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Establishing Norms and Determining Cost Items for Materials in Operation and Maintenance of the CaiLon – Cai Be Irrigation System

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Abstract

The CaiLon - CaiBe irrigation system includes three sluices: one on the CaiLon River, one on the CaiBe River, and the Xeo Ro sluice in Chau Thanh and An Bien districts, Kien Giang province, Vietnam. This is currently the largest irrigation project in Vietnam in terms of scale and water flow capacity, responsible for controlling saline, freshwater, and brackish water to facilitate production models based on the ecosystem for an area of 384,120 hectares in Kien Giang, Hau Giang, Soc Trang, Bac Lieu, and Ca Mau provinces. Establishing norms and cost items as a basis for completing the organizational structure of the unit that will be assigned to manage and exploit the project is essential for allocating labor and material costs.

Keywords: CaiLon - CaiBe irrigation system, norms, cost items

1. Introduction

The CaiLon - CaiBe irrigation system is a newly invested project, currently lacking economic and technical norms for management and operation. Therefore, researching and establishing these norms for the management, exploitation, and protection of the irrigation system is urgent to enhance management efficiency, ensure safety, and maintain the system's quality and service efficiency. Essential norms for current management operations include labor norms, maintenance norms, and material consumption norms for operating machinery and equipment. This article investigates establishing norms and determining material cost items for the operation and maintenance of the CaiLon - CaiBe irrigation system.

The Investment and Construction Management Board for Irrigation Project 10, under the Ministry of Agriculture and Rural Development, is tasked with managing and exploiting the CaiLon - CaiBe system to regulate water for production, prevent salinity, and manage waterway traffic within the system. Establishing norms serves as a basis for

perfecting the organizational structure of the managing unit, assigning labor, and material costs for immediate management tasks during operation.

Materials and fuels for operating and maintaining irrigation machinery and equipment include gasoline, lubricating oil, hydraulic oil, various greases, kerosene, rags, etc., to ensure the normal operation of machinery and equipment per management regulations.

2. Principles and Methods for Establishing Material Consumption Norms for the Operation and Maintenance of the CaiLon – CaiBe Irrigation Project

Material and fuel norms for operating and maintaining machinery and equipment are established based on the following principles: (i) Ensure accuracy regarding the current status of machinery and equipment in the irrigation system managed by the unit (including quantity, type, lifespan, technical condition, etc.); (ii) Comply with operating and maintenance procedures for various types of machinery and equipment (pumps, engines, opening and closing devices, etc.); (iii) Base norms on the actual operating hours of existing machinery and the number of maintenance instances for equipment in the irrigation system; (iv) Consider the specific characteristics of the unit's operation and maintenance of machinery and equipment to adjust the norms during their development.

Basic methods for establishing material consumption norms include:

a) Statistical Method

This method uses historical statistical data on material and fuel consumption of existing machinery and equipment to establish norms. By analyzing machine running hours, electric motor operations, and maintenance instances, comprehensive material consumption norms are calculated.

- Analyze and calculate material and fuel consumption levels for operating and maintaining various types of machinery, equipment, engines, and opening and closing devices based on historical statistical data.

- Utilize consumption levels for the operation and maintenance of each category of machinery, equipment, engines, and opening and closing devices that have been performed.

- Use consumption levels for the operation and maintenance of similar types of machinery and equipment calculated or based on similar machinery and equipment.

- Reference published data from experts or professional organizations.

b) Field Testing Method

This method involves practical measurement of material and fuel consumption during the operation and maintenance of machinery and equipment. It is the primary

method for developing detailed norms of material and fuel consumption in the operation and maintenance of irrigation projects.

Calculate and determine material and fuel consumption levels for operating various types of machinery, equipment, engines, and opening and closing devices through field surveys over one or multiple cycles to identify reasonable, scientific consumption levels for machinery and equipment operation per procedures and regulations. Specific steps include:

- Analyze and study the structure of material consumption, identifying factors affecting material use in the operation and maintenance of machinery, equipment, and irrigation projects.

