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02131

Dear Sir,

Subject : FOURTH QUARTERLY REPORT AND FINAL REPORT -
GENERAL PHARMACEUTICALS LIMITED - KABWE / ZAMBIA

Please find herewith three copies of the last quarterly report and final report concerning production and quality control at General Pharmaceuticals - Kabwe, Project No ZAM/74/002/A/01/37.

Attached to the report are :

- Memo to the General Manager dated 08.11.1979 - Water distiller
- Memo to the General Manager dated 05.11.1979 - Work to be done
- Memo to the General Manager dated 19.11.1979 - Staff evaluation
- Memo to the General Manager dated 21.11.1979 - Instructions for use
- Seven professional evaluations
- Two Press articles
- Training programme - Part IV - Water treatment

Yours faithfully,

R.D. SARACCHI
Production and Quality
Control Advisor

Mr. M. MAY / Mrs. A. TCHECKNAVORIAN
Chemical Industries Section
Industrial Operations Division
UNIDO / VIENNA

UNIDO PROJECT No. ZAM/74/002/A/01/37

GENERAL PHARMACEUTICALS LIMITED - KABWE / ZAMBIA

FOURTH QUARTERLY REPORT AND FINAL REPORT

PERIOD FROM 21 SEPTEMBER TO 30 NOVEMBER, 1979

1) FOREWORD

This report is at the same time the last quarterly report and the final report. It will refer to the former quarterly reports and the preliminary report in order to provide an overall picture regarding the Production and Quality Control Departments.

It's aim is to show the work done during the period mentioned above, to point out the main impediments which exist, to suggest some alternative solutions and to give an overall picture of the Production and Quality Control Department at the time I left Zambia.

2) PRODUCTION - WORK DONE

Production continued at about half the plant's capacity up to the 26th October when it had to be stopped due to lack of raw materials.

The production details are :

- Number of days which should have been worked	:	49
- Number of days worked	:	24
- Number of batches which should have been manufactured	:	98
- Number of batches manufactured	:	24
- Number of bags which should have been packed	:	196'000
- Number of bags packed	:	54'234
- Working capacity	:	27.67 %
- Total quantity of bags rejected	:	717 = 1.32 %
- Total quantity of bags visually checked	:	5'149 = 9.50 %
- Total quantity rejected for particulate matters compared to those visually checked	:	22 = 0.43 %

- Type of solution packed :

Dextrose 5 %	1000 ml.	:	5'873 bags
Dextrose 2.5 % + ½ Darrow's	1000 ml.	:	35'132 bags
Dextrose 2.5 % + ½ Darrow's	150 ml.	:	13'229 bags

- Quantity of bags 1000 ml. packed	:	41'005
- Quantity of bags 150 ml. packed	:	13'229

.../...

The production during this last quarter was not planned according to the market requirements, but only according to the existing constraint at GPL., the main one being that only a limited quantity and variety of raw materials were available at the plant.

Production is expected to start again by January 1980 as the supplier of raw materials (VIFOR) has agreed to airfreight part of the raw materials, although the amendments to the Import Licence and to the Letter of Credit are not yet finalised.

3) QUALITY CONTROL - WORK DONE

The laboratories have pre-analysed and analysed the batches of Dextrose 5 % for chemical and sterility only. Sterility tests have been performed on Dextrose 2.5 % in ½ Darrow's solution.

All the tests performed, except for a few which are not yet complete, have shown results within the range of acceptance.

Chemical analysis could not be fully performed on the Dextrose 2.5 % in ½ Darrow's solution as the flame photometers are not in working order.

Apart from a few pyrogen tests which have been performed on the rabbits in order to assess their reactions, nothing has been done in that department.

VIFOR has returned almost all the results for the batches manufactured up to the end of August and apart from one batch, everything received up to now has been accepted and can be sold.

4) PRODUCTION IMPEDIMENTS

The main impediments are the same as the ones already described in my previous report, i.e. :

- Lack of raw materials
- Lack of spare parts

In addition, the Production Manager and his assistant were on training in Switzerland for two and one month respectively.

5) QUALITY CONTROL IMPEDIMENTS

The main impediments are the same as the ones already described in my previous reports, i.e. :

- Lack of chemicals and reagents
- Flame photometers not working
- Modifications of the rabbits environment not done

In addition, the two assistants Quality Control Managers went for one month each to Switzerland for training.

.../...

6) STAFF

A professional evaluation is attached herewith for the following key staff :

- Mr. M. NSENSEMA - General Manager
- Mr. N. MWALE - Production Manager
- Mr. N. NTAMBO - Assistant Production Manager
- Mr. M. SIKANYIKA - Head of the workshop - Mechanical
- Mr. C. MASONGO - Head of the workshop - Electrical
- Mr. N. PATEL - Assistant Quality Control Manager
- Mr. M. ILUYA - Assistant Quality Control Manager

7) PRODUCTION TRAINING PROGRAMME

Part IV "Water Treatment" is attached herewith and the training has been given to the staff concerned. Due to lack of time, Part IV "Maintenance" could not be drafted. There is however with the Production Manager, a complete set of manuals, pamphlets, etc... for each and every machine, giving full details regarding maintenance, overhaul and repairs. These manuals also contain full lists of spare parts with code numbers. This should allow GPL's staff to easily sort out any type of problems. In addition, when any breakdown occured during the past year, a full lecture was given to the respective staff of the workshop about each specific problem.

8) 1979 RESULTS

The results obtained by the production department from the 20th January up to the 30th November, 1979 are as follows :

- Number of days which should have been worked	:	210	
- Number of days worked	:	121	
- Number of batches which should have been manufactured	:	420	
- Number of batches manufactured	:	156	
- Number of bags which should have been packed	:	840'000	
- Number of bags packed	:	332'503	
- Working capacity	:	39.58 %	
- Total quantity rejected	:	7'058 =	2.12 %
- Total quantity of bags visually checked	:	32'744 =	9.86 %
- Total quantity of bags rejected for particulate matters (compared to quantity visually checked)	:	75 =	0.23 %

.../...

Type of solutions packed :

- Sodium chloride 0.9 %	- 1000 ml.	: 93'576
- Dextrose 5 %	- 1000 ml.	: 103'240
- Sodium chloride 0.9 % + Dextrose 5 %	- 1000 ml.	: 19'694
- Sodium chloride 0.9 % + Dextrose 5 %	- 150 ml.	: 1'486
- Darrow's	- 1000 ml.	: 10'219
- Darrow's	- 150 ml.	: 29'872
- Hartmann's	- 1000 ml.	: 6'594
- Hartmann's	- 150 ml.	: 12'230
- Dextrose 2.5 % + ½ Darrow's	- 1000 ml.	: 38'386
- Dextrose 2.5 % + ½ Darrow's	- 150 ml.	: 17'206

Quantity of bags - 1000 ml. - packed		: 271'709
Quantity of bags - 150 ml. - packed		: 60'794

The above results are showing that, compared to the rated capacity of 840'000 bags for the period worked and on which the 1979 budget is based, the production could only go on at 39.58 %.
However, if compared to the Zambian marked study I made at the end of 1978 and which showed that the local consumption would be, at a maximum, 600'000 units per year (or 504'000 units for the period worked), the working capacity for the same period would be increased to 65.97 %.

It seems that the Board of Directors has started to realize that budgeting on 1'000.000 units a year in order to reduce the price of the finished product is in fact now costing more to the Company whose local sales are far below the breakeven point and do not even match the quantities manufactured. The sales abroad, on which the board had great expectations was over estimated, as it seems that no orders are to be expected in the near future.

.../...

	1978 MARKET SURVEY		1979 PRODUCTION			
	Quantity of bags per year (demand)	% of the market	Quantity manufactured	% of the total production	% of the demand manufactured	Number of months for the market to absorb the quantities manufactured
Dextrose 2.5 % + ½ Darrow's	221'740	36	55'592	16.72	25.07	3
Sodium chloride 0.9 %	118'300	19.2	93'576	28.14	79.10	9.5
Dextrose 5 %	63'860	10.4	103'240	31.05	161.67	19.5
Dextrose 2.5 % + sodium chloride 0.45 %	43'600	7.1	NIL	NIL	NIL	NIL
Dextrose 2.5 %	43'600	7.1	NIL	NIL	NIL	NIL
Darrow's	42'000	6.8	40'091	12.06	95.45	11.5
Dextrose 5 % + sodium chloride 0.9 %	36'000	5.8	21'180	6.36	58.83	7
Hartmann's	17'611	2.9	18'824	5.66	106.89	13

According to the market survey, the demand was : 54 % of the total in 1000 ml. bags
38 % of the total in 150 ml. bags

The ratio manufactured by GPL has been : 81.7 % of the total in 1000 ml. bags
18.3 % of the total in 150 ml. bags

N.B. The above-named solutions are the main ones demanded by the market which is composed of 13 to 15 different solutions GPL could manufacture.

As one can see above, compared to the market study made at the end of 1978, and which in my opionion is still valid to-day, the raw materials purchases were not accurately planned and therefore the production, in order to keep going,had to manufacture some solutions which , compared to some others,are not in great demand and which will have to be kept in store for more than a year before being used.

Although this has not had serious repercussions on the market this year, since the sales are not as large as expected due to the importation of finished products from abroad, the production will have to be adjusted next year accordingly to the market requirements, as no more importations are expected.

10) CONCLUSIONS

The management has to be more effective in solving problems as they arise. It may be necessary to increase the salary levels in order to keep the skilled staff more content and prevent them from leaving the production place.

Planning for the purchase of raw materials should be in accordance with the market demand and should be early enough so that they can be brought in by sea instead of being air flown.This would reduce some of the high overhead costs the company now faces.
Indeed, a special effort will be required from the management in all departments, to considerably reduce expenditures,which are running rather high at present, if the company seriously intends to be competitive in the Export Market.

Spare parts for the equipment should be bought so that in case of major breakdowns, the plant does not stop operating for weeks or even months.

Modifying the rabbits environment and if necessary getting a new breed of rabbits, plus getting in flame photometers repaired will allow the analytical department to be independent and will save quite a large sum of money the Company is now spending in getting some analysis done overseas.

Revising the budget closer to the existing market conditions would adjust the price of finished products so that they are not sold at loss prices. At the same time, working hand in hand with the three main buyers (NCCM, RCM and MEDICAL STORES) is imperative.

.../...

Some minor modifications suggested earlier on (see previous reports and annexes) would also help in rationalizing productions and purchases ans therefore ease the work in those two departments.

More management meetings are necessary in order to speed up actions. This year the average was only of one meeting every 3 weeks which is not enough for a new factory. Closer links between the management and the workers might give the management better and more realistic informations on what is happening in the plant and at the same time bring back some confidence in the management to the workers.

R.D.SARACCHI

Production and Quality Control

Adviser

The General Manager

Production & Quality Control Advisor

GPL/RDS/js.

