



Environmental Analysis of the Design Solution Water Consumption in Production

Boboeva Gulmira Sadykovna ¹, Madjidova Tanzila Rakhimovna ²

¹ Samarkand State Institute of Architecture and Civil Engineering

² Faculty of Geography and Ecology, Samarkand State University, Republic of Uzbekistan

Abstract: In this article, normative calculations of water consumption and water supply for slate production are given, water costs for technical processes and for household and drinking needs are given. The ecological state of enterprises has been studied and analyzed. And also, wastewater analyses, monitoring and efficiency of the treatment facility.

Keywords: water consumption, calculation, chemical composition, wastewater, purification, analysis, ecological condition, analysis.

Introduction. Providing industrial enterprises with water is one of the important national economic tasks. In the vast majority of industries, water is used in production processes. The requirements for the quantity and quality of the supplied water are determined by the nature of the technological process. The fulfillment of these requirements by the water supply system ensures the normal operation of the enterprise and the proper quality of the intake products.

All nature users should take into account the need to reproduce natural resources, prevent harmful irreversible consequences for the environment and human health, ensure transparency in solving environmental problems and be responsible for violating the requirements of environmental legislation. State management of nature protection is carried out by the Cabinet of Ministers of the Republic of Uzbekistan and the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection, local government bodies.

Methods. Drinking water. (GOST 4151-72), Method of determination. Drinking water. (GOST 18164-72), Methodological recommendations for determining the mass concentration of ammonium ions in natural and wastewater using the Nessler reagent. (RD 118.3897485.16-92). These methods are gradually being used in industrial enterprises, since the above analyses give concrete results.

Calculations and analyses. Prospecting for uranium within Tamdykuduk-Tulyantashskaya square. Taldykuduk-Tulyantashskaya square is located within the southern Mesozoic-Cenozoic frame of the Bukantau Mountains in the extreme southwest of the Bukantau uranium ore region. Administratively, the area belongs to the Uchkuduk district of the Navoi region of the Republic of Uzbekistan. Working days–240 days. The planned duration of the work is 5 years.

As a result of various-scale prospecting operations for uranium conducted within the considered areas in the past, the degree of study of the sites is different.

On the southern flank of Tamdykuduk-Tulyantashskaya square, where, according to the results of previous work, the predicted resources of uranium of category P2 were identified, the drilling network is 1.6 ± 0.05 km. In this regard, in accordance with the "Methodological guidelines for conducting geological exploration for uranium by stages (forecast-geological, prospecting-evaluation and exploration work) in sedimentary cover rocks" (Goskomgeologiya RUz, 2011). The drilling volume according to the projected task is 125 140 p.m. at Taldykuduk-Tulyantashskaya. The distribution of volumes by drilling conditions is presented in Table 1.1

Well Group	Type drilling	Drilling volume by drillability category, p.m						Middle category	Number of wells	Average depth of wells	Drilling diameter, mm	
		Total	Normalized conditions				Abnormal cond.					
			III	IV	V	VI						III
Taldykuduk-Tulyanashskaya Square												
0-300	Cornless	1080	225	315	495	45	0	4,2	9	230	112-118	
	with quern	990	315	0	180	225	270				112-118	
	Total	2070	810	315	675	270	270					
0-500	Cornless	36480	3200	5760	24960	2560	0	4,2	128	430	112-118	
	with quern	18560	8320	0	3200	3200	3840				112-118	
	Total	55040										
	Hydrogeological wells											
	0-500	Cornless	750	170	90	425	65	0	4,47	2	415	215 190 132
		with quern	80	10	0	5	25	40				
		Total	830									
In total												
0-800	Cornless	56000	14560	6160	29680	5600	0	4,38	112	600	112-118	
	with quern	11200	3920	0	1680	2240	3360				112-118	
	Total	67200										
TOTAL DRILLING		125140							251			

Volume distribution according to drilling conditions. tab. 1.1

The well section is represented by rocks of the sedimentary complex, which are generally characterized as weak. Drilling of wells in the above-productive thickness will be carried out without core sampling by solid face; for ore-bearing deposits - with full core sampling by the core method.

Drilling operations are the main technical means at all stages of the study of uranium ore objects of the infiltration ("sandstone") type, since they provide the main factual material (core) from potentially ore-bearing deposits with the necessary density of observation points that ensure the reliability of mapping ore-forming zones of reservoir oxidation, evaluation of the forecast resources of uranium and MIK, as well as conducting related research.

Taking into account the available information on drilling knowledge, the methodology provides for drilling a total of 251 wells on 31 profiles. The total drilling volume will be 125170 p.m. The initial data for drilling operations, broken down by groups of wells, ore-bearing horizons, are presented in the tables below.

Core sampling from wells is carried out at the intersections of the productive horizon. The requirements for the core yield are standard: 50% for the reference interval, 75% for the restriction zone (the actual ore-containing strata of the section). Taking into account the information about the estimated ore-bearing area (the length of the wedging fronts of the PO, the average width of ore deposits ~ 200 m), the number of ore wells for uranium is assumed to be equal to 30% of the total number of wells and is 75 wells for the Tamdykuduk-Tulyantash area.

Water consumption will consist of water consumption for industrial, household needs and irrigation of the territory and will be repaid at the expense of imported water.

