Economic Evaluation Report

for mAb_DS_production_modelling

October 13, 2025

1. EXECUTIVE SUMMARY (2025 prices)

Total Capital Investment	142,078,000 $
Capital Investment Charged to This Project	142,078,000 $
Operating Cost	41,461,000 $/yr
Revenues	53,879,000 $/yr
Batch Size	44.90 kg MP
Cost Basis Annual Rate	269.39 kg MP/yr
Unit Production Cost	153,905.00 $/kg MP
Net Unit Production Cost	153,905.00 $/kg MP
Unit Production Revenue	200,000.00 $/kg MP
Gross Margin	23.05 %
Return On Investment	14.20 %
Payback Time	7.04 years
IRR (After Taxes)	7.45 %
NPV (at 7.0% Interest)	3,635,000 $

MP = Flow of Component 'mAb' in Stream 'Final Product'

2. EQUIPMENT SPECIFICATION AND FOB COST (2025 prices)

Main Equipment

Quantity/ Standby/ Staggered	Name	Description	Unit Cost ($)	Cost ($)
1 / 0 / 0	BR-101	Bioreactor Vessel Volume = 18948.39 L	2,833,000	2,833,000
1 / 0 / 0	SBR-102	Seed Bioreactor Vessel Volume = 4739.39 L	1,966,000	1,966,000
1 / 0 / 0	SBR-101	Seed Bioreactor Vessel Volume = 1182.18 L	1,749,000	1,749,000
1 / 0 / 0	C-101	PBA Column Column Volume = 476.71 L	898,000	898,000
1 / 0 / 0	DS-101	Disk-Stack Centrifuge Throughput = 1797.08 L/h	666,000	666,000
1 / 0 / 0	C-102	PBA Column Column Volume = 206.51 L	653,000	653,000
1 / 0 / 0	C-103	PBA Column Column Volume = 138.33 L	596,000	596,000
2 / 0 / 0	RBS-101	Rocking Bioreactor Skid Container Volume = 100.00 L	336,000	672,000
5 / 0 / 0	RBS-102	Rocking Bioreactor Skid Container Volume = 100.00 L	336,000	1,680,000
1 / 0 / 0	V-109	Blending Tank Vessel Volume = 27366.76 L	297,000	297,000
1 / 0 / 0	H-112	Blending Tank Vessel Volume = 27366.76 L	297,000	297,000
1 / 0 / 0	V-105	Blending Tank Vessel Volume = 16816.65 L	239,000	239,000
1 / 0 / 0	V-106	Blending Tank Vessel Volume = 16007.49 L	234,000	234,000
1 / 0 / 0	H-111	Blending Tank Vessel Volume = 11169.97 L	202,000	202,000
1 / 0 / 0	V-108	Blending Tank Vessel Volume = 11169.97 L	202,000	202,000
1 / 0 / 0	DE-103	Dead-End Filter Filter Area = 40.00 m2	197,000	197,000
1 / 0 / 0	V-103	Blending Tank Vessel Volume = 10173.88 L	194,000	194,000
1 / 0 / 0	BP-118	Blending Tank Vessel Volume = 6883.78 L	166,000	166,000
1 / 0 / 0	HB-118	Blending Tank Vessel Volume = 6883.78 L	166,000	166,000
1 / 0 / 0	V-107	Blending Tank Vessel Volume = 6701.98 L	165,000	165,000
1 / 0 / 0	H-110	Blending Tank Vessel Volume = 6701.98 L	165,000	165,000
1 / 0 / 0	BP-103	Blending Tank Vessel Volume = 5672.32 L	155,000	155,000
1 / 0 / 0	BH-103	Blending Tank Vessel Volume = 5672.32 L	155,000	155,000
1 / 0 / 0	V-110	Blending Tank Vessel Volume = 4312.08 L	140,000	140,000

