

Scientific and Methodological Foundations for Determining the Annual Workload of State Inspectors in the Field of Protection Against Emergencies

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Abstract: This article develops a scientific and methodological approach to determining the annual workload of a state inspector responsible for fire safety supervision in the field of protection against emergencies. The approach integrates the number of supervised facilities, inspection frequency according to their fire risk groups, standard or actual time recorded for individual supervisory activities, and the inspector's annual working time fund. The study takes into account the number of working days, daily working hours, and planned reductions in available working time when calculating the annual working time fund. The annual working time fund is analysed in accordance with the provisions of the Labour Code governing working hours, weekly rest periods, non-working public holidays, and annual leave, as well as the additional non-working days and rescheduled rest days established for 2026. Based on a five-day working week of 40 hours and an eight-hour working day, the total annual working time fund for 2026 was calculated at 248 working days, equivalent to 1,984 hours. After accounting for an assumed reduction of 30 working days for preliminary planning purposes, the effective annual working time fund was determined to be 1,744 hours. Furthermore, a procedure is proposed for assessing the inspector's annual workload in hours, taking into account inspection frequencies for facilities classified into fire risk Groups 1–4, night-time inspections, and official statistical indicators of fire safety supervision activities for 2023 and 2026. The proposed approach emphasises that supervisory workload should be determined not solely by the number of supervised facilities, but also by inspection frequency and the total labour time required to complete each supervisory activity. The methodology enables an objective assessment of inspectors' workloads, the determination of required staffing levels, the rational allocation of supervised facilities across territorial sectors, and an evaluation of whether the planned volume of supervisory activities can be accommodated within the available working time fund.

Keywords: fire safety supervision, state inspector, annual working time fund, standard time, supervised facility, fire risk group, inspection frequency, labour input, workload, fire prevention, risk-based supervision, working time balance.

Introduction

State supervision in the field of protection against emergencies extends beyond conducting on-site inspections of supervised facilities. Throughout the year, state inspectors perform a wide range of duties, including registering and assigning supervised facilities, conducting comprehensive and follow-up inspections, operational inspections, preventive and night-time inspections, reviewing

complaints and applications, carrying out pre-investigation inquiries into fire incidents, preparing and processing official documentation, entering data into information systems, conducting public awareness activities, and fulfilling other official responsibilities. Consequently, assessing an inspector's actual workload solely on the basis of the number of assigned facilities does not adequately reflect the structure and extent of the labour input required to perform these duties [1].

The Law of the Republic of Uzbekistan "On Fire Safety" defines fire supervision as an activity undertaken to verify compliance with fire safety requirements and implement appropriate measures based on inspection findings. The Regulation on State Fire Supervision and the Instruction registered with the Ministry of Justice of the Republic of Uzbekistan on 11 December 2018 under Registration No. 3097 (hereinafter referred to as the Instruction) establish the organisational and legal procedures governing these activities. Accordingly, a workforce requirement calculation model cannot be developed independently of the relevant statutory powers, the fire risk classification of supervised facilities, and the legally permitted frequency of inspections [2].

The practical significance and scale of this issue are further demonstrated by official statistics. According to the Ministry of Emergency Situations of the Republic of Uzbekistan (MES) report for 2023, a total of 55,615 scheduled inspections, 37,801 follow-up inspections, 115,845 operational inspections, and 13,035 fire prevention inspections were conducted across a registered population of 319,398 enterprises and organisations. These four categories alone accounted for 222,296 supervisory and preventive activities. Furthermore, by 6 July 2026, preventive assessments had been conducted at 55,441 facilities, approximately 2 million individual residential houses, more than 44,000 multi-apartment residential buildings, and nearly 1.5 million apartments. In addition, more than 127,000 meetings and discussions had been organised, reaching over 6 million citizens. These figures highlight the need to quantify inspectors' workload in terms of the number of facilities requiring supervision, the frequency of supervisory activities, and the time spent performing them [3].

Moreover, during the first six months of 2026, the number of fires decreased by 12%, the number of people injured in fires by 38%, and the number of fire-related fatalities by 15% compared with the corresponding period in 2025. These trends demonstrate the importance of jointly analysing performance indicators and resource expenditure when evaluating supervisory and preventive activities. Even when the number of fires declines, the coverage of preventive measures and the effective targeting of supervisory activities remain dependent on appropriate workforce and resource planning [4].