- Based on procedures and technology, compile detailed norms of material consumption for each type of existing machinery and equipment of the unit according to time, each operation, or the number of maintenance instances.

- Select representative machines for field testing within each group of machinery and equipment. For machinery and engines, operate the machine for about 3 to 5 hours (depending on actual field conditions). After completing the test run, measure and record actual material and fuel consumption levels, documenting all data from the field survey.

- For opening and closing devices, conduct maintenance operations per procedures and measure actual material consumption for one maintenance instance of each type of device.

c) Comparative Extrapolation Method

In practice, it may be challenging to measure all types of machinery and equipment, or some units may have inconsistent data collection. Thus, the comparative extrapolation method can be applied to develop material consumption norms by calculating norms for similar types of machinery and equipment under similar operating conditions or utilizing material consumption data from other locations with similar conditions.

The development of material consumption norms for operating and maintaining machinery and equipment using the comparative extrapolation method involves combining the results of field testing and statistical methods to derive reasonable consumption levels.

Each method has its own advantages and disadvantages, so different methods can be applied during the norm development process to achieve the most appropriate results.

3. Order of formulation of consumption norms of materials and raw materials for operation and maintenance of machinery, equipment and irrigation works in Cai Lon – Cai Be

3.1. Synthesis and grouping of machinery and equipment

First of all, statistics on the types of machinery and equipment currently serving the operation management of the unit.

Next, classify and group machinery and equipment according to technical characteristics, such as types of machines, motors with different capacities, different types of opening and closing equipment such as V0, V1, V2, V3, V5, and VĐ10, VĐ20; 3-5 ton winch, cables of all kinds, hydraulic cylinders,... Based on the system of machinery, equipment and irrigation works of Board 10, some types of machinery, equipment and irrigation works are classified into the following 5 groups: (1) Mechanical and hydraulic equipment group; (2) Group of electrical equipment for management and operation of the work system; (3) Group of equipment for opening and closing regulating sewers; (4) Motor group for operation of irrigation equipment and works; (5) Group of machinery for management and operation of irrigation works.

Then analyze data, classify and evaluate the quality of machinery and equipment: The level of consumption of raw materials and fuel for operation, machinery and equipment depends on many factors, of which the important factor is the life and quality of machinery and equipment. The older the machinery and equipment, the more materials and fuel are consumed during operation and maintenance and vice versa. Therefore, the purpose of the classification assessment by quality of machinery and equipment is to build a detailed average norm of material consumption representing each type of machinery and equipment for the whole unit.

3.2. Formulation of detailed material consumption norms

After completing the classification of existing machinery and equipment of the unit, proceed to formulate detailed material consumption norms for each type as follows:

a) Formulation of detailed material consumption norms for mechanical and hydraulic equipment:

Detailed material consumption norms for mechanical and hydraulic equipment are determined by the method of empirical statistics or actual measurement surveys on the field as follows:

** Develop detailed material consumption norms by empirical statistical methods:*

Based on statistics on the use of materials from the last 3 to 5 years, and at the same time statistics on the total number of annual maintenance of mechanical and hydraulic equipment to determine the material consumption norm for each maintenance.

From the statistical results of actual consumption of materials for maintenance of mechanical and hydraulic equipment over the years, calculate the average annual

material consumption for each work item (kg/year) of the unit by calculating the average material consumption of the last 3 to 5 years according to the following formula:

$$L_i^{J-K} = \frac{\sum_{N=1-n} L_{i-N}^{J-K}}{N} \quad [3\text{-}1]$$

In which:

- L_i^{J-K}: The average consumption of five types of materials *i* of equipment type *j* for work item K,

- L_{i-N}^{J-K}: Consumption of material type *i* of equipment *type j* in work item *K* in year *n*,

- N: number of years of calculation.