8. 11. 79.

WATER DISTILLER

Actually GPL. has one water distiller installed and one stored in the raw materials store which came via Lobito and which was repaired at the end of last year. As GPL. decided not to sell the one which was repaired, I would suggest that it is installed in the water treatment room.

Indeed there is enough space for that room to hold a second distiller.

However, the installation of the distiller will have to be done so that there is enough space in order to easily remove or add some stainless steel storage tanks if necessary, and so that either distiller could easily be dismantled in ca: of a break down.

By adding the spare distiller GPL. will, in case of major break down with the actual one, not have to stop production. In addition, GPL could get some more distilled water.

It is however, to be noted that the waterstill is to be connected to the electrical stabiliser.

R.D. SARACCHI

c.c. B. Sarin

The General Manager [illegible]

Production [illegible]uality Control Advisor 05.11.79.

Before leaving Zambia, I would like to bring to your attention the main following points which are still pending:-

1. Providing shelves in the room provided in [illegible] for storing the samples of the batches [illegible]. This point was brought up in my [illegible] February, 21st March, 7th May, 27th June, and [illegible]th September, 1979.

2. Fix on line the water pressure reducer for the water still. This point was brought up in my [illegible] 1st February, 21st March, 7th May, 27th June, and 1[illegible]th September, 1979.

3. [illegible] the water tank connection in order to [illegible] [illegible] 1000 litres or adding some additional [illegible] tank.

This point was brought up in my memos dated 9th March, 21st March, 7th May, 27th June and 1[illegible]th September, [illegible].

4. Enforcing fully the discipline list issued at the beginning of February, 1979.

5. Processing the spare parts list issued on 13th [illegible] in order to get all necessary quotations, for the Bank of Zambia to issue an import licence and foreign exchange allocations.

This was brought up in my memos dated 7th May, 27th June and 11th September, 1979.

6. Processing the chemicals and reagents list issued on [illegible] in order to [illegible] all [illegible] quotations for the Bank of Zambia to issue an [illegible] [illegible] and foreign exchange allocations. [illegible] brought up in my memos dated 7th May, [illegible] June and [illegible]th September, 1979.

7. [illegible] the supply of [illegible] [illegible] [illegible] load variations.

2......

This was discussed since last July and brought up in my memo dated 11th September, 1979.

8. Awaiting for the perforated metal plate for the [illegible] to be made locally as per Viper's [illegible] Mr. D.P. Chudin's visit early last July.

This point was brought up in my memo dated 11th September, 1979.

9. Covering the steam pipe so that the rain [illegible] will not affect the temperature of the steam.

This has to be done before the rainy season has to start, indeed it is a problem which has been discussed since last June and which was mentioned in my memo dated 11th September, 1979.

Unfortunately, the rainy season has already started and one can foresee that it nothing is immediately done, that not only the entire insulating material around the steam pipe will have to be replaced as it will be damaged by the rain but the specification of finished products might be affected.

10. Taking a decision regarding my memo dated 11th [illegible] solution preparation, as to whether or not [illegible] only the solution preparation room at [illegible].

As you know, these points are to be considered as the most urgent ones regarding the production and quality control [illegible] ments and they should be taken into serious consideration.

R.D'S RACCHI

General Manager — GPL/NM/j·.

Production & Quality Control Advisor — 19. 11. 79.

STAFF AVALUATION

Before leaving Zambia I am giving you herewith the professional evaluation for the following key staff of the Production and Quality Control Department.

Mr. N. Mvale
Mr. M. Ntambo
Mr. M. Sikanyika
Mr. C. Masongo
Mr. N. Patel
Mr. H. Iluya

The evaluations also reflect on how the staff caught the training programme which has been given for:-

- Packaging
- Sterilisation
- Solution Preparation and bags filling
- Water Treatment

I have generally been satisfied with the general workers in all departments with regard to the training programme. However as I am not directly dealing with the general workers, a detailed professional evaluation adapted to their position should be made by the Production Manager for each one of them.

R.D. SARACCHI

The General Manager

Production & Quality Control Manager

GPL/RDS/js.

21. 11. 79.

INSTRUCTIONS FOR USE

At the end of last year, when CPL. was still a project, it was suggested that one way of participating in the reduction of the expenditures was to get the instructions for use, which are packed along with the finished products, printed on the polyethylene overpacking instead of having them on separate papers.

Not only would this method ensure that each and every nurse handling the intravenous infusions receives an instruction for use with each bag but it will also reduce the price for instruction for use to almost zero as the printing is done automatically along with the sealing of the overpacking bags, by the manufacturer.

In addition it will simplify the work in the packing and in the raw material store.

However, the manufacturers of bags which were approached did request us to get the printing plates imported from overseas. They were also ready to give GPL. some addresses where they could be obtained and indicated that the price for a set was around K300.

In order to fit the smaller size of overpacking bags used at the factory, the instructions for use is to be simplified as per the sample which I gave to GPL. last year.

I believe that it is worthwhile for the company to pursue this matter.

R.D. SARACCHI

FROM ..[illegible]..

TO .....

DATE NOVEMBER 1979
PAGE 1/5

DEPARTMENT ..... DIRECT HEAD .....

NAMES M. C. NIEUWENHUIS SEX M AGE 32

QUALIFICATIONS B.Sc. IN COMMERCE - INDIA

FUNCTIONS GENERAL MANAGER SINCE NOVEMBER 1978

DATE OF ENTRY NOVEMBER 1978 AS GENERAL MANAGER

EVALUATION No. 2 PERIOD FROM APRIL 79 TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

	1	2	3	4	5	FACTOR
1.- Professional knowledge and aptitudes				(4)		4
2.- Interest and curiosity to improve				(4)		4
3.- Efficiency - Performance and dexterity				(4)		4
4.- Accuracy - Organization				(4)		4
5.- Professional conscience				(4)		4
6.- Ideas, initiatives and responsibilities				(4)		4
7.- Memory			(3)			3
8.- Tenacity			(3)			3
9.- Discipline				(4)		4
10.- Regularity in work		(2)				2
11.- Complexity				(4)		4
12.- Tidiness - Cleanliness		(2)				2
13.- Absence - Punctuality		(2)				2
14.- Self Control	(1)					1
15.- Trust - Worthiness			(3)			3
16.- Friendship			(3)			3
17.- Honesty				(4)		4
18.- Discretion	(1)					1
19.- General attitude					(5)	5
20.- Personality - character					(5)	5
21.- Optimum results - Saving				(4)		4
22.- Ability to analyse and foresee situations					(5)	5
					TOTAL	75

1	2	3	4	5
A	B	C	D	E

PREVIOUS MEANS : 3,18

MEAN: 3.41

2.- PERSONAL APPRECIATIONS

No change from the last evaluation - M. Nieuwenhuis is too weak for a general manager position and is more interested about his personal benefit than in bringing GPL to a sound footing

SIGNATURE

FROM .....

TO .....

DATE NOVEMBER 1979

DEPARTMENT ...PRODUCTION..... DIRECT HEAD GENERAL MANAGER

NAMES .....N. MUSALE..... SEX ....M..... AGE ..31....

QUALIFICATIONS ..BSC - SCIENCE TEMPLE UNIVERSITY - PHILADELPHIA USA

FUNCTIONS ...PRODUCTION MANAGER..... SINCE JULY 1978.

DATE OF ENTRY ..DECEMBER 1977..... AS ..PROJECT OFFICER....

EVALUATION No.....2..... PERIOD FROM APRIL 79. TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

	1	2	3	4	5	FACTOR
1.- Professional knowledge and aptitudes			3	(4)		4
2.- Interest and curiosity to improve			(3)	4		3
3.- Efficiency - Performance and dexterity			3	(4)		4
4.- Accuracy - Organization			3	(4)		4
5.- Professional conscience			3	(4)		4
6.- Ideas, initiatives and responsibilities			3	(4)		4
7.- Memory			(3)	4		3
8.- Tenacity			(3)	4		3
9.- Discipline			3	(4)		4
10.- Regularity in work			(3)	4		3
11.- Complexity			3	(4)		4
12.- Tidiness - Cleanliness			(3)	4		3
13.- Absence - Punctuality			3	(4)		4
14.- Self Control		(2)	3	4		2
15.- Trust - Worthiness		2	3	(4)		4
16.- Friendship		(2)	3	4		2
17.- Honesty		2	3	4	(5)	5
18.- Discretion		(2)	3	4		2
19.- General attitude		2	(3)	4		3
20.- Personality - character		2	3	(4)		4
21.- Optimum results - Saving		2	3	(4)		4
22.- Ability to analyse and foresee situations		2	3	(4)		4
						TOTAL
						22 77

1	2	3	4	5
A	B	C	D	E

PREVIOUS MEANS : 3.5

MEAN: 3.5

2.- PERSONAL APPRECIATIONS

Mr Musale is more interested in what he is going to do after working hours and in lawn tennis than in what is to be done during working hours.

For other remarks see previous evaluation

SIGNATURE

FROM .....

TO .....

DATE NOVEMBER 1979

PAGE 1/5

DEPARTMENT Productions ..... DIRECT HEAD Production Manager

NAMES ...H.M. DIALLO..... SEX .....M..... AGE ..31....

QUALIFICATIONS DIPLOMA CHEMICAL ENGINEERING - NIAGARA COLL. - CANADA

FUNCTIONS ...Assistant Production Manager..... SINCE 14.05.79...

DATE OF ENTRY ..15.05.78..... AS LAB. TECHNICIAN....

EVALUATION No.....2..... PERIOD FROM APRIL 79. TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

	1	2	3	4	5	FACTOR
1.- Professional knowledge and aptitudes		(2)	3	4	5	2
2.- Interest and curiosity to improve	(1)	2	3	4	5	1
3.- Efficiency - Performance and dexterity	(1)	2	3	4	5	1
4.- Accuracy - Organization	(1)	2	3	4	5	1
5.- Professional conscience	(1)	2	3	4	5	1
6.- Ideas, initiatives and responsibilities	(1)	2	3	4	5	1
7.- Memory	(1)	2	3	4	5	1
8.- Tenacity	(1)	2	3	4	5	1
9.- Discipline	(1)	2	3	4	5	1
10.- Regularity in work	(1)	2	3	4	5	1
11.- Complexity		(2)	3	4	5	2
12.- Tidiness - Cleanliness	(1)	2	3	4	5	1
13.- Absence - Punctuality	(1)	2	3	4	5	1
14.- Self Control		(2)	3	4	5	2
15.- Trust - Worthiness	(1)	2	3	4	5	1
16.- Friendship	(1)	2	3	4	5	1
17.- Honesty	(1)	2	3	4	5	1
18.- Discretion	(1)	2	3	4	5	1
19.- General attitude	(1)	2	3	4	5	1
20.- Personality - character	(1)	2	3	4	5	1
21.- Optimum results - Saving	(1)	2	3	4	5	1
22.- Ability to analyse and foresee situations	(1)	2	3	4	5	1
						TOTAL
	1	2	3	4	5	22
	A	B	C	D	E	

PREVIOUS MEANS : 1.14

MEAN: 1.14

2.- PERSONAL APPRECIATIONS

Very good & all respect

SIGNATURE

FROM R.D. SCARONI

TO .....