Methodology

The organisational and preventive significance of state fire supervision in ensuring fire safety within the field of protection against emergencies has been examined in national scientific studies. In his textbook *State Fire Supervision*, A.B. Axmedov systematically addresses the annual assignment of supervised facilities to inspectors, the compilation of facility registers according to fire risk groups, and the organisation of territorial supervisory activities. In his educational manual *Fire Prevention and Organisation of Supervision*, the author recommends assessing the actual monthly working time of a state fire supervision official in relation to the standard working time fund using the formula ($N=S/F \times 100$). When extended to an annual assessment framework, this methodological principle implies that workload calculations should account not only for the number of supervisory activities performed but also for the time required to complete them [5].

The manual further specifies that the time allocated to inspections and preventive assessments should include fire safety briefings, consultations, and meetings with employees and members of the public conducted upon completion of the relevant supervisory activities. It also provides for night-time inspections to be carried out within scheduled duty periods, official business trips to be accounted for according to the number of working days spent, and actual time expenditure to be recorded for certain categories of supervisory activities. These provisions demonstrate the

scientific limitations of assuming that every supervised facility requires an identical amount of inspection time. Instead, the total labour input should encompass preparation, travel to and from the facility, on-site inspection or assessment, the provision of explanations and guidance, documentation, and data entry into information systems [6].

In his 2025 study, A.B.Axmedov analysed inspection frequency according to the fire risk classification of supervised facilities, including the requirement to conduct inspections at least once per quarter at facilities where large numbers of people are present during night-time hours. A.B.Axmedov, I.G'.Xajiyev, and M.R.Doschanov examined the responsibilities of the state fire supervision system and its role in ensuring fire safety, drawing on relevant legislative and regulatory sources. Although these studies establish the legal input parameters for a workforce resource model, there remains a need for a mathematical formulation that integrates the precise annual working time fund with the volume of facilities requiring supervision, expressed in units of working time [7].

Within the theory of labour standardisation, the decomposition of work processes into individual elements, the observation and measurement of working time expenditure, and the determination of labour requirements using established standards are recognised as fundamental methodological approaches. In this context, according to the scientific perspectives of B.M.Genkin, a Russian economist, Doctor of Economic Sciences, Professor, and Honoured Scientist of the Russian Federation, the analysis of working time expenditure, the standardisation of labour processes, and their optimisation constitute important scientific and methodological foundations for the effective organisation and management of work.

The Regulatory Enforcement and Inspections Toolkit, published in 2018 by the Organisation for Economic Co-operation and Development (OECD), recommends adopting risk-based and proportionate approaches to the organisation of regulatory enforcement and inspections. According to this framework, inspection frequency and the resources allocated to supervisory activities should be proportionate to the risk levels of supervised facilities, while inspection planning and decision-making should be based on reliable information and evidence. These principles strengthen the scientific and methodological foundation for developing a workload assessment model that integrates the number of supervised facilities, inspection frequency, and standard time requirements [8].

Regulatory Framework for the Annual Working Time Fund

The Labour Code of the Republic of Uzbekistan establishes the legal framework governing the organisation of employees' working hours and rest periods. In particular, Article 182 of the Code stipulates that the normal duration of working time must not exceed 40 hours per week, irrespective of whether a five-day or six-day working week is applied. Furthermore, Article 207 provides for two rest days per week under a five-day working schedule and one rest day per week under a six-day working schedule, thereby safeguarding employees' right to rest. Article 208 specifies non-working public holidays and regulates the procedure for transferring rest days when public holidays coincide with regular days off. Collectively, these provisions constitute the legal basis for determining employees' annual working time funds, calculating workloads, and ensuring the rational planning of working hours and rest periods [9].

The statutory minimum annual leave entitlement is 21 calendar days. Employees of state authorities and republican executive authorities are entitled to extended basic annual leave of 27 calendar days, unless a longer period is prescribed by law for specific categories of employees. Accordingly, the expression "30 days $\times$ 8 hours = 240 hours" should not be interpreted as a statutory annual leave entitlement under the Labour Code. In this study, the 30-day period represents an assumed aggregate allowance adopted for workforce planning purposes, encompassing annual leave, temporary incapacity for work, training, activities arising from official duties that divert inspectors from scheduled supervisory tasks, and other relevant factors. Moreover, annual leave entitlements are expressed in calendar days, whereas the corresponding

reduction in the working time fund must be calculated on the basis of the working hours actually affected according to the employee's work schedule [10].