1 / 0 / 0	BH-102	Blending Tank Vessel Volume = 3272.49 L	127,000	127,000
1 / 0 / 0	BP-102	Blending Tank Vessel Volume = 3272.49 L	127,000	127,000
1 / 0 / 0	BH-101	Blending Tank Vessel Volume = 3272.49 L	127,000	127,000
1 / 0 / 0	BP-101	Blending Tank Vessel Volume = 3272.49 L	127,000	127,000
1 / 0 / 0	V-102	Blending Tank Vessel Volume = 3156.08 L	126,000	126,000
1 / 0 / 0	V-104	Blending Tank Vessel Volume = 2444.44 L	116,000	116,000
1 / 0 / 0	HB-115	Blending Tank Vessel Volume = 2173.82 L	112,000	112,000
1 / 0 / 0	HB-116	Blending Tank Vessel Volume = 2173.82 L	112,000	112,000
1 / 0 / 0	BP-115	Blending Tank Vessel Volume = 2173.82 L	112,000	112,000
1 / 0 / 0	BP-116	Blending Tank Vessel Volume = 2173.82 L	112,000	112,000
1 / 0 / 0	DE-102	Dead-End Filter Filter Area = 20.00 m2	105,000	105,000
1 / 0 / 0	V-112	Blending Tank Vessel Volume = 1724.83 L	104,000	104,000
1 / 0 / 0	V-111	Blending Tank Vessel Volume = 1724.83 L	104,000	104,000
1 / 0 / 0	V-114	Blending Tank Vessel Volume = 1524.57 L	101,000	101,000
1 / 0 / 0	V-116	Blending Tank Vessel Volume = 1285.19 L	96,000	96,000
1 / 0 / 0	V-115	Blending Tank Vessel Volume = 1285.22 L	96,000	96,000
1 / 0 / 0	DF-101	Diafilter Membrane Area = 20.15 m2	95,000	95,000
1 / 0 / 0	V-113	Blending Tank Vessel Volume = 862.76 L	87,000	87,000
1 / 0 / 0	V-101	Blending Tank Vessel Volume = 787.27 L	85,000	85,000
1 / 0 / 0	V-117	Blending Tank Vessel Volume = 186.86 L	68,000	68,000
1 / 0 / 0	HB-117	Blending Tank Vessel Volume = 189.91 L	68,000	68,000
1 / 0 / 0	BP-117	Blending Tank Vessel Volume = 189.91 L	68,000	68,000
1 / 0 / 0	DF-102	Diafilter Membrane Area = 9.64 m2	61,000	61,000
1 / 0 / 0	DE-104	Dead-End Filter Filter Area = 10.00 m2	59,000	59,000
1 / 0 / 0	DE-101	Dead-End Filter Filter Area = 10.00 m2	59,000	59,000
1 / 0 / 0	DE-107	Dead-End Filter Filter Area = 10.00 m2	59,000	59,000
1 / 0 / 0	DE-109	Dead-End Filter Filter Area = 10.00 m2	59,000	59,000
1 / 0 / 0	DE-105	Dead-End Filter Filter Area = 10.00 m2	59,000	59,000

1 / 0 / 0	DE-106	Dead-End Filter	59,000	59,000
		Filter Area = 10.00 m2		
1 / 0 / 0	DE-108	Dead-End Filter	59,000	59,000
		Filter Area = 10.00 m2		
		Unlisted Equipment		4,359,000

Auxiliary Equipment

	TOTAL	21,795,000

3. FIXED CAPITAL ESTIMATE SUMMARY (2025 prices in $)

3A. Total Plant Direct Cost (TPDC) (physical cost)	
1. Equipment Purchase Cost	21,795,000
2. Installation	10,003,000
3. Process Piping	7,628,000
4. Instrumentation	8,718,000
5. Insulation	654,000
6. Electrical	2,180,000
7. Buildings	9,808,000
8. Yard Improvement	3,269,000
9. Auxiliary Facilities	8,718,000
TPDC	72,773,000

3B. Total Plant Indirect Cost (TPIC)	
10. Engineering	18,193,000
11. Construction	25,471,000
TPIC	43,664,000

