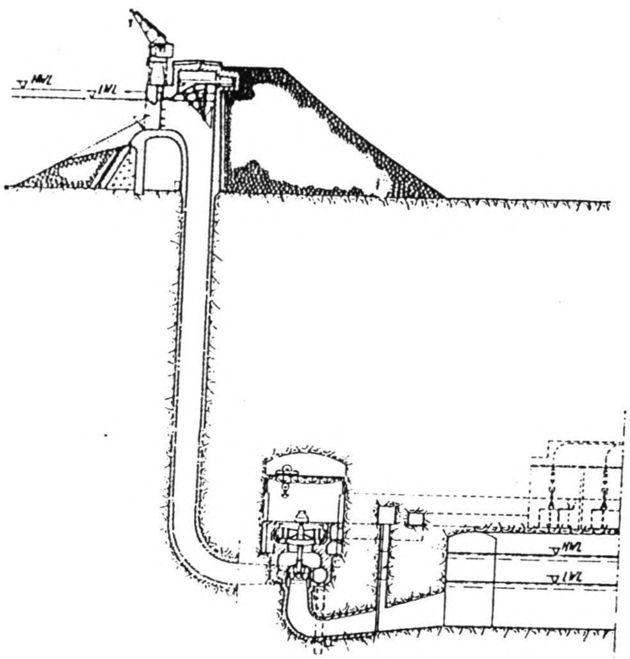
Projekt JAI-MARO Waterkrachtcentrale

-Suriname-

Afstudeerontwerp

Mei 1988 R.D. Pherai



Deel B Ondergrondse centrale
-Energieberekeningen-

Bijlagen

TU Delft
Technische Universiteit Delft

Faculteit der Civiele Techniek
vakgroep Waterbouwkunde
vakgroep Civiele Bedrijfskunde

T.U. Delft
faculteit der Civiele Techniek
vakgroep: Waterbouwkunde,
Civiele Bedrijfskunde

Projekt JAI-MARO Waterkrachtcentrale

-Suriname-

Deel B: Ondergrondse centrale
-Energieberekeningen-

Bijlagen

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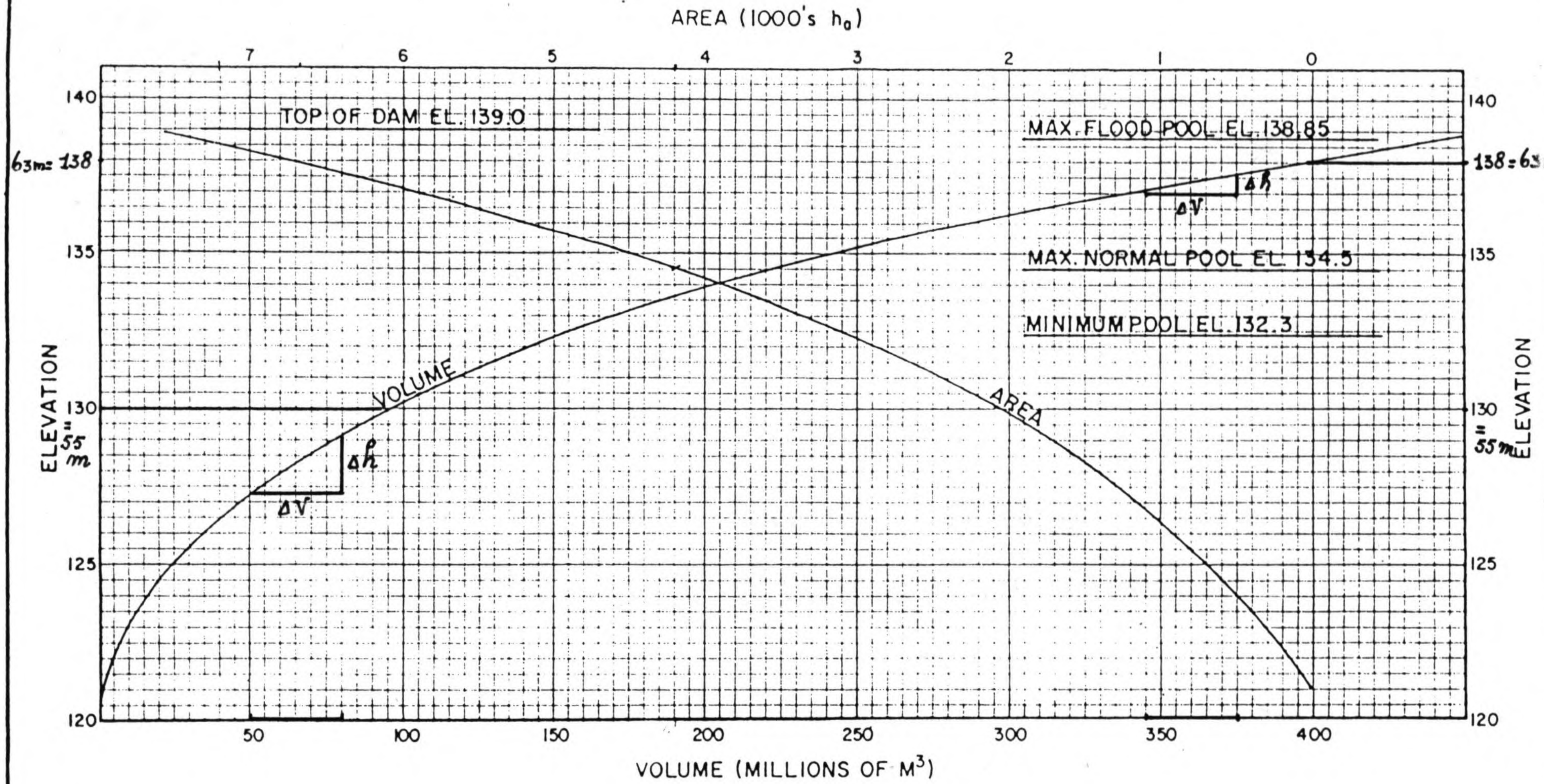
5.3.



N = 8 * Q * H

JAI KREEK RESERVOIR
AREA-VOLUME CURVES
PEILEN IN METERS T.O.V N.S.P.

5.4.4.

The Summation Curve - Its Establishment and Application in Hydrology

The author explains how summation curves can be used in computing many problems of river regulation for power and other purposes

By J. OTNES, M.N.I.F.*

THE River Flow Summation Curve, also termed the Mass Curve, is one of the most suitable methods for studying the effect of various storage capacities provided on a river and for the utilisation of water in its practical aspects. In this article the method of establising a summation curve will be explained. Some of its applications will also be described. These are so numerous, however, that only a few examples can be dealt with in a short paper of this type.

The Hydrological Branch of Norges Vassdrags og Elektrisitetsvesen (Norwegian Department of Watercourses and Electricity) has for years applied calculations based on summation curves for a multitude of practical purposes. In basins with a complex system of reservoirs for utilisation in one or more power stations, far-reaching conclusions have been arrived at by computations derived from one or more summation curves. A standard system for the application of these curves has gradually been developed, and a few of the examples and methods which are explained in this article have been taken from the current practice in this office.

The method has been applied on investigations in the Rufiji basin, Tanganyika, where hydrological observations are available for only a very few years. This article explains how a summation curve can be established under such conditions, and what results can be obtained with only a very few years of river-flow records.

NOTATIONS:

- q = rate of river flow, cusecs, acre ft. per day (m^3/sec.).
- $\bar{q}$ = average rate of flow.
- q_c = curve constant.
- q_r = regulated flow.
- $q_{r(m-n)}$ = regulated flow from year m to year n.
- Q = volume of water, acre ft. (m^3).
- S = reservoir capacity, acre ft. (m^3).
- $S_{(m-n)}$ = reservoir capacity required from year m to year n.
- t = time, seconds, days.

Basic principles

Applied to hydrology, the summation curve gives the accumulated discharge for a river-gauging station from a set time which is usually chosen as at the commencement of the observations. Daily discharges are added together in a suitable unit, selected in accordance with the size of the run-off. Commonly used units are millions or thousands of cubic metres, acre feet or cubic feet. The curve is plotted with time t as abscissa and the accumulated discharge Q as the ordinate.

The curve is an integral curve, and if q denotes the rate of discharge, Q can be expressed as follows:

$$Q = \int q\,dt \qquad \dots (1)$$

From this can be derived

$$q = \frac{dQ}{dt} \qquad \dots (2)$$

The rate of discharge is thus expressed by the slope of the tangent at any point of the curve. The average discharge between two arbitrary points on the curve (t_m, Q_m) and (t_{m+1}, Q_{m+1}), will be accordingly:

$$q = \frac{Q_{m+1} - Q_m}{t_{m+1} - t_m} \qquad \dots (3)$$

Fig. 1 shows three successive "water regulation years." This is a time unit commonly used in hydrology when analyses are carried out on these curves. A water regulation year has no fixed length. It may vary from year to year and may even exceed a year depending upon the designed degree of regulation and the annual distribution of run-off. It may therefore be defined as a period of time from the beginning of a regulation in one year to the end of that regulation.

In Fig. 1, a line is drawn from the first minimum turning point (t_1, Q_1) to the fourth (t_4, Q_4). This represents the average discharge for the three complete regulation years and can be expressed as follows:—

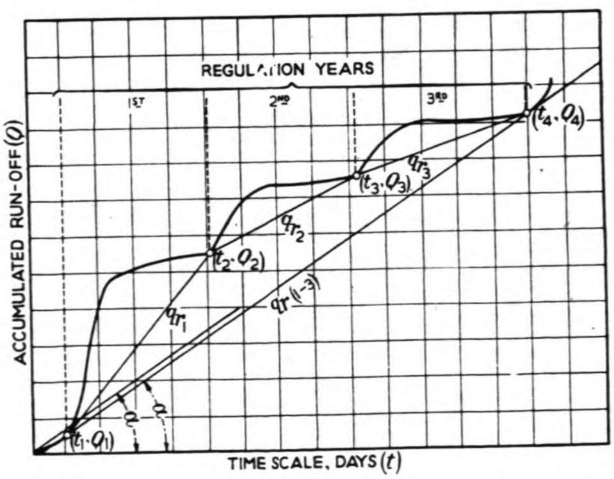


Fig. 1. Three successive water regulation years

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$$q = \tan \alpha = \frac{Q_4 - Q_1}{t_4 - t_1} \quad \ldots (4)$$

At all points where the tangent to the curve is parallel to this line, the discharge is equal to the three-years average. A steeper slope of this tangent indicates a higher discharge than the three-years average discharge and *vice versa*. It will be evident that if the river goes dry, the curve will be horizontal during that period.

If the observation period is two or three years only, the curve can be plotted as shown in Fig. 1, but if data extend over a longer period, the curve cannot be fitted within the limits of the paper. In such cases it can be plotted as the accumulated sum of the deviations from the mean. The main trace of the curve will thus be horizontal and it can be plotted on a roll of graph paper.

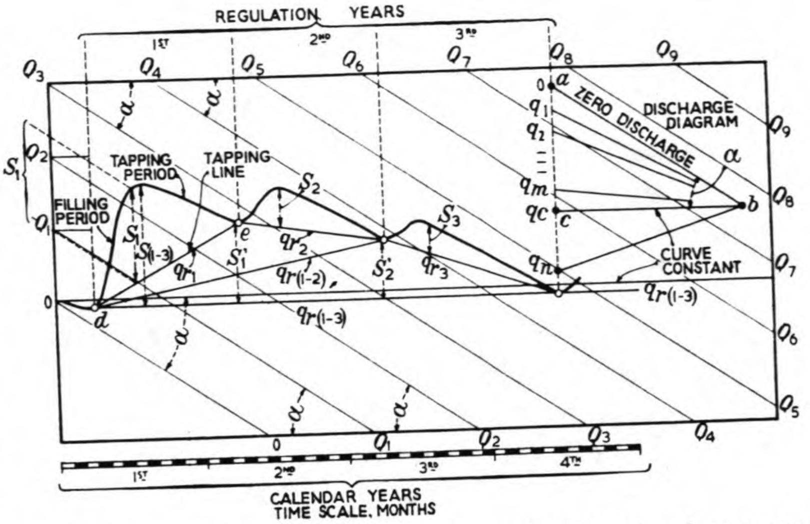

Fig. 2. The summation curve of Fig. 1 transferred to the skew system

If possible, a summation curve should be plotted in accordance with a long-term average $\bar{q}$. If only a few years of observation are available when the curve has to be established, an average for a longer period should be computed indirectly in comparison with run-off in adjacent catchments or with rainfall. An average will always vary slightly as data for new years come into the calculations, and for this reason it is more correct to signify the applied figure representing the up-to-date actual average as the "curve constant" q_c. If q_c is carefully selected it will always be close to the current average value, and the plus and minus deviations will be of about the same order from year to year. In this manner a summation curve covering a period of 50 years or more can be plotted on the same roll of graph paper. The run-off conditions for the station in question are clearly illustrated by this curve. Storage capacity requirements year by year, or for longer periods, can easily be visualised. Studies and graphical calculations can be made directly on the curve.

If no modern electric calculating machines are available, the computations of daily divergencies from an average is laborious for a long period of observations. Another method of obtaining the same result is to plot the curve to a skew co-ordinate system, Fig. 2. The same years as on Fig. 1 are used for the example and all the ordinates are turned through an angle $-\alpha$ from their origin. The line representing the curve constant is also horizontal on this graph.

By transferring a summation curve from the right-angled co-ordinate system, Fig. 1, to the skew system, Fig. 2, all points on the curve are transferred vertically. The time scale thus remains horizontal and unchanged.

The discharge diagram, Fig. 2, is established from a right-angled triangle, *abc*, as follows: The hypotenuse, *ab*, is parallel to the skew ordinates and represents zero discharge. The side *bc*, is horizontal and gives the curve constant q_c. If the side *ac* is divided into q_c units, the rate of flow is expressed by lines drawn from *b* to these points respectively. It is practical to utilise the graph-paper division and to draw some standard lines representing round numbers of discharge (q_1, q_2 ...... q_m). The line *ac* can be extended and by applying the same scale below *c* as above, discharges higher than q_c can be calibrated, q_n.

In practice the skew ordinates are drawn only for an equal round number of river run-off, Q_1, Q_2, Q_3, etc. (Fig. 2) and the curve is plotted by applying an appropriately scaled ruler. Five-day progressive totals are invariably used and run-off details will be sufficiently expressed.

When a curve is started and new observations are received from the field, these discharges should be added to the previous total and the curve extended. The graph paper should last for years and should therefore be as strong as possible. A transparent tracing cloth is preferable. Copies of the curve can then be taken at any time and the roll easily stored in shelves retained for this purpose. Inches divided into 20ths is a suitable graph division, with $\frac{1}{10}$ths or $\frac{1}{20}$ ths representing two days in the horizontal direction.

The vertical scale must be selected according to the size of the run-off and should preferably be such that α is as near 45° as is possible. If α is too small the curve becomes "flat" and the necessary accuracy by graphical computations may be difficult to obtain. On the other hand if α is too great it will be difficult to keep the curve inside the scaled area for any length of time.

The maximum possible steady flow over the first regulation year is signified by q_{r1} (Fig. 2), the size of which can be determined by a parallel transfer to the discharge diagram. An effective reservoir capacity of S_1 is required for the maintenance of this flow. The latter is expressed by the maximum distance between the curve and the "tapping line." The time between the first tangent point *d* and the day of maximum reservoir capacity is called the "filling period," and the time between this day and the second tangent point *e* when the reservoir is again empty, the "tapping period." For the second and third regulation years the corresponding flows are expressed by q_{r2} and q_{r3}. The storage capacities required are given by S_2 and S_3.

When more years follow each other as in Fig. 2, it is possible to keep a steady flow over longer periods. The maximum possible steady flow over the first two years is $q_{r(1-2)}$ and for the three years $q_{r(1-3)}$. The

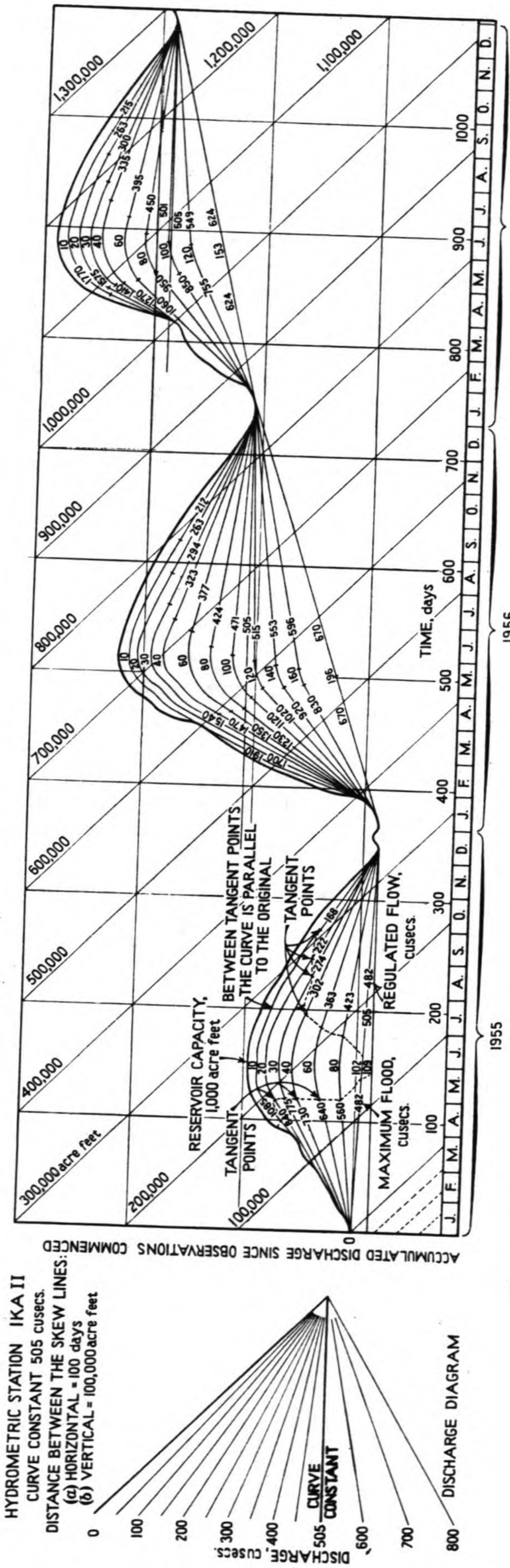

Fig. 3. Method of graphical calculation when the reservoir capacity is taken as an independent variable

maximum effective reservoir capacity required in the latter instance is $S_{(1-3)}$ which has to be filled during the first year. A volume of S_1' must be kept back in the reservoir from the first to the second regulation year and correspondingly S_2' from the second to the third year.

Example on Establishment of a Summation Curve

Chosen as an example is the summation curve for Igawa hydrometric station on the Mbarali River, Rufiji basin. On the date of establishment, observations were available for three hydrological years only, and a suitable curve constant was determined in comparison with rainfall over the catchment area. The data are as follows, all given in acre feet:—

	Rainfall	Run-off
1954–55	1,067,000	336,999
1955–56	1,408,000	494,410
1956–57	1,308,000	438,543

There is a reasonable correspondence between these rainfall and run-off data. The average rainfall in the seventeen-year period since 1940–41 is 1,130,000 acre feet which gives an average yearly run-off of approximately 365,000 acre feet, equivalent to a discharge of 505 cusecs over the year.

If the vertical distance between the skew ordinates is selected as 100,000 acre feet, the horizontal distance between them will be 100 days. If the scale is selected as one inch to 20,000 acre feet and one-tenth to two days, α equals 45° which is very convenient for plotting. The curve is given to a reduced scale in Fig. 3.

In most instances the horizontal distance will not work out to be a round number of days, as for the Igawa station. For convenient plotting, it is therefore recommended to round off the number of days as first computed and adjust q_c thereafter.

The basic figures for the Igawa summation curve will be:

Curve constant q_c: 505 cusecs (17-year average).
Vertical distance between skew lines: 100,000 acre feet.
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The actual summation of discharges is done on a calculating machine which types the figures. Six months can be calculated on the same sheet of paper and the records kept in an ordinary computation file for the station. An extract of the summation for Igawa is given for the first half of 1956 in Table 1, discharges being given in acre feet. Progressive run-off totals are calculated for five-day periods and at the end of each month (indicated thus *).

Application of Summation Curves

REGULATION CURVES:

The "yearly regulation curves" can be established from a summation curve. These curves show the resultant regulated flow for any *effective* reservoir capacity located upstream of the point under consideration. The regulated flow may be defined as the minimum flow in the regulation year when storage is utilised for obtaining a flow as even as possible at a given point. A yearly regulation curve commences at the point of minimum discharge and ends at the point of average discharge over the total regulation year. In certain instances the regulation curves can be extended for regulation studies over further years.

It does not matter which of the units—reservoir capacity or discharge—is chosen as an independent variable for the purpose of calculation. On the extract form, Table 2, the reservoir volumes are entered in

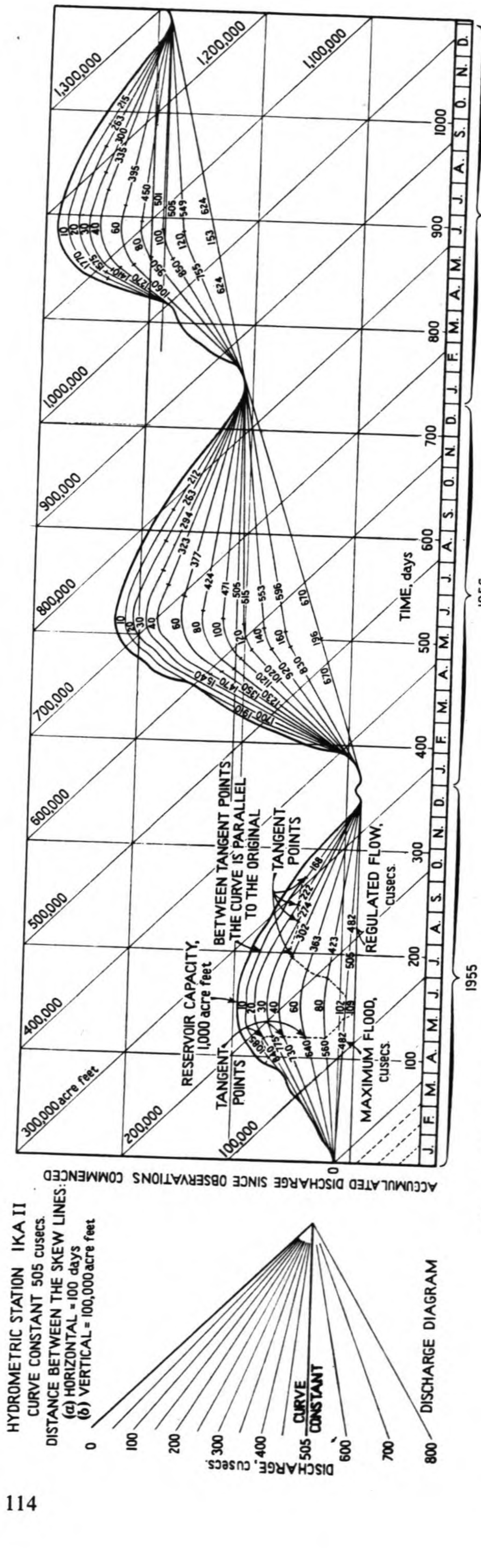

Fig. 3. Method of graphical calculation when the reservoir capacity is taken as an independent variable

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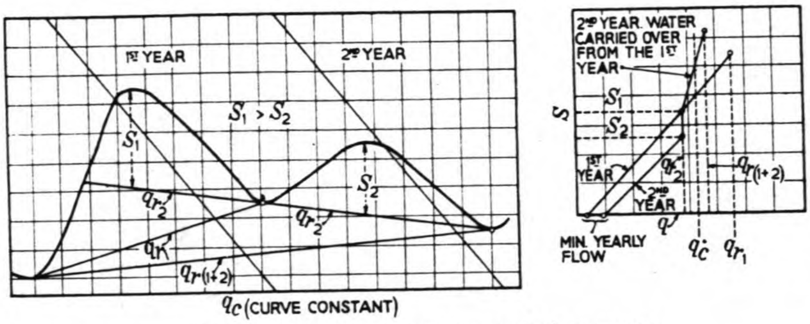


Fig. 4. An interrupted regulation curve

the first column and the corresponding regulated flows are calculated year by year and have been entered in the appropriate places. The data are most conveniently computed graphically and if the curve scale is not too small, reasonable accuracy will be obtained. The calculations can be checked arithmetically from the accumulated discharge similar to that given in Table 1.

When the reservoir capacity is used as the independent variable, the graphical calculations are performed by taking parallel transfers of the curve as shown in Fig. 3. The tapping lines are drawn as tangents to the original summation curve and to the parallel curves respectively and are thereafter calibrated by a transfer to the discharge diagram.

The regulation curves are established without taking into account evaporation losses from the surface of a reservoir. This is a special factor which has to be deducted from the storage capacity in the tapping period. If this is done the curves are still valid. If a lake is utilised for storage, evaporation from its surface is automatically included in the discharge observations and cannot therefore be deducted again. It is presumed that the evaporation from a lake is about the same in a natural as in a regulated state. The only practical difference may be in the evaporation from a random strip due to changes in water level from natural conditions.

The second part of Table 2 gives the length of the tapping period. This is an important factor when loss of water by evaporation has to be estimated. For lower grades of regulation the loss of water during the filling period is of little consequence. Beginning with a full reservoir, evaporation must be calculated from the time when tapping commences and until the regulated flow is equivalent to the natural flow of the river. The length of the tapping period can be taken directly from the summation curve but more accurate results are obtained when it is taken from calculations similar to those in Table 1.

Seepage from a reservoir is also a special factor which, in certain instances, will lower the effective storage capacity. If at all possible, adjustment should be made for this loss. In most cases, however, a great deal of the percolated water can be reckoned as returning to the river downstream of the reservoir, and the practical adjustment will not be so great as at first assumed. In quite a few instances it can also be disregarded, but this depends upon local factors and must be studied in each particular case.

The third portion of Table 2 gives figures for the regulation curves in percentage of the average. Storage capacity is calculated as a percentage of the yearly average volume of water going into the river, and the regulated flow is given accordingly in percentage of the average rate of flow. This is done in order to facilitate extended use of the regulation curve. Experience has shown that catchments of approximately the same hydrological character produce nearly equivalent regulation curves when expressed in percentage values. This often permits the use of the regulation curve in an adjacent area and for other points on the same river.

The yearly regulation curves are always continuous. For parts of the curve where the tapping period is constant, the regulation curve is linear. The tapping period will, however, as a rule increase with the storage, resulting in a corresponding curvature of the regulation curve. This implies that each addition to the storage capacity will always give a progressively smaller increase in the regulated flow.

TABLE 1.—EXTRACT OF THE CALCULATIONS OF PROGRESSIVE RUN-OFF TOTAL FOR MBARALI AT IGAWA, 1956 (Discharge in Acre Feet)

January	February	March	April	May	June
350317*	419039*	529201*	611560*	697278*	739462*
474	1664	2303	3330	1972	896
768	1514	2637	5463	1898	890
727	3687	3014	4557	1843	878
3200	9686	2968	5076	1798	866
948	3788	2855	5358	1770	860
356434*	439378*	542978*	635344*	706559*	743852*
967	4024	2616	5209	1834	846
864	3944	2395	3753	1665	846
2232	3997	2375	3177	1614	834
792	3379	3153	2822	1539	834
1291	3971	3464	2616	1440	834
362580*	458693*	556981*	652921*	714651*	748046*
711	3763	3142	2426	1432	834
565	3083	2659	2323	1408	846
769	1953	2283	2283	1424	834
1259	2509	2344	2067	1432	834
560	2344	2144	2028	1392	810
366444*	472345*	569553*	664048*	721739*	752204*
642	2855	1981	1953	1290	792
625	2232	1943	2067	1259	786
2888	4211	2637	2193	1259	792
3106	5930	3439	2115	1259	792
5449	10015	3813	2028	1199	792
379154*	497588*	583366*	674404*	728005*	756158*
3223	4990	2854	2028	1148	786
3788	3003	2447	2702	1097	745
2957	2900	2313	3642	1056	720
2077	2833	2364	2174	1126	720
1972	2344	2313	2067	1104	733
393171*	513658*	595657*	687017*	733536*	759862*
3637	2115	2283	1972	1090	733
10532	7142	2385	1934	1063	733
3366	3318	1981	2125	967	692
3366	2968	2811	2212	942	681
2900	529201*	4376	2018	942	642
2067		2067	697278*	922	763343*
419039*		611560*		739462*	

When regulation curves are computed over more years, an interrupted curve is often obtained. This occurs as shown in Fig. 4, when a year with favourable conditions involving a lower grade of regulation follows a less favourable year. The second year gives a maximum regulated flow of q_{r_2} requiring a storage capacity of S_2. The same regulated flow during the first year requires a reservoir capacity of S_1. It is implied here that $S_2 < S_1$, and if the water is carried over from the first to the second year, the regulation curve will get an interruption corresponding to the difference $S_1 - S_2$ at a flow of q_{r2}.

When water is carried over from one year to another, the calculations are most conveniently tabulated as in Table 3. This shows four selected years from Röldalsvatn hydrometric station, Norway. On Fig. 5, the same years are reproduced to a reduced size.

Regulated discharge, expressed in cu. m. per sec., is the independent variable here, and the storage capacities in million cu. m. required for keeping this flow, is entered in the yearly columns. The curve constant is 36 cu. m. per sec. To be able to maintain this flow during the year 1922–23 and 1923–24, water had to be brought forward from previous years and reservoir capacities of 688 and 750 million cu. m. were required respectively. The filling of these reservoirs had to commence in 1920–21, which is indicated by arrows in Table 3. The maximum reservoir capacity was required in 1921–22 to provide for the water requirements in the following two deficient years.

The average discharge over the regulation years and the corresponding reservoir capacities are listed at the foot of the table. As will be observed from Fig. 5, the year 1923–24 gets an interrupted regulation curve at a flow of 34 cu. m. per sec., when water is carried over from previous years. This is entered in Table 3, with a small circle between the years 1922–23 and 1923–24, indicating that the tapping line is a tangent to the curve here.

The regulation curves can be used directly when an increased steady flow is the object for regulation. This is very often the case in power-plant development. For irrigation purposes rainfall and agricultural conditions must also be taken into consideration and an uneven flow may often be found to be desirable and more economical. The appropriate variations of flow must then be considered within the limitations of the reservoir capacities. Estimates of this nature can be carried out directly on the summation curve.

When observations are available for a great number of years, the basic data for the regulation curves can be grouped in various ways. Under such conditions the establishment of the "median curve" will be found to be practicable. The available years of observations are then grouped into two equal parts of which the one half (50%) shows more-favourable and the other half (50%) less-favourable regulation conditions than the median curve. This curve is applied in cases where a water deficit can be permitted in half the number of years.

An average curve can also be used in certain instances, but it has its disadvantages. Two slightly different curves are derived depending upon whether the reservoir capacity or the regulated flow is shown as an independent variable.

The "most-unfavourable regulation curve" is very important in many instances, when great safety is required as in the case of a water-supply scheme. This is determined as the upper enveloping curve for the total series of available data.

Depending upon the degree of safety required in water estimates, various kinds of regulation curves can be established. A 90% safety curve is commonly used in Norway, where this system has been developed. This means that the power plant in question, under the suggested river regulation, will not receive enough water in one out of ten years to yield full capacity.

The median curve, the most-unfavourable curve, and other percentage safety curves will only be established up to average discharge ($\bar{q}$ or 100%). There is no point in extending these curves further. Over a long period the regulated discharge cannot exceed the average discharge.

Flood Reduction Curves

Following the same principles as for the regulation curves, the flood reduction curves for a gauging

TABLE. 2.

REGULATION EFFECT OF VARIOUS STORAGE CAPACITIES.

RIVER MBARALI STATION IGAWA NO. IKA. II. CATCHMENT AREA 619 SQ. MILES.

AVERAGE YEARLY RUNOFF± 365,000 ACRE FEET± 505 CUSECS.

STORAGE CAPACITY (S)	REGULATED FLOW DURING THE DRY SEASON CUSECS. (Qr)					LENGTH OF TAPPING PERIOD IN DAYS.					PERCENTAGES OF AVERAGES. STORAGE CAPACITY. %	REGULATED FLOW, %.				
ACRE FEET	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959		1955	1956	1957	1958	1959
0	68	105	115			0	0	0	0	0	0	13.5	20.8	22.8		
5,000	133	185	184			69	76	77			1.4	26.3	36.6	36.4		
10,000	168	212	215			76	93	89			2.7	33.3	42.0	42.6		
15,000	199	237	242			95	105	110			4.1	39.4	46.9	47.9		
20,000	222	263	263			102	126	116			5.5	44.0	52.0	52.0		
30,000	274	294	300			116	168	138			8.2	54.3	58.2	59.4		
40,000	302	323	335			152	183	157			11.0	59.8	64.0	66.3		
60,000	363	377	395			164	191	175			16.4	71.8	74.6	78.2		
80,000	423	424	450			169	216	197			21.9	83.7	83.9	89.0		
100,000	477	471	501			191	221	203			27.4	94.4	93.3	99.2		
120,000		515	549				227	208			32.9		102.0	108.7		
140,000		553					242				38.4		109.5			
160,000		596					248				43.9		118.0			
└→	482	670	624			191	253	215			└→	95.2	132.7	123.5		
	102,000	196,000	153 000			—	—	—	—	—		28 0	53.7	41 9		

station can be established. These relate the size of effective reservoir capacity on a river to the corresponding maximum flood obtained under regulated conditions. It is then presumed that all reservoir capacities are utilised for cutting the flood peaks off in such a way as to get the maximum flow as even and as small as possible at the station under condition.

The computation of regulated floods is conveniently done graphically, as explained on the summation curve for Igawa, Fig. 3. In this instance, the tapping lines are drawn as tangents to the original summation curve at the time when filling commences and at the same time as tangents to the parallel curves drawn at appropriate intervals. The distance between the original curve and the parallel one denotes the reservoir capacity under consideration. At the second tangent point, this particular reservoir is filled and will remain full until tapping commences with the derived regulated flow, as already explained. The sizes of various reservoir capacities in question are marked on Fig. 3, at the time when the reservoir is full.

Extracts from the curve are listed in Table 4. The values in the second part of Table 4 are computed in percentage of the same yearly average as the regulation curves, *vide* Table 2. The purpose of the relative computations is for an extended use of the data. When a flood reduction curve is expressed as a percentage, it can, to a certain extent, also be applied in other catchments and for other points on the same river, provided hydrological conditions are more or less identical. A special table can be made for the length of the filling period if required.

TABLE 3

Regulated Discharge	Reservoir Capacity Required			
	1920–21	1921–22	1922–23	1923–24
m^3/sec.		million m^3		
5	8	24	13	38
10	50	98	97	107
15	111	172	195	183
20	200	252	302	265
25	292	333	410	357
30	386	421	523	453
36	500	524		
	←—	— 688 —	— 663 →	
	←—	— 750 —	——	— 570 →
Average discharge ...	41·6	38·8	31.0	34.0
Reservoir capacity required	608	566	545	
		←—	— 610 —o	— 528 →

General Considerations

In Fig. 6 are plotted the regulation curves and the flood reduction curves for Igawa. As will be seen the three regulation curves show a very small difference. This is due to the fact that there is no appreciable rainfall influencing the river flow during the dry season, and that the river depletion curves thus become approximately parallel and of about equal length from year to year. The regulation curves are plotted up to the point showing an even flow throughout the whole regulation year. The flood reduction curves vary more from year to year and as a result of this, estimates of flood control become more uncertain. It is recommended that the most unfavourable curve be chosen for safety.

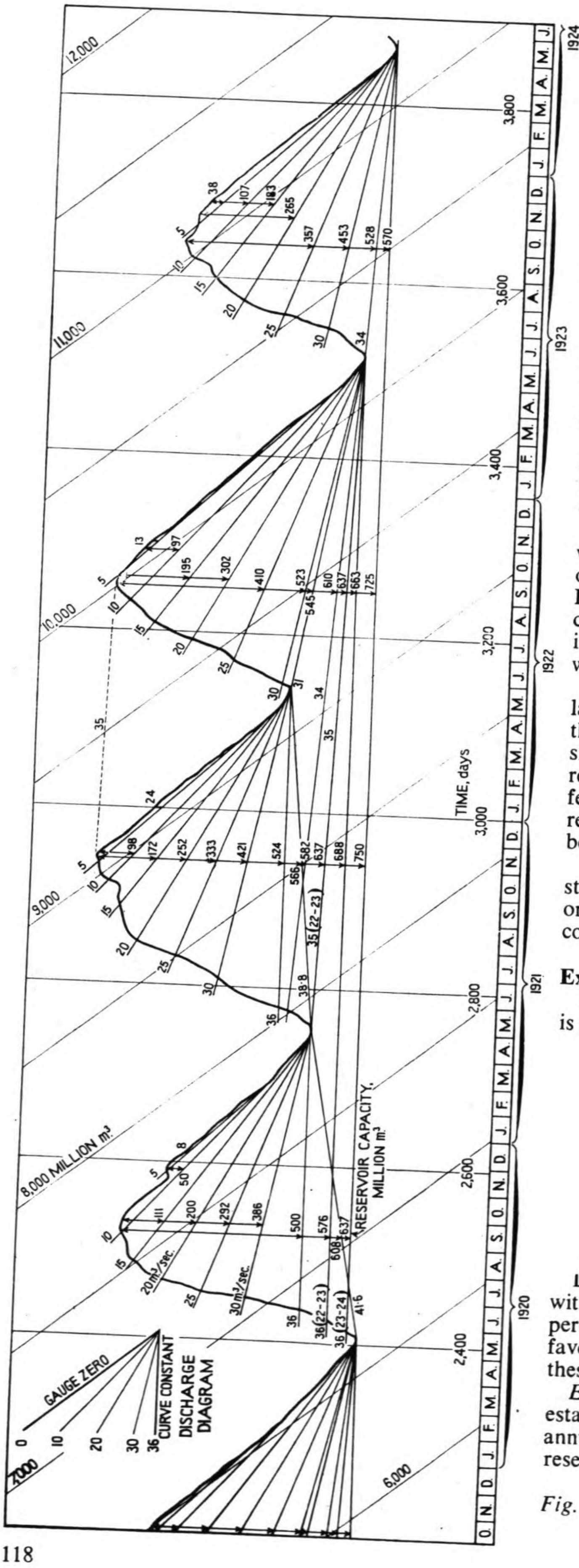
It can be mentioned that 1956 was a very heavy rainfall year, not only for the Mbarali area but more or less for the whole south-eastern part of Tanganyika. At many stations the 1956 rainfall is the maximum ever observed. The flood reduction curve for this year can therefore be considered as very unfavourable and be applied in calculations on flood control.

When a reservoir is situated in the headwaters of the catchment and is a great distance from the utilisation point, the filling possibilities must be studied separately and carefully. If such a reservoir can be filled, its actual location should not really matter for the corresponding regulation curve. In some areas, however, the loss of water in the dry season will increase as the river flow increases. This merely means that the losses from the stretch of the river considered will be higher when more water is available. This factor must be studied separately.

The flood reduction curves will only apply if the actual flood contribution from the partial unregulated sub-catchment between the reservoir and the utilisation point does not exceed the computed regulated flood. For this purpose a reservoir can contribute only to the extent of regulation of its own catchment.

TABLE 4.—MBARALI RIVER AT IGAWA
Regulation effects of various storage capacities.