DATE NOVEMBER 1979

PAGE 1/5

DEPARTMENT MAINTENANCE + REPAIRS. DIRECT HEAD PRODUCTION MANAGER

NAMES H. SIKAUNIKA..... SEX M..... AGE 27...

QUALIFICATIONS DIPL. MECHANICAL TECHNOLOGY - NORTHERN TECH. COLLEGE NDOLA

FUNCTIONS HEAD OF MECHANICAL DEPARTMENT..... SINCE 1.3.77..

DATE OF ENTRY 1.3.70..... AS HEAD OF MECH. DEP.

EVALUATION No.....2..... PERIOD FROM APRIL 79. TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

						FACTOR
1.- Professional knowledge and aptitudes	1	2	(3)	4	5	3
2.- Interest and curiosity to improve	1	2	(3)	4	5	3
3.- Efficiency - Performance and dexterity	1	2	3	(4)	5	4
4.- Accuracy - Organization	1	2	3	(4)	5	4
5.- Professional conscience	1	2	3	(4)	5	4
6.- Ideas, initiatives and responsibilities	1	2	(3)	4	5	3
7.- Memory	1	2	(3)	4	5	3
8.- Tenacity	1	2	(3)	4	5	3
9.- Discipline	1	2	(3)	4	5	3
10.- Regularity in work	1	2	(3)	4	5	3
11.- Complexity	1	(2)	3	4	5	2
12.- Tidiness - Cleanliness	1	2	(3)	4	5	3
13.- Absence - Punctuality	1	(2)	3	4	5	2
14.- Self Control	1	(2)	3	4	5	2
15.- Trust - Worthiness	1	2	(3)	4	5	3
16.- Friendship	1	(2)	3	4	5	2
17.- Honesty	1	2	(3)	4	5	3
18.- Discretion	1	(2)	3	4	5	2
19.- General attitude	1	2	(3)	4	5	3
20.- Personality - character	1	2	(3)	4	5	3
21.- Optimum results - Saving	1	2	(3)	4	5	3
* 22.- Ability to analyse and foresee situations	1	2	3	(4)	5	4
						TOTAL
						22 65

PREVIOUS MEANS : 3.0

MEAN: 2.95

1	2	3	4	5
A	B	C	D	E

2.- PERSONAL APPRECIATIONS

No important since last evaluation

SIGNATURE

FROM R.D. SIANGOMA...

TO .....

DATE NOVEMBER 1979

PAGE 1/5

DEPARTMENT MAINTENANCE + REPAIRS. DIRECT HEAD PRODUCTION MANAGER

NAMES C. J. MASONGA..... SEX ....M..... AGE ..31....

QUALIFICATIONS DIPL. ELECTRICAL TECHNOLOGY - ZAMBIA INST. OF TECHN. - KITWE

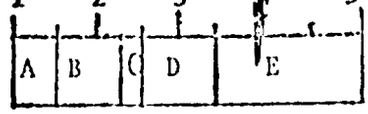
FUNCTIONS HEAD OF ELECTRICAL DEPARTMENT.... SINCE ..1.3.79...

DATE OF ENTRY ..1.3.79..... AS HEAD OF ELECTR. DEP.

EVALUATION No.....2..... PERIOD FROM APRIL 79 TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

						FACTOR
1.- Professional knowledge and aptitudes	1	2	(3)	4	5	3
2.- Interest and curiosity to improve	1	2	3	4	(5)	5
3.- Efficiency - Performance and dexterity	1	2	3	4	(5)	5
4.- Accuracy - Organization	1	2	3	(4)	5	4
5.- Professional conscience	1	2	3	(4)	5	4
6.- Ideas, initiatives and responsibilities	1	2	3	(4)	5	4
7.- Memory	1	2	(3)	4	5	3
8.- Tenacity	1	2	3	(4)	5	4
9.- Discipline	1	2	3	(4)	5	4
10.- Regularity in work	1	2	(3)	4	5	3
11.- Complexity	1	2	3	(4)	5	4
12.- Tidiness - Cleanliness	1	2	3	(4)	5	4
13.- Absence - Punctuality	1	(2)	3	4	5	2
14.- Self Control	1	(2)	3	4	5	2
15.- Trust - Worthiness	1	2	3	(4)	5	4
16.- Friendship	1	2	3	(4)	5	4
17.- Honesty	1	2	3	(4)	5	4
18.- Discretion	1	2	(3)	4	5	3
19.- General attitude	1	2	3	4	(5)	5
20.- Personality - character	1	2	3	4	(5)	5
21.- Optimum results - Saving	1	2	3	4	(5)	5
* 22.- Ability to analyse and foresee situations	1	2	3	4	(5)	5
						TOTAL
	1	2	3	4	5	22



PREVIOUS MEANS : 3.32

MEAN: 3.9

2.- PERSONAL APPRECIATIONS

Very reluctant to do anything anymore

SIGNATURE

FROM ...A.K.S...

TO .....

DATE NOVEMBER 1979
PAGE 1/5

DEPARTMENT ANALYTICAL LABORATORY DIRECT HEAD GENERAL MANAGER

NAMES .....N. PATEL..... SEX .....M..... AGE ...27...

QUALIFICATIONS BSC.-HSC BIOCHEMISTRY - UNIVERSITY OF LONDON....

FUNCTIONS ASS. QUALITY CONTROL MANAGER..... SINCE ..17.7.78..

DATE OF ENTRY ....17.7.78..... AS ASS. QUAL. CONTROL MAN.

EVALUATION No.....2..... PERIOD FROM APRIL 79.. TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

	1	2	3	4	5	FACTOR	
1.- Professional knowledge and aptitudes	1	(2)	3	4	5		2
2.- Interest and curiosity to improve	1	(2)	3	4	5		2
3.- Efficiency - Performance and dexterity	1	(2)	3	4	5		2
4.- Accuracy - Organization	(1)	2	3	4	5		1
5.- Professional conscience	1	(2)	3	4	5		2
6.- Ideas, initiatives and responsibilities	(1)	2	3	4	5		1
7.- Memory	(1)	2	3	4	5		1
8.- Tenacity	1	(2)	3	4	5		2
9.- Discipline	1	(2)	3	4	5		2
10.- Regularity in work	(1)	2	3	4	5		1
11.- Complexity	(1)	2	3	4	5		1
12.- Tidiness - Cleanliness	(1)	2	3	4	5		1
13.- Absence - Punctuality	1	(2)	3	4	5		2
14.- Self Control	1	2	(3)	4	5		3
15.- Trust - Worthiness	(1)	2	3	4	5		1
16.- Friendship	(1)	2	3	4	5		1
17.- Honesty	(1)	2	3	4	5		1
18.- Discretion	(1)	2	3	4	5		1
19.- General attitude	(1)	2	3	4	5		1
20.- Personality - character	1	(2)	3	4	5		2
21.- Optimum results - Saving	(1)	2	3	4	5		1
* 22.- Ability to analyse and foresee situations	(1)	2	3	4	5		1
						TOTAL	
	1	2	3	4	5	22	32
	A	B	C	D	E		

PREVIOUS MEANS : 1.55

MEAN: 1.45

2.- PERSONAL APPRECIATIONS

Same as last evaluation

SIGNATURE

FROM ..[illegible]..

TO .....

DATE NOVEMBER 1979

PAGE 1/5

DEPARTMENT ANALYTICAL LABORATORY DIRECT HEAD GENERAL MANAGER

NAMES M. SILUYA SEX M AGE 35

QUALIFICATIONS BSC. CHEMISTRY - UNIVERSITY OF ZAMBIA

FUNCTIONS ASSISTANT QUALITY CONTROL MANAGER SINCE 1.7.78

DATE OF ENTRY 4.4.78 AS WORK CHEMIST

EVALUATION No. 2 PERIOD FROM APRIL 79 TO NOVEMBER 79

1.- PROFESSIONAL EVALUATION

	1	2	3	4	5	FACTOR
1.- Professional knowledge and aptitudes	1	(2)	3	4	5	2
2.- Interest and curiosity to improve	1	2	3	(4)	5	4
3.- Efficiency - Performance and dexterity	1	2	(3)	4	5	3
4.- Accuracy - Organization	1	(2)	3	4	5	2
5.- Professional conscience	1	(2)	3	4	5	2
6.- Ideas, initiatives and responsibilities	1	2	(3)	4	5	3
7.- Memory	1	2	(3)	4	5	3
8.- Tenacity	1	2	(3)	4	5	3
9.- Discipline	1	(2)	3	4	5	2
10.- Regularity in work	1	(2)	3	4	5	2
11.- Complexity	1	2	(3)	4	5	3
12.- Tidiness - Cleanliness	1	(2)	3	4	5	2
13.- Absence - Punctuality	1	(2)	3	4	5	2
14.- Self Control	(1)	2	3	4	5	1
15.- Trust - Worthiness	1	(2)	3	4	5	2
16.- Friendship	1	(2)	3	4	5	2
17.- Honesty	(1)	2	3	4	5	1
18.- Discretion	1	(2)	3	4	5	2
19.- General attitude	1	(2)	3	4	5	2
* 20.- Personality - character	1	(2)	3	4	5	2
21.- Optimum results - Saving	1	2	(3)	4	5	3
* 22.- Ability to analyse and foresee situations	1	2	(3)	4	5	3
						TOTAL
	1	2	3	4	5	22 51

PREVIOUS MEANS : 1.86

MEAN: 2.32

A	B	D	E

2.- PERSONAL APPRECIATIONS

Does the minimum - needs to be pushed constantly

SIG[illegible]

PERSONAL EVALUATION - SCALE

1. 1) Excellent
   2) Strong
   3) Not enough
   4) Weak
   5) Nil

2. 1) Much interested to improve himself and the work
   2) Interested
   3) Should do better
   4) Trying
   5) Nil

3. 1) Rapid in solving problems - taking decisions and acting
   2) Normal
   3) Should do better - is wasting time
   4) Slow - loses a lot of time
   5) Very slow

4. 1) Very accurate and organized
   2) Accurate
   3) Should do better
   4) Not enough - must re-start the work often, wasting time and material
   5) Nil

5. 1) Constant worry to do the best
   2) Conscientious
   3) Should do better
   4) Is happy with
   5) Just the opposite

6. 1) Plenty of good ideas and initiatives likes to take responsibilities
   2) Exploring for more initiatives
   3) Takes sometimes initiatives but should do better
   4) Does not like taking initiative and responsibility
   5) Nil - has no idea, can attribute to himself those founded by others