When determining the annual working time fund, each of these factors must be accounted for separately, with due consideration given to its specific impact on the time effectively available for performing assigned duties. In this context, Table 1 systematically presents the principal regulatory factors considered in calculating the annual working time fund, their substantive provisions, and their respective implications for the availability of working time.

Table 1. Principal Regulatory Factors Determining the Annual Working Time Fund

No.	Factor	Regulatory Provisions	Source
1.	Normal working hours	Not exceeding 40 hours per week	Labour Code, Article 182
2.	Weekly rest periods	Two rest days per week under a five-day working week; one rest day under a six-day working week	Labour Code, Article 207
3.	Non-working public holidays	Nine designated public holidays; provisions for transferring rest days when public holidays coincide with regular days off	Labour Code, Article 208
4.	Minimum basic annual leave	21 calendar days	Labour Code, Article 217
5.	Annual leave for employees of state authorities and republican executive authorities	27 calendar days, subject to statutory exceptions	Labour Code, Article 218
6.	Additional non-working days in 2026	2 January, 28–29 May, and 31 August for all employees	Presidential Decree No. DP-257, dated 24 December 2025
7.	Rescheduled rest days under the five-day working week in 2026	9 March, 23 March, and 11 May; 12 December is designated as a working day, with the rest day transferred to 31 December	Presidential Decree No. DP-257

Initial Model and Clarification of Key Concepts. The initial formula adopted in this study was $F=D \times H-L$, as specified in the preliminary data. To ensure scientific precision, this formula was divided into two stages: the total annual working time fund, $F_n=D \times H$, and the effective working time fund after deducting planned time losses, $F_e= F_n-L$. This distinction prevents confusion between "working time" as defined under labour legislation and the time actually available for performing scheduled supervisory duties.

$$F_n = D \times H$$

$$F_e = D \times H - L$$

where:

F_n – total annual working time fund, hours;

F_e – effective working time fund available for performing scheduled duties, hours;

D – number of working days in the annual working calendar;

H – duration of one working day, hours;

L – total number of scheduled working hours unavailable for performing planned supervisory activities during the year.

Under a five-day working week of 40 hours, the daily working time is calculated as $H = 40/5 = 8$ hours. However, under a six-day working schedule, the daily working time cannot automatically be assumed to be eight hours; it must be determined according to the applicable working arrangements [11].

In the simplified calculation presented in the preliminary data, 104 weekly rest days and approximately 11 public holidays or additional non-working days were deducted from the 365 calendar days of the year, resulting in an estimated $D \approx 250$ working days. The daily working time was assumed to be $H = 8$ hours, while planned time losses were estimated at $L = 30 \times 8 = 240$ hours. Accordingly, the effective annual working time fund was calculated as follows:

$$F = 250 \times 8 - 240 = 1\,760 \text{ hours}$$

Although this simplified calculation is suitable for preliminary workforce planning, it does not fully account for the specific weekdays on which public holidays fall in a given year or for the rescheduling of rest days established by presidential decrees. Therefore, in practical annual workforce planning, the number of working days D must be calculated separately for each calendar year.

Workload Model Based on Supervised Facilities and Standard Time Requirements.

1. Determination of the Annual Number of Supervisory Activities at Facilities

According to Instruction No. 3097 of the Ministry of Emergency Situations of the Republic of Uzbekistan, the frequency of inspections conducted under state fire supervision is determined by the fire risk classification of supervised facilities.

The Instruction establishes the following inspection frequencies:

Group 1 facilities – comprehensive and follow-up inspections may be conducted no more than once per year;

Group 2 facilities – inspections may be conducted no more than once every two years;

Group 3 facilities – inspections may be conducted no more than once every three years;

Group 4 facilities – state fire supervision is carried out as necessary, based on the level of risk and applicable regulatory requirements;

Facilities accommodating large numbers of people at night – night-time inspections must be conducted at least once every quarter.[12]

To incorporate these inspection frequencies into the annual workload calculation model, the number of supervised facilities is converted into an annual calculated indicator of supervisory activities.