Based on the standard process for operation and maintenance for each type of equipment, determine the number of maintenance times in a year and calculate the average material consumption for each type of equipment according to the following formula:

$$V_i^J = \frac{L_i^{J-K}}{Q_J^K} \quad [3\text{-}2]$$

In which:

- V_i^J: Norms of material consumption basis *i* for 1 maintenance of equipment type *j*,

- L_i^{J-K}: The average consumption of five types of materials *i* of equipment type *j* for work item K,

-: The number of maintenance times in 1 year according to the standard process of equipment type $Q_J^K j$,

Applying the above calculation process and method, it is possible to build detailed norms of materials for the operation and maintenance of all types of mechanical and hydraulic equipment according to the actual statistical method.

** Develop detailed material consumption norms by practical testing methods:*

From the results of data survey and equipment classification, develop detailed norms of material consumption for each type of mechanical and hydraulic equipment according to each type of equipment quality (old, medium, and new).

For each type of equipment, select 1 or 2 mechanical and hydraulic equipment representing each group, conduct surveys, measure the consumption of materials and raw materials for the operation and maintenance of mechanical and hydraulic equipment. At the site, monitor and measure the actual consumption of all types of raw materials, fully record the actual survey data to summarize the consumption of materials for each type of mechanical and hydraulic equipment for 1 maintenance.

In fact, the level of material consumption for equipment maintenance also depends on the quality of the equipment (new equipment consumes less materials than old equipment). Therefore, the consumption norm of detailed materials is calculated by weighting average according to the following formula:

$$V_i^J = \frac{V_{i-cu}^J * M_{cu}^J + V_{i-tb}^J * M_{tb}^J + V_{i-moi}^J * M_{moi}^J}{M_{cu}^J + M_{tb}^J + M_{moi}^J} \qquad [3\text{-}3]$$

In which:

- V_i^J : Detailed consumption norm of material type *i* of equipment type *j*,
- V_{i-cu}^J : Material consumption *i* for 1 maintenance of old equipment *group j*,
- V_{i-tb}^J : Material consumption *i* for 1 maintenance of the average group of equipment *j*,
- V_{i-moi}^J : Consumption of materials *i* for 1 maintenance of a new group of equipment *j*,
- M_{cu}^J : Old quality equipment number of equipment type *j*,
- M_{tb}^J : The average quality equipment quantity of equipment type *j*,
- M_{moi}^J : Number of old quality equipment of equipment type *j*.

Applying the above calculation formula and calculation steps, we can build detailed material consumption norms for the operation and maintenance of existing mechanical and hydraulic equipment of the unit according to the actual testing method.

** Develop detailed material consumption norms by the method of internal comparison:*

In case the statistics are not listed for a long enough period (3 to 5 years), the statistics shall be referred to and compared with the results of the actual testing method.

b) Formulation of detailed fuel consumption norms for the group of machinery in service of management and operation of irrigation works:

Detailed fuel consumption norms for machinery in service of management and operation of irrigation works shall be determined by the method of empirical statistics or actual measurement surveys:

** Develop detailed fuel consumption norms by empirical statistical method:*

Based on statistics on the use of raw materials from the last 3-5 years for engines, and at the same time statistics on the total number of operating hours of the engine annually to determine the fuel consumption norm for each engine running hour.

From the results of collecting actual data on fuel consumption for engine operation over the years, calculate the average annual fuel consumption for each type of engine (kg/year) of the unit by calculating the average fuel consumption from the last 3 to 5 years according to the following formula:

$$L_i^{J-K} = \frac{\sum_{N=1-n} L_{i-N}^{J-K}}{N} \quad [3\text{-}4]$$

In which:

- L_i^{J-K} : The average consumption of five types of fuel *i* of engine j in cluster K,

- L_{i-N}^{J-K} : Fuel consumption of type *i* of engine type *j* in cluster *K* for year *n*,

- N: number of years of calculation.