Storage capacity acre/ft	Maximum Flood after Regulation. cusecs.			Percentages			
				Reservoir	Regulated Flood		
S	1955	1956	1957		1955	1956	1957
0	3,100	9,300	6,800	0·0	614	1,842	1,347
10,000	1,085	1,910	1,770	2·7	215	378	350
20,000	840	1,700	1,575	5·5	166	337	312
30,000	775	1,540	1,410	8·2	153	305	279
40,000	730	1,470	1,270	11·0	144	291	251
60,000	640	1,350	1,060	16·5	127	267	210
80,000	560	1,230	950	21·9	111	244	188
100,000		1,120	850	27·4		222	168
120,000		1,020	755	32·9		202	150
140,000		920		38·4		182	
160,000		830		43·9		164	
	482	670	624		95	133	124
——→	102,000	196,000	153,000	——→	28·0	53·7	41·9



Afflux Summation Curves

If existing lakes in the catchment are proposed to be utilised for regulation, summation curves should be established taking the *natural* regulation effect of these into account. This is calculated from their regular water-level observations and storage-capacity curves. It is not necessary to compute the difference in storage capacity from time to time. A second combined summation curve is established in which five days' progressive run-off, similar to those given in Table 1, and the corresponding capacity of the reservoir are added together. The storage capacity curve can be established for this purpose from an arbitrary datum level. If there is a significant distance between the lake in question and the discharge gauging point, the time taken by the water to travel from the lake to the gauging station must be taken into consideration.

When the afflux summation curve is established and thus the natural regulation effect of a lake eliminated, the designed lake storage in its full capacity can be applied in calculation of regulation yield.

When establishing afflux summation curves in a warmer climate, evaporation losses from the surface of the lake or reservoir must be considered carefully. For lake regulation, however, it will often be found convenient and practical to let the curve represent inflow minus evaporation, the total of which is the water available to play with.

If it is not proposed to utilise a lake for river regulation, the summation curve for gauging stations farther downstream should be established without considering its natural effect. On the other hand, if the regulation curve from this catchment has to be transferred to an adjacent area with no lakes as a natural regulation factor, the afflux summation curve should be applied for the calculation.

After reservoirs are constructed on a river, the storage effect of these must be taken into account in order to get summation curves conforming to natural conditions.

Examples on Application of Regulation Curves

A median regulation curve expressed as percentages is given as follows:

q_r	S	q_r	S
		55	14·0
12	0·0	60	16·6
15	0·4	65	19·3
20	1·6	70	22·1
25	2·8	75	25·0
30	4·1	80	28·0
35	5·6	85	31·4
40	7·4	90	35·2
45	9·4	95	39·7
50	11·6	100	45·3

Let us assume that this is a yearly regulation curve, with no water carried over from previous years. A perennial regulation curve usually becomes more unfavourable for higher regulation percentages than these figures will indicate.

Example 1: Suppose that this regulation curve is established for a catchment *A*, where the average annual run-off is 1 million acre feet (1,383 cusecs). A reservoir is surveyed and the effective capacity cal-

Fig. 5. Regulated discharge diagram of Röldalsvatn hydrometric station, Norway

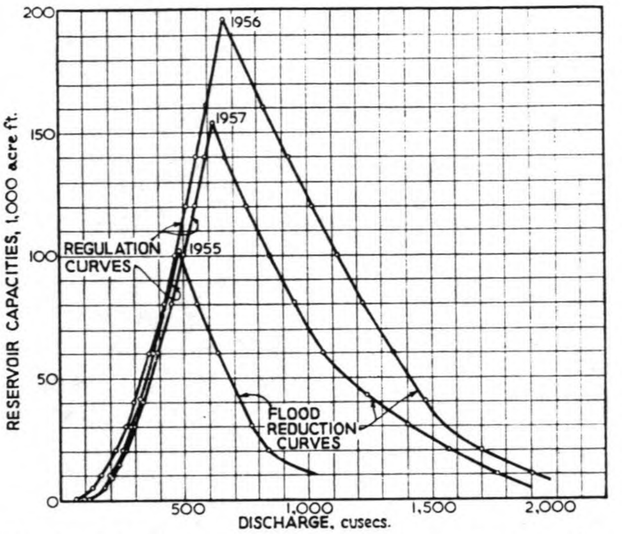


Fig. 6. Regulation and flood reduction curves for Igawa

culated to 250,000 acre feet. This gives a storage percentage of 25. The reservoir is located at *A* or in such a place in the catchment that it can be filled in a median year. From the curve a regulation percentage of 75 is extracted which corresponds to a regulated discharge of 1,037 cusecs. The median minimum rate of flow is 12% (166 cusecs) and the increase of river flow due to regulation is (1,037 – 166) cusecs = 871 cusecs.

Example 2: Suppose now that the water utilisation point is not at the dam site *A*, but at a point *B* farther downstream. No river flow records exist for *B*, but the type of catchment, exposure and orientation is about the same at *A*, and the river flow can be estimated to be say 50% more than at *A* (1·5 million acre feet or 2,075 cusecs).

Using the same regulation curve, the calculations will be as follows:

Storage percentage ... ... = 16·67
Regulation percentage ... ... = 60·1
Regulated flow ... ... = 1,247 cusecs
Increase in river flow (1247 – 249) cusecs ... ... = 998 „
Increase from calculation in Example 1 (998 – 871) cusecs ... = 127 „

It will be seen that when hydrological conditions are relatively the same, it is more economical, purely from a hydrological point of view, to build or utilise a reservoir in a large catchment than in a small one. The storage percentage is less and thus the tapping period shorter for the same size of reservoir. The yield therefore becomes correspondingly higher. The example is as illustrated in Fig. 7. If an even flow is required at *B* the flow at *A* becomes uneven as shown by the curve *bid*. The regulated flow at *A*, as defined in this article, is determined by the same regulation percentage as at *B*, 60·1% of the average which is equivalent to 831 cusecs. The average flow over the tapping period at *A* is still 1,037 cusecs.

If there are more points on the same river where regulated flow must be calculated, the procedure is as follows:

1. Points between *A* and *B* get the same regulation percentage as at *B*.
2. Points downstream of *B* get the same *increase* in river flow as *B*.

If the point is far downstream, evaporation losses must be taken into consideration.

If the low flood period for *B* and points farther downstream do not coincide, the regulation will have a decreasing effect for the downstream stretch of the river. This can be seen from graphs similar to those in Fig. 7 when the two points *c* and *h* occur at different times.

Example 3. Suppose that two utilisation points are located as on Fig. 8. In *A*'s catchment is a reservoir S_1 and between *A* and *B* is another S_2. If the storage percentage for *A* is greater than for *B* the reservoir S_2 should be considered as regulating the partial sub-

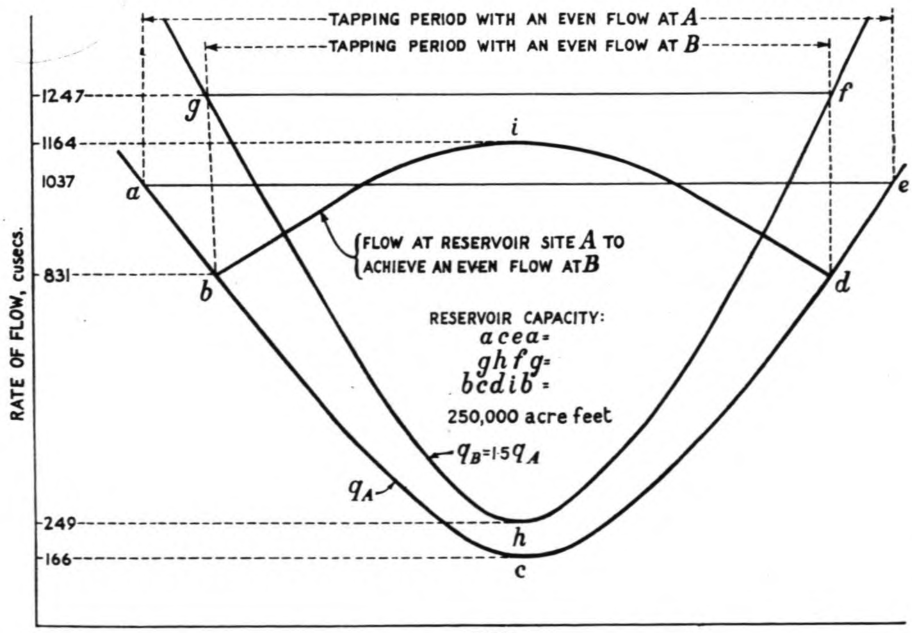


Fig. 7. The downstream decreasing effect of regulation at low flood periods

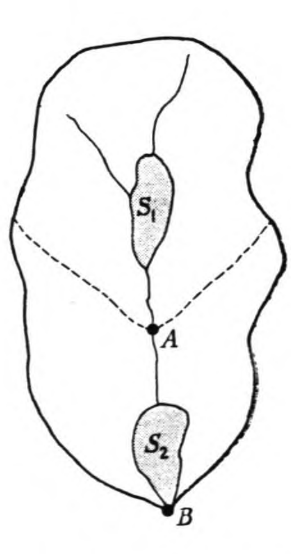
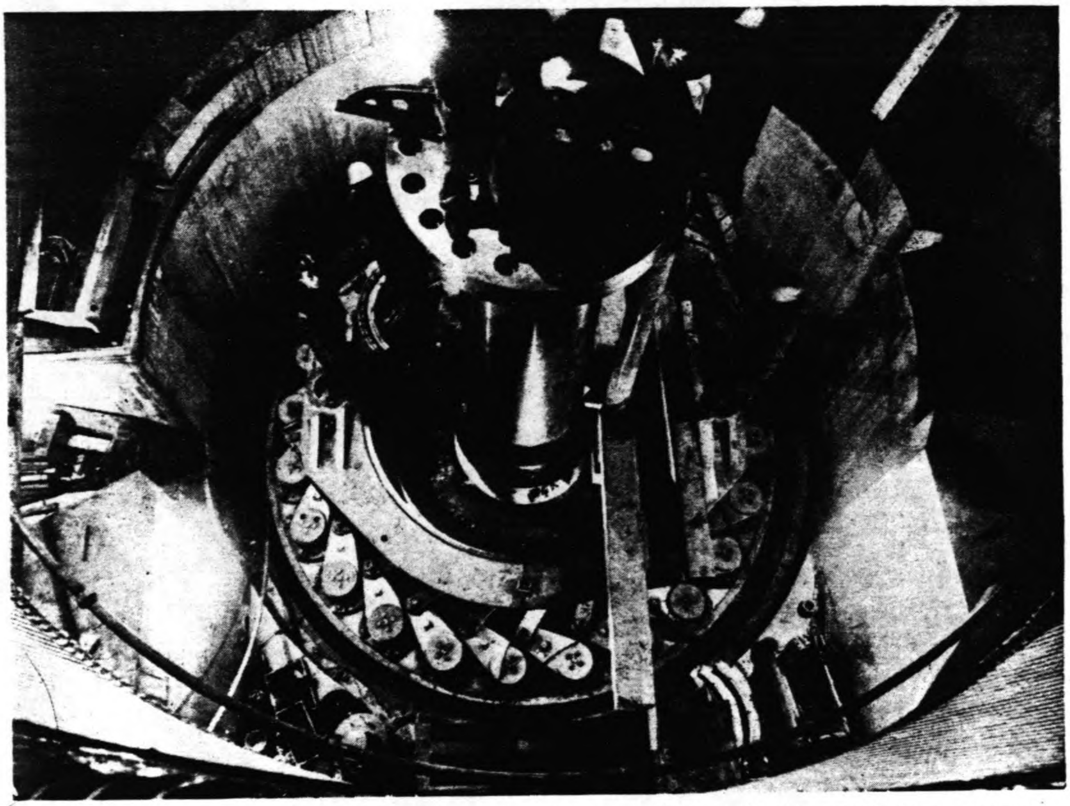


Fig. 8. Scheme of two utilisation points

catchment between A and B only. The discharge at A is calculated separately and the actual regulated flow at B will be the total of these two. If on the other hand the storage percentage at B is greater than at A, the storage S_2 would enable the regulation of some of the water from A. The regulated flow at B is therefore calculated for the entire catchment, taking both reservoirs as one. The regulated flow at A would be as previously calculated.

These are but a very few generalised examples on the application of regulation curves. In practice many special factors may come into the calculations, draw-off for irrigation, short-time regulation, special laws and rules for water utilisation, etc. It has nevertheless been hoped that the general method has been explained in such a manner that it can be applied by the reader, as and when required, to the particular problems with which he is faced.

Chute-des-Passes Turbines



One of the turbine pits at Chute-des-Passes with installation work in progress

The first two of five 200,000 h.p. hydraulic turbines, the most powerful in North America, are now in commercial operation at the Chute-des-Passes power plant of Northern Quebec, Canada. Each has a rating 20% higher than the units at Grand Coulee on the Columbia River. The project, which was described in WATER POWER, May 1959, issue, is to provide additional electricity for the smelters of Aluminum Company of Canada Limited, and will cost $150 million. When it comes into full operation, early in 1960, it will increase the capacity of Alcan's and its affiliates' Saguenay hydro-electric system in Northern Quebec by nearly a third, to a total of 3,600,000 h.p. All five turbines were designed by The English Electric Co. Ltd., Rugby, England, and built by the John Inglis Co. Ltd., Toronto, a member of the English Electric Group. An interesting feature is that the governors for the vertical Francis turbines are of the magnetic-amplifier type, permitting all five turbines in the power station to be controlled together as a single machine. This is relatively new to North America, and the Chute-des-Passes power station is the first million horsepower plant to use this system. The station itself is underground, some 450 ft. below the surface, and is fed by the water from nearby Lake Peribonka by a six-mile long concrete-lined tunnel 34 ft. in diameter. At the net head of 540 ft. each turbine develops 200,000 h.p., but at the maximum head of 640 ft. each is estimated to have an output of 265,000 h.p.

Glenfield Cone Valves

Essentially the cone valve is similar to a conventional plug cock, having the plug axis either vertical or horizontal and being readily arranged for driving by manual, electric, hydraulic or pneumatc power. Glenfield & Kennedy Limited have fairly recently issued a range of valves in regular sizes from 15 to 48 in. in diameter and for working pressures from a head of 289 to 580 ft. The seats are of Monel metal, deposited by weld on the parent metal and machined to match the plug faces. The actuating mechanism, Tabel B.5.1.

Berekeningsstaat voor het construeren van de gereduceerde afvoer-sommatiekromme van de Jai-kreek over de periode van 1 januari 1952 t/m 31 december 1981 (30 jaren).

*Langjarig gemiddeld jaardebiet Qgem = 54.4 m3/s.

Kolommen:
- [1] = Kreekdebiet gedurende de maand [m3/s].
- [2] = Verschil van de aangevoerde en gemiddelde hoeveelheid [m3 * 30 * 24 * 3600 = m3 * 2.592 * 10E6].
- [3] = Totaal verschil van de aangevoerde en de gemiddelde hoeveelheid [m3 * 2.592 * 10E6].
- [4] = Verticaal uit te zetten afstand vanaf de baislijn [=horizontale poolstraal] [cm].

Schalen:
-Horizontaal : 0.8 cm = 2 maanden = 5.184 * 10E6 sec.
-Verticaal : 0.8 cm = 7.5 maanden * 10 m3/s = 194.4 * 10E6 m3.

Stuwmeer:
- Maximale inhoud [bij 138 m + N.S.P.] : 398 * 10E6 m3 =1.64 cm.
- Nuttige inhoud [tussen 130 m + N.S.P. en 138 m + N.S.P.] : 301 * 10E6 m3 = 1.24 cm.

JAAR&MAAND	[1]	[2]	[3]	[4]
1952				
JAN	24.6	-29.8	-29.8	-0.3
FEB	64.4	10.0	-19.8	-0.2
MRT	32.3	-22.1	-41.9	-0.4
APR	29.4	-25.0	-66.9	-0.7
MEI	117.1	62.7	-4.2	.0
JUN	75.2	20.8	16.6	0.2
JUL	100.3	45.9	62.5	0.7
AUG	59.3	4.9	67.4	0.7
SEP	24.8	-29.6	37.8	0.4
OKT	11.3	-43.1	-5.3	-0.1
NOV	11.8	-42.6	-47.9	-0.5
DEC	19.3	-35.1	-83.0	-0.9
SUBTOTAAL	569.8	-83.0		
1953				
JAN	30.9	-23.5	-106.5	-1.1
FEB	96.2	41.8	-64.7	-0.7
MRT	179.5	125.1	60.4	0.6
APR	189.7	135.3	195.7	2.1
MEI	215.0	160.6	356.3	3.8
JUN	155.4	101.0	457.3	4.9
JUL	99.1	44.7	502.0	5.4
AUG	63.1	8.7	510.7	5.4
SEP	33.0	-21.4	489.3	5.2
OKT	14.9	-39.5	449.8	4.8
NOV	9.2	-45.2	404.6	4.3
DEC	7.8	-46.6	358.0	3.8
SUBTOTAAL	1663.6	358.0		

vervolg Tabel B.5.1.

1954				
JAN	20.0	-34.4	323.6	3.5
FEB	32.8	-21.6	302.0	3.2
MRT	97.6	43.2	345.2	3.7
APR	107.2	52.8	398.0	4.2
MEI	206.1	151.7	549.7	5.9
JUN	123.2	68.8	618.5	6.6
JUL	88.0	33.6	652.1	7.0
AUG	69.4	15.0	667.1	7.1
SEP	35.9	-18.5	648.6	6.9
OKT	21.5	-32.9	615.7	6.6
NOV	19.8	-34.6	581.1	6.2
DEC	30.9	-23.5	557.6	5.9
SUBTOTAAL	2516.0	557.6		
1955				
JAN	32.3	-22.1	535.5	5.7
FEB	31.8	-22.6	512.9	5.5
MRT	103.6	49.2	562.1	6.0
APR	82.8	28.4	590.5	6.3
MEI	111.6	57.2	647.7	6.9
JUN	145.1	90.7	738.4	7.9
JUL	104.6	50.2	788.6	8.4
AUG	76.6	22.2	810.8	8.6
SEP	37.6	-16.8	794.0	8.5
OKT	18.6	-35.8	758.2	8.1
NOV	10.8	-43.6	714.6	7.6
DEC	21.7	-32.7	681.9	7.3
SUBTOTAAL	3293.1	681.9		
1956				
JAN	42.2	-12.2	669.7	7.1
FEB	74.2	19.8	689.5	7.4
MRT	93.3	38.9	728.4	7.8
APR	116.9	62.5	790.9	8.4
MEI	159.5	105.1	896.0	9.6
JUN	110.1	55.7	951.7	10.2
JUL	79.5	25.1	976.8	10.4
AUG	54.2	-0.2	976.6	10.4
SEP	42.9	-11.5	965.1	10.3
OKT	15.7	-38.7	926.4	9.9
NOV	14.9	-39.5	886.9	9.5
DEC	42.9	-11.5	875.4	9.3
SUBTOTAAL	4139.4	875.4		

vervolg Tabel B.5.1.

1957				
JAN	31.3	-23.1	852.3	9.1
FEB	49.2	-5.2	847.1	9.0
MRT	21.5	-32.9	814.2	8.7
APR	45.8	-8.6	805.6	8.6
MEI	124.8	70.4	876.0	9.3
JUN	139.8	85.4	961.4	10.3
JUL	95.7	41.3	1002.7	10.7
AUG	74.0	19.6	1022.3	10.9
SEP	27.7	-26.7	995.6	10.6
OKT	10.1	-44.3	951.3	10.1
NOV	5.8	-48.6	902.7	9.6
DEC	10.8	-43.6	859.1	9.2
SUBTOTAAL	4775.9	859.1		
1958				
JAN	16.6	-37.8	821.3	8.8
FEB	30.6	-23.8	797.5	8.5
MRT	51.1	-3.3	794.2	8.5
APR	91.6	37.2	831.4	8.9
MEI	89.4	35.0	866.4	9.2
JUN	48.0	-6.4	860.0	9.2
JUL	32.8	-21.6	838.4	8.9
AUG	22.4	-32.0	806.4	8.6
SEP	8.7	-45.7	760.7	8.1
OKT	6.7	-47.7	713.0	7.6
NOV	3.4	-51.0	662.0	7.1
DEC	1.9	-52.5	609.5	6.5
SUBTOTAAL	5179.1	609.5		
1959				
JAN	8.4	-46.0	563.5	6.0
FEB	19.8	-34.6	528.9	5.6
MRT	25.8	-28.6	500.3	5.3
APR	64.3	9.9	510.2	5.4
MEI	73.5	19.1	529.3	5.6
JUN	104.3	49.9	579.2	6.2
JUL	73.3	18.9	598.1	6.4
AUG	39.8	-14.6	583.5	6.2
SEP	16.9	-37.5	546.0	5.8
OKT	6.3	-48.1	497.9	5.3
NOV	8.0	-46.4	451.5	4.8
DEC	6.8	-47.6	403.9	4.3
SUBTOTAAL	5626.3	403.9		

vervolg Tabel B.5.1.

1960				
JAN	19.0	-35.4	368.5	3.9
FEB	26.8	-27.6	340.9	3.6
MRT	17.1	-37.3	303.6	3.2
APR	47.2	-7.2	296.4	3.2
MEI	106.8	52.4	348.8	3.7
JUN	178.1	123.7	472.5	5.0
JUL	147.2	92.8	565.3	6.0
AUG	72.8	18.4	583.7	6.2
SEP	30.9	-23.5	560.2	6.0
OKT	13.0	-41.4	518.8	5.5
NOV	7.2	-47.2	471.6	5.0
DEC	11.1	-43.3	428.3	4.6
SUBTOTAAL	6303.5	428.3		
1961				
JAN	34.2	-20.2	408.1	4.4
FEB	20.7	-33.7	374.4	4.0
MRT	22.9	-31.5	342.9	3.7
APR	10.6	-43.8	299.1	3.2
MEI	25.6	-28.8	270.3	2.9
JUN	89.7	35.3	305.6	3.3
JUL	81.2	26.8	332.4	3.5
AUG	68.9	14.5	346.9	3.7
SEP	21.9	-32.5	314.4	3.4
OKT	15.7	-38.7	275.7	2.9
NOV	9.4	-45.0	230.7	2.5
DEC	16.9	-37.5	193.2	2.1
SUBTOTAAL	6721.2	193.2		
1962				
JAN	39.8	-14.6	178.6	1.9
FEB	33.5	-20.9	157.7	1.7
MRT	33.3	-21.1	136.6	1.5
APR	21.0	-33.4	103.2	1.1
MEI	102.2	47.8	151.0	1.6
JUN	118.8	64.4	215.4	2.3
JUL	79.1	24.7	240.1	2.6
AUG	46.8	-7.6	232.5	2.5
SEP	17.8	-36.6	195.9	2.1
OKT	6.8	-47.6	148.3	1.6
NOV	7.5	-46.9	101.4	1.1
DEC	16.2	-38.2	63.2	0.7
SUBTOTAAL	7244.0	63.2		

vervolg Tabel B.5.1.

1963				
JAN	42.7	-11.7	51.5	0.5
FEB	113.3	58.9	110.4	1.2
MRT	46.8	-7.6	102.8	1.1
APR	97.9	43.5	146.3	1.6
MEI	127.7	73.3	219.6	2.3
JUN	162.9	108.5	328.1	3.5
JUL	112.1	57.7	385.8	4.1
AUG	67.0	12.6	398.4	4.2
SEP	31.3	-23.1	375.3	4.0
OKT	11.7	-42.7	332.6	3.5
NOV	6.0	-48.4	284.2	3.0
DEC	20.0	-34.4	249.8	2.7
SUBTOTAAL	8083.4	249.8		
1964				
JAN	12.8	-41.6	208.2	2.2
FEB	9.6	-44.8	163.4	1.7
MRT	14.7	-39.7	123.7	1.3
APR	7.7	-46.7	77.0	0.8
MEI	14.7	-39.7	37.3	0.4
JUN	64.3	9.9	47.2	0.5
JUL	65.1	10.7	57.9	0.6
AUG	36.2	-18.2	39.7	0.4
SEP	13.0	-41.4	-1.7	.0
OKT	6.0	-48.4	-50.1	-0.5
NOV	1.7	-52.7	-102.8	-1.1
DEC	3.6	-50.8	-153.6	-1.6
SUBTOTAAL	8332.8	-153.6		
1965				
JAN	35.7	-18.7	-172.3	-1.8
FEB	31.3	-23.1	-195.4	-2.1
MRT	43.4	-11.0	-206.4	-2.2
APR	19.3	-35.1	-241.5	-2.6
MEI	75.0	20.6	-220.9	-2.4
JUN	88.2	33.8	-187.1	-2.0
JUL	61.5	7.1	-180.0	-1.9
AUG	35.4	-19.0	-199.0	-2.1
SEP	14.7	-39.7	-238.7	-2.5
OKT	4.1	-50.3	-289.0	-3.1
NOV	1.9	-52.5	-341.5	-3.6
DEC	1.5	-52.9	-394.4	-4.2
SUBTOTAAL	8744.8	-394.4		

vervolg Tabel B.5.1.

1966				
JAN	11.6	-42.8	-437.2	-4.7
FEB	23.6	-30.8	-468.0	-5.0
MRT	30.9	-23.5	-491.5	-5.2
APR	26.3	-28.1	-519.6	-5.5
MEI	54.2	-0.2	-519.8	-5.5
JUN	82.9	28.5	-491.3	-5.2
JUL	68.2	13.8	-477.5	-5.1
AUG	55.4	1.0	-476.5	-5.1
SEP	31.8	-22.6	-499.1	-5.3
OKT	9.9	-44.5	-543.6	-5.8
NOV	7.0	-47.4	-591.0	-6.3
DEC	7.7	-46.7	-637.7	-6.8
SUBTOTAAL	9154.3	-637.7		
1967				
JAN	33.7	-20.7	-658.4	-7.0
FEB	34.7	-19.7	-678.1	-7.2
MRT	44.6	-9.8	-687.9	-7.3
APR	44.8	-9.6	-697.5	-7.4
MEI	92.1	37.7	-659.8	-7.0
JUN	136.9	82.5	-577.3	-6.2
JUL	99.5	45.1	-532.2	-5.7
AUG	49.9	-4.5	-536.7	-5.7
SEP	20.7	-33.7	-570.4	-6.1
OKT	7.5	-46.9	-617.3	-6.6
NOV	5.5	-48.9	-666.2	-7.1
DEC	11.6	-42.8	-709.0	-7.6
SUBTOTAAL	9735.8	-709.0		
1968				
JAN	18.3	-36.1	-745.1	-7.9
FEB	70.6	16.2	-728.9	-7.8
MRT	49.7	-4.7	-733.6	-7.8
APR	115.2	60.8	-672.8	-7.2
MEI	109.4	55.0	-617.8	-6.6
JUN	144.6	90.2	-527.6	-5.6
JUL	134.2	79.8	-447.8	-4.8
AUG	68.9	14.5	-433.3	-4.6
SEP	35.7	-18.7	-452.0	-4.8
OKT	26.3	-28.1	-480.1	-5.1
NOV	21.0	-33.4	-513.5	-5.5
DEC	48.4	-6.0	-519.5	-5.5

vervolg Tabel B.5.1.

1969				
JAN	72.8	18.4	-501.1	-5.3
FEB	57.8	3.4	-497.7	-5.3
MRT	47.5	-6.9	-504.6	-5.4
APR	131.8	77.4	-427.2	-4.6
MEI	130.9	76.5	-350.7	-3.7
JUN	107.5	53.1	-297.6	-3.2
JUL	56.6	2.2	-295.4	-3.2
AUG	42.2	-12.2	-307.6	-3.3
SEP	14.5	-39.9	-347.5	-3.7
OKT	8.9	-45.5	-393.0	-4.2
NOV	3.4	-51.0	-444.0	-4.7
DEC	1.7	-52.7	-496.7	-5.3
SUBTOTAAL	11253.7	-496.7		
1970				
JAN	11.6	-42.8	-539.5	-5.8
FEB	28.0	-26.4	-565.9	-6.0
MRT	43.9	-10.5	-576.4	-6.1
APR	92.1	37.7	-538.7	-5.7
MEI	104.6	50.2	-488.5	-5.2
JUN	106.0	51.6	-436.9	-4.7
JUL	73.7	19.3	-417.6	-4.5
AUG	60.5	6.1	-411.5	-4.4
SEP	28.9	-25.5	-437.0	-4.7
OKT	10.6	-43.8	-480.8	-5.1
NOV	13.7	-40.7	-521.5	-5.6
DEC	8.9	-45.5	-567.0	-6.0
SUBTOTAAL	11836.2	-567.0		
1971				
JAN	70.4	16.0	-551.0	-5.9
FEB	71.8	17.4	-533.6	-5.7
MRT	110.4	56.0	-477.6	-5.1
APR	101.2	46.8	-430.8	-4.6
MEI	157.4	103.0	-327.8	-3.5
JUN	150.1	95.7	-232.1	-2.5
JUL	184.6	130.2	-101.9	-1.1
AUG	85.8	31.4	-70.5	-0.8
SEP	51.6	-2.8	-73.3	-0.8
OKT	28.4	-26.0	-99.3	-1.1
NOV	14.5	-39.9	-139.2	-1.5
DEC	11.3	-43.1	-182.3	-1.9
SUBTOTAAL	12873.7	-182.3		

vervolg Tabel B.5.1.

1972				
JAN	34.9	-19.5	-201.8	-2.2
FEB	45.3	-9.1	-210.9	-2.2
MRT	80.0	25.6	-185.3	-2.0
APR	140.0	85.6	-99.7	-1.1
MEI	194.2	139.8	40.1	0.4
JUN	120.7	66.3	106.4	1.1
JUL	89.2	34.8	141.2	1.5
AUG	45.8	-8.6	132.6	1.4
SEP	26.0	-28.4	104.2	1.1
OKT	9.9	-44.5	59.7	0.6
NOV	9.6	-44.8	14.9	0.2
DEC	22.4	-32.0	-17.1	-0.2
SUBTOTAAL	13691.7	-17.1		
1973				
JAN	18.6	-35.8	-52.9	-0.6
FEB	23.9	-30.5	-83.4	-0.9
MRT	43.6	-10.8	-94.2	-1.0
APR	28.3	-26.1	-120.3	-1.3
MEI	68.0	13.6	-106.7	-1.1
JUN	135.2	80.8	-25.9	-0.3
JUL	65.3	10.9	-15.0	-0.2
AUG	41.0	-13.4	-28.4	-0.3
SEP	38.6	-15.8	-44.2	-0.5
OKT	20.7	-33.7	-77.9	-0.8
NOV	17.1	-37.3	-115.2	-1.2
DEC	42.7	-11.7	-126.9	-1.4
SUBTOTAAL	14234.7	-126.9		
1974				
JAN	58.3	3.9	-123.0	-1.3
FEB	67.5	13.1	-109.9	-1.2
MRT	67.5	13.1	-96.8	-1.0
APR	76.9	22.5	-74.3	-0.8
MEI	49.2	-5.2	-79.5	-0.8
JUN	97.8	43.4	-36.1	-0.4
JUL	103.1	48.7	12.6	0.1
AUG	92.3	37.9	50.5	0.5
SEP	36.6	-17.8	32.7	0.3
OKT	19.8	-34.6	-1.9	.0
NOV	11.6	-42.8	-44.7	-0.5
DEC	23.6	-30.8	-75.5	-0.8
SUBTOTAAL	14938.9	-75.5		

vervolg Tabel B.5.1.

1975				
JAN	35.2	-19.2	-94.7	-1.0
FEB	19.3	-35.1	-129.8	-1.4
MRT	24.8	-29.6	-159.4	-1.7
APR	50.6	-3.8	-163.2	-1.7
MEI	99.8	45.4	-117.8	-1.3
JUN	108.9	54.5	-63.3	-0.7
JUL	118.6	64.2	0.9	.0
AUG	112.6	58.2	59.1	0.6
SEP	73.7	19.3	78.4	0.8
OKT	27.5	-26.9	51.5	0.5
NOV	15.2	-39.2	12.3	0.1
DEC	20.2	-34.2	-21.9	-0.2
SUBTOTAAL	15645.3	-21.9		
1976				
JAN	57.1	2.7	-19.2	-0.2
FEB	45.3	-9.1	-28.3	-0.3
MRT	61.0	6.6	-21.7	-0.2
APR	132.8	78.4	56.7	0.6
MEI	220.5	166.1	222.8	2.4
JUN	139.1	84.7	307.5	3.3
JUL	105.1	50.7	358.2	3.8
AUG	54.0	-0.4	357.8	3.8
SEP	23.6	-30.8	327.0	3.5
OKT	9.6	-44.8	282.2	3.0
NOV	5.3	-49.1	233.1	2.5
DEC	7.2	-47.2	185.9	2.0
SUBTOTAAL	16505.9	185.9		
1977				
JAN	19.0	-35.4	150.5	1.6
FEB	16.1	-38.3	112.2	1.2
MRT	31.8	-22.6	89.6	1.0
APR	74.0	19.6	109.2	1.2
MEI	62.7	8.3	117.5	1.3
JUN	62.2	7.8	125.3	1.3
JUL	69.7	15.3	140.6	1.5
AUG	44.6	-9.8	130.8	1.4
SEP	15.7	-38.7	92.1	1.0
OKT	12.3	-42.1	50.0	0.5
NOV	7.0	-47.4	2.6	.0
DEC	32.1	-22.3	-19.7	-0.2
SUBTOTAAL	16953.1	-19.7		

vervolg Tabel B.5.1.

1978				
JAN	21.2	-33.2	-52.9	-0.6
FEB	48.2	-6.2	-59.1	-0.6
MRT	39.5	-14.9	-74.0	-0.8
APR	76.9	22.5	-51.5	-0.5
MEI	101.7	47.3	-4.2	.0
JUN	70.6	16.2	12.0	0.1
JUL	57.4	3.0	15.0	0.2
AUG	75.2	20.8	35.8	0.4
SEP	34.2	-20.2	15.6	0.2
OKT	17.1	-37.3	-21.7	-0.2
NOV	10.4	-44.0	-65.7	-0.7
DEC	23.6	-30.8	-96.5	-1.0
SUBTOTAAL	17529.1	-96.5		
1979				
JAN	33.7	-20.7	-117.2	-1.3
FEB	23.6	-30.8	-148.0	-1.6
MRT	56.6	2.2	-145.8	-1.6
APR	101.2	46.8	-99.0	-1.1
MEI	98.6	44.2	-54.8	-0.6
JUN	134.0	79.6	24.8	0.3
JUL	95.9	41.5	66.3	0.7
AUG	64.6	10.2	76.5	0.8
SEP	28.0	-26.4	50.1	0.5
OKT	18.8	-35.6	14.5	0.2
NOV	9.2	-45.2	-30.7	-0.3
DEC	23.6	-30.8	-61.5	-0.7
SUBTOTAAL	18216.9	-61.5		
1980				
JAN	25.1	-29.3	-90.8	-1.0
FEB	17.8	-36.6	-127.4	-1.4
MRT	28.2	-26.2	-153.6	-1.6
APR	70.1	15.7	-137.9	-1.5
MEI	145.6	91.2	-46.7	-0.5
JUN	129.9	75.5	28.8	0.3
JUL	69.2	14.8	43.6	0.5
AUG	45.5	-8.9	34.7	0.4
SEP	31.8	-22.6	12.1	0.1
OKT	10.4	-44.0	-31.9	-0.3
NOV	12.5	-41.9	-73.8	-0.8
DEC	18.3	-36.1	-109.9	-1.2
SUBTOTAAL	18821.3	-109.9		

vervolg Tabel B.5.1.