7. 1) Excellent
   2) Good
   3) Not enough
   4) Poor
   5) Nil

8.
1) Always fighting for his-her ideas with an open mind
2) Tenacious
3) Can solve small difficulties but should do better
4) Surrend quickly
5) Surrend immediately

9.
1) Very disciplinated, accept and execute without frustration the work which was given to him (her)
2) Usually good
3) Is sometimes reticent to execute the work which has to be done
4) Is often reticent to execute the work which has to be done
5) Can refuse to execute the work which has to be done

10.
1) Very regular, maximum constant efforts
2) Regular
3) Doubtful
4) Not regular
5) Very irregular

11.
1) Like to solve any type of problems
2) Does not like to solve too complicated problems
3) Does not like to solve complicated problems
4) Does not like to solve even simple problems
5) Is not able to solve any type of problems

12.
1) Especially tidy and clean
2) Tidy and clean
3) Should do better
4) Sometimes tidy and clean
5) Not at all

13.
1) Never absent but for sickness
2) Very few unjustified absence
3) Should be more serious
4) Many unjustified absence
5) Too many

14.
1) Has self-control in any situation
2) Good
3) Not enough
4) Impulsive
5) Does not control his words and his behaviour

15.
1) Trust worthy in all matters
2) Reliable in most matters
3) Not enough
4) Not reliable
5) Does not care for anything

16.
1) Easily approached by people to whom he or she gives help in any circumstances
2) Approached by people and gives help
3) Is looking for friends
4) Tolerate the friends but sometimes egoistic
5) Shun friends, always at war with them

17.
1) Hate what is trickery and lies
2) Does not trick and lie
3) Is tricking or lying only in grave situation
4) Solving situation by tricks or lies
5) Is always ready to trick or lie

18.
1) Very discreet
2) Discreet
3) Should watch himself more
4) Not discreet
5) Information agency

19.
1) Very co-operative through work and discussion, accept and gives advice
2) Co-operative
3) Too sure of himself, should be more co-operative
4) Sometimes arrogant and mythomaniac can accept advice
5) Arrogant and mythomaniac refuses to take advice, makes mistakes and argues too conceited

20. * ONLY FOR HEADS

1) Very strong, is respected for his - her qualities
2) Strong, is in general respected
3) Should do better. Needs often help to be respected
4) Often not respected due to his - her hesitant attitude
5) Nil. Makes mistakes, abuses of his - her power
Demand respect whether earned or not

21. * ONLY FOR HEADS

1) Always is improving to save material and money - can do a lot with a mini
2) Is trying to save material and money
3) Should do better. Needs often to be checked by his - her head for optimum results
4) Is not interested, so that his - her work stays easy
5) Is not looking at all when he - she spend others money and material

22. * ONLY FOR HEADS

1) Very good, can fastly foresee and analyse situations in long distance and by doing so avoiding mistakes
2) Usually good
3) Should be better, does sometimes not see the reality
4) Is encountering difficulties in realising long distances situations
5) Nil, cannot see further than the work he (she) is doing at the moment

MEAN			
	A =	VERY GOOD	(1 - 1,5)
	B =	GOOD	(1,5 - 2,25)
	C =	MINIMUM	(2,25 - 2,5)
	D =	NOT ENOUGH	(2,5 - 3,5)
	E =	HOPELESS	(3,5 - 5)

N.B. This mean is to be considered as rough estimate

[illegible]

[illegible] [illegible] the [illegible] fixes [illegible] prices for the [illegible] ducts, [illegible] equity [illegible] [illegible]

[illegible] the Party and [illegible] Government [illegible] these measures [illegible]

[illegible]ly, [illegible] companies will [illegible] run profitably

[illegible] said [illegible] the corporation's board of directors was not empowered to make [illegible] such changes but that [illegible] the Government [illegible] majority shareholders [illegible] companies which

made losses in the Zambia Sugar Company (K5.4 million), [illegible] Zambia Breweries, Zambia [illegible], Zambezi [illegible] mills, Kabwe Industrial [illegible], Kapiri Glass Products and [illegible] Cement which for the first time [illegible] a loss of K3 million.

Profit making companies include National [illegible] Company (K26.5 million) and Zambia [illegible] Building Supplies which closed the year with a K4.3 million profit.

Referring to [illegible] situation in [illegible] companies, the managing director [illegible]

Mr Chi[illegible] [illegible] the [illegible] venture, Indeco [illegible] conditions.

"Indeco [illegible] to retain Zambi[illegible] [illegible] [illegible] improve [illegible] are ready [illegible]

Indeco

[illegible] Mr Chi[illegible]

worried.

Mr Chileshe pointed out that [illegible] organisation [illegible] will not deliberately close down [illegible] subsidiaries [illegible] running at a loss [illegible] companies [illegible] on borrowing [illegible] automatically [illegible] out of business [illegible] their creditors withdraw their services.

He said [illegible] is to build a strong economic base which will in turn create room for expansion and [illegible] for the provision of various services, the Party and Government have to act quickly.

Although [illegible] Indeco made a pre-tax profit of only K[illegible] million during the year [illegible] Mr Chileshe said the profit was not even three per cent of the company's assets.

The managing director said if [illegible] run, Indeco was [illegible] to make a minimum of K20 million [illegible].

He disclosed that while the profit making companies in the group earned K[illegible] million pre-tax profit, [illegible] firms lost K[illegible] million [illegible] the total profit [illegible] bare K[illegible] [illegible]

[illegible]ily Mail

[illegible] serve the country — Without fear or favour

Monday, [illegible]

Poor pay-so Indeco workers qu[illegible]

By [illegible] Reporter

THE Industrial Development Corporation (Indeco) has [illegible] of its best employees because of poor [illegible] of service and [illegible] salaries, it was [illegible] over the weekend.

Indeco [illegible] director Mr Lishomwa Muuka has therefore [illegible] the Government to review urgently salaries of workers in the company because the Mwanakatwe Salaries [illegible] salaries for parastatal employees [illegible].

Mr Muuka [illegible] Indeco was facing serious problems at the moment including [illegible] pricing systems, inefficiency, poor [illegible].

But he stressed that [illegible] of these problems was more serious than the low [illegible] workers were being subjected to [illegible] morale of workers to work hard [illegible].

[illegible] when he had his salary increased [illegible] maximum salary category to which some people belonged is no longer there," he said.

Mr Muuka was speaking when he presented long service awards to Indeco employees in Zimco building.

He said he had written to Zimco executive director for corporate planning and administration, Mr Ignatius Muchangwe, to ask for a review of salaries for Indeco workers.

Zimco [illegible] he said, would discuss the matter next month and appealed to workers to sympathise with the company while the matter was being handled.

He however noted that already the company had lost many brilliant employees due to poor conditions [illegible] adding [illegible].

He warned that Indeco was heading for a bad financial year and predicted heavy losses at the end of the year due to several [illegible].

"Even [illegible] did not expect to perform badly are also heading for losses," he added.

He [illegible] the company would [illegible].

[illegible] 1975 [illegible] raw materials [illegible] there, [illegible] more problems for the company [illegible] shortages.

As long as people do not produce [illegible] the demand, shortages and the black market would always be there.

He noted that people were criticising Indeco [illegible] the country because of the nature of the commodities the company dealt with.

He told Indeco senior executives who attended [illegible] that he was not going to tolerate such [illegible] parts [illegible] not [illegible].

Mr Muuka said he was aware of cases where [illegible] desks of some managers for days without any [illegible] done."

He also pointed out that [illegible] women [illegible] corruption [illegible] and nepotism in the company.

Those [illegible] Mr Chitamb[illegible] [illegible] Mulenga Simp[illegible] officer of Indeco [illegible] Mrs Janet M[illegible] officer [illegible] Mr Brian G[illegible] Indeco and Mrs [illegible] Kabimba [illegible] accountant.

GENERAL PHARMACEUTICALS LIMITED

KABWE - ZAMBIA

TRAINING PROGRAMME

IV WATER TREATMENT

DEFINITION

The objectives of the department is to produce a minimum quantity of soft water and pro-injection water in order to allow the production of Intravenous fluids to reach the rated capacity of 4000 bags of either 150 or 500 or 1000 ml. per day.

In other words it means:

- Enough pro-injection water for manufacturing the solution, cleaning the equipment and for the analytical laboratories.
- Enough soft water to feed the steam boiler.
- Enough soft water to cool the finished product at the end of sterilisation.

The equipment available on site allows the quantity of the different qualities of water to be produced, but only if the operations described hereafter are carefully followed and done with great cleanliness.

Some parts of the water treatment installation are breakable and they should be handled with care.

As part of the installation is regenerated with hydrochloric acid and caustic soda with high concentration, the staff assigned to this department will have to follow very closely the method described hereafter and handle the equipment smoothly in order to avoid any accident.

The same applies when handling the phenyl mercury borate disinfectant and the steam.

Nobody except for the staff assigned to this department should handle the equipment.

2/.....

The staff which has been assigned by GPL's management to this department are:-

- The quality control department
- The workshop staff
- The Production Manager and his assistant
- 1 Night Watchman

I. THE DEPARTMENT IS COMPOSED OF THE MAIN FOLLOWING MACHINERY AND EQUIPMENT

		Quantity
-	Water booster pump	1
-	Brine tank	1
-	Scavenger filter type SC 50	1
-	Softener type A 40	1
-	Softener type A 50	1
-	Deioniser type E 50	2
-	Water purity control panel	1
-	Neutraliser type NT 60	1
-	Water distiller type A 200	1
-	Stainless steel vats 2000 L. capacity with UV lamps	2
-	Transfer pump	1

II MODE OF WATER TREATMENT

(see simplified water flow sheet page 19 and distilled water flow sheet page 20)

The water supplied by the City Council, which is of drinkable quality, is stored in a 10,000 liter tank (A) located on the roof of the factory building; i.e. about 6 m. above the treatment plant.

From the tank the water goes through a galvanised pipe to the booster pump (B) for the pressure to be increased between 4 to 6 kg/cm^2

From the booster pump the water goes to the scavenger filter (D) for removal of the organic matters

3/.....

The scavenger filter s loaded with special resins which are exchanging sodium against the organic matters contained by the water.

The water is going from the scavenger filter to either one of the softener or to both of them (E + F) for the water to be purified from the calcium it contains. The softeners are loaded with special resins which are exchanging sodium against the calcium contained in the water

From the softeners the water is going to either the boiler or the autoclaves for being used as soft water, or to one of the deionizers (G + H) for further treatment.

The deionisers are loaded with two different resins which are exchanging the cations contained in the water against H^+ and the anions against OH^-. By releasing OH^- and H^+ it forms water ($H^+ + OH^- = H_2O$)

From the deioniser the water is going to the waterstill (K) for distillation and from the waterstill it is stored into two stainless steel tanks (L + M) of a capacity of 2000 l. each.

