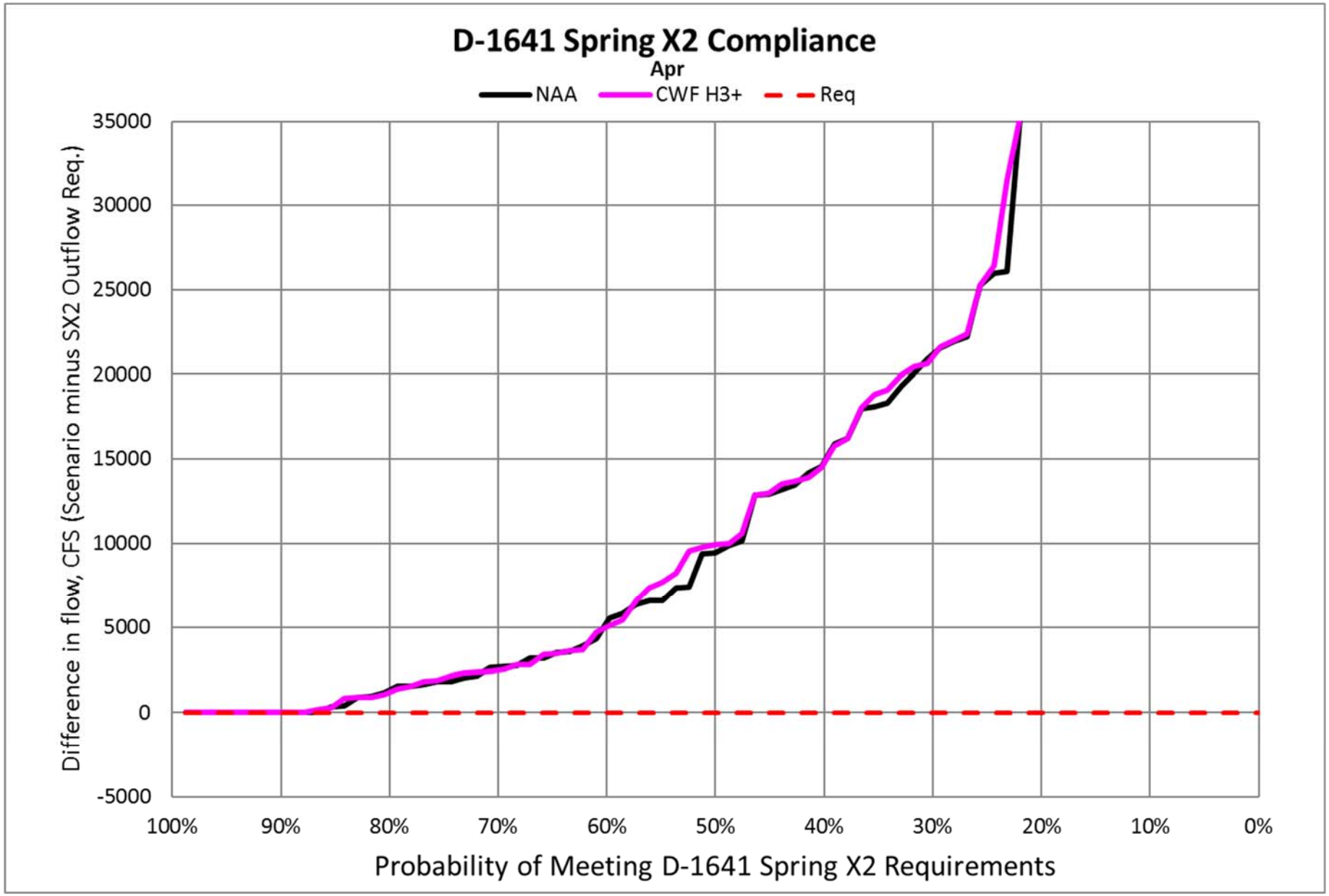


Figure 4: Spring X2 Compliance for April

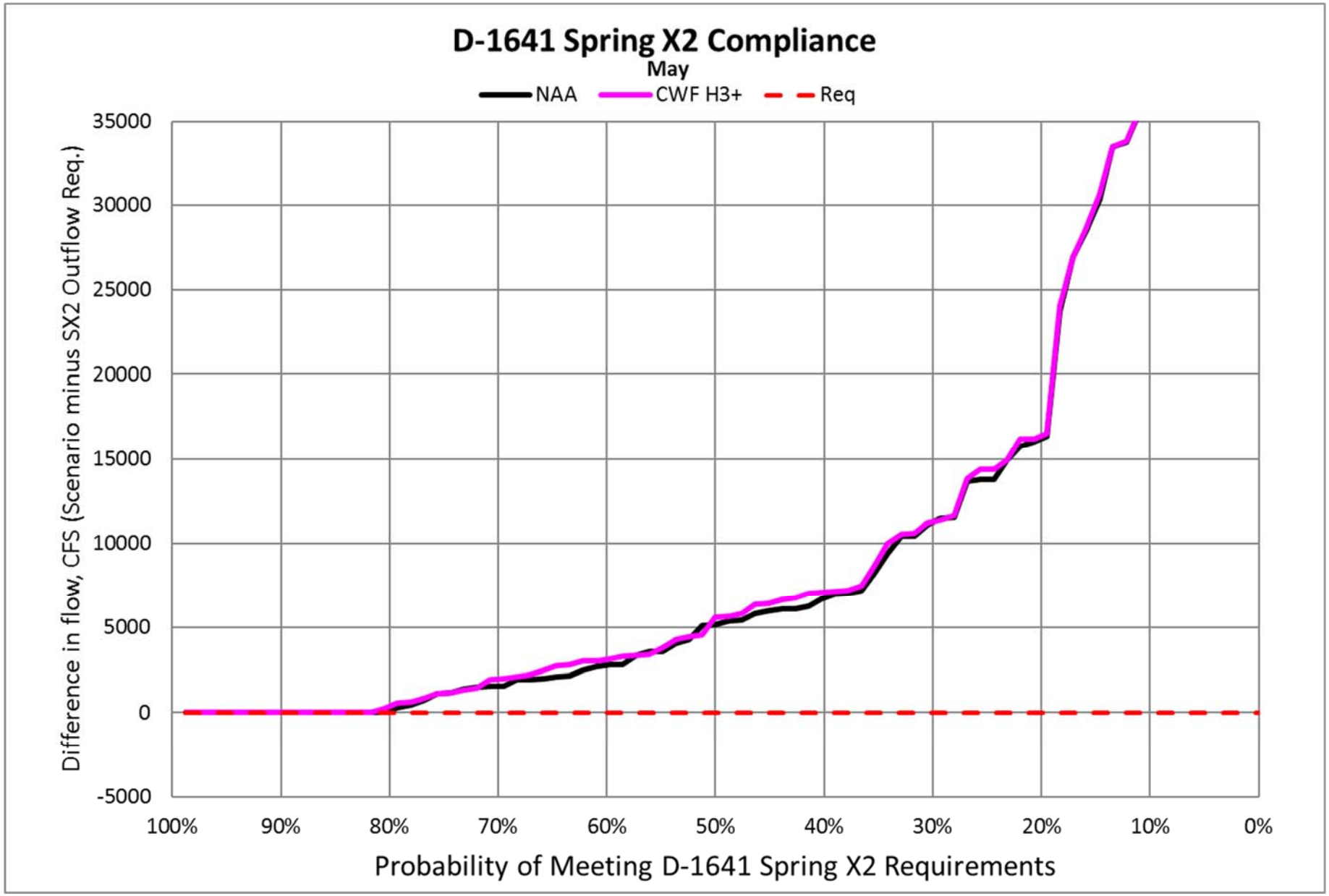


Figure 5: Spring X2 Compliance for May

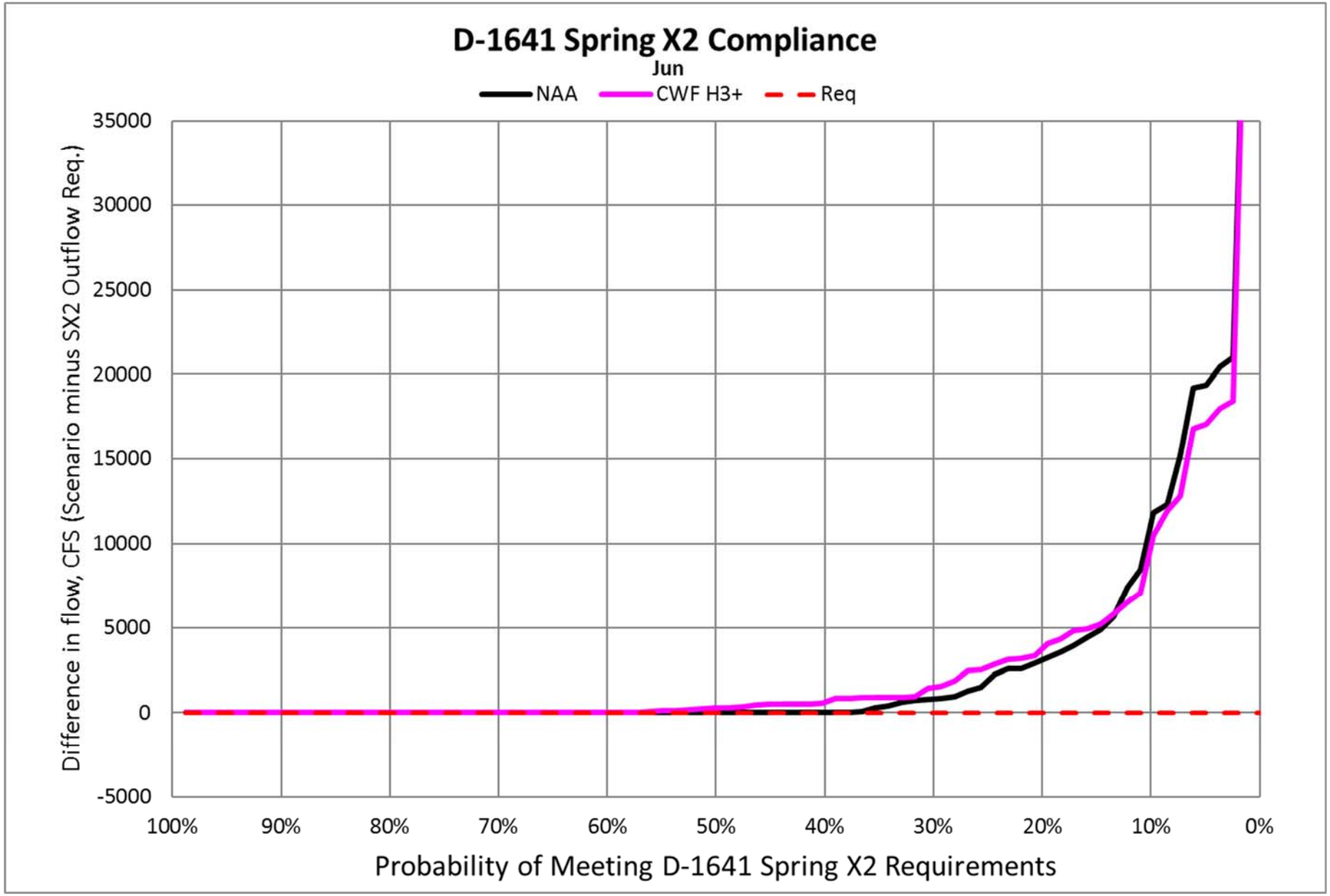


Figure 6: Spring X2 Compliance for June

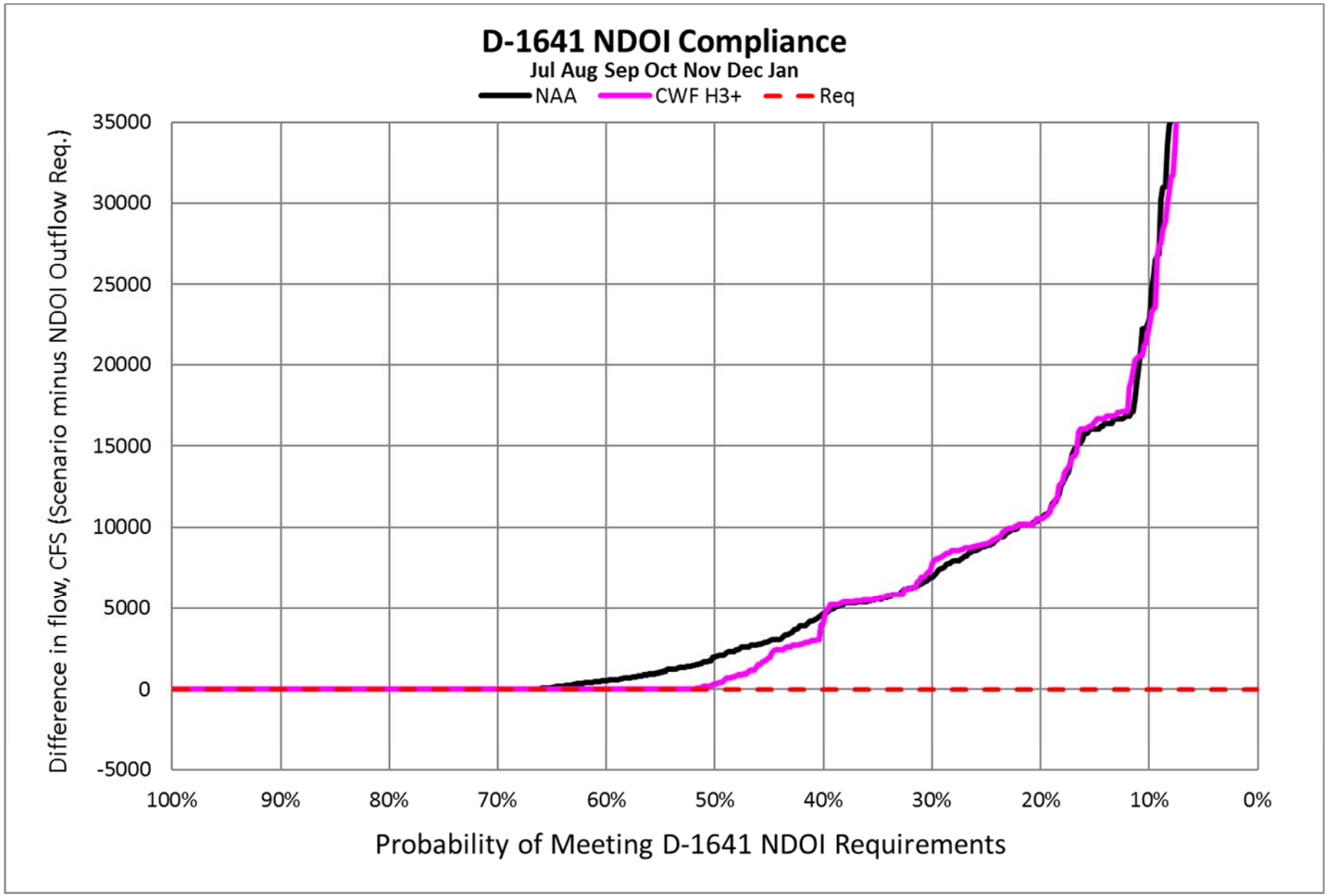


Figure 7: D-1641 NDOI Compliance for July-January

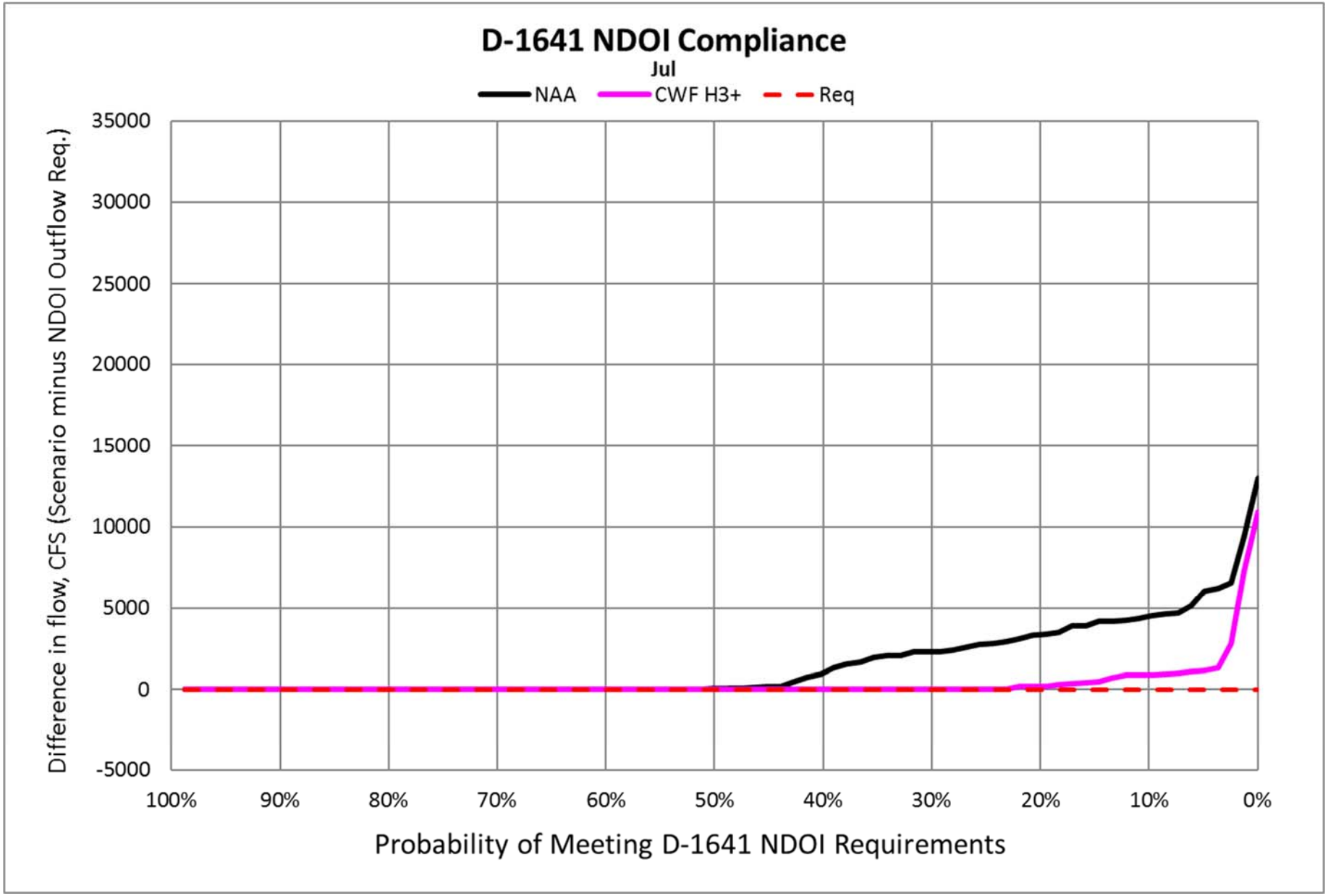


Figure 8: D-1641 NDOI Compliance for July

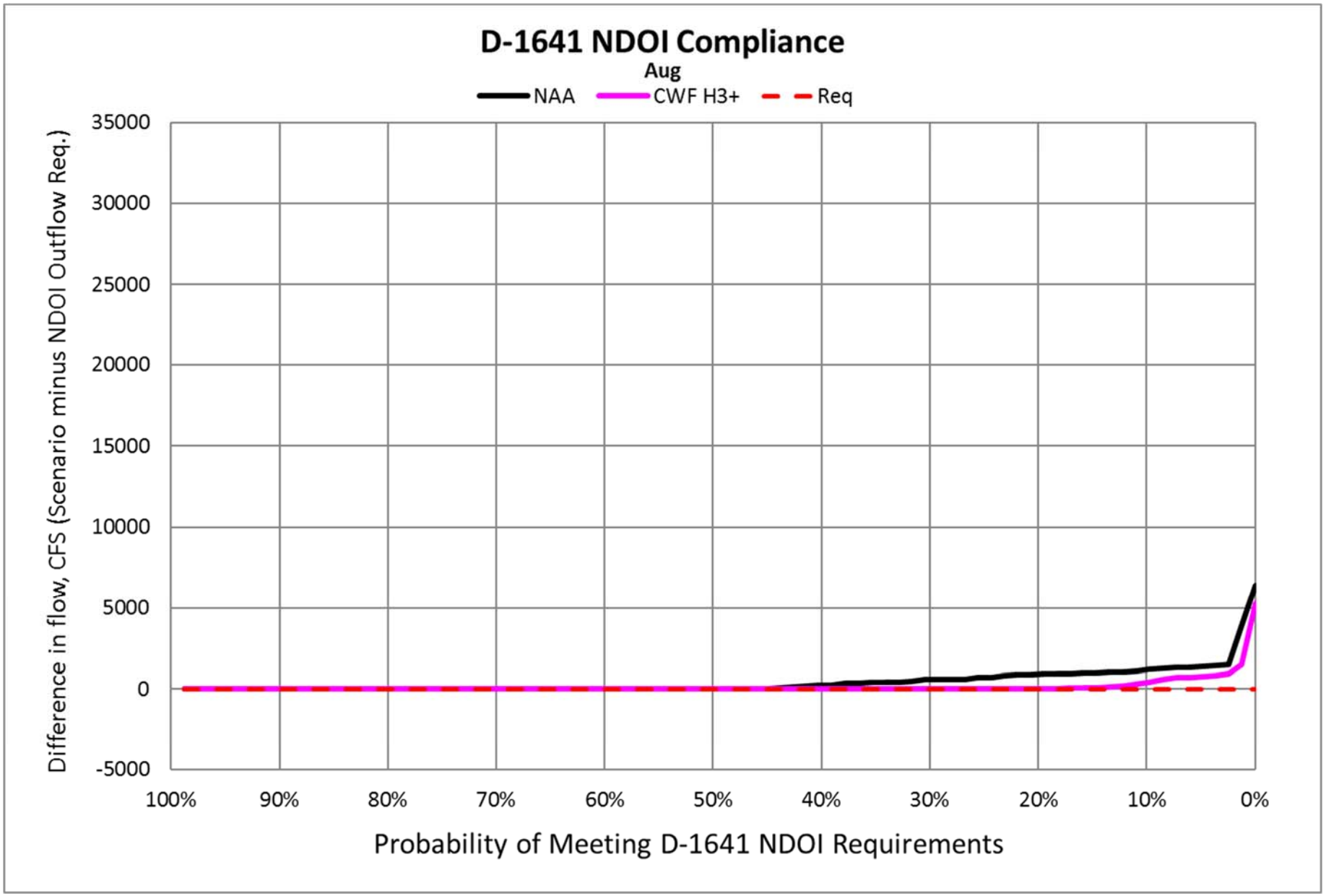


Figure 9: D-1641 NDOI Compliance for August

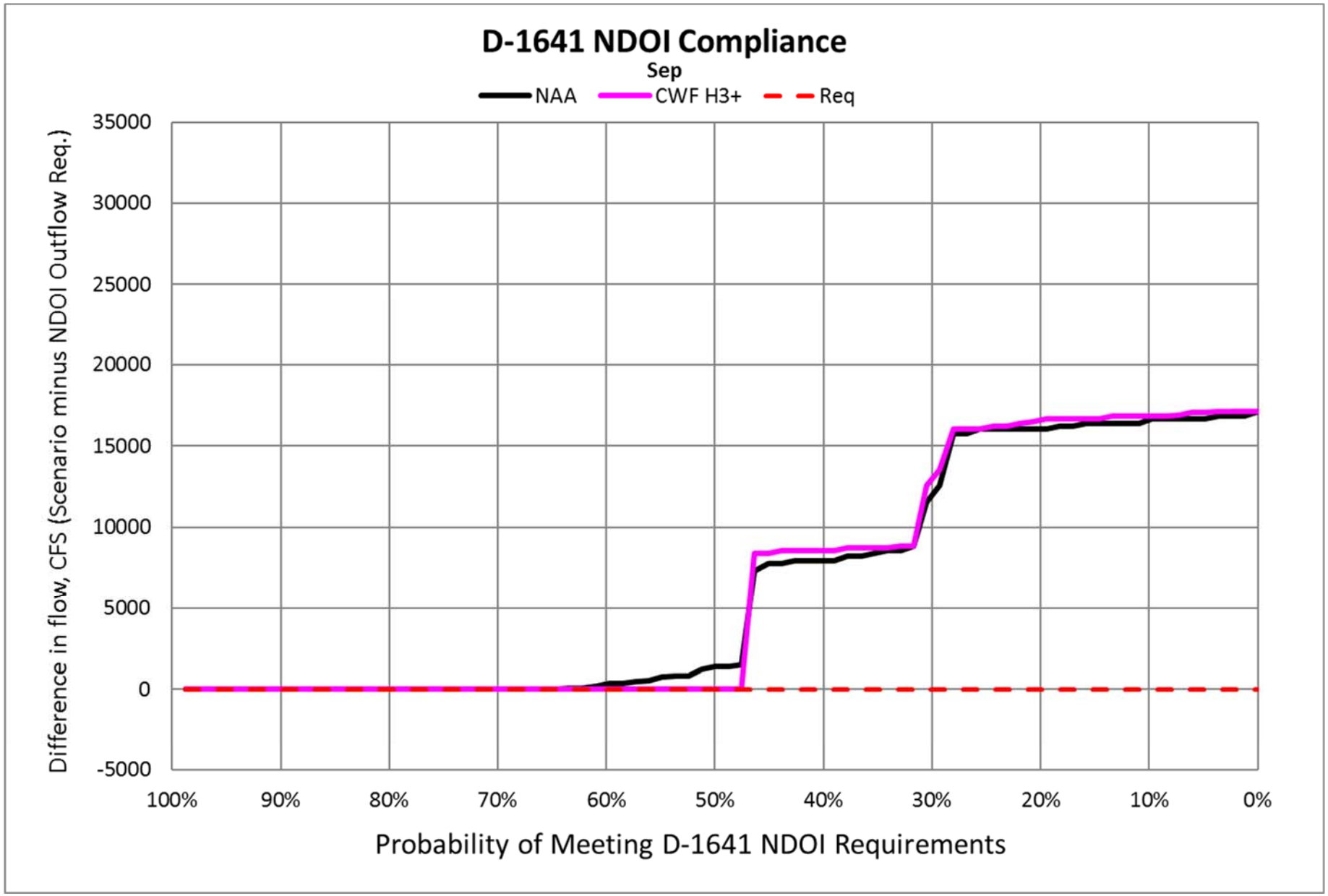