1981				
JAN	23.9	-30.5	-140.4	-1.5
FEB	47.7	-6.7	-147.1	-1.6
MRT	39.3	-15.1	-162.2	-1.7
APR	72.3	17.9	-144.3	-1.5
MEI	132.8	78.4	-65.9	-0.7
JUN	140.7	86.3	20.4	0.2
JUL	134.5	80.1	100.5	1.1
AUG	68.0	13.6	114.1	1.2
SEP	44.6	-9.8	104.3	1.1
OKT	24.8	-29.6	74.7	0.8
NOV	11.6	-42.8	31.9	0.3
DEC	16.6	-37.8	-5.9	-0.1
EINDTOTAAL	19578.1	-5.9		

Q GEM. = 54.4 [m3/s]

5.4.5. Primair vermogen. Periode 01-09-1963 t/m 31-01-1968

Vol meer ←

Tabel $N = 12000$ kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

0 = overlaat in werking

	Jaar en maand	Volume begin [$*10^6 m^3$]	[N] [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume eind [$*10^6 m^3$]	ΔH [m]	Heind [m]
0	Sept.'63	398	12.000	63.0	23.8	31.3	+ 7.5	+ 19.4	398	0.0	63.0
	Okt.'63	398	12.000	63.0	23.8	11.7	− 12.1	− 31	367	- 0.5	62.5
	Nov.'63	367	12.000	62.5	24.0	6.0	- 18.0	- 47	320	- 0.8	61.7
	Dec. "	320	12.000	61.7	24.3	20.0	- 4.3	- 11	309	- 0.2	61.5
	Jan.'64	309	12.000	61.5	24.4	12.8	- 11.6	- 30	79	- 0.5	61.0
	Febr. "	279	12.000	61.0	24.6	9.6	- 15.0	- 39	240	- 0.8	60.2
	Mrt. "	240	12.000	60.2	24.9	14.7	- 10.2	- 26	214	- 0.6	59.6
	Apr. "	214	12.000	59.6	25.2	7.7	- 17.5	- 45	169	- 1.4	58.2
	Mei "	169	12.000	58.2	25.8	14.7	- 11.1	- 29	140	- 1.0	57.2
	Jun. "	140	12.000	57.2	26.2	64.3	+ 38.1	+ 99	239	+ 2.9	60.1
	Jul. "	239	12.000	60.1	24.9	65.1	+ 40.2	+ 104	343	+ 2.0	62.1
	Aug. "	343	12.000	62.1	24.2	36.2	+ 12.0	+ 31	374	+ 0.6	62.7
	Sept. "	374	12.000	62.7	23.9	13.0	- 10.9	- 28	346	- 0.5	62.5
	Okt. "	346	12.000	62.2	24.1	6.0	- 18.1	- 47	299	- 0.8	61.4
	Nov. "	299	12.000	61.4	24.4	1.7	- 22.7	- 59	240	- 1.2	60.2
	Dec. "	240	12.000	60.2	24.9	3.6	- 21.3	- 55	185	- 1.5	58.7
	Jan.'65	185	12.000	58.7	25.6	35.7	+ 10.1	+ 26	211	+ 0.7	59.4
	Febr. "	211	12.000	59.4	25.3	31.3	+ 6.0	+ 16	227	+ 0.4	59.8
	Mrt. "	227	12.000	59.8	25.1	43.4	+ 18.3	+ 47	274	+ 1.2	61.0
	Apr. "	274	12.000	61.0	24.6	19.3	- 5.3	- 14	260	- 0.3	60.7
	Mei "	260	12.000	60.7	24.7	75.0	+ 50.3	+ 130	390	+ 2.1	62.8
0	Jun. "	390	12.000	62.8	23.9	88.2	+ 64.3	+ 167	398	+ 0.2	63.0

Q↑ = Qturbine ; Q↓ = instroomdebiet

Vervolg Tabel N = 12000 kW

$55.0 \leq H \leq 63.0$ [m]
$97. \leq V_n \leq 398$ [$\times 10^6 m^3$]

O = overlaat in werking	Jaar en maand	V_n Volume [$\times 10^6 m^3$] Begin	N [kW]	H [m] Begin	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n Volume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
O	Jul. 65	398	12.000	63.0	23.8	61.5	+ 37.7	+ 98	398	0.0	63.0
O	Aug. „	398	12.000	63.0	23.8	35.4	+ 11.6	+ 30	398	0.0	63.0
	Sept. „	398	12.000	63.0	23.8	14.7	- 9.1	- 24	374	-0.4	62.6
	Okt. „	374	12.000	62.6	24.0	4.1	- 19.9	- 52	322	-1.0	61.6
	Nov. „	322	12.000	61.6	24.3	1.9	- 22.4	- 58	264	-1.1	60.5
	Dec. „	264	12.000	60.5	24.8	1.5	- 23.3	- 60	204	-1.5	59.0
	Jan. 66	204	12.000	59.0	25.4	11.6	- 13.8	- 36	168	-1.1	57.9
	Febr. „	168	12.000	57.9	25.9	23.6	- 2.3	- 6	162	-0.3	57.6
	Mrt. „	162	12.000	57.6	26.0	30.9	+ 4.9	+ 13	175	+0.5	58.1
	Apr. „	175	12.000	58.1	25.8	26.3	+ 0.5	+ 1	176	+0.0	58.1
	Mei „	176	12.000	58.1	25.8	54.2	+ 28.4	+ 74	250	+2.0	60.1
O	Jun. „	250	12.000	60.1	25.0	82.9	+ 57.9	+150	398	+2.9	63.0
O	Jul. „	398	12.000	63.0	23.8	68.2	+ 44.4	+115	398	0.0	63.0
O	Aug. „	398	12.000	63.0	23.8	55.4	+ 31.6	+ 82	398	0.0	63.0
O	Sept. „	398	12.000	63.0	23.8	31.8	+ 8.0	+ 21	398	0.0	63.0
	Okt. „	398	12.000	63.0	23.8	9.9	- 7.1	- 18	380	-0.4	62.6
	Nov. „	380	12.000	62.6	24.0	7.0	- 17.0	- 44	336	-0.8	61.8
	Dec. „	336	12.000	61.8	24.3	7.7	- 16.6	- 43	293	-0.8	61.0
	Jan. 67	293	12.000	61.0	24.6	33.7	+ 9.1	+ 24	317	+0.5	61.5
	Febr. „	317	12.000	61.5	24.4	34.7	+ 10.3	+ 27	344	+0.4	61.9
	Mrt. „	344	12.000	61.9	24.2	44.6	+ 20.4	+ 53	397	+1.1	63.0
O	Apr. „	397	12.000	63.0	23.8	44.8	+ 24.0	+ 54	398	0.0	63.0
O	Mei „	398	12.000	63.0	23.8	92.1	+ 68.3	+ 177	398	0.0	63.0
O	Jun. „	398	12.000	63.0	23.8	136.9	+113.1	+ 293	398	0.0	63.0

$55.0 \leq H \leq 63$ [m]
$97 \leq V_n \leq 398$ [$*10^6 m^3$]

Vervolg Tabel N = 12000 kW

	Jaar en maand	$V_n$olume [$*10^6 m^3$] begin	N [kW]	H [m] begin	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	$V_n$olume eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]
0	Jul. '67	398	12.000	63.0	23.8	99.5	+ 75.7	+ 196	398	0.0	63.0
0	Aug. "	398	12.000	63.0	23.8	49	+ 26.1	+ 68	398	0.0	63.0
	Sept. "	398	12.000	63.0	23.8	20.7	- 3.1	- 8	390	-0.2	62.8
	Okt. "	390	12.000	62.8	23.9	7.5	- 16.4	- 43	347	-0.7	62.1
	Nov. "	347	12.000	62.1	24.2	5.5	- 18.7	- 49	298	-1.0	61.1
	Dec. "	298	12.000	61.1	24.5	11.6	- 12.9	- 33	265	-0.6	60.5
	Jan. '68	265	12.000	60.5	24.8	10.3	- 6.5	- 17	248	-0.4	60.1

- $Q_{max_{turb.}} = \frac{12.000}{8 * 55.0} = 27.3\ m^3/s.$
- $Q_{min_{turb.}} = \frac{12000}{8 * 63.0} = 23.8\ m^3/s$

→ Vol meer

Primair vermogen. Periode 01-09-1963 t/m 31-01-1968

Tabel $N = 12.500$ kW ; • $55.0 \le H \le 63.0$ [m] ; • $97 \le V_n \le 398$ [$m^3 * 10^6$] ; • $Q_{min\ turb} = 24.8\ m^3/s$; • $Q_{max\ turb} = 28.4\ m^3/s$

O = overlaat in werking	Jaar en maand	$V_n$olume [$\times 10^6 m^3$]	N [kW]	H [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
O	Sept. 63	398	12.500	63.0	24.8	31.3	+ 6.5	+ 17	398	0.0	63.0
	Okt. "	398	12.500	63.0	24.8	11.7	- 13.1	- 34	364	-0.6	62.4
	Nov. "	364	12.500	62.4	25.0	6.0	- 19.0	- 49	315	-0.9	61.5
	Dec. "	315	12.500	61.5	25.4	20.0	- 5.4	- 14	301	-0.3	61.2
	Jan. 64	301	12.500	61.2	25.6	12.8	- 12.8	- 33	268	-0.7	60.5
	Febr. "	268	12.500	60.5	25.9	9.6	- 16.3	- 42	226	-1.0	59.5
	Mrt. "	226	12.500	59.5	26.3	14.7	- 11.6	- 30	196	-0.8	58.7
	Apr. "	196	12.500	58.7	26.6	7.7	- 18.9	- 49	147	-1.6	57.1
	Mei "	147	12.500	57.1	27.4	14.7	- 12.7	- 33	114	-1.4	55.7
	Jun. "	114	12.500	55.7	28.0	64.3	+ 36.3	+ 94	208	+3.3	59.0
	Jul. "	208	12.500	59.0	26.5	65.1	+ 38.6	+100	308	+2.4	61.4
	Aug. "	308	12.500	61.4	25.4	36.2	+ 10.8	+ 28	336	+0.5	61.9
	Sept. "	336	12.500	61.9	25.2	13.0	- 12.2	- 32	304	-0.7	61.2
	Okt. "	304	12.500	61.2	25.5	6.0	- 19.5	- 51	253	-1.2	60.0
	Nov. "	253	12.500	60.0	26.0	1.7	- 24.3	- 63	190	-1.7	58.3
	Dec. "	190	12.500	58.3	26.8	3.6	- 23.2	- 60	130	-2.1	56.2
	Jan. 65	130	12.500	56.2	27.8	35.7	+ 7.9	+ 21	151	+0.9	57.1
	Febr. "	151	12.500	57.1	27.4	31.3	+ 3.9	+ 10	161	+0.4	57.5
	Mrt. "	161	12.500	57.5	27.2	43.4	+ 16.2	+ 42	203	+1.3	58.8
	Apr. "	203	12.500	58.8	26.6	19.3	- 7.3	- 19	184	-0.6	58.2
	Mei "	184	12.500	58.2	26.9	75.0	+ 48.1	+ 125	309	+2.9	61.1
O	Jun. "	309	12.500	61.1	25.6	88.2	+ 62.6	+ 163	398	+1.9	63.0
O	Jul. "	398	12.500	63.0	24.8	61.5	+ 36.7	+ 95	398	0.0	63.0

Q↑ = Q turbine ; Q↓ = instroomdebiet.

<u>Vervolg</u> Tabel N = 12.500 kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$\times 10^6 m^3$]

	Jaar en maand	V_n dume [$\times 10^6 m^3$]	N [kW]	H [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n dume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
0	Aug. '65	398	12.500	63.0	24.8	35.4	+10.6	+28	398	0.0	63.0
	Sept. "	398	12.500	63.0	24.8	14.7	-10.1	-26	372	-0.5	62.5
	Okt. "	372	12.500	62.5	25.0	4.1	-20.9	-54	318	-1.0	61.5
	Nov. "	318	12.500	61.5	25.4	1.9	-23.5	-61	257	-1.2	60.3
	Dec. "	217	12.500	60.3	25.9	1.5	-24.4	-63	194	-1.7	58.6
	Jan. '66	194	12.500	58.6	26.7	11.6	-15.1	-39	155	-1.2	57.4
	Febr. "	155	12.500	57.4	27.2	23.6	-3.6	-9	146	-0.4	57.0
	Mrt. "	146	12.500	57.0	27.4	30.9	+3.5	+9	155	+0.4	57.4
	Apr. "	155	12.500	57.4	27.2	26.3	-0.9	-2	153	-0.2	57.[illegible]
	Mei "	153	12.500	57.2	27.3	54.2	+26.9	+70	223	+2.2	59.4
	Jun. "	223	12.500	59.4	26.3	82.9	+56.6	+147	370	+3.0	62.4
0	Jul. "	370	12.500	62.4	25.1	68.2	+43.1	+112	398	+0.6	63.0
0	Aug. "	398	12.500	63.0	24.8	55.4	+30.6	+80	398	+0.0	63.0
0	Sept. "	398	12.500	63.0	24.8	31.8	+7.0	+18	398	+0.0	63.0
	Okt. "	398	12.500	63.0	24.8	9.9	-14.9	-39	359	-0.8	62.2
	Nov. "	359	12.500	62.2	25.1	7.0	-18.1	-47	312	-0.9	61.3
	Dec. "	312	12.500	61.3	25.5	7.7	-17.8	-46	266	-1.0	60.3
	Jan. '67	266	12.500	60.3	25.9	33.7	+7.8	+20	286	+0.5	60.8
	Febr. "	286	12.500	60.8	25.7	34.7	+9.0	+23	309	+0.5	61.3
	Mrt. "	309	12.500	61.3	25.5	44.6	+19.1	+50	359	+0.9	62.2
0	Apr. "	359	12.500	62.2	25.1	44.8	+19.7	+51	398	+0.8	63.0
0	Mei "	398	12.500	63.0	24.8	92.1	+67.3	+174	398	0.0	63.0
0	Juni "	398	12.500	63.0	24.8	136.9	+112.1	+291	398	0.0	63.0

<u>Vervolg</u> Tabel N = 12.500 kW

- $55.0 \leq H \leq 63$ [m]
- $97 \leq V_n \leq 398$ [$\times 10^6 m^3$]

	Jaar en maand	$V_n$olume begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	Q ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]
0	Jul. '67	398	12.500	63.0	24.8	99.5	+74.7	+194	398	0.0	63.0
0	Aug. "	398	12.500	63.0	24.8	49.9	+25.1	+65	398	0.0	63.0
	Sept. "	398	12.500	63.0	24.8	20.7	-4.1	-11	387	-0.2	62.8
	Okt. "	387	12500	62.8	24.9	7.5	-17.4	-45	342	-0.8	62.0
	Nov. "	342	12.500	62.0	25.2	5.5	-19.7	-51	291	-1.0	61.0
	Dec. "	294	12.500	61.0	25.6	11.6	-14.0	-36	255	-0.8	60.2
	Jan. '68	255	12.500	60.2	26.0	18.3	-7.7	-20	235	-0.5	59.7

Primair vermogen. Tabel N = 13.000 kW
Periode 01-09-1963 t/m 31-01-1968
↳ Vol meer

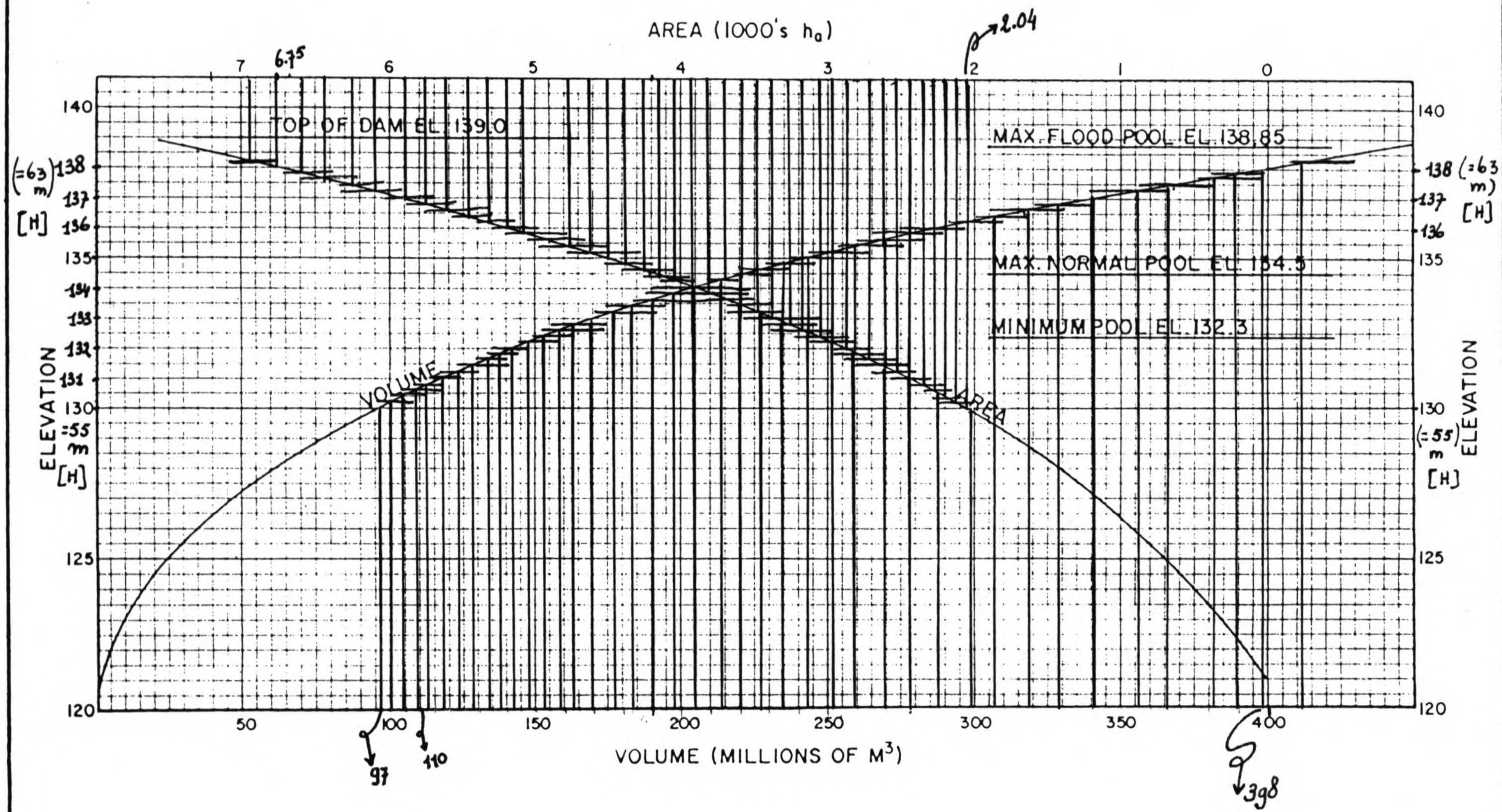
$97 * [10^6 m^3] \leq V_n \leq 398 [* 10^6 m^3]$
$55.0 m \leq H \leq 63.0 [m]$

	Jaar en maand	Volume start *[$10^6 m^3$]	N [kW]	H [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔVolume *[$10^6 m^3$]	Volume eind [*$10^6 m^3$]	ΔH [m]	H eind [m]
Overlaat	Sept. '63	398	13.000	63.0	25.8	31.3	+5.5	+14	398	0.0	63.0
	Okt. "	398	13.000	63.0	25.8	11.7	-14.1	-36	362	-0.6	62.4
	Nov. "	362	13.000	62.4	26.0	6.0	-20.0	-52	310	-1.0	61.4
	Dec. "	310	13.000	61.4	26.5	20.0	-6.5	-17	293	-0.4	61.0
	Jan. '64	293	13.000	61.0	26.6	12.8	-13.8	-36	257	-0.7	60.3
	Febr. "	257	13.000	60.3	27.0	9.6	-17.4	-45	212	-1.2	59.1
	Maart "	212	13.000	59.1	27.5	14.7	-12.8	-33	179	-1.0	58.1
	April "	179	13.000	58.1	28.0	7.7	-20.3	-53	126	-2.0	56.1
	Mei "	126	13.000	56.1	29.0	14.7	-14.3	-37	89	-1.7	54.4
	Juni "	-	-	-	-	-	-	-	-	-	↑ <55

Q↑ = Qturbine = uitstroomdebiet ; Q↓ = instroomdebiet.
$Q_{min\ turb} = 25.8\ m^3/s$; $Q_{max\ turb} = 29.6\ m^3/s$.
* Het primair vermogen blijft gehandhaafd op

N = 12.500 kW.

5.4.6.



JAI KREEK RESERVOIR
AREA-VOLUME CURVES
PEILEN IN METERS T.O.V N.S.P.

5.4.6. Tabel Oppervlakte - Volumekromme van het Jai-reservoir.

Waterstand meer [h] t.o.v bodem [m]	h meer t.o.v N.S.P [m]	Verval H t.o.v beneden-waterstand [m]	Δ H [m]	Oppervlakte meer [x 10⁶ m²]	Volume meer [x 10⁶ m³]
0.0	120.0	45.0	–	0.0	0.0
5.0	125.0	50.0	5.0	7.0	24.0
10.0	130.0	55.0	5.0	20.4	97.0
10.2	130.2	55.2	0.2	21.3	100.0
10.4	130.4	55.4	0.2	22.0	104.0
10.6	130.6	55.6	0.2	22.9	108.5
10.8	130.8	55.8	0.2	23.6	112.5
11.0	131.0	56.0	0.2	24.6	118.0
11.2	131.2	56.2	0.2	25.5	123.5
11.4	131.4	56.4	0.2	26.4	128.0
11.6	131.6	56.6	0.2	27.4	134.0
11.8	131.8	56.8	0.2	28.0	138.0
12.0	132.0	57.0	0.2	28.8	142.5
12.2	132.2	57.2	0.2	29.9	148.0
12.4	132.4	57.4	0.2	30.6	153.5
12.6	132.6	57.6	0.2	31.9	158.5
12.8	132.8	57.8	0.2	32.8	163.0
13.0	133.0	58.0	0.2	33.8	170.0
13.2	133.2	58.2	0.2	35.0	177.0
13.4	133.4	58.4	0.2	36.0	183.5
13.6	133.6	58.6	0.2	37.2	190.5
13.8	133.8	58.8	0.2	38.3	198.0

Vervolg **Tabel Oppervlakte-Volume** kromme van **het Jai-reservoir.**

h meer t.o.v. bodem [m]	h meer t.o.v N.S.P [m]	H t.o.v. benedenwaterstand [m]	ΔH [m]	Oppervlakte meer [$*10^6 m^2$]	Volume meer [$*10^6 m^3$]
14.0	134.0	59.0	0.2	39.3	205.0
14.2	134.2	59.2	0.2	40.4	214.0
14.4	134.4	59.4	0.2	41.5	220.5
14.6	134.6	59.6	0.2	42.5	227.5
14.8	134.8	59.8	0.2	43.9	235.0
15.0	135.0	60.0	0.2	45.1	243.0
15.2	135.2	60.2	0.2	46.3	251.5
15.4	135.4	60.4	0.2	47.6	259.5
15.6	135.6	60.6	0.2	49.0	270.0
15.8	135.8	60.8	0.2	50.8	278.5
16.0	136.0	61.0	0.2	52.0	288.0
16.2	136.2	61.2	0.2	53.2	299.0
16.4	136.4	61.4	0.2	54.6	307.5
16.6	136.6	61.6	0.2	56.0	318.5
16.8	136.8	61.8	0.2	57.4	328.5
17.0	137.0	62.0	0.2	58.8	340.5
17.2	137.2	62.2	0.2	61.0	356.0
17.4	137.4	62.4	0.2	62.6	365.0
17.6	137.6	62.6	0.2	64.4	382.0
17.8	137.8	62.8	0.2	66.0	389.0
18.0	138.0	63.0	0.2	67.5	398.0
18.2	138.2	63.2	0.2	68.6	411.0

5.4.6 • Hogere vermogens in de kritieke periode (01-09-1963 t/m 31-01-1968)

Tabel N = 20.000 kW.

• 55.0 ≤ H ≤ 63.0 [m]
• 97 ≤ V_n ≤ 398 [*10⁶ m³]

Meer vol op 01-09-1963

O = Overlaat in werking

	Jaar en maand	$V_n$olume begin [*10⁶m³]	N [kW]	H_{begin} [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [*10⁶m³]	$V_n$olume eind [*10⁶m³]	ΔH [m]	H_{eind} [m]
	Sept. '63	398	20.000	63.0	39.7	31.3	- 8.4	-22.	376	-0.4	62.6
	Okt. "	376	20.000	62.6	39.9	14.7	- 27.6	- 72	304	-1.3	61.3
	Nov. "	304	20.000	61.3	40.8	6.0	- 34.8	- 90	214	-1.9	59.4
	Dec. "	214	20.000	59.4	42.1	20.0	- 22.1	- 57	157	-1.8	57.6
	Jan. '64	157	20.000	57.6	43.4	12.8	- 30.6	- 79	—	—	—
	Meer loopt leeg op 23 januari 1964. Meer weer vol op 1 juli 1964.										
O	Juli '64	398	20.000	63.0	39.7	65.1	+25.4	+ 66	398	0.0	63.0
	Aug. "	398	20.000	63.0	39.7	36.2	- 3.5	- 9	389	-0.2	62.8
	Sept. "	389	20.000	62.8	39.8	13.0	-26.8	- 70	328	-1.0	61.8
	Okt. "	328	20.000	61.8	40.4	6.0	-34.4	- 89	239	-1.9	59.9
	Nov. "	228	20.000	59.9	41.8	1.7	-40.1	-104	135	-3.2	56.7
	Dec. "	129	20.000	56.7	44.1	3.6	-40.5	-105	-	-	-
	Meer loopt leeg op 11 december 1964. Meer weer vol op 5 april 1965.										
	April '65	398	20.000	63.0	39.7	19.3	- 20.4	- 53	345	-0.9	62.1
O	Mei "	345	20.000	62.1	40.3	75.0	+ 34.7	+ 90	398	+0.9	63.0
O	Juni "	398	20.000	63.0	39.7	88.2	+48.5	125	398	0.0	63.0
	Meer vol op 18 mei 1965.										

Q↑ = Q turbine ; Q↓ = Q instroom;
• Q min. turb = 39.7 m³/s
• Q max. turb = 45.5 m³/s.

<u>Vervolg</u> Tabel $N = 20.000$ kW

• $55.0 \leq H \leq 63.0$ [m]
• $97 \leq V_n \leq 398$ [$\times 10^6$ m]

	Jaar en maand	V_n olume begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
0	Juli '65	398	20.000	63.0	39.7	61.5	+21.8	–	398	0.0	63.0
	Aug. "	398	20.000	63.0	39.7	35.4	−4.3	−11	387	−0.2	62.8
	Sept. "	398	20.000	62.8	39.8	14.7	−25.1	−65	322	−1.3	61.5
	Okt. "	322	20.000	61.5	40.6	4.1	−36.5	−95	227	−2.1	59.4
	Nov. "	227	20.000	59.4	42.0	1.9	−40.1	−104	123	−3.4	56.0
	Dec. "	123	20.000	56.0	44.6	1.5	−43.1	−112	–	–	–

Meer loopt leeg op 7 december 1965.
Meer weer vol op 12 mei 1966.

	Jaar en maand	V_n olume begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
0	Mei '66	398	20.000	63.0	39.7	54.2	+14.5	+38	398	0.0	63.0
0	Juni "	398	20.000	63.0	39.7	82.9	+43.2	+112	398	0.0	63.0
0	Juli "	398	20.000	63.0	39.7	68.2	+28.5	+74	398	0.0	63.0
0	Aug. "	398	20.000	63.0	39.7	55.4	+15.7	+41	398	0.0	63.0
	Sept. "	398	20.000	63.0	39.7	31.8	−7.9	−21	377	−0.4	62.6
	Okt. "	377	20.000	62.6	39.9	9.9	−30.0	−78	299	−1.4	61.2
	Nov. "	299	20.000	61.2	40.8	7.0	−33.8	−88	211	−1.9	59.3
	Dec. "	211	20.000	59.3	42.2	7.7	−34.5	−89	122	−2.1	57.2
	Jan '67	122	20.000	57.2	43.7	33.7	−10.0	−26	–	–	–

Meer loopt leeg op 29 januari 1967.
Meer weer vol op 24 april 1967.

<u>Vervolg</u> Tabel N= 20.000 kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [x10⁶m³]

	Jaar en maand	$V_n$olume begin [x10⁶m³]	N [kW]	H_{begin} [m]	Q ↑ [m³/s]	Q ↓ [m³/s]	ΔQ [m³/s]	ΔV [x10⁶m³]	$V_n$olume eind [x10⁶m³]	ΔH [m]	H_{eind} [m]
0	April '67	398	20.000	63.0	39.7	44.8	+ 5.1	-	398	0.0	63.0
0	Mei "	398	20.000	63.0	39.7	92.1	+52.4	+ 136	398	0.0	63.0
0	Juni "	398	20.000	63.0	39.7	136.9	+97.2	+252	398	0.0	63.0
0	Juli "	398	20.000	63.0	39.7	99.5	+59.8	+ 155	398	0.0	63.0
0	Aug. "	398	20.000	63.0	39.7	49.9	+ 10.2	+ 26	398	0.0	63.0
	Sept. "	398	20.000	63.0	39.7	20.7	- 19.0	- 49	349	-0.9	62.1
	Okt. "	349	20.000	62.1	40.3	7.5	- 32.8	- 85	264	-1.7	60.4
	Nov. "	264	20.000	60.4	41.4	5.5	-35.9	- 93	171	-2.4	58.0
	Dec. "	171	20.000	58.0	43.1	11.6	- 31.5	- 82	-	-	-

Meer loopt leeg op 27 december 1967.

Produktietyd en te leveren hoeveelheden energie.
Tabel N = 20.000 kW. Periode 01-09-1963 t/m 31-01-1968.

Data voor meerinhoud		Duur Dagen	Duur Maanden	Hoeveelheden energie in kwh * 10^6.
01-09-'63 Vol	23-01-'64 Leeg	143	4.80	20.000 * 143 * 24 = 68.6
23-01-'64 Leeg	01-07-'64 Vol	158	5.30	–
01-07-'64 Vol	11-12-'64 Leeg	160	5.30	20.000 * 160 * 24 = 76.8
11-12-'64 Leeg	05-04-'65 Vol	114	3.80	–
05-04-'65 Vol	07-12-'65 Leeg	242	8.10	20.000 * 242 * 24 = 116.2
07-12-'65 Leeg	12-05-'66 Vol	155	5.20	–
12-05-'66 Vol	29-01-'67 Leeg	257	8.60	20.000 * 257 * 24 = 123.4
29-0.-'67 Leeg	24-04-'67 Vol	85	2.80	–
24-04-'67 Vol	27-12-'67 Leeg	243	8.10	20000 * 243 * 24 = 116.6
27-12-'67 Leeg	01-02-'68 Leeg	33	1.10	–
		1590	53.00	Totaal = 501.6 Gemiddeld/jaar = 113.7

- Er wordt geleverd gedurende 1045 dagen
  $\triangleq 1045/1590 * 100\% =$ ca. 65.7 % van de tyd.

- Per jaar gemiddeld te leveren: (jaar met 8760 uren)
  $0.657 * 365 * 24 * 20.000 =$ ca $115.1 * 10^6$ kWh.

- Relatieve fout hierby: $\frac{115.1 - 113.7}{113.7} * 100\% = 1.2\ \%$ en is toelaatbaar.

• Periode 01-09-1963 t/m 31-01-1968. ~~Tabel~~ N = 25.000 kW.
Meer vol op 01-09-1963

O = overlaat in werking

O	Jaar en maand	V_n volume begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n volume eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]
	Sept.'63	398	25.000	63.0	49.6	31.3	- 18.7	- 47	351	-0.8	62.2
	Okt. "	351	25.000	62.2	50.2	11.7	- 38.5	- 100	251	-2.1	60.1
	Nov. "	251	25.000	60.1	52.0	6.0	- 46.0	- 119	132	-3.5	56.6
	Dec. "	132	25.000	56.6	55.2	20.0	-35.2	- 35	97	-1.6	55.0
	Meer loopt leeg op 11 december 1963 om 12.00 uur. Daarna begint het vullen (11.5 dagen).										
	Meerinhoud: 1 jan. '64	129							129	+1.5	56.5
	1 febr. '64	162							162	+1.2	57.7
	1 maart '64	187							187	+1.0	58.7
	1 april '64	225							225	+1.0	59.7
	1 mei '64	245							245	+0.6	60.3
	1 juni '64	283							283	+0.9	61.2
	Meer weer vol op 24 juni 1964										
O	24.06.'64	398	25.000	63.0	49.6	63.4	+ 14.7	+ 38	398	0.0	63.0
O	juli '64	398	25.000	63.0	49.6	65.1	+ 15.5	+ 40	398	0.0	63.0
	Aug.	398	25.000	63.0	49.6	36.2	- 13.4	- 35	363	-0.7	62.3
	Sept. "	363	25.000	62.3	50.1	13.0	- 37.1	- 96	267	-1.7	60.6
	Okt. "	267	25.000	60.6	51.5	6.0	- 45.5	- 118	149	-3.3	57.3
	Nov. "	149	25.000	57.3	54.4	1.7	- 52.8	- 52	97	-2.3	55.0

Q↑ = Q turbine ; Q↓ = Q instroom ; $Q_{min.turb}$ = 49.6 m^3/s ;
$Q_{max.turb.}$ = 56.8 m^3/s.

• $55.0 \leq H \leq 63.0$ [m]
• $97 \leq V_n \leq 398$ [$*10^6 m^3$]

Vervolg Tabel N = 25.000 kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

	Jaar en maand	$V_n$olume begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [$*10^6 m^3$]	$V_n$olume eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]
	Meer loopt leeg op 11 november 1964 Weer vol op 2 april 1965										
	April '65	398	25.000	63.0	49.6	19.3	-30.3	-75	323	-1.4	61.6
	Mei '65	323	25.000	61.6	50.7	75.0	+24.3	+63	386	+1.2	62.8
0	Juni '65	386	25.000	62.8	49.7	88.2	+38.5	+100	398	+0.2	63.0
0	Juli "	398	25.000	63.0	49.6	61.5	+11.9	+31	398	0.0	63.0
	Aug. "	398	25.000	63.0	49.6	35.4	-14.2	-37	361	-0.6	62.4
	Sept. "	361	25.000	62.4	50.1	14.7	-35.4	-92	269	-1.7	60.7
	Okt. "	269	25.000	60.7	51.5	4.1	-47.4	-123	146	-3.5	57.2
	Nov. "	146	25.000	57.2	54.6	1.9	-52.7	-137	97	-2.2	55.0
	Meer loopt leeg op 11 november 1965. Meer weer vol op 12 mei 1966.										
	12 mei '66	398	25000	63.0	-	-	-	-	398	0.0	63.0
0	Mei '66	398	25.000	63.0	49.6	54.2	+4.6	+12	398	0.0	63.0
0	Juni "	398	25.000	63.0	49.6	82.9	+33.3	+86	398	0.0	63.0
0	Juli "	398	25.000	63.0	49.6	68.2	+18.6	+48	398	0.0	63.0
0	Aug. "	398	25.000	63.0	49.6	55.4	+5.8	+15	398	0.0	63.0
	Sept. "	398	25.000	63.0	49.6	31.8	-17.8	-46	352	0.8	62.2
	Okt. "	352	25.000	62.2	50.2	9.9	-40.3	-105	247	2.1	60.1
	Nov. "	247	25.000	60.1	52.0	7.0	-45.0	-117	130	3.5	56.6
	Dec. "	130	25.000	56.6	52.2	7.7	-47.5	-123	97	1.6	55.0

Vervolg Tabel N = 25.000 kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

Jaar en maand	Volume begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Meer loopt leeg op 8 december 1966 Meer weer vol op 28 maart 1967										
28.03.'67	398	25.000	63.0	49.6	–	–	–	398	0.0	63.0
Maart '67	398	25.000	63.0	49.6	44.6	- 5.0	- 1	397	-0.1	62.9
April "	397	25.000	62.9	49.6	44.8	- 4.8	- 12	385	-0.1	62.8
Mei "	385	25.000	62.8	49.8	92.1	+ 42.3	+ 13	398	0.2	63.0
0 Juni "	398	25.000	63.0	49.6	136.9	–	–	–	–	–
0 Juli "	398	25.000	63.0	49.6	99.5	–	–	398	–	63.0
0 Aug. "	398	25.000	63.0	49.6	49.9	+ 0.3	–	398	–	63.0
Sept. "	398	25.000	63.0	49.6	20.7	- 28.9	- 75	323	-1.4	61.6
Okt. "	323	25.000	61.6	50.7	7.5	- 43.2	- 112	211	-2.4	59.2
Nov. "	211	25.000	59.2	52.8	5.5	- 47.3	- 123	97	-4.2	55.0
Dec. "	–	–	–	–	–	–	–	–	–	–
Jan. '68	–	–	–	–	–	–	–	–	–	–
Meer loopt leeg op 28 november 1967 Meer weer vol op 9 februari 1968										

Produktietyd en te leveren hoeveelheden energie.

Tabel N = 25.000 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6
		Dagen	Maanden	
01-09-'63 vol	11-12-'63 leeg	101	3.37	25.000 * 101 * 24 = 60.6
11-12-'63 leeg	21-06-'64 vol	190	6.33	-
21-6-'64 vol	11-11-'64 leeg	140	4.67	25.000 * 140 * 24 = 84.0
11-11-'64 leeg	02-04-'65 vol	141	4.70	-
02-04-'65 vol	11-11-'65 leeg	219	7.30	25.000 * 219 * 24 = 131.4
11-11-'65 leeg	12-05-'66 vol	181	6.03	-
12-05-'66 vol	08-12-'66 leeg	206	6.87	25.000 * 206 * 24 = 123.6
08-12-'66 leeg	28-03-'67 vol	110	3.67	-
28-03-'67 vol	28-11-'67 leeg	240	8.00	25.000 * 240 * 24 = 144.0
28-11-'67 leeg	01-02-'68 leeg	62	2.07	-
		1590	53.00	Totaal 543.6 Gemiddeld/jaar: 123.1.

- Er wordt geleverd gedurende 906 dagen ≙ $906/1590 * 100\% = 57\%$ van de tyd.
- Per jaar gemiddeld te leveren op basis van 8760 uren per jaar: $0.57 * 8760 * 25000 =$ ca. $124.8 * 10^6$ kWh
- Relatieve fout hierby: $\frac{124.8 - 123.1}{123.1} * 100\% = 1.4\%$. is toelaatbaar.

Tabel N = 37500 kW. Periode 01-09-1963 t/m 31-01-1968

Meer vol op 01-09-1963

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$\times 10^6 m^3$]

0 = Overlaat in werking.

Jaar en maand	$V_n$olume meer begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume meer eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]
Sept. '63	398	37.500	63.0	74.4	31.3	-43.1	-112	286	-2.0	61.0
Okt "	286	37.500	61.0	76.8	11.7	-65.1	-169	117	-5.0	56.0
Nov "	117	37.500	56.0	83.7	6.0	-77.7	-201	97	-1.0	55.0
Meer loopt leeg op 3 november 1963. Meer weer vol op 15 juni 1964.										
15-30 Juni '64	398	37.500	63.0	74.4	64.3	-10.1	-13	385	-0.2	62.8
Juli "	385	37.500	62.8	74.6	65.1	-9.5	-25	360	-0.4	62.4
Aug. "	360	37.500	62.4	75.1	36.2	-38.9	-100	260	-2.0	60.4
Sept. "	260	37.500	60.4	77.5	13.0	-64.5	-167	97	-5.4	55.0
Meer loopt leeg op 29 september 1964. Meer weer vol op 26 maart 1965.										
26-30 Maart '65	398	37.500	63.0	74.4	43.4	-31.0	-11	387	-0.1	62.9
April "	387	37.500	62.9	74.5	19.3	-55.2	-143	244	-2.7	60.2
Mei "	244	37.500	60.2	77.9	75.0	-2.9	-6	238	-0.2	60.0
Juni "	238	37.500	60.0	78.2	88.2	+10.0	+26	264	-0.6	60.6
Juli "	264	37.500	60.6	77.4	61.5	-15.9	-41	223	-1.0	59.6
Aug. "	223	37.500	59.6	78.7	35.4	-43.3	-112	111	-3.9	55.7
Sept. "	111	37.500	55.7	84.2	14.7	-69.5	-180	97	0.7	55.0

Q↑ = Q turbine; Q↓ = Q instroom; $Q_{min.turb}$ = 74.4 m^3/s; $Q_{max\ turb}$ = 85.2 m^3/s.

Vervolg Tabel N = 37.500 kW · $55.0 \leq H \leq 63.0$ [m]
· $97 \leq V_n \leq 398$ [$*10^6 m^3$]

Jaar en maand	V_v olume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n olume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Meer loopt leeg op 2 september 1965. Meer weer vol op 1 mei 1966.										
Mei '66	398	37.500	63.0	74.4	54.2	-20.2	-52	346	-1.0	62.0
Juni "	346	37.500	62.0	75.6	82.9	+7.3	+19	365	+0.3	62.3
Juli "	365	37.500	62.3	75.2	68.2	-7.0	-18	347	-0.3	62.0
Aug. "	345	37.500	62.0	75.6	55.4	-20.2	-52	293	-1.1	60.9
Sept. "	291	37.500	60.9	77.0	31.8	-45.2	-117	174	-2.9	58.0
Okt. "	172	37.500	58.0	80.8	9.9	-70.9	-183	97	-3.0	55.0
Meer loopt leeg op 12 oktober 1966. Meer weer vol op 18 maart 1967.										
Maart '67	398	37.500	63.0	74.4	44.6	-29.8	-31	367	-0.6	62.4
April "	367	37.500	62.4	75.1	44.8	-30.3	-79	288	-1.4	61.0
Mei "	288	37.500	61.0	76.8	92.1	+15.3	+40	328	+0.8	61.8
0 Juni "	328	37.500	61.8	75.8	136.9	+61.1	+158	398	+1.2	63.0
0 Juli "	398	37.500	63.0	74.4	99.5	+25.1	+65	398	0.0	63.0
Aug. "	398	37.500	63.0	74.4	49.9	-24.5	-64	334	-1.2	61.8
Sept. "	334	37.500	61.8	75.8	20.7	-55.1	-143	191	-3.3	58.5
Okt. "	191	37.500	58.5	80.1	7.5	-72.6	-188	97	-3.5	55.0
Meer loopt leeg op 15 oktober 1967 (tot 1 februari 1968).										

Produktietijd en te leveren hoeveelheden energie

Tabel N= 37.500 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6.
		Dagen	Maanden	
01-09-'63 vol	03-11-'63 leeg	63	2.10	37.500 * 63 * 24 = 56.7
03-11-'63 leeg	15-06-'64 vol	222	7.40	–
15-06-'64 vol	29-09-'64 leeg	104	3.47	37.500 * 104 * 24 = 93.6
29-09-'64 leeg	26-03-'65 vol	177	5.90	–
26-03-'65 vol	02-09-'65 leeg	156	5.20	37.500 * 156 * 24 = 140.4
02-09-'65 leeg	01-05-'66 vol	239	7.97	–
01-05-'66 vol	12-10-'66 leeg	161	5.37	37.500 * 161 * 24 = 144.9
12-10-'66 leeg	18-03-'67 vol	156	5.20	–
18-03-'67 vol	15-10-'67 leeg	207	6.90	37.500 * 207 * 24 = 186.3
15-10-'67 leeg	01-02-'68 leeg	105	3.50	
		1590	53.00	Totaal 591.9 Gemiddeld/jaar: 134.0

- Er wordt geleverd gedurende 691 dagen ≙ 691/1590 * 100% = 43.5 % van de tijd
- Per jaar gemiddeld te leveren op basis van 8760 uren per jaar: 0.435 * 8760 * 37500 = 142.9 * 10^6 kWh.
- Relatieve fout hierbij $\frac{142.9 - 134.0}{134.0}$ * 100% = 6.6 % → Berekening enigszins ruw, doch gedaan op basis van 8640 uren per jaar!