These tanks are equipped with ultra violet tubes. The tanks are connected to a transfer pump (N) for supplying water to the solution preparation room and to the analytical department.

From the water storage tank located on the roof, up to the dionisers, all pipes are galvanised iron. From the deionisers up to the waterstill the pipes are made out of PVC. From the waterstill onwards the whole installation is made out of stainless steel.

III. OPERATION (DEIONISED WATER)

The operation described hereafter will refer to the various manufacturers' booklet and drawings which are available with the Production Manager and the workshop. In addition all valves are numbered either on the drawings attached to this leaflet or directly on the installation itself.

4/....

A. BOOSTER PUMP B) AND WATER STORAGE TANK (A)

The installation will be supplied as much as possible through the water storage tank. The water storage tank is filled through valve 1. The tank is equipped with a float valve which regulates the water level in the tank. The outlet of the tank is through valve 2 which is on the roof of the factory building and the water flows to the booster pump B through valve 4. In order to adjust the pressure at the outlet of the pump, two by-passes have been installed, one from the outlet of the booster pump back to the inlet through valve 5 and the other one from the outlet of the booster pump back to the water storage tank through valve 6.

In case of any problem, the water storage tank can be by-passed through valve 3. It is however, to be noted that if the storage tank is by-passed for more than two or three days its water should be drained. Indeed, still water develops fungus and bacteria very fast and becomes improper for use. If the tank has to be drained for such reason, the tank will have to be brushed and rinsed before being filled again.

If using the tank, valves 1- 2- 4- 6 have to be fully open, valve 3 is fully closed and valve 5 is open in order to get a pressure between 4 and 6 kg/cm^2 on the manometer. If by-passing the tank, valves 3- 4- 6 have to be fully open, valves 1 - 2 fully closed and valve 5 is open in order to get a pressure between 4 and 6 kg/cm^2 on the manometer

B. SCAVENGER FILTER (C + D)

The water coming from the booster pump goes to the scavenger filter (D).

Valves 9 and 16 of the simplified water flow sheet have to be fully open and valves 1 and 2 numbered on the scavenger filter have to be fully open. All other valves on the filter are fully closed.

5/....

SOFTENERS (E F)

The water coming from the scavenger filter goes to either one or both the softeners through valves 12 and/or 13 of the simplified water flow sheet.

However, if any problem with the scavenger, the latter can be by-passed through valves 10 and/or 11. If not by-passed, valves 12 and/or 13 are fully open and valves 10 and/or 11 are fully closed. If by-passed, valves 10 and/or 11 and 12 and/or 13 are fully open and valves 9 and 16 of the scavenger filter are fully closed.

The softeners are equipped with a special valve named SOLO VALVE. The solo valve, during operation is to be set on position SERVICE (BETRIEB.) The outlet of the softeners is through valves 17 and 18, from those two outlets the soft water is distributed to the boiler, the autoclaves and the deionisers.

However, in case of any trouble with the softeners during production, the softeners can be by-passed through valve 7 of the simplified water flow sheet for the autoclaves only. Indeed, by by-passing the softeners, the water will contain large quantities of calcium and is therefore, improper for both the boiler and the deionisers. In case of by-passing the softeners, valve 7 of the simplified water flow sheet is fully open and valve 27 is fully closed.

If not by-passed, valve 7 is fully closed and valve 27 is fully open. The softeners can work either one by one or together.

However, it has been found more convenient at GPL to use them one by one.

1. Assuming softeners E of the simplified water flow sheet is used alone during normal production day, the instal lation will be set as follows: (see simplified water flow sheet) valves 7- 10- 11- 13- 18- 21- 22 are fully closed valves 12- 17- 19- 20- 25- 26- 27 are fully open.

6/....

Assuming softener F of the simplified water flow sheet is used alone during normal production day, the installation will be set as follows; (see simplified water flow sheet)

Valves 7- 10- 11- 12- 17- 19- 20 are fully closed.
Valves 13- 18- 21- 22- 25- 26- 27 are fully open

In both cases the softeners are getting their water supply from the scavenger filter and are supplying the boiler, the autoclaves and the deionisers with soft water.

3. Assuming both softeners are working at the same time and assuming that as softener E is smaller than softener F, softener E is going to feed the boiler only, while softener F is going to feed both the autoclaves and the deionisers, the installation will be set as follows: (see simplified water flow sheet).

Valves 7 - 10- 11- 19- 25-are fully closed.
Valves 12- 13- 17- 18- 20- 21- 22- 26- 27- are fully open.
In this case too, the softeners are fed from the scavenger filters. In case it is felt during production that the softeners are soon to be exhausted and that a a regeneration of the resins might soon be necessary it is possible to save some soft water for the boiler and the deionisers by by-passing the softerner for supplying the autoclaves.

4. Assuming that softener E of the simplified water flow sheet is used alone during normal production day and that the softener E is by-passed for the supply of water to the autoclaves, the installation will be set as follows: (see simplified water flow sheet).

Valves 10- 11- 13- 18- 21- 22- 25- 27 are fully closed.
Valves 7- 12- 17- 19- 20- 26 are fully open.

5. Assuming that softener F of the simplified water flow sheet is used alone during normal production day and that the softener F is by-passed for the supply of water to the autoclaves, the installation will be set as follows: (see simplified water flow sheet).

Valves 10- 11- 12- 17- 19- 20- 27 are fully closed
Valves 7- 13- 18- 21- 22- 25- 26 are fully open.

7/...

5. Assuming that both softeners are working at the same time during normal production day and that the softeners are by-passed for the supply of water to the autoclaves, and assuming that softener E is supplying the boiler and that softener F is supplying the deionisers, the installation will be set as follows: (see simplified water flow sheet).

Valves 10- 11- 19- 22- 25- 27 are fully closed.
Valves 7- 12- 13- 17- 18- 20- 21- 26 are fully open.

In the cases 4 - 5 and 6 above, the softeners are fed with water from the scavenger filter.

As mentioned at the beginning of point C SOFTENERS, the scavenger filter can be by-passed by closing fully valves 9 and 16 of the simplified water flow sheet and by closing valves 1 and 2 on the scavenger filter. Then valves 10 and/or 11 and valves 12 and/or 13 of the simplified water flow sheet will be fully open.

D. <u>DEIONISERS (G + H)</u>

The water supplying the deionisers will have to be softened. The installation is such that the deionisers are working only one at a time. In case the one working is getting exhausted, it will automatically switch off and the other one will automatically be switched on. Indeed the deionisers are connected to a control panel measuring the conductivity of the water and switching on or off either deioniser accordingly.

During operation, both deionisers will be set as follows

Valves 14- 15- 23- 24 of the simplified water flow sheet will be fully open.

<u>N.B</u>. Valves 23 - 24 of the simplified water flow sheet are the same one as the ones in the manufacturers' booklet holding number 7. This number 7 is also affixed on the valves themselves on each deioniser.

8/....

Valves 23a and 24a of the simplified water flow sheet are the same ones as the ones in the manufacturer's booklet holding number 1. They are pneumatic and electrical valves, they must therefore, be fed with compressed air and elctricity.

Air is supplied by the air compressor at a pressure around 100 PSI (7ATU)
Electricity is supplied from the control panel measuring the conductivity of the water. When energised by the control panel, the valve will open and if not energised the valve remains closed. As the deionisers are working one by one, one of the pneumatic valve will be open while the otner one will be closed.

IV. REGENERATION (DEIONISED WATER)

The operations described refer hereafter to the various manufacturers' booklets and drawingswhich are available with the Production Manager and the workshop, in addition, all valves are numbered either on the drawings attached to this leaflet or directly on the installation itself.

As much as possible the regenerations should not be done during production hours of either distilled water or finished products.

A. SCAVENGER FILTER (C + D)

The scavenger filter is used to retain the organic matters dissolved in the water supplied by the City Council.

The filter is loaded with adsorbtive resins.
In regular intervals, the potassium permanganate consumption ($KMnO_4$) of the raw water and the treated water has to be determined by taking samples at the inlet and the outlet of the filter.

The scavenger filter absorbs roughly 40 to 60% of the dissolved substances. As soon as the KMn04 consumption in the raw water and the treated water are approximately equal, the scavenger filter has to be regenerated.

However, it is recommended to regenerate it at least once a week.

Every regeneration begins with a backwashing in order to expand the resins. Proceed as follows:

Close fully valves 1 and 2 of the manufacturer's drawing and valve 16 of the simplified water flow sheet. Open fully valve 4 and adjust with valve 3 the flow of water so that it reads $0.5M^3$ on the flow-meter. Back wash for 20 minutes.

Caution: Avoid a flushing out of the resins. If necessary reduce the flow with valve 3.

After 20 minutes close valves 3 and 4 fully. After backwashing the regeneration can start. The regeneration is done with 213 liters of brine 25% concentration.

The brine is prepared in the brine tank C of the simplified water flow sheet by pouring in salt, technical quality up to half of its capacity. By opening fully valve 8 of the simplified water flow sheet, water will enter from the bottom of the brine tank and fill it up. Once full, close valve 8 fully.

In order to get a brine at 25% concentration, this operation should be done at least 24 hours before starting the regeneration.

The brine tank is built so that one cannot suck more brine than the quantity prescribed for one regeneration. Proceed as follows:

10/....

Open fully valve 7 and 6 of the manufacturer's booklet. Open valve 5 of the manufacturer's booklet so that the brine is sucked in about 10 to 15 minutes. Then close valve 5 fully.

As soon as the water coming out of valve 7 has a salty taste, close fully valve 7 and 6. Leave the scavenger containing the brine, to rest overnight. The next day the scavenger will have to be rinsed. Proceed as follows:

Open fully valves 9 of the simplified water flow sheet and valve 1 of the manufacturer's booklet.
Open valve 7 until the flow-meter reads $2M^3$ per hour.
When the water flows out clear, colourless and without any salty taste the rinsing is over. Close fully valve 7.

The scavenger is ready to be used, but the organic matters content should be analysed by the Quality Control Department to make sure that the regeneration was effective. Once done, by opening valve 2 of the manufacturer's booklet and valve 16 of the simplified water flow sheet, the scavenger can be used again.

B. SOFTENERS (E + F)

The softeners are used to retain the calcium dissolved in the water and exchange it against sodium which is released by the resins contained in the softeners.

In regular intervals the analysis of the hardness of the water flowing out of the softeners is to be checked by the quality control department who will, by exhaustion of the resins, order the regeneration to be done.
The regeneration starts with a backwash of the resins, proceed as follows:

Close fully valve 12 and 17 or 13 and 18 of the simplified water flow sheet depending on which softener the regeneration has to be done.