3C. Total Plant Cost (TPC = TPDC+TPIC)	
TPC	116,437,000

3D. Contractor's Fee & Contingency (CFC)	
12. Contractor's Fee	5,822,000
13. Contingency	11,644,000
CFC = 12+13	17,466,000

3E. Direct Fixed Capital Cost (DFC = TPC+CFC)	
DFC	133,902,000

4. LABOR COST - PROCESS SUMMARY

Labor Type	Unit Cost ($/h)	Annual Amount (h)	Annual Cost ($)	%
Operator	69.00	22,202	1,531,912	100.00
TOTAL		22,202	1,531,912	100.00

5. MATERIALS COST - PROCESS SUMMARY

Bulk Material	Unit Cost ($)	Annual Amount		Annual Cost ($)	%
Air	0.00	248,276	kg	0	0.00
Amm. Sulfate	8.00	816	kg	6,527	0.05
CIP-Acid	9.80	46,739	kg	458,043	3.34
CIP-Caustic	0.00	94,066	kg	0	0.00
ConcPBS	9.27	1,040	kg	9,642	0.07
HIC-El-Buff	9.58	17,940	kg	171,937	1.25
HIC-Eq-Buff	8.01	33,722	kg	270,240	1.97
IEX-El-Buff	9.39	1,052	kg	9,871	0.07
IEX-Eq-Buff	9.90	37,154	kg	367,849	2.68
Inoc Media Sltn	15.80	1,404	kg	22,188	0.16
NaCl (1 M)	0.00	12,007	kg	0	0.00
NaOH (0.5 M)	0.00	29,532	kg	0	0.00
Polysorbate 80	1.83	1	kg	1	0.00
Prot-A Reg Buff	9.98	36,029	kg	359,642	2.62
Protein A Eluti	9.94	60,015	kg	596,807	4.35
Protein-A Equil	9.93	147,534	kg	1,465,017	10.67
Serum Free Medi	300.00	3,634	kg	1,090,150	7.94
Water	0.00	68,773	kg	0	0.00
WFI	10.00	889,944	kg	8,899,444	64.83
TOTAL				13,727,358	100.00

NOTE: Bulk material consumption amount includes material used as:
- Raw Material
- Cleaning Agent
- Heat Transfer Agent (if utilities are included in the operating cost)

6. VARIOUS CONSUMABLES COST (2025 prices) - PROCESS SUMMARY

Consumable	Units Cost ($)	Annual Amount		Annual Cost ($)	%
100 mL T-Flask	1.70	246	item	418	0.05
2.2 L Roller Bottle	6.00	48	item	288	0.04
100 L Cell Bag	300.00	42	item	12,600	1.60
Dft DEF Cartridge	1,000.00	78	item	78,000	9.93
Dft PBA Chrom Resin	1,500.00	462	L	692,935	88.18
Dft Membrane	400.00	1	m2	507	0.06
1 L Plastic Bag	0.20	5,142	item	1,028	0.13
TOTAL				785,777	100.00