• $55.0 \leq H \leq 63.0$ [m]
• $97 \leq V_n \leq 398$ [$*10^6 m^3$]

Tabel N = 45.000 kW. Periode 01-09-1963 t/m 31-01-1968
Meer vol op 01-09-1963.

O = overlaat in werking

Jaar en Maand	$V_n$olume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [$*10^6 m^3$]	$V_n$olume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Sept. '63	398	45.000	63.0	89.3	31.3	-58.0	-150	248	-3.2	59.8
Okt "	248	45.000	5 .8	94.1	11.7	-82.4	-213	97	-4.8	55.0
Meer leeg op 21 oktober 1963. Meer weer vol op 13 juni 1964.										
13-30 Juni '64	398	45.000	63.0	89.3	64.3	-25.0	-37	361	-0.6	62.4
Juli "	361	45.000	62.4	90.1	65.1	-25.0	-37	324	-0.6	61.8
Aug. "	324	45.000	61.8	91.0	36.2	-54.8	-142	182	-3.4	58.4
Sept. "	182	45.000	58.4	96.3	13.0	-83.3	-216	97	-3.4	55.0
Meer leeg op 12 september 1964. Weer vol op 21 maart 1965.										
21-30 Maart '65	398	45.000	63.0	89.3	43.3	-45.9	-36	362	-0.6	62.4
April "	362	45.000	62.4	90.1	19.3	-70.8	-184	178	-4.2	58.2
Mei "	178	45.000	58.2	96.6	75.0	-21.6	-56	122	-2.0	56.2
Juni "	122	45.000	56.2	100.1	88.2	-11.9	-31	97	-1.2	55.0
Meer loopt leeg op 24 juni 1965 Meer weer vol op 3 september 1965										
Sept. '65	398	45.000	63.0	89.3	14.7	-74.6	-174	224	-3.4	59.6
Okt. "	224	45.000	59.6	94.4	4.1	-90.3	-234	97	-4.6	55.0

Q↑ = Q turbine; Q↓ = Q instroom; $Q_{min. turb}$ = 89.3 m³/s; $Q_{max. turb}$ = 102.3 m³/s.

Vervolg Tabel N = 45.000 kW.

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

Jaar en maand	Volume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Meer loopt leeg op 16 oktober 1965. Meer weer vol op 11 mei 1966.										
11-30 Mei '66	398	45.000	63.0	89.3	54.2	-35.1	-58	340	-1.0	62.0
Juni "	340	45.000	62.0	90.7	82.9	-7.8	-20	320	-0.4	61.6
Juli "	320	45.000	61.6	91.3	68.2	-23.1	-60	260	-1.3	60.3
Aug. "	260	45.000	60.4	93.2	55.4	-37.8	-98	162	-2.1	58.2
Sept. "	162	45.000	58.2	96.7	31.8	-64.9	-168	97	-3.2	55.0
Meer loopt leeg op 12 september 1966. Meer weer vol op 3 maart 1967										
Maart '67	398	45.000	63.0	89.3	44.6	-44.7	-104	294	-1.9	61.1
April "	294	45.000	61.1	92.1	44.8	-47.3	-123	171	-4.1	57.0
Mei "	171	45.000	57.0	98.7	92.1	-6.6	-17	154	-0.6	56.4
Juni "	154	45.000	56.4	99.8	136.9	+37.1	+96	250	-2.7	59.1
Juli "	250	45.000	59.1	95.1	99.5	+4.4	+11	261	-0.3	59.4
Aug. "	261	45.000	59.4	94.7	49.9	-44.8	-116	145	-3.3	56.1
Sept. "	145	45.000	56.1	100.4	20.7	-79.7	-207	97	-1.1	55.0
Meer loopt leeg op 7 september 1967. Leeg tot 1 februari 1968										

Produktietyd en te leveren hoeveelheden energie
Tabel N = 45000 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhoud		Duur Dagen	Duur Maanden	Hoeveelheden energie in kWh * 10^6
01-09-'63 Vol	21-10-'63 leeg	51	1.70	45.000 * 51 * 24 = 55.08
21-10-'63 leeg	13-06-'64 Vol	232	7.73	-
13-06-'64 Vol	12-09-'64 leeg	89	2.97	45.000 * 89 * 24 = 96.12
12-09-'64 leeg	21-03-'65 Vol	189	6.30	-
21-03-'65 Vol	24-06-'65 leeg	93	3.1	45.000 * 93 * 24 = 100.44
24-06-'65 leeg	03-09-'65 Vol	69	2.3	-
03-09-'65 Vol	16-10-'65 leeg	43	1.43	45.000 * 43 * 24 = 46.44
16-10-'65 leeg	11-05-'66 Vol	205	6.83	-
11-05-'66 Vol	12-09-'66 leeg	121	4.03	45.000 * 121 * 24 = 136.68
12-09-'66 leeg	03-03-'67 Vol	171	5.70	-
03-03-'67 Vol	07-09-'67 leeg	184	6.13	45.000 * 184 * 24 = 198.72
07-09-'67 leeg	01-02-'68 leeg	143	4.77	
		1590	53.00	Totaal 627.48 Gemiddeld/jaar 142.1

- Er wordt geleverd gedurende 581 dagen $\doteq \frac{581}{1590} * 100\% = 36.5\%$ van de tyd
- Per jaar gemiddeld te leveren: $0.365 * 8760 * 45000 = 143.9 * 10^6$ kWh
- Relatieve fout hierin: $\frac{143.9 - 142.1}{142.1} * 100\% = 1.3\%$

is toelaatbaar

Tabel N = 55.000 kW. Periode 01-09-1963 t/m 31-01-1968.

Meer vol op 01-09-1963.

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$\times 10^6 m^3$]

O = overlaat in werking

Jaar en maand	V_n volume meer begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n volume meer eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]
Sept. '63	398	55.000	63.0	109.1	31.3	-77.8	-201	197	-4.2	58.8
Okt. "	197	55.000	58.8	116.9	11.7	-85.6	—	—	—	—

Meer loopt leeg op 14 oktober 1963

Meer weer vol op 11 juni 1964

Jaar en maand	V_n volume meer begin	N	H_{begin}	Q↑	Q↓	ΔQ	ΔV	V_n volume meer eind	ΔH	H_{eind}
Juni '64	398	55.000	63.0	109.1	64.3	-44.8	-74	324	-1.2	61.8
Juli "	324	55.000	61.8	111.3	65.1	-46.2	-120	204	-3.2	58.6
Aug. "	204	55.000	58.6	117.3	36.2	-81.8	—	—	—	—

Meer loopt leeg op 15 augustus 1964.

Meer weer vol op 24 februari 1965

Jaar en maand	V_n volume meer begin	N	H_{begin}	Q↑	Q↓	ΔQ	ΔV	V_n volume meer eind	ΔH	H_{eind}
Febr. '65	398	55.000	63.0	109.1	31.1	-77.8	-40	358	-0.9	62.1
Maart "	358	55.000	62.1	110.7	43.4	-67.3	-174	184	-3.9	58.2
April "	184	55.000	58.2	118.1	19.3	-98.8	—	—	—	—

Meer loopt leeg op 10 april 1965.

Meer weer vol op 10 juni 1965

Jaar en maand	V_n volume meer begin	N	H_{begin}	Q↑	Q↓	ΔQ	ΔV	V_n volume meer eind	ΔH	H_{eind}
Juni '65	398	55.000	63.0	109.1	88.2	-20.9	-36	362	-0.6	62.4
Juli "	362	55.000	62.4	110.2	61.5	-48.7	-126	236	-2.5	59.9
Aug. "	236	55.000	59.9	114.9	35.4	-79.5	—	—	—	—

Q↑ = $Q_{turbine}$: Q↓ = $Q_{instroom}$; $Q_{min. turb.}$ = 109.1 m^3/s : $Q_{max. turb}$ = 125 m^3/s.

Vervolg Tabel N = 55.000 kW.

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$* 10^6 m^3$]

Jaar en maand	V_n olume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n olume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Meer loopt leeg op 20 augustus 1965. Meer weer vol op 26 maart 1966.										
Maart '66	398	55.000	63.0	109.1	30.9	-78.2	-27	371	-0.5	62.5
April "	371	55.000	62.5	110.0	26.3	-83.7	-217	154	-5.0	57.5
Mei "	154	55.000	57.5	119.5	54.2	-65.3	–	–	–	–
Meer loopt leeg op 10 mei 1966. Meer weer vol op 29 juni 1966.										
Juni '66	398	55.000	63.0	109.1	82.9	-26.2	-2	396	-0.1	62.9
Juli "	396	55.000	62.9	109.2	68.2	-41.0	-106	290	-1.8	62.1
Aug. "	290	55.000	61.1	112.5	55.4	-57.1	-148	142	-3.8	57.3
Sept. "	142	55.000	57.3	120.1	31.8	-88.3	–	–	–	–
Meer loopt leeg op 6 september 1966. Meer weer vol op 28 februari 1967.										
Febr. '67	398	55.000	63.0	109.1	34.7	-74.4	-13	385	-0.2	62.8
Maart "	385	55.000	62.8	109.5	44.6	-64.9	-168	217	-3.4	59.4
April "	217	55.000	59.4	115.8	44.8	-71.0	-184	–	–	–

<u>Vervolg</u> Tabel N = 55000 kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

	Jaar en maand	V_n olume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n olume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
	Meer loopt leeg op 20 april 1967. Meer weer vol op 2 juni 1967										
0	Juni '67	398	55.000	63.0	109.1	136.9	+ 27.8	+ 67	398	0.0	63.0
	Juli "	398	55.000	63.0	109.1	99.5	- 9.6	- 25	373	-0.5	62.5
	Aug. "	373	55.000	62.5	110.0	49.9	- 60.1	- 156	217	-3.3	59.2
	Sept. "	217	55.000	59.2	116.2	20.7	- 95.5	- 248	—	—	—
	Meer leeg op 15 september 1967. Meer weer vol op 22 februari 1968. (N.V.T.)										

Produktietyd en te leveren hoeveelheden energie

Tabel N = 55000 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhouden		Duur		Hoeveelheden energie in kWh * 10^6.
		Dagen	Maanden	
01-09-'63 Vol	14-10-'63 leeg	44	1.47	55.000 * 44 * 24 = 58.08
14-10-'63 leeg	11-06-'64 Vol	237	7.90	–
11-06-'64 Vol	15-08-'64 leeg	64	2.13	55.000 * 64 * 24 = 84.48
15-08-'64 leeg	24-02-'65 Vol	189	6.30	–
25-02-'65 Vol	10-04-'65 leeg	46	1.53	55.000 * 46 * 24 = 60.72
10-04-'65 leeg	10-06-'65 Vol	60	2.00	–
10-06-'65 Vol	20-08-'65 leeg	70	2.33	55.000 * 70 * 24 = 92.40
20-08-'65 leeg	26-03-'66 Vol	216	7.20	–
26-03-'66 Vol	10-05-'66 leeg	44	1.47	55.000 * 44 * 24 = 58.08
10-05-'66 leeg	29-06-'66 Vol	49	1.63	–
29-06-'66 Vol	06-09-'66 leeg	67	2.23	55.000 * 67 * 24 = 88.44
06-09-'66 leeg	28-02-'67 Vol	172	5.73	–
28-02-'67 Vol	20-04-'67 leeg	52	1.73	55.000 * 52 * 24 = 68.64
20-04-'67 leeg	02-06-'67 Vol	42	1.40	–
02-06-'67 Vol	15-09-'67 leeg	103	3.43	55.000 * 103 * 24 = 135.96
15-09-'67 leeg	01-02-'68 Vol	135	5.50	–
		15[illegible]	53.00	Totaal 646.80

Vervolg tabel produktietyd en te leveren hoeveelheden energie. N = 55000 kW. Periode 01-09-1963 t/m 31-01-1968.

	Dagen	Maanden	
Data meerinhoud	1590	53	Totaal : 646.8 Gemiddeld/jaar 146.4

- Er wordt geleverd gedurende 490 dagen ≙ $490/1590 * 100\% = 30.8\%$ van de tyd

- Per jaar gemiddeld te leveren:
$0.308 * 8760 * 55000 = 148.4 * 10^6$ kWh

- Relatieve fout hierin: $\frac{148.4 - 146.4}{146.4} * 100\% = 1.4\%$
is toelaatbaar

Tabel N = 65.000 kW. Periode 01-09-1963 t/m 31-01-1968
Meer vol op 01-09-1963.

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6 m^3$]

O = Overlaat in werking

Jaar en maand	Volume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Sept. '63	398	65.000	63.0	129.0	31.3	-97.7	-253	145	-5.7	57.3
Okt. "	445	65.000	57.3	141.6	11.7	-130.3	–	–	–	–

Meer leeg op 4 oktober 1963.
Meer weer vol op 10 juni 1964.

Jaar en maand	Volume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Juni '64	398	65.000	63.0	129.0	64.3	-64.7	-112	286	-1.9	61.1
Juli "	286	65.000	61.1	133.1	65.1	-68.0	-176	110	-5.3	55.8
Aug. "	110	65.000	55.8	145.7	36.2	-109.5	–	–	–	–

Meer leeg op 01 augustus 1964.
Meer weer vol op 20 februari 1965.

Jaar en maand	Volume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Febr. '65	398	65.000	63.0	129.0	31.3	-97.7	-84	314	-1.6	61.4
Maart "	314	65.000	61.4	132.3	43.4	-88.9	-230	–	–	–

Meer leeg op 28 maart 1965.
Meer weer vol op 6 juni 1965.

Jaar en maand	Volume meer begin [$*10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	Volume meer eind [$*10^6 m^3$]	ΔH [m]	H eind [m]
Juni '65	398	65.000	63.0	129.0	88.2	-40.8	-85	313	-1.5	61.5
Juli "	313	65.000	61.5	132.1	61.5	-70.6	-183	130	-5.0	56.5
Aug "	130	65.000	56.3	143.7	35.4	-108.3	–	–	–	–

Meer leeg op 4 augustus 1965.
Meer weer vol op 27 maart 1966.

Vervolg Tabel $N = 65.000$ kW

- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$*10^6$ m^3]

Jaar en maand	$V_n$olume meer begin [$*10^6$ m^3]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6$ m^3]	$V_n$olume meer eind [$*10^6$ m^3]	ΔH [m]	H eind [m]
Maart '66	398	65.000	63.0	129.0	30.9	-98.1	-25	373	-0.5	62.5
April "	373	65.000	62.5	130.0	26.3	-103.7	-269	104	-7.1	55.4
Mei "	104	65.000	55.4	146.7	54.2	-92.5	-	-	-	-
Meer leeg op 01 mei 1966. Meer weer vol op 23 juni 1966.										
Juni '66	398	65.000	63.0	129.0	82.9	-46.1	-28	370	-0.4	62.6
Juli "	370	65.000	62.6	129.8	68.2	-61.6	-160	210	-3.4	59.2
Aug. "	210	65.000	59.2	137.3	55.4	-81.9	-212	-	-	-
Meer leeg op 16 augustus 1966. Meer weer vol op 30 december 1966.										
Jan. '67	398	65.000	63.0	129.0	33.7	-95.3	-247	151	-5.6	57.4
Febr. "	151	65.000	57.4	141.7	34.7	-107.0	-	-	-	-
Meer leeg op 6 februari 1967. Meer weer vol op 29 april 1967.										
April '67	398	65.000	63.0	129.0	44.8	-84.2	-7	391	-0.2	62.8
Mei "	391	65.000	62.8	129.4	92.1	-37.7	-97	294	-1.7	61.1
Juni "	294	65.000	61.1	132.9	136.9	+4.0	-10	304	-0.2	61.3
Juli "	304	65.000	61.3	132.5	99.5	+33.0	-85	219	-1.9	57.4
Aug. "	219	65.000	59.4	136.9	49.9	-87.0	-226	-	-	-

Vervolg Tabel $N = 65000$ kW

$Q\uparrow = Q_{turbine}$; $Q\downarrow = Q_{instroom}$; $Q_{min.turb} = 129.0$ m³/s

$Q_{max.turb} = 147.7$ m³/s

Meer leeg op 16 augustus 1967.   Meer weer vol op 13 februari 1968

Produktietyd en te leveren hoeveelheden energie
Tabel N = 65.000 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6.
		Dagen	Maanden	
01-09-'63 Vol	04-10-'63 leeg.	34	1.47	65.000 * 34 * 24 = 53.0
04-10-'63 leeg	10-06-'64 Vol	246	8.20	–
10-06-'64 Vol	01-08-'64 leeg	51	1.70	65.000 * 34 * 24 = 79.6
01-08-'64 leeg	20-02-'65 Vol	199	6.63	–
20-02-'65 Vol	28-03-'65 leeg	38	1.27	65.000 * 38 * 24 = 59.3
28-03-'65 leeg	06-06-'65 Vol	68	2.27	–
06-06-'65 Vol	04-08-'65 leeg	58	1.93	65.000 * 58 * 24 = 90.5
04-08'65 leeg	27-03-'66 Vol	233	7.77	–
27-03-'66 Vol	01-05-'66 leeg	34	1.13	65.000 * 34 * 24 = 53.0
01-05-'66 leeg	23-06-'66 Vol	52	1.73	–
23-06-'66 Vol	16-08-'66 leeg	53	1.77	65.000 * 53 * 24 = 82.7
16-08-'66 leeg	30-12-'66 Vol	134	4.47	–
30-12-'66 Vol	06-02-'67 leeg	36	1.20	65.000 * 36 * 24 = 56.2
06-02-'67 leeg	29-04-'67 Vol	83	2.77	–

Vervolg Tabel N = 65000 kW. Produktietyd en te leveren hoeveelheden energie

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6
		Dagen	Maanden	
29-04-'67 Vol	16-08-'67 leeg	107	3.57	65.000 * 107 * 24 = 166.9
16-08-'67 leeg	01-02-'68 leeg	164		
		1590	53.00	Totaal 641.2 Gemiddeld/jaar 145.2

- Er wordt geleverd gedurende 411 dagen ≙ $411/1590 * 100\% = 25.9\%$ van de tyd
- Per jaar gemiddeld te leveren:
  $0.259 * 8760 * 65.000 = 147.5 * 10^6$ kWh.
- Relatieve fout hieruit: $\frac{147.5 - 145.2}{145.2} * 100\%$
  $= 1.6\%$ is toelaatbaar

Tabel N = 70.000 kW. Periode 01-09-1963 t/m 31-01-1968
Meer vol op 01-09-1963. • 55.0 ≤ H ≤ 63.0 [m]
• 97 ≤ Vn ≤ 398 [x 10⁶ m³]

O = overlaat in werking

Jaar en maand	Volume meer begin [x10⁶ m³]	N [kW]	H begin [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [x10⁶ m³]	Volume meer eind [x10⁶ m³]	ΔH [m]	H eind [m]
Sept. '63	398	70.000	63.0	138.9	31.3	-107.6	-279	119	-6.9	56.1
Okt. "	119	70.000	56.1	155.9	11.7	-144.2	-373	–	–	–

Meer loopt leeg op 2 oktober 1963.
Meer weer vol op 9 juni 1964.

Jaar en maand	Volume meer begin [x10⁶ m³]	N [kW]	H begin [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [x10⁶ m³]	Volume meer eind [x10⁶ m³]	ΔH [m]	H eind [m]
Juni '64	398	70.000	63.0	138.9	64.3	-74.6	-135	263	-2.6	60.4
Juli "	263	70.000	60.4	144.8	65.1	-79.7	-207	–	–	–

Meer loopt leeg op 24 juli 1964.
Meer weer vol op 7 februari 1965.

Jaar en maand	Volume meer begin [x10⁶ m³]	N [kW]	H begin [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [x10⁶ m³]	Volume meer eind [x10⁶ m³]	ΔH [m]	H eind [m]
Febr. '65	398	70.000	63.0	138.9	31.3	-107.6	-214	184	-4.5	58.5
Maart "	184	70.000	58.5	149.6	43.4	-106.2	–	–	–	–

Meer loopt leeg op 10 maart 1965.
Meer weer vol op 27 mei 1965.

Jaar en maand	Volume meer begin [x10⁶ m³]	N [kW]	H begin [m]	Q↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [x10⁶ m³]	Volume meer eind [x10⁶ m³]	ΔH [m]	H eind [m]
Mei '65	398	70.000	63.0	138.9	75.0	-63.9	-17	381	-0.3	62.7
Juni "	381	70.000	62.7	139.5	88.2	-51.3	-133	248	-2.5	60.2
Juli "	248	70.000	60.2	145.5	61.5	-84.0	-218	–	–	–

Meer loopt leeg op 21 juli 1965.
Meer weer vol op 5 maart 1965.

Q↑ = Q turbine; Q↓ = Q instroom; Q min. turb. = 138.9 m³/s; Q max. turb = 159.1 m³/s

Vervolg Tabel N = 70.000 kW. Periode 01-09-1963 t/m 31-01-1968
- $55.0 \leq H \leq 63.0$ [m]
- $97 \leq V_n \leq 398$ [$\times 10^6 m^3$]

Jaar en maand	V_n olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	N_n olume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
Maart '66	398	70.000	63.0	138.9	30.9	-108.0	-233	165	-5.1	57.9
April "	165	70.000	57.9	151.1	26.3	-124.8	-313	-	-	-

Meer loopt leeg op 6 april 1966.
Meer weer vol op 15 juni 1966.

Jaar en maand	V_n olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	N_n olume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
Juni '66	398	70.000	63.0	138.9	82.9	-56.0	-73	325	-1.3	61.7
Juli "	325	70.000	61.7	141.8	68.2	-73.6	-191	134	-5.0	56.7
Aug. "	134	70.000	56.7	154.2	55.4	-98.8	-	-	-	-

Meer loopt leeg op 4 augustus 1966.
Meer weer vol op 10 januari 1967.

Jaar en maand	V_n olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	N_n olume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
Jan. '67	398	70.000	63.0	138.9	33.7	-105.2	-182	216	-3.7	59.3
Febr. "	216	70.000	59.3	147.6	34.7	-112.9	-293	-	-	-

Meer loopt leeg op 12 februari 1967.
Meer weer vol op 2 mei 1967.

Jaar en maand	V_n olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	Q↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	N_n olume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]
Mei '67	398	70.000	63.0	138.9	92.1	-46.8	-113	285	-2.0	61.0
Juni "	285	70.000	61.0	143.4	136.9	-6.5	-17	268	-0.4	60.6
Juli "	268	70.000	60.6	144.3	99.5	-44.8	-116	152	-3.1	57.5
Aug. "	152	70.000	57.5	152.2	49.9	-102.3	-265	-	-	-

Vervolg Tabel N= 70.000 kW.
Periode: 01-09-1963 t/m 31-01-1968

Meer loopt leeg op 6 augustus 1967. Meer weer vol op 5 februari 1968.

Produktietyd en te leveren hoeveelheden energie

Tabel N= 70.000 kW. Periode 01-09-1963 t/m 31-01-1968

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6.
		Dagen	Maanden	
01-09-'63 Vol	02-10-'63 leeg	32	1.07	70.000 * 32 * 24 = 53.8
02-10-'63 leeg	09-06-'64 Vol	247	8.23	–
09-06-'64 Vol	24-07-'64 leeg	45	1.50	70.000 * 45 * 24 = 75.6
24-07-'64 leeg	07-02-'65 Vol	193	6.43	–
07-02-'65 Vol	10-03-'65 leeg	33	1.10	70.000 * 33 * 24 = 55.4
10-03-'65 leeg	27-05-'65 Vol	77	2.57	–
27-05-'65 Vol	21-07-'65 leeg	54	1.80	70.000 * 54 * 24 = 90.7
21-07-'65 leeg	05-03-'6 Vol	224	7.47	–
05-03-'66 Vol	06-04-'66 leeg	31	1.03	70.000 * 31 * 24 = 52.1
06-04-'66 leeg	15-06-'66 Vol	69	2.30	–
15-06-'66 Vol	04-08-'66 leeg	49	1.63	70.000 * 49 * 24 = 82.3
04-08-'66 leeg	10-01-'67 Vol	156	5.20	–
10-01-'67 Vol	12-02-'67 leeg	32	1.07	70.000 * 32 * 24 = 53.8
12-02-'67 leeg	02-05-'67 Vol	80	2.67	–

Vervolg Tabel N = 70.000 kW Produktietyd en te leveren hoeveelheden energie.

Data voor meerinhoud		Duur		Hoeveelheden energie in kWh * 10^6.
		Dagen	Maanden	
02-05-'67 Vol	06-08-'67 Leeg	94	3.13	70.000 * 94 * 24 = 157.2
06-08-'67 Leeg	01-02-'68 Leeg	174		
		1590	53.00	Totaal 621.6
				Gemiddeld/jaar 140.8

- Er wordt geleverd gedurende 370 dagen ≙ $370/1590 * 100\% = 23.3\%$ van de tyd
- Per jaar gemiddeld te leveren: $0.233 * 8760 * 70.000 = 142.9 * 10^6$ kWh
- Relatieve fout hierin: $\frac{142.9 - 140.8}{140.8} * 100\%$

$= 1.5\%$ is toelaatbaar.

5.4.7. Energieberekeningen volledige tydreeks (30 jaren)

Tabel $N = 25.000$ kW ; $Q_{turb.\,gem.} = \frac{12500}{8 \times 60} = 52.1\ m^3/s.$

Vol	:	1 jan. 1952	Energie	:	11.1 mnd.
Leeg	:	3 dec. 1952	Geen energie	:	3.00 mnd.
Vol	:	2 maart 1953	Energie	:	9.40 mnd.
Leeg	:	12 dec. 1953	Geen energie	:	3.30 mnd.
Vol	:	20 maart 1954	Energie	:	9.73 mnd.
Leeg	:	12 jan. 1955	Geen energie	:	2.23 mnd
Vol	:	19 maart 1955	Energie	:	9.16 mnd.
Leeg	:	24 dec. 1955	geen energie	:	2.13 mnd.
Vol	:	28 febr. 1956	Energie	:	12.00 mnd.
Leeg	:	1 maart 1957	Geen energie	:	2.40 mnd.
Vol	:	12 mei 1957	Energie	:	6.80 mnd.
Leeg	:	6 dec. 1957	Geen energie	:	3.90 mnd.
Vol	:	3 april 1958	Energie	:	6.23 mnd.
Leeg	:	10 okt. 1958	Geen energie	:	6.47 mnd.
Vol	:	24 april 1959	Energie	:	6.70 mnd.
Leeg	:	15 nov. 1959	Geen energie	:	5.40 mnd.
Vol	:	27 april 1960	Energie	:	7.30 mnd.
Leeg	:	6 dec. 1960	Geen energie	:	5.33 mnd.
Vol	:	22 mei 1961	Energie	:	6.47 mnd.
Leeg	:	6 dec. 1961	Geen energie	:	3.67 mnd.
Vol	:	26 maart 1962	Energie	:	7.83 mnd.
Leeg	:	21 nov. 1962	Geen energie	:	2.80 mnd.
Vol	:	15 febr. 1963	Energie	:	9.83 mnd.

$H_{gem} = 60$ m. Basisberekening: gereduceerde afvoer- [illegible]

<u>Vervolg</u> Tabel N = 25.000 kW. Q turb. gem = 52.1 m³/s bij Hgem = 60 m. Tijdreeks 30 jaren

Leeg : 10 dec. 1963	Geen energie : 6.33 mnd.
Vol : 20 juni 1964	Energie : 4.70 mnd.
Leeg : 11 nov. 1964	Geen energie : 4.70 mnd.
Vol : 2 april 1965	Energie : 7.30 mnd.
Leeg : 11 nov. 1965	Geen energie : 6.03 mnd.
Vol : 12 mei 1966	Energie : 6.87 mnd.
Leeg : 8 dec. 1966	Geen energie : 3.67 mnd.
Vol : 28 maart 1967	Energie : 8.00 mnd.
Leeg : 28 nov. 1967	Geen energie : 2.37 mnd.
Vol : 9 febr. 1968	Energie : 21.10 mnd.
Leeg : 12 nov. 1969	Geen energie : 4.90 mnd.
Vol : 9 april 1970	Energie : 7.90 mnd.
Leeg : 6 dec. 1970	Geen energie : 2.33 mnd.
Vol : 16 febr. 1971	Energie : 11.07 mnd.
Leeg : 18 jan. 1972	Geen energie : 2.10 mnd.
Vol : 21 maart 1972	Energie : 8.10 mnd.
Leeg : 24 nov. 1972	Geen energie : 4.40 mnd.
Vol : 6 april 1973	Energie : 20.60 mnd.
Leeg : 24 dec. 1974	Geen energie : 3.83 mnd.
Vol : 19 april 1975	Energie : 19.37 mnd.
Leeg : 1 dec. 1976	Geen energie : 4.57 mnd.
Vol : 17 april 1977	Energie : 7.03 mnd.

Vervolg Tabel N = 25000 kW. $Q_{turb. gem} = 52.1\ m^3/s$ by $H_{gem} = 60$ m. Volledige tydreeks van 30 jaren

Leeg	:	10 nov. 1977
Vol	:	9 maart 1978
Leeg	:	12 dec. 1978
Vol	:	24 maart 1979
Leeg	:	10 dec. 1979
Vol	:	15 april 1980
Leeg	:	6 dec. 1980
Vol	:	23 maart 1981
Leeg	:	31 dec. 1981

Geen energie	:	3.70	mnd.
Energie	:	9.10	mnd.
Geen energie	:	3.40	mnd.
Energie	:	0.80	mnd.
Geen energie	:	3.90	mnd.
Energie	:	7.70	mnd.
Geen energie	:	3.57	mnd.
Energie	:	9.23	mnd.

Tabel N = 25000 kW. Q gem. turb. = 52.1 m^3/s.
Produktietyd energie by volledige tydreeks van 30 jaren op basis van getekende gereduceerde afwersommatiekromme. tekening nr. (1)

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Wél energie (maanden)	Geen energie (maanden)
11.00	3.0
9.40	3.3
9.73	2.2
9.16	2.1
12.00	2.4
6.80	3.9
6.23	6.5
6.70	5.4
7.30	5.5
6.47	3.7
7.83	2.8
9.83	6.3
4.70	4.7
7.3	6.0
6.87	3.6
8.00	2.4
21.10	4.9
7.90	2.3
11.07	2.1
8.10	4.4

Vervolg Tabel N = 25.000 kW
Produktietyd energie by volledige tydreeks van 30 jaren.

	Wél energie (maanden)	Géén energie (maanden)
	20.6	3.8
	19.37	4.6
	7.03	3.7
	9.10	3.4
	8.80	3.9
	7.70	3.5
	9.23	—
Σ	259.40	100.60

Controle:
259.4 + 100.6 = 360 mnd.

- Produktie gedurende: 259.4/360 * 100% = 72 % van de tyd.
- Totale hoeveelheid geleverde energie:
  259.4 * 30 * 24 * 25000 = 4.67 * 10^9 kWh
- Gemiddeld per jaar: 155.64 * 10^6 kWh.
- Te leveren gemiddeld per jaar op basis van 8760 uren (365 * 24): 0.72 * 8760 * 25000 = 157.7 * 10^6 kWh.
- Relatieve fout hierin: $\frac{157.7 - 155.6}{155.6}$ * 100% = 1.4 %

is toelaatbaar.

Tabel N = 37.500 kW. $Q_{turb.\,gem.} = \frac{37.500}{8 \times 60} = 78.1\ m^3/s$
by H_{gem} = 60 m. Volledige tydreeks (30 jaren)

Vol : 1 jan. 1952	
	Energie : 3.06 mnd.
Leeg : 2 april 1952	
	Geen energie : 1.70 mnd.
Vol : 23 mei 1952	
	Energie : 4.90 mnd.
Leeg : 20 okt. 1952	
	Geen energie : 3.87 mnd.
Vol : 16 febr. 1953	
	Energie : 8.37 mnd
Leeg : 27 okt. 1953	
	Geen energie : 4.57 mnd
Vol : 14 maart 1954	
	Energie : 7.67 mnd.
Leeg : 4. nov. 1954	
	Geen energie : 3.90 mnd.
Vol : 1 maart 1955	
	Energie : 8.20 mnd.
Leeg : 7 nov. 1955	
	Geen energie : 3.37 mnd.
Vol : 10 febr. 1956	
	Energie : 8.30 mnd.
Leeg : 27 okt. 1956	
	Geen energie : 3.50 mnd.
Vol : 12 febr. 1957	
	Energie : 8.50 mnd.
Leeg : 27 okt. 1957	
	Geen energie : 5.10 mnd.
Vol : 30 maart 1958	
	Energie : 4.73 mnd.
Leeg : 22 aug. 1958	
	Geen energie : 7.83 mnd.
Vol : 17 april 1959	
	Energie : 5.60 mnd.
Leeg : 5 okt. 1959	
	Geen energie : 6.53 mnd.
Vol : 21 april 1960	
	Energie : 6.27 mnd.
Leeg : 29 okt. 1960	
	Geen energie : 6.40 mnd.
Vol : 11 mei 1961	
	Energie : 5.17 mnd.
Leeg : 16 okt. 1961	
	Geen energie : 3.73 mnd.
Vol : 8 febr. 1962	
	Energie : 7.73 mnd.

Berekening analytisch.

Vervolg Tabel $N = 37500$ kW. $Q_{turb.\,gem.} = 78.2\ m^3/s$ by $H_{gem.} = 60$ m. Volledige tydreeks (30 jaren)

Leeg : 1 okt. 1962	Geen energie : 4.37 mnd.
Vol : 11 febr. 1963	Energie : 8.50 mnd.
Leeg : 26 okt. 1963	Geen energie : 7.60 mnd.
Vol : 14 juni 1964	Energie : 3.50 mnd.
Leeg : 29 sept. 1964	Geen energie : 5.90 mnd.
Vol : 26 maart 1965	Energie : 5.20 mnd.
Leeg : 2 sept. 1965	Geen energie : 7.97 mnd.
Vol : 1 mei 1966	Energie : 5.37 mnd.
Leeg : 12 okt. 1966	Geen energie : 5.20 mnd.
Vol : 18 maart 1967	Energie : 6.90 mnd.
Leeg : 15 okt. 1967	Geen energie : 4.63 mnd.
Vol : 4 maart 1968	Energie : 8.10 mnd.
Leeg : 7 nov. 1968	Geen energie : 2.47 mnd.
Vol : 21 jan. 1969	Energie : 8.23 mnd.
Leeg : 28 sept. 1969	Geen energie : 6.27 mnd.
Vol : 6 april 1970	Energie : 6.47 mnd.
Leeg : 20 okt. 1970	Geen energie : 3.60 mnd.
Vol : 8 febr. 1971	Energie : 9.87 mnd.
Leeg : 19 nov. 1971	Geen energie : 3.60 mnd.
Vol : 7 maart 1972	Energie : 7.23 mnd.
Leeg : 14 okt. 1972	Geen energie : 5.37 mnd.
Vol : 25 maart 1973	Energie : 6.50 mnd
Leeg : 10 okt. 1973	Geen energie : 3.40 mnd.

<u>Vervolg</u> Tabel N = 37500 kW. $Q_{turb.gem.}$ = 78.1 m³/s by H_{gem} = 60 m. Volledige tydreeks (30 jaren)

Vol	:	22 jan. 197
heeg	:	7 nov. 1974
Vol	:	3 april 1975
heeg	:	29 nov. 1975
Vol	:	25 febr. 1976
heeg	:	16 okt. 1976
Vol	:	13 april 1977
heeg	:	20 sept. 1977
Vol	:	24 febr. 1978
heeg	:	9 okt. 1978
Vol	:	7 maart 1979
heeg	:	27 okt. 1979
Vol	:	4 april 1980
heeg	:	13 okt. 1980
Vol	:	6 maart 1981
heeg	:	9 nov. 1981

Energie	:	9.50 mnd.
Geen energie	:	4.87 mnd.
Energie	:	7.87 mnd.
Geen energie	:	2.87 mnd.
Energie	:	7.70 mnd
geen energie	:	5.90 mnd.
Energie	:	5.23 mnd.
Geen energie	:	5.13 mnd.
Energie	:	7.50 mnd.
Geen energie	:	4.93 mnd.
Energie	:	7.67 mnd.
Geen energie	:	5.23 mnd.
Energie	:	6.30 mnd.
Geen energie	:	4.77 mnd.
Energie	:	8.10 mnd.
Geen energie	:	1.70 mnd.

Tabel N = 37500 kW. Q turb. gem = 78.1 m³/s.

Produktietyd energie by volledige tydreeks van 30 jaren; analytisch;

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Wél energie (maanden	Géén energie
4.00	1.00
4.67	3.87
8.37	4.57
7.67	3.90
8.20	3.37
8.30	3.50
8.50	5.10
4.73	7.83
5.60	6.53
6.27	6.40
5.17	3.73
7.73	4.37
8.50	7.60
3.50	5.90
5.20	7.97
5.37	5.20
6.90	4.63
8.10	2.47
8.23	6.27
6.47	3.60
9.37	3.60

Vervolg Tabel N = 37500 kW.

Produktietyd energie by volledige tydreeks van 30 jaren

Wél energie (maanden)	Géén energie (maanden)
7.23	5.37
6.50	3.40
9.50	4.87
7.87	2.87
7.70	5.90
5.23	5.13
7.50	4.93
7.67	5.23
6.30	4.77
8.10	1.70
Σ = 214.50	= 145.50

Controle: 214.5 + 145.5 = 360 mnd.

- Produktie gedurende: $\frac{214.5}{360} * 100\% = 60\%$ van de tyd
- Totale hoeveelheid geleverde energie:

  $214.5 * 30 * 24 * 37500 = 5.8 * 10^9$ kWh.
- Gemiddeld per jaar: $194.4 * 10^6$ kWh
- Te leveren gemiddeld per jaar op basis van 8760 uur : $0.60 * 8760 * 37500 = 197.1 * 10^6$ kWh
- Relatieve fout hierin: $\frac{197.1 - 194.4}{194.4} * 100\% = 1.4\%$ is toelaatbaar.

Tabel N = 45.000 kW. $Q_{turb.gem} = \frac{45000}{8 \times 60} = 93.8\ m^3/s$ by $H_{gem} = 60\ m$. Volledige tydreeks (30 jaren). Berekening analytisch

Vol : 1 jan. 1952			Energie	:	3.20	mnd.
Leeg : 6 april 1952			Geen energie	:	1.60	mnd.
Vol : 24 mei 1952			Energie	:	4.20	mnd.
Leeg : 1 okt. 1952			Geen energie	:	4.43	mnd.
Vol : 13 febr. 1953			Energie	:	7.90	mnd.
Leeg : 10 okt. 1953			Geen energie	:	5.03	mnd.
Vol : 11 maart 1954			Energie	:	7.03	mnd.
Leeg : 12 okt. 1954			Geen energie	:	4.23	mnd.
Vol : 19 febr. 1955			Energie	:	7.93	mnd.
Leeg : 17 okt. 1955			Geen energie	:	3.90	mnd.
Vol : 14 febr. 1956			Energie	:	7.67	mnd.
Leeg : 4 okt. 1956			Geen energie	:	4.13	mnd.
Vol : 8 febr. 1957			Energie	:	2.07	mnd.
Leeg : 10 april 1957			Geen energie	:	1.37	mnd.
Vol : 21 mei 1957			Energie	:	4.67	mnd.
Leeg : 11 okt. 1957			Geen energie	:	5.53	mnd.
Vol : 27 maart 1958			Energie	:	4.07	mnd.
Leeg : 29 juli 1958			Geen energie	:	8.30	mnd.
Vol : 8 april 1959			Energie	:	4.87	mnd
Leeg : 4 sept. 1959			Geen energie	:	7.23	mnd.
Vol : 11 april 1960			Energie	:	6.03	mnd.
Leeg : 12 okt. 1960			Geen energie	:	6.67	mnd.
Vol : 2 mei 1961			Energie	:	4.10	mnd.