Figure 10: D-1641 NDOI Compliance for September

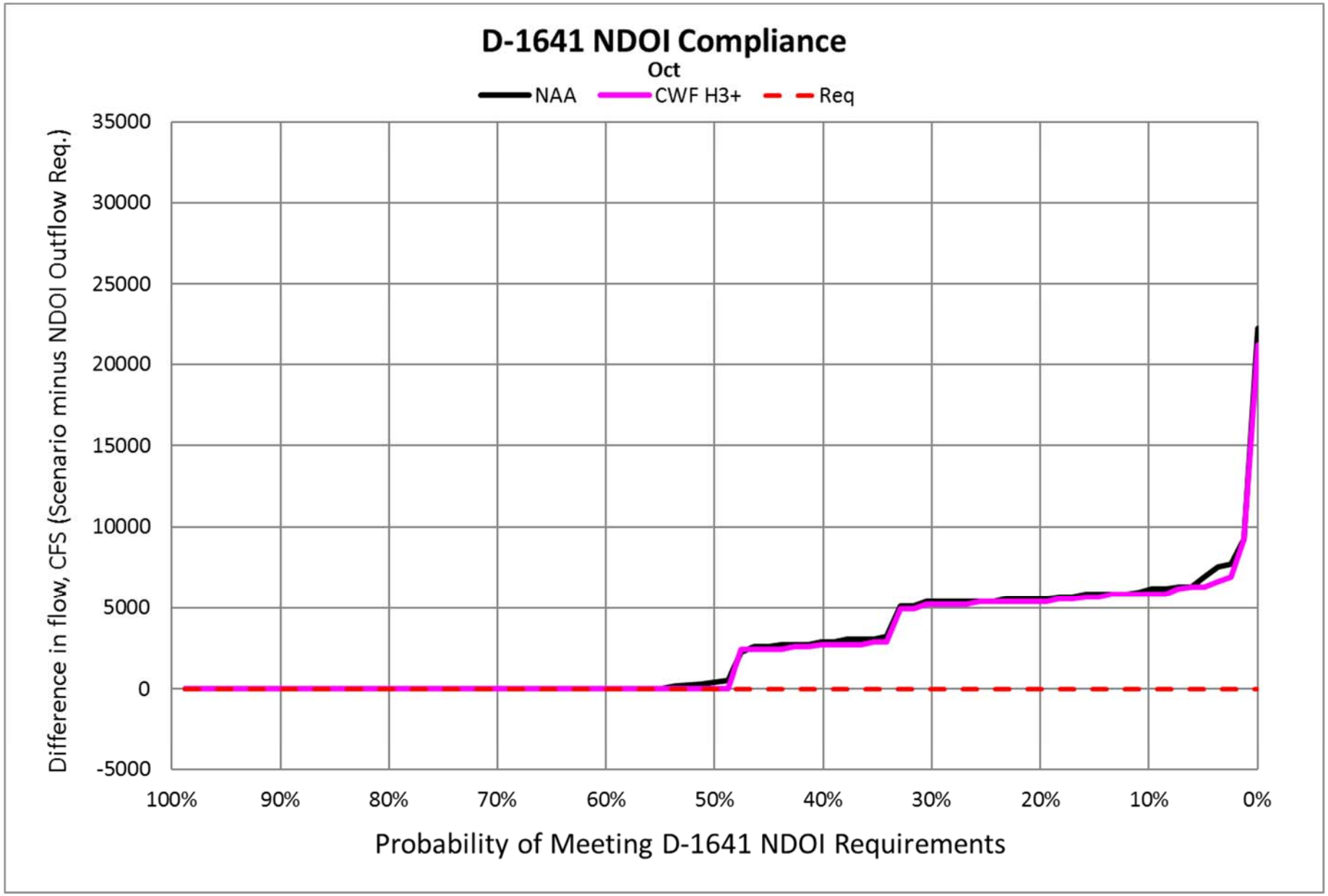


Figure 11: D-1641 NDOI Compliance for October

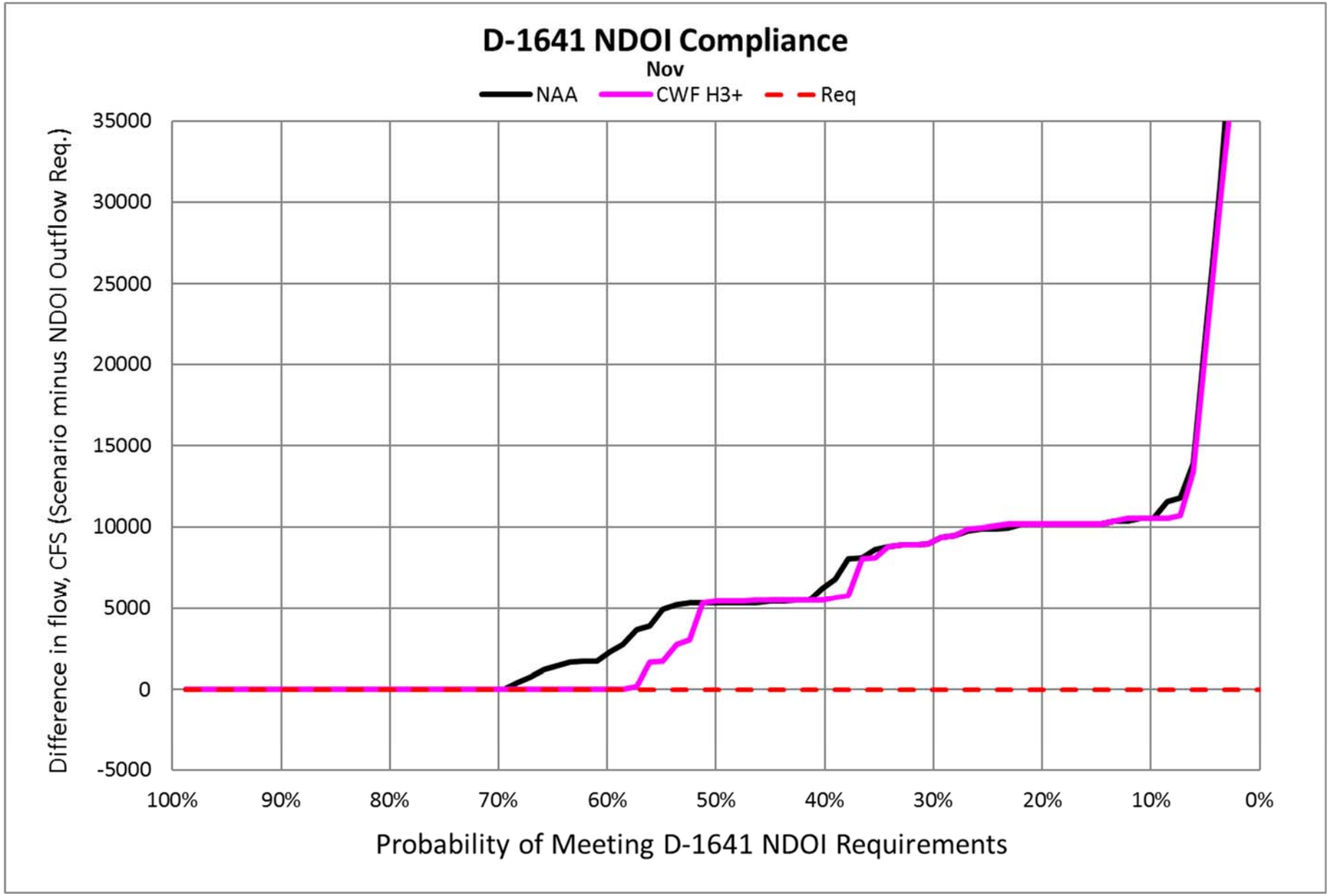


Figure 12: D-1641 NDOI Compliance for November

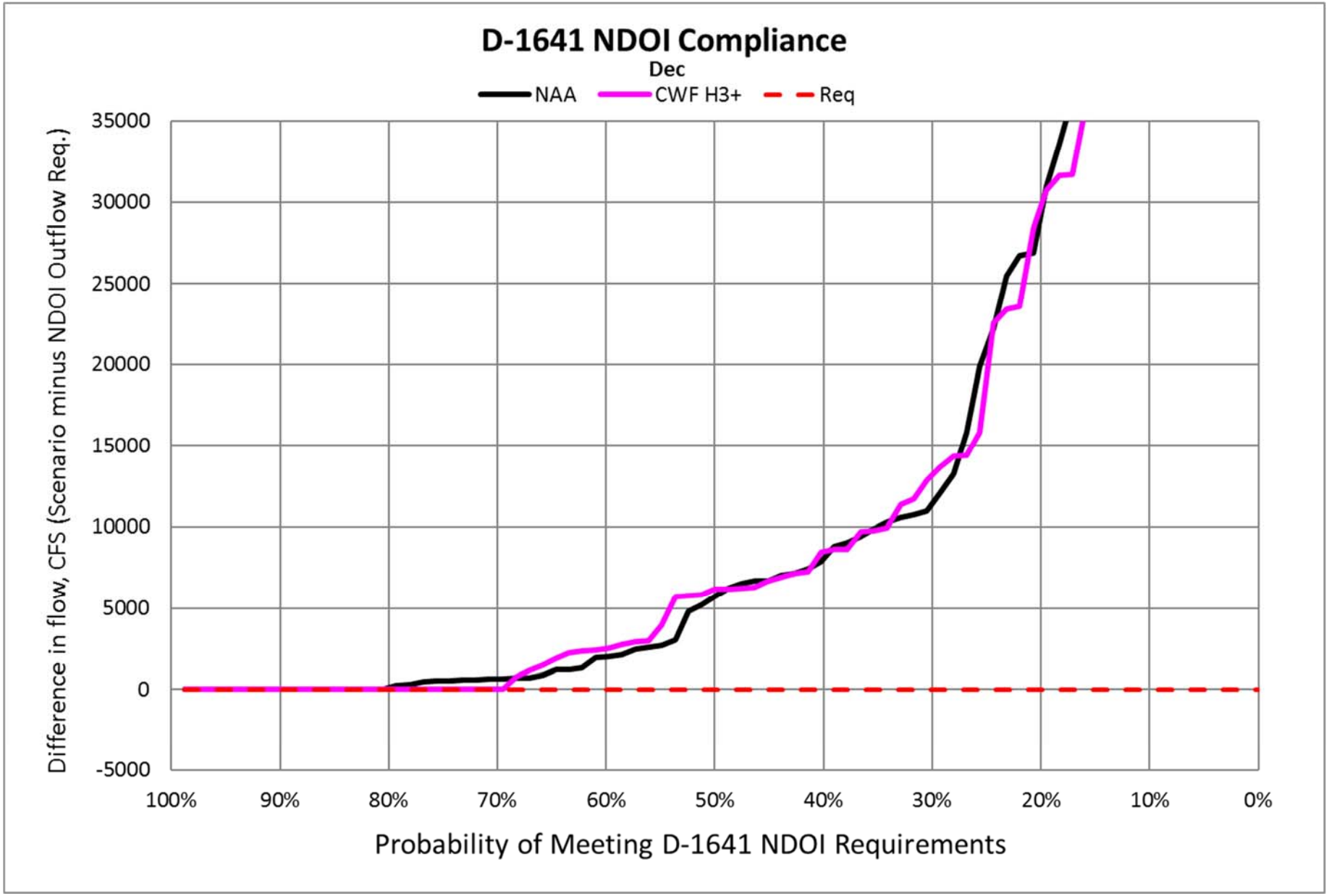


Figure 13: D-1641 NDOI Compliance for December

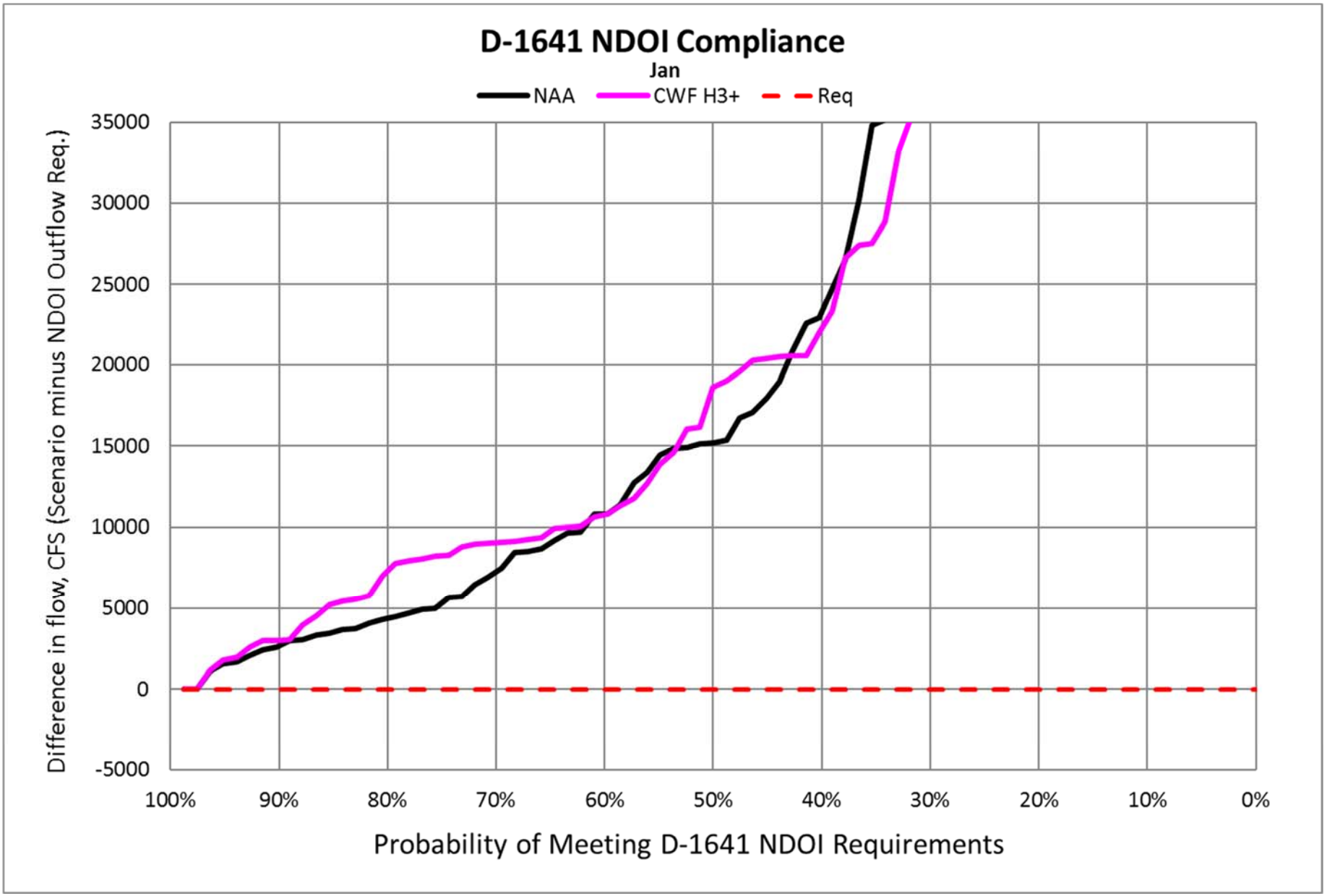


Figure 14: D-1641 NDOI Compliance for January

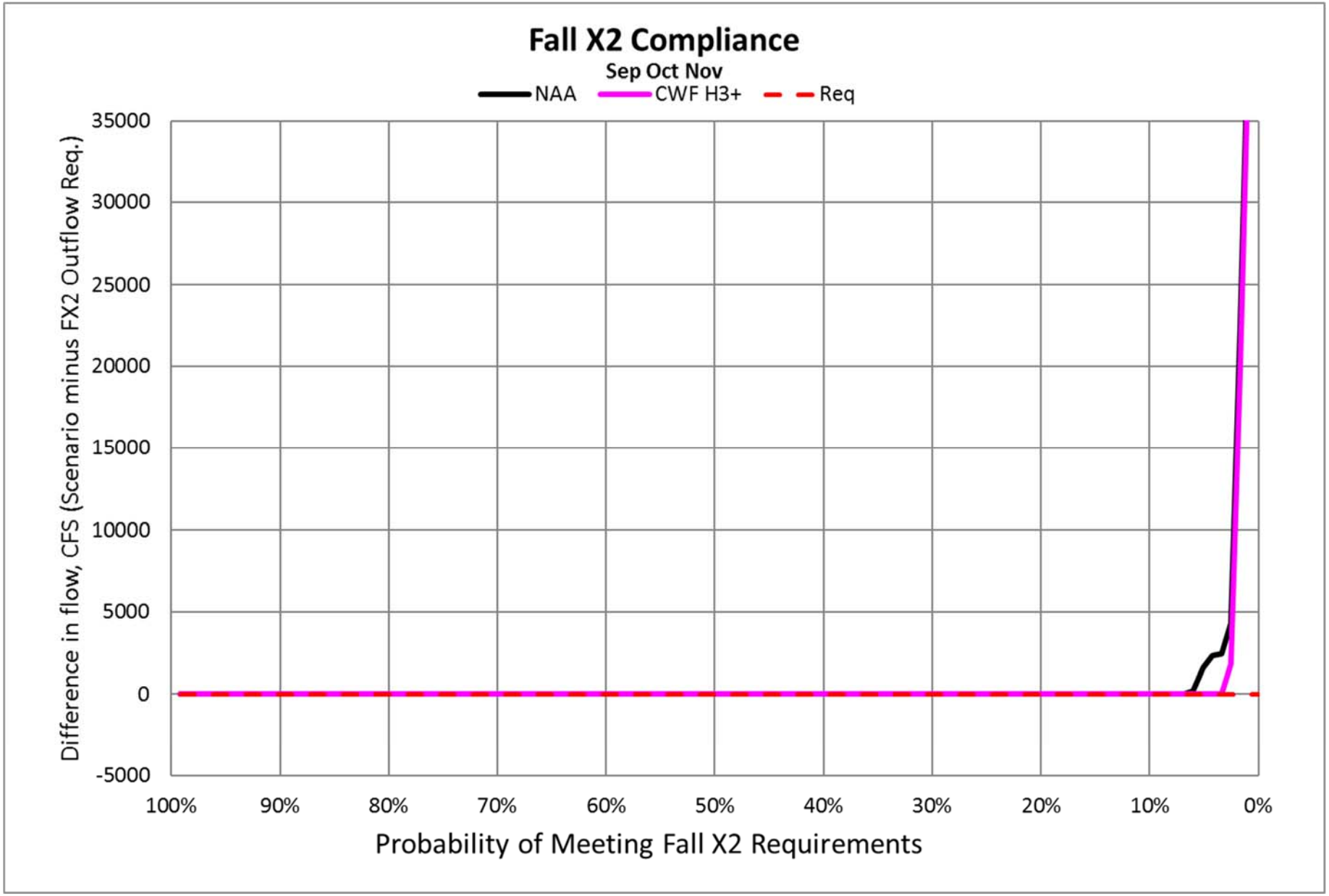


Figure 15: Fall X2 Compliance for September - November

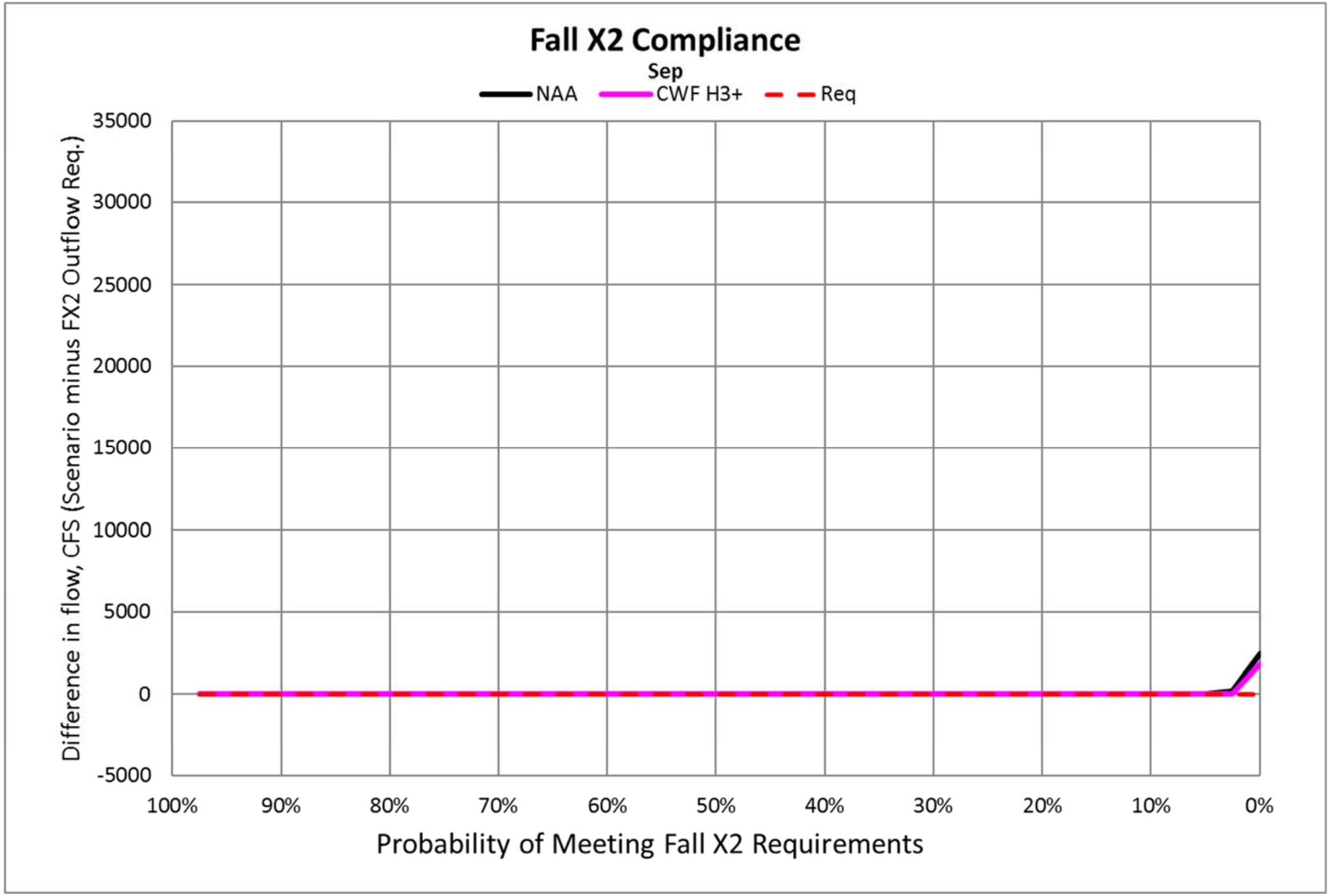