Water for production needs will be brought by a water truck based on a KAMAZ truck with an average tank volume of 6 m³. The water used during drilling containing suspended particles will be pumped from the well into the sump, where it will separate from the suspended particles and flow back into the well using a pump.

Water supply of drilling rigs will be carried out by specialized water-carrying vehicles. Household and drinking needs of workers and employees.

Water consumption for the household and drinking needs of the company's personnel is calculated according to the formula:

$$W = \frac{N \cdot r \cdot T}{1000}, \text{ m}^3/\text{year}$$

where:

N- is the standard of water consumption per person per shift, N =25 liters for workers and N=12 liters for employees and ITR;

r- is the number of employees;

T- is the number of working days in a year.

20 people will work at the site during the exploration work, including: ITR – 4 people, workers – 16 people. The number of working days on the site is 240 days.

Water consumption for workers:

$$W = 25 \times 16 \times 240 / 1000 = 96 \text{ m}^3/\text{year} \text{ or } 0.4 \text{ m}^3/\text{day}.$$

Water consumption for ITR:

$$W = 12 \times 4 \times 240 / 1000 = 11,52 \text{ m}^3/\text{year} \text{ or } 0.048 \text{ m}^3/\text{day}.$$

In total, 0.448 m³/day of water will be consumed for household and drinking needs. or 107.52 m³/year.

Production needs

When drilling wells, water and clay solution will be used as a washing liquid. It is not planned to add any reagents to the washing liquid.

Water is consumed for production needs for 240 days a year.

The total flow rate of the flushing fluid for the projected areas is accepted according to the analogues of Taldykuduk-Tulyantash in the amount of 0.371 tons per 1 p.m. of drilling, including:

- clay solution – 0,235 t/m;
- industrial water – 0.136 t/m.

Total drilling volume for the entire period of work (5 years) it will amount to 125140 p.m. Up to 25028 p.m. will be drilled per year. It follows from the above that during the search and evaluation work for the year, $25028 \times 0.371 = 9285.4 \text{ m}^3/\text{year}$ or $38.7 \text{ m}^3/\text{day}$ will be spent on drilling.

The total length of the access roads provided for by the exploration project is 15 km. Since the work project is designed for 5 years, the need to use access roads will be $15 \text{ km} \div 5 \text{ years} = 3 \text{ km}$ in 1 year. The need for water for dust suppression is 1.5 m³/day per 1 km. Thus, the water demand will be $3 \times 1.5 = 4.5 \text{ m}^3/\text{day}$ or 1080 m³/year.

The total water consumption for the exploration period will be 43.648 m³/day. or 10472.92 m³/year.

Water disposal. In the process of economic use of water, economic and fecal effluents of polluted waters will be formed. The amount of household fecal effluents is equal to the water consumption for household and drinking needs and will be 0.448 m³/day, or 107.52 m³/year.

Note: A temporary toilet is in effect. But, no water is connected. Why, because, geological exploration works on the Taldykuduk-Tulyantash site with subsequent detailed assessment of the detected definition of a distant urban sewer line. After the end of the geological exploration work, the toilet should be filled with soil.

The economic and fecal effluents at the site of the projected works with a volume of 0.448 m³ /day, or 107.52 m³ / year, will flow without cleaning into the bio-toilet (with a volume of 0.25 m³). Once every two days, the household and fecal effluents will be taken out by self-cleaning services to the treatment facilities.

Water consumption for industrial and technical needs of 10365.4 m³/year is irrevocable, no effluents are formed.

Clay solution in the amount of 89.04 tons/year will be used in the process of isolating aquifers opened during drilling.

There is no discharge into surface watercourses and to the terrain.

Impacts associated with waste generation.

As the ecological analysis of the technological process has shown, during the operation of the enterprise, as well as during the repair of its equipment, waste from the main and auxiliary industries, as well as consumption waste of 10 types will be generated:

- ferrous metal waste
- waste of cleaning material (rags);
- used fuels and lubricants;
- used batteries;
- used tires;
- solid household waste (MSW);
- waste of worn workwear;
- drilling mud waste (OBR);
- amount of drilling mud (BS);
- drilling wastewater (BSW).

The drilling sludge waste is considered conditional and has not been calculated, since after the completion of drilling the well, all the waste will be fully used in the reclamation of the well.

To write this chapter, the guiding documents of the Republic of Uzbekistan on the management of production and consumption waste were used [10-17].

Ferrous metal waste. Ferrous metal waste is formed mainly during wear, breakage, as well as repair of technological equipment, vehicles.

Conclusion. According to the company's forecast data, the amount of ferrous metal waste generated can reach 0.3 tons/year. The water consumption of the exploration site will consist of water consumption for household, drinking and production needs. Drinking water supply and technical water supply is carried out from the Botany spring. In the process of economic use of water, economic and fecal effluents of polluted waters will be formed.

The amount of household fecal effluents is equal to the water consumption for household and drinking needs and will be 0.448 m³/day, or 107.52 m³/year. Water consumption for industrial and technical needs of 10365.4 m³/year is irrevocable, no effluents are formed.

Clay solution in the amount of 89.04 tons/year will be used in the process of isolating aquifers opened during drilling. There is no discharge into surface watercourses and to the terrain.

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