7. WASTE TREATMENT/DISPOSAL COST (2025 prices) - PROCESS SUMMARY

Waste Category	Unit Cost ($)	Annual Amount		Annual Cost ($)	%
Solid Waste				0	0.00
Aqueous Liquid				4,746	100.00
P-5:SIP-1	0.00	236	kg	0	0.00
P-5:CIP-1(Pre Rinse)	5.00	2	MT	10	0.21
P-5:CIP-1(Caustic Wash)	5.00	1	MT	7	0.14
P-5:CIP-1(Post Rinse)	5.00	4	MT	20	0.41
P-5:CIP-1(Acid Wash)	5.00	1	MT	3	0.07
P-5:CIP-1(Final Rinse)	5.00	5	MT	26	0.55
P-6:SIP-1	0.00	355	kg	0	0.01
P-6:CIP-1(Pre Rinse)	5.00	3	MT	13	0.27
P-6:CIP-1(Caustic Wash)	5.00	2	MT	9	0.18
P-6:CIP-1(Post Rinse)	5.00	5	MT	26	0.54
P-6:CIP-1(Acid Wash)	5.00	1	MT	4	0.09
P-6:CIP-1(Final Rinse)	5.00	7	MT	34	0.72
P-8:SIP-1	0.00	947	kg	1	0.02
P-8:CIP-1(Pre Rinse)	5.00	3	MT	16	0.33
P-8:CIP-1(Caustic Wash)	5.00	2	MT	11	0.22
P-8:CIP-1(Post Rinse)	5.00	6	MT	31	0.65
P-8:CIP-1(Acid Wash)	5.00	1	MT	5	0.11
P-8:CIP-1(Final Rinse)	5.00	8	MT	41	0.87
P-10:SIP-1	0.00	1,422	kg	1	0.03
P-10:CIP-1(Pre Rinse)	5.00	4	MT	20	0.43
P-10:CIP-1(Caustic Wash)	5.00	3	MT	14	0.29
P-10:CIP-1(Post Rinse)	5.00	8	MT	41	0.86
P-10:CIP-1(Acid Wash)	5.00	1	MT	7	0.15
P-10:CIP-1(Final Rinse)	5.00	11	MT	54	1.14
P-11:SIP-1	0.00	3,052	kg	3	0.06
P-11:CIP-1(Pre Rinse)	5.00	5	MT	23	0.48
P-11:CIP-1(Caustic Wash)	5.00	3	MT	16	0.33
P-11:CIP-1(Post Rinse)	5.00	9	MT	46	0.96
P-11:CIP-1(Acid Wash)	5.00	2	MT	8	0.16
P-11:CIP-1(Final Rinse)	5.00	12	MT	61	1.29
P-13:SIP-1	0.00	733	kg	1	0.02
P-13:CIP-1(Pre Rinse)	5.00	3	MT	14	0.30
P-13:CIP-1(Caustic Wash)	5.00	2	MT	10	0.21
P-13:CIP-1(Post Rinse)	5.00	6	MT	28	0.60
P-13:CIP-1(Acid Wash)	5.00	1	MT	5	0.10
P-13:CIP-1(Final Rinse)	5.00	8	MT	38	0.80
P-15:SIP-1	0.00	5,685	kg	6	0.12
P-15:CIP-1(Pre Rinse)	5.00	6	MT	32	0.68
P-15:CIP-1(Caustic Wash)	5.00	4	MT	22	0.47
P-15:CIP-1(Post Rinse)	5.00	13	MT	65	1.36
P-15:CIP-1(Acid Wash)	5.00	2	MT	11	0.23
P-15:CIP-1(Final Rinse)	5.00	17	MT	86	1.81
P-16:CIP-1(Pre Rinse)	5.00	5	MT	27	0.57
P-16:CIP-1(Caustic Wash)	5.00	4	MT	19	0.39
P-16:CIP-1(Post Rinse)	5.00	11	MT	54	1.14
P-16:CIP-1(Acid Wash)	5.00	2	MT	9	0.19
P-16:CIP-1(Final Rinse)	5.00	14	MT	72	1.52
P-17:SIP-1	0.00	1,800	kg	2	0.04
P-17:CIP-1(Pre Rinse)	5.00	3	MT	15	0.31