Figure 16: Fall X2 Compliance for September

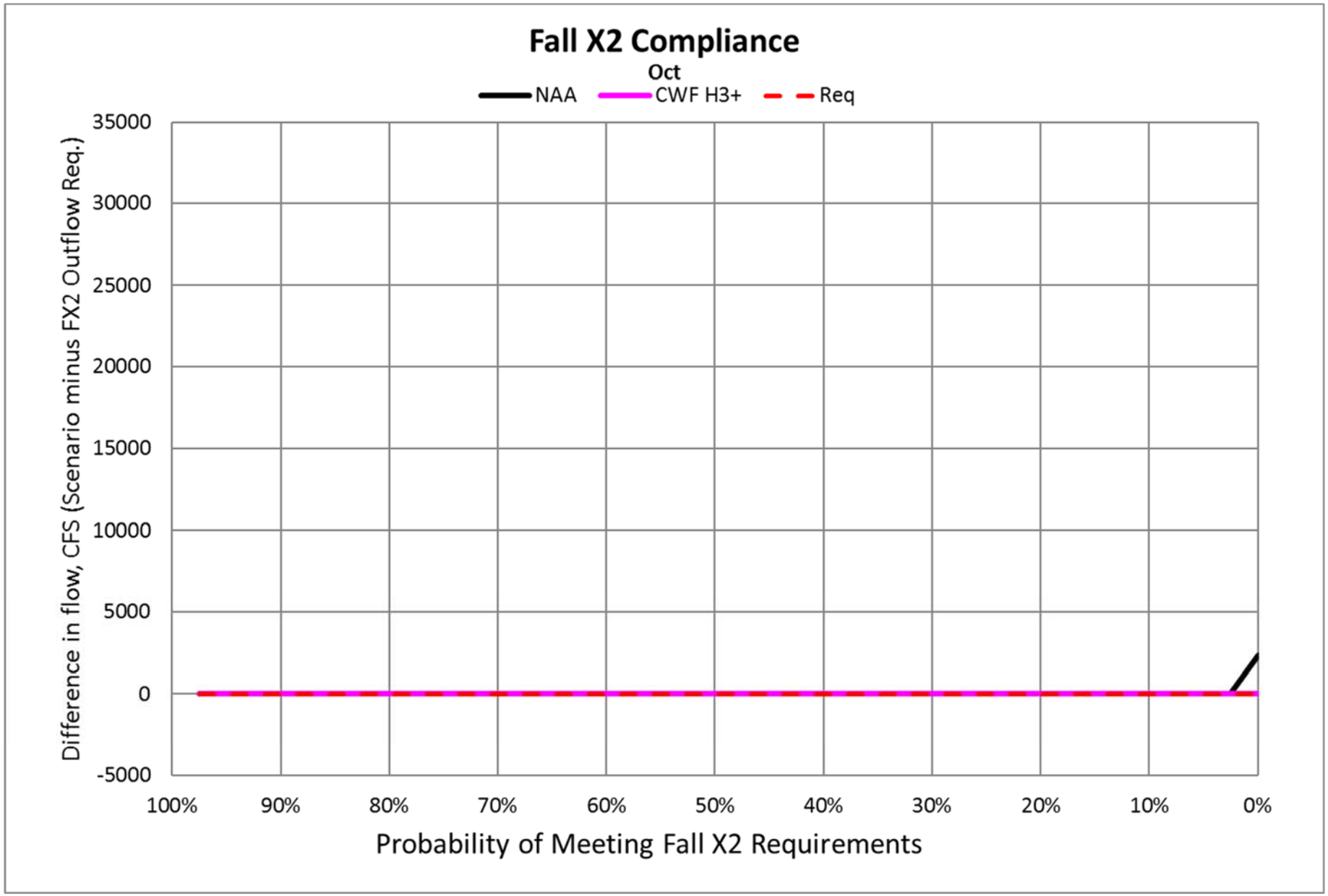


Figure 17: Fall X2 Compliance for October

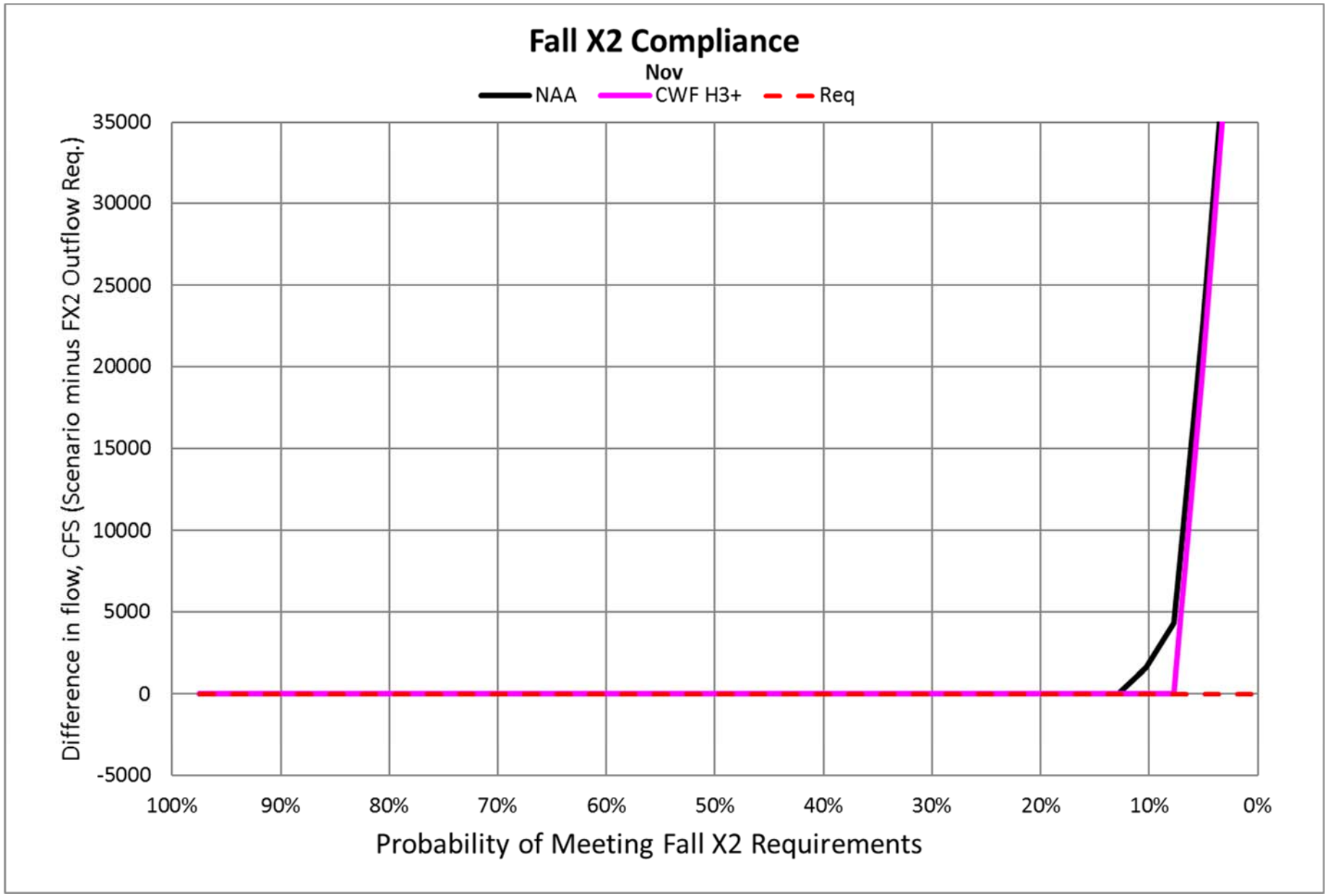


Figure 18: Fall X2 Compliance for November

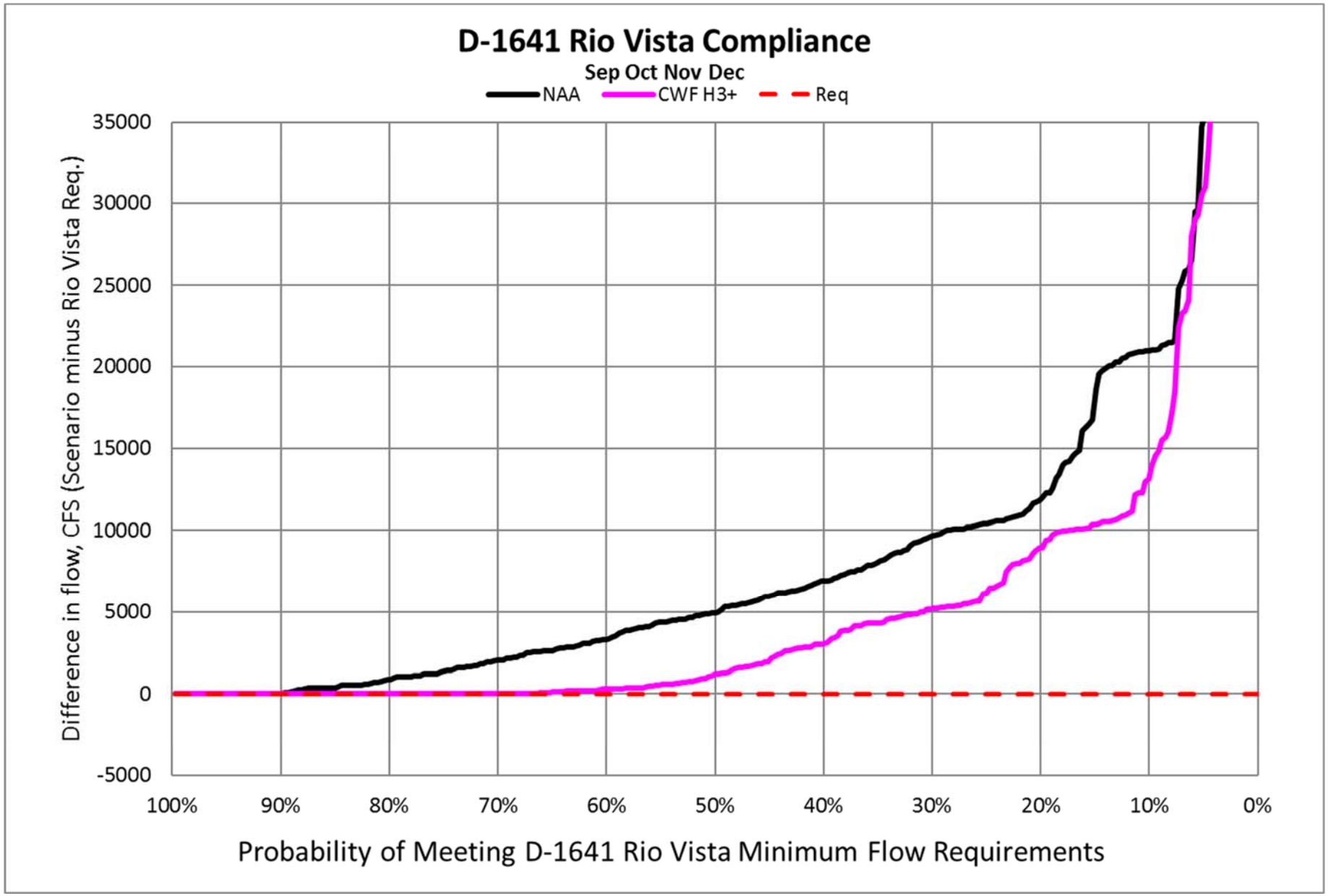


Figure 19: D-1641 Rio Vista Minimum Flow Compliance for September - December

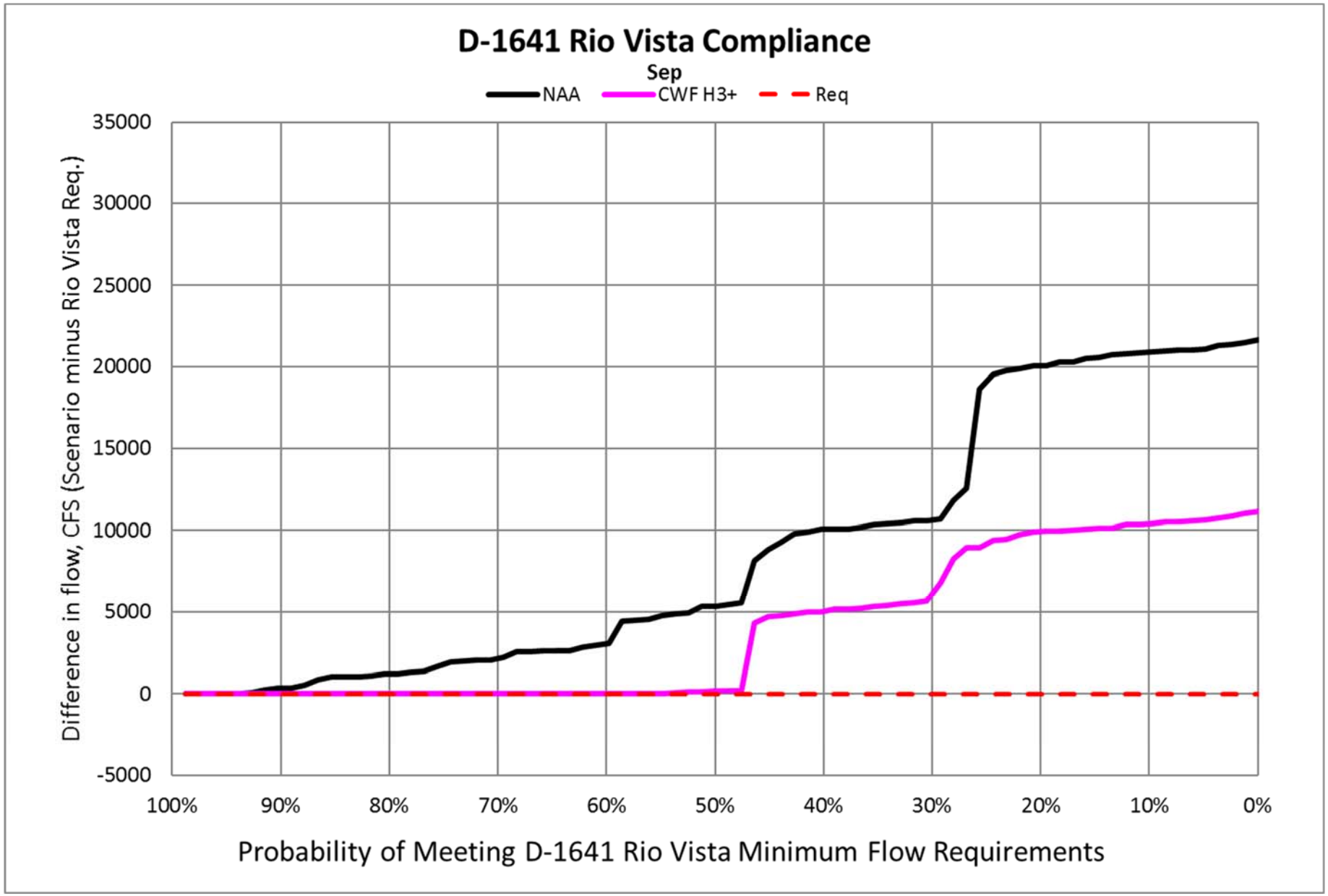


Figure 20: D-1641 Rio Vista Minimum Flow Compliance for September

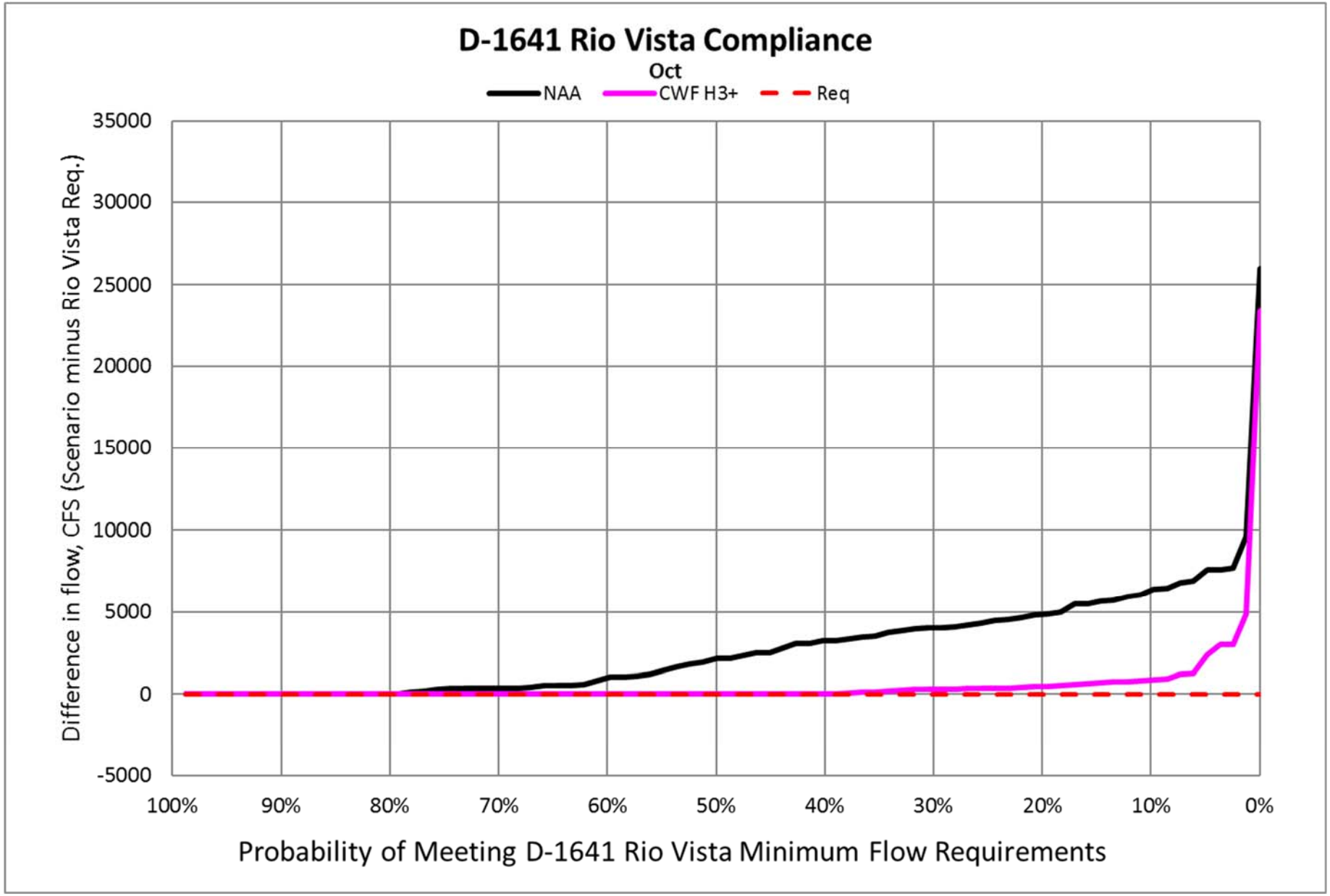


Figure 21: D-1641 Rio Vista Minimum Flow Compliance for October