From the results of the survey on the number of operating hours in the years (from the operation monitoring book), we calculate the total average operating hours of all types of machines (hours/year) of the unit by the method of taking the average of the last 3-5 years according to the following formula:

$$T_{tb}^{K} = \frac{\sum_{n} T_N^K}{N} \quad [3\text{-}5]$$

In which:

- T_{tb}^{K} : Total average annual operating time of cluster *K* (hours/year);

- T_N^K : Total operating time of year *N* of cluster *K* (hours/year).

Then apply the following formula:

$$V_i^{J-K} = \frac{L_i^{J-K}}{T_{tb}^{K}} \quad [3\text{-}6]$$

In which:

V_i^{J-K} : Fuel consumption *i* of engine type *j* at cluster *K* (kg/engine running hour).

The same type of machine *but* the calculation results V_i^{J-K} at different clusters will not be the same. Therefore, in order to calculate the norms of fuel consumption for machine operation by statistical method, the weighted average is calculated according to the following formula to obtain detailed norms of fuel consumption for machine operation of the whole unit:

$$V_i^J = \frac{\sum V_i^{J-K} * M_J^K}{\sum M_J^K} \qquad [3\text{-}7]$$

In which:

- V_i^J : Norms of fuel consumption basis for machine operation,

- V_i^{J-K} : Fuel consumption *i* of engine type *J* at cluster *K* of the unit (kg/engine running hour),

- M_J^K : Number of j-type machines at cluster *K*,

- $\sum M_J^K$: Total number of j-type machines of the whole unit.

Applying the above calculation process and method, we can also build detailed fuel norms for the operation of other types of machines according to the actual statistical method:

** Develop detailed fuel consumption norms by practical testing methods:*

From the results of data survey and engine classification, develop detailed norms of fuel consumption for each type of engine according to each type of engine quality (old, medium, and new engines).

For each group of engines, select 1 or 2 machines representing each group, conduct surveys, measure fuel consumption for machine operation. At the site, let the machine operate for about 3 to 5 hours, after the end of the machine test run, monitor and measure the actual consumption of all types of raw materials, fully record the actual survey data to summarize the consumption level. From the above results, divide the total volume consumed by the actual number of hours of running the test machine to get the detailed consumption for 1 hour of machine operation.

In fact, the level of fuel consumption for the operation of machines depends a lot on the quality of the machine (the consumption of new machines is less than that of old machines). Therefore, the detailed material consumption norm for operation for each type of machine will be averaged according to the following formula:

$$V_i^J = \frac{V_{i-cu}^J * M_{cu}^J + V_{i-tb}^J * M_{tb}^J + V_{i-moi}^J * M_{moi}^J}{M_{cu}^J + M_{tb}^J + M_{moi}^J} \qquad [3\text{-}8]$$

In which:

- V_i^J : Detailed consumption norms of fuel type *i* of engine type *j*,

- V_{i-cu}^J : Fuel consumption *i* per 1 hour of engine operation of the old engine group of type *j*,

- V_{i-tb}^{J}: Fuel consumption *i* per 1 hour of engine operation of the average group of engine type *j*,

- V_{i-moi}^{J}: Fuel consumption *i* per 1 hour of engine operation of the new engine group type *j*,

- M_{cu}^{J}: Old quality machine number of type *j*,

- M_{tb}^{J}: The average number of machines of machine type *j*,

- M_{moi}^{J}: Number of old machines of type *j*.

Applying the calculation formula and the above calculation steps, develop detailed fuel consumption norms for machine operation for the management and operation of the existing irrigation system of Board 10 according to the actual testing method.

3.3. Formulation of consumption norms of general materials

- The consumption of general materials for a type of machinery and equipment is the volume of materials for the operation and maintenance of machinery and equipment calculated for 1 production cycle (usually 1 year). The unit of calculation is kg/year or kg/ha/year.