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The following mathematical model is proposed:

$$Q_y = N_1 \cdot 1 + N_2 \cdot 0,5 + N_3 \cdot \frac{1}{3} + N_4 \cdot p_4 + 4 \cdot N_t$$

where:

Q_y – calculated annual number of supervisory activities at supervised facilities;

N_1 – number of facilities classified in Fire Risk Group 1;

N_2 – number of facilities classified in Fire Risk Group 2;

N_3 – number of facilities classified in Fire Risk Group 3;

N_4 – number of facilities classified in Fire Risk Group 4;

p_4 – proportion of Group 4 facilities subject to supervisory activities during the current year, determined on the basis of risk assessment and applicable legal provisions;

N_t – number of facilities requiring night-time inspections.

This mathematical model enables the supervisory requirements of facilities belonging to different fire risk groups to be expressed as a single annual calculated indicator.

The coefficients

$$1; 0,5; \frac{1}{3}$$

represent the conversion factors used to express the maximum permitted inspection frequencies for the respective fire risk groups as annual equivalents.

For example:

For Group 1 facilities:

$$1 \text{ facility} = 1 \text{ supervisory activity per year}$$

For Group 2 facilities:

$$1/2 = 0,5 \text{ supervisory activities per year}$$

For Group 3 facilities:

$$1/3 = 0,33 \text{ supervisory activities per year}$$

For facilities requiring night-time inspections:

$$4 \times N_t$$

The coefficient of 4 is applied because the quarterly inspection frequency requires four supervisory activities to be conducted annually.

$$\tau_j = t_{\text{prep}} + t_{\text{travel}} + t_{\text{site}} + t_{\text{consult}} + t_{\text{doc}} + t_{\text{infor}}$$

where:

τ_j – the total time required for supervisory activity of type j (hours);

t_{prep} – time spent preparing for the activity and analysing initial information;

t_{travel} – time spent travelling to and from the facility;

t_{site} – time spent conducting the inspection at the facility;

t_{consult} – time spent providing advice, explanations and briefings;

t_{doc} – time spent documenting findings and preparing official records;

t_{infor} – time spent entering information into the information system.

The inspector's total annual workload is determined by the following formula:

$$T_y = \sum_{j=1}^m (Q_j \times \tau_j) + T_{\text{other}}$$

where:

T_y – the inspector's total annual workload (hours);

Q_j – the annual number of supervisory activities of type j;

τ_j – total time required for one activity of type j (hours);

m – the total number of types of supervisory activity;

T_{other} – annual time devoted to operational inspections, reviewing complaints, investigating fires, preparing reports, duty shifts and other official tasks.

2. Determination of Annual Workload Utilisation and Required Staffing Levels.

The inspector's annual workload utilisation rate is calculated as follows:

$$K_y = \frac{T_y}{F_e} \times 100\%$$

where:

K_y – the inspector's annual workload utilisation rate, %;

T_y – the inspector's total annual workload, hours;

F_e – the effective annual working time fund per inspector, hours.

Interpretation of workload utilisation:

$K_y = 100\%$ indicates that the planned volume of work equals the effective working time available to one inspector. In this case, the workload is considered to be at its planned optimum.

$K_y > 100\%$ indicates that the assigned workload exceeds the inspector's effective working time fund. Additional staff or a redistribution of duties is therefore necessary.

$K_y < 100\%$ indicates that a proportion of the available working time remains for additional tasks, emergencies, an operational reserve or other official duties.

3. Determination of the Required Number of Inspectors.

The minimum number of inspectors required for a territory or organisational unit is calculated using the following formula:

$$I_{required} = \left\lceil \frac{T_y}{F_e} \right\rceil$$

where:

$I_{required}$ – the minimum required number of inspectors;

T_y – total annual workload, hours;

F_e – effective annual working time fund per inspector, hours.

This formula estimates the minimum workforce required by dividing the total labour input by the effective working time available to one employee. Rounding the result upwards determines the smallest whole number of staff positions sufficient to complete the planned workload.[13]

Result and Discussion

1. Calendar-Based Calculation of the Working Time Fund for 2026.

Calculations based on the Gregorian calendar show that 2026 contains 261 Mondays to Fridays. In determining an employee's annual working time fund, however, statutory non-working public holidays and additional or rescheduled rest days must be excluded from this total. Accordingly,

Presidential Decree No. PF-257, presidential decisions concerning the observance of Ramadan and Qurban Hayit, and Article 208 of the Labour Code were used to identify 14 non-working days that fall on, or are transferred to, weekdays under a five-day working schedule. Since the Saturday rest day of 12 December 2026 is transferred to Thursday, 31 December, 12 December is reinstated as a working day. Thus, $D = 261 - 14 + 1 = 248$ working days.

