Taxonomy no 1.	3.1	Item		Pumps Centrifuç	gal															
Population	Installations				A	ggregated time	in service	(10® hou	s)				No of demands							
350	59	Cale	ndar time'				T		Operatio	nal time '	,		1		10340					
					13.9546					5.7455										
Failure mode	<u> </u>	H	No of	Failt			ilure rate (ure rate (per 10 ⁶ hours).					Active			Repair (manh	oure)			
			failures		Lower		T	Upper	SD		nit		rep.hrs		Min			ean	Max	
Critical		┢	464*	0.00		21.60		124.23	67 21			33.25	39.7	+	1.0			7.6	1025.0	
orniour .			464*	0.00		70.52		284.09	07.21	106.81		80.76					· ·		1020.0	
Breakdown		37'				1.20		1.67	7 92	100.01		2.65		6.4	3.0			766.0		
DIGANUOWII		31	37*		0.00		21.16	1.07	11.38			6.44		0.4	J.U			07.1		
Erratia autout						0.15	21.10	0.79				0.14		9.8		11.0	20 E		68.0	
Erratic output		2*	2*		0.00						0.35	0.14	'	9.6		11.0	39.5		00.0	
External leakage	- Process	77*	-		0.00	2.25		2;22 5.52			5.52		30.2				42.0	444.0		
medium	1100000	77*		0.00		7.04		38.07		.04		3.40	00.2		2.0		72.0	1444.0		
External leakage	Litility modium	46*		0.00			2.94		9.28		3.30	0.40					29.8		90.0	
External leakage	- Othity medium	40	46*	0.00		1.61			13.65		3.30		16.0	1	2.0		29.0		90.0	
Fail to atout on de			40		0.00		26.68					8.01								
Fail to start on de	emano	42*	40*			2.28	55.00	8.52					55.8		1.0		63.0	551.0		
			42*		0.02		55.88			.10		7.31								
Fail to stop on de	mand	2*		0.00		0.13		0.65			0.14			3.5	3.0			3.5	4.0	
			2*	0.00		0.38	1.55		0.58		0.35									
High output		3*		0.00		0.69	3.58		2.77			0.21		-	1.0			3.3	6.0	
		3*		0.00		2.49	13.73		6.44		0.52									
Internal leakage		3*		0.00		0.16		0.87	0.57			0.21	18	88.0		36.0	90.7	188.0		
			3*	0.00		0.56	2.63		1.08		0.52			J						
Low output		40*		0.00		2.58		3.33	17	.49	2.87		38.2		3.0		45.3	508.0		
		40*		0.00		4.68	7.79		27	.92	6.96									
Noise	-	4*		0.00		0.25	1.29		0.57		0.29		25.0			16.0	67.3	122.0		

8' 5*	8* 5*	0.00 0.00	0.60 1.85		3.20		2.68	0.57		275.5	2.0		424.5	734.0	
5*		0.00	1.85								_		-		
5*	5*					8.07	3.14	1.39							
5*	-	0.1	1 0.36		0.72		0.19	0.36		183.2	3.0		265.0		1025
		0.00	6.83		37.16		17.32	0.87							
16*		0.00	0.65		2.84	;	3.03	1.15		11.6	1.0	21.7			88
16*		0.15	2.58			7.60	2.53	2.78							
	120*	0.00	6.33			33.92	15.65	8.60		39.7	1.0	45.0		714.0	
	120*	0.5	1 22.56			69.52	24.44		20.89						
27*		0.00	0.61		0.72		6.77	1.93		23.9	7.0	47.3		211.0	
27*		0.00	1.77		3.32		10.06	4.70							
32*		0.00	2.12			10.93	4.76	2.29		81.2	5.0		118.3	896.0	
32*		0.62	6.76		18.55		6.00	5.57							