The formula for determining the aggregate consumption is as follows:

MVTTH-i = [Detailed Norms] * [Hours of Operation] (or Number of Maintenance Cycles) [39]

In which:

- MVTTH-i: Consumption of general materials for operation and maintenance of machinery *and equipment type i.*

- Operating hours are the actual operating time of the type of machine in a year of production. The number of operating hours is calculated based on the operating needs of the machine to meet the management requirements of the unit.

- The number of times of maintenance of machinery and equipment is determined according to the annual maintenance operation regulations.

+ Determination of operation targets:

The operating index of the machine is the actual number of operating hours in a year and is determined from calculating the average number of operating hours of the machine per year from the data monitoring the operation of the machine of each cluster according to the following formula:

$$T_{vh} = \frac{\sum_{i=1}^{n} T_{vh-i}}{n * N} \qquad [3\text{-}10]$$

In which:

- TVH: Operating indicators to be calculated (hours/year),

- Tvh-i: Hours of operation of the machine in the first year ,

- N: Total number of active machines of the unit,

- n: Number of calculation years (is the number of years with data in the operation monitoring book).

+ Determination of the number of times of maintenance of machinery and equipment:

- The number of maintenance times for machinery and equipment of irrigation works is the number of maintenance times in a year and is determined based on the regulations on the process of operation and maintenance of machinery and equipment.

- The number of times of maintenance of machinery and equipment according to the actual management to ensure the normal operation of machinery and equipment.

3.4. Calculation of consumption norms of general materials for operation and maintenance of Cai Lon - Cai Be irrigation system

The consumption norms of general materials for the whole enterprise are determined according to the formula:

$$V_{Ban}^{X} = \sum_{i=1}^{n} V_{Bao-duong}^{i} + \sum_{j=1}^{m} V_{Van-hanh}^{j}$$

$$V_{DN}^{X} = \sum_{i=1}^{n} V_{maybom-đongco}^{i} + \sum_{j=1}^{m} V_{\text{thietbi -dongmo}}^{\text{j}} \qquad [3\text{-}11]$$

In which:

-: Consumption norm of material $V_{Ban}^{X}X$ for the operation and maintenance of machinery and equipment of the whole Board 10 in a year (kg/year),

- : Total consumption of X materials $\sum_{i=1}^{n} V_{Bao-duong}^{i}$ for maintenance and operation of the pump and engine *in* one year (kg/year),

- : Total consumption of X materials $\sum_{j=1}^{m} V_{Van-hanh}^{j}$ for maintenance and operation of the jth opening and closing machine in one year (kg/year).

Material and fuel consumption norms for each project include:

- Number of kilograms of lubricant oil per year per project.
- Number of kilograms of various anti-rust lubricants and greases per year per project.
- Number of liters of Diesel oil per year per project.
- Number of kilograms of cleaning rags per year per project.

Material, fuel, and composite material consumption norms for each unit and the entire province:

- Number of kilograms of lubricant oil per year per unit (district/city/agriculture project management board).
- Number of kilograms of various anti-rust lubricants and greases per year per unit (district/city/agriculture project management board).
- Number of liters of Diesel oil per year per unit (district/city/agriculture project management board).
- Number of kilograms of cleaning rags per year per unit (district/city/agriculture project management board).

Table 3.1: Summary Table of Material and Fuel Consumption for the Operation and Maintenance of Irrigation Project Equipment Cai Lon, Cai Be, Xeo Ro Sluices