Vervolg Tabel $N = 45.000$ kW. $Q_{turb.gem.} = 93.8\ m^3/s$
by $H_{gem} = 60.$ m. Volledige tydreeks van 30 jaren
Berekening analytisch

Leeg : 5 sept. 1961	Geen energie : 5.30 mnd.
Vol : 14 febr. 1962	Energie : 1.87 mnd.
Leeg : 10 april 1962	Geen energie : 1.67 mnd.
Vol : 30 mei 1962	Energie : 3.73 mnd.
Leeg : 22 sept. 1962	Geen energie : 4.60 mnd.
Vol : 10 febr. 1963	Energie : 8.00 mnd.
Leeg : 10 okt. 1963	Geen energie : 8.03 mnd.
Vol : 11 juni 1964	Energie : 3.03 mnd.
Leeg : 12 sept. 1964	Geen energie : 6.30 mnd.
Vol : 21 maart 1965	Energie : 3.10 mnd.
Leeg : 24 juni 1965	Geen energie : 2.30 mnd.
Vol : 3 sept. 1965	Energie : 1.43 mnd.
Leeg : 16 okt. 1965	Geen energie : 6.83 mnd.
Vol : 11 mei 1966	Energie : 4.03 mnd.
Leeg : 12 sept. 1966	Geen energie : 5.70 mnd.
Vol : 3 maart 1967	Energie : 6.13 mnd.
Leeg : 7 sept. 1967	Geen energie : 5.57 mnd.
Vol : 24 febr. 1968	Energie : 7.70 mnd.
Leeg : 15 okt. 1968	Geen energie : 2.97 mnd.
Vol : 14 jan. 1969	Energie : 7.83 mnd.
Leeg : 9 sept. 1969	Geen energie : 6.80 mnd.
Vol : 3 april 1970	Energie : 5.07 mnd.
Leeg : 29 sept. 1970	Geen energie : 4.20 mnd.

Vervolg Tabel $N = 45000$ kW. $Q_{turb.\ gem.} = 93.8\ m^3/s$ by $H_{gem} = 60$ m. Volledige tydreeks van 30 jaren. Berekening analytisch.

Vol : 5 febr. 1971	Energie : 8.83 mnd.
Leeg : 30 okt. 1971	Geen energie : 4.13 mnd.
Vol : 4 maart 1972	Energie : 6.80 mnd.
Leeg : 28 sept. 1972	Geen energie : 5.73 mnd.
Vol : 20 maart 1973	Energie : 4.73 mnd.
Leeg : 12 aug. 1973	Geen energie : 3.93 mnd.
Vol : 10 dec. 1973	Energie : 3.43 mnd.
Leeg : 23 maart 1974	Geen energie : 1.70 mnd.
Vol : 14 mei 1974	Energie : 5.17 mnd.
Leeg : 19 okt. 1974	Geen energie : 5.13 mnd.
Vol : 23 maart 1975	Energie : 7.60 mnd.
Leeg : 11 nov. 1975	Geen energie : 3.27 mnd.
Vol : 19 febr. 1976	Energie : 7.43 mnd.
Leeg : 2 okt. 1976	Geen energie : 6.30 mnd.
Vol : 11 april 1977	Energie : 3.97 mnd.
Leeg : 10 aug. 1977	Geen energie : 5.57 mnd.
Vol : 27 jan. 1978	Energie : 2.63 mnd.
Leeg : 16 april 1978	Geen energie : 1.27 mnd.
Vol : 24 mei 1978	Energie : 3.83 mnd.
Leeg : 19 sept. 1978	Geen energie : 5.17 mnd.
Vol : 24 febr. 1979	Energie : 7.47 mnd.
Leeg : 8 okt. 1979	Geen energie : 5.67 mnd.
Vol : 28 maart 1980	Energie : 5.87 mnd.

Vervolg Tabel N = 45.000 kW. Q turb.gem. = 93.8 m³/s.
by Hgem = 60 m. Volledige tydruk.

Leeg : 24 sept. 1980		Geen energie	:	5.07	mnd.
Vol : 26 febr. 1981		Energie	:	7.73	mnd.
Leeg : 18 okt. 1981		Geen energie	:	2.40	mnd.

Tabel N = 45000 kW. $Q_{turb.gem} = 93.8\ m^3/s$
Produktietyd energie by volledige tydreeks van 30 jaren analytisch;

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Wél energie (maanden)	Geen energie (maanden)
3.2	1.60
4.2	4.43
7.9	5.03
7.03	4.23
7.93	3.90
7.67	4.13
2.07	1.37
4.67	5.53
4.07	8.30
4.87	7.23
6.03	6.67
4.10	5.30
1.87	1.67
373	· 4.6
8.0	8.03
3.03	6.30
3.10	2.30
1.43	6.83
4.03	5.70
6.13	5.57

Vervolg Tabel N = 45000 kW
Produktietyd energie bij volledige tydreeks van 30 jaren.

	Wél energie (maanden)	Géén energie (maanden)
	7.70	2.97
	7.83	6.80
	5.87	4.20
	8.83	4.13
	6.00	5.73
	4.73	3.93
	3.43	1.70
	5.17	5.13
	7.60	3.27
	7.43	6.30
	3.97	5.57
	2.63	1.27
	3.83	5.17
	4.47	5.67
	5.87	5.07
	7.73	2.40
Σ	188.95 → 189	171.04 → 171

• Controle: 189 + 171 = 360 mnd

• Produktie gedurende $\frac{189}{360} * 100\% = 52.7\%$ van de tyd

• Totale hoeveelheid geleverde energie: $189 * 30 * 24 * 45000 = 612.4 * 10^9$ kWh

• Gemiddeld per jaar: $204.1 * 10^6$ kWh

• Te leveren per jaar op basis van 8760 uur: $0.527 * 8760 * 45000 = 207.7 * 10^6$ kWh

• Relatieve fout hieruit: $\frac{207.7 - 204.1}{204.1} * 100\% = 1.8\%$ is toelaatba

Tabel N = 55.000 kW. Berekening analytisch.

$Q_{turb.gem} = \frac{55.000}{8 * 60} = 114.6 \ m^3/s$ bij $H_{gem} = 60$ m. Volledige tijdreeks

Vol : 1 jan. 1952	Energie : 1.53 mnd.
leeg : 16 febr. 1952	Geen energie : 2.67 mnd.
Vol : 6 mei 1952	Energie : 3.87 mnd.
leeg : 2 sept. 1952	Geen energie : 5.13 mnd.
Vol : 6 febr. 1953	Energie : 2.40 mnd.
leeg : 18 sept. 1953	Geen energie : 5.60 mnd.
Vol : 6 maart 1954	Energie : 6.37 mnd.
leeg : 17 sept. 1954	Geen energie : 4.30 mnd.
Vol : 26 jan. 1955	Energie : 2.50 mnd.
leeg : 11 april 1955	Geen energie : 1.20 mnd.
Vol : 17 mei 1955	Energie : 4.33 mnd.
leeg : 27 sept. 1955	Geen energie : 4.47 mnd.
Vol : 11 febr. 1956	Energie : 6.87 mnd.
leeg : 2 sept. 1956	Geen energie : 4.02 mnd.
Vol : 9 jan. 1957	Energie : 1.60 mnd.
leeg : 27 febr. 1957	Geen energie : 2.47 mnd.
Vol : 11 mei 1957	Energie : 4.30 mnd.
leeg : 20 sept. 1957	Geen energie : 5.97 mnd.
Vol : 19 maart 1958	Energie : 3.03 mnd.
leeg : 20 juni 1958	Geen energie : 8.13 mnd.
Vol : 24 febr. 1959	Energie : 1.37 mnd.
leeg : 5 april 1959	Geen energie : 1.67 mnd.
Vol : 25 mei 1959	Energie : 2.93 mnd.

Vervolg Tabel N = 55.000 kW. Berekening analytisch $Q_{turb. gem.} = 1146\ m^3/s$ bij $H_{gem} = 60$ m. Volledige tijdreeks.

Leeg	:	23 aug. 1959	Geen energie	:	7.37	mnd.
Vol	:	4 april 1960	Energie	:	5.77	mnd.
Leeg	:	27 sept. 1960	Geen energie	:	6.47	mnd.
Vol	:	11 april 1961	Energie	:	1.20	mnd.
Leeg	:	17 mei 1961	Geen energie	:	1.63	mnd.
Vol	:	6 juli 1961	Energie	:	2.27	mnd.
Leeg	:	14 sept. 1961	Geen energie	:	5.20	mnd.
Vol	:	20 febr. 1962	Energie	:	1.43	mnd.
Leeg	:	3 april 1962	Geen energie	:	1.07	mnd.
Vol	:	29 mei 1962	Energie	:	3.17	mnd.
Leeg	:	4 sept. 1962	Geen energie	:	5.10	mnd.
Vol	:	7 febr. 1963	Energie	:	7.27	mnd.
Leeg	:	15 sept. 1963	Geen energie	:	8.73	mnd.
Vol	:	7 juni 1964	Energie	:	2.10	mnd.
Leeg	:	10 aug. 1964	Geen energie	:	6.47	mnd.
Vol	:	24 febr. 1965	Energie	:	1.53	mnd.
Leeg	:	10 april 1965	Geen energie	:	2.00	mnd.
Vol	:	10 juni 1965	Energie	:	2.33	mnd.
Leeg	:	20 aug. 1965	Geen energie	:	7.20	mnd.
Vol	:	26 maart 1966	Energie	:	1.47	mnd.
Leeg	:	10 mei 1966	Geen energie	:	1.63	mnd.
Vol	:	29 juni 1966	Energie	:	2.23	mnd.

Vervolg Tabel N = 55000 kW. Berekening analytisch Q turb. gem. = 114.6 m^3/s bij H_{gem} = 60 m. Volledige tijdreeks

Leeg	:	6 sept. 1966	Geen energie	:	5.73 mnd.
Vol	:	28 febr. 1967	Energie	:	1.73 mnd.
Leeg	:	20 april 1967	Geen energie	:	1.40 mnd.
Vol	:	2 juni 1967	Energie	:	3.43 mnd.
Leeg	:	15 sept. 1967	Geen energie	:	5.40 mnd.
Vol	:	27 febr. 1968	Energie	:	6.70 mnd.
Leeg	:	18 sept. 1968	Geen energie	:	3.50 mnd.
Vol	:	3 jan. 1969	Energie	:	2.23 mnd.
Leeg	:	10 maart 1969	Geen energie	:	0.97 mnd.
Vol	:	19 april 1969	Energie	:	4.07 mnd.
Leeg	:	21 aug. 1969	Geen energie	:	7.10 mnd.
Vol	:	24 maart 1970	Energie	:	4.57 mnd.
Leeg	:	11 aug. 1970	Geen energie	:	4.07 mnd
Vol	:	7 jan. 1971	Energie	:	9.03 mnd.
Leeg	:	8 okt. 1971	Geen energie	:	4.50 mnd
Vol	:	23 febr. 1972	Energie	:	6.47 mnd.
Leeg	:	7 sept 1972	Geen energie	:	6.03 mnd.
Vol	:	8 maart 1973	Energie	:	1.47 mnd.
Leeg	:	22 april 1973	Geen energie	:	1.57 mnd.
Vol	:	9 juni 1973	Energie	:	2.60 mnd.
Leeg	:	27 aug. 1973	Geen energie	:	3.93 mnd.
Vol	:	25 dec. 1973	Energie	:	2.17 mnd.
Leeg	:	30 febr. 1974	Geen energie	:	1.63 mnd.

Vervolg Tabel N = 55.000 kW. Berekening analytisch
$Q_{turb. gem} = 114.6\ m^3/s$. bij $H_{gem} = 60m$. Volledige tijdreeks.

Vol : 19 april 1974	Energie : 3.77 mnd.
leeg : 12 aug. 1974	Geen energie : 2.97 mnd.
Vol : 11 nov. 1974	Energie : 1.20 mnd.
leeg : 17 dec. 1974	Geen energie : 3.97 mnd.
Vol : 16 april 1975	Energie : 5.77 mnd.
leeg : 9 okt. 1975	Geen energie : 3.80 mnd.
Vol : 3 febr. 1976	Energie : 7.40 mnd.
leeg : 15 sept. 1976	Geen energie : 6.70 mnd.
Vol : 6 april 1977	Energie : 2.40 mnd.
leeg : 18 juni 1977	Geen energie : 5.67 mnd.
Vol : 8 dec. 1977	Energie : 1.33 mnd.
leeg : 18 jan. 1978	Geen energie : 2.67 mnd.
Vol : 8 april 1978	Energie : 3.30 mnd.
leeg : 17 juli 1978	Geen energie : 1.90 mnd.
Vol : 14 sept. 1978	Energie : 1.30 mnd.
leeg : 23 okt. 1978	Geen energie : 5.60 mnd.
Vol : 11 maart 1979	Energie : 5.63 mnd.
leeg : 30 aug. 1979	Geen energie : 5.63 mnd.
Vol : 19 febr. 1980	Energie : 1.30 mnd.
leeg : 28 maart 1980	Geen energie : 1.37 mnd.
Vol : 19 mei 1980	Energie : 3.73 mnd.
leeg : 1 sept. 1980	Geen energie : 5.46 mnd.
Vol : 13 febr. 1981	Energie : 1.63 mnd.

Vervolg Tabel N = 55.000 kW. Berekening analytisch
Q turb. gem. = 114.6 m^3/s bij Hgem = 60 m. Volledige tijdreeks.

Leeg : 2 april 1981 Vol : 11 mei 1981 Leeg : 30 sept. 1981 Vol : –	Geen energie : 1.30 mnd. Energie : 4.63 mnd. Geen energie : 3.00 mnd.

Tabel N = 55.000 kW. Q turb. gem = 114.6 m³/s
Produktietyd energie by volledige tydreeks van 30 jaren; analytisch; op t=0 (1 januari 1952) meer vol

Wél energie (maanden)	Géén energie (maanden)
1.53	2.67
3.87	5.13
7.40	5.60
6.37	4.30
2.51	1.20
4.33	4.47
6.87	4.07
1.60	2.42
4.30	5.97
3.03	8.13
1.37	1.67
2.93	7.37
5.77	6.47
1.20	1.63
2.27	5.20
1.43	1.07
3.17	5.10
7.27	8.73
2.10	6.47
1.53	2.00
2.33	7.20

Vervolg Tabel N = 55000 kW
Produktietyd energie by volledige tydreeks van 30 jaren

Wél energie (maanden)	Géén energie (maanden)
1.47	1.63
2.23	5.73
1.73	1.40
3.43	5.40
6.70	3.50
2.23	0.97
4.07	7.10
4.57	4.87
9.03	4.50
6.47	6.63
1.47	1.57
2.60	3.93
2.17	1.63
3.77	2.97
1.20	3.97
5.77	3.80
7.40	6.70
2.40	5.67
1.33	2.67
3.30	1.90
1.30	5.60

Vervolg Tabel N = 55000 kW
Produktietyd energie by volledige tydreeks van 30 jaren.

	Wél energie (maanden)	Géén energie (maanden)
	5.63	5.63
	1.30	1.37
	3.73	5.46
	1.63	1.30
	4.63	3.00
Σ	164.75	195.25

Controle: 164.75
195.25 +
360 mnd.

- Produktie gedurende:

  $164.75/360 * 100\% = 45.8\%$ van de tyd

- Totale hoeveelheid geleverde energie:

  $164.75 * 30 * 24 * 55000 = 6.52 * 10^9$ kWh.

- Gemiddeld per jaar: $217.5 * 10^6$ kWh.

- Te leveren per jaar op basis van 8760 uren:

  $0.458 * 8760 * 55000 = 220.7 * 10^6$ kWh.

- Relatieve fout is: $\frac{220.7 - 217.5}{217.5} * 100\% = 1.5\%$ is toelaatbaar.

Tabel N = 65000 kW Berekening analytisch

$Q_{turb.\,gem.} = \frac{65.000}{8 \times 60} = 135.4\ m^3/s$ by $H_{gem} = 60m$. Volledige tydreeks.

Vol :	1 jan. 1952	Energie :	1.07 mnd.
Leeg :	2 febr. 1952	Geen energie :	2.73 mnd.
Vol :	24 april 1952	Energie :	2.67 mnd.
Leeg :	19 juli 1952	Geen energie :	1.67 mnd.
Vol :	4 sept. 1952	Energie :	1.03 mnd.
Leeg :	5 okt. 1952	Geen energie :	4.30 mnd.
Vol :	14 febr. 1953	Energie :	6.60 mnd.
Leeg :	2 sept. 1953	Geen energie :	5.93 mnd.
Vol :	30 febr. 1954	Energie :	5.87 mnd.
Leeg :	26 aug. 1954	Geen energie :	4.10 mnd.
Vol :	29 dec. 1954	Energie :	1.13 mnd.
Leeg :	3 febr. 1955	Geen energie :	1.73 mnd.
Vol :	25 maart 1955	Energie :	4.40 mnd.
Leeg :	7 aug. 1955	Geen energie :	2.87 mnd.
Vol :	3 nov. 1955	Energie :	0.87 mnd.
Leeg :	1 dec. 1955	Geen energie :	2.67 mnd.
Vol :	21 febr. 1956	Energie :	4.93 mnd.
Leeg :	19 juli 1956	Geen energie :	2.13 mnd.
Vol :	23 sept. 1956	Energie :	1.03 mnd.
Leeg :	24 okt. 1956	Geen energie :	3.70 mnd.
Vol :	15 febr. 1957	Energie :	1.13 mnd.
Leeg :	19 maart 1957	Geen energie :	1.87 mnd.

Vervolg Tabel N = 65000 kW. Berekening analytisch
Q turb. gem. = 135.4 m^3/s. bij H_{gem} = 60 m. Volledige tijdreeks.

Vol	:	15 mei 1957	Energie	:	3.63 mnd.
leeg	:	4 sept. 1957	Geen energie	:	6.23 mnd.
Vol	:	11 maart 1958	Energie	:	2.03 mnd.
leeg	:	12 mei 1958	Geen energie	:	2.03 mnd.
Vol	:	13 juli 1958	Energie	:	1.07 mnd.
leeg	:	15 aug. 1958	Geen energie	:	7.97 mnd.
Vol	:	14 april 1959	Energie	:	2.07 mnd.
leeg	:	16 juni 1959	Geen energie	:	1.37 mnd.
Vol	:	27 juli 1959	Energie	:	1.23 mnd.
leeg	:	4 sept. 1959	Geen energie	:	7.23 mnd.
Vol	:	11 april 1960	Energie	:	4.07 mnd.
leeg	:	7 sept. 1960	Geen energie	:	6.03 mnd.
Vol	:	8 maart 1961	Energie	:	1.00 mnd.
leeg	:	8 april 1961	Geen energie	:	2.67 mnd.
Vol	:	28 juni 1961	Energie	:	1.97 mnd.
leeg	:	27 aug. 1961	Geen energie	:	5.27 mnd.
Vol	:	5 febr. 1962	Energie	:	1.13 mnd.
leeg	:	9 maart 1962	Geen energie	:	2.40 mnd.
Vol	:	24 mei 1962	Energie	:	2.67 mnd.
leeg	:	11 aug. 1962	Geen energie	:	5.53 mnd.
Vol	:	27 jan. 1963	Energie	:	2.03 mnd.
leeg	:	28 maart 1963	Geen energie	:	1.20 mnd.

<u>Vervolg</u> Tabel N = 65000 kW. Berekening analytisch.
Qturb. gem. = 135.4 m^3/s. bij Hgem = 60 m. Volledige tijdreeks.

Vol : 4 mei 1963	
	Energie : 4.10 mnd.
leeg : 7 sept. 1963	
	Geen energie : 8.43 mnd.
Vol : 20 mei 1964	
	Energie : 1.73 mnd.
leeg : 2 juli 1964	
	Geen energie : 3.93 mnd.
Vol : 4 nov. 1964	
	Energie : 0.87 mnd.
leeg : 27 nov. 1964	
	Geen energie : 4.20 mnd.
Vol : 3 april 1965	
	Energie : 3.10 mnd.
leeg : 6 mei 1965	
	Geen energie : 1.43 mnd.
Vol : 19 juni 1965	
	Energie : 1.63 mnd.
leeg : 8 aug. 1965	
	Geen energie : 7.73 mnd
Vol : 30 maart 1966	
	Energie : 1.03 mnd.
leeg : 1 mei 1966	
	Geen energie : 1.73 mnd.
Vol : 23 juni 1966	
	Energie : 1.77 mnd.
leeg : 16 aug. 1966	
	Geen energie : 4.47 mnd.
Vol : 30 dec. 1966	
	Energie : 1.20 mnd.
leeg : 6 febr. 1967	
	Geen energie : 2.27 mnd.
Vol : 29 april 1967	
	Energie : 3.57 mnd.
leeg : 16 aug. 1967	
	Geen energie : 5.87 mnd.
Vol : 12 febr. 1968	
	Energie : 1.50 mnd.
leeg : 27 maart 1968	
	Geen energie : 1.07 mnd.
Vol : 29 april 1968	
	Energie : 4.33 mnd.
leeg : 9 sept. 1968	
	Geen energie : 3.60 mnd.

Vervolg Tabel N = 65.000 kW. Berekening analytisch
Qturb. gem. = 135.4 m³/s. bij Hgem. = 60 m. Volledige tydreeks.

Vol : 27 dec. 1968	Energie : 1.67 mnd.
leeg : 17 febr. 1969	Geen energie : 1.77 mnd.
Vol : 10 april 1969	Energie : 3.70 mnd.
leeg : 1 aug. 1969	Geen energie : 7.13 mnd.
Vol : 5 maart 1970	Energie : 1.77 mnd.
leeg : 28 april 1970	Geen energie : 1.13 mnd.
Vol : 2 juni 1970	Energie : 2.30 mnd.
leeg : 11 aug. 1970	Geen energie : 4.87 mnd.
Vol : 7 jan. 1971	Energie : 1.87 mnd.
leeg : 3 maart 1971	Geen energie : 1.07 mnd.
Vol : 5 april 1971	Energie : 5.63 mnd.
leeg : 24 sept. 1971	Geen energie : 4.57 mnd.
Vol : 11 febr. 1972	Energie : 5.70 mnd.
leeg : 2 aug. 1972	Geen energie : 5.23 mnd.
Vol : 9 jan. 1973	Energie : 1.00 mnd.
leeg : 9 febr. 1973	Geen energie : 3.10 mnd.
Vol : 12 mei 1973	Energie : 2.67 mnd.
leeg : 2 aug. 1973	Geen energie : 3.97 mnd.
Vol : 1 dec. 1973	Energie : 1.30 mnd.
leeg : 10 jan. 1974	Geen energie : 1.80 mnd.
Vol : 4 maart 1974	Energie : 1.83 mnd.
leeg : 29 april 1974	Geen energie : 1.70 mnd.

Vervolg Tabel N = 65000 kW. Berekening analytisch.
Qturb. gem. = 135.4 m^3/s. bij Hgem. = 60 m. Volledige tijdreeks.

Vol : 20 juni 1974	Energie : 2.63 mnd.
Leeg : 9 sept. 1974	Geen energie : 4.70 mnd.
Vol : 30 jan. 1975	Energie : 1.00 mnd.
Leeg : 30 febr. 1975	Geen energie : 2.40 mnd.
Vol : 12 mei 1975	Energie : 1.07 mnd.
Leeg : 14 sept. 1975	Geen energie : 3.77 mnd.
Vol : 7 jan. 1976	Energie : 1.40 mnd.
Leeg : 19 febr. 1976	Geen energie : 1.67 mnd.
Vol : 9 april 1976	Energie : 4.73 mnd.
Leeg : 1 sept. 1976	Geen energie : 7.03 mnd.
Vol : 2 april 1977	Energie : 1.73 mnd.
Leeg : 24 mei 1977	Geen energie : 1.80 mnd.
Vol : 18 juli 1977	Energie : 1.40 mnd.
Leeg : 30 aug. 1977	Geen energie : 5.57 mnd.
Vol : 17 febr. 1978	Energie : 1.27 mnd.
Leeg : 25 maart 1978	Geen energie : 1.50 mnd.
Vol : 10 mei 1978	Energie : 2.03 mnd.
Leeg : 11 juli 1978	Geen energie : 1.77 mnd.
Vol : 4 sept. 1978	Energie : 3.10 mnd.
Leeg : 7 okt. 1978	Geen energie : 4.97 mnd.
Vol : 6 maart 1979	Energie : 2.30 mnd.
Leeg : 15 mei 1979	Geen energie : 1.00 mnd.
Vol : 15 jun. 1979	Energie : 2.57 mnd.

Vervolg Tabel N = 65000 kW. Berekening analytisch
Q turb. gem. = 135.4 m^3/s. bij H gem. = 60 m. Volledige tijdreeks.

Leeg	:	2 sept.	1979				
				Geen energie	:	5.67	mnd.
Vol	:	22 febr.	1980				
				Energie	:	1.07	mnd.
Leeg	:	24 maart	1980				
				Geen energie	:	1.47	mnd.
Vol	:	8 mei	1980				
				Energie	:	3.23	mnd.
Leeg	:	15 aug.	1980				
				Geen energie	:	5.37	mnd.
Vol	:	26 jan.	1981				
				Energie	:	1.27	mnd.
Leeg	:	4 maart	1981				
				Geen energie	:	1.93	mnd.
Vol	:	2 mei	1981				
				Energie	:	4.47	mnd.
Leeg	:	16 sept.	1981				
				Geen energie	:	3.47	mnd.

Tabel N = 65000 kW. Q turb. gem. = 135.4 m³/s
Produktietyd energie by volledige tydreeks van 30 jaren; analytisch

Op t=0 (1 Januari 1952) meer vol.

Wél energie (maanden)	Géén energie (maanden)
1.07	2.73
2.67	1.67
1.03	4.30
6.60	5.93
5.07	4.10
1.13	1.73
4.40	2.87
0.87	2.67
4.93	2.13
1.03	3.70
1.13	1.87
3.63	6.23
2.03	2.03
1.07	7.97
2.07	1.37
1.23	7.23
4.87	6.03
1.00	2.67
1.97	5.27
1.13	2.40
2.67	5.53

Vervolg Tabel N = 65000 kW.
Produktietyd energie by volledige tydreeks van 30 jaren.

Wél energie (maanden)	Geen energie (maanden)
2.03	1.20
4.10	0.43
1.73	3.93
0.87	4.20
3.10	1.43
1.63	7.73
1.77	4.47
1.20	2.77
3.57	5.87
1.50	1.07
4.33	5.60
1.67	1.77
3.70	7.13
1.77	1.13
2.30	4.87
1.87	1.07
5.63	4.57
5.70	5.23
1.00	3.10
2.67	3.97

Vervolg Tabel N = 65.000 kW.

Produktietyd by volledige tydruks van 30 jaren

Wél energie (maanden)	Géén energie (maanden)
1.30	1.06
1.03	1.70
2.63	4.70
1.00	2.40
4.07	3.77
1.40	1.67
4.73	7.03
1.73	1.00
1.40	5.57
1.27	1.50
2.03	1.77
3.10	4.97
2.30	1.00
2.57	5.67
1.07	1.47
3.23	5.37
1.27	1.93
4.47	3.47
Σ = 145.00	215.00

Controle: 145.0
215.0 +
360 mnd.

- Te leveren per jaar op basis van 8760 uren:
  0.40 * 8760 * 65000
  = 227.8 * 10^6 kWh
- Relatieve fout hieruit: $\frac{227.8 - 226.2}{226.2} * 100\%$
  = 0.7% is toelaatbaar

- Produktie gedurende $\frac{145}{360} * 100\% = 40\%$ van de tyd
- Totale hoeveelheid gelewerde energie:
  145.0 * 30 * 24 * 65000 = 6.8 * 10^9 kWh
- Gemiddeld per jaar: 226.2 * 10^6 kWh.

N = 70000 kW. Entrapolatie.

- Op basis van kritieke periode te leveren gedurende 23.3% van de tyd.

- Volledige tydserie: 14.2% erby ⇒ te leveren gedurende ca 37.5% van de tyd (entrapolatie conservatief).

- 37.5% by 8760 uren per jaar:

  $0.375 * 8760 * 70.000 = 230.0 * 10^6$ kWh.

5.6. Verdampingscyfers Jai-meer. (gemiddelden)
(Bron Ir. F. Breeveld).

MAAND	VERDAMPING *) [mm/dag]
JANUARI	4
FEBRUARI	3
MAART	4
APRIL	2
MEI	0
JUNI	0
JULI	2
AUGUSTUS	5
SEPTEMBER	7
OKTOBER	8
NOVEMBER	6
DECEMBER	5

*) verdamping vanaf meeroppervlakte.

- Voor iedere maand verdampingscyfers om te rekenen naar verdamping in [m^3/s] naar conformiteit van de afvoergegevens.
- Omrekeningsfactor (algemeen):
  a = verdamping in [mm/dag]
  A = oppervlakte van het meer aan het begin van iedere maand [$\times 10^6 m^2$]

• *Factor*:

$$\text{Verdamping } [m^3/s] = a * 10^{-3} \, m/\text{dag} * A * 10^6 m^2$$

$$= \frac{a * A * 10^3 \, m^3}{\text{dag}}$$

$$= \frac{a * A * 10^3}{24 * 3600} \; [m^3/s]$$

$$= a * A * 0.011574 \; [m^3/s]$$

Met a^* = verdamping in $[m^3/s]$ levert dit op voor iedere maand:

MAAND	VERDAMPING	
	a [mm/dag]	a^* [$m^3/s * A$]
JANUARI	4	0.046296
FEBRUARI	3	0.034722
MAART	4	0.046296
APRIL	2	0.023148
MEI	0	0
JUNI	0	0
JULI	2	0.023148
AUGUSTUS	5	0.05787
SEPTEMBER	7	0.081018
OKTOBER	8	0.092592
NOVEMBER	6	0.069444
DECEMBER	5	0.05787

5.6. Energieberekeningen $N = 60.000$ kW.

- Uitgangspunten:
  - Medeneming verdampingcyfers
  - Verwaarlozing: · kwel uit meer
    · regenaandeel op het meeroppervlakte.

- $N = 60.000$ kW.

$-N = 8 * Q * H.$

$- H_{max} = 63.0 m \quad ; \quad Q_{max\,turb.} = \frac{N}{8 * H_{min}} = 136.4\, m^3/s$

$- H_{gem} = 60\, m \quad ; \quad Q_{gem.\,turb.} = \frac{N}{8 * H_{gem.}} = 125\, m^3/s$

$- H_{min} = 55 m \quad ; \quad Q_{min.\,turb.} = \frac{N}{8 * H_{max.}} = 119.1\, m^3/s.$

- Start berekeningen.
  - Meer vol op 1 Januari 1952.
  - Verdamping in m/sec.

    Stel verdamping is a mm/dag ≙

$$\frac{a\, mm}{24 * 3600\, sec} = a\, mm * 1.1574 * 10^{-5}/sec.$$

$$= a * 1.1574 * 10^{-8} \left[m/sec \right]$$

Zie verder tabel blz 2.

Tabel N = 60.000 kW. O = overlaat in werking. ; E = verdamping.

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]=[5]*[7]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]
MAAND + JAAR	BERGINGS VOLUME BEGIN [$*10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/sec $*10^{-8}$]	$Q_E = E^*_{meer} * A_{meer}$ [m^3/s]	$Q_{turb.} = Q\uparrow$ [m^3/s]	$Q_E + Q_{turb.} = Q_{TOT}\uparrow$ [m^3/s]	$Q_{unstr.} = Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	BERGINGS VOLUME EIND [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{eind} [$*10^6 m^2$]
jan. '52	390.0	60.000	63.0	67.5	4.0	4.6	3.10	119.1	-122.2	+24.6	-97.6	-253.0	145.0	-5.9	57.1	29.3
febr. '52	145.0	60.000	57.1	29.3	3.0	3.5	1.0	131.4	-132.4	+64.4	-68.0	–	–	–	–	–
Meer leeg op: **8** februari 1952																
febr.'52	–	–	–		3.0	3.5	1.0	–	-1.0	+64.4	+63.4	+120.5	217.5	+4.3	59.3	40.9
mrt.'52	217.5	–	59.3	40.9	4.0	4.6	1.9	–	-1.9	+32.3	+30.4	+78.8	296.3	+1.9	61.2	53.2
apr.'52	296.3	–	61.2	53.2	2.0	2.3	1.2	–	-1.2	+29.4	+28.2	+73.1	369.4	+1.2	62.4	62.6
mei'52	**36**9.4	–	62.4	62.6	0.0	0.0	0.0	–	0.0	+117.1	+117.1	–	–	–	–	–
Meer vol op: 3 mei 1952																
mei'52	390.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+117.1	-2.0	-4.7	393.3	-0.1	62.9	66.8
jun.'52	393.3	60.000	62.9	66.8	0.0	0.0	0.0	119.3	-119.3	+75.2	-44.1	-114.3	279.0	-2.1	60.8	50.8
jul.'52	279.0	60.000	60.8	50.8	2.0	2.3	1.2	123.4	-124.6	+100.3	-24.3	-63.0	216.0	-1.5	59.3	40.9
aug.'52	216.0	60.000	59.3	40.9	5.0	5.8	2.4	126.5	-128.9	+59.3	-69.6	-180.4	–	–	–	–
Meer leeg op: **20** augustus 1952																

vervolg tabel N = 60.000 kW   0 = overlaat in werking.

MAAND + JAAR	V_{nolume} begin [* 10⁶ m³]	N [kW]	H_{begin} [m]	A_{meer} begin [* 10⁶ m²]	E_{meer} [mm/dag]	E^{*}_{meer} [m/sec × 10⁻⁸]	Q_E [m³/s]	Q↑ [m³/s]	Q_{TOT}↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [* 10⁶ m³]	V_{nolume} eind [* 10⁶ m³]	ΔH [m]	H_{eind} [m]	A_{eind} [m² × 10⁶]
aug. '52	—	—	—	—	5.0	5.8	1.2	—	-1.2	+59.3	+58.1	+50.2	147.2	+2.2	57.2	29.9
sept. '52	147.2	—	57.2	29.9	7.0	8.1	2.4	—	-2.4	+24.8	+22.4	+50.1	205.3	+1.8	59.0	39.3
okt. '52	205.3	—	59.0	39.3	8.0	9.3	3.6	—	-3.6	+11.3	+7.7	+20.0	225.3	+0.5	59.5	42.0
nov. '52	225.3	—	59.5	42.0	6.0	6.9	2.9	—	-2.9	+11.8	+8.9	+23.1	248.4	+0.6	60.1	45.7
dec. '52	248.4	—	60.1	45.7	5.0	5.8	2.7	—	-2.7	+19.3	+16.6	+43.0	291.6	+0.1	61.1	52.6
jan. '53	291.6	—	61.1	52.6	4.0	4.6	2.4	—	-2.4	+30.9	+28.5	+73.9	365.5	+1.3	62.4	62.6
febr. '53	365.5	—	62.4	62.6	3.0	3.5	2.2	—	-2.2	+96.2	+94.0	—	—	—	—	—
Meer vol op : 4 februari 1953																
febr. 53	365.5+32.5	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+96.2	-25.3	-56.8	341.2	-1.0	62.0	58.8
0 mrt. '53	341.2	60.000	62.0	58.8	4.0	4.6	2.7	121.0	-123.7	+179.5	+55.8	+56.8	398.0	+1.0	63.0	67.5
Meer vol op: 12 maart 1953																
Blijft vol t/m 30 juni 1953																
jul. '53	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+99.1	-21.6	-56.0	342.0	-1.0	62.0	58.8
aug. '53	342.0	60.000	62.0	58.8	5.0	5.8	3.4	121.0	-124.4	+63.1	-61.3	-158.9	183.1	-3.6	58.4	36.0
sept. '53	183.1	60.000	58.4	36.0	7.0	8.1	2.9	128.4	-131.3	+33.0	-98.3	—	—	—	—	—
Meer leeg op : 10 september 1953																

vervolg tabel N = 60.000 kW.