11/...

set the solo valve on position backwash (RUCKSPULEN) and slowly open fully valve 12 or 13 accordingly. The solo valve is adjusted by the workshop staff so that the backwash flow is 15 l/min (0.9 M^3/h) for type A40 and 30 l/min (1.8 m^3/h) for type A50.

The backwashing will last for about 10 minutes then close fully valve 12 or 13 accordingly.

In case of an over flow of resins, the backwashing has to be stopped and the workshop staff called for readjustment of the backwashing flow.

Once the backwashing is done, the softeners will have to be loaded with technical grade salt. Proceed as follows:

- Remove the cover of the softener
- Set the solo valve on position "fill in salt" (salzeinwurf) and pull the solo valve's handle until the water level inside the softener reaches the level of the solo valve.
- Then release the solo valve's handle.
- With the help of a funnel pour the salt into the softener. Type A40 will be loaded with 30 kg of salt in pellets and type A50 with 45 kg.
- If necessary, during the pouring of the salt, pull solo valve's handle in order to avoid an overflowing of the water.
- When the salt has been poured in set the solo valve on position "service" (Betrieb) and slowly open valve 12 or 13 accordingly in order to fill up the softener with water.
  Once the softener is full close fully valve 12 or 13 and screw the cover back on to the softener.
  The cover should not leak.
- Set the solo valve on position "regeneration" and slowly open valve 12 or 13 accordingly. The softeners have been adjusted by the workshop staff so that the regeneration flow is, for the type A40 of 10 l/min (0.6 M^3/h) and for the type A50 of 15 l/min (0.9 m^3/h). From time to time the flow will have to be checked.

12/....

- Regenerate until the water coming out of the softener is tasteless and free of hardness. The quality control is to check for the hardness.
- When the regeneration is over, set the solo valve on position "service" (Betrieb), and by opening valve 17 or 18 accordingly the softener can be used again.

C. DEIONISERS (G + H + I)

The deionisers are used to retain all remaining mineral matters dissolved in the softened water.

They are filled with two different resins, one is exchanging cations and the other one anions. During the operation, both the resins have roughly the same density and are blended.

When the resins are exhausted, their density changes between one another and they can easily be separated by backwashing.

The dark resins remove the cations (Na-Mg etc) and the light resins remove the anions (cl-SO_4-SiO_2 etc) The water flows from the top to the bottom. The quality of the demineralised water is checked by measuring the electric resistance (Mohm/cm) or the conductivity (μs/cm).

Therefore the plant has to be regenerated when:

> The electric resistance is decreasing or when the conductivity is increasing.

As previously mentioned, the deionisers are working alternatively and when the one working is getting exhausted it switches off and the one ready for use is switching on.

13/....

As during interruption of ~~service~~ the electric resistance may decrease or the conductivity increase, though the resins are not exhausted it is necessary, during such interruption to switch on the recirculating pump K of the manufacturer's drawing and to fully open the valves located on each side of the pump. In case the resistance is ~~high~~ less or the conductivity ~~low~~ high but the resins are not exhausted, one can, by opening valves 1 and 10 of the manufacturer's booklet and flushing water to the drain, bring the quality of the water to its required standard.

The minimum acceptable standard for GPL is 500,000 ohms or 2/ms. Below these figure the dionisers have to be regenerated.

The regeneration of the anion resins (light ones) is done with a sodium hydroxide solution 30% and the cation resins (dark one) are regenerated with a hydrochloric solution 30 to 34% concentration. For each regeneration, 26 l of hydrochloric acid 30% and 39 l of sodium hydroxide 30% are required.

NB. Sodium hydroxide and hydrochloric acid are dangerous chemicals to handle and all protections should be taken in order to avoid any accident. Gas mask, rubber-gloves with long sleeves-goggles etc. are strongly recommended.

The hydrochloric acid and sodium hydroxide solution are normally prepared by the quality control department.

Proceed as follows for the regeneration:

- Close fully valves 14- 23-or 15- 24 of the simplified water flow sheet according to which deioniser is to be regenerated.

14/.....

- Close valves 1 and 7 of the manufactuer's booklet.
- Switch the circulating pump off and close the valves at its end.
- Make sure that the neutraliser(I) of the simplified water flow sheet is fully loaded with the neutralising chemical. If not top it up.
- Backwash the resins and separate them by opening fully valve 12 of the manufacturer's booklet and by adjusting valve 6 of the same booklet until the flow meter reads around 1.2 m^3/h.

Make sure that no resin is over flowing, in which case the flow will have to be reduced by closing a little bit valve 6. However, the resins have to be lifted up to the middle of the top sight-glass, indeed it will ensure a good separation of the resin, and it might sometimes be necessary to increase the flow beyond 1.2 m^3/h.

As soon as only dark resins can be seen at the two lower sight glasses and only light resins can be seen at the top sight glass start timing for about 15 minutes, then close slowly and together valve 6 and 12.

The resins will settle down.
If the back-washing was correctly done, once the resins are settled, a very clear separation line between the two resins can be observed at the middle sight-glass. If the separation is not perfectly clear, restart the back-washing.

- Once the back-washing is over the regeneration of the anionic resin can be started. Proceed as follows:

  - Tightly screw on valve2 of the manufacturer's booklet the "Saran" hose.
  - Open fully valve 3-4-14 of the manufacturer's booklet.

15/.....

- Dip the "Saran" hose into the sodium hydroxide drum.
- Open slowly valve 2 of the manufacturer's booklet. The sodium hydroxide will be sucked. The valve 2 will have to be opened so that the sodium hydroxide is sucked over a 20 minutes period.

N.B. Avoid any suction of air

Once the sodium hydroxide has been sucked, rinse the "Saran" hose by sucking about 5 l. of water, then close valve 2

- Once the regeneration of the anionic resin is over, the regeneration of the cationic resin can start. Proceed as follows:
- Tightly screw on valve 5 of the manufacturer's booklet the "Saran" hose.
- Dip the "Saran" hose into the hydrochloric acid drum.
- Open slowly valve 5 of the manufacturer's booklet. The hydrochloric acid will be sucked. The valve 5 will have to be opened so that the hydrochloric acid is sucked over a 20 minutes period.

N.B. Avoid any suction of air

- Once the hydrochloric acid has been sucked, rinse the "Saran" hose by sucking about 5 l. of water then close valve 5.
- The water containing the excess of sodium hydroxide and hydrochloric acid is passing through the neutraliser before being drained. Leave valves 3- 4- 14 fully open until the water coming out the neutraliser is neutral.
- Once it is neutral, slowly close valve 14 and slowly open valve 11.
- Continue rinsing until the water coming out is clear, colourless and tasteless. PH should be neutral.
- Then slowly close valves 11- 3- 4 fully.

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Once rinsing is over the resins have to be blended again. Proceed as follows:-

- Open fully valves 10 and 13 of the manufacturer's booklet and drain the water up to half of the middle sight glass. Close valve 10.
- Very slowly open valve 9 of the manufacturer's booklet. Valve 9 allows air to enter into the deioniser. The pressure of the air will have to be adjusted on the pressure reducer located at the back of the deionisers. The pressure will be between 7 and 11 PSI (0.5 and 0.8 atu).
- Very slowly increase the flow of air by opening valve 9 until the deioniser starts vibrating a little.
- Mix the resins for about 5 minutes, close valve 9 and wait for the resins to settle down.
- Repeat the mixing operation 2 or 3 times until the blending is homogenous.
- Open valve 6 slowly and fill the deioniser up to the half of the highest sight glass then close valve 6.
- Open valve 1 and continue the filling until water over flows through valve 13.
- Close valve 13 and open valve 8 until water over flows through it. Then close valve 8.
- Open valve 10 and rinse until the water quality reaches the required standard on the main switch board. The rinsing might take between 10 to 20 minutes. Then close valve 10.
- By opening valve 7, switching the circulating pump, on and opening the valves at each of its sides, the deioniser can be used again.

D. MISCELLANEOUS (DEIONISED WATER)

- Regeneration should always be made in time so that the production is not stopped because of non availability of either soft water or deionised water.

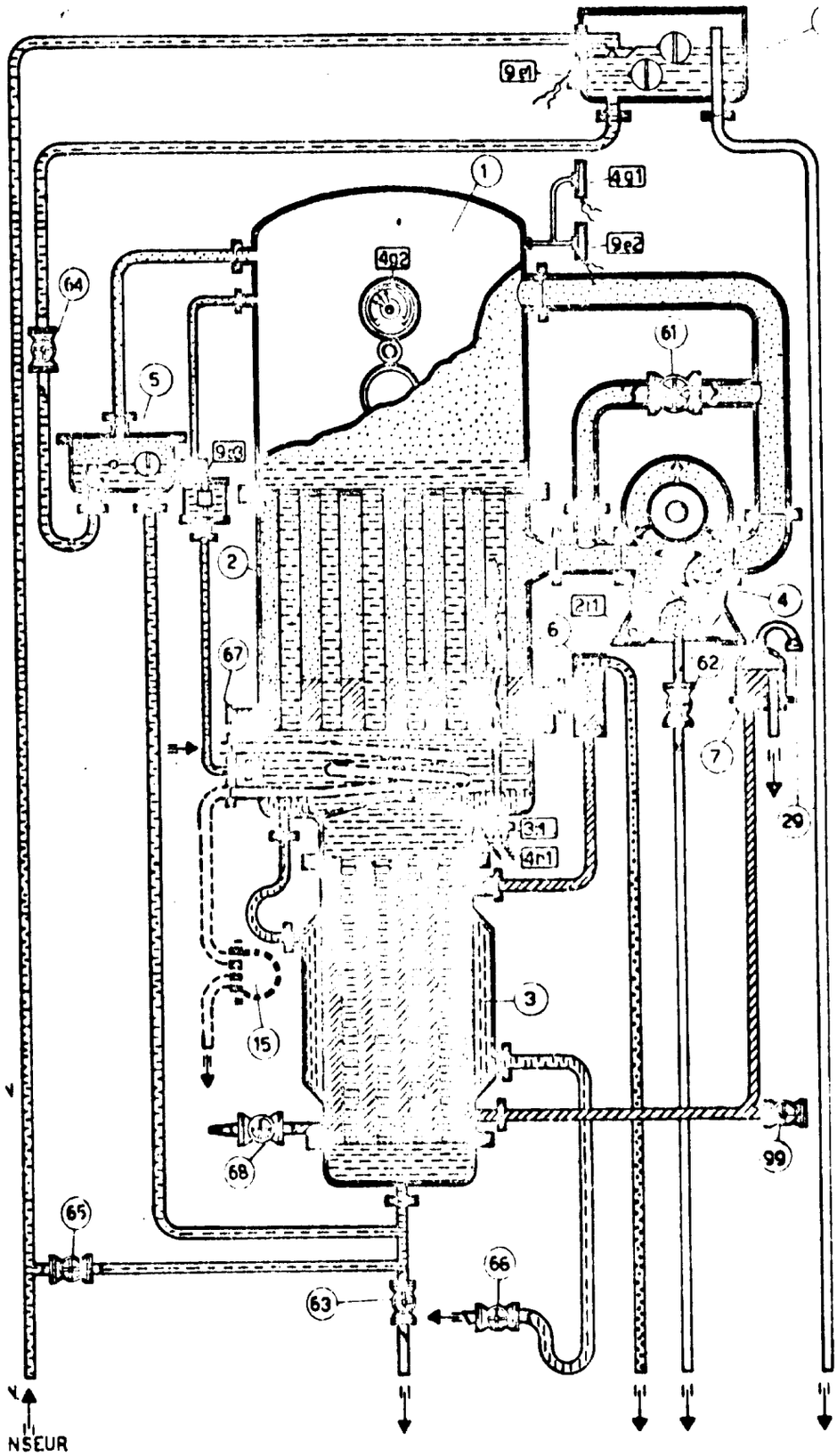
17/.....