TT	Material Type	Units of Calculation	CaiLon				Caibe				Xeo Ro		
			Drain	Scada	Locks	SUM	Drain	Scada	Locks	SUM	Scada	Locks	SUM
1	Grease 70 degrees	kg	1,80	3,00		4,80	1,40	3,00		4,40	6,00		6,00
2	Grease 130 degrees	kg	143,00		1,60	144,60	8,00		1,60	9,60		1,60	1,60
3	Lead chalk grease	kg	3,80			3,80	3,40			3,40			
4	Water-resistant grease	kg	1.030,20		25,60	1.055,80	152,20		25,60	177,80		38,40	38,40
5	Gasoline	litre	23,46	28,17	6,36	57,99	11,22	6,48	6,36	24,06	2,25	6,72	8,97
6	Hydraulic Oil	litre	1.014,00			1.014,00	158,00			158,00			
7	Gearbox Oil	litre	198,00			198,00	36,00			36,00			
8	Kerosene	litre	28,80	6,30		35,10	7,20	2,10		9,30	4,30		4,30
9	Lubricants	litre	91,06			91,06	0,82			0,82			
10	Armor Paper	sheet	282,35	1.514,40	23,76	1.820,51	54,35	357,60	23,76	435,71	144,00	42,96	186,96
11	Mop	kg	488,68	583,62	13,80	1.086,10	57,20	136,74	13,80	207,74	53,62	18,60	72,22
12	Brooms	female	272,50	63,00	24,00	359,50	44,50	21,00	24,00	89,50	19,00	32,00	51,00
13	Anti-rust paint	kg	201,50	16,38		217,88	32,00	5,46		37,46	4,94		4,94
14	Soap	kg	438,28	121,21		559,49	48,00	16,11		64,11	20,45		20,45
15	Bristles	female	3,00	33,50		36,50		144,00		144,00	73,50		73,50
16	Glass cleaner	Go	0,30	347,40		347,70		34,80		34,80	55,80		55,80

TT	Material Type	Units of Calculation	CaiLon				Caibe				Xeo Ro		
			Drain	Scada	Locks	SUM	Drain	Scada	Locks	SUM	Scada	Locks	SUM
17	Machine wipes	female		795,00		795,00		312,00		312,00	195,00		195,00
18	90% alcohol	litre		91,50		91,50		43,20		43,20	26,70		26,70
19	Cooling Adhesive	Go		0,90		0,90		3,60		3,60	0,90		0,90
20	Paint brushes	female		63,00		63,00		26,50		26,50	19,00		19,00
21	Electrical Adhesive Tape	roll		338,60		338,60		63,60		63,60	57,80		57,80
22	Rust Spray RP7	vase		150,20		150,20		72,00		72,00	22,20		22,20
23	Salinity Sample Solution	litre		14,60		14,60		3,65		3,65	3,65		3,65
24	pH Standard Solution	litre		14,60		14,60							
25	Electrode solution (COD, BOD)	litre		58,40		58,40							
26	Electrode cleaning solution	litre		58,40		58,40							
27	Probe-head cleaner	litre		240,90		240,90		21,90		21,90	36,50		36,50
28	Alcohol Cleaning Tools	litre		1.204,50		1.204,50		109,50		109,50	182,50		182,50
29	Wipes	box		240,90		240,90		21,90		21,90	36,50		36,50
30	Distilled water	litre		12.045,00		12.045,00		1.095,00		1.095,00	1.825,00		1.825,00

Table 3.2: Summary of costs of materials and raw materials for operation and maintenance of machinery and equipment of irrigation works