$$D_{2026} = 261 - 14 + 1 = 248 \text{ days}$$

$$F_n = 248 \times 8 = 1,984 \text{ hours}$$

$$L = 30 \times 8 = 240 \text{ hours (assumed for planning purposes)}$$

$$F_e = 1,984 - 240 = 1,744 \text{ hours}$$

Thus, retaining the preliminary assumption of an aggregate time allowance equivalent to 30 working days, the effective annual working time fund per inspector is 1,744 hours under the calendar-specific five-day working schedule for 2026. The simplified 250-day model gives 1,760 hours, which is 16 hours, or two working days (approximately 0.92%), higher. Although the difference may appear small, when multiplied across hundreds of inspectors it can produce a material difference in total staffing capacity.

To demonstrate the difference between these two approaches and compare the calendar-based result for 2026 with the simplified preliminary calculation, the principal indicators are presented in Table 2.

Table 2. Comparison of the Simplified Calculation and the 2026 Calendar-Based Calculation

Indicator	Simplified calculation	Calendar-based calculation for 2026	Difference
Working days, D	250 days (estimated)	248 days (five-day week in 2026)	–2 days
Daily working hours, H	8 hours	8 hours	0
Gross annual fund, $D \times H$	2,000 hours	1,984 hours	–16 hours
Time allowance, L	240 hours	240 hours	0
Effective fund, F	1,760 hours	1,744 hours	–16 hours (–0.92%)
Monthly average	146.7 hours	145.3 hours	–1.4 hours

The principal scientific conclusion is that 1,760 hours should not be described as an “annual statutory standard”, but rather as the result of a simplified planning calculation based on $D = 250$ and $L = 240$. Legislation prescribes the maximum normal weekly working time and the rules on rest days, public holidays and leave; annual hours must be calculated from the relevant year’s working calendar and the individual employee’s balance of unavailable time [14].

2. Annual Supervisory Activity by Facility Risk Group.

Inspection frequency by fire risk group is a key factor in calculating the annual workload attributable to supervised facilities. Because each group is subject to a different frequency, the classification directly affects the number of activities to be carried out over the year. The annual volume of supervision must therefore take account of both the number of facilities and their respective risk groups and legally permitted inspection frequencies. These indicators enable the annual supervisory workload to be calculated for each group. Table 3 summarises the fire risk groups, applicable inspection frequencies and corresponding annual calculated indicators.

Table 3. Legally Permitted Inspection Frequency and Annual Calculated Indicator by Facility Group[15]

Category	Permitted inspection frequency	Annual calculated indicator	Comment
Group 1	No more than once per year	1.00 activity/facility-year	High-frequency planning stream
Group 2	No more than once every two years	0.50 activity/facility-year	Allocated over a two-year cycle
Group 3	No more than once every three years	0.333 activity/facility-year	Allocated over a three-year cycle
Group 4	As required	p ₄	Determined during the year according to risk assessment and legal grounds
Facilities accommodating people overnight or large numbers of people	Night-time inspection at least once per quarter	4.00 inspections/facility-year	Requires duty shifts and separate planning

As Table 3 demonstrates, an identical number of facilities does not necessarily imply the same volume of supervision in different territorial areas. For instance, each Group 1 facility generates 1.0 annual inspection unit for planning purposes, whereas the corresponding indicator for a Group 3 facility is 0.333. Facilities requiring night-time inspections also generate at least four separate inspection activities per year, in addition to any applicable daytime inspections. Consequently, the allocation of facilities to inspectors should take account not only of “facility numbers” but also of “inspection frequency $\times$ labour input per inspection” [16].

3. Scale of Supervisory Workload Based on Statistical Data.

When assessing the actual workload of state inspectors in the field of protection against emergencies, it is important to consider not only the calculated annual flow of supervised facilities but also official statistics on state fire supervision. These indicators provide an empirical perspective on the volume of supervisory activities, inspections and other official work undertaken during the year. Official statistics for the relevant years were therefore examined to assess the scale of workload and its relationship to actual service activities [17]. The main quantitative indicators of state fire supervision are presented in Table 4 and Figure 1.