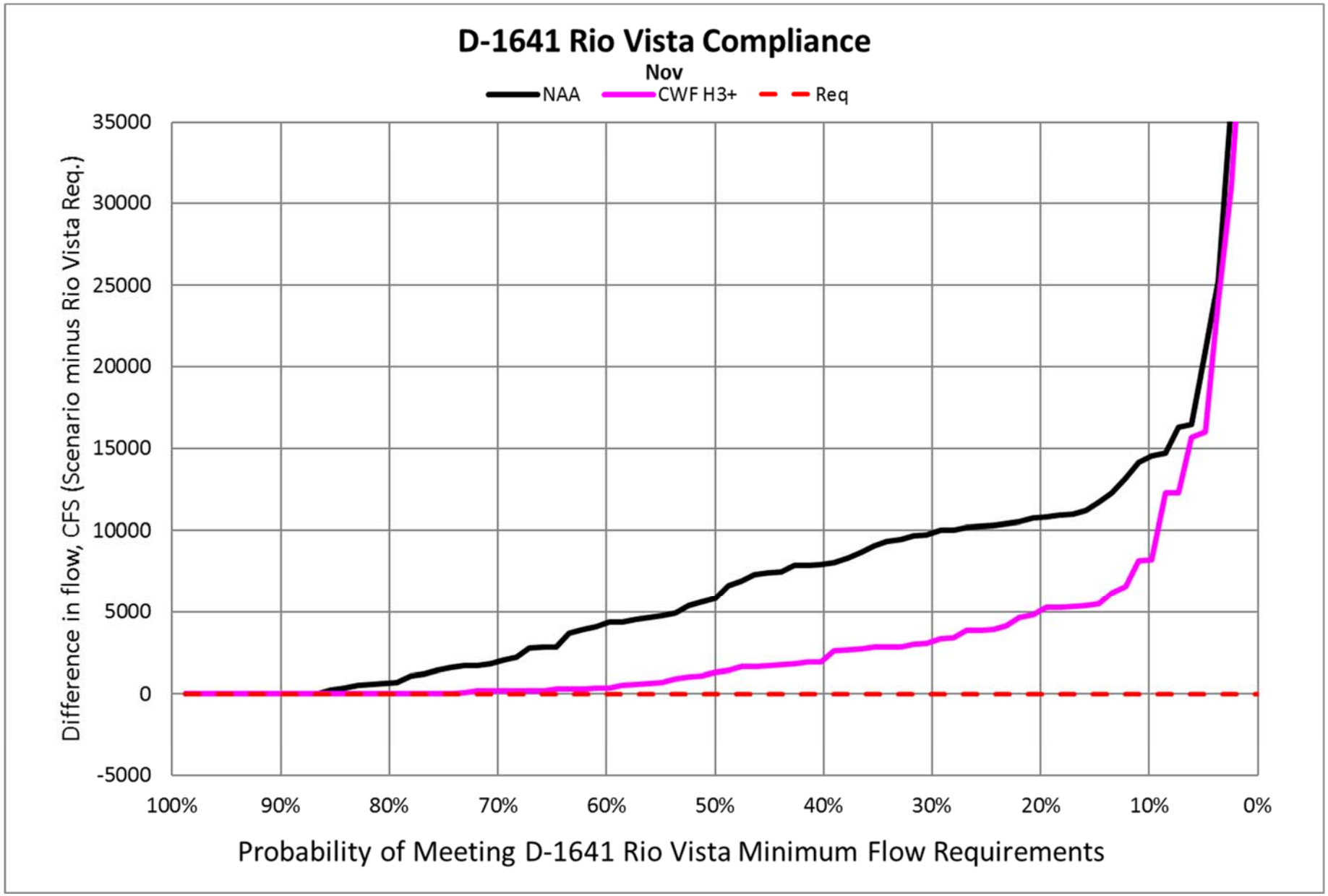


Figure 22: D-1641 Rio Vista Minimum Flow Compliance for November

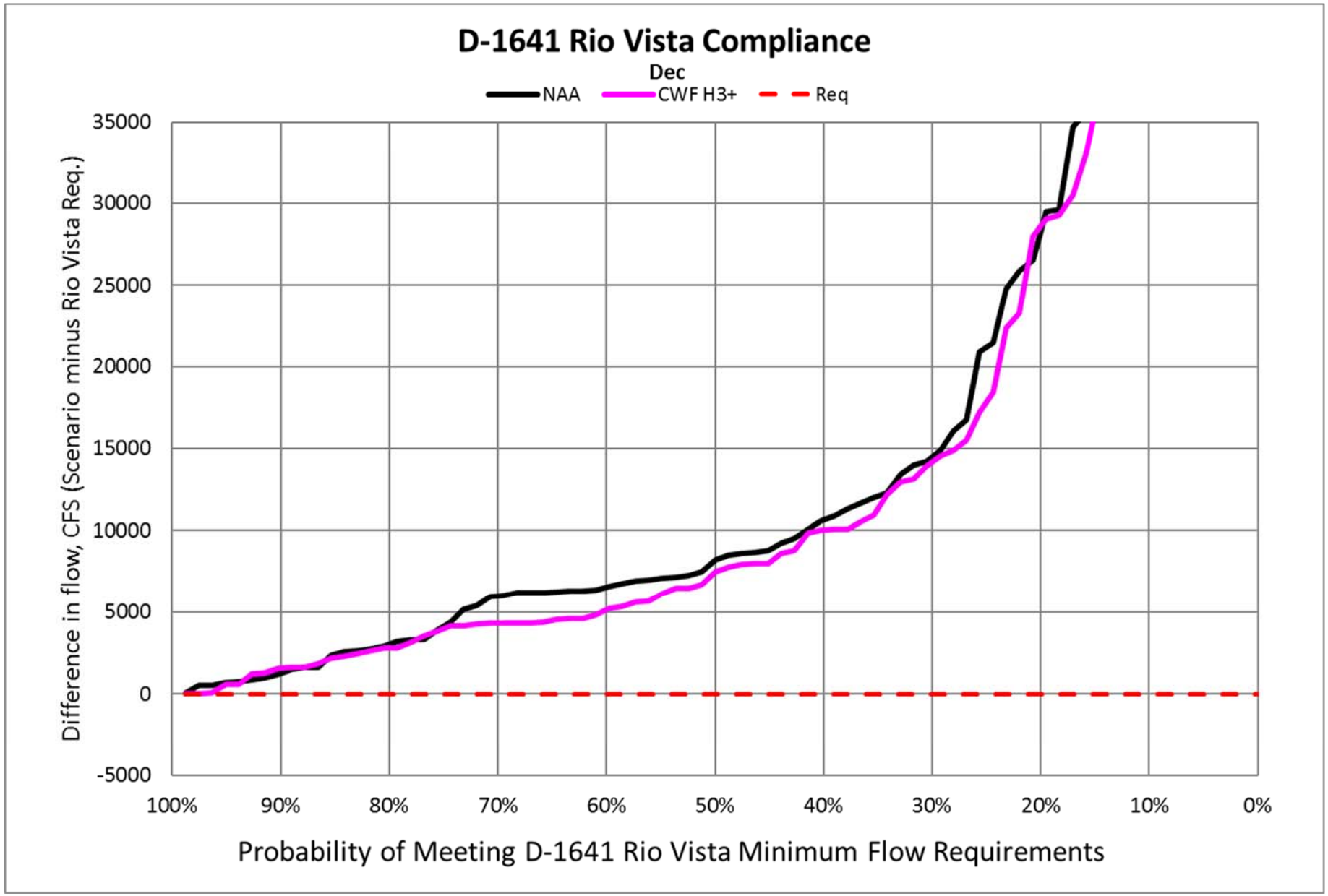


Figure 23: D-1641 Rio Vista Minimum Flow Compliance for December

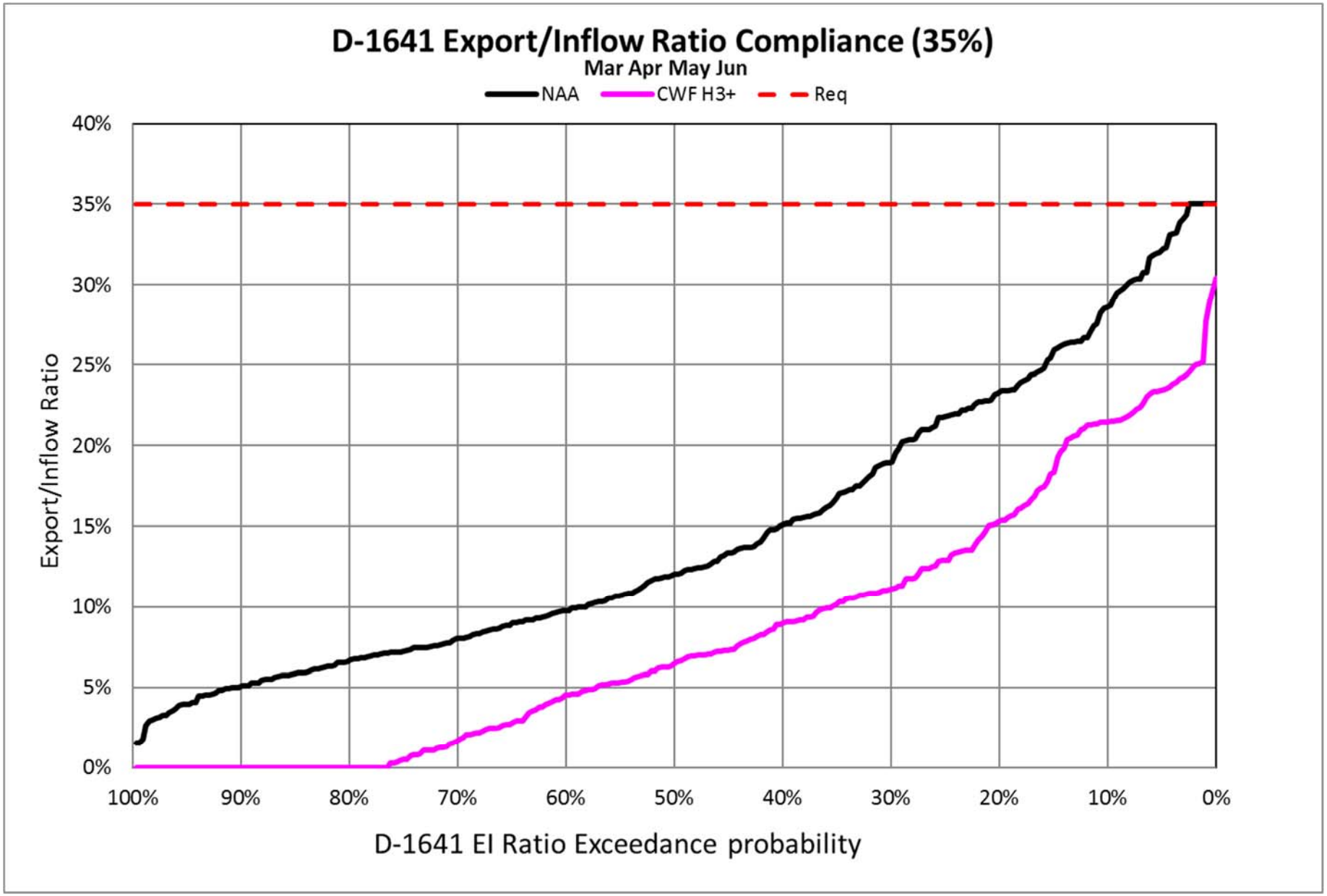


Figure 24: D-1641 Export/Inflow Ratio Compliance for March – June (35%)

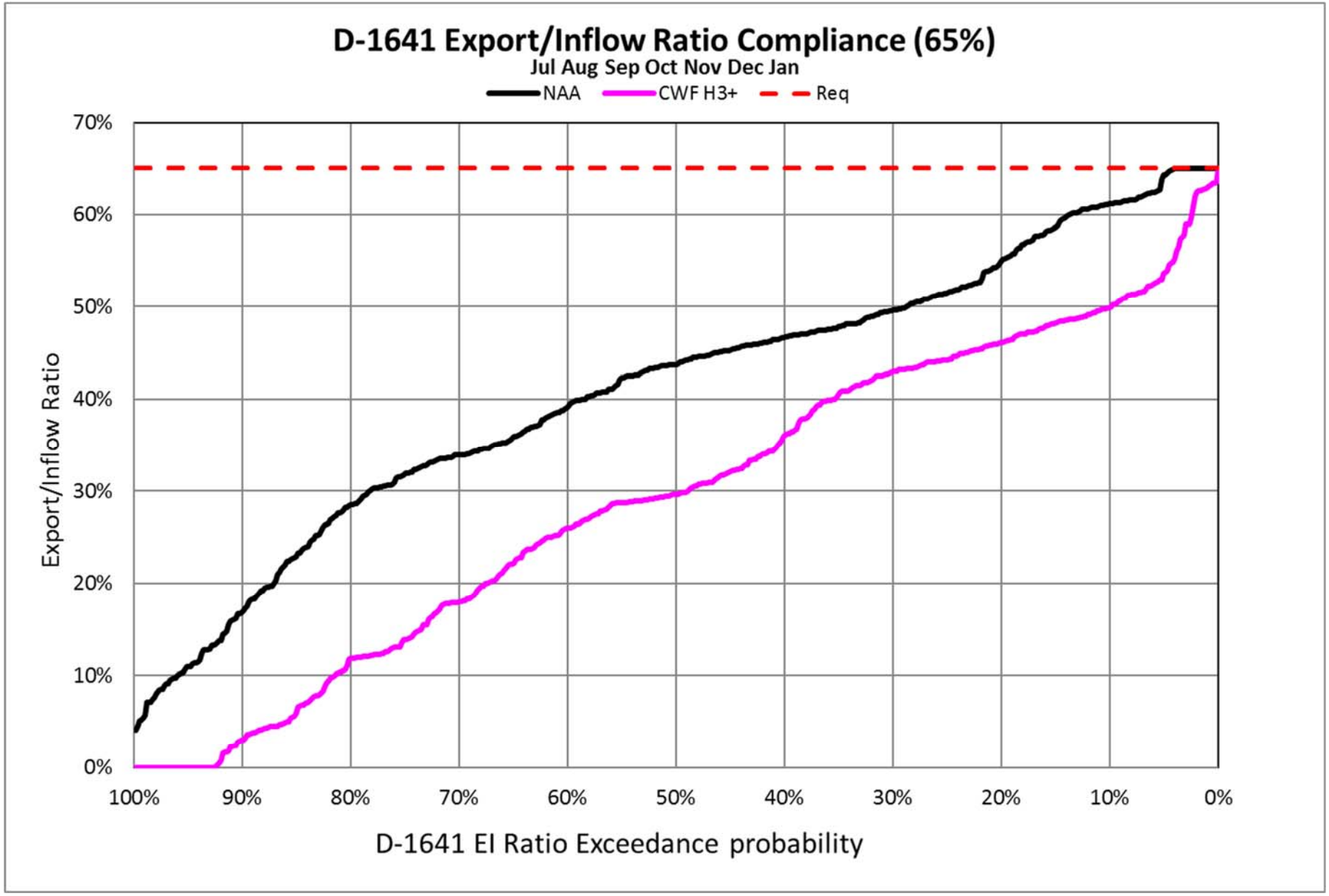


Figure 25: D-1641 Export/Inflow Ratio Compliance for July – January (65%)

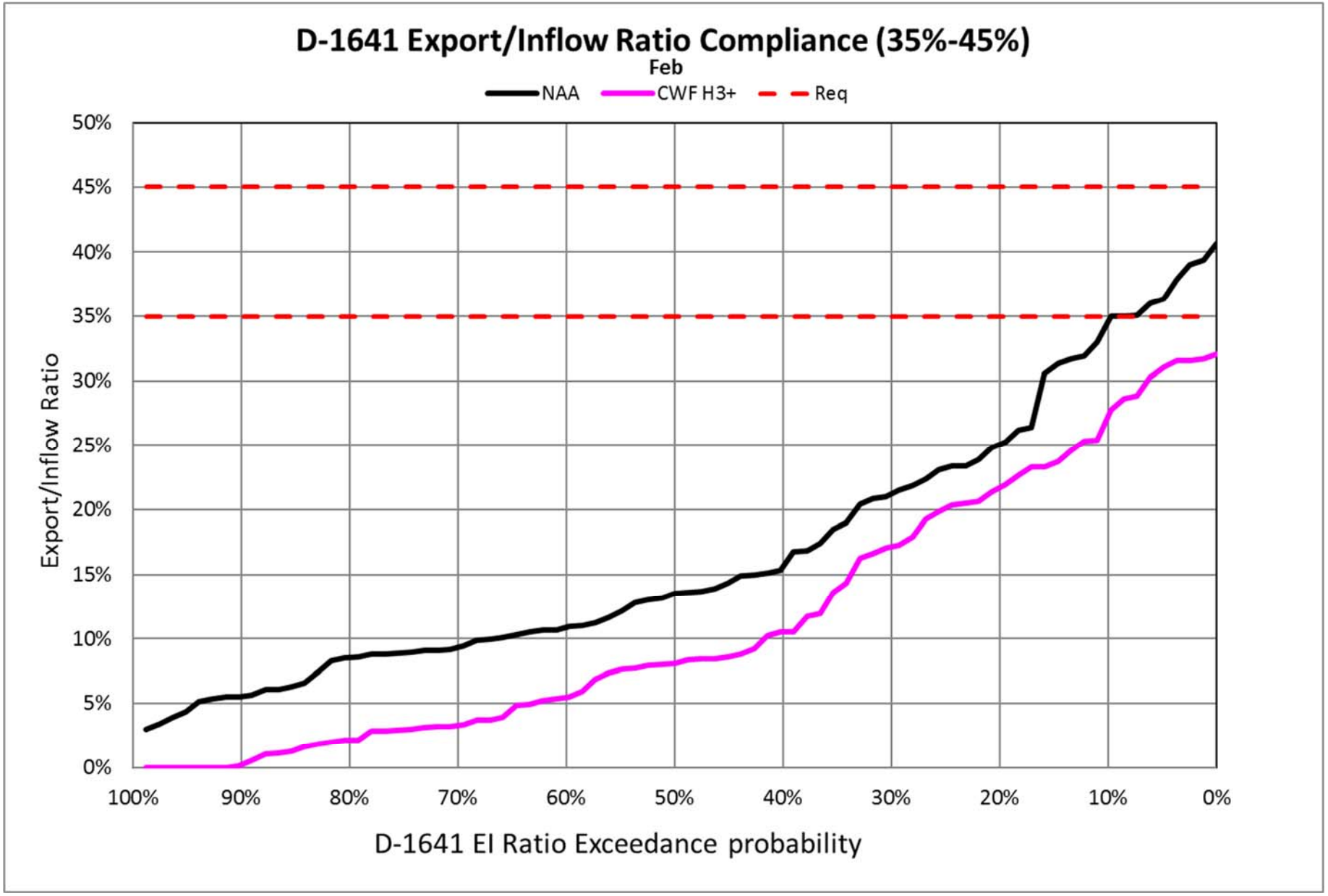


Figure 26: D-1641 Export/Inflow Ratio Compliance for February (35%-45%)