P-17:CIP-1(Caustic Wash)	5.00	7	MT	37	0.77
P-17:CIP-1(Post Rinse)	5.00	3	MT	15	0.31
P-17:CIP-1(Acid Wash)	5.00	3	MT	15	0.32
P-17:CIP-1(Final Rinse)	5.00	3	MT	15	0.31
P-19:CIP-1(Pre Rinse)	5.00	11	MT	53	1.12
P-19:CIP-1(Caustic Wash)	5.00	4	MT	18	0.38
P-19:CIP-1(Post Rinse)	5.00	8	MT	40	0.84
P-19:CIP-1(Acid Wash)	5.00	2	MT	11	0.23
P-19:CIP-1(Final Rinse)	5.00	21	MT	107	2.24
P-21:SIP-1	0.00	2,011	kg	2	0.04
P-21:CIP-1(Pre Rinse)	5.00	4	MT	20	0.42
P-21:CIP-1(Caustic Wash)	5.00	3	MT	14	0.29
P-21:CIP-1(Post Rinse)	5.00	8	MT	40	0.84
P-21:CIP-1(Acid Wash)	5.00	1	MT	7	0.14
P-21:CIP-1(Final Rinse)	5.00	11	MT	53	1.12
P-22:SIP-1	0.00	3,351	kg	3	0.07
P-22:CIP-1(Pre Rinse)	5.00	5	MT	24	0.50
P-22:CIP-1(Caustic Wash)	5.00	3	MT	16	0.34
P-22:CIP-1(Post Rinse)	5.00	9	MT	47	1.00
P-22:CIP-1(Acid Wash)	5.00	2	MT	8	0.17
P-22:CIP-1(Final Rinse)	5.00	13	MT	63	1.33
P-23:SIP-1	0.00	8,210	kg	8	0.17
P-23:CIP-1(Pre Rinse)	5.00	6	MT	32	0.67
P-23:CIP-1(Caustic Wash)	5.00	4	MT	22	0.46
P-23:CIP-1(Post Rinse)	5.00	13	MT	64	1.34
P-23:CIP-1(Acid Wash)	5.00	2	MT	11	0.23
P-23:CIP-1(Final Rinse)	5.00	17	MT	85	1.79
P-24:CIP-1(Pre Rinse)	5.00	6	MT	29	0.62
P-24:CIP-1(Caustic Wash)	5.00	3	MT	14	0.29
P-24:CIP-1(Post Rinse)	5.00	8	MT	40	0.84
P-24:CIP-1(Acid Wash)	5.00	1	MT	7	0.14
P-24:CIP-1(Final Rinse)	5.00	11	MT	53	1.12
P-25:CIP-1(Pre Rinse)	5.00	8	MT	39	0.82
P-25:CIP-1(Caustic Wash)	5.00	3	MT	16	0.34
P-25:CIP-1(Post Rinse)	5.00	9	MT	47	1.00
P-25:CIP-1(Acid Wash)	5.00	2	MT	8	0.17
P-25:CIP-1(Final Rinse)	5.00	13	MT	63	1.33
P-26:CIP-1(Pre Rinse)	5.00	28	MT	141	2.98
P-26:CIP-1(Caustic Wash)	5.00	4	MT	22	0.46
P-26:CIP-1(Post Rinse)	5.00	13	MT	64	1.34
P-26:CIP-1(Acid Wash)	5.00	2	MT	11	0.23
P-26:CIP-1(Final Rinse)	5.00	17	MT	85	1.79
P-28:CIP-1(Pre Rinse)	5.00	3	MT	17	0.36
P-28:CIP-1(Caustic Wash)	5.00	2	MT	12	0.25
P-28:CIP-1(Post Rinse)	5.00	7	MT	34	0.72
P-28:CIP-1(Acid Wash)	5.00	1	MT	6	0.12
P-28:CIP-1(Final Rinse)	5.00	9	MT	46	0.97
P-29:CIP-1(Cleaning Step #1)	5.00	9	MT	45	0.94
P-30:CIP-1(Pre Rinse)	5.00	3	MT	13	0.27
P-30:CIP-1(Caustic Wash)	5.00	2	MT	9	0.18
P-30:CIP-1(Post Rinse)	5.00	5	MT	25	0.53
P-30:CIP-1(Acid Wash)	5.00	1	MT	4	0.09
P-30:CIP-1(Final Rinse)	5.00	7	MT	34	0.71
P-31:CIP-1(Pre Rinse)	5.00	3	MT	13	0.27
P-31:CIP-1(Caustic Wash)	5.00	2	MT	9	0.18
P-31:CIP-1(Post Rinse)	5.00	5	MT	25	0.53