Drain big, small, sloppy

TT	Material Name	Units of Calculation	Total Volume			Unit price (VND)	Cash (VNĐ)		
			CaiLon	CaiBe	Xeo Ro		CaiLon	CaiBe	Xeo Ro
1	Grease 70 degrees	kg	4,80	4,40	6,00	95.000	456.000	418.000	570.000
2	Grease 130 degrees	kg	144,60	9,60	1,60	95.000	13.737.000	912.000	152.000
3	Lead chalk grease	kg	3,80	3,40	-	100.000	380.000	340.000	-
4	Water-resistant grease	kg	1.055,80	177,80	38,40	100.000	105.580.000	17.780.000	3.840.000
5	Gasoline	litre	57,99	24,06	8,97	24.000	1.391.760	577.440	215.280
6	Hydraulic Oil	litre	1.014,00	158,00	-	95.000	96.330.000	15.010.000	-
7	Gearbox Oil	litre	198,00	36,00	-	85.000	16.830.000	3.060.000	-
8	Kerosene	litre	35,10	9,30	4,30	12.000	421.200	111.600	51.600
9	Lubricants	litre	91,06	0,82	-	85.000	7.740.100	69.700	-
10	Armor Paper	sheet	1.820,51	435,71	186,96	10.000	18.205.100	4.357.100	1.869.600
11	Mop	kg	1.086,10	207,74	72,22	18.000	19.549.800	3.739.320	1.299.960
12	Brooms	female	359,50	89,50	51,00	15.000	5.392.500	1.342.500	765.000
13	Anti-rust paint	kg	217,88	37,46	4,94	60.000	13.072.800	2.247.600	296.400
14	Soap	kg	559,49	64,11	20,45	20.000	11.189.720	1.282.200	409.000
15	Bristles	female	36,50	144,00	73,50	15.000	547.500	2.160.000	1.102.500
16	Glass cleaner	Go	347,70	34,80	55,80	20.000	6.954.000	696.000	1.116.000

TT	Material Name	Units of Calculation	Total Volume			Unit price (VND)	Cash (VNĐ)		
			CaiLon	CaiBe	Xeo Ro		CaiLon	CaiBe	Xeo Ro
17	Machine wipes	female	795,00	312,00	195,00	20.000	15.900.000	6.240.000	3.900.000
18	90% alcohol	litre	91,50	43,20	26,70	85.000	7.777.500	3.672.000	2.269.500
19	Cooling Adhesive	Go	0,90	3,60	0,90	50.000	45.000	180.000	45.000
20	Paint brushes	female	63,00	26,50	19,00	15.000	945.000	397.500	285.000
21	Electrical Adhesive Tape	roll	338,60	63,60	57,80	10.000	3.386.000	636.000	578.000
22	Rust Spray RP7	vase	150,20	72,00	22,20	85.000	12.767.000	6.120.000	1.887.000
23	Salinity Sample Solution	litre	14,60	3,65	3,65	330.000	4.818.000	1.204.500	1.204.500
24	pH Standard Solution	litre	14,60	-	-	445.000	6.497.000	-	-
25	Electrode solution (COD, BOD)	litre	58,40	-	-	1.140.000	66.576.000	-	-
26	Electrode cleaning solution	litre	58,40	-	-	370.000	21.608.000	-	-
27	Probe-head cleaner	litre	240,90	21,90	36,50	250.000	60.225.000	5.475.000	9.125.000
28	Alcohol Cleaning Tools	litre	1.204,50	109,50	182,50	80.000	96.360.000	8.760.000	14.600.000
29	Wipes	box	240,90	21,90	36,50	20.000	4.818.000	438.000	730.000
30	Distilled water	litre	12.045,00	1.095,00	1.825,00	20.000	240.900.000	21.900.000	36.500.000
TOTAL							**860.399.980**	**109.126.460**	**82.811.340**

4. Conclusion

Establishing material and fuel consumption norms for the operation, maintenance, and repair of the CaiLon – CaiBe irrigation system is essential to meet management requirements. This contributes to maintaining the quality of the project infrastructure and equipment, ensuring safety, and enhancing the efficiency of management and operation. It maximizes the service efficiency of the systems managed by the Investment and Construction Management Board for Irrigation Project 10 during the exploitation and operation process.

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[2] National Assembly (2017), Law on Irrigation No. 08/2017/QH14 dated June 19, 2017.

[3] Ministry of Agriculture and Rural Development (2018), Circular No. 05/2018/TT-BNNPTNT dated May 15, 2018, detailing several provisions of the Law on Irrigation.

[4] Ministry of Agriculture and Rural Development (2022), Circular No. 27/2022/TT-BNNPTNT dated December 30, 2022, providing guidelines on establishing economic-technical norms for the management and exploitation of irrigation works.

[5] Other related reference materials...