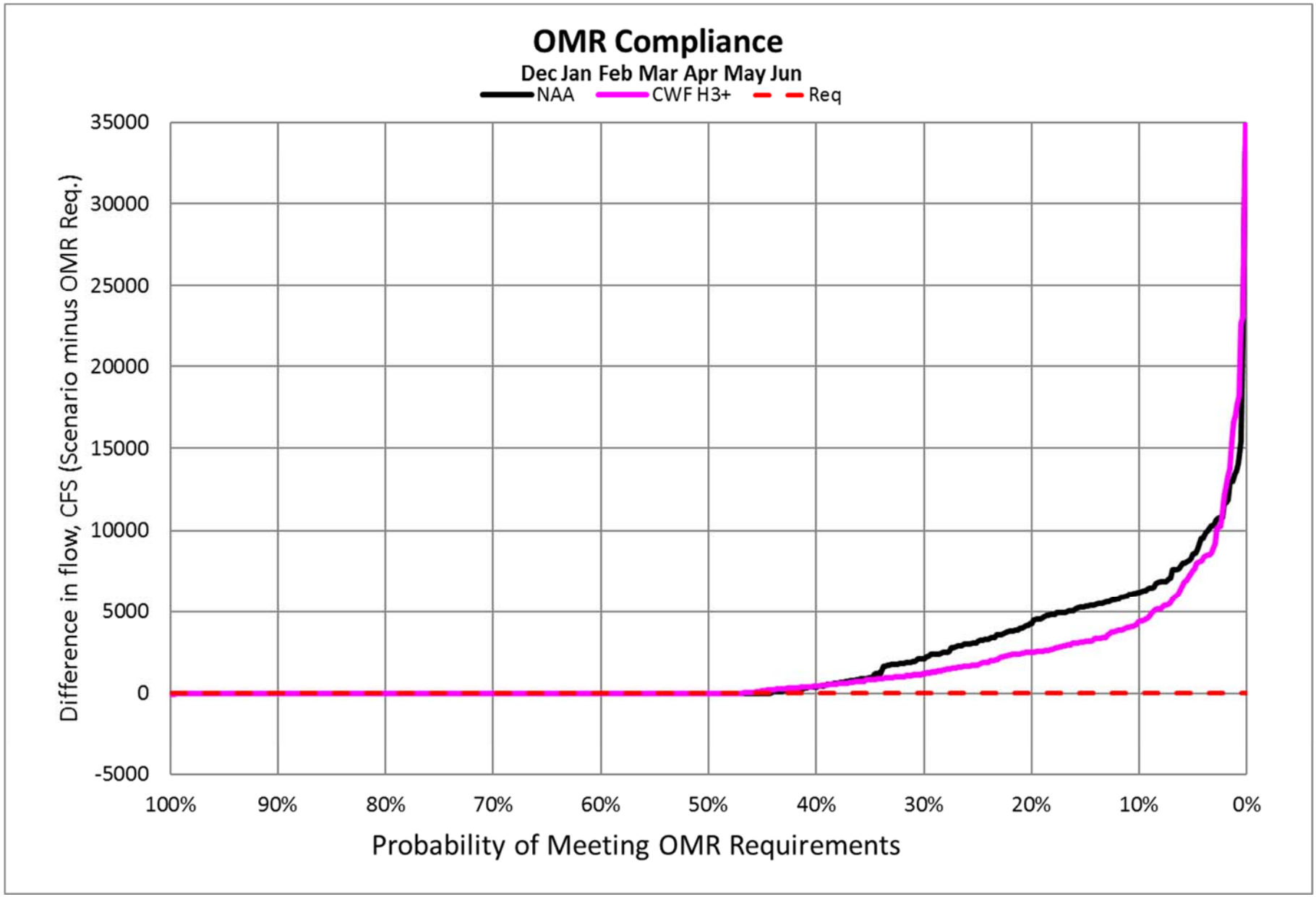


Figure 27: OMR Compliance for December – June

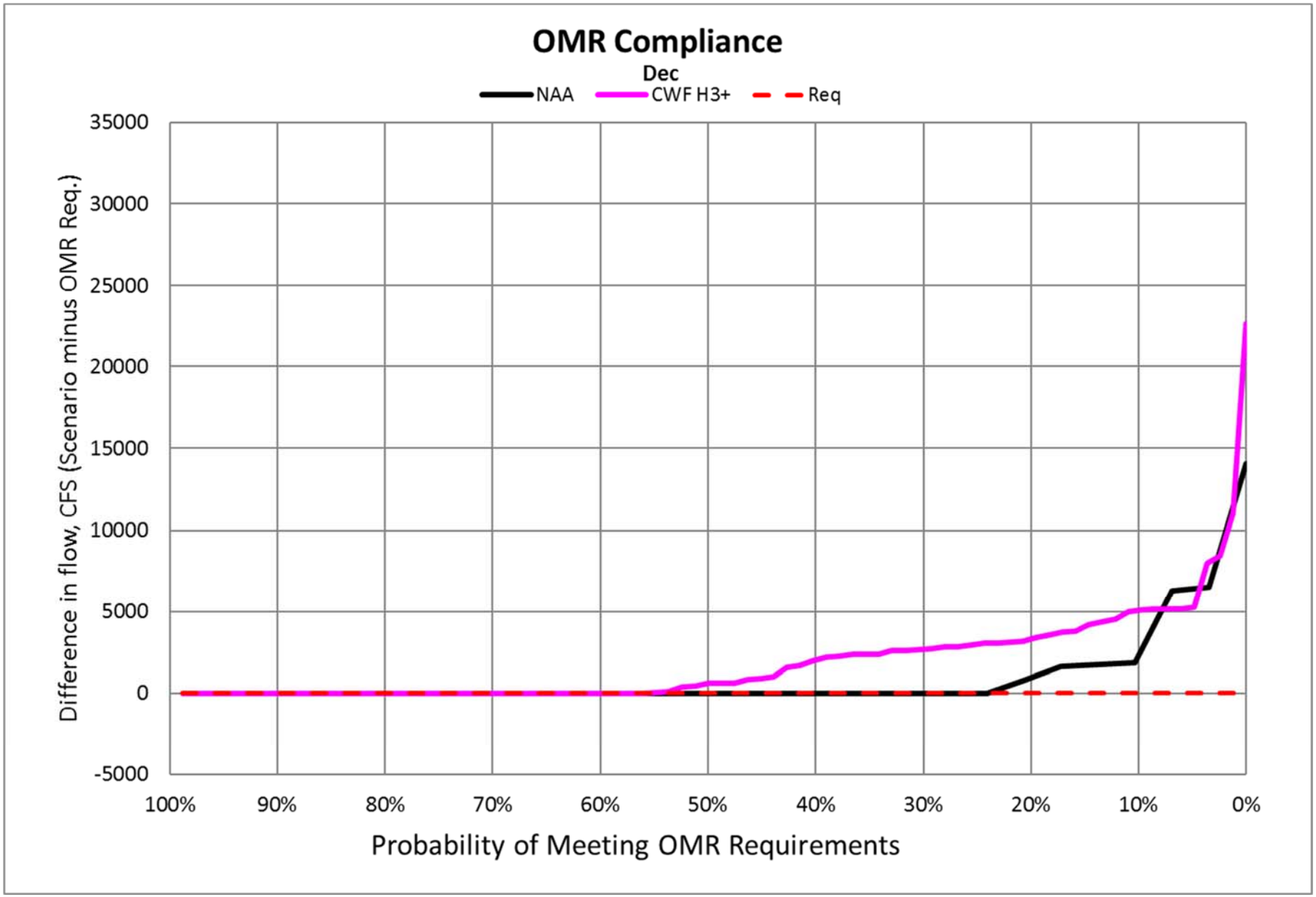


Figure 28: OMR Compliance for December

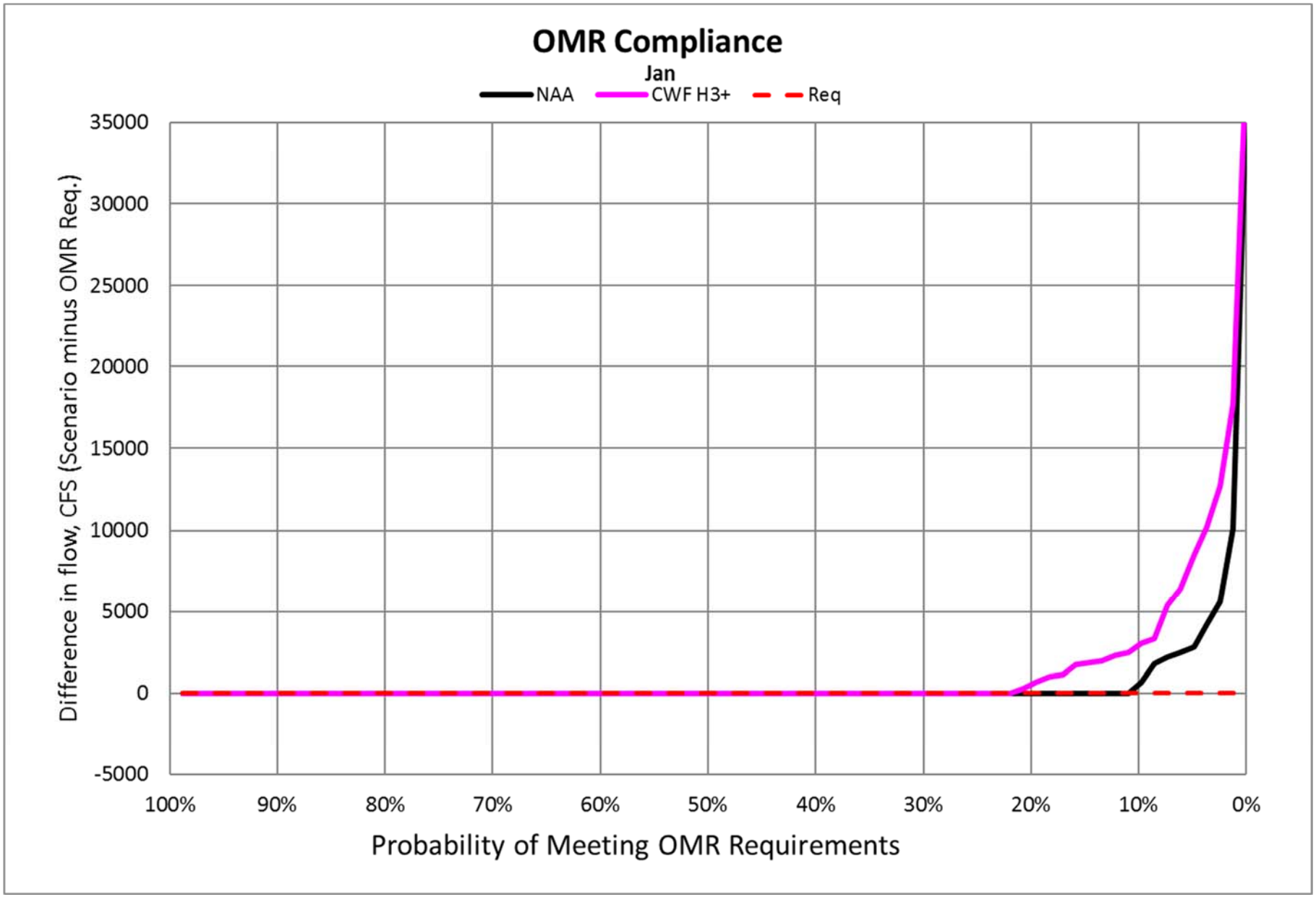


Figure 29: OMR Compliance for January

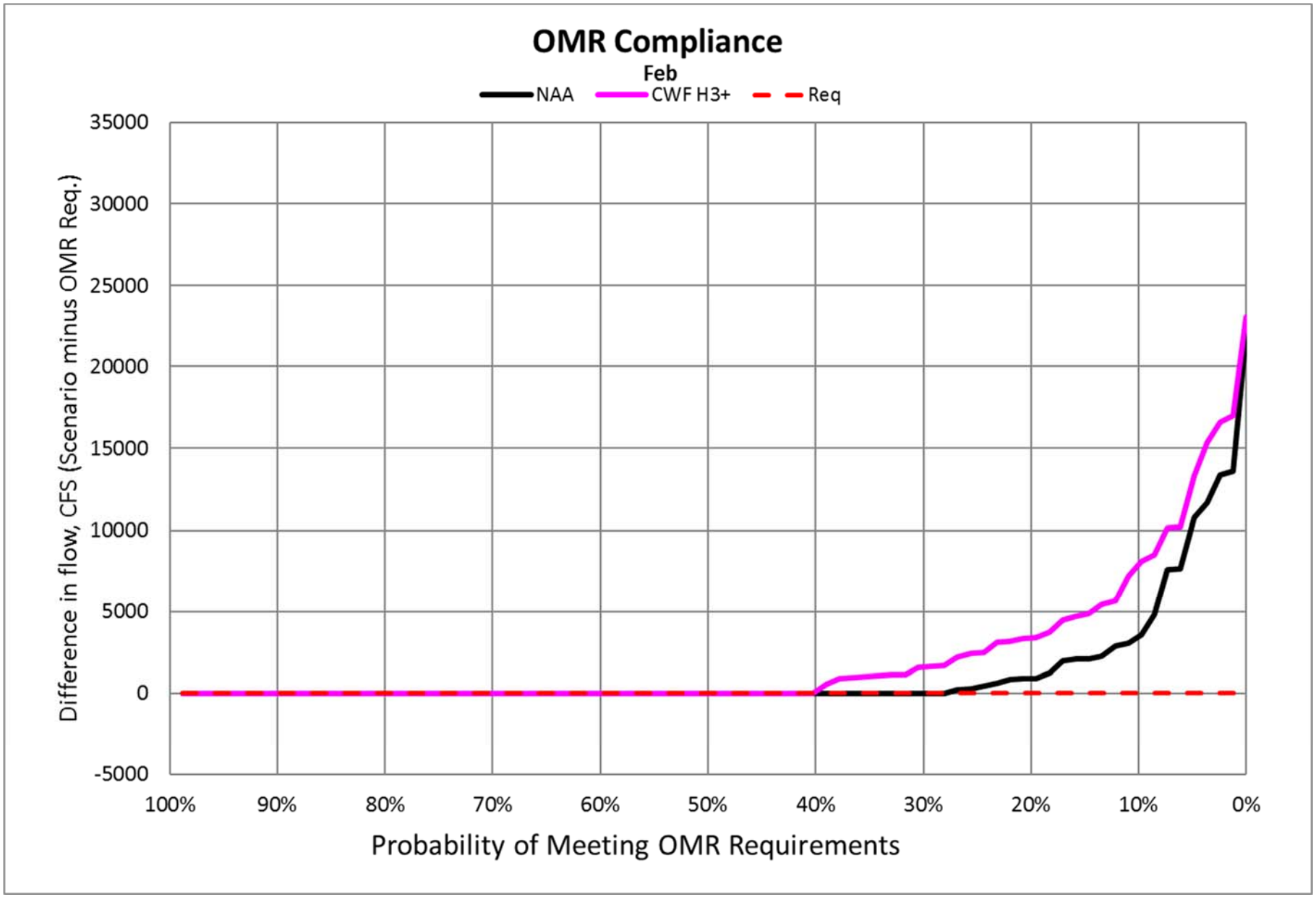


Figure 30: OMR Compliance for February

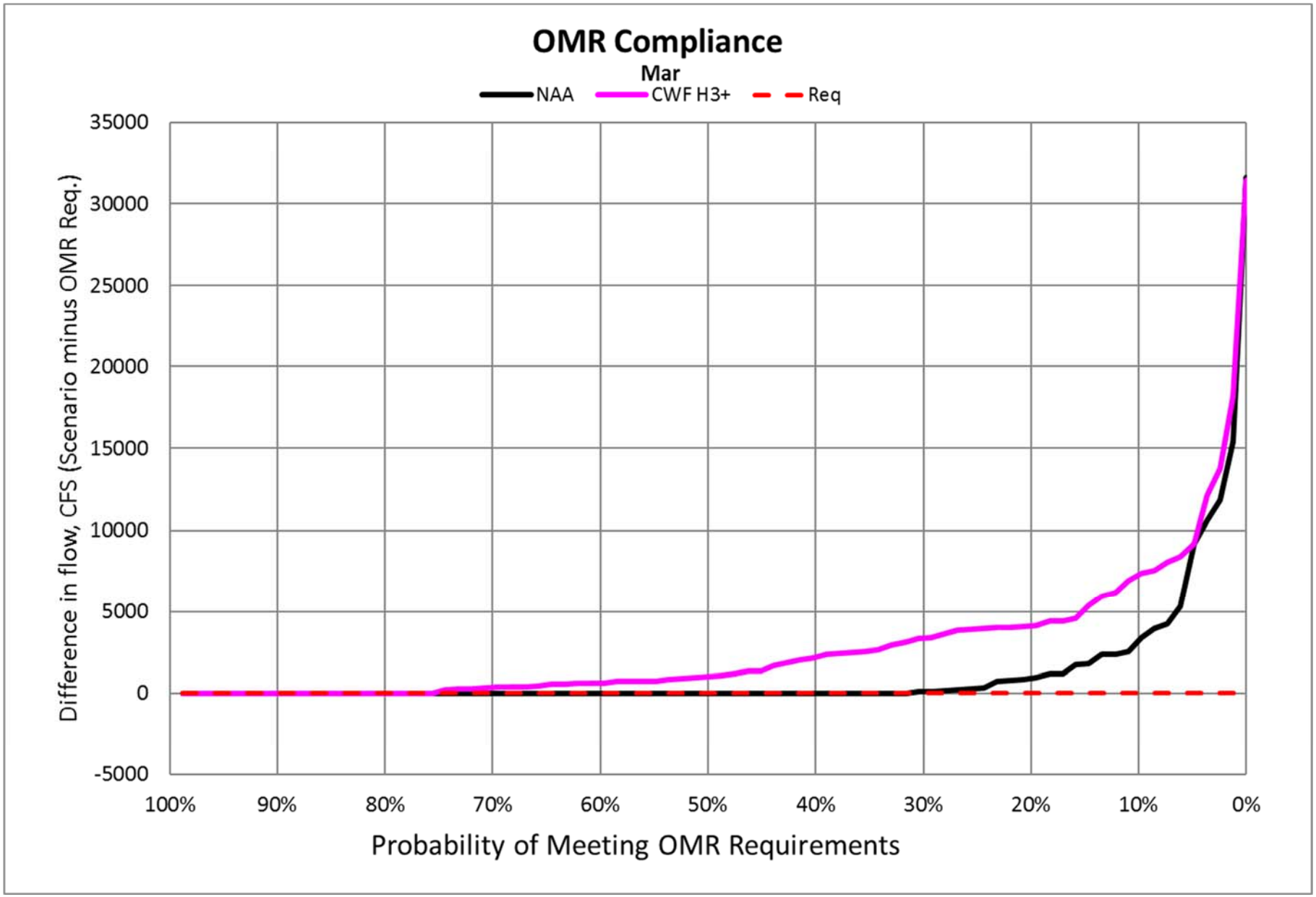


Figure 31: OMR Compliance for March

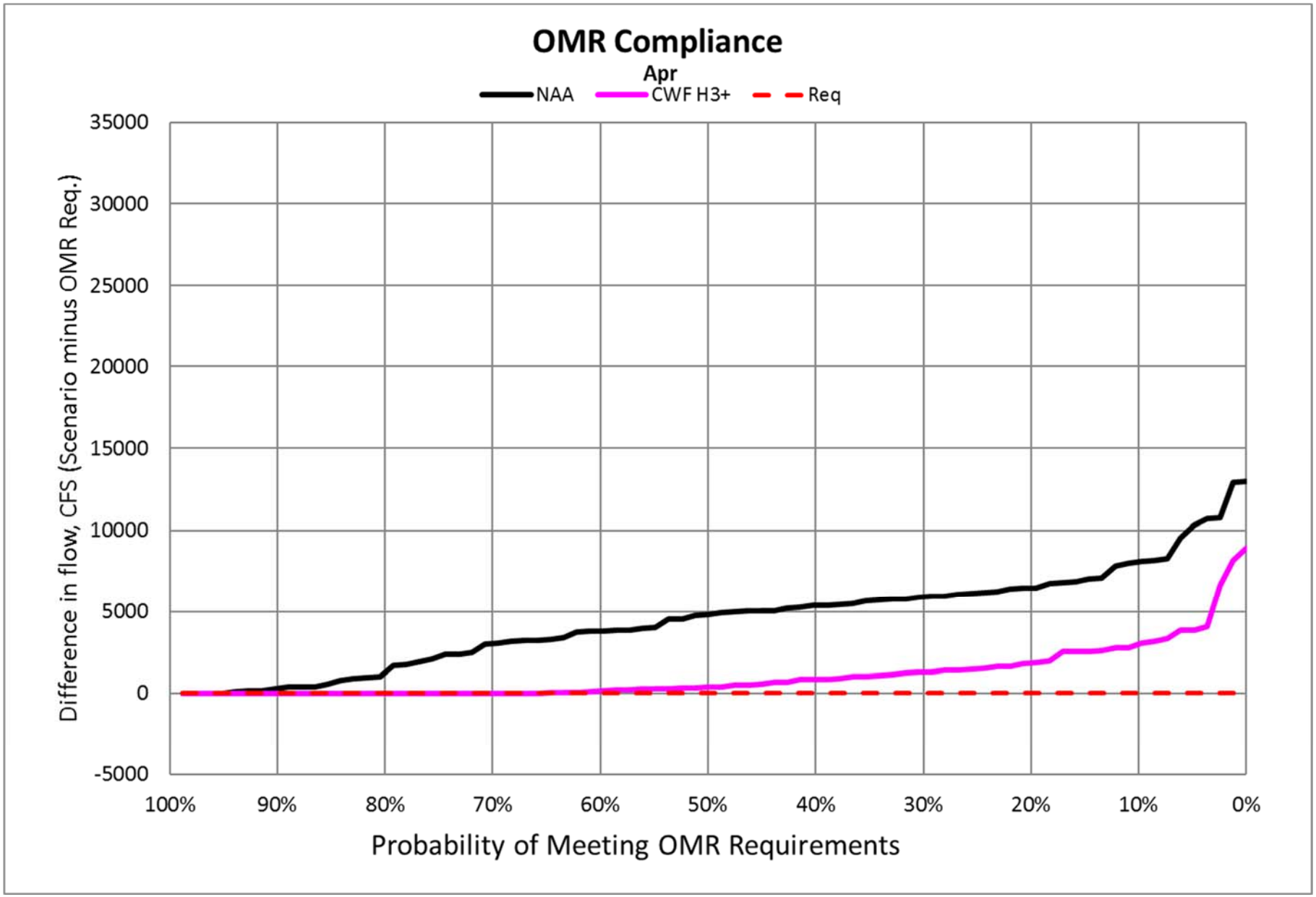


Figure 32: OMR Compliance for April

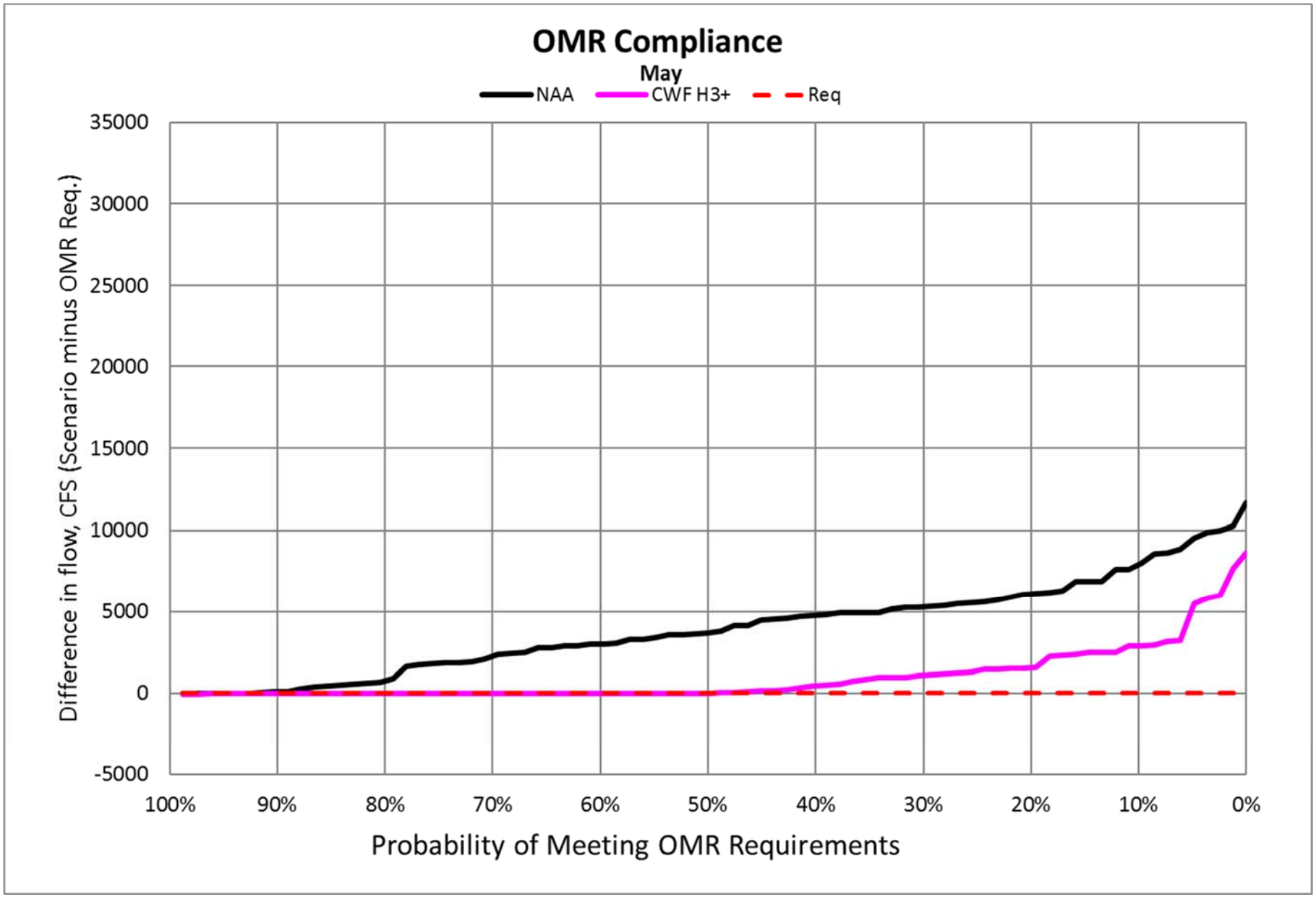


Figure 33: OMR Compliance for May

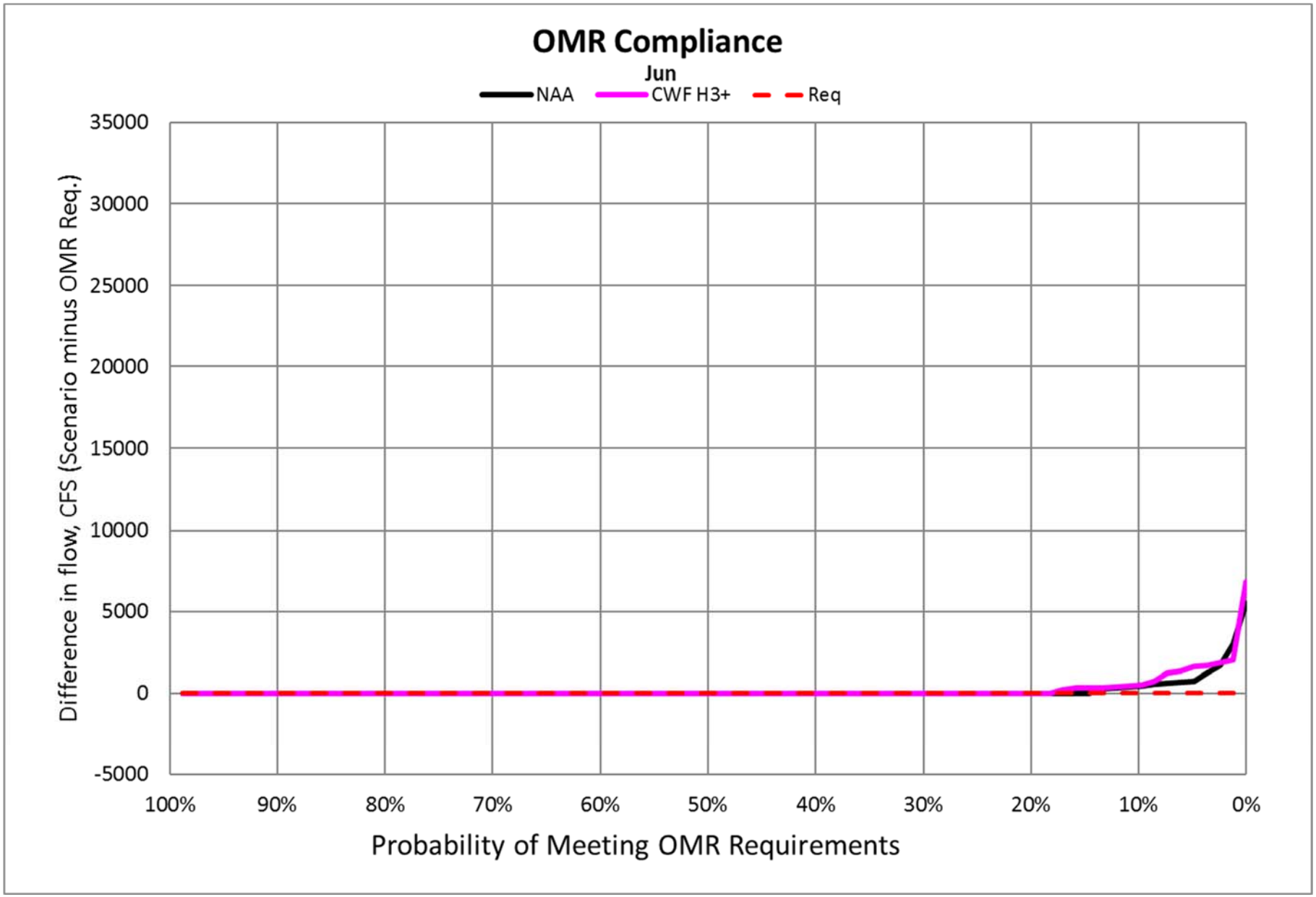


Figure 34: OMR Compliance for June