	537*	0.00	32.39		1	63.45	70.23		38.48	22.3	0.5	32.1		798.0	
	537*	3.74		237.30	7	47.95	267.91		93.46						
9*			0.85		4.95	1	2.70	0.64		9.0					65
		0.00									2.0	16.0			
9*		0.00	2.95		12.59	ŀ	4.86	1.57							
10*		0.00	1.95			10.27	6.99	0.72		20.3	2.0	17.4			65
10*		0.00	4.87			26.99	13.79	1.74							
	27* 32* 32* 9* 10*	120* 120* 27* 27* 32* 32* 537* 537* 9*	120* 0.00 120* 0.5 27* 0.00 27* 0.00 32* 0.62 537* 0.00 537* 3.74 9* 0.00 9* 0.00 10* 0.00	120* 0.00 6.33 120* 0.51 22.56 27* 0.00 0.61 27* 0.00 2.12 32* 0.00 2.12 32* 0.62 6.76 537* 0.00 32.39 537* 3.74 9* 0.00 9* 0.00 9* 0.00 1.95	120* 0.00 6.33 120* 0.51 22.56 27* 0.00 0.61 27* 0.00 1.77 32* 0.00 2.12 32* 0.62 6.76 537* 0.00 32.39 537* 3.74 237.30 9* 0.00 9* 0.00 9* 0.00 1.95	120* 0.00 6.33 120* 0.51 22.56 27* 0.00 0.61 0.72 27* 0.00 1.77 3.32 32* 0.00 2.12 32* 0.62 6.76 18.55 537* 0.00 32.39 1 537* 3.74 237.30 7 9* 0.85 4.95 10* 0.00 1.95	120* 0.00 6.33 33.92 120* 0.51 22.56 69.52 27* 0.00 0.61 0.72 27* 0.00 1.77 3.32 32* 0.00 2.12 10.93 32* 0.62 6.76 18.55 537* 0.00 32.39 163.45 537* 3.74 237.30 747.95 9* 0.00 2.95 4.95 10* 0.00 1.95 12.59 10* 0.00 1.95 10.27	120* 0.00 6.33 33.92 15.65 120* 0.51 22.56 69.52 24.44 27* 0.00 0.61 0.72 6.77 27* 0.00 1.77 3.32 10.06 32* 0.00 2.12 10.93 4.76 32* 0.62 6.76 18.55 6.00 537* 0.00 32.39 163.45 70.23 537* 3.74 237.30 747.95 267.91 9* 0.00 2.95 4.95 2.70 0.00 1.95 10.27 6.99	120* 0.00 6.33 33.92 15.65 8.60 120* 0.51 22.56 69.52 24.44 1.93 27* 0.00 0.61 0.72 6.77 1.93 27* 0.00 1.77 3.32 10.06 4.70 32* 0.00 2.12 10.93 4.76 2.29 32* 0.62 6.76 18.55 6.00 5.57 537* 0.00 32.39 163.45 70.23 70.23 537* 3.74 237.30 747.95 267.91 0.64 9* 0.00 2.95 4.95 2.70 0.64 10* 0.00 1.95 12.59 4.86 1.57 10* 0.00 1.95 10.27 6.99 0.72	120* 0.00 6.33 33.92 15.65 8.60 120* 0.51 22.56 69.52 24.44 20.89 27* 0.00 0.61 0.72 6.77 1.93 27* 0.00 1.77 3.32 10.06 4.70 32* 0.00 2.12 10.93 4.76 2.29 32* 0.62 6.76 18.55 6.00 5.57 537* 0.00 32.39 163.45 70.23 38.48 537* 3.74 237.30 747.95 267.91 93.46 9* 0.00 2.95 4.95 2.70 0.64 0.00 2.95 12.59 4.86 1.57 10* 0.00 1.95 10.27 6.99 0.72	120* 0.00 6.33 33.92 15.65 8.60 39.7 27* 0.00 0.61 0.72 6.77 1.93 23.9 27* 0.00 1.77 3.32 10.06 4.70 32* 0.00 2.12 10.93 4.76 2.29 81.2 32* 0.62 6.76 18.55 6.00 5.57 537* 0.00 32.39 163.45 70.23 38.48 22.3 537* 3.74 237.30 747.95 267.91 93.46 9* 0.00 2.95 4.95 2.70 0.64 9.0 9* 0.00 2.95 12.59 4.86 1.57 10* 0.00 1.95 10.27 6.99 0.72 20.3	120* 0.00 6.33 33.92 15.65 8.60 39.7 1.0 27* 0.00 0.61 0.72 6.77 1.93 23.9 7.0 27* 0.00 1.77 3.32 10.06 