Table 4. Official Quantitative Indicators of State Fire Supervision Activities

Period	Indicator	Value	Comment/source
2023	Scheduled inspections	55,615	MES annual press release
2023	Follow-up inspections	37,801	MES annual press release
2023	Operational inspections	115,845	MES annual press release
2023	Fire prevention assessments	13,035	MES annual press release

2023	Fires nationwide	10,204	59 fewer than in 2022
2026, to 6 July	Facilities subject to preventive assessment	55,441	MES “Urgent 60 Days” report
2026, to 6 July	Preventive meetings and discussions	Over 127,000	More than 6 million people reached
2026, first half	Change in number of fires	–12%	Relative to the first half of 2025

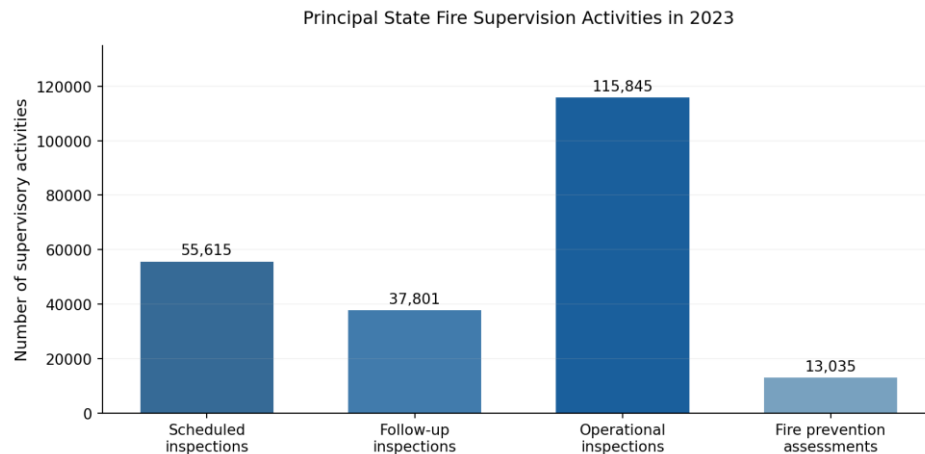


Figure 1. Number of Main State Fire Supervision Activities in 2023

Figure 1 shows the distribution of the four principal activity streams, which together amounted to 222,296 supervisory and preventive activities in 2023. Operational inspections accounted for the largest share, with 115,845 activities (52.1%); scheduled inspections accounted for 55,615 (25.0%), follow-up inspections for 37,801 (17.0%), and fire prevention assessments for 13,035 (5.9%). These percentages are based on numbers of activities and do not exclude the possibility that the same facility was involved in more than one category. The scientific significance of this distribution is that a substantial proportion of an inspector’s workload may arise from operational and follow-up activities that cannot be predicted solely from the pre-established list of facilities. The annual planning model should therefore include a separate T_boshqa time component for other duties and unplanned work.

4. Sensitivity of the Annual Working Time Fund to Time Allowances.

Planned reductions in available working time are a significant factor in determining the annual working time fund. Changes in the amount of annual leave, temporary incapacity for work, training, other activities arising from official duties and circumstances that divert staff from supervision directly affect the hours actually available to an inspector. Evaluating how sensitive the working time fund is to different allowances is therefore important for accurate workload planning and substantiating staffing requirements. Table 5 and Figure 2 show how the gross annual working time fund of 1,984 hours calculated for 2026 changes under different assumed levels of time losses.[18]

Table 5. Variation in the Gross Annual Working Time Fund of 1,984 Hours in 2026 by Assumed Time Losses

Time allowance, working days	L, hours	F _e , hours	Percentage of gross working time fund
20	160	1,824	91.9%
25	200	1,784	89.9%

Time allowance, working days	L, hours	F _e , hours	Percentage of gross working time fund
30	240	1,744	87.9%
35	280	1,704	85.9%
40	320	1,664	83.9%