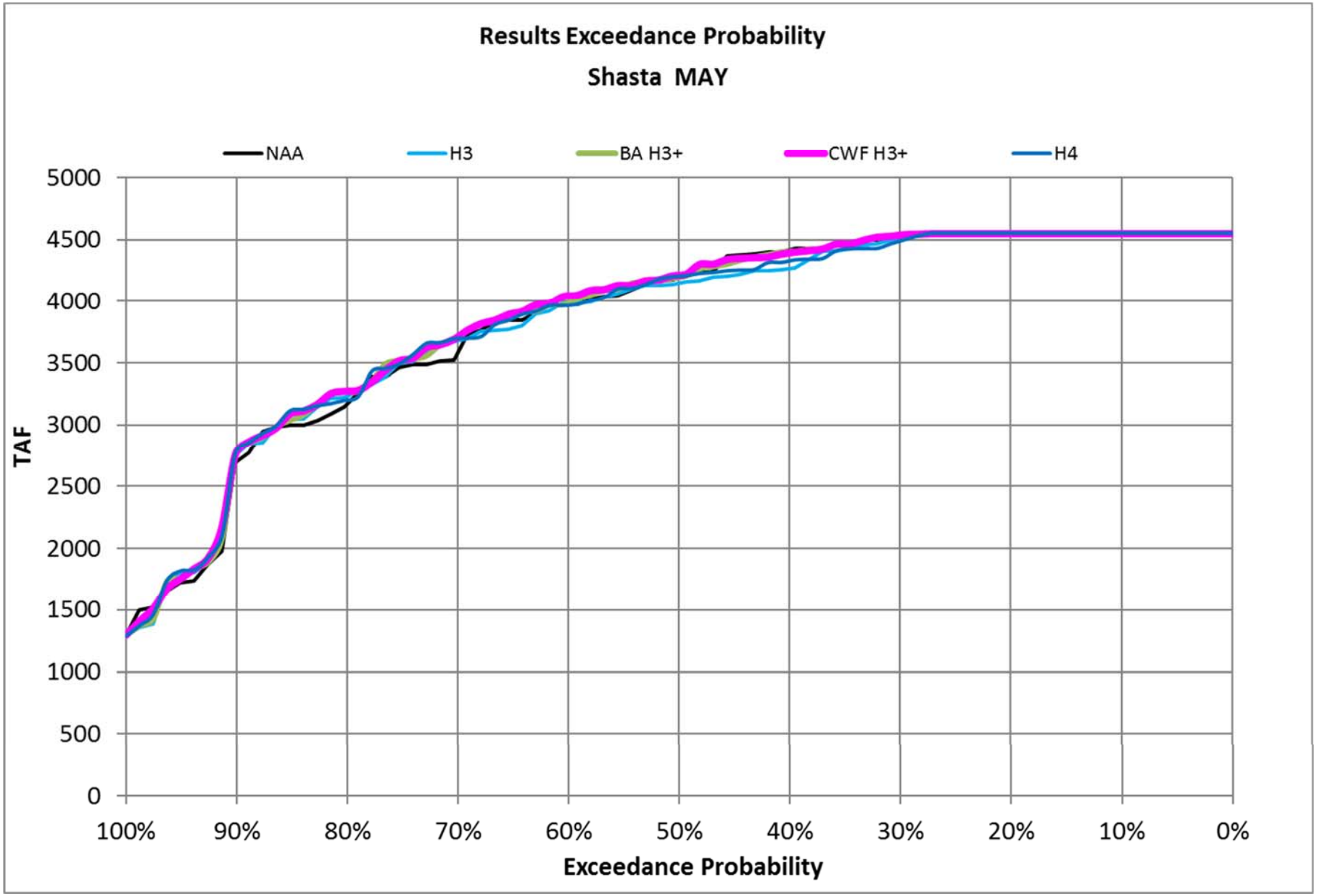


Figure 35: Simulated End of May Shasta Storage

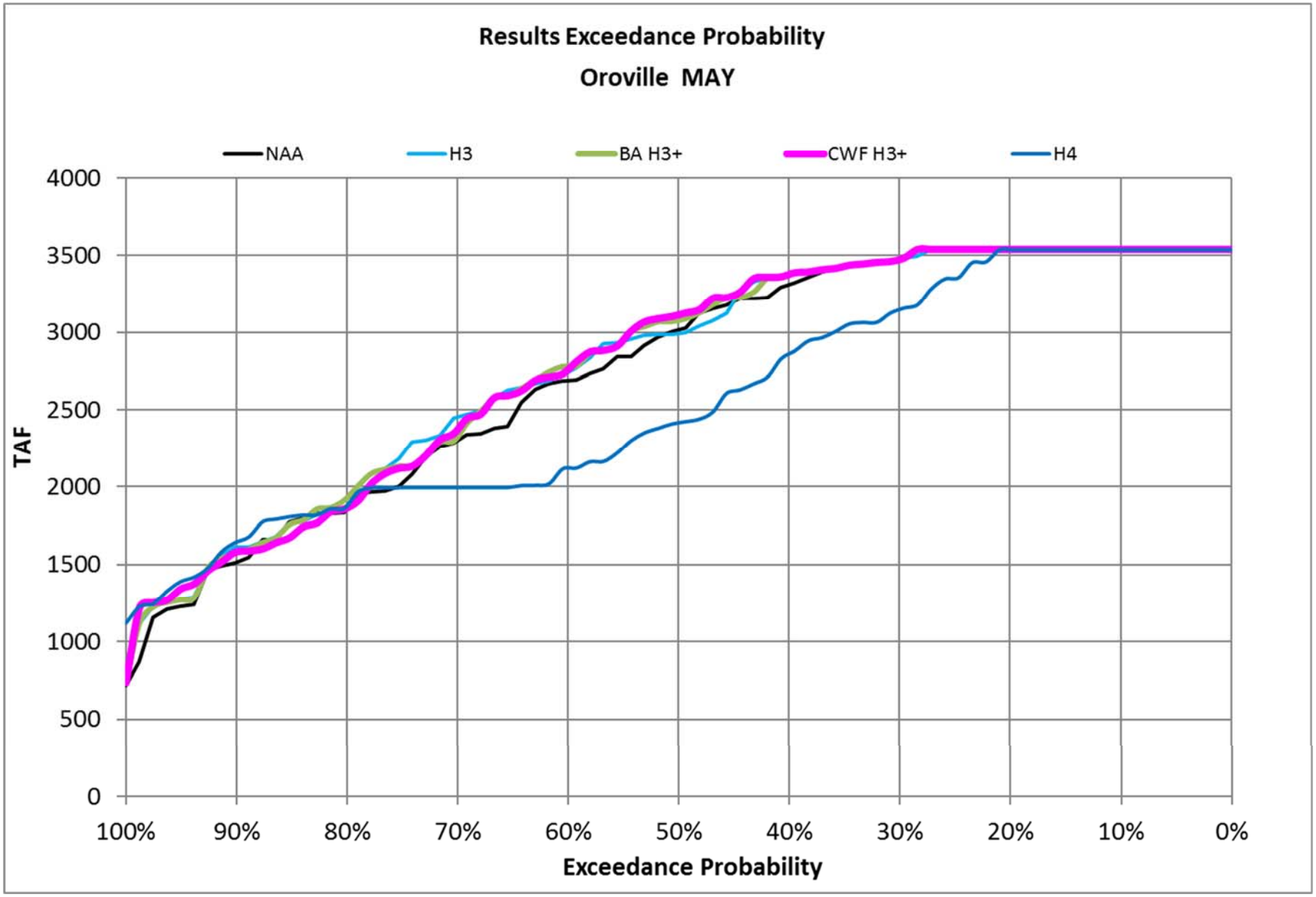


Figure 36: Simulated End of May Oroville Storage

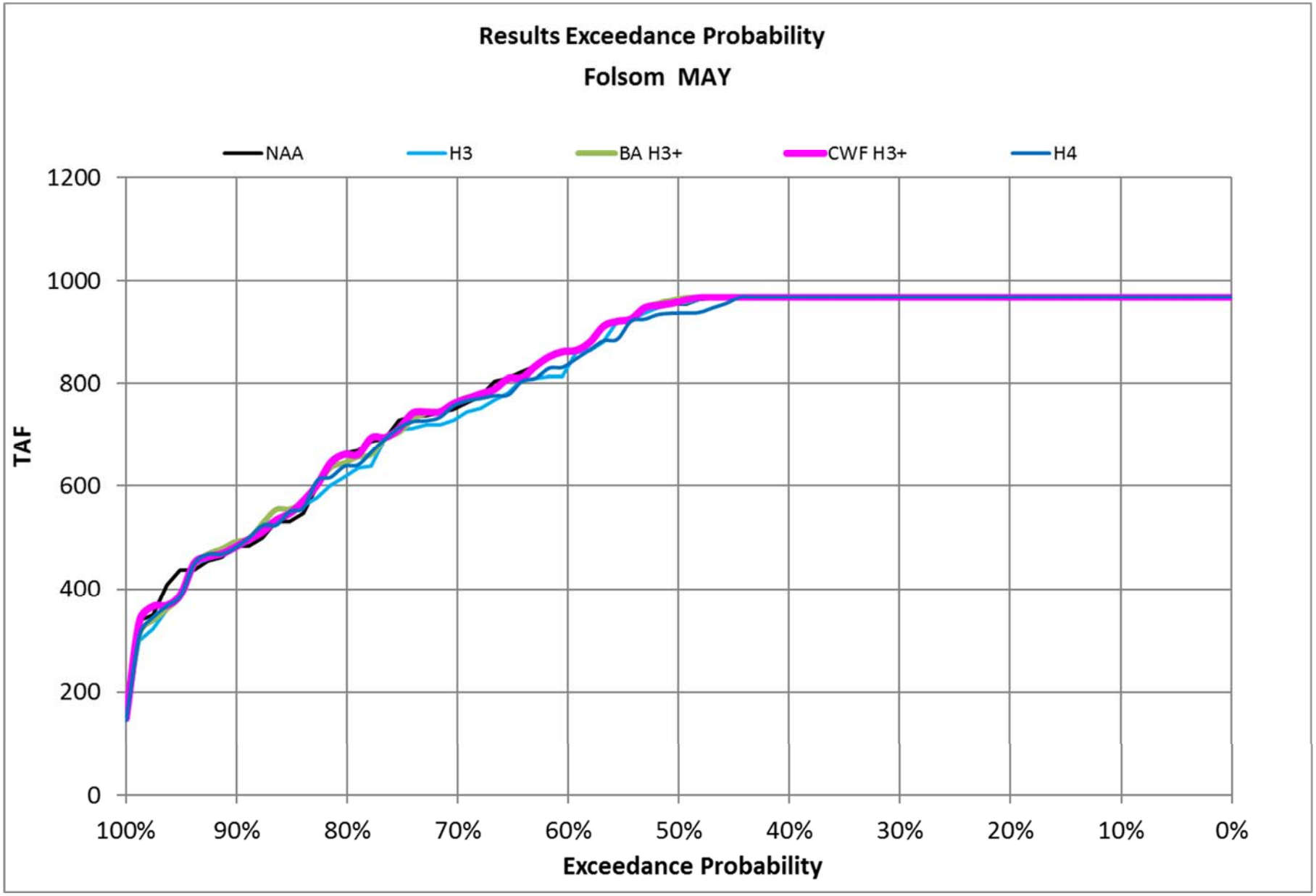


Figure 37: Simulated End of May Folsom Storage

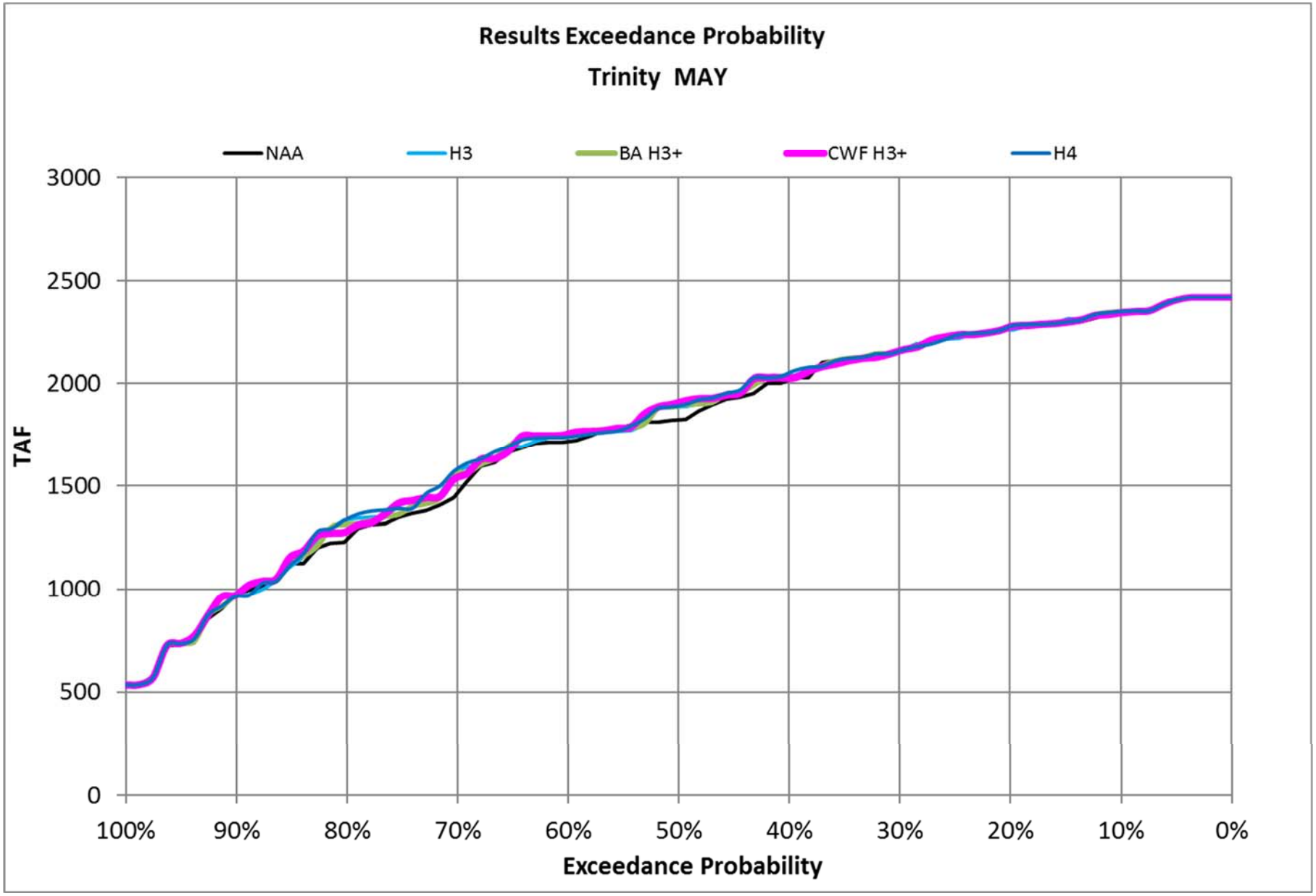


Figure 38: Simulated End of May Trinity Storage

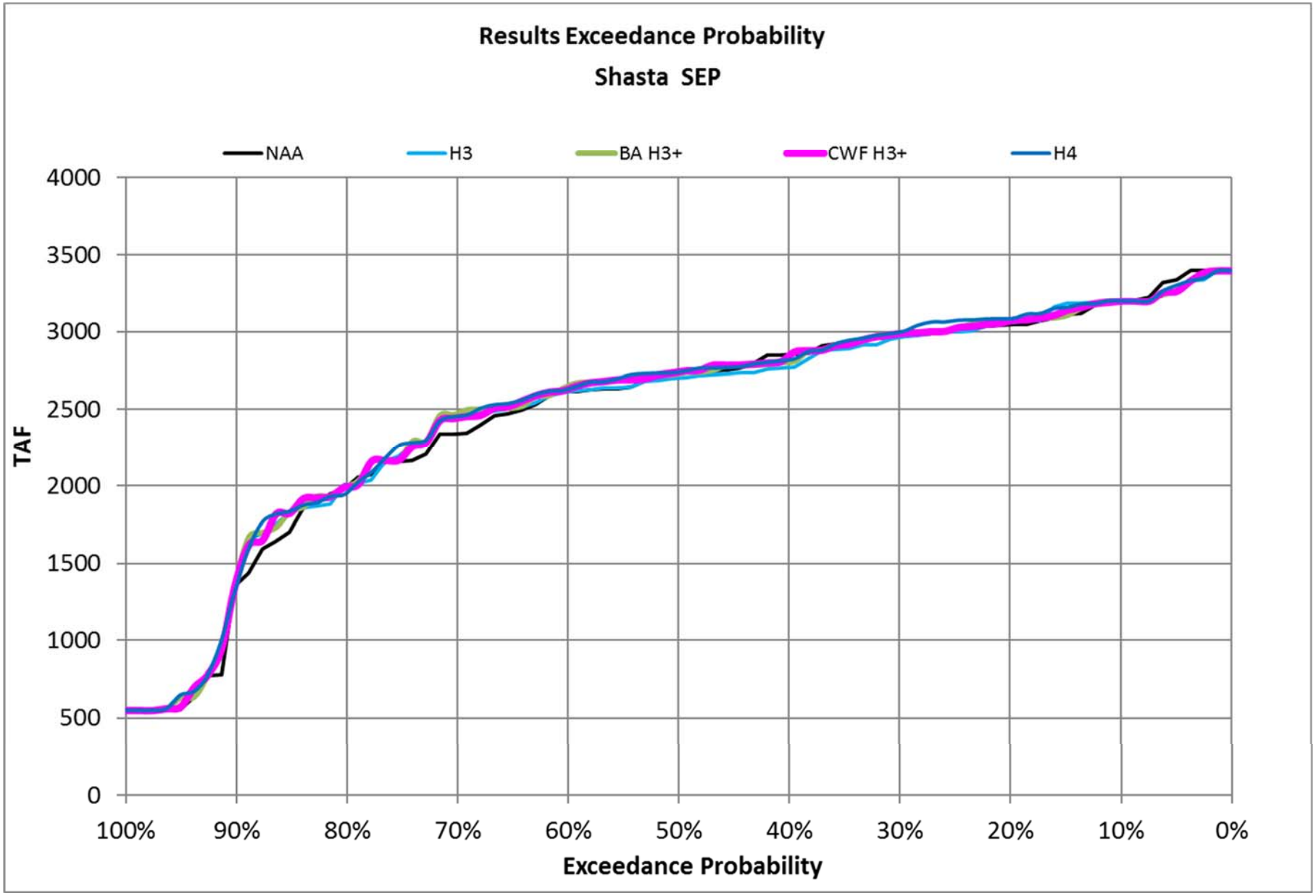


Figure 39: Simulated End of September Shasta Storage

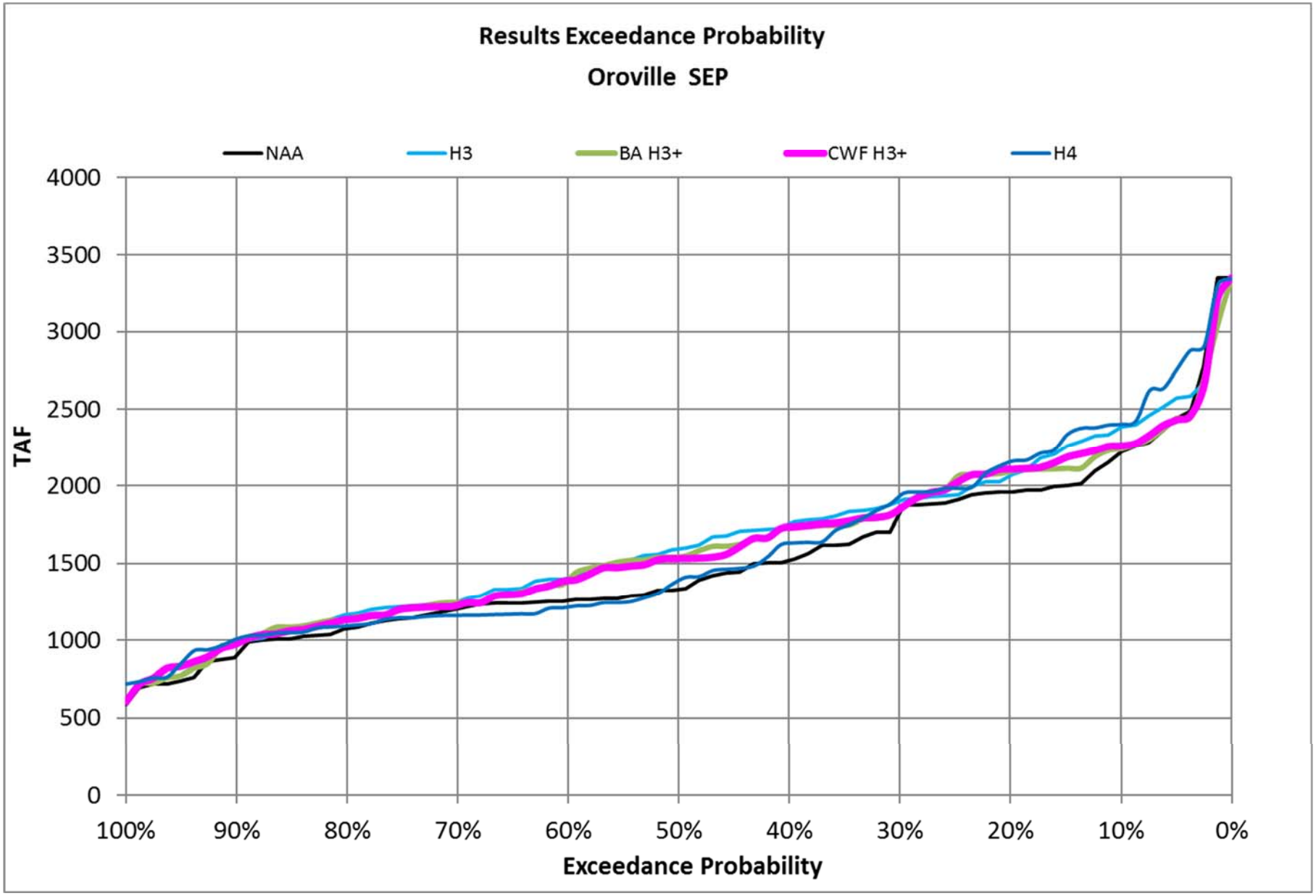


Figure 40: Simulated End of September Oroville Storage

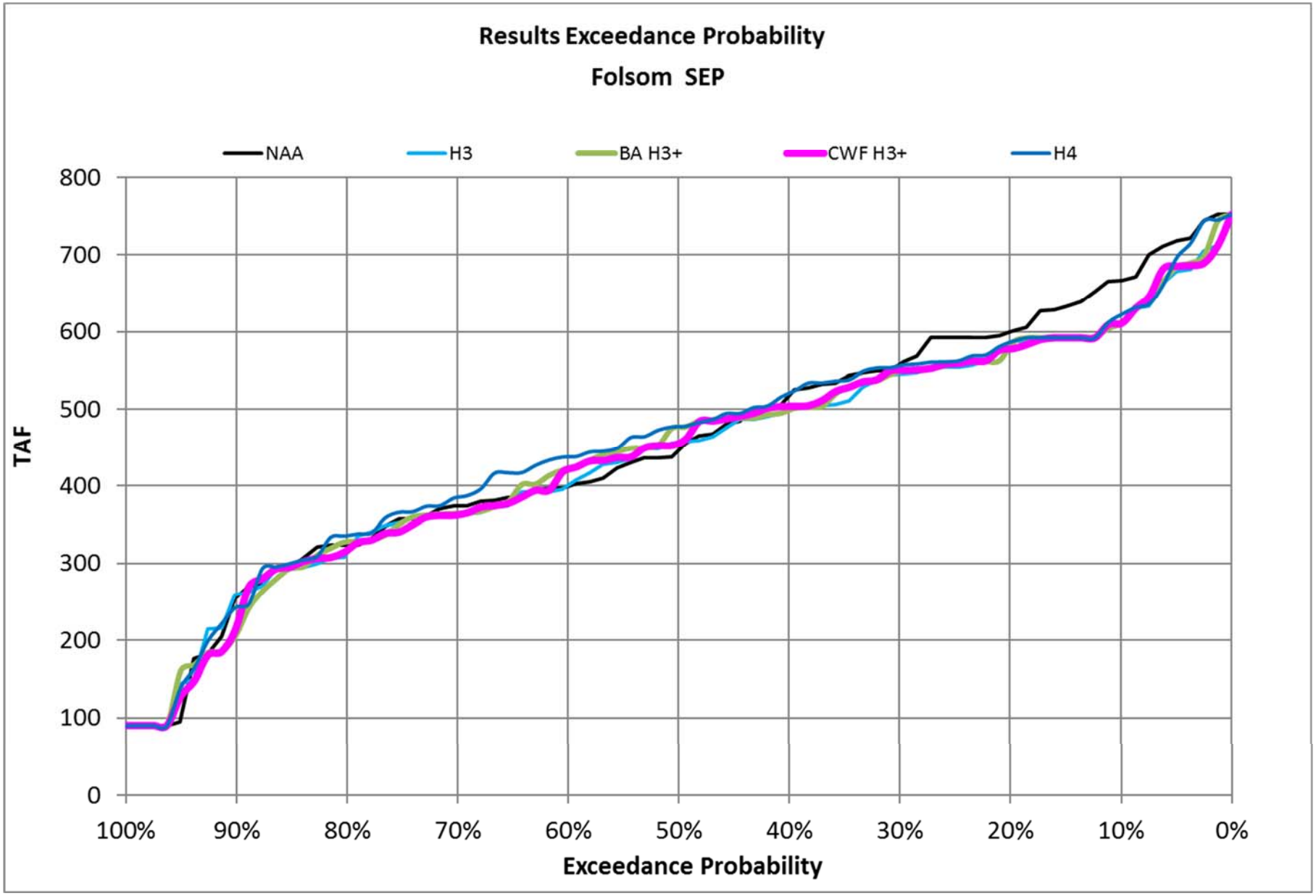


Figure 41: Simulated End of September Folsom Storage