P-31:CIP-1(Acid Wash)	5.00	1	MT	4	0.09
P-31:CIP-1(Final Rinse)	5.00	7	MT	34	0.71
P-32:CIP-1(Pre Rinse)	5.00	2	MT	10	0.21
P-32:CIP-1(Caustic Wash)	5.00	1	MT	7	0.15
P-32:CIP-1(Post Rinse)	5.00	4	MT	20	0.42
P-32:CIP-1(Acid Wash)	5.00	1	MT	3	0.07
P-32:CIP-1(Final Rinse)	5.00	5	MT	27	0.57
P-36:CIP-1(Pre Rinse)	5.00	3	MT	14	0.29
P-36:CIP-1(Caustic Wash)	5.00	2	MT	9	0.20
P-36:CIP-1(Post Rinse)	5.00	5	MT	27	0.58
P-36:CIP-1(Acid Wash)	5.00	1	MT	5	0.10
P-36:CIP-1(Final Rinse)	5.00	7	MT	37	0.77
P-43:SIP-1	0.00	57	kg	0	0.00
P-43:CIP-1(Pre Rinse)	5.00	1	MT	6	0.13
P-43:CIP-1(Caustic Wash)	5.00	1	MT	4	0.09
P-43:CIP-1(Post Rinse)	5.00	2	MT	12	0.26
P-43:CIP-1(Acid Wash)	5.00	0	MT	2	0.04
P-43:CIP-1(Final Rinse)	5.00	3	MT	16	0.34
P-46:SIP-1	0.00	2,065	kg	2	0.04
P-46:CIP-1(Pre Rinse)	5.00	4	MT	20	0.42
P-46:CIP-1(Caustic Wash)	5.00	3	MT	14	0.29
P-46:CIP-1(Post Rinse)	5.00	8	MT	40	0.85
P-46:CIP-1(Acid Wash)	5.00	1	MT	7	0.14
P-46:CIP-1(Final Rinse)	5.00	11	MT	54	1.13
P-47:SIP-1	0.00	57	kg	0	0.00
P-47:CIP-1(Pre Rinse)	5.00	1	MT	6	0.13
P-47:CIP-1(Caustic Wash)	5.00	1	MT	4	0.09
P-47:CIP-1(Post Rinse)	5.00	2	MT	12	0.26
P-47:CIP-1(Acid Wash)	5.00	0	MT	2	0.04
P-47:CIP-1(Final Rinse)	5.00	3	MT	16	0.34
P-48:CIP-1(Pre Rinse)	5.00	3	MT	14	0.29
P-48:CIP-1(Caustic Wash)	5.00	2	MT	9	0.20
P-48:CIP-1(Post Rinse)	5.00	5	MT	27	0.58
P-48:CIP-1(Acid Wash)	5.00	1	MT	5	0.10
P-48:CIP-1(Final Rinse)	5.00	7	MT	37	0.77
P-49:SIP-1	0.00	652	kg	1	0.01
P-49:CIP-1(Pre Rinse)	5.00	3	MT	14	0.29
P-49:CIP-1(Caustic Wash)	5.00	2	MT	9	0.20
P-49:CIP-1(Post Rinse)	5.00	5	MT	27	0.58
P-49:CIP-1(Acid Wash)	5.00	1	MT	5	0.10
P-49:CIP-1(Final Rinse)	5.00	7	MT	37	0.77
P-51:SIP-1	0.00	652	kg	1	0.01
P-51:CIP-1(Pre Rinse)	5.00	3	MT	14	0.29
P-51:CIP-1(Caustic Wash)	5.00	2	MT	9	0.20
P-51:CIP-1(Post Rinse)	5.00	5	MT	27	0.58
P-51:CIP-1(Acid Wash)	5.00	1	MT	5	0.10
P-51:CIP-1(Final Rinse)	5.00	7	MT	37	0.77
P-52:SIP-1	0.00	2,065	kg	2	0.04
P-52:CIP-1(Pre Rinse)	5.00	4	MT	20	0.42
P-52:CIP-1(Caustic Wash)	5.00	3	MT	14	0.29
P-52:CIP-1(Post Rinse)	5.00	8	MT	40	0.85
P-52:CIP-1(Acid Wash)	5.00	1	MT	7	0.14
P-52:CIP-1(Final Rinse)	5.00	11	MT	54	1.13
P-35:CIP-1(Pre Rinse)	5.00	2	MT	12	0.26
P-35:CIP-1(Caustic Wash)	5.00	2	MT	8	0.18
P-35:CIP-1(Post Rinse)	5.00	5	MT	24	0.51