4.70 4.70 32* 0.00 2.12 10.93 4.76 2.29 81.2 5.0 32* 0.62 6.76 18.55 6.00 5.57 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7 5.7 93.46 9	120* 0.00 6.33 33.92 15.65 8.60 39.7 1.0 45.0 27* 0.00 0.61 0.72 6.77 1.93 23.9 7.0 47.3 27* 0.00 1.77 3.32 10.06 4.70 81.2 5.0 32* 0.00 2.12 10.93 4.76 2.29 81.2 5.0 32* 0.62 6.76 18.55 6.00 5.57 5.57 537* 0.00 32.39 163.45 70.23 38.48 22.3 0.5 32.1 537* 3.74 237.30 747.95 267.91 93.46 9.0 2.0 16.0 9* 0.00 2.95 12.59 4.86 1.57 20.3 2.0 17.4 10* 0.00 1.95 10.27 6.99 0.72 20.3 2.0 17.4	120* 0.00 6.33 33.92 15.65 8.60 39.7 1.0 45.0 27* 0.00 0.61 0.72 6.77 1.93 23.9 7.0 47.3 27* 0.00 1.77 3.32 10.06 4.70 32* 0.00 2.12 10.93 4.76 2.29 81.2 5.0 118.3 32* 0.62 6.76 18.55 6.00 5.57 5.7 5	120*

Taxonomy no 1.3	3.1	Item Machinery Pumps Centrifugal		
Population	Installations	Aggregated time in	service (10 ⁶ hours)	No of demands
350	59	Calendar time *	Operational time *	10340

Failure mode	No of	Failure rate (per 10 ^s hours).							tive	ve Repair (manhours)				
	failures	Lower Mean		Upper	SD	nit		rep.hrs	ŀ	Min	М	ean	Max	
External leakage - Process	56'	0.00	3.25	18.02	9.21		4.01	1	14.1	2.0	31.7	2	78.0	
medium	56*	0.02	10.52	41.84	15.63	9.75						- [
External leakage - Utility medium	178*	0.00	9.26	45.08	18.79	1:	2.76	30.2		1.0	36.3	2	19.0	
	178*	0.00	57.14	265.19	107.20	30.98						-		
Fail to stop on demand	3*	0.00	0.30	1.59	1.11		0.21	3.8		6.0		7.7	10.0	
	3*	0.00	9.30	43.28	17.53	0.52						- 1		
High output	Т	0.00	0.07	0.20	0.07	0.07		2.0		2.0	2.0	- [2.0	
	1*	0.00	0.15	0.48	0.17	0.17						- 1		
Internal leakage	11*	0.00	0.87	4.75	2.22	0.79		56.8		2.0	56.0	3	04.0	
	11*	0.00	6.17	34.28	17.67		1.91					- 1		
Low output	30*	1.32	2.15	3.15	0.56	2.15		8.4		0.5	14.4	1.	44.0	
	30*	4.96	37.34	94.91	29.45	5.22						- 1		
Minor in-service problems	3*	0.00	0.29	1.61	0.83		0.21	13.0		18.0	0 22.0	- [26.0	
	3*	0.00	9.27	43.11	17.46	0.52						- 1		
Noise	5*	0.00	0.32	1.72	1.08	0.36		17.7		6.0	35.3	7	5.0	
	5*	0.00	0.95	4.61	1.91	0.87						- 1		
Other	46*	0.00	4.29	21.19	8.96	3.30		18.5		1.0	21.8	1	65.0	
	46*	0.00	27.99	132.88	54.47		8.01					- 1		
Overheating	9*	0.00	0.83	4.58	2.14	0.64		45.6		7.0	6	6.0 1	12.0	
	9*	0.00	6.15	34.20	17.71	1.57						- [
Parameter deviation	70*	0.00	2.60	3.48	17.29	5.02		4.5		1.0	7.3	6	7.0	
	70*	0.00	5.71	19.81	27.67	1:	2.18					- [
Structural deficiency	61*	0.00	1.73	1.92	13.81	4.37		26.9		1.0	33.9	7	98.0	
	61*	0.00	5.75	20.30	27.74	1	0.62							
Vibration	45*	0.00	2.89	16.73	9.18	3.22		34.2		1.0	78.1	7:	37.0	