Maand + jaar	V_{nolume} begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_{nolume} eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{eind} [$*10^6 m^2$]
sept 53	97.0	—	55.0	20.4	7.0	8.1	1.7	—	-1.7	+33.0	+31.3	+54.1	151.1	+2.3	57.3	30.3
okt. 53	151.1	—	57.3	30.3	8.0	9.3	2.8	—	-2.8	+14.9	+12.1	+31.4	182.5	+1.3	58.4	36.0
nov. 53	182.5	—	58.4	36.0	6.0	6.9	2.5	—	-2.5	+9.2	+6.7	+17.4	199.9	+0.5	58.9	38.8
dec. 53	199.9	—	58.9	38.8	5.0	5.8	2.3	—	-2.3	+7.8	+5.5	+14.3	214.2	+0.3	59.2	40.4
jan. 54	214.2	—	59.2	40.4	4.0	4.6	1.9	—	-1.9	+20.0	+18.1	+46.9	261.1	+1.2	60.0	47.6
febr 54	261.1	—	60.4	47.6	3.0	3.5	1.7	—	-1.7	+3[illegible].8	+31.1	+80.6	341.7	+1.6	62.0	58.8
mrt. 54	341.7	—	62.0	58.8	4.0	4.6	2.7	—	-2.7	+97.6	+94.9	—	—	—	—	

Meer vol op: $\frac{(398.0 - 341.7) * 10^6}{94.9 * 24 * 3600} = 7$ maart 1954

Maand + jaar	V_{nolume} begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_{nolume} eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{eind} [$*10^6 m^2$]
mrt 54	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+97.6	-24.6	-48.9	349.1	-0.9	62.1	59.9
apr. 54	349.1	60.000	62.1	59.9	2.0	2.3	1.4	120.8	-122.2	+107.2	-15.0	-38.9	310.2	-0.6	61.5	55.3
mei 54	310.2	60.000	61.5	55.3	0.0	0.0	0.0	122.0	-122.0	+206.1	+84.1	—	—	—	—	—

Meer weer vol op: $\frac{(398.0 - 310.2) * 10^6}{84.1 * 24 * 3600} = 12$ mei 1954

Ook gedurende juni met $Q = 123.2\ m^3/s > 119.1$ volle produktie vervolgtabel N = 60000 kW

Maand + jaar	Volume begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m³/s]	$Q\uparrow$ [m³/s]	$Q_{TOT}\uparrow$ [m³/s]	$Q\downarrow$ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	Volume eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{eind} [$\times 10^6 m^2$]
juli '54	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+88.0	-32.7	-84.8	313.2	-1.5	61.5	55.3
aug. '54	313.2	60.000	61.5	55.3	5.0	5.8	3.2	122.0	-125.2	+69.4	-55.8	-144.6	168.6	-3.5	58.0	33.8
sept. '54	168.6	60.000	58.0	33.8	7.0	8.1	2.7	129.3	-132.0	+35.9	-96.1	—	—	-	—	—

Meer leeg op: $\frac{(168.6 - 97.0) * 10^6}{96.1 * 86.400}$ = 9 september 1954

Maand + jaar	Volume begin	N	H_{begin}	A_{meer} begin	E_{meer}	E^*_{meer}	Q_E	$Q\uparrow$	$Q_{TOT}\uparrow$	$Q\downarrow$	ΔQ	ΔV	Volume eind	ΔH	H_{eind}	A_{eind}
sept. '54	97.0	—	55.0	20.4	7.0	8.1	1.7	—	-1.7	+35.9	+34.2	+62.1	159.1	+2.6	57.6	31.9
okt. '54	159.1	—	57.6	31.9	8.0	9.3	3.0	—	-3.0	+21.5	+18.5	+48.0	207.1	+1.5	59.6	39.8
nov. '54	207.1	—	59.1	39.8	6.0	6.9	2.8	—	-2.8	+19.8	+17.0	+44.1	251.2	+1.1	60.2	46.3
dec. '54	251.2	—	60.2	46.3	5.0	5.8	2.7	—	-2.7	+30.9	+28.2	+73.1	324.3	+1.5	61.7	56.7
jan. '55	324.3	—	61.7	56.7	4.0	4.6	2.6	-	-2.6	+32.3	+29.7	+77.0	—	-	—	-

Meer vol op: $\frac{(398.0 - 324.8) * 10^6}{29.7 * 86400}$ = 29 januari 1955

Maand + jaar	Volume begin	N	H_{begin}	A_{meer} begin	E_{meer}	E^*_{meer}	Q_E	$Q\uparrow$	$Q_{TOT}\uparrow$	$Q\downarrow$	ΔQ	ΔV	Volume eind	ΔH	H_{eind}	A_{eind}
jan. '55	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+32.3	+89.9	-7.8	390.2	-0.2	62.8	66.0
febr. '55	390.2	60.000	62.8	66.0	3.0	3.5	2.3	119.4	-121.7	+31.8	-89.9	-233.0	157.0	-5.3	57.5	31.3
mrt. '55	157.0	60.000	57.5	31.3	4.0	4.6	1.4	130.4	-131.8	+103.6	-28.2	-73.1	—	—	—	—

vervolg tabel N = 60000 kW

Jaar + maand	V_n olume begin [$*10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$*10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $*10^8$]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n olume eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A eind [$*10^6 m^2$]
Meer leeg op: $\frac{(157.0 - 97.0) * 10^6}{282 * 86400}$ = 25 maart 1955																
mrt '55	970	—	55.0	20.4	40	4.6	09	—	-0.9	+103.6	+102.7	+44.4	141.4	+2.0	57.0	28.8
apr. '55	141.4	—	57.0	28.8	2.0	2.3	0.7	—	-0.7	+82.8	+82.1	+212.8	354.2	+5.2	62.0	61.0
mei '55	354.2	—	62.2	61.0	0.0	0.0	0.0	0.0	0.0	+111.6	—	—	—	-	-	—
Meer vol op: $\frac{(398.0 - 354.2) * 10^6}{111.6 * 86400}$ = 5 mei 1955																
mei '55	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+111.6	-7.5	-16.2	381.8	-0.4	62.6	64.4
juni '55	381.8	60.000	62.6	64.4	00	00	00	119.8	-119.8	+145.1	+25.3	-	-	-	-	-
Meer vol op: 7 juni 1955; blijft vol tot en met 30 juni 1955.																
juli '55	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+104.6	-16.1	-41.7	356.3	-0.8	62.2	61.0
aug. '55	356.3	60.000	62.2	61.0	5.0	5.8	3.5	120.6	-124.1	+76.6	-47.5	-123.1	233.2	-2.4	59.8	43.9
sept. '55	233.2	60.000	59.8	43.9	7.0	8.1	3.6	125.4	-129.0	+37.6	-91.4	-236.9	—	-	-	—
Meer leeg op: 17 sept. 1955																
sept. '55	97.0	—	55.0	20.4	7.0	8.1	1.7	-	-1.7	+37.6	+35.9	+40.3	137.3	+1.8	56.8	28.0

0

vervolg tabel N = 60.000 kW

Jaar en maand	$V_n$olume begin [$\times 10^6 m^3$]	N [kW]	Hbegin [m]	Ameer begin [$\times 10^6 m^2$]	Emeer [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	Heind [m]	Aeind [$\times 10^6 m^2$]
okt.'55	137.3	–	56.8	28.0	8.0	9.3	2.6	–	-2.6	+18.6	+16.0	+41.5	178.8	+1.5	58.3	35.5
nov.'55	178.8	–	58.3	35.5	6.0	6.9	2.5	–	-2.5	+10.8	+8.3	+21.5	200.3	+0.6	58.9	38.8
dec.'55	200.3	–	58.9	38.8	5.0	5.8	2.2	–	-2.2	+21.7	+19.5	+50.5	250.8	+0.3	60.2	46.3
jan.'56	250.3	–	60.2	46.3	4.0	4.6	2.1	–	-2.1	42.2	+40.1	+103.9	354.7	+2.0	62.2	61.0
febr.'56	354.7	–	62.2	61.0	3.0	3.5	2.1	–	-2.1	74.2	+72.1	+186.9	–	–	–	–
Meer vol op: 7 februari 1956																
febr.56	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+74.2	-47.3	-94.0	304.0	-1.7	61.3	53.9
mrt.'56	304.0	60.000	61.3	53.9	4.0	4.6	2.5	122.4	-124.9	+93.3	-31.6	-81.9	222.1	-1.7	59.4	41.5
apr.'56	222.1	60.000	59.4	41.5	2.0	2.3	1.0	126.3	-127.3	+116.9	-10.4	-27.0	195.1	-0.7	58.7	37.7
mei 56	195.1	60.000	58.7	37.7	0.0	0.0	0.0	127.8	-127.8	+159.5	+31.7	+82.2	277.3	+2.1	60.8	50.8
juni'56	277.3	60.000	60.8	50.8	0.0	0.0	0.0	123.4	-123.4	+110.1	-13.3	-34.5	242.8	-0.8	60.0	45.1
juli'56	242.8	60.000	60.0	45.1	2.0	2.3	1.0	125.0	-126.0	+79.5	-46.5	-120.5	122.3	-3.8	56.2	25.5
aug.'56	122.3	60.000	56.2	25.5	5.0	5.8	1.5	133.5	-135.0	+54.2	-80.8	-209.4	–	–	–	–
Meer leeg op: 4 augustus 1956																

vervolg tabel $N = 60000$ kW.

Jaar + maand	$V_n$olume begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $\times 10^8$]	Q_E [m³/s]	Q↑ [m³/s]	Q_{TOT}↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$m^2 \times 10^6$]
aug.'56	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+54.2	+53.0	+119.1	216.1	+4.3	59.3	40.9
sept.'56	216.1	–	59.3	40.9	7.0	8.1	3.3	–	-3.3	+42.9	+39.6	+102.6	318.7	+2.3	61.6	56.0
okt.'56	318.7	–	61.6	56.0	8.0	9.3	5.2	–	-5.2	+15.7	+10.5	+27.2	345.9	+0.5	62.1	59.4
nov.'56.	345.9	–	62.1	59.4	6.0	6.9	4.1	–	-4.1	+14.9	+10.8	+28.0	373.9	+0.4	62.5	63.5
dec.'56	373.9	–	62.5	63.5	5.0	5.8	3.7	–	-3.7	+42.9	+39.2	+101.6	–	–	–	–
Meer vol op: 7 december 1956																
dec.'56	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+42.9	-80.1	-159.2	238.8	-3.1	59.9	44.5
jan.'57	238.8	60.000	59.9	44.5	4.0	4.6	2.1	125.2	-127.3	+31.3	-96.0	–	–	–	–	–
Meer leeg op: 17 januari 1957																
jan.'57	97.0	–	55.0	20.4	4.0	4.6	0.9	–	-0.9	+31.3	+30.4	+34.2	131.2	+1.5	56.5	26.9
febr.'57	131.2	–	56.5	26.9	3.0	3.5	0.9	–	-0.9	+49.2	+48.3	+125.2	256.4	+3.8	60.3	47.0
mrt.'57	256.4	–	60.3	47.0	4.0	4.6	2.2	–	-2.2	+21.5	+19.3	+50.0	306.4	+1.1	61.4	54.6
apr.'57	306.4	–	61.4	54.6	2.0	2.3	1.3	–	-1.3	+45.8	+44.5	115.3	–	–	–	–
Meer vol op: 24 april 1957																

vervolg tabel $N = 60.000$ kW.

Jaar+ maand	$V_n$olume begin [$\times 10^6 m^3$]	N [kW]	Hbegin [m]	Ameer begin [$\times 10^6 m^2$]	Emeer [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	$A_{meer\ eind}$ [$\times 10^6 m^2$]
apr. '57	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+45.8	-749	-30.8	359.2	-0.7	62.3	61.8
mei '57	359.2	60.000	62.3	61.8	0.0	0.0	0.0	120.4	-120.4	+124.8	+44.	+11.4	370.6	+0.2	62.5	63.5
juni '57	370.6	60.000	62.5	63.5	0.0	0.0	0.0	120.0	-120.0	+139.8	+19.8	+51.30	–	–	-	-
Meer vol op: 16 juni 1957; blijft vol tot 1 juli 1957																
juli '57	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+95.7	-25.0	-64.8	333.2	-1.1	61.9	59.5
aug. '57	333.2	60.000	61.9	59.5	5.0	5.8	3.5	121.2	-124.7	+74.0	-50.7	-131.4	201.8	-3.0	58.9	38.8
sept. '57	201.8	60.000	58.9	38.8	7.0	8.1	3.1	127.3	-130.4	+27.7	-102.7	–	–	–	–	–
Meer leeg op: 12 september 1957																
sept. '57	97.0	–	55.0	20.4	7.0	8.1	1.7	–	-1.7	+27.7	+26.0	+40.4	137.4	+1.8	56.8	28.0
okt. '57	137.4	–	56.8	28.0	8.0	9.3	2.6	–	-2.6	+10.1	+7.5	+19.4	156.8	+0.7	57.5	31.3
nov. '57	156.8	–	57.5	31.3	6.0	6.9	2.2	–	-2.2	+5.8	+3.6	+9.3	166.1	+0.4	57.9	33.3
dec. '57	166.1	–	57.9	33.3	5.0	5.8	1.9	–	-1.9	+10.8	+8.9	+23.1	189.2	+0.7	58.6	37.2
jan '58	189.2	–	58.6	37.2	4.0	4.6	1.7	–	-1.7	+16.6	+14.9	+38.6	227.8	+1.0	59.6	42.5
febr. '58	227.8	–	59.6	42.5	3.0	3.5	1.5	–	-1.5	+30.6	+29.1	+75.4	303.2	–	61.3	53.9

vervolg tabel N = 60.000 kW

Jaar + maand	$V_n$olume begin [* $10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [* $10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s * 10^{-8}]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [* $10^6 m^3$]	$V_n$olume eind [* $10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [* $10^6 m^2$]
mrt. '58	303.2	–	61.3	53.9	4.0	4.6	2.5	–	-2.5	+51.1	+48.6	+120.0	–	–	–	–
Meer vol op: 23 maart 1958																
mrt.'58	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+51.1	-71.1	-43.0	355.0	-0.8	62.2	61.0
apr. '58	355.0	60.000	62.2	61.0	2.0	2.3	1.4	120.6	-122.0	+91.6	-30.4	-78.0	276.2	-1.5	60.7	49.9
mei '58	276.2	60.000	60.7	49.9	0.0	0.0	0.0	123.6	-123.6	+89.4	-34.2	-88.7	187.6	-2.2	58.5	36.6
jun. '58	187.6	60.000	58.5	36.6	0.0	0.0	0.0	128.2	-128.2	+48.0	-80.2	-207.9	–	–	–	–
Meer leeg op 13 juni 1958																
jun.'58	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+48.0	+4.8	+70.5	167.5	+2.9	57.9	33.3
jul.'58	167.5	–	57.9	33.3	2.0	2.3	0.8	–	-0.8	+32.8	+32.0	+82.9	250.4	+2.3	60.2	46.3
aug.'58	250.4	–	60.2	46.3	5.0	5.8	2.7	–	-2.7	+22.4	+19.7	+51.1	301.5	+1.1	61.3	53.9
sept.'58	301.5	–	61.3	53.9	7.0	8.1	4.4	–	-4.4	+8.7	+4.0	+10.4	311.9	+0.2	61.5	55.3
okt.'58	311.9	–	61.5	55.3	8.0	9.3	5.1	–	-5.1	+6.7	+1.6	+4.1	316.0	+0.1	61.6	56.0
nov.'58	316.0	–	61.6	56.0	6.0	6.9	3.9	–	-3.9	+3.4	-0.5	-1.3	314.7	+0.0	61.6	56.0
dec.'58	314.7	–	61.6	56.0	5.0	5.8	3.2	–	-3.2	+1.9	-1.3	-3.4	311.3	-0.1	61.5	55.3

vervolg tabel N = 60.000 kW.

Jaar + maand	$V_n$olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^* meer [m/s] $\times 10^{-8}$	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
jan. '59	311.3	–	61.5	55.3	4.0	4.6	2.5	–	-2.5	+8.4	+5.9	+15.3	326.6	+0.3	61.8	57.4
febr. '59	326.6	–	61.8	57.4	3.0	3.5	2.0	–	-2.0	+19.8	+17.8	+46.1	372.7	+0.7	62.5	63.5
mrt. '59	356.2	–	62.5	63.5	4.0	4.6	2.9	–	-2.9	+25.8	+22.9	+59.4	–	–	–	–
Meer vol op: 13 maart 1959																
mrt. '59	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+25.8	-96.4	-141.6	256.4	-2.7	60.3	47.0
apr. '59	256.4	60.000	60.3	47.0	2.0	2.3	1.1	124.4	-125.5	+64.3	-61.2	-158.6	97.8	-5.2	55.1	20.5
mei '59	97.8	60.000	55.1	20.5	0.0	0.0	0.0	136.1	-136.1	+73.5	-62.6	–	–	–	–	–
Meer leeg op: 30 april 1959																
mei '59	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+73.5	+73.5	+190.5	287.5	+6.0	61.0	52.0
jun. '59	287.5	–	61.0	52.0	0.0	0.0	0.0	–	0.0	+104.3	+104.3	+270.4	–	–	–	–
Meer vol op: 12 juni 1959																
jun. '59	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+104.3	-14.8	-23.0	375.0	-0.5	62.5	63.5
jul. '59	375.0	60.000	62.5	63.5	2.0	2.3	1.5	+120.0	-121.5	+73.3	-48.2	-124.9	250.1	-2.3	60.2	46.3
aug. '59	250.1	60.000	60.2	46.3	5.0	5.8	4.1	+124.6	-128.7	+39.8	-88.9	-230.4	–	–	–	–

vervolg tabel N = 60000 kW.

Jaar + maand	Vvolume begin [×10⁶m³]	N [kW]	Hbegin [m]	Ameer begin [×10⁶m²]	Emeer [mm/dag]	E*meer [m/s ×10⁻⁸]	Q_E [m³/s]	Q↑ [m³/s]	Q_{TOT}↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [×10⁶m³]	Vvolume eind [×10⁶m³]	ΔH [m]	Heind [m]	Ameer eind [×10⁶m²]
Meer leeg op: 20 augustus 1959																
aug. '59	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+39.8	+38.6	+33.4	130.4	+1.5	56.5	26.9
sept. 59	130.4	–	56.5	26.9	7.0	8.1	2.2	–	-2.2	+16.9	+14.7	+38.1	168.5	+1.5	58.0	33.8
okt. '59	168.5	–	58.0	33.8	8.0	9.3	3.1	–	-3.1	+6.3	+3.2	+8.3	176.8	+0.2	58.2	35.0
nov. '59	176.2	–	58.2	35.0	6.0	6.9	2.4	–	-2.4	+8.0	+5.7	+14.8	191.4	+0.4	58.6	37.2
dec. '59	191.4	–	58.6	37.2	5.0	5.8	2.2	–	-2.2	+6.8	+4.6	+11.9	203.3	+0.4	59.0	39.3
jan. '60	203.3	–	59.0	39.3	4.0	4.6	1.8	–	-1.8	+19.0	+17.2	+44.6	247.9	+1.1	60.1	45.7
febr. '60	247.9	–	60.1	45.7	3.0	3.5	1.6	–	-1.6	+26.8	+25.2	+65.3	313.2	+1.4	61.5	55.3
mrt '60	313.2	–	61.5	55.3	4.0	4.6	2.5	–	-2.5	+17.1	+14.6	+37.8	351.0	+0.6	62.1	59.9
apr. '60	351.0	–	62.1	59.9	2.0	2.3	1.4	–	-1.4	+47.2	+45.8	+118.7	–	–	–	–
Meer vol op: 5 april 1960																
apr. '60	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	-47.2	-73.5	-158.8	239.2	-3.1	59.9	44.5
mei '60	239.2	60.000	59.9	44.5	0.0	0.0	0.0	126.1	-126.1	+106.8	-19.3	-50.0	189.2	-1.3	58.6	37.2
jun. '60	189.2	60.000	58.6	37.2	0.0	0.0	0.0	128.0	-128.0	+178.1	+50.1	+129.9	319.1	+3.0	61.6	56.0
jul. '60	319.1	60.000	61.6	56.0	2.0	2.3	1.3	121.8	-123.1	+147.2	+24.1	+62.5	381.6	+1.0	62.6	64.4

vervolg tabel N: 60000 kW

Jaar + maand	V_{nolume} begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT.}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_{nolume} eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
aug.'60	381.6	60.000	62.6	64.4	5.0	5.8	3.7	+119.8	-123.5	+72.8	-50.7	-131.4	250.2	-2.4	60.2	46.3
sept.'60	250.2	60.000	60.2	46.3	7.0	8.1	3.8	124.6	-128.4	+30.9	-97.5	-252.7	–	–	–	–
Meer leeg op: 18 september 1960																
sept.'60	97.0	–	55.0	20.4	7.0	8.1	1.7	–	-1.7	+30.9	+29.2	+30.3	127.3	+1.4	56.4	26.4
okt.'60	127.3	–	56.4	26.4	8.0	9.3	2.5	–	-2.5	+13.0	+10.5	+27.2	154.5	+1.0	57.4	30.6
nov.'60	154.4	–	57.4	30.6	6.0	6.9	2.1	–	-2.1	+7.2	+5.1	+13.2	167.6	+0.5	57.9	33.3
dec.'60	167.6	–	57.9	33.3	5.0	5.8	1.9	–	-1.9	+11.1	+9.2	+23.9	191.5	+0.7	58.6	37.2
jan.'61	191.5	–	58.6	37.2	4.0	4.6	1.7	–	-1.7	+34.2	+32.5	+84.2	275.7	+2.1	60.7	49.9
febr.'61	275.7	–	60.7	49.9	3.0	3.5	1.8	–	-1.8	+20.7	+18.9	+49.0	324.7	+2.0	61.7	56.7
mrt.'61	324.7	–	61.7	56.7	4.0	4.6	2.6	–	-2.6	+22.9	+20.3	+52.6	377.3	+0.9	62.6	64.4
apr.'61	377.3	–	62.6	64.4	2.0	2.3	1.5	–	-1.5	+10.6	+9.1	+23.6	–	–	–	–
Meer vol op: 26 april 1961																
apr.'61	390.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+10.6	110.1	-30.1	359.9	-0.7	62.3	61.8
mei '61	359.9	60.000	62.3	61.8	0.0	0.0	0.0	120.4	-120.4	+25.6	-94.8	-245.7	114.2	-6.4	55.9	24.1

vervolg tabel N = 60000 kW

Jaar + maand	Volume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	Volume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
jun.'61	114.2	60.000	55.9	24.1	0.0	0.0	0.0	134.2	-134.2	+89.7	-44.5	-115.3	–	–	–	–
Meer leeg op: 5 juni 1961																
juni'61	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+89.7	+89.7	+193.8	290.8	6.1	61.1	52.6
juli'61	290.8	–	61.1	52.6	2.0	2.3	1.2	–	-1.2	+81.2	+80.0	+207.4	–	–	–	–
Meer vol op: 16 juli 1961																
juli '61	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+81.2	-39.5	-47.8	350.2	-0.9	62.1	59.9
aug.'61	350.2	60.000	62.1	59.9	5.0	5.8	3.5	120.8	-124.3	+60.9	-55.4	-143.6	206.6	-3.1	59.0	39.3
sept.'61	206.6	60.000	59.0	39.3	7.0	8.1	3.2	127.1	-130.3	+21.9	-108.4	-281.0	–	–	–	–
meer leeg op: 12 september 1961																
sept.'61	97.0	–	55.0	20.4	7.0	8.1	1.7	–	-1.7	+21.9	+20.2	+31.4	128.4	+1.4	56.4	26.4
okt.'61	128.4	–	56.4	26.4	8.0	9.3	2.5	–	-2.5	+15.7	+13.2	+34.2	162.6	+1.4	57.8	32.8
nov. 61	162.6	–	57.8	32.8	6.0	6.9	2.3	–	-2.3	+9.4	+7.1	+18.4	181.0	+0.5	58.3	35.5
dec. 61	181.0	–	58.3	35.5	5.0	5.8	2.1	–	-2.1	+16.9	+14.8	+38.4	219.4	+1.1	59.4	41.5

vervolg tabel N = 60000 kW

Jaar + maand	$V_n$olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/sec 10^{-8}]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
jan. '62	219.4	–	59.4	41.5	4.0	4.6	1.9	–	-1.9	+39.8	+37.9	+90.2	317.6	+2.2	61.6	56.0
febr. 62	317.6	–	61.6	56.0	3.0	3.5	2.0	–	-2.0	+33.5	+31.5	+81.7	399.3	–	–	–
Meer vol op: 1 maart 1962																
mrt. '62	390.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	122.2	+33.3	-889	-2394	167.6	-5.1	57.9	33.3
apr. '62	167.6	60.000	57.9	33.3	2.0	2.3	0.8	129.5	130.3	+21.0	-109.3	-283.3	–	–	–	–
Meer leeg op: 8 april 1962																
apr. '62	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+21.0	+20.5	+39.0	136.0	+1.7	56.7	27.7
mei '62	136.0	–	56.7	27.7	0.0	0.0	0.0	–	0.0	+102.2	+102.2	+2649	398	+6.3	63.0	67.5
Meer vol op: 30 mei 1962																
jun. '62	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+118.8	-0.3	0.8	397.2	0	63.0	67.5
jul. '62	397.2	60.000	63.00	67.5	2.0	2.3	1.6	119.1	-120.7	+79.1	-41.6	107.8	289.4	-2.0	61.0	52.0
aug. '62	289.4	60.000	61.0	52.0	5.0	5.8	3.0	123.0	-126.0	+46.8	-79.2	-205.3	–	–	–	–
Meer leeg op: 28 augustus 1962																

vervolg tabel N = 60000 kW

Jaar + maand	Volume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	Q ↑ [m^3/s]	$Q_{TOT.}$ ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	Volume meer eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
aug. '62	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+46.8	+45.6	+7.9	104.9	+0.4	55.4	22.0
sept. '62	104.9	–	55.4	22.0	7.0	8.1	1.8	–	-1.8	+17.8	+16.0	+41.5	146.4	+1.7	57.1	29.4
okt. '62	146.4	–	57.1	29.4	8.0	9.3	2.7	–	-2.7	+6.8	+4.1	+10.6	157.0	+0.5	57.6	31.9
nov. '62	157.0	–	57.6	31.9	6.0	6.9	2.2	–	-2.2	+7.5	+5.3	+13.7	170.7	+0.4	58.0	33.9
dec. '62	170.7	–	58.0	33.9	5.0	5.8	2.0	–	-2.0	+16.2	+14.2	+36.8	207.5	+1.1	59.1	39.8
jan. '63	207.5	–	59.1	39.8	4.0	4.6	1.8	–	-1.8	+42.7	+40.9	+106.0	313.5	+2.4	61.5	55.3
febr. '63	313.5	–	61.5	55.3	3.0	3.5	1.9	–	-1.9	+113.3	+111.4	+288.8	–	–	–	–
Meer vol op: 9 februari 1963																
febr. '63	390.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+113.3	-8.2	-14.9	383.1	-0.4	62.6	64.4
mrt. '63	381.1	60.000	62.6	64.4	4.0	4.6	3.0	119.8	-122.8	+46.8	-76.0	-197.0	186.1	-4.1	58.5	36.6
apr. '63	186.1	60.000	58.5	36.6	2.0	2.3	0.8	120.2	-129.0	+97.9	-31.1	-80.6	105.5	-3.0	55.5	22.5
mei '63	105.5	60.000	55.5	22.5	0.0	0.0	0.0	135.1	-135.1	+127.7	-7.4	-19.2	–		–	–
Meer leeg op: 13 mei 1963																

vervolg tabel $N = 60000$ kW

Jaar + maand	$V_n$olume meer begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^k_{meer} [m/s $\times 10^{-8}$]	Q_E [m³/s]	$Q\uparrow$ [m³/s]	$Q_{TOT.}\uparrow$ [m³/s]	$Q\downarrow$ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$\times 10^6 m^2$]
mei '63	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+127.7	+127.7	+187.6	284.6	5.9	60.9	51.4
juni '63	284.6	–	60.9	51.4	0.0	0.0	0.0	–	0.0	+162.9	+162.9	+422.2	–	–	–	–
Meer vol op : 8 juni 1963																
juni '63	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+162.9	+43.8	–	398.0	0	63.0	67.5
jul. '63	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+112.1	- 8.6	- 22.3	375.7	- 0.5	62.5	63.5
aug. '63	375.7	60.000	62.5	63.5	5.0	5.8	3.7	120.0	-123.7	+67.0	-56.7	-147.0	228.7	- 2.9	59.6	42.5
sept. '63	228.7	60.000	59.6	42.5	7.0	8.1	3.4	125.8	-129.2	+31.3	-97.9	-253.9	–	–	–	–
Meer leeg op : 16 september 1963																
sept '63	97.0	–	55.0	20.4	7.0	8.1	1.7	–	- 1.7	+31.3	+29.6	+35.8	132.8	+ 1.6	56.6	27.4
okt. '63	132.8	–	56.6	27.4	8.0	9.3	2.6	–	- 2.6	+11.7	+ 9.1	+23.6	156.4	+ 0.9	57.5	31.3
nov. '63	156.4	–	57.5	31.3	6.0	6.9	2.2	–	- 2.2	+ 6.0	+ 3.8	+9.9	166.3	+ 0.4	57.9	33.3
dec. '63	166.3	–	57.9	33.3	5.0	5.8	1.9	–	- 1.9	+20.0	+18.1	+46.9	213.2	+ 1.3	59.2	40.4
jan. '64	213.2	–	59.2	40.4	4.0	4.6	1.9	–	-1.9	+12.8	+10.9	+28.3	241.5	+ 0.8	60.0	45.1
febr. '64	245.1	–	60.0	45.1	3.0	3.5	1.6	–	-1.6	+ 9.6	+ 8.0	+20.7	265.8	+ 0.5	60.5	48.3

vervolg tabel N = 60000 kW

Jaar + maand	$V_n$olume meer begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m³/s]	Q ↑ [m³/s]	Q_{TOT} ↑ [m³/s]	Q ↓ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	$V_n$olume eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
mrt. '64	265.8	–	60.5	48.3	4.0	4.6	2.2	–	-2.2	+14.7	+12.5	+32.4	298.2	+0.7	61.2	53.2
apr. '64	298.2	–	61.2	53.2	2.0	2.3	1.2	–	-1.2	+7.7	+6.5	+16.9	315.1	+0.3	61.5	55.3
mei '64	315.1	–	61.5	55.3	0.0	0.0	0.0	–	0.0	+14.7	+14.7	+38.1	353.2	+0.7	62.2	61.0
jun. '64	353.2	–	62.2	61.0	0.0	0.0	0.0	–	0.0	+64.3	+64.3	+166.7	–	–	–	–
Meer vol op: 8 juni 1964																
jun. '64	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+64.3	-54.8	-142.0	256.0	-2.7	60.3	47.0
jul. '64	256.0	60.000	60.3	47.0	2.0	2.3	1.1	124.4	-125.5	+65.1	-59.3	-153.7	102.4	-5.0	55.3	21.7
aug '64	102.4	60.000	55.3	21.7	5.0	5.8	1.6	135.6	-137.2	+36.2	-101.0	-261.8	–	–	–	–
Meer leeg op: 1 augustus 1964																
aug. '64	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+36.2	+35.0	+87.7	184.7	+3.4	58.4	36.0
sept. '64	184.7	–	58.4	36.0	7.0	8.1	2.9	–	-2.9	+13.0	+10.1	+26.2	210.9	+0.7	59.1	39.8
okt. '64	210.9	–	59.1	39.8	8.0	9.3	3.7	–	-3.7	+6.0	+2.3	+6.0	216.9	+0.2	59.3	41.0
nov. '64	216.9	–	59.3	41.0	6.0	6.9	2.8	–	-2.8	+1.7	-1.1	-2.9	214.0	-0.1	59.2	40.4
dec. '64	214.0	–	59.2	40.4	5.0	5.8	2.3	–	-2.3	+3.6	+1.3	+3.4	217.4	+0.1	59.3	41.0

vervolg tabel N = 60.000 kW

Jaar + maand	V_n begin [* $10^6 m^3$]	N [kW]	H begin [m]	A_{meer} begin [* $10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s * 10^{-8}]	Q_E [m^3/s]	Q_T↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [* $10^6 m^3$]	V_n eind [* $10^6 m^3$]	ΔH [m]	H eind [m]	A_{meer} eind [* $10^6 m^2$]
jan. '65	217.4	–	59.3	41.0	4.0	4.6	1.9	–	-1.9	+35.7	+33.8	+87.6	305.0	+1.8	61.1	52.6
febr. '65	305.0	–	61.1	52.6	3.0	3.5	1.8	–	-1.8	+31.3	+29.5	+76.5	381.5	+1.5	62.6	64.4
mrt. '65	381.5	–	62.6	64.4	4.0	4.6	3.0	–	-3.0	+43.4	+40.4	+104.7	–	–	–	–
Meer vol op: 5 maart 1965																
mrt. '65	390.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+43.4	-78.8	-170.2	227.8	-3.4	59.6	42.5
apr. '65	227.8	60.000	59.6	42.5	2.0	2.3	1.0	125.8	-126.8	+19.3	-107.5	-278.6	–	–	–	–
Meer leeg op: 14 april 1965																
apr. '65	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+19.3	+18.8	+26.0	123.0	+1.2	56.2	25.5
mei '65	123.0	–	56.2	25.5	0.0	0.0	0.0	–	0.0	+75.0	+75.0	+194.4	317.4	+5.4	61.6	56.0
juni '65	317.4	–	61.6	56.0	0.0	0.0	0.0	–	0.0	+88.2	+88.2	+228.6	–		–	–
Meer vol op: 11 juni 1965																
juni '65	390.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+88.2	-30.9	-50.7	347.3	-0.9	62.1	59.9
juli '65	347.3	60.000	62.1	59.9	2.0	2.3	1.4	120.8	-122.2	+61.5	-60.7	-157.3	190.0	-3.5	58.6	37.2
aug. '65	190.0	60.000	58.6	37.2	5.0	5.8	2.2	128.0	-130.2	+35.4	-94.8	-245.7	–	–		

vervolg tabel N = 60000 kW

Jaar + maand	V_n begin [×10⁶ m³]	N [kW]	H begin [m]	A_{meer} begin [×10⁶ m²]	E_{meer} [mm/dag]	E^*_{meer} [m/s ×10⁻⁸]	Q_E [m³/s]	$Q\uparrow$ [m³/s]	$Q_{TOT}\uparrow$ [m³/s]	$Q\downarrow$ [m³/s]	ΔQ [m³/s]	ΔV [×10⁶ m³]	V_n eind [×10⁶ m³]	ΔH [m]	H eind [m]	A_{meer} eind [×10⁶ m²]
Meer leeg op: 11 augustus 1965																
aug. 65	97.0	–	55.0	20.4	5.0	5.8	1.2	–	−1.2	+35.4	+34.2	+56.1	153.1	+2.4	57.4	30.6
sept. 65	153.1	–	57.4	30.6	7.0	8.1	2.8	–	−2.8	+14.7	+11.9	+30.8	183.9	+1.0	58.4	36.0
okt. '65	183.4	–	58.4	36.0	8.0	9.3	3.6	–	−3.6	+4.1	+0.5	+1.3	185.2	+0.1	58.5	+36.6
nov. '65	185.2	–	58.5	36.6	6.0	6.9	2.5	–	−2.5	+1.9	−0.6	−1.6	183.6	−0.1	58.4	+36.0
dec '65	183.6	–	58.4	36.0	5.0	5.8	2.1	–	−2.1	+1.5	−0.6	−1.6	182.0	–	58.4	+36.0
jan. '66	182.0	–	58.4	36.0	4.0	4.6	1.7	–	−1.7	+11.6	+9.9	+25.7	207.7	+0.8	59.2	40.4
febr. '66	207.7	–	59.2	40.4	3.0	3.5	1.4	–	−1.4	+23.6	+22.2	+57.5	265.2	+1.3	60.5	48.3
mrt. '66	265.2	–	60.5	48.3	4.0	4.6	2.2	–	−2.2	+30.9	+28.7	+74.4	339.6	+1.5	62.0	58.8
apr. '66	339.6	–	62.0	58.8	2.0	2.3	1.4	–	−1.4	+26.3	+24.9	+64.5	–	–	–	–
Meer vol op: 27 april 1966																
apr. '66	390.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	−120.7	+26.3	−94.4	−24.5	373.5	−0.5	62.5	63.5
mei '66	373.5	60.000	62.5	63.5	0.0	0.0	0.0	120.0	−120.0	+54.2	−65.8	−170.6	202.9	−3.6	58.9	38.8
jun. '66	202.9	60.000	58.9	38.8	0.0	0.0	0.0	127.3	−127.3	+82.9	−44.4	−115.1	–	–	–	–

vervolg tabel N = 60000 kW

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$*10^6 m^2$]
Meer leeg op: 20 juni 1966																
jun.'66	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+82.9	+14.3	+14.3	111.3	+0.8	55.8	23.6
jul.'66	111.3	–	55.8	23.6	2.0	2.3	0.5	–	-0.5	+68.2	+67.7	+175.5	286.8	+5.2	61.0	52.0
aug.66	286.8	–	61.0	52.0	5.0	5.8	3.0	–	-3.0	+55.4	+52.4	+135.8	–	–	–	–
Meer vol op: 25 augustus 1966																
aug.'66	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+55.4	-67.6	-29.2	368.8	-0.6	62.4	62.6
sept.'66	368.8	60.000	62.4	62.6	7.0	8.1	5.1	120.2	-125.3	+31.8	-93.5	-242.4	126.4	-6.1	56.3	26.0
okt.'66	126.4	60.000	56.3	26.0	8.0	9.3	2.4	133.2	-135.6	+9.9	-125.7	–	–	–	–	–
Meer leeg op: 3 oktober 1966																
okt.'66	97.0	–	55.0	20.4	0.0	9.3	1.9	–	-1.9	+9.9	+0.0	+10.7	115.7	+0.9	55.9	24.1
nov.'66	115.7	–	55.9	24.1	6.0	6.9	1.7	–	-1.7	+7.0	+5.3	+13.7	129.4	+0.5	56.4	26.4
dec.'66	129.4	–	56.4	26.4	5.0	5.8	1.5	–	-1.5	+7.7	+6.2	+16.1	145.5	+0.7	57.1	+29.4
jan.'66	145.5	–	57.1	29.4	4.0	4.6	1.4	–	-1.4	+33.7	+32.3	+83.7	229.2	+2.6	59.7	+43.2
febr.'66	229.2	–	59.7	43.2	3.0	3.5	1.5	–	-1.5	+34.7	+33.2	+86.1	315.3	+1.8	61.5	55.3

vervolg tabel $N = 60000$ kW

jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
mrt. '67	315.3	—	61.5	55.3	4.0	4.6	2.5	—	-2.5	+44.6	+42.1	+109.1	—	—	—	—
Meer vol op: 23 maart 1967																
mrt. 67	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+44.6	-77.6	-46.9	351.1	-0.9	62.1	59.9
apr. 67	351.1	60.000	62.1	59.9	2.0	2.3	1.4	120.8	-122.2	+44.8	-77.4	-200.6	150.5	-4.0	57.3	30.3
mei 67	150.5	60.000	57.3	30.3	0.0	0.0	0.0	130.9	-130.9	+92.1	-38.8	-100.5	—	—	—	—
Meer leeg op: 16 mei 1967																
mei '67	97.0	—	55.0	20.4	0.0	0.0	0.0	—	0.0	+92.1	+92.1	+111.4	208.4	+4.1	59.1	39.8
jun. 67	208.4	—	59.1	39.8	0.0	0.0	0.0	—	0.0	+136.9	+136.9	+354.8	—	—	—	—
Meer vol op: 16 juni 1967																
jun. '67	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+136.9	+17.8	+21.5	398.0	—	63.0	67.5
jul. '67	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+99.5	-21.2	-55.0	343.0	-1.0	62.0	58.8
aug. '67	343.0	60.000	62.0	58.8	5.0	5.8	3.4	121.0	-124.3	+49.9	+74.4	-192.8	+150.2	-4.7	57.3	30.3
sept. '67	150.2	60.000	57.3	30.3	7.0	8.1	2.5	130.9	-133.4	+20.7	-112.7	-292.1	—	—	—	—
Meer leeg op: 6 september 1967																

vervolg tabel N = 60000 kW.