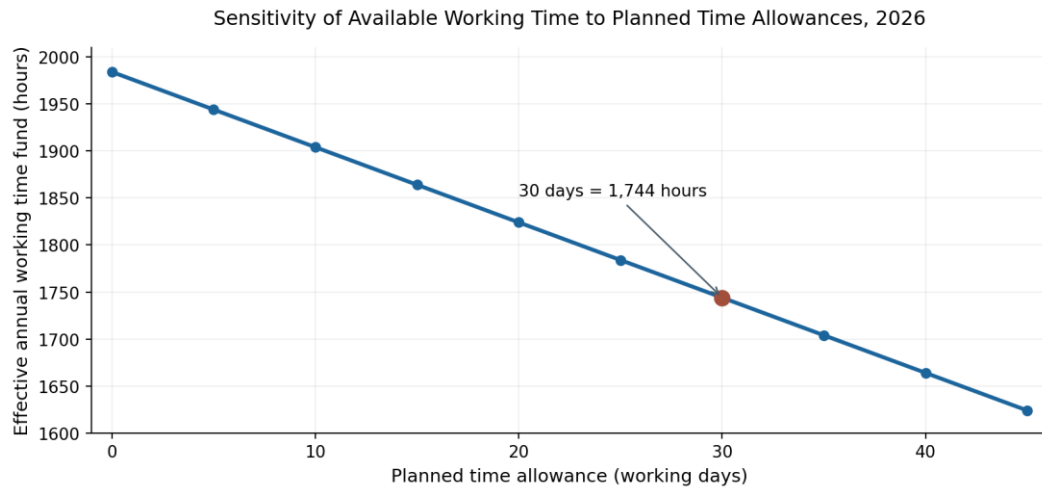


Figure 2. Relationship Between the Effective Working Time Fund and Planned Time Losses Under a Five-Day Working Week in 2026 (author's calculations)

Figure 2 illustrates a linear relationship: with an eight-hour working day, each additional working day unavailable for planned supervisory work reduces the effective annual fund by exactly eight hours. The fund equals 1,824 hours for a 20-day allowance, 1,744 hours for 30 days and 1,664 hours for 40 days. Rather than fixing L at 240 hours for every inspector, a more robust scientific approach would be to record separately the proportion of leave falling on scheduled working days, temporary incapacity for work, training and other time components from historical records, and to estimate a forecast value for the planning year.

5. General Procedure for Calculating Annual Workload.

1. Prepare a working calendar for the planning year: identify the five- or six-day working schedule, public holidays, transferred rest days and additional non-working days, and calculate D.
2. Determine H from the normal weekly working time prescribed by the Labour Code and the applicable working schedule, and calculate:

$$F_n = D \times H$$

3. Determine planned time losses L in hours falling within the working schedule, and calculate:

$$F_e = F_n - L$$

4. Classify the facilities assigned to an inspector into Fire Risk Groups 1–4 and identify facilities requiring night-time inspections.

5. Establish the legally permitted annual inspection frequency f_j for each facility category and calculate the annual number of activities as:

$$Q_j = N_j \times f_j$$

6. Determine τ_j , the full standard or empirically observed duration of each activity type. This should include preparation, travel, on-site work, advice or briefings, documentation and data entry:

$$\tau_j = t_{\text{prep}} + t_{\text{travel}} + t_{\text{site}} + t_{\text{consult}} + t_{\text{doc}} + t_{\text{infor}}$$

7. Account for expected hours devoted to operational inspections, complaints, pre-investigation inquiries into fires, reporting, duty shifts and other mandatory activities in the T_{other} component.

8. Calculate the total workload:

$$T_y = \sum_{j=1}^m (Q_j \times \tau_j) + T_{other}$$

and assess the inspector's utilisation rate using:

$$K_y = \frac{T_y}{F_e} \times 100\%$$

9. Determine the number of inspectors required for the territory or organisational unit using:

$$I_{zarur} = \left\lceil \frac{T_y}{F_e} \right\rceil$$

The result is then subjected to expert review in light of the geographical dispersion of facilities and observed risk indicators.

10. At the end of the year, compare the planned values of τ_j and L with actual service records, and recalibrate the parameters for the following year using empirical data.

To integrate the mathematical models and calculation procedures described above, an algorithm has been developed for determining the annual workload of state inspectors in the field of protection against emergencies. The algorithm links the calculation of the annual working time fund, allowances for planned time losses, inspection frequencies by facility fire risk group, labour input per supervisory activity and the number of inspectors required on the basis of total annual workload. The stages and sequence of the proposed calculation algorithm are presented in Figure 3.[19]



Figure 3. Algorithm for Determining the Annual Workload of State Inspectors in the Field of Protection Against Emergencies

The proposed algorithm divides the annual workload calculation into a consistent sequence of stages and connects the result of each stage to subsequent calculations. At the final stage, total estimated labour input is compared with the effective annual working time fund to determine the inspector's utilisation rate and the staffing positions required for the relevant territory or organisational unit. The acceptability of the resulting estimates is assessed, and the initial calculation parameters are revised where necessary.