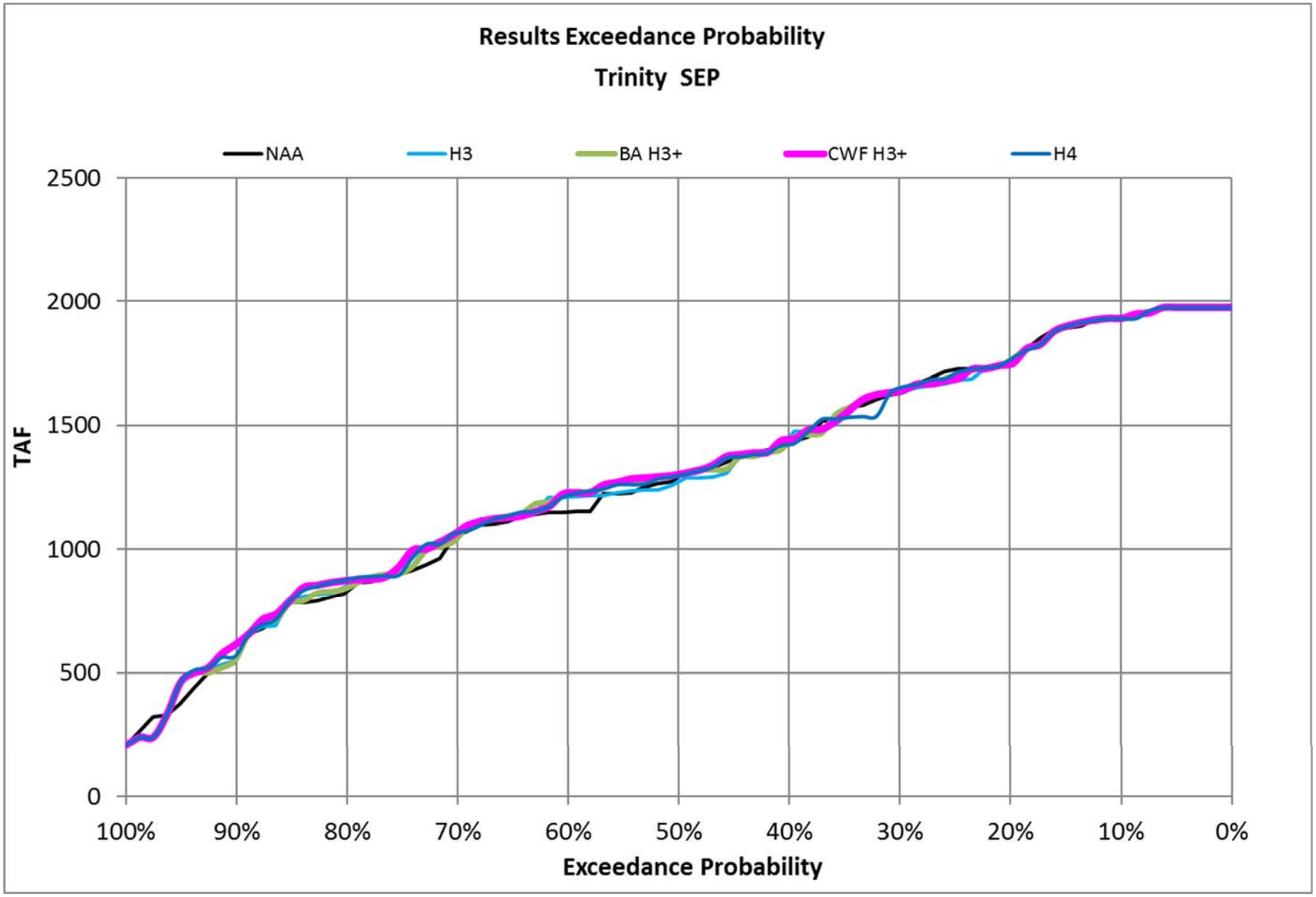
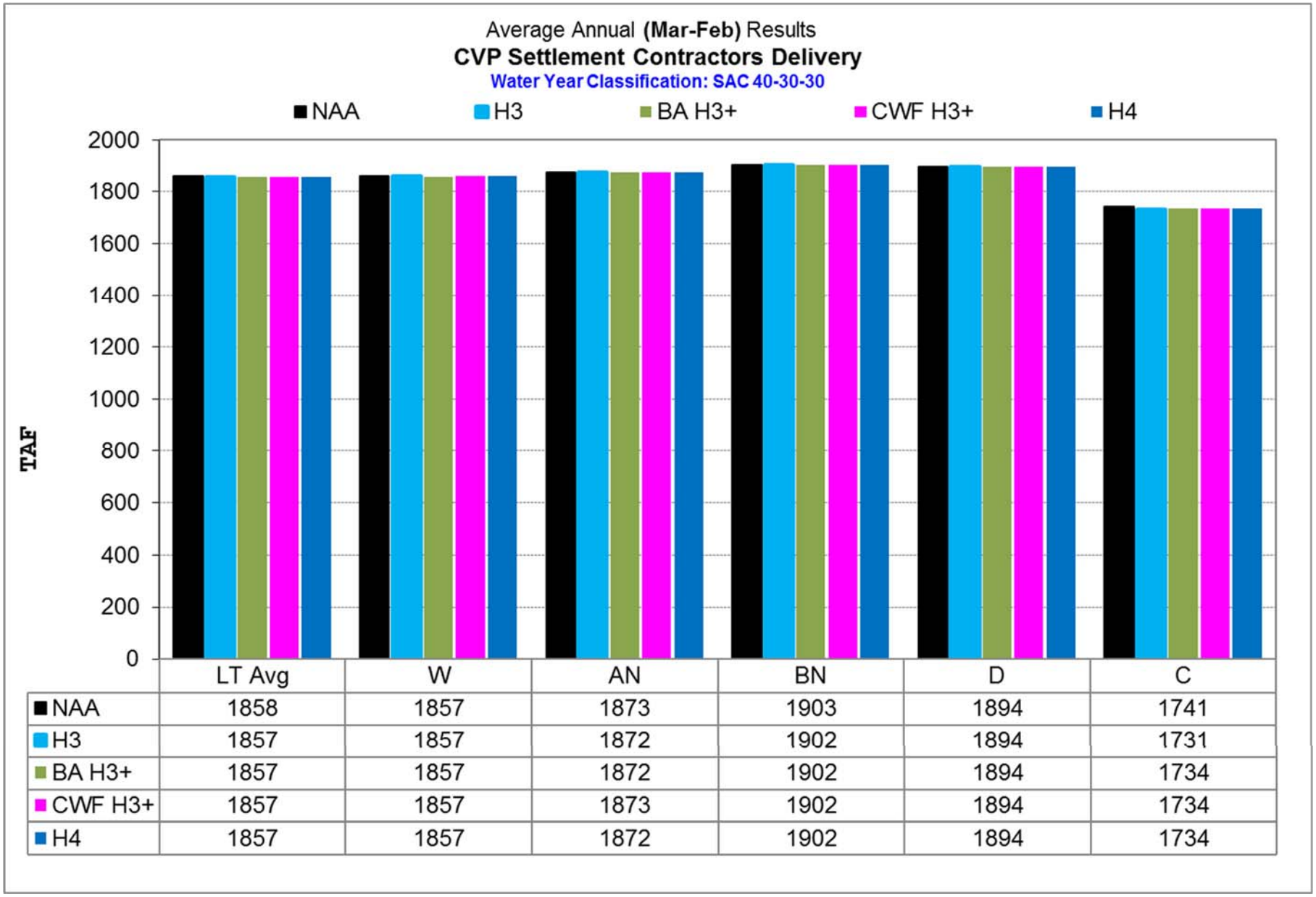
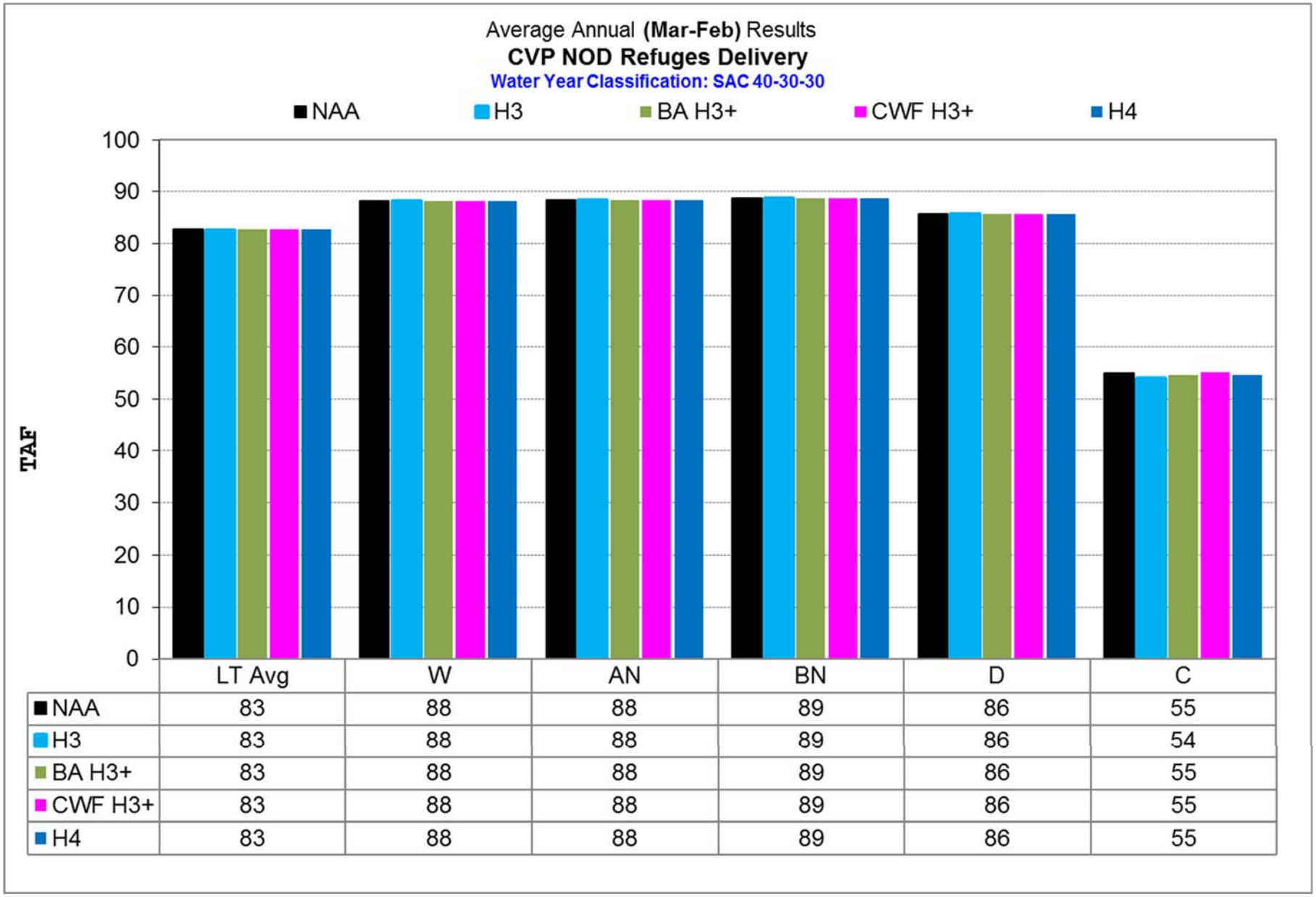


Figure 42: Simulated End of September Trinity Storage



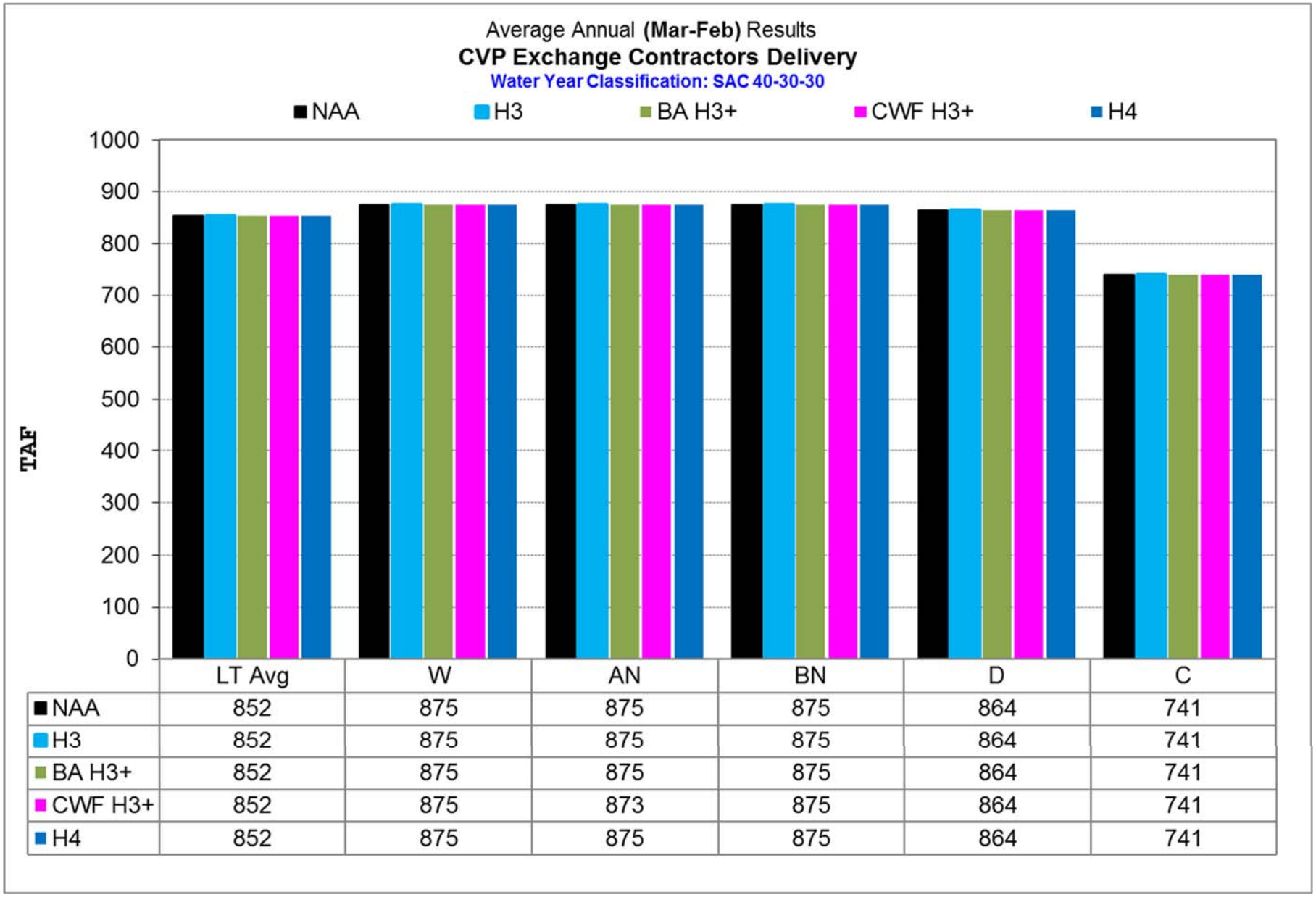
	LT Avg	W	AN	BN	D	C
NAA	1858	1857	1873	1903	1894	1741
H3	1857	1857	1872	1902	1894	1731
BA H3+	1857	1857	1872	1902	1894	1734
CWF H3+	1857	1857	1873	1902	1894	1734
H4	1857	1857	1872	1902	1894	1734

Figure 43: Simulated CVP Deliveries to Settlement Contractors



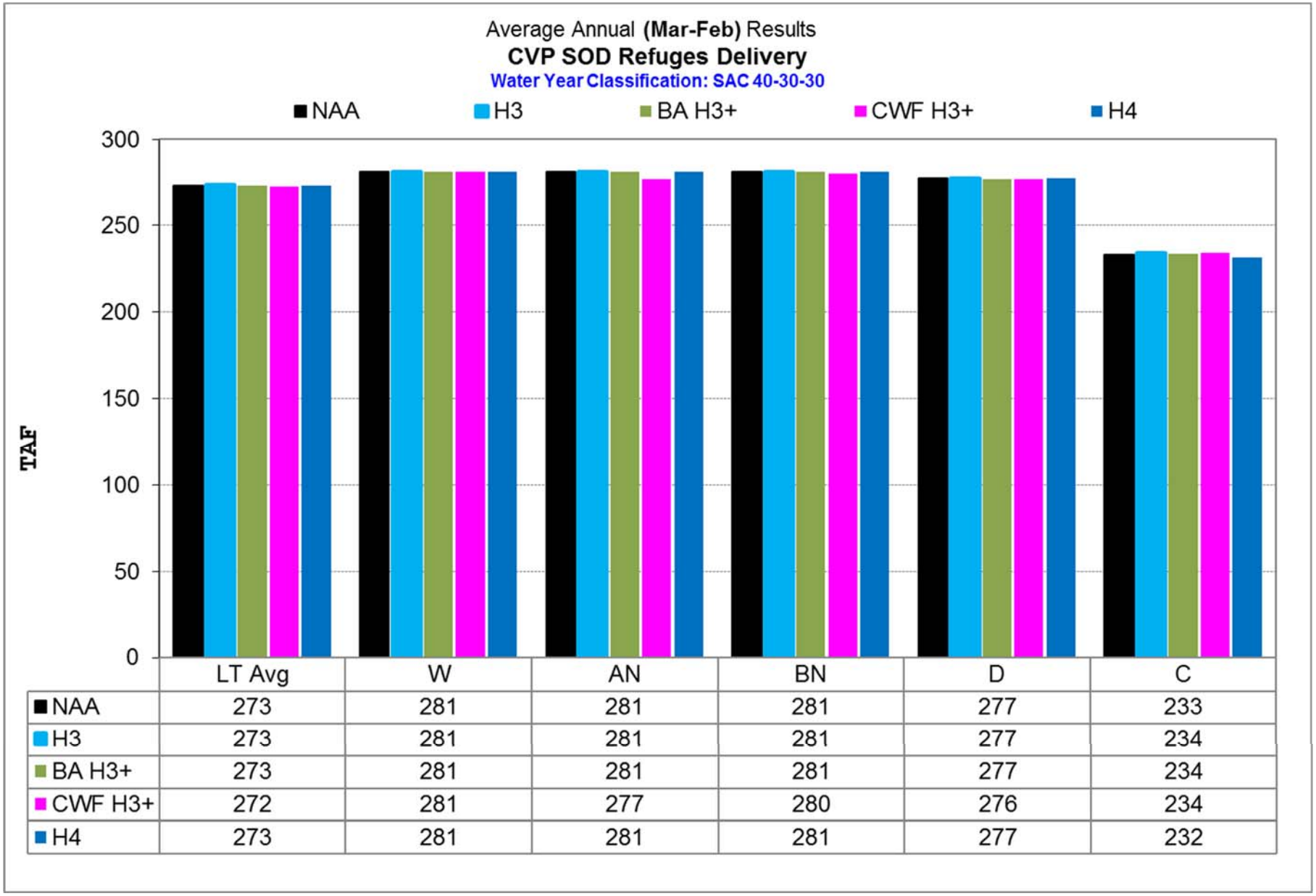
	LT Avg	W	AN	BN	D	C
NAA	83	88	88	89	86	55
H3	83	88	88	89	86	54
BA H3+	83	88	88	89	86	55
CWF H3+	83	88	88	89	86	55
H4	83	88	88	89	86	55