P-35:CIP-1(Acid Wash)	5.00	1	MT	4	0.09
P-35:CIP-1(Final Rinse)	5.00	6	MT	32	0.68
P-37:SIP-1	0.00	1,702	kg	2	0.04
P-37:CIP-1(Pre Rinse)	5.00	4	MT	19	0.40
P-37:CIP-1(Caustic Wash)	5.00	3	MT	13	0.27
P-37:CIP-1(Post Rinse)	5.00	8	MT	38	0.79
P-37:CIP-1(Acid Wash)	5.00	1	MT	6	0.14
P-37:CIP-1(Final Rinse)	5.00	10	MT	50	1.06
P-39:CIP-1(Pre Rinse)	5.00	12	MT	60	1.25
P-39:CIP-1(Caustic Wash)	5.00	3	MT	13	0.27
P-39:CIP-1(Post Rinse)	5.00	8	MT	38	0.79
P-39:CIP-1(Acid Wash)	5.00	1	MT	6	0.14
P-39:CIP-1(Final Rinse)	5.00	10	MT	50	1.06
P-40:CIP-1(Pre Rinse)	5.00	4	MT	21	0.45
P-40:CIP-1(Caustic Wash)	5.00	2	MT	11	0.23
P-40:CIP-1(Post Rinse)	5.00	6	MT	31	0.66
P-40:CIP-1(Acid Wash)	5.00	1	MT	5	0.11
P-40:CIP-1(Final Rinse)	5.00	8	MT	42	0.88
P-41:SIP-1	0.00	982	kg	1	0.02
P-41:CIP-1(Pre Rinse)	5.00	3	MT	16	0.33
P-41:CIP-1(Caustic Wash)	5.00	2	MT	11	0.23
P-41:CIP-1(Post Rinse)	5.00	6	MT	31	0.66
P-41:CIP-1(Acid Wash)	5.00	1	MT	5	0.11
P-41:CIP-1(Final Rinse)	5.00	8	MT	42	0.88
P-42:SIP-1	0.00	982	kg	1	0.02
P-42:CIP-1(Pre Rinse)	5.00	3	MT	16	0.33
P-42:CIP-1(Caustic Wash)	5.00	2	MT	11	0.23
P-42:CIP-1(Post Rinse)	5.00	6	MT	31	0.66
P-42:CIP-1(Acid Wash)	5.00	1	MT	5	0.11
P-42:CIP-1(Final Rinse)	5.00	8	MT	42	0.88
P-44:CIP-1(Pre Rinse)	5.00	4	MT	21	0.44
P-44:CIP-1(Caustic Wash)	5.00	2	MT	11	0.23
P-44:CIP-1(Post Rinse)	5.00	6	MT	31	0.66
P-44:CIP-1(Acid Wash)	5.00	1	MT	5	0.11
P-44:CIP-1(Final Rinse)	5.00	8	MT	42	0.88
P-50:SIP-1	0.00	386	kg	0	0.01
P-50:CIP-1(Pre Rinse)	5.00	2	MT	11	0.24
P-50:CIP-1(Caustic Wash)	5.00	2	MT	8	0.17
P-50:CIP-1(Post Rinse)	5.00	5	MT	23	0.48
P-50:CIP-1(Acid Wash)	5.00	1	MT	4	0.08
P-50:CIP-1(Final Rinse)	5.00	6	MT	31	0.65
P-45:SIP-1	0.00	386	kg	0	0.01
P-45:CIP-1(Pre Rinse)	5.00	2	MT	11	0.24
P-45:CIP-1(Caustic Wash)	5.00	2	MT	8	0.17
P-45:CIP-1(Post Rinse)	5.00	5	MT	23	0.48
P-45:CIP-1(Acid Wash)	5.00	1	MT	4	0.08
P-45:CIP-1(Final Rinse)	5.00	6	MT	31	0.65
P-56:CIP-1(Cleaning Step #1)	5.00	18	MT	90	1.89
P-57:SIP-1	0.00	56	kg	0	0.00
P-57:CIP-1(Pre Rinse)	5.00	1	MT	6	0.13
P-57:CIP-1(Caustic Wash)	5.00	1	MT	4	0.09
P-57:CIP-1(Post Rinse)	5.00	2	MT	12	0.25
P-57:CIP-1(Acid Wash)	5.00	0	MT	2	0.04
P-57:CIP-1(Final Rinse)	5.00	3	MT	16	0.34
Organic Liquid				0	0.00
Emissions				0	0.00