Jaar + maand	Vn begin [*10⁶m³]	N [kW]	H begin [m]	A meer begin [*10⁶m²]	E meer [mm/dag]	E*meer [m/s *10⁻⁸]	Q E [m³/s]	Q ↑ [m³/s]	Q TOT. ↑ [m³/s]	Q ↓ [m³/s]	Δ Q [m³/s]	Δ V [*10⁶m³]	Vn eind [*10⁶m³]	Δ H [m]	H eind [m]	A meer eind [*10⁶m²]
sept.'67	97.0	—	55.0	20.4	7.0	8.1	1.7	—	- 1.7	+20.7	+19.0	+49.3	146.3	+2.1	57.1	29.4
okt.'67	146.3	—	57.1	29.4	8.0	9.3	2.7	—	- 2.7	+ 7.5	+ 4.8	+12.4	158.7	+0.5	57.6	31.9
nov.'67	158.7	—	57.6	31.9	6.0	6.9	2.2	—	- 2.2	+ 5.5	+ 3.3	+ 8.6	167.3	+0.3	57.9	33.3
dec.'67	167.3	—	57.9	33.3	5.0	5.8	1.9	—	- 1.9	+11.6	+9.7	+25.1	192.4	+0.8	58.7	37.8
jan'68	192.4	—	58.7	37.8	4.0	4.6	1.7	—	- 1.7	+18.3	+16.6	+43.0	235.4	+1.1	59.8	43.9
febr.'68	235.4	—	59.8	43.9	3.0	3.5	1.5	—	- 1.5	+70.6	+69.1	+179.1	—	—	—	—
Meer vol op: 27 februari 1968																
febr.68	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.4	+70.6	-50.8	- 13.2	384.8	-0.3	62.7	65.2
mrt.'68	384.8	60.000	62.7	65.2	4.0	4.6	3.0	119.6	-122.6	+49.7	-72.9	-189.0	195.8	-4.0	58.7	37.8
apr.'68	195.8	60.000	58.7	37.8	2.0	2.3	0.9	127.8	-128.7	+115.2	-13.5	-35.0	160.8	-1.0	57.7	32.4
mei'68	160.8	60.000	57.7	32.4	0.0	0.0	0.0	130.0	-130.0	+109.4	-20.6	-53.4	107.4	-2.1	55.6	22.9
jun.'68	107.4	60.000	55.6	22.9	0.0	0.0	0.0	134.9	-134.9	+144.6	+ 9.7	+25.2	132.6	+ 0.9	56.5	26.9
jul.68	132.6	60.000	56.5	26.9	2.0	2.3	8.6	132.7	-133.3	+134.2	-0.9	- 2.5	134.9	+0.1	56.6	27.9
aug.'68	134.9	60.000	56.6	27.4	5.0	5.8	1.6	132.5	-134.1	+ 68.9	-65.2	-169.0	—	—	—	—

vervolg tabel $N = 60000$ kW

Jaar + maand	V_n begin [*10^6 m^3]	N [kW]	H begin [m]	A_{meer} begin [*10^6 m^2]	E_{meer} [mm/dag]	E^*_{meer} [m/s *10^-8]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [*10^6 m^3]	V_n eind [*10^6 m^3]	ΔH [m]	H eind [m]	A_{meer} eind [*10^6 m^2]
Meer leeg op: 7 augustus 1968																
aug.'68	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+60.9	+67.7	+134.5	231.5	+47	59.7	43.2
sept.'68	231.5	–	59.7	43.2	7.0	8.1	3.5	–	-3.5	+35.7	+32.2	+83.5	315.0	+1.8	61.5	55.3
okt.'68	315.0	–	61.5	55.3	8.0	9.3	5.1	–	-5.1	+26.3	+21.2	+55.0	370.0	+1.0	62.5	63.5
nov.'68	370.0	–	62.5	63.5	6.0	6.9	4.4	–	-4.4	+21.0	+16.6	+43.0	–	–	–	–
Meer vol op: 20 november 1968																
nov.'68	398.0	60.000	63.0	67.5	6.0	6.8	4.6	119.1	-123.7	+21.0	-102.7	-88.7	309.3	-1.6	61.4	54.6
dec.68	309.3	60.000	61.4	54.6	5.0	5.8	3.2	122.2	-125.4	+48.4	-77.0	-199.6	109.7	-5.8	55.6	22.9
jan.'69	109.7	60.000	55.6	22.9	4.0	4.6	1.1	134.9	-136.0	+72.8	-63.2	-163.8	–	–	–	–
Meer leeg op: 2 januari 1969																
jan.69	97.0	–	55.0	20.4	4.0	4.6	0.9	–	-0.9	+72.8	+71.9	+173.9	270.9	+5.6	60.6	49.0
febr.'69	270.9	–	60.6	49.0	3.0	3.5	1.7	–	-1.7	+57.8	+56.1	+145.4	–	–	–	–
Meer vol op: 26 februari 1969																

vervolg tabel N = 60000 kW.

Jaar + maand	Vn begin [*10⁶m³]	N [kW]	H begin [m]	A meer begin [*10⁶m²]	E meer [mm/dag]	E*meer [m/s *10⁻⁸]	QE [m³/s]	Q↑ [m³/s]	Q TOT.↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [*10⁶m³]	Vn eind [*10⁶m³]	ΔH [m]	H eind [m]	A meer eind [*10⁶m²]
febr.'69	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+57.8	-63.7	-22.0	376.0	-0.5	62.5	63.5
mrt. 69	376.0	60.000	62.5	63.5	4.0	4.6	2.9	120.0	-122.9	+47.5	-75.4	-195.4	180.6	-4.4	58.1	34.4
apr. '69	180.6	60,000	58.1	34.4	2.0	2.3	0.8	129.1	-129.9	+131.8	+1.9	+4.9	185.5	+0.4	58.5	36.6
mei '69	185.5	60,000	58.5	36.6	0.0	0.0	0.0	128.2	-128.2	+130.9	+2.7	+7.0	192.5	+0.2	58.7	37.8
jun.'69	192.5	60.000	58.7	37.8	0.0	0.0	0.0	127.8	-127.8	+107.5	-20.3	-52.6	139.9	-1.9	56.8	28.0
jul. 69	139.9	60.000	56.8	28.0	2.0	2.3	0.6	132.0	-132.6	+56.6	-76.0	-197.0	–	–	–	–
Meer leeg op: 7 juli 1969																
jul.'69	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+56.6	+56.1	+111.5	208.5	+4.1	59.1	39.8
aug.'69	208.5	–	59.1	39.8	5.0	5.8	2.3	–	-2.3	+42.2	+39.9	+103.4	311.9	+2.4	61.5	55.3
sept.'69	311.9	–	61.5	55.3	7.0	8.1	4.5	–	-4.5	+14.5	+10.0	+25.9	337.8	+0.5	62.0	58.8
okt.'69	337.8	–	62.0	58.8	8.0	9.3	5.5	–	-5.5	+8.9	+3.4	+8.8	346.6	+0.1	62.1	59.9
nov.'69	346.6	–	62.1	59.9	6.0	6.9	4.1	–	-4.1	+3.4	-0.7	-1.8	344.8	0	62.1	59.9
dec.'69	344.8	–	62.1	59.9	5.0	5.8	3.5	–	-3.5	+1.7	-1.8	-4.7	340.1	-0.1	62.0	58.8
jan.'70	340.1	–	62.0	58.8	4.0	4.6	2.7	–	-2.7	+11.6	+8.9	+23.1	363.2	+0.4	62.4	62.6
febr.'70	363.2	–	62.4	62.6	3.0	3.5	2.2	–	-2.2	+28.0	+25.8	+66.9	–	–	–	–

vervolg tabel N = 60000 kW

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT.}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$*10^6 m^2$]
Meer vol op: 16 februari 1970																
febr.'70	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+28.0	-93.5	-113.1	284.9	-2.1	60.9	51.4
mrt.'70	284.9	60.000	60.9	51.4	4.0	4.6	2.4	123.2	-125.6	+43.9	-81.7	-211.8	—	—	—	—
Meer leeg op: 27 maart 1970																
mrt.'70	97.0	—	55.0	20.4	4.0	4.6	0.9	—	-0.9	+43.9	+43.0	+11.2	108.2	+0.6	55.6	22.9
apr.'70	108.2	—	56.6	22.9	2.0	2.3	0.5	—	-0.5	+92.1	+91.6	+237.4	345.6	+6.5	62.1	59.9
mei'70	345.6	—	62.1	59.9	0.0	0.0	0.0	—	0.0	+104.6	+104.6	—	—	—	—	—
Meer vol op: 6 mei 1970																
mei'70	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+104.6	-14.5	-30.1	367.9	-0.6	62.4	62.6
jun.'70	367.9	60.000	62.4	62.2	0.0	0.0	0.0	120.2	-120.2	+106.0	-14.2	-36.8	331.1	-0.6	61.8	57.4
jul.'70	331.1	60.000	61.8	57.4	2.0	2.3	1.3	121.4	-122.7	+73.7	-49.0	-127.0	204.1	—	59.0	39.3
aug.'70	204.1	60.000	59.0	39.3	5.0	5.8	2.3	127.1	-129.4	+60.5	-68.9	-170.6	—	—	—	—
Meer leeg op: 10 augustus 1970																

vervolg tabel $N = 60000$ kW.

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	Q ↑ [m^3/s]	Q_{TOT} ↑ [m^3/s]	Q ↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
aug.'70	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+60.5	+59.3	+61.5	158.5	+2.6	57.6	31.9
sept.'70	158.5	–	57.6	31.9	7.0	8.1	2.6	–	-2.6	+28.9	+26.3	+68.2	226.7	+2.0	59.6	42.5
okt.'70	226.7	–	59.6	42.5	8.0	9.3	4.0	–	-4.0	+10.6	+6.6	+17.1	243.8	+0.4	60.0	45.1
nov.'70	243.8	–	60.0	45.1	6.0	6.9	3.1	–	-3.1	+13.7	+10.6	+27.5	271.3	+0.6	60.6	49.0
dec.'70	271.3	–	60.6	49.0	5.0	5.8	2.8	–	-2.8	+8.9	+6.1	+15.8	287.1	+0.4	61.0	52.0
jan.'71	287.1	–	61.0	52.0	4.0	4.6	2.4	–	-2.4	+70.4	+68.0	+176.3	–	–	–	–
Meer vol op: 19 januari 1971																
jan.'71	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+70.4	-51.8	+49.2	348.8	-0.9	62.1	59.9
febr.'71	348.8	60.000	62.1	59.9	3.0	3.5	2.1	120.8	-122.9	+71.8	-51.1	-132.5	216.3	-2.8	59.3	41.0
mrt'71	216.3	60.000	59.3	41.0	4.0	4.6	1.9	126.5	-128.4	+110.4	-18.0	-46.7	169.6	-1.3	58.0	33.8
apr.'71	169.6	60.000	58.0	33.8	2.0	2.3	0.8	129.3	-130.1	+101.2	-28.9	-74.9	–	–	–	–
Meer leeg op: 29 april 1971																
apr.'71	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+101.2	+99.7	+8.6	105.6	+0.4	55.4	22.0
mei'71	105.6	–	55.4	22.0	0.0	0.0	0.0	–	0.0	+157.4	+157.4	+408.0	–	–	–	–

vervolg tabel $N = 60000$ kW.

	Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^8$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$\times 10^6 m^2$]
	Meer vol op: 22 mei 1971																
0	mei '71	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+157.4	+30.3	+26.5	398.0	–	63.0	67.5
0	jun. '71	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+150.1	+31.0	–	398.0	–	63.0	67.5
0	jul. '71	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+104.6	+63.9	–	398.0	–	63.0	67.5
	aug. '71	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+85.8	-37.2	-96.4	301.6	-1.8	61.2	53.2
	sept. '71	301.6	60.000	61.2	53.2	7.0	8.1	4.3	122.6	-126.9	+51.6	-75.3	-195.2	106.4	-5.7	55.5	22.5
	okt. '71	106.4	60.000	55.5	22.5	8.0	9.3	2.1	135.1	-137.2	+20.4	-108.8	–	–	–	–	–
	Meer leeg op: 1 oktober 1971																
	okt. '71	97.0	–	55.0	20.4	8.0	9.3	1.9	–	-1.9	+28.4	+26.5	+66.4	163.4	+2.8	57.8	32.8
	nov. '71	163.4	–	57.8	32.8	6.0	6.9	2.3	–	-2.3	+14.5	+12.2	+31.6	195.0	+0.9	58.7	37.8
	dec. '71	195.0	–	58.7	37.8	5.0	5.8	2.2	–	-2.2	+11.3	+9.1	+23.6	218.6	+0.7	59.4	41.4
	jan. '72	218.6	–	59.4	41.4	4.0	4.6	1.9	–	-1.9	+34.9	+33.0	+85.5	304.1	+0.9	61.3	53.9
	febr. '72	304.1	–	61.3	53.9	3.0	3.5	1.9	–	-1.9	+45.3	+43.1	+112.5	–	–	–	–
	Meer vol op: 25 februari 1972																

vervolg tabel $N = 60.000$ kW.

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H begin [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m³/s]	Q↑ [m³/s]	$Q_{TOT.}$↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A_{meer} eind [$*10^6 m^2$]
febr.'72	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+45.3	-76.2	-32.9	365.1	-0.6	62.4	62.6
mrt.'72	365.1	60.000	62.4	62.6	4.0	4.6	2.9	120.2	-123.1	+80.0	-43.1	-111.7	253.4	-2.1	60.3	47.0
apr.'72	253.4	60.000	60.3	47.0	2.0	2.3	1.1	124.4	-125.5	+140.0	+14.5	+37.6	291.0	+0.8	61.1	52.6
mei'72	291.0	60.000	61.1	52.6	0.0	0.0	0.0	122.8	-122.8	+194.2	+71.4	+185.1	398.0	+1.9	63.0	67.5
jun.'72	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+120.7	+1.6	+4.1	398.0	–	63.0	67.5
jul.'72	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+89.2	-31.5	-81.7	316.3	-1.4	61.6	56.0
aug.'72	316.3	60.000	61.6	56.0	5.0	5.8	3.6	121.8	-125.4	+45.8	-79.6	-206.3	110.0	-5.9	55.7	23.3
sept.'72	110.0	60.000	55.7	23.3	7.0	8.1	1.9	134.7	-136.6	+26.0	-110.6	–	–	–	–	–
Meer leeg op: 1 september 1972																
sept.'72	97.0	–	55.0	20.4	7.0	8.1	1.7	–	-1.7	+26.0	+24.3	+60.9	157.9	+2.6	57.6	31.9
okt.'72	157.9	–	57.6	31.9	8.0	9.3	3.0	–	-3.0	+9.9	+6.9	+17.9	175.8	+0.6	58.2	35.0
nov.'72	175.8	–	58.2	35.0	6.0	6.9	2.4	–	-2.4	+9.6	+7.2	+18.7	194.5	+0.5	58.7	37.8
dec.'72	194.5	–	58.7	37.8	5.0	5.8	2.2	–	-2.2	+22.4	+20.2	+52.4	246.9	+1.4	60.1	45.7
jan.'73	246.9	–	60.1	45.7	4.0	4.6	2.1	–	-2.1	+18.6	+16.5	+42.8	289.7	+0.9	61.0	52.0
febr.'73	289.7	–	61.0	52.0	3.0	3.5	1.8	–	-1.8	+23.9	+22.1	+57.3	347.0	+1.1	62.1	59.9

vervolg tabel N = 60000 kW

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_E [m³/s]	$Q\uparrow$ [m³/s]	$Q_{TOT}\uparrow$ [m³/s]	$Q\downarrow$ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$\times 10^6 m^2$]
mrt.'73	347.0	–	62.1	59.9	4.0	4.6	2.8	–	-2.8	+43.6	+40.8	+105.8	–	–	–	–
Meer vol op: 15 maart 1973																
mrt'73	390.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+43.6	-77.9	-101.0	297.0	-1.8	61.2	53.2
apr.'73	297.0	60.000	61.2	53.2	2.0	2.3	1.2	122.6	-123.8	+28.3	-95.3	-247.0	–	–	–	–
Meer leeg op: 24 april 1973																
apr.'73	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+28.3	+27.8	+14.4	111.4	+0.8	55.8	23.6
mei'73	111.4	–	55.8	23.6	0.0	0.0	0.0	–	0.0	+68.0	+68.0	+176.3	287.7	+5.2	61.0	52.0
jun.'73	287.7	–	61.0	52.0	0.0	0.0	0.0	–	0.0	+135.2	+135.2	+350.4	–	–	–	–
Meer vol op: 9 juni 1973																
jun.'73	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+135.2	+16.1	29.2	398.0	–	63.0	67.5
jul.'73	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+65.3	-55.4	-143.6	254.4	-2.9	60.3	47.0
aug.'73	254.4	60.000	60.3	47.0	5.0	5.8	2.7	124.4	-127.1	+41.0	-86.1	-223.2	–	–	–	–
Meer leeg op: 21 augustus 1973																

vervolg tabel N = 60000 kW.

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$*10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m/s $x10^{-8}$]	Q_E [m^3/s]	Q↑ [m^3/s]	$Q_{TOT.}$↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$*10^6 m^2$]
aug.'73	97.0	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+41.0	+39.8	+31.0	128.0	+1.4	56.4	26.4
sept.'73	128.0	–	56.4	26.4	7.0	0.1	2.1	–	-2.1	+38.6	+36.5	+94.6	222.6	+3.1	59.5	42.0
okt.'73	122.6	–	59.5	42.0	8.0	9.3	3.9	–	-3.9	+20.7	+16.8	+43.6	266.2	+1.1	60.6	49.0
nov.'73	266.2	–	60.6	49.0	6.0	6.9	3.4	–	-3.4	+17.1	+13.7	+35.5	301.7	+0.8	61.2	53.2
dec.'73	301.7	–	61.2	53.2	5.0	5.8	3.1	–	-3.1	+42.7	+39.6	+102.6	–	–	–	–
Meer vol op: 28 december 1973																
dec.'73	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+42.7	-80.3	-13.9	384.1	-0.3	62.7	65.2
jan'74	384.1	60.000	62.7	65.2	4.0	4.6	3.0	119.6	-122.6	+58.3	-64.3	-166.7	217.4	-3.4	59.3	40.5
febr.'74	217.4	60.000	59.3	40.5	3.0	3.5	1.4	126.5	-127.9	+67.5	-60.4	-156.6	–	–	–	–
Meer leeg op: 23 februari 1974																
febr.'74	97.0	–	55.0	20.4	3.0	3.5	0.7	–	-0.7	+67.5	+66.8	+40.4	137.4	+1.8	56.8	28.0
mrt'74	137.4	–	56.8	28.0	4.0	4.6	1.3	–	-1.3	+67.5	+66.2	+171.6	309.0	+4.6	61.4	54.6
apr.'74	309.0	–	61.4	54.6	2.0	2.3	1.3	–	-1.3	+76.9	+75.6	+196.0	–	–	–	–
Meer vol op: 14 april 1974																

vervolg tabel $N = 60000$ kW

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s × 10^{-8}]	Q_E [m³/s]	Q↑ [m³/s]	$Q_{TOT.}$↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$\times 10^6 m^2$]
apr.'74	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+76.9	-43.8	-60.6	337.4	-0.1	62.0	58.8
mei '74	337.4	60.000	62.0	58.8	0.0	0.0	0.0	121.0	-121.0	+49.2	-71.8	-106.1	151.3	-4.7	57.3	30.3
juni'74	151.3	60000	57.3	30.0	0.0	0.0	0.0	130.9	-130.9	+97.8	-33.1	-85.8	—	—	—	—
Meer leeg op : 19 juni 1974																
jun.'74	97.0	—	55.0	20.4	0.0	0.0	0.0	—	0.0	+97.8	+97.8	+93.0	190.0	+3.6	58.6	31.9
jul.'74	190.0	—	58.6	31.9	2.0	2.3	0.7	—	-0.7	+103.1	+102.4	+265.4	—	—	—	—
Meer vol op : 24 juli 1974																
juli'74	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+103.1	-17.6	-9.1	388.9	-0.2	62.8	66.0
aug.'74	388.9	60.000	62.8	66.0	5.0	5.8	3.8	119.4	-123.2	+92.3	-30.9	-80.1	308.8	-1.4	61.4	54.6
sept.'74	308.8	60.000	61.4	54.6	7.0	8.1	4.4	122.1	-126.5	+36.6	-89.9	-233.0	—	—	—	—
Meer leeg op : 27 september 1974																
sept.'74	97.0	—	55.0	20.4	7.0	8.1	1.7	—	-1.7	+36.6	+34.9	+9.0	106.0	+0.5	55.5	22.5
okt.'74	106.0	—	55.5	22.5	8.0	9.3	2.1	—	-2.1	+19.8	+17.7	+45.9	151.9	+1.8	57.3	30.3
nov.'74	151.9	—	57.3	30.3	6.0	6.9	2.1	—	-2.1	+11.6	+9.5	+24.6	+176.5	+0.9	58.2	35.0

vervolg tabel $N = 60.000$ kW.

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-8}$]	Q_6 [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT.}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$\times 10^6 m^2$]
dec.'74	176.5	—	58.2	35.0	5.0	5.8	2.0	—	-2.0	+23.6	+21.6	+56.0	232.5	+1.5	59.7	43.2
jan.'75	232.5	—	59.7	43.2	4.0	4.6	2.0	—	-2.0	+35.2	+33.2	+86.1	318.6	+1.9	61.6	56.0
febr.'75	318.6	—	61.6	56.0	3.0	3.5	2.0	—	-2.0	+19.3	+17.3	+44.8	363.4	+0.8	62.4	62.6
mrt.'75	363.4	—	62.4	62.6	4.0	4.6	2.9	—	-2.9	+24.8	+21.9	+56.8	—	—	—	—
Meer vol op: 10 maart 1975																
mrt.'75	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+24.8	-97.4	-101.0	297.0	-1.8	61.2	53.2
apr.'75	297.0	60.000	61.2	53.2	2.0	2.3	1.2	122.6	-123.8	+50.6	-73.2	-189.7	107.3	-5.6	55.6	22.8
mei'75	107.3	60.000	55.6	22.8	0.0	0.0	0.0	134.9	-134.9	+99.8	-35.1	-91.0	—	—	—	—
Meer leeg op: 3 mei 1975																
mei '75	97.0	—	55.0	20.4	0.0	0.0	0.0	—	0.0	+99.8	+99.8	+232.8	329.8	+6.8	61.8	57.4
juni'75	**329.8**	—	61.8	57.4	0.0	0.0	0.0	—	0.0	+108.9	+108.9	+282.3	—	—	—	—
Meer vol op: 7 juni 1975																
jun.'75	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+108.9	-10.2	-20.3	377.7	-0.5	62.5	63.5
jul.'75	377.7	60.000	62.5	63.5	2.0	2.3	1.5	120:	-122.5	+118.6	-3.9	-10.1	367.6	-0.1	62.4	62.6

vervolg tabel N = 60 000 kW.

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E^*_{mar} [m/s $\times 10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT.}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
aug. '75	367.6	60.000	62.4	62.6	5.0	5.8	3.6	120.2	-123.8	+112.6	-11.2	-29.0	338.6	-0.4	62.0	50.8
sept. '75	338.6	60.000	62.0	50.8	7.0	8.1	4.8	121.0	-125.8	+73.7	-52.1	-135.0	203.6	-3.0	59.0	39.3
okt. '75	203.6	60.000	59.0	39.3	8.0	9.3	3.7	127.1	-130.8	+27.5	-103.3	-267.8	—	—	—	—
Meer leeg op: 12 oktober 1975																
okt. '75	97.0		55.0	20.4	8.0	9.3	1.9	—	-1.9	+27.5	+25.6	+39.8	136.8	+1.7	56.7	27.7
nov. '75	136.8	—	56.7	27.7	6.0	6.9	1.9	—	-1.9	+15.2	+13.3	+34.5	171.3	+1.3	58.0	33.8
dec. '75	171.3	—	58.0	33.8	5.0	5.8	2.0	—	-2.0	+20.2	+18.2	+47.2	218.5	+1.3	59.3	41.0
jan. '76	218.5	—	59.3	41.0	4.0	4.6	1.9	—	-1.9	+57.1	+55.2	+143.1	361.6	+3.0	62.3	61.8
febr. '76	361.6	—	62.3	61.8	3.0	3.5	2.2	—	-2.2	+45.3	+43.1	+117.1	—	—	—	—
Meer vol op: 10 februari 1976																
febr. '76	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+45.3	-76.2	-131.7	266.3	-2.5	60.5	48.3
mrt. '76	266.3	60.000	60.5	48.3	4.0	4.6	2.2	124.0	-126.2	+61.0	-65.2	-169.0	79.3	-5.5	55.0	20.4
Meer leeg op: 30 maart 1976																

vervolg tabel N = 60.000 kW

	Jaar + maand	Vn begin [*10⁶m³]	N [kW]	H begin [m]	A meer begin [*10⁶m²]	E meer [mm/dag]	E*meer [m/s *10⁻⁸]	Q_E [m³/s]	Q↑ [m³/s]	Q_{TOT}↑ [m³/s]	Q↓ [m³/s]	ΔQ [m³/s]	ΔV [*10⁶m³]	Vn eind [*10⁶m³]	ΔH [m]	H eind [m]	A meer eind [*10⁶m²]
	apr.'76	97.0	–	55.0	20.4	2.0	2.3	0.5	–	-0.5	+132.8	+132.3	+342.9	–	–	–	–
	Meer vol op: 26 april 1976																
0	apr'76	398.0	60000	63.0	67.5	2.0	2.3	0.5	119.1	-119.6	+132.8	+13.2	–	398.0	–	63.0	67.5
0	mei'76	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+220.5	+101.4	–	398.0	–	63.0	67.5
0	jun'76	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+139.1	+20.0	–	398.0	–	63.0	67.5
	jul.'76	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+105.1	-15.6	-40.4	357.6	-0.8	62.2	61.4
	aug.'76	357.6	60.000	62.2	61.0	5.0	5.8	3.5	120.6	-124.1	+54.0	-70.1	-181.7	175.9	-4.0	58.2	35.0
	sept.'76	175.9	60.000	58.2	35.0	7.0	8.1	2.8	128.9	-131.7	+23.6	-108.1	-280.2	–	–	–	–
	Meer leeg op: 8 september 1976																
	sept.'76	97.0	–	55.0	20.4	7.0	8.1	1.6	–	-1.6	+23.6	+22.0	+41.8	138.8	+1.8	56.8	28.0
	okt.'76	138.8	–	56.8	28.0	8.0	9.3	2.6	–	-2.6	+9.6	+7.0	+18.1	156.9	+0.7	57.5	31.3
	nov. 76	156.9	–	57.5	31.3	6.0	6.9	2.2	–	-2.2	+5.3	+3.1	+8.0	164.9	+0.3	57.8	32.8
	dec.'76	164.9	–	57.8	32.8	5.0	5.8	1.9	–	-1.9	+7.2	+5.8	+13.7	178.6	+0.4	58.2	35.0
	jan'77	178.6	–	58.2	35.0	4.0	4.6	1.6	–	-1.6	+19.0	+17.4	+45.1	223.7	+1.3	59.5	42.0

vervolg tabel $N = 60.000$ kW.

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H_{begin} [m]	A_{meer} begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $*10^{-8}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H_{eind} [m]	A_{meer} eind [$*10^6 m^2$]
febr.'77	**223.7**	–	59.5	42.0	3.0	3.5	1.5	–	-1.5	+16.1	+14.6	+37.8	261.5	**+0.9**	**60.4**	**47.6**
mrt'77	261.5	–	60.4	47.6	4.0	4.6	2.2	–	-2.2	+31.8	+29.6	+76.7	338.2	+1.6	**62.0**	58.8
apr.'77	338.2	–	**62.0**	58.8	2.0	2.3	1.4	–	-1.4	+74.0	+72.6	+188.2	–	–	–	–
Meer vol op : 10 april 1977																
apr.'77	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+74.0	-46.7	-80.7	317.3	-1.4	61.6	56.0
mei'77	317.3	60.000	61.6	56.0	0.0	0.0	0.0	121.8	-121.8	+62.7	-59.1	-153.1	164.2	-3.8	57.8	32.8
jun.'77	164.2	60.000	57.8	32.8	0.0	0.0	0.0	129.8	-129.8	+62.2	-67.6	-175.1	–	–	–	–
Meer leeg op: 12 juni 1977																
jun.'77	97.0	–	55.0	20.4	0.0	0.0	0.0	–	0.0	+62.2	+62.2	+96.7	193.7	+3.7	58.7	37.8
jul.'77	193.7	–	58.7	37.8	2.0	2.3	0.9	–	-0.9	+69.7	+60.8	+178.3	372.0	+3.8	62.5	63.5
aug.'77	372.0	–	62.5	63.5	5.0	5.8	3.7	–	-3.7	+44.6	+40.9	+106.0	–	–	–	–
Meer vol op: 7 augustus 1977																
aug.'77	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+44.6	-78.4	**-155.8**	242.2	-3.0	60.0	45.1
sept.'77	242.2	60.000	60.0	45.1	7.0	8.1	3.7	125.0	-128.7	+15.7	-113.0	-292.9	–	–	–	–

vervolg tabel $N = 60000$ kW.

Jaar en maand	V_n begin [$*10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$*10^6 m^2$]	E meer [mm/dag]	E^*_{meer} [m^3/s $*10^{-3}$]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$*10^6 m^2$]
Meer vol op: 25 mei 1978																
mei'78	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+101.7	-17.4	-7.5	390.5	-0.2	62.8	66.0
jun.'78	390.5	60.000	62.8	66.0	0.0	0.0	0.0	119.4	-119.4	+70.6	-48.8	-126.5	264.0	-2.3	60.5	48.3
jul.'78	264.0	60.000	60.5	48.3	2.0	2.3	1.1	124.0	-125.1	+57.4	-67.7	-175.5	—	—	—	—
Meer leeg op: 29 juli 1978																
jul.'78	97.0	–	55.0	20.4	2.0	2.3	0.5	—	-0.5	+57.4	+56.9	+5.0	102.0	+0.1	55.1	21.7
aug.'78	102.0	–	55.1	21.7	5.0	5.8	1.3	—	-1.3	+75.2	+73.9	+191.6	293.6	+0.6	61.1	52.6
sept.'78	293.6	–	61.1	52.6	7.0	8.1	4.3	—	-4.3	+34.2	+29.9	+77.5	371.1	+1.4	62.5	63.5
okt.'78	371.1	–	62.5	63.5	8.0	9.3	5.9	—	-5.9	+17.1	+11.2	+29.0	—	—	—	—
Meer vol op: 20 oktober 1978																
okt.'78	398.0	60.000	63.0	67.5	8.0	9.3	6.3	119.1	-125.4	+17.1	-108.3	-18.7	379.3	-0.4	62.6	64.4
nov.'78	379.3	60.000	62.6	64.4	6.0	6.9	4.4	119.8	-124.2	+10.4	-113.8	-295.0	—	—	—	—
Meer leeg op: 29 november 1978																

vervolg tabel N = 60000 kW

Jaar + maand	V_n begin [$*10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$*10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s * 10^{-8}]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$*10^6 m^3$]	V_n eind [$*10^6 m^3$]	ΔH [m]	H eind [m]	A meer [$*10^6 m^2$]
Meer leeg op : 15 september 1977																
sept. '77	97.0	—	55.0	20.4	7.0	8.1	1.7	—	-1.7	+15.7	+14.0	+18.1	115.1	+0.9	55.9	24.1
okt. '77	115.1	—	55.9	24.1	8.0	9.3	2.5	—	-2.5	+12.3	+9.8	+25.4	140.5	+1.0	56.9	28.4
nov. '77	140.5	—	56.9	28.4	6.0	6.9	2.0	—	-2.0	+7.0	+5.0	+13.0	153.5	+0.5	57.4	30.6
dec. '77	153.5	—	57.4	30.6	5.0	5.8	1.8	—	-1.8	+32.1	+30.3	+78.5	232.0	+2.3	59.7	43.2
jan. '78	232.0	—	59.7	43.2	4.0	4.6	2.0	—	-2.0	+21.8	+19.2	+49.8	281.8	+1.2	60.9	51.4
febr. '78	281.8	—	60.9	51.4	3.0	3.5	1.8	—	-1.8	+48.2	+46.4	+120.3	—	—	—	—
Meer vol op : 29 februari 1978																
febr. 78	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+48.2	-73.3	-6.0	392.0	-0.1	62.9	66.8
mrt '78	392.0	60.000	66.8	66.8	4.0	4.6	3.1	119.2	-122.3	+39.5	-82.8	-214.6	177.4	-4.7	58.2	35.0
apr. '78	177.4	60.000	35.0	35.0	2.0	2.3	0.8	128.9	-129.7	+76.9	-52.8	-136.9	—	—	—	—
Meer leeg op : 18 april 1978																
apr. 78	97.0	—	55.0	20.4	2.0	2.3	0.5	—	-0.5	+76.9	+76.4	+79.2	176.2	+3.2	58.2	35.0
mei 78	176.2	—	58.2	35.0	0.0	0.0	0.5	—	-0.0	+101.7	+101.7	+263.6	—	—	—	—

vervolg tabel $N = 60.000$ kW

Jaar + maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A_{meer} begin [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{-3}$]	Q_E [m³/s]	$Q\uparrow$ [m³/s]	$Q_{TOT.}\uparrow$ [m³/s]	$Q\downarrow$ [m³/s]	ΔQ [m³/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A_{meer} eind [$\times 10^6 m^2$]
nov.'78	97.0	–	55.0	20.4	6.0	6.9	1.4	–	-1.4	+10.4	+10.0	+0.9	97.9	–	55.0	20.4
dec.'78	97.9	–	55.0	20.4	5.0	5.8	1.2	–	-1.2	+23.6	+22.4	+58.1	156.0	+2.5	57.0	31.3
jan.'79	156.0	–	57.5	31.3	4.0	4.6	1.4	–	-1.4	+33.7	+32.3	+83.7	239.7	+2.4	59.9	44.5
febr.'79	239.7	–	59.9	44.5	3.0	3.5	1.6	–	-1.6	+23.6	+22.0	+57.0	296.7	+1.3	61.2	53.2
mrt.'79	296.7	–	61.2	53.2	4.0	4.6	2.4	–	-2.4	+56.6	+54.2	+140.5	–	–	–	–
Meer vol op: 22 maart 1979																
mrt.'79	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+56.6	-65.6	-45.3	352.7	-0.8	62.2	61.0
apr.'79	352.7	60.000	62.2	61.0	2.0	2.3	1.4	120.6	-122.0	+101.2	-20.8	-53.9	298.8	-0.1	61.2	53.2
mei'79	298.8	60.000	61.2	53.2	0.0	0.0	0.0	122.6	-122.6	+98.6	-24.0	-62.2	236.6	-1.4	59.8	43.9
jun.'79	236.6	60.000	59.8	43.9	0.0	0.0	0.0	125.4	-125.4	+134.0	+8.6	+22.3	258.9	+0.6	60.4	47.6
jul.'79	258.9	60.000	60.4	47.6	2.0	2.3	1.1	124.2	-125.3	+95.9	-29.4	-76.2	182.7	-2.0	58.4	36.0
aug.'79	182.7	60.000	58.4	36.0	5.0	5.8	2.1	128.4	-130.5	+64.6	-65.9	-170.8	–	–	–	–
Meer leeg op: 15 augustus 1979																

vervolg tabel N = 60000 kW

Jaar / maand	V_n begin [$\times 10^6 m^3$]	N [kW]	H begin [m]	A meer begin [$\times 10^6 m^2$]	E meer [mm/dag]	E* meer [m/s $\times 10^{-9}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	V_n eind [$\times 10^6 m^3$]	ΔH [m]	H eind [m]	A meer eind [$\times 10^6 m^2$]
aug.'79	97.0	—	55.0	20.4	5.0	5.8	1.2	—	-1.2	+64.0	+63.4	+82.2	179.2	+3.2	58.2	35.0
sept.'79	179.2	—	58.2	35.0	7.0	8.1	2.8	—	-2.8	+28.0	+25.2	+65.3	244.5	+1.8	60.0	45.1
okt.'79	244.5	—	60.0	45.1	8.0	9.3	4.2	—	-4.2	+18.8	+14.6	+37.8	282.3	+0.9	60.9	51.4
nov.'79	282.3	—	60.9	51.4	6.0	6.9	3.6	—	-3.6	+9.2	+5.6	+14.5	296.8	+0.3	61.2	53.2
dec.'79	296.8	—	61.2	53.2	5.0	5.8	3.1	—	-3.1	+23.6	+20.	+53.1	349.9	+0.9	62.1	59.9
jan.'80	349.9	—	62.1	59.9	4.0	4.6	2.8	—	-2.8	+25.1	+22.3	+57.8	—	—	—	—
Meer vol op: 25 januari 1980																
jan.'80	398.0	60.000	63.0	67.5	4.0	4.6	3.1	119.1	-122.2	+25.1	-97.1	-42.0	356.0	-0.8	62.2	61.0
febr.'80	356.0	60.000	62.2	61.0	3.0	3.5	2.1	120.6	-122.7	+17.8	-104.9	-271.9	—	—	—	—
Meer leeg op 29 februari 1980																
febr.'80	97.0	—	55.0	20.4	3.0	3.5	0.7	—	-0.7	+17.8	+17.1	+1.5	90.5	+0.1	55.1	20.8
mrt.'80	90.5	—	55.1	20.8	4.0	4.6	1.0	—	-1.0	+28.2	+27.2	+70.5	169.0	+2.9	58.0	33.8
apr.'80	169.0	—	58.0	33.8	2.0	2.3	0.8	—	-0.8	+70.1	+69.3	+179.6	348.6	+4.1	62.1	59.9
mei'80	348.6	—	62.1	59.9	0.0	0.0	0.0	—	0.0	+145.6	+145.6	+377.4	—	—	—	—

vervolg tabel N = 60000 kW

	Jaar + maand	$V_{n\,begin}$ [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	$A_{meer\,begin}$ [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^{[illegible]}$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_{n\,eind}$ [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	$A_{meer\,eind}$ [$\times 10^6 m^2$]
	Meer vol op : 4 mei 1980																
0	mei '80	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+145.6	+26.5	+59.5	398.0	—	63.0	67.5
0	jun. '80	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+129.9	+10.8	—	398.0	—	63.0	67.5
	jul. '80	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+69.2	-51.5	-133.5	264.5	-2.5	60.5	48.3
	aug. '80	264.5	60.000	60.5	48.3	5.0	5.8	2.8	124.0	-126.8	+45.5	-81.3	-210.7	—	—	—	—
	Meer leeg op : 24 augustus 1980.																
	aug. '80	97.0	—	55.0	20.4	5.0	5.8	1.2	—	-1.2	+45.5	+44.3	+23.0	120.0	+1.1	56.1	25.1
	sept. '80	120.0	—	56.1	25.1	7.0	8.1	2.0	—	-2.0	+31.8	+29.8	+77.2	197.2	+2.7	58.8	38.3
	okt. '80	197.2	—	58.8	38.3	8.0	9.3	3.6	—	-3.6	+10.4	+6.8	+17.6	214.8	+0.4	59.2	40.4
	nov. '80	214.8	—	59.2	40.4	6.0	6.9	2.8	—	-2.8	+12.5	+9.7	+25.1	239.9	+0.7	59.9	44.5
	dec. '80	239.9	—	59.9	44.5	5.0	5.8	2.6	—	-2.6	+18.3	+15.7	+40.7	280.6	+0.9	60.8	50.8
	jan. '81	280.6	—	60.8	50.8	4.0	4.6	2.3	—	-2.3	+23.9	+21.6	+56.0	336.6	+1.1	61.9	58.1
	febr. '81	336.6	—	61.9	58.1	3.0	3.5	2.0	—	-2.0	+47.7	+45.7	+118.5	—	—	—	—
	Meer vol op : 16 februari 1981																

vervolg tabel N = 60000 kW

Jaar / maand	V_n begin [x10^6 m^3]	N [kW]	H begin [m]	A meer begin [x10^6 m^2]	E meer [mm/dag]	E meer [m^3/s x10$^?$]	Q_E [m^3/s]	Q↑ [m^3/s]	Q_{TOT}↑ [m^3/s]	Q↓ [m^3/s]	ΔQ [m^3/s]	ΔV [x10^6 m^3]	V_n eind [x10^6 m^3]	ΔH [m]	H eind [m]	A meer eind [x10^6 m^2]
febr. '81	398.0	60.000	63.0	67.5	3.0	3.5	2.4	119.1	-121.5	+47.7	-73.8	-89.3	308.7	-1.6	61.4	54.6
mrt. '81	308.7	60.000	61.4	54.6	4.0	4.6	2.5	122.2	-124.3	+39.3	-85.0	-220.3	–	–	–	–
Meer leeg op: 29 maart 1981																
mrt. '81	97.0	–	55.0	20.4	4.0	4.6	+0.9	–	-0.9	+39.3	+30.4	+3.3	100.3	+0.2	55.2	21.3
apr. '81	100.3	–	55.2	21.3	2.0	2.3	0.5	–	-0.5	+72.3	+71.8	+186.1	286.4	+5.8	61.0	52.0
mei '81	286.4	–	61.0	52.0	0.0	0.0	0.0	–	0.0	+132.8	+132.8	+344.2	–	–	–	–
Meer vol op: 10 mei 1981																
0 mei '81	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+132.8	+13.7	+35.5	398.0	–	63.0	67.5
0 jun. '81	398.0	60.000	63.0	67.5	0.0	0.0	0.0	119.1	-119.1	+140.7	+21.6	+56.0	398.0	–	63.0	67.5
0 jul. '81	398.0	60.000	63.0	67.5	2.0	2.3	1.6	119.1	-120.7	+134.5	+13.8	+35.8	398.0	–	63.0	67.5
aug. '81	398.0	60.000	63.0	67.5	5.0	5.8	3.9	119.1	-123.0	+68.0	-55.0	-142.6	+255.4	-2.7	60.3	47.0
sept. '81	255.4	60.000	60.3	47.0	7.0	8.1	3.8	124.4	-128.2	+44.6	-83.6	-216.7	–	–	–	–
Meer leeg op: 22 september 1981																

vervolg tabel $N = 60.000$ kW.