- By-passing the scavenger or the softeners is a solution which should be adopted only in case of emergency and poor planning of regeneration is not an emergency.
- The capacity of the installation depends on the quality of water. The quality of water can vary with the seasons of the year. However, a general idea on the quantity of water which can be treated by either the scavenger, the softeners or the deionisers can be obtained by checking and recording the figures from the flow meters placed on each softener and deioniser. It will give a good idea as to whether the resins are soon to be exhausted or not.
- In case the required quality of water cannot be obtained after regeneration of the deionisers it means that the regeneration did not succeed. The cause might come from the main following reasons:-

  - Resins not well separated
  - Suction of either acid or soda to rapid or uneven succion.
  - Either valve 3 or 4 not opening fully.
  - One of the water vacuum pump of the deioniser is obstructed.
  - Suction of air.

  The cause will have to be found and repaired and the regeneration restarted.
- If the resins do not blend easily during air mixing at the end of regeneration, it means that most probably the regeneration did not succeed.

WATER STILL



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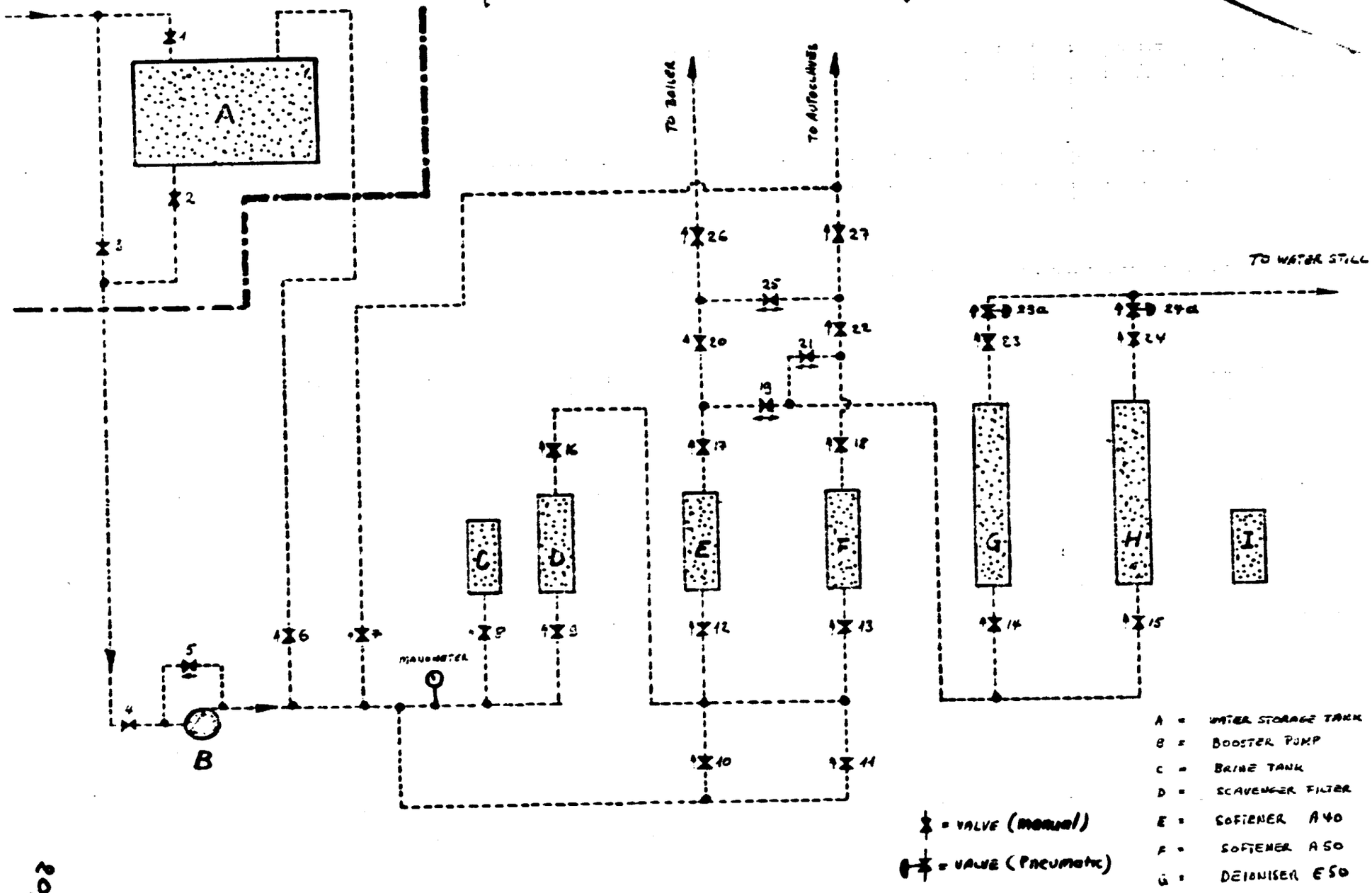
SIMPLIFIED WATER FLOW SHEET



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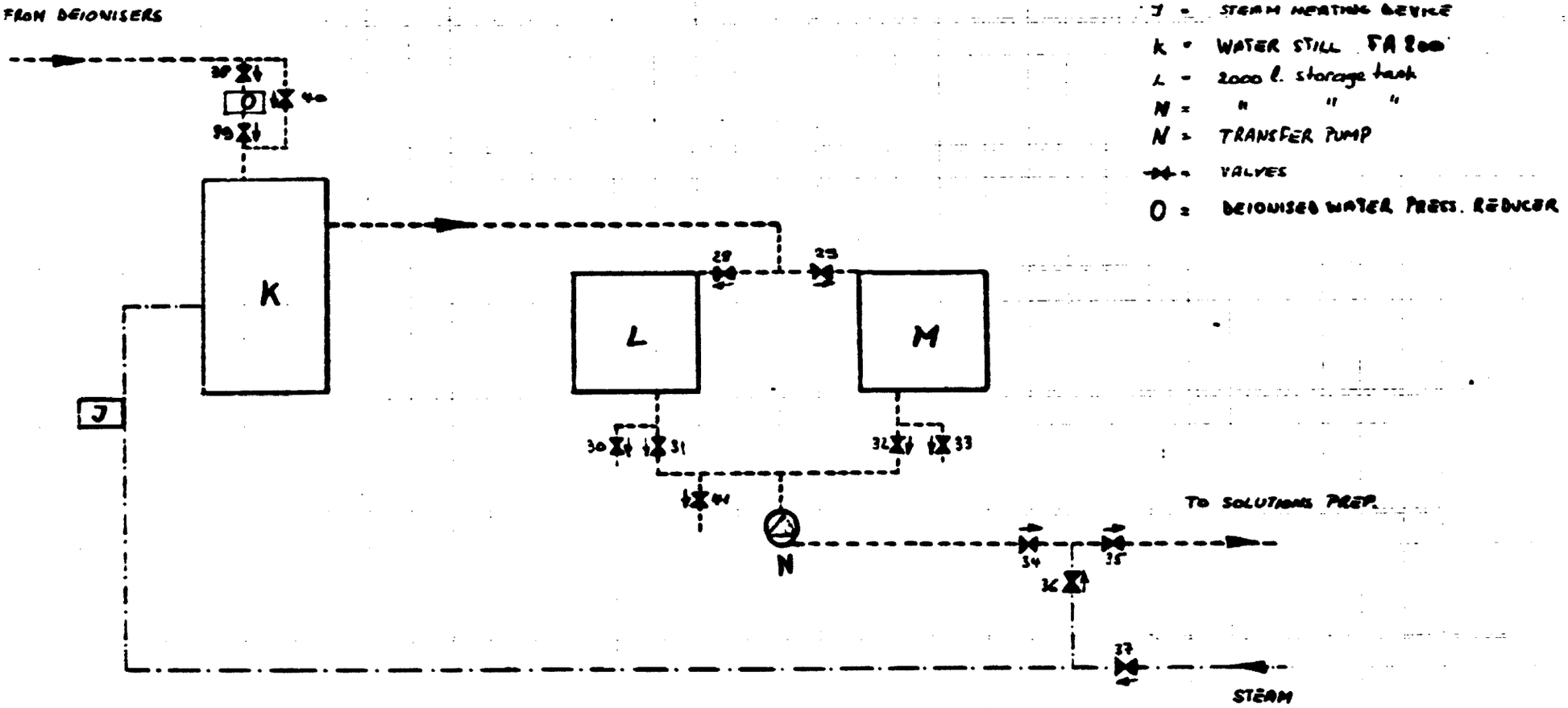
DISTILLED WATER FLOW SHEET



OPERATION - (WATER STILL)

The operations described hereafter will refer to the various manufacturer's booklets and drawings which are available with the Production Manager and with the workshop. In addition, all remaining valves are numbered on the "Distilled water flow sheet" and on the "Water still" drawing attached to this leaflet.

WATER STILL (K)

The deionised water is coming from the deionisers to the water still through a 1" PVC pipe equipped with a pressure reducer (O) adjusted on 2.5 kg/cm^2.

It has been noticed that at night, when the deionising plant is used only for distilling water, it is not necessary to switch on the booster pump (B). Indeed as the water consumption is only of 200 l./h. the pressure given by the storage tank's height is enough to supply the water still. It is however, necessary to by-pass the pressure reducer (O) by closing valves 38 - 39 and by opening valve 40.

When day time production is going on and when in addition to the water still, the deionising plant is feeding the boiler, the autoclaves and the analytical laboratories, the booster pump is to be switched on.

As the water still has to be fed with a pressure not exceeding 2.5 kg/cm^2, the by-pass has to be closed (valve 40) and the water has to flow through the pressure reducer (open valves 38-39). The water still is based on the priciple of the thermocompression of vapour. The steam is generated by electric heaters and under a light vacuum given by a special vacuum/compressor.