TOTAL	4,746	100.00

8. UTILITIES COST (2025 prices) - PROCESS SUMMARY

Utility	Unit Cost ($)	Annual Amount	Ref. Units	Annual Cost ($)	%
Std Power	0.10	19,609	kW-h	1,961	39.36
Steam	32.00	68	MT	2,192	43.99
Chilled Water	0.50	1,660	MT	830	16.65
TOTAL				4,982	100.00

9. ANNUAL OPERATING COST (2025 prices) - PROCESS SUMMARY

Cost Item	$	%
Raw Materials	13,727,000	33.11
Labor-Dependent	1,532,000	3.69
Facility-Dependent	25,176,000	60.72
Laboratory/QC/QA	230,000	0.55
Consumables	786,000	1.90
Waste Treatment/Disposal	5,000	0.01
Utilities	5,000	0.01
Transportation	0	0.00
Miscellaneous	0	0.00
Advertising/Selling	0	0.00
Running Royalties	0	0.00
Failed Product Disposal	0	0.00
TOTAL	41,461,000	100.00

10. PROFITABILITY ANALYSIS (2025 prices)

A.	Direct Fixed Capital	133,902,000 $
B.	Working Capital	1,481,000 $
C.	Startup Cost	6,695,000 $
D.	Up-Front R&D	0 $
E.	Up-Front Royalties	0 $
F.	Total Investment (A+B+C+D+E)	142,078,000 $
G.	Investment Charged to This Project	142,078,000 $
H.	**Revenue/Savings Rates**	
	Final Product (Main Revenue)	269 kg/yr
I.	**Revenue/Savings Price**	
	Final Product (Main Revenue)	12,254.38 $/kg
J.	**Revenues/Savings**	
	Final Product (Main Revenue)	53,878,799 $/yr
1	Total Revenues	53,878,799 $/yr
2	Total Savings	0 $/yr
K.	**Annual Operating Cost (AOC)**	
1	Actual AOC	41,461,000 $/yr
2	Net AOC (K1-J2)	41,461,000 $/yr
L.	**Unit Production Cost /Revenue**	
	Unit Production Cost	153,905.00 $/kg MP
	Net Unit Production Cost	153,905.00 $/kg MP
	Unit Production Revenue	200,000.00 $/kg MP
M.	Gross Profit (J-K)	12,418,000 $/yr
N.	Taxes (40%)	4,967,000 $/yr
O.	Net Profit (M-N + Depreciation)	20,171,000 $/yr
	Gross Margin	23.05 %
	Return On Investment	14.20 %
	Payback Time	7.04 years

MP = Flow of Component 'mAb' in Stream 'Final Product'