Jaar + maand	$V_{n\ begin}$ [$\times 10^6 m^3$]	N [kW]	H_{begin} [m]	$A_{meer\ begin}$ [$\times 10^6 m^2$]	E_{meer} [mm/dag]	E^*_{meer} [m/s $\times 10^3$]	Q_E [m^3/s]	$Q\uparrow$ [m^3/s]	$Q_{TOT}\uparrow$ [m^3/s]	$Q\downarrow$ [m^3/s]	ΔQ [m^3/s]	ΔV [$\times 10^6 m^3$]	$V_{n\ eind}$ [$\times 10^6 m^3$]	ΔH [m]	H_{eind} [m]	$A_{meer\ eind}$ [$\times 10^6 m^2$]
sept.'81	97.0	—	55.0	20.1	7.0	8.1	1.7	—	-1.7	+44.6	+42.9	+29.7	126.7	+1.3	56.3	26.0
okt.'81	126.7	—	56.3	26.0	8.0	9.3	2.4	—	-2.4	+24.8	+22.4	+58.1	184.8	+2.1	58.4	36.0
nov.'81	184.8	—	58.4	36.0	6.0	6.9	2.5	—	-2.5	+11.6	+9.1	+23.6	208.4	+0.7	59.1	39.9
dec.'81	208.4	—	59.1	39.9	5.0	5.8	2.3	—	-2.3	+16.6	+14.3	+37.1	245.5	+0.9	60.0	45.1

Meer geraakt dus niet vol vóór 31 december 1981.

Produktietyd en te leveren hoeveelheden energie.

Tabel N = 60.000 kW

Meer vol / leeg	Meer leeg / vol	Wél energie [mnd]	[dgn]	Géén energie [mnd]	[dgn]	Hoeveelheid energie [in kWh * 10^6]
01-01-'52	08-02-'52	1.27	38	—	—	60.000 * 38 * 24 = 54.72
08-02-'52	03-05-'52	—	—	2.83	85	—
03-05-'52	20-08-'52	3.57	107	—	—	60.000 * 107 * 24 = 154.08
20-08-52	04-02-'53	—	—	5.47	164	—
04-02-'53	10-09-'53	7.20	216	—	—	60.000 * 216 * 24 = 311.04
-09-'53	07-03-'54	—	—	590	177	—
07-03-'54	09-09-'54	6.07	182	—	—	60.000 * 182 * 24 = 26208
09-09-'54	29-01-'55	—	—	467	140	—
29-01-'55	25-03-'55	1.87	56	—	—	60.000 * 56 * 24 = 80.64
25-03-'55	05-05-'55	—	—	133	40	—
05-05-'55	17-09-'55	4.40	132	—	—	60.000 * 132 * 24 = 190.08
17-09-'55	07-02-'56	—	—	4.67	140	—
07-02-'56	04-08-'56	5.90	177	—	—	60.000 * 177 * 24 = 254.88
04-08-'56	07-12-'56	—	—	4.10	12.3	—
07-12-'56	17-01-'57	1.33	40	—	—	60.000 * 40 * 24 = 57.60
17-01-'57	24-04-'57	—	—	3.23	97.0	—
24-04-'57	12-09-'57	4.6	13.8	—	—	60000 * 138 * 24 = 198.72
12-09-'57	23-03-'58	—	—	6.37	19.1	—
23-03-'58	13-06-'58	2.67	80	—	—	60.000 * 80 * 24 = 115.20
13-06-'58	13-03-'59	—	—	900	270	

Vervolg Tabel N = 60000 kW. Produktietijd.

Meer vol / leeg	Meer leeg / vol	Wél energie [mnd]	[dgn]	Géén energie [mnd]	[dgn]	Hoeveelheid energie [in kWh * 10^6]
13 - 03 - '59	30 - 04 - '59	1.57	47	—	—	60.000 * 47 * 24 = 67.68
30 - 04 - '59	12 - 06 - '59	—	—	1.40	42	—
12 - 06 - '59	20 - 08 - '59	2.27	68	—	—	60.000 * 68 * 24 = 97.92
20 - 08 - '59	05 - 04 - '60	—	—	7.50	225	—
05 - 04 - '60	18 - 09 - '60	5.43	16.3	—	—	60000 * 163 * 24 = 234.72
18 - 09 - '60	26 - 04 - '61	—	—	7.27	218	—
26 - 04 - '61	05 - 06 - '61	1.30	39	—	—	60.000 * 39 * 24 = 56.16
05 - 06 - '61	16 - 07 - '61	—	—	1.37	41	—
16 - 07 - '61	12 - 09 - '61	1.87	56	—	—	60.000 * 56 * 24 = 80.64
12 - 09 - '61	30 - 02 - '62	—	—	5.6	168	—
30 - 02 - '62	08 - 04 - '62	1.27	38	—	—	60.000 * 38 * 24 = 54.72
08 - 04 - '62	30 - 05 - '62	—	—	1.73	52	—
30 - 05 - '62	28 - 08 - '62	2.93	88	—	—	60.000 * 88 * 24 = 126.72
28 - 08 - '62	09 - 02 - '63	—	—	5.37	161	—
09 - 02 - '63	13 - 05 - '63	3.13	94	—	—	60.000 * 94 * 24 = 135.36
13 - 05 - '63	08 - 06 - '63	—	—	0.83	25	—
08 - 06 - '63	16 - 09 - '63	3.27	98	—	—	60.000 * 98 * 24 = 141.12
16 - 09 - '63	08 - 06 - '64	—	—	8.73	262	—
08 - 06 - '64	01 - 08 - '64	1.77	53	—	—	60.000 * 53 * 24 = 76.32
01 - 08 - '64	05 - 03 - '65	—	—	1.90	57	—
05 - 03 - '65	14 - 04 - '65	2.00	60	—	—	60.000 * 60 * 24 = 86.40

Vervolg tabel N= 60000 kW. Produktietyd

Meer vol/leeg	Meer leeg/vol	Wél energie		Géén energie		Hoeveelheid energie [in kWh $\times 10^6$]
		[mnd]	[dgn]	[mnd]	[dgn]	
14 - 04 - '65	11 - 06 - 65	—	—	1.90	57	—
11 - 06 - '65	11 - 08 - 65	2.00	60	—	—	60.000*60*24= 86.40
11 - 08 - '65	27 - 04 - '66	—	—	8.53	256	—
27 - 04 - '66	28 - 06 - '66	2.03	61	—	—	60.000*61*24= 87.84
28 - 06 - '66	25 - 08 - '66	—	—	1.90	57	—
25 - 08 - '66	03 - 10 - '66	1.27	38	—	—	60.000*38*24= 54.72
03 - 10 - 66	23 - 03 - '67	—	—	5.67	17.0	—
23 - 03 - '67	16 - 05 - '67	1.77	53	—	—	60.000*53*24= 76.32
16 - 05 - '67	16 - 06 - '67	—	—	1.0	3.0	—
16 - 06 - '67	06 - 09 - '67	2.67	80	—	—	60.000*80*24= 115.2
06 - 09 - '67	27 - 02 - '68	—	—	5.70	17.1	—
27 - 02 - '68	07 - 08 - '68	5.33	16.0	—	—	60.000*160*24= 230.4
07 - 08 - '68	20 - 11 - '68	—	—	3.43	10.3	—
20 - 11 - '68	02 - 01 - '69	1.4	4.2	—	—	60.000*42*24 = 6048
02 - 01 - '69	26 - 02 - '69	—	—	1.80	54	—
26 - 02 - '69	07 - 07 - '69	4.37	13.1	—	—	60.000*131*24= 188.64
07 - 07 - '69	16 - 02 - '70	—	—	7.30	21.9	—
16 - 02 - '70	27 - 03 - '70	1.37	41.	—	—	60.000*41*24= 59.04
27 - 03 - '70	06 - 05 - '70	—	—	1.30	3.9	—
06 - 05 - '70	18 - 08 - '70	3.40	10.2	—	—	60.000*100*24= 144.00
18 - 08 - '70	19 - 01 - '71	—	—	0.77	2.3	—
19 - 01 - '71	29 - 04 - '71	4.3	12.9	—	—	60.000*186*24= 267.84
29 - 04 - '71	22 - 05 - '71	—	—	6.47	19.4	—

Vervolg tabel N = 60000 kW. Produktietyd.

Meer vol / leeg	Meer leeg / vol	Wél energie [mnd]	Wél energie [dgn]	Geen energie [mnd]	Geen energie [dgn]	Hoeveelheden energie [in kWh * 10^6]
22-05-'71	01-10-71	4.3	129	—	—	60.000*129*24=185.76
01-10-'71	25-02-'72	—	—	4.80	144	—
25-02-'72	01-09-'72	6.0	186	—	—	60.000*186*24=267.84
01-09-'72	15-03-'73	—	—	6.47	194	—
15-03-'73	24-04-'73	1.30	39	—	—	60000*39*24 = 56.16
24-04-'73	09-06-'73	—	—	1.50	45	—
09-06-'73	21-08-'73	2.40	72	—	—	60.000*72*24 = 103.68
21-08-'73	28-12-'73	—	—	4.23	127	—
28-12-'73	23-02-'74	1.83	55	—	—	60000*55*24 = 79.20
23-02-'74	14-04-'74	—	—	1.70	51	—
14-04-'74	19-06-'74	2.17	65	—	—	60.000*65*24=93.60
19-06-'74	24-07-'74	—	—	1.17	35	—
24-07-'74	27-09-'74	2.1	63	—	—	60.000*63*24=90.72
27-09-'74	18-03-'75	—	—	5.70	171	—
18-03-'75	03-05-'75	1.50	45	—	—	60.000*45*24= 64.80
03-05-'75	07-06-'75			1.13	34	—
07-06-'75	12-10-'75	4.17	125	—	—	60000*125*24 =180.00
12-10-'75	10-02-'76	—	—	3.93	118	—
10-02-'76	30-03-'76	1.67	50	—	—	60.000*50*24= 89.28
30-03-'76	03-05-'76	—	—	1.1	33	—
26-04-'76	08-09-'76	4.4	132	—	—	60000*132*24= 190.1
08-09-'76	10-04-'77	—	—	7.07	212	—
10-04-'77	12-06-'77	2.07	62	—	—	60.000*62*24 = 89.28

Vervolg tabel N = 60.000 kW : Produktietyd.

Meer vol / leeg	Meer leeg / vol	Wel energie [mnd]	Wel energie [dgn]	Geen energie [mnd]	Geen energie [dgn]	Hoeveelheden energie [in kWh * 10^6]
12 - 06 - '77	07 - 08 - '77	—	—	1.83	55	—
07 - 08 - '77	15 - 09 - '77	1.27	38	—	—	60.000 * 38 * 24 = 54.72
15 - 09 - '77	29 - 02 - '78			5.47	164	—
29 - 02 - '78	18 - 04 - '78	1.63	49	—	—	60.000 * 49 * 24 = 70.56
18 - 04 - '78	25 - 05 - '78	—	—	1.23	37	—
25 - 05 - '78	29 - 07 - '78	2.13	64	—	—	60.000 * 64 * 24 = 92.16
29 - 07 - '78	28 - 10 - '78	—	—	2.97	89	—
28 - 10 - '78	29 - 11 - '78	1.03	31	—	—	60.000 * 31 * 24 = 44.64
29 - 11 - '78	22 - 03 - '79	—	—	3.77	113	—
22 - 03 - '79	15 - 08 - '79	4.77	143	—	—	60.000 * 143 * 24 = 205.92
15 - 08 - '79	25 - 01 - '80	—	—	5.33	160	—
25 - 01 - '80	29 - 02 - '80	1.13	34	—	—	60.000 * 34 * 24 = 48.96
29 - 02 - '80	04 - 05 - '80	—	—	2.16	65	—
04 - 05 - '80	24 - 08 - '80	3.67	110	—	—	60.000 * 110 * 24 = 158.40
24 - 08 - '80	16 - 02 - '81	—	—	5.73	172	—
16 - 02 - '81	29 - 03 - '81	1.43	43	—	—	60.000 * 43 * 24 = 61.92
29 - 03 - '81	10 - 05 - '81	—	—	1.37	41	—
10 - 05 - '81	22 - 09 - '81	4.4	132	—	—	60.000 * 132 * 24 = 190.80
22 - 09 - '81	30 - 12 - '81	—	—	3.27	98	—
"Controle" 149.5 + 210.5 = 360.	Totalen (Σ)	149.5	4485	210.5	6315	≈ 647.5 gem. per jaar: 215.8

- Energie gedurende: $\frac{149.5}{360} * 100\% = 41.5\%$ van de tyd.
- Met 8760 uren per jaar: $0.415 * 8760 * 60000 = 218.1 * 10^6$ kWh gemiddeld te leveren.
- Relatieve fout hierin ongeveer: $\frac{218.1 - 215.8}{215.8} * 100\% = 1.07\%$ is ruim toelaatbaar.

5.6 Afschatting neerslag overschot op het Jai meer.

+ Neerslag op het meeroppervlakte:
  P gemiddeld meer = ca 2300 mm/jaar →
  zie hoofdstuk ② en ontwerprapport Jai-kreekomleidingsprojekt [Hensley-Schmidt].

+ Verdamping vanaf het meeroppervlakte:

JANUARI	4 mm/dag * 30 dagen = 120 mm	
FEBRUARI	3 mm/dag * 30 dagen = 90 mm	
MAART	4 mm/dag * „ „ = 120 mm	
APRIL	2 mm/dag * „ „ = 60 mm	
MEI	0 mm/dag * „ „ = 0 mm	
JUNI	0 mm/dag * „ „ = 0 mm	
JULI	2 mm/dag * „ „ = 60 mm	
AUGUSTUS	5 mm/dag * „ „ = 150 mm	
SEPTEMBER	7 mm/dag * „ „ = 210 mm	
OKTOBER	8 mm/dag * „ „ = 240 mm	
NOVEMBER	6 mm/dag * „ „ = 180 mm	
DECEMBER	5 mm/dag * „ „ = 150 mm. +	
gemiddelde jaarlykse verdamping		1380 mm.

• Neerslag overschot op het Jai-meer:
  Ca. 2300 - 1380 = 920 mm/jaar gemiddeld.

Tabel Hoeveelheid water, die overlaat passeert bij N = 60.000 kW, over de volledige periode van 30 jaren.

Periode, maand/jaar vanaf volmeer.	Q↓ [m³/s]	Q_E [m³/s]	$Q_{TURBINE}$ (= Q↑) [m³/s]	$Q↑_{TOT}$ [m³/s] = ΣQ_{TURB+E}	ΔQ [m³/s]	$\Delta V_{OVERLAAT}$ [*10⁶ m³]
12 - 03 - 53 t/m						
30 - 03 - 53.	179.5	3.1	119.1	122.2	+57.3	89.11
april '53.	189.7	1.6	119.1	120.7	+69.0	178.85
mei '53.	215.0	–	119.1	119.1	+95.9	248.57
juni '53.	155.4	–	119.1	119.1	+36.3	94.09
12 - 05 - '54 t/m						
30 - 05 - '54.	206.1	–	119.1	119.1	+87.0	135.30
juni '54	123.1	–	119.1	119.1	+4.0	10.37
07 - 06 - '55 t/m						
30 - 06 - '55.	145.1	–	119.1	119.1	+26.0	51.67
16 - 06 - '57 t/m	139.8	–	119.1	119.1	+20.7	25.04
30 - 06 - '57.						
08 - 06 - '63 t/m						
30 - 06 - '63.	162.9	–	119.1	119.1	+43.8	83.23
16 - 06 - '67 t/m						
30 - 06 - '67.	136.9	–	119.1	119.1	+17.8	21.53
22 - 06 - '71 t/m						
30 - 06 - '71.	157.4	–	119.1	119.1	+38.3	26.47
juni '71.	150.1	–	119.1	119.1	+31.0	80.35
juli '71.	184.6	1.6	119.1	120.7	+63.9	165.63
17 - 05 - '72 t/m						
30 - 05 - '72.	194.2	–	119.1	119.1	+75.1	84.35
juni '72.	120.7	–	119.1	119.1	+1.6	4.15

Vervolg tabel hoeveelheid water, die overlaat passeert bij N = 60.000 kW.

Periode (maand, jaar) vanaf vol meer.	Q↓ [m³/s]	Q_E [m³/s]	$Q_{TURBINE}$ (=Q↑) [m³/s]	Q_{TOT}↑ = ΣQ_{TURB+E} [m³/s]	ΔQ [m³/s]	$\Delta V_{OVERLAAT}$ [$*10^6$ m³]
09 - 07 - 73 t/m						
30 - 07 - '73.	135.2	—	119.1	119.1	+16.1	29.21
03 - 05 - '76 t/m						
30 - 05 - '76.	220.5	—	119.1	119.1	+101.4	236.55
juni '76.	139.1	—	119.1	119.1	+20.0	51.84
04 - 05 - '80 t/m.						
30 - 05 - '80.	145.6	—	119.1	119.1	+26.5	59.53
juni '80.	129.9	—	119.1	119.1	+10.8	20.00
10 - 05 - '81 t/m.						
30 - 05 - '81.	132.8	—	119.1	119.1	+13.7	23.67
juni '81.	140.7	—	119.1	119.1	+41.6	55.99
juli '81.	134.5	1.6	119.1	120.7	+13.8	35.77
					Σ	1819.26

- Gedurende 30 jaren totaal over de overlaat:
  $1819.26 * 10^6$ m³ water → gemiddeld per jaar: $60.64 * 10^6$ m³
- Relatief t.o.v. het instroomdebiet:
  * Instroomvolume over 30 jaren:
    $30 * 12 * 2.592 * 10^6 * 54.4 \ m^3/s = 5.07617 * 10^{10} \ m^3$
  * Exclusief. verdamping en over totaal genomen:
    $$\frac{1819.26 * 10^6}{5.07617 * 10^{10}} = 0.03584 * 100\% \approx 3.6\%$$ verdwijnt er dus over de overlaat.
  * Met verdamping erbij → moeilijk exact uit te rekenen. Werk met een gemiddeld meeroppervlakte.

* Effectieve benutting van het instroomvolume (exclusief verdamping); indien gesteld wordt dat buiten het water, dat de overlaat passeert al het overige door de turbines heen gaat ⇨ :

$$\frac{5.07617 * 10^{10} - 1819.26 * 10^{6}}{5.07617 * 10^{10}} * 100\%$$

≈ 96.4 % benutting van het water.

+ Met verdamping erbij ⇨ reken uit totale hoeveelheid verdampte water. Stel gemiddeld meeroppervlakte gedurende een gemiddeld jaar =.

$\left(\frac{67.5 + 20.4}{2}\right) = 43.95 * 10^{6}\ m^2 \rightarrow$ rond dit af op:

$45 * 10^{6}\ m^2 \triangleq 45\ km^2$.

$1\ mm/dag \triangleq \frac{1 * 10^{-3}\ m}{24 * 3600\ sec} = 1.1574 * 10^{-8}\ m/s$.

januari : $4\ mm/dag \triangleq 4.62962 * 10^{-8}\ m/s * 2.592 * 10^{6} * 45 * 10^{6}$
$= 5.4 * 10^{6}\ m^3$

februari : $3\ mm/dag \triangleq\ = 4.05 * 10^{6}\ m^3$

maart : $4\ mm/dag \triangleq\ = 5.4 * 10^{6}\ m^3$

april : $2\ mm/dag \triangleq\ = 2.7 * 10^{6}\ m^3$

mei : $0\ mm/dag \triangleq\ =$ –

juni : $0\ mm/dag \triangleq\ =$ –

juli : $2\ mm/dag \triangleq\ = 2.7 * 10^{6}\ m^3$

augustus : $5\ mm/dag \triangleq\ = 6.75 * 10^{6}\ m^3$

september : $7\ mm/dag \triangleq\ = 9.45 * 10^{6}\ m^3$

oktober : 8 mm/dag ≙ $= 10.8 * 10^6 m^3$
november : 6 mm/dag ≙ $= 8.1 * 10^6 m^3$
december : 5 mm/dag ≙ $6.75 * 10^6 m^3$

+

- gemiddeld per jaar totaal $62.1 * 10^6 m^3$ verdamping.
- Over 30 jaren: $1863 * 10^6 m^3$.
- Inclusief verdamping gaat er door de turbines over 30 jaren: $4.70794 * 10^{10} m^3$ → procentueel op het totaal is dit $\frac{4.70794 * 10^{10}}{5.07617 * 10^{10}} = 0.9275 * 100\%$ = ca <u>92.75%</u> benutting

- Verlies via overlaat: $1819.26 * 10^6 m^3$
- door turbines : $4.70794 * 10^{10} m^3$

} ⇒ verlies

procentueel : $\frac{1819.26 * 10^6}{4.70794 * 10^{10}} = 0.03864 * 100\% \approx$ <u>3,85</u> %.

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GEREDUCEERDE AFVOER SOMMATIEKROMME
DATUM: MAART 1988 | SCHAAL: ZIE TITELS
STUDENT: R.D.PHERAI | TEKENING: ①

HOOFDSTUK 6

Bylagen 6.3. Duurlynen, afgeleidt uit de figuren Ⓒ en Ⓓ op tekening nr. ①

① Tabel duurlyn voor het verval Hb(ruto) [m] t.o.v de volledige reeks van 30 jaren (360 maanden ≙ T = 100% ≙ 180 cm op tekening nr ①). MET ALLEEN PRODUKTIE.

	Hb ≤ 55.m	Hb ≤ 56.m	Hb ≤ 57.m	Hb ≤ 58 m	Hb ≤ 59 m	Hb ≤ 60 m	Hb ≤ 61 m	Hb ≤ 62 m	Hb ≤ 63 m
Jaar	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]
1952		0.10	0.30	0.45	0.60	0.95	1.30	1.65	
1953		0.05	0.075	0.10	0.25	0.35	0.50	0.65	
1954		0.025	0.05	0.15	0.25	0.40	0.50	1.30	
1955		0.18	0.40	0.55	0.80	0.95	1.35	1.65	
1956		0.10	0.20	0.30	0.75	1.50	2.60	3.00	
1957		0.15	0.20	0.30	0.40	0.65	0.80	1.05	
1958		0.025	0.10	0.15	0.30	0.60	0.80	1.10	
1959		0.15	0.30	0.45	0.55	0.70	1.05	1.40	
1960		0.025	0.05	0.10	0.40	1.00	1.45	2.10	
1961		0.125	0.30	0.40	0.55	0.80	1.00	1.25	
1962		0.125	0.30	0.35	0.50	0.70	0.90	1.20	
1963		0.25	0.50	0.75	0.90	1.20	1.50	1.70	
1964		0.10	0.20	0.25	0.35	0.45	0.60	0.70	
1965		0.10	0.20	0.25	0.45	0.70	0.75	1.25	
1966		0.15	0.35	0.50	0.70	0.95	1.15	1.40	
1967		0.15	0.30	0.50	0.75	0.95	1.20	1.30	
1968		0.425	1.60	2.00	2.45	2.65	2.85	3.10	
1969		0.075	0.25	0.45	1.75	1.85	1.95	2.05.	

vervolg tabel duurlyn voor Hbruto [m] t.o.v de volledige tydreeks van 30 jaren. MET ALLÉÉN PRODUKTIE!

	Hb ≤ 55m	Hb ≤ 56m	Hb ≤ 57m	Hb ≤ 58m	Hb ≤ 59m	Hb ≤ 60m	Hb ≤ 61m	Hb ≤ 62m	Hb ≤ 63m.
Jaar	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]
1970		0.20	0.30	0.40	0.60	0.80	1.10	1.55	
1971		0.275	0.45	0.70	1.20	1.55	1.80	2.20	
1972		0	0.10	0.20	0.25	0.35	1.00	1.60	
1973		0.15	0.25	0.40	0.50	0.60	1.05	1.15	
1974		0.35	0.55	0.95	1.10	1.45	1.60	2.25	
1975		0.25	0.30	0.45	0.55	0.80	1.00	1.30	
1976		0.10	0.20	0.35	0.50	0.75	1.05	1.30	
1977		0.10	0.25	0.35	0.55	0.70	0.95	1.25	
1978		0.25	0.50	0.80	1.05	1.30	1.65	2.00	
1979		0.10	0.15	0.20	0.40	0.90	1.65	2.15	
1980		0.20	0.35	0.45	0.60	0.70	0.90	1.15	
1981		0.15	0.30	0.40	0.55	0.75	0.95	1.30	
Σ	105.3	4.2	9.3	13.7	20.6	27.9	37.0	47.5	180
[%]	58.5	2.4	5.2	7.6	11.4	15.5	20.5	26.4	100
		60.9	63.7	66.1	69.9	74.0	79.1	84.9	

Uit deze tabel voor de duurlyn van Hb t.o.v. T = 360 maanden volgt nu de tabel voor de duurlyn van Hb (by alléén produktie) t.o.v alléén de produktie-periode van 41.5% van de tyd ≙ 149.4 maanden.

② Tabel duurlyn voor Hb(netto) op basis van alléén productie met T = 149.4 maanden (≙ 41.5% van de totale reeks van 360 maanden, welke oorspronkelijk dus 100% van de tyd is). 41.5% wordt nu dus 100% van de tyd, overeenkomende met 74.7 cm op tekening nr ①

	Hb ≤ 55 m	Hb ≤ 56 m	Hb ≤ 57 m	Hb ≤ 58 m	Hb ≤ 59 m	Hb ≤ 60 m	Hb ≤ 61 m	Hb ≤ 62 m	Hb ≤ 63 m
[cm]	0	4.2	9.3	13.7	20.6	27.9	37.0	47.5	74.7
[%]	0	5.7	12.4	18.3	27.5	37.4	49.5	63.5	100

Opmerking: Gedurende de periode van vullen van het meer is de h meer by de volledige tydreeks steeds gesteld op 55 m. Dit is niet geheel juist, doch medenemen van het aandeel van h tydens het vullen zou een niet correct beeld opleveren van de vermogensduurlyn. Om toch enig inzicht te verkrygen in het verloop van de duurlyn voor Hb met medeneming van de periode gedurende welke niet geproduceerd wordt is hierna volgende tabel voor die duurlyn opgesteld.

③ Tabel Duurlyn van het verval $H_{b(netto)}$ [m] met in achtname van de volledige tydreeks; deze mag dus niet worden gebruikt by de bepaling van H, waaruit de vermogensduurlyn wordt afgeleidt.

MÈT EN ZONDER PRODUKTIE.!

[T = 360 mnd. ≙ 100% van de tyd]

	$H_b \leq$ 55m	$H_b \leq$ 56m	$H_b \leq$ 57m	$H_b \leq$ 58m	$H_b \leq$ 59m	$H_b \leq$ 60m	$H_b \leq$ 61m	$H_b \leq$ 62m	$H_b \leq$ 63.m
Jaar	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]
195		0.20	0.60	1.10	1.55	3.05	4.15	4.85	
1953		0.20	0.40	0.80	1.75	2.20	2.30	2.85	
1954		0.20	0.35	0.60	1.10	2.00	2.80	3.65	
1955		0.35	0.75	1.40	2.20	2.90	3.40	4.00	
1956		0.20	0.40	0.60	1.10	2.10	3.60	4.75	
1957		0.45	0.95	2.10	2.90	3.10	3.65	4.25	
1958		0.20	0.30	0.40	1.05	1.90	2.95	5.60	
1959		0.40	0.90	1.40	3.10	3.30	3.70	4.75	
1960		0.15	0.55	1.40	2.10	3.15	3.95	5.20	
1961		0.45	0.90	1.60	2.50	3.25	3.85	4.80	
1962		0.55	1.10	2.10	3.00	3.50	3.95	5.15	
1963		0.50	1.25	2.10	3.20	3.50	4.00	4.45	
1964		0.25	0.50	0.65	1.25	3.35	4.45	5.50	
1965		0.45	0.80	1.30	3.20	3.80	4.35	4.55	
1966		0.70	1.80	2.10	2.85	3.60	4.30	5.00	
1967		0.50	0.85	2.20	3.30	3.80	4.25	4.75	

vervolg tabel duurlyn Hb(ruto) (volledige tydreeks).

MÈT EN ZONDER PRODUKTIE!

	Hb ≤ 55m	Hb ≤ 56m	Hb ≤ 57m	Hb ≤ 58m	Hb ≤ 59m	Hb ≤ 60m	Hb ≤ 61m	Hb ≤ 62m	Hb ≤ 63m
Jaar	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]
1968		0.55	1.75	2.25	2.95	3.15	4.35	4.95	
1969		0.30	0.55	1.00	2.50	2.85	3.30	4.15	
1970		0.30	0.55	0.95	1.40	2.30	3.70	4.30	
1971		0.55	0.90	1.40	2.25	3.10	3.60	4.15	
1972		0.20	0.50	1.00	1.80	2.50	3.40	3.75	
1973		0.45	0.75	1.10	1.50	2.00	3.50	4.65	
1974		0.70	1.30	2.20	2.60	3.25	3.65	4.25	
1975		0.40	0.80	1.40	1.70	2.50	3.10	3.80	
1976		0.45	0.95	2.20	2.65	3.10	3.60	4.05	
1977		0.60	1.25	2.00	2.75	3.80	4.50	5.25	
1978		0.65	1.20	1.65	2.10	2.70	3.55	4.50	
1979		0.20	0.30	0.50	1.15	2.25	3.75	5.30	
1980		0.45	0.90	1.40	1.95	3.00	3.80	4.20	
1981		0.30	0.75	1.10	1.90	2.75	3.15	3.95	
Σ		11.9	24.9	42.0	65.4	87.8	110.6	135.4	
[%]	0	6.6	13.8	23.3	36.3	48.8	61.5	75.2	100

Tabel. Duurlyn voor $Q_{(turbine)}$ [m³/s]

T = 30 jaren = 360 maanden = 100% (≙ 180 cm op tekening nr. ①)

Jaar	$Q_t \leq$ 119.1 [cm]	$Q_t \leq$ 120.0 [cm]	$Q_t \leq$ 122.0 [cm]	$Q_t \leq$ 124.0 [cm]	$Q_t \leq$ 126.0 [cm]	$Q_t \leq$ 128.0 [cm]	$Q_t \leq$ 130.0 [cm]	$Q_t \leq$ 132.0 [cm]	$Q_t \leq$ 134.0 [cm]	$Q_t \leq$ 136.4 [cm]
1952		0.85	1.15	1.45	1.70	1.85	1.90	2.10	2.20	
1953		2.40	3.10	3.20	3.35	3.40	3.45	3.50	3.55	
1954		1.30	2.30	2.50	2.60	2.70	2.85	2.90	2.95	
1955		1.20	1.55	2.00	2.20	2.35	2.50	2.65	2.80	
1956		0.20	0.60	1.15	1.90	2.95	3.10	3.25	3.40	
1957		0.75	1.65	1.80	1.90	2.15	2.20	2.30	2.40	
1958		0.075	0.35	0.65	0.85	1.05	1.10	1.15	1.20	
1959		0.325	0.65	0.95	1.20	1.30	1.45	1.60	1.75	
1960		0.15	0.90	1.45	1.75	2.45	2.50	2.55	2.60	
1961		0.45	0.90	1.05	1.25	1.35	1.45	1.55	1.60	
1962		0.80	1.15	1.35	1.40	1.60	1.75	1.85	1.95	
1963		1.30	1.50	1.80	2.05	2.25	2.45	2.65	2.80	
1964		0.10	0.20	0.35	0.45	0.50	0.60	0.70	0.90	
1965		0.20	0.55	0.80	1.10	1.25	1.35	1.40	1.50	
1966		0.10	0.35	0.55	0.75	0.95	1.20	1.40	1.50	
1967		0.60	0.95	1.15	1.35	1.55	1.75	1.90	2.10	
1968		0.15	0.35	0.60	0.80	1.00	1.55	1.80	2.85	
1969		0.10	0.20	0.30	0.40	0.90	1.85	2.05	2.10	
1970		0.40	1.15	1.35	1.60	1.85	2.00	2.05	2.20	
1971		1.45	2.00	2.20	2.45	2.75	3.15	3.30	3.40	

Vervolg tabel duurlyn Q(turbine). [m³/s]

	Qt≤ 119.1	Qt≤ 120.0	Qt≤ 122.0	Qt≤ 124.0	Qt≤ 126.0	Qt≤ 128.0	Qt≤ 130.0	Qt≤ 132.0	Qt≤ 134.0	Qt≤ 136.4
Jaar	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]	[cm]
1972		1.00	1.70	2.50	2.75	2.80	2.90	2.95	3.00	
1973		0.70	0.90	1.05	1.20	1.30	1.45	1.55	1.60	
1974		0.95	1.50	1.70	1.90	2.05	2.30	2.55	2.70	
1975		0.50	1.70	1.90	2.10	2.30	2.45	2.55	2.70	
1976		1.30	1.80	2.00	2.20	2.35	2.50	2.60	2.70	
1977		0.25	0.55	0.80	1.00	1.10	1.25	1.40	1.55	
1978		1.15	1.30	1.45	1.60	1.75	1.90	2.00	2.15	
1979		0.15	0.50	0.90	1.85	2.10	2.20	2.25	2.30	
1980		1.10	1.30	1.60	1.70	1.80	1.95	2.05	2.20	
1981		1.60	1.90	2.20	2.35	2.40	2.50	2.65	2.75	
Σ	105.3	21.6	34.7	42.8	49.7	56.1	61.6	65.2	69.5	180
[%]		12	19.3	23.8	27.6	31.7	34.2	36.2	38.6	
	58.5	70.5	77.8	82.3	86.1	89.7	92.7	94.7	97.1	100

Voor het vaststellen van de ontwerpdebieten is het niet juist om uit te gaan van de volledige reeks, aangezien gedurende 58,5% van de tyd er niet geproduceerd wordt en alsdus het turbinedebiet nul is; er is dan geen sprake van belasting van de turbines. Het ontwerpdebiet moet worden gebaseerd op de periode (c.q. tydsduur) waarin er daadwerkelyk debieten door de turbines heengaan. En dat is dus ca 41.5% van de tyd (volledige reeks) (≙ 149.4 maanden). De tydsduur van 41.5% moet nu wel worden getransformeerd naar 100%

④ Tabel. Duurlyn Q turbine [m^3/s], betrokken op 41.5% van de volledige reeks; 41.5% komt nu overeen met 100%.

T = 41.5% van 360 mnd ≙ 149.4 mnd ≙ 74.7 cm op tekening nr ①.

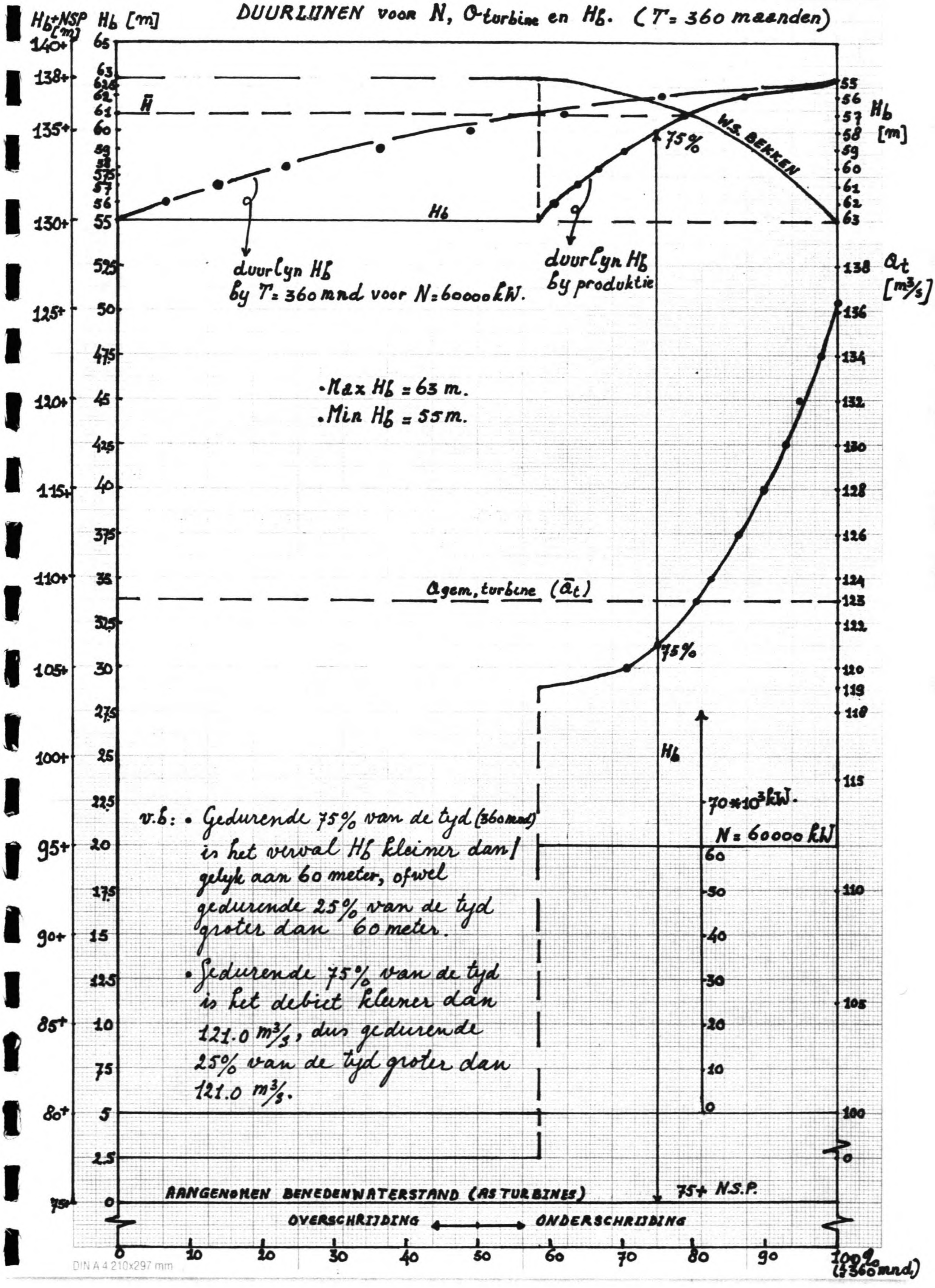
	Qt ≤ 119.1	Qt ≤ 120.0	Qt ≤ 122.0	Qt ≤ 124.0	Qt ≤ 126.0	Qt ≤ 128.0	Qt ≤ 130.0	Qt ≤ 132.0	Qt ≤ 134.0	Qt ≤ 136.4
[cm]	0	21.6	34.7	42.8	49.7	56.1	61.6	65.2	69.5	74.7
[%]	0	28.9	46.5	57.3	66.5	75.1	82.5	87.3	93.0	100

↓

Qt ≤ 125 m^3/s voor 61.9 % van de tyd.

(lineair geïnterpoleerd)

DUURLIJNEN voor N, Q-turbine en Hb. (T = 360 maanden)



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