The vapour is sucked at one end of the vacuum/compressor, compressed and ejected at the other side of the vacuum/compressor under a light pressure.

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The steam under pressure is then passing through a heat exchanger. The heat exchanger receives the steam at its top and the cold deionised water at its bottom. The steam, in the heat exchanger will release its calories to pre-heat the cold deionised water. By cooling down, the steam will condensate and flow out of the distiller as distilled water. The distilled water will have, at the outlet of the distiller, a temperature of 8 to 15°C above the deionised water. Unless the temperature of the distilled water is not to be cooled below this temperature, the water still does not use any cooling water and is therefore not creating any waste.

The temperature of the distilled water at the outlet of the distiller is cool enough for GPL's use.

Once started and settled, the water still works automatically. However, in case of any breakdown like lack of water, electricity failure, motor failure etc. The water still is equipped with security devices switching it instantly off. In such a case, the entire procedure described hereafter is to be started again.

A set of indicator warning lights is fitted on the main panel of the still. In case of common break down, the corresponding indicator will be on along with a bell. The purity of the distilled water is controlled by an electronic device fixed on the wall behind the still. The minimum acceptable quality is 500,000 ohms.

The still is designed for 24 h/day operation but it can of course be switched off and restarted any time. The rated capacity of the still is 200 l./h

The method described hereafter is the most appropriate for GPL's use. For any other method or variation see the manufacturer's booklet.

Initial Filling (Drawing 75278/V 3)

- All valves are closed
- Open discharge 62 of the compressor
- Open by-pass 61
- Fill the plant by opening valve 64 (which is to be kept open permanently) and the valve 65 for quick filling.
- When the water reaches half way up the sight-glass of the automatic feeder 5, close valve 65
- The filling of the plant will be completed through valve 64 and through the automatic feeder 5.

Initial heating (electric)

- The initial heating can take between $1\frac{1}{2}$ and $2\frac{1}{2}$ hours
- All valves are closed except for valve 64
- Open discharge 62 of the compressor
- Open by-pass 61
- Switch the main electric supply located on the wall behind the still on
- Switch on the lamp "general" on the front electrical panel
- Make sure that the timer is having its front panel switch on position 2 "clock out".
- Switch all heaters' switches located on the front electrical panel on and the automatic one on position 1. "continuous heating service".
- Make sure that the water level on the automatic feeder 5 does not go beyond the top of the sight glass, if necessary drain to adjust the level by opening tap "still discharge" at the back of the still.
- Let the still be heated until the green lamp "heated compressor" comes on, then wait until steam comes out of the "incondensable gas outlet" located at the back of the still.
- Once the lamp is on and the steam comes out check that the compressor is rotating freely without friction by pulling manually on the V belts. If the compressor does not rotate freely, call the workshop staff.

- If the compressor is free; proceed as follows:-

- <u>Water Still Starting</u>

- The water still starting can take between ½ and 1½ hours.
- Close discharge 62 of the compressor.
- Switch the bell on position II "alarm-switching off"
- Make a "lamp test" to make sure that all bulbs of the warning lights are in working condition. The test is made by pushing the button "lamp test" located on the front panel.
- Switch on the lamp "motor", the motor driving the compressor will start.
- Leave the compressor turning for 5 to 10 minutes in that position.
- Then start closing the by-pass 61 very slowly and intermittently so that:
    - the vacuum never exceeds 1.3 m/H_2O on the manometer 4g2
    - The intensity never exceeds 10A on the amperemeter 2g1

- If the above mentioned values are exceeded, open slightly the by-pass to reduce them. Continue closing when the values have decreased enough to allow an increase made by the closing of the by-pass. This operation will take between 15 to 45 minutes.

- Once the by-pass 61 is fully closed, wait until the vacuum starts decreasing and moves up to 1 m/H_2O then start switching the heaters off one by one but by making sure that not more than 1000 to 2000 watts are switched off at the same time.

The vacuum should never go beyond 1.3 m/H_2O and the amperemeter never show beyond 10A. Assuming that the above values are exceeded it means that the heaters have been switched off too quickly and that some should be switched on again.

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- However, if the vacuum is far below 1 m/H_2O and if some steam is coming out of the "incondensable gas outlet" it means that the still is over-heating and that the heaters can be switched off faster.

- The still has been adjusted by the workshop so that the automatic heater once switched on position 2 "automatic heating service" plus either a 1000 watts heater or a 1500 watts heater is working automatically without any manual adjustment between 1.1 and 1.3 m/H_2O vacuum. The automatic heater will switch on or off according to the temperature need of the still. Once the still is stabilised, slightly open tap 66 "concentrate drainage " so that the impurities which were in the deionised water and which are concentrated in the water still are constantly drained out.

- The still will work automatically until the quantity of distilled water needed is reached.

- STOPPING THE WATER STILL

- Switch off all heaters
- Open by-pass 61 fully
- Switch off the compressor
- Open valve 62 compressor discharge fully
- Close tap 66
- Switch the main electrical supply off.

EMPTYING AND REFILLING THE STILL

If the still is to be stopped for more than 24 hours it is advisable to drain it fully by opening valves 63- 66- 68. In addition, every two weeks the water contained in the still should be drained and replaced by fresh water.

Every drainage should be immediately followed by a refilling, even if the still is not going to be used for some time.

N.B.: The drainage of the still is not to be done when the still is hot but it should be done only when the still is either cold or slightly warm.

26/....

The refilling is to be done only when the still is cold. The distilled water outlet is equipped with a special device having an ultra-violet lamp. This lamp is to be on as soon as the still is in operation. Check it every time the still is started.

The distilled water can be collected only once the still is stabilised and working automatically.

VI DISTILLED WATER STORAGE (See distilled water flow sheet)

From the water still the distilled water is transferred and stored into stainless steel tanks.

It goes from the water still through valves 28 and 29 into tanks L and M of 2000 liters capacity each. From the tanks, through valves 31 and 32 it goes to the stainless steel transfer pump N which sends the distilled water through stainless steel piping to the solution preparation room and the quality control department through valves 34 and 35. Valves 30, 33 and 41 are used for draining the stainless steel tanks and pipes.

The storage tanks are equipped with ultra-violet lamps which have to remain on 24 hours a day and 7 days a week.

N.B.: Ultra violet lamps are dangerous for the eyes and one should wear goggles with special ultra violet filtration lenses. The covers and lids of the tanks have to remain constantly closed.

PREPARATION WORK

Every Friday after the production of Intravenous Fluids is over or every time the production is to be stopped for more than 24 hours the following will have to be done:-

- The stainless steel pipes and tanks will have to be cleaned and disinfected, the tanks are at first emptied and cleaned up with soap-disinfectant and brushed.

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- The person cleaning the tanks will wear boots which will be used only for that purpose.
  The same cleaning applies to the covers and lids.

- Once brushed the tanks, covers and lids will be thoroughly rinsed with raw water.

- Once the tanks, covers and lids have been thoroughly rinsed with raw water, steam will be passed through the whole stainless steel system for about 5 minutes as follows:
  - The covers and lids have been removed from the tanks.
  - Open valves 37- 36- 34 and 41 (all other valves are closed) until the steam coming out from valve 41 is colourless.
  - Then close valve 41
  - Open valve 31 and let steam flush for about 3 minutes
  - Open valve 30 and let steam flush for about 3 minutes.
  - Close valves 30 and 31
  - Open valve 32 and let steam flush for about 3 minutes
  - Open valve 35 and let steam flush for about 3 minutes.
  - Close valves 32- 33- 34- 36- 37
  - For passing steam in the stainless steel system located in the other departments, close valve 34 and open valve 35-36 and 37, then see under the other parts of the training programme

- Open valves 30- 33- 31 and rinse the tanks thoroughly with raw water. Close all valves

- The Quality Control Department will have by then prepared a concentrated solution of phenyl mercuryborate. This concentrated solution will be poured into either tank and diluted up to a volume of 1000 liters with raw water.

  The final dilution up to the volume of 1000 liters will give a solution of 1/10,000 of phenylmercuryborate.

- Make sure that half of this quantity is, as described under part I of the training programme transferred to the solution preparation department and used to fill all the stainless steel pipes up to the quality control department.

28/.....

- Then open valves 31 and 32 and let the solution flow from one tank to the other until the level stabilises.
- Switch the transfer pump N on, open valve 34 and 35 and purge the air in all the stainless steel piping system from the solution preparation and the quality control department.
- Close the valves in these departments once the air has been purged.
- Close valves 35- 34- 32- 31.
- Switch the transfer pump off.
- Close the tanks with cover and lid.
- Switch the UV.lamps on

The installation will remain with disinfectant solution until the production is started again.

When the production is to be started again, the disinfectant solution will be drained by opening all the valves and the whole installation will be thoroughly cleaned and rinsed with raw water.

N.B. None of the disinfectant is to remain in either pipe or tank. The disinfectant is VERY TOXIC

It is recommended to use rubber gloves with long sleeves for handling the disinfectant.

The distilled water can then be stored into the tanks. The tanks will always remain closed with the ultra violet lamps switched on.

DISTILLATION

Once distillation is started, the tanks will be filled one by one. If tank L is to be filled at first, valve 28 will be open but valve 29 will be closed. Once tank L is full, valve 28 will be closed and valve 29 will be opened.

All other valves from the tank onwards will be closed. When the distillation is over, valve 28 and 29 will remain open

29/....

If tank L was filled at first it will have to be used at first in order to keep the water stored for a minimum of time, the same applies for tank M.

The distillation can go on for one week without cleaning the tanks. But this is of course possible only if the covers have remained constantly closed on the tanks, the UV lamps on, and the environment is clean.

VII. MISCELLANEOUS

- In case of breakdown with any part of the water treatment plant, the Production Manager, the Assistant Production Manager, the quality control department, the workshop are to be immediately informed.

- Any breakdown in this department is to be given priority. Indeed, without distilled water no production can go on.

- As the plant is working overnight, the above mentioned people should be ready any time at night to come to the plant in case of any problem in order to get the production of distilled water to go on.

- The night watchman is only to make sure that everything works well. He is to be instructed adequetely so that he can, in case of emergency, inform the people concerned and so that these people can reach the factory as quickly as possible to solve the problems.

- The distilled water has to be processed and sterilised within 24 hours from the time it has been distilled. If the water is stored for more than 14 hours it will have to be drained. Indeed there will not be enough time left to process and sterilise it. Before restarting the water still during the week, the distilled water in the tanks will have to be drained.

30/.....

- All operations described herein will have to be carried out with great care and cleanliness.

- Repairs are to be carried out by the maintenance staff only.

- Make sure that the recommendations made in February 1979 about discipline in the factory are always fully implemented.

- The staff should always remeber that manufacturing Intravenous Fluids demands a lot of cleanliness, alertness, and initiatives to constantly improve the work

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