	45*	0.00	8.58	37.96	14.93	7.83				
Incipient	936*	0.00	56.57	262.99	106.45	67.07	10.8	0.5	15.6	697.0
	936*	95.49	834.30	2182.80	686.83	162.91				
Abnormai instrument										
reading	445*	0.00	25.76	128.63	54.90	31.89	5.7	0.5	8.1	144.0
_	445*	4.46	274.18	862.22	308.37	77.45				
Erratic output	5*	0.00	0.39	2.04	1.41	0.36	4.1	2.0	8.2	16.0
	5*	0.00	1.36	5.38	2.01	0.87				
External leakage - Process	46*	0.00	2.73	14.38	9.89	3.30	15.3	0.5	24.4	206.0
medium	46*	0.00	8.60	44.48	19.52	8.01				
External leakage - Utility medium	108*	0.00	5.29	28.69	13.34	7.74	23.5	1.0	28.0	179.0
	108*	0.57	17.63	53.47	18.40	18.80				
Internal leakage	9'	0.00	0.45	2.09	0.84	0.64	42.6	0.5	41.2	172.0
	9*	0.28	1.42	3.27	0.96	1.57				
Low output	r	0.00	0.06	0.33		0.07	2.0	2.0	2.0	2.0
	1*	0.00	0.18	0.55	0.20	0.17				
Comments	•	-					-	•	-	(cont.)

Taxonomy no 1.3	3.1	Item Machinery P	umps Centrifugal								
Population 350	Installations 59		А	ggregated time in	No of demands 10340						
		Ca	lendar time * 13.9	546	Оре	erational time * 5.7	7455				
Failure	mode			Failu	re rate (per 10 ⁶ ho	ours).				Repair (manhour	s)
		No of failures	Lower	Mean	Upper	SD	n/t	Active rep.hrs	Min	Mean	Max
Minor in-service p	roblems	213*	0.00	15.38	80.97	36.69	15.26	6.1	0.5	10.4	111.0
		213⁺	39.27	391.65	1057.33	338.88	37.07				
Noise		8'	0.00	0.64	3.23	1.39	0.57	7.3	0.5	20.1	46.0

	194			2.90	1277.00			1001.75		339.22		0.0		.020.0
All modes	194	19*	0.00		112.64	546.	74	226.89		139.67	21.3	0.5	30.5	1025.0
Unknown	9		0.00 0.00		3.20	4.48 15.	2.79 07 6.15		0.64 1.57		6.8	2.0	12.1	48.0
	2		0.00		0.60	3.14	1.42		0.35					
Other	2		0.01).15		13 0.14		0.14			12.0	12.0	12.0
	1	*	0.00	0	0.84	4.	67 2.38		0.17					
External leakag e - Utility medium	r		0.00	0).21	0.59		1.05	0.07		-	29.0	29.0	29.0
	12	*	0.01	4	.50	17.	33 6.65		2.09					
Unknown	12*		0.00	1	.17	6.	11 3.08		0.86		6.8	2.0	13.6	48.0
Vibration	n		0.00		2.48	9.16	3.38		0.79	1.91		1.0	26.7	96.0
Vibration	4 ii		0.00		.48	8.16	4.96 33 1.28		0.70 0.79		9.9	4.0	26.7	96.0
Unknown	4		0.00	4	0.41		74 2.34		0.29		45.3	8.0	38.5	70.0
	12)* -	1.32	2	2.21	3.	0.60		2.09					
Structural deficiency	12)* -		0.00).79	4.43		2.30	0.86		42.1	1.0	70.0	213.5
	23	3*	0.02	3	3.82	13.	98 5.17		4.00					
Parameter deviation	23	j*	0.00	1	.08	5.59	4.15		1.65		9.3	2.0	14.1	81.0
o vollisaumig	4		0.00		0.67		33 1.09		0.70		00.0	0.0	00	
Overheating	4		0.00	٥	20.65		95 1.08	44.28	8.18 0.29		30.3	3.0	34.3	64.0
Other	47* 47	**		0.00	3.14 20.65	17.		8.40			27.3	1.0	46.0	697.0
	8		0.04	2	2.12	0.	58 2.32		1.39					