Figure 44: Simulated CVP Deliveries to North of Delta Refuges



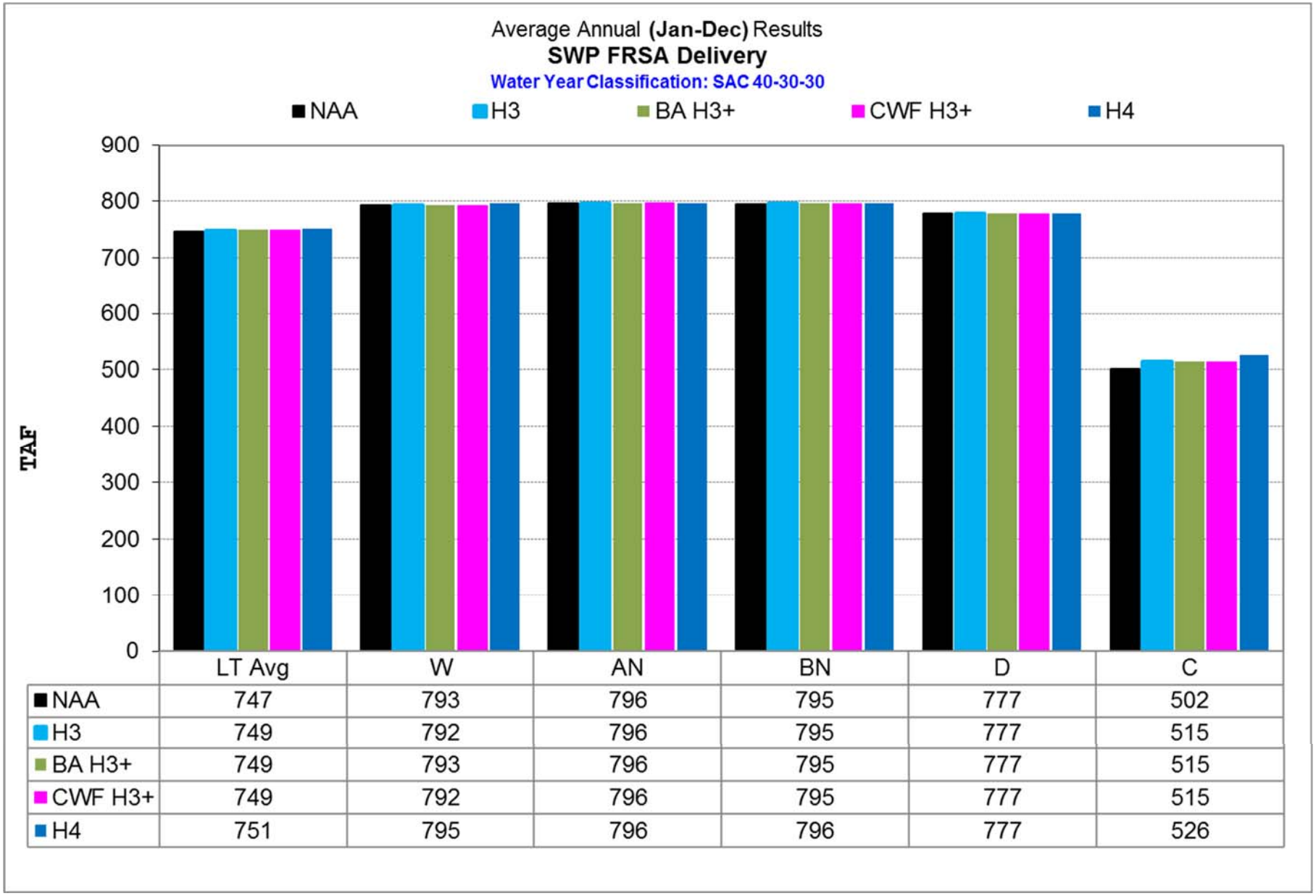
	LT Avg	W	AN	BN	D	C
NAA	852	875	875	875	864	741
H3	852	875	875	875	864	741
BA H3+	852	875	875	875	864	741
CWF H3+	852	875	873	875	864	741
H4	852	875	875	875	864	741

Figure 45: Simulated CVP Deliveries to Exchange Contractors



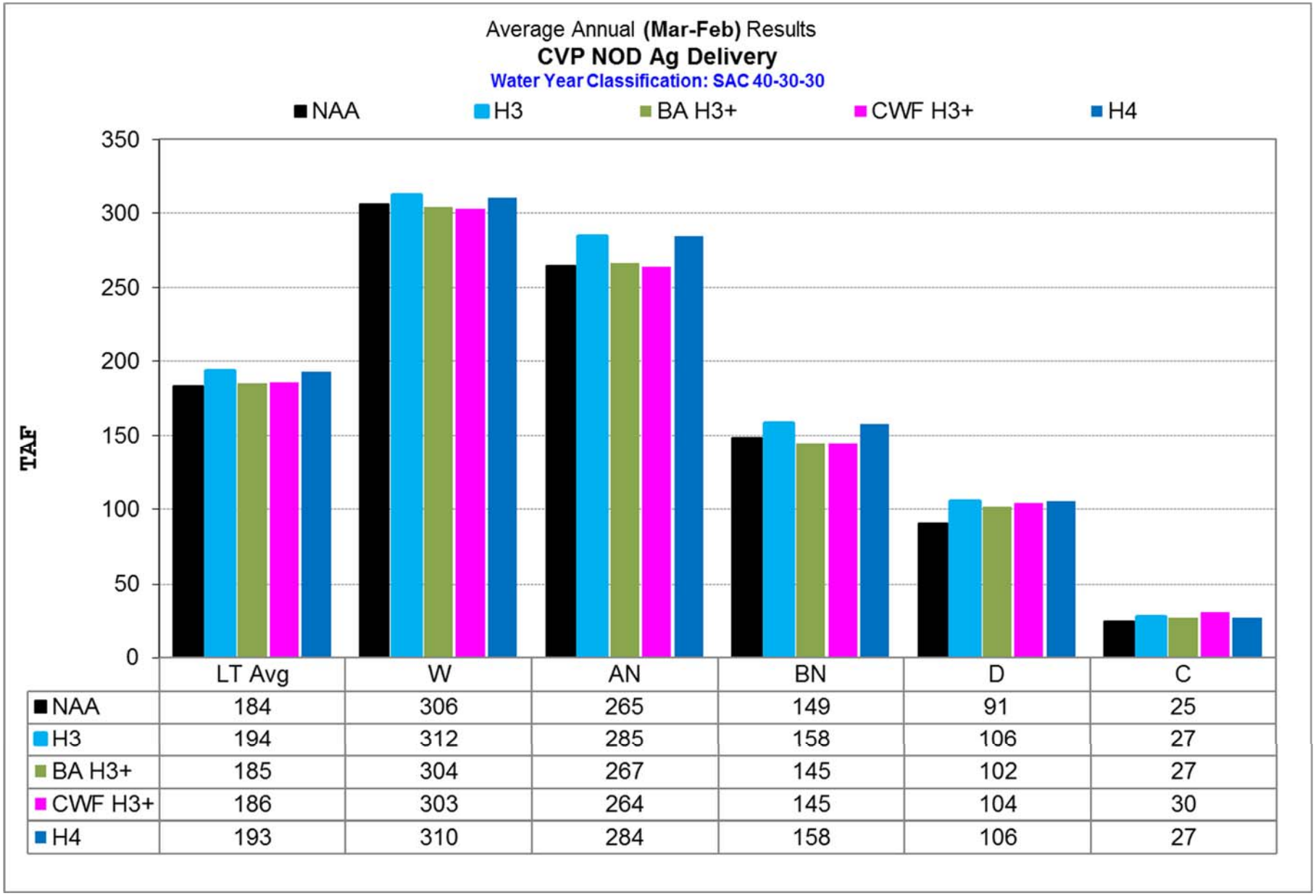
	LT Avg	W	AN	BN	D	C
NAA	273	281	281	281	277	233
H3	273	281	281	281	277	234
BA H3+	273	281	281	281	277	234
CWF H3+	272	281	277	280	276	234
H4	273	281	281	281	277	232

Figure 46: Simulated CVP Deliveries to South of Delta Refuges (Level 2 Demand)



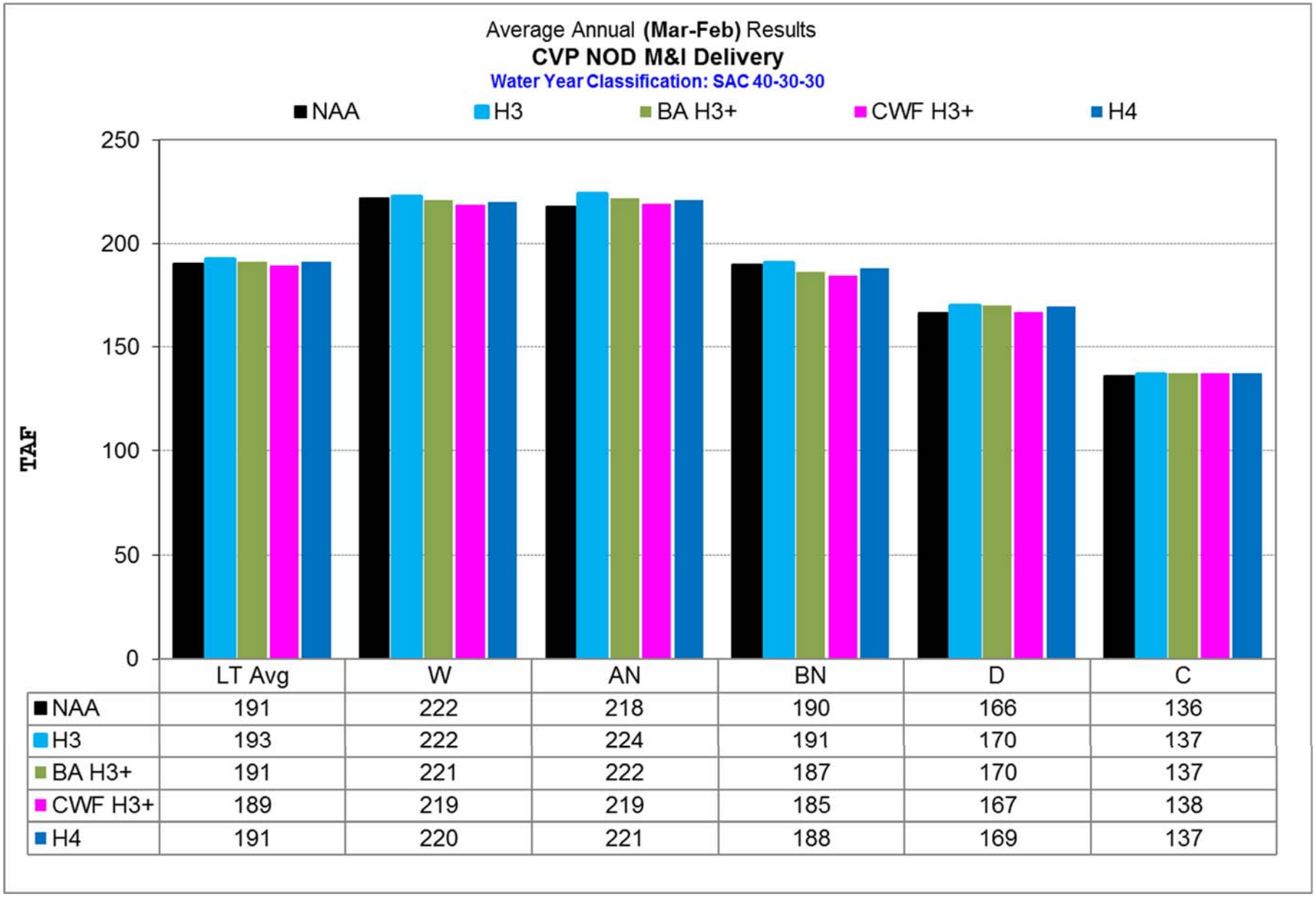
	LT Avg	W	AN	BN	D	C
NAA	747	793	796	795	777	502
H3	749	792	796	795	777	515
BA H3+	749	793	796	795	777	515
CWF H3+	749	792	796	795	777	515
H4	751	795	796	796	777	526

Figure 47: Simulated SWP Deliveries to Feather River Service Areas Contractors



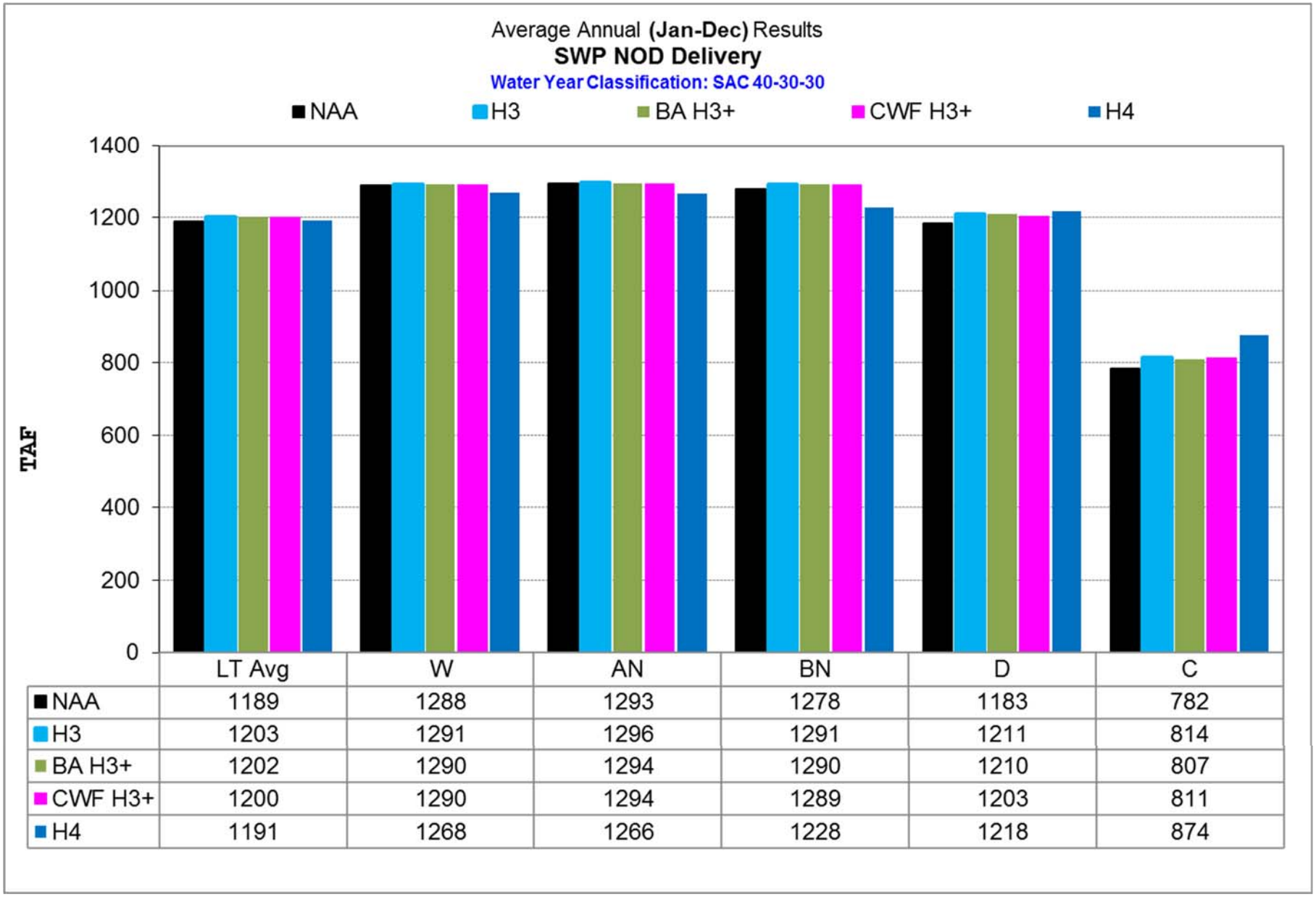
	LT Avg	W	AN	BN	D	C
NAA	184	306	265	149	91	25
H3	194	312	285	158	106	27
BA H3+	185	304	267	145	102	27
CWF H3+	186	303	264	145	104	30
H4	193	310	284	158	106	27

Figure 48: Simulated CVP Deliveries to Sacramento Valley Agricultural Water Service Contractors



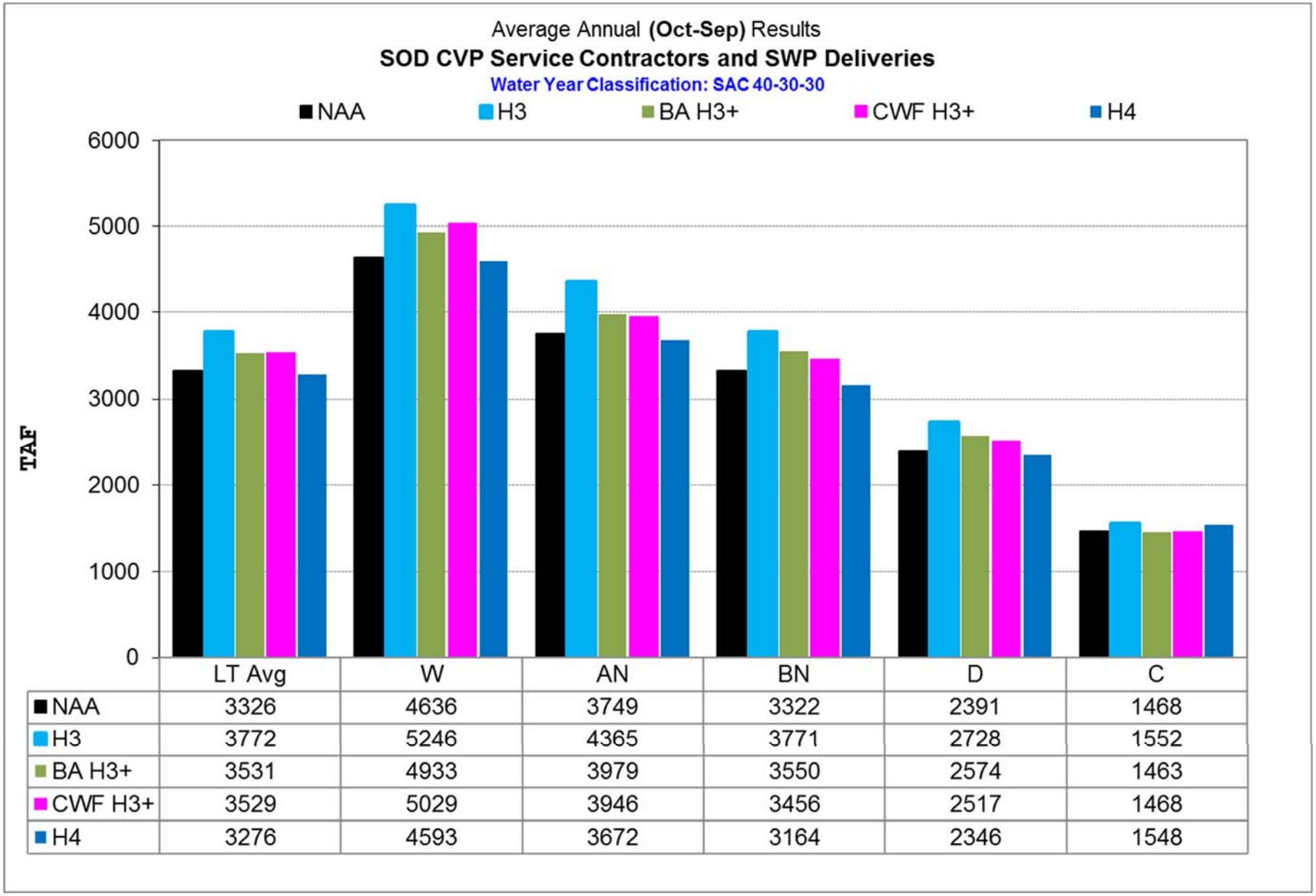
	LT Avg	W	AN	BN	D	C
NAA	191	222	218	190	166	136
H3	193	222	224	191	170	137
BA H3+	191	221	222	187	170	137
CWF H3+	189	219	219	185	167	138
H4	191	220	221	188	169	137

Figure 49: Simulated CVP Deliveries to Sacramento Valley Municipal and Industrial Water Service



	LT Avg	W	AN	BN	D	C
NAA	1189	1288	1293	1278	1183	782
H3	1203	1291	1296	1291	1211	814
BA H3+	1202	1290	1294	1290	1210	807
CWF H3+	1200	1290	1294	1289	1203	811
H4	1191	1268	1266	1228	1218	874

Figure 50: Simulated SWP Deliveries to North of Delta Contractors



	LT Avg	W	AN	BN	D	C
NAA	3326	4636	3749	3322	2391	1468
H3	3772	5246	4365	3771	2728	1552
BA H3+	3531	4933	3979	3550	2574	1463
CWF H3+	3529	5029	3946	3456	2517	1468
H4	3276	4593	3672	3164	2346	1548

Figure 51: Simulated Combined SWP and CVP South of Delta Water Service Contractor Deliveries

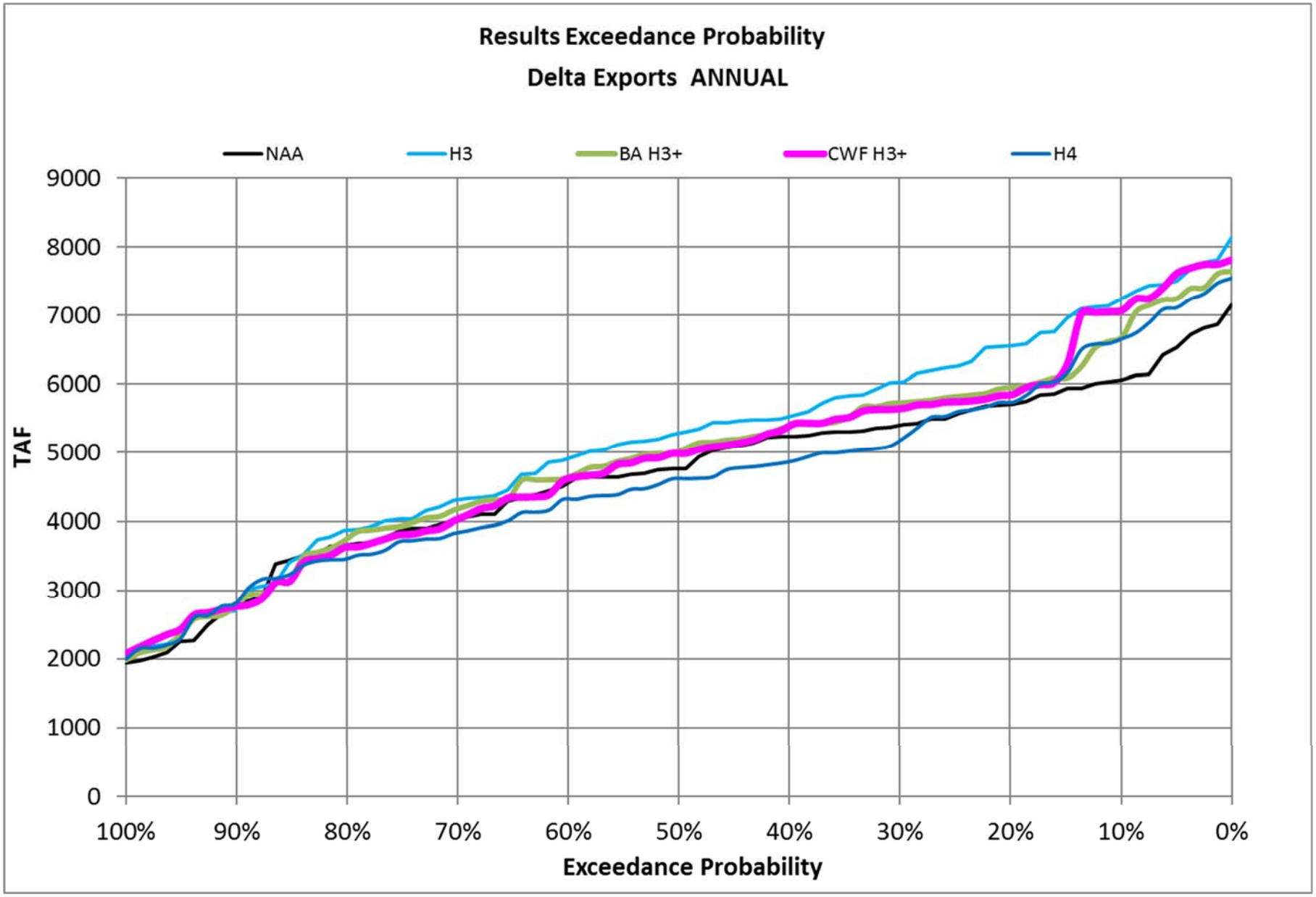


Figure 52: Simulated Combined SWP and CVP Delta Exports