Discussion. The findings first demonstrate the need to distinguish the “annual working time fund” as a concept in labour law from its use in management and resource accounting. The Labour Code regulates normal weekly working hours, rest days, public holidays and the calendar duration of leave. An annual figure such as “1,760 hours”, however, is not itself a statutory provision; it is a calculated quantity based on the selected year, working-week schedule and assumed time allowances. Clearly identifying this distinction in a scientific paper prevents methodological errors [20].

A second important finding is that although the expression $365 - 104 - 11 \approx 250$ can assist rough planning, “11 official public holidays” is not a fixed annual number in Uzbekistan. Article 208 of the Labour Code lists nine categories of non-working public holidays, but the weekday on which each falls, transfers of rest days and additional non-working days established by presidential instruments alter D. Hence, the calendar-based calculation for 2026 gives 248 rather than the simplified figure of 250 days [21].

A third issue concerns parameter L. Leave, illness, training and official business travel should not automatically be treated as identical categories of “lost time”. Official travel can constitute working time in the legal sense; however, if it reduces an inspector's capacity to complete planned inspections within an assigned sector, it may be recorded separately in the resource model as time unavailable for direct supervision. Accordingly, L is defined here not as total legally “non-working time”, but as scheduled hours unavailable for the selected planned duties.

Fourth, facility counts alone do not fully describe workload. A group of 100 Group 1 facilities and a group of 100 Group 3 facilities do not generate the same annual inspection frequency; facilities requiring night-time inspections create an additional recurring workload. Furthermore, MES figures for 2023 show that operational inspections were approximately 2.08 times as numerous as scheduled inspections. Staffing estimates based only on the planned facility register may therefore underestimate the volume of unplanned work [22].

A fifth issue is the establishment of “standard time”. National teaching and methodological sources prescribe standard times for some activities and the recording of actual time expenditure for others; the monthly $S/F \times 100$ indicator is also recommended. It would therefore be appropriate to introduce a dedicated empirical time-measurement stage in further dissertation research. Several months of observations should be gathered for each inspection type and facility risk group, and a statistically stable full-duration parameter τ_j should be estimated, including travel and documentation time. This would replace purely subjective expert estimates with standards grounded in observed service activity [23].

The OECD approach to regulatory inspection and enforcement likewise calls for resources to be allocated in proportion to risk and outcomes, rather than mechanically according to the number of inspections. Future calculations may therefore refine τ_j or Q_j to reflect facility risk, territorial location and the probability of repeated non-compliance. The present study, however, initially uses legally established inspection frequencies and the available working time fund. This avoids counting the same factor twice when additional risk coefficients are subsequently introduced [24].

A limitation of the study is that the existence of a single, updated and publicly available national set of hourly standards for all types of service activity could not be confirmed. Rather than introducing artificial numerical values for unknown standards, the article proposes applying existing departmental standards where available and estimating τ_j from empirical time

measurements for other activities. This approach preserves scientific reliability and allows further calibration when time-record data become available from MES information systems.[25]

Conclusion

The research demonstrates that assessing the annual workload of state inspectors in the field of protection against emergencies requires an integrated calculation framework incorporating the working time fund, the number of supervised facilities, their fire risk groups, inspection frequency and the time required for individual service activities. The 2026 working calendar, applicable labour legislation, facility risk groups and official statistics on state fire supervision were analysed together. On this basis, the following scientific and practical conclusions were reached.

When calculating the annual working time fund of a state inspector, the gross working time fund and planned time losses must be accounted for separately. It is essential to distinguish statutory requirements from assumed values adopted for planning purposes.

The Labour Code's provisions on normal weekly working time, rest days, non-working public holidays and annual leave constitute the legal basis for calculating the annual working time fund. Nevertheless, the allowance equivalent to 30 working days must not be regarded as a universal statutory leave entitlement; in this study it is an assumed planning parameter combining leave and other expected reductions in time available for planned work.

For 2026, on the basis of a five-day, 40-hour working week and an eight-hour working day, and taking account of public holidays and additional and transferred rest days, the calendar-based calculation yielded 248 working days and a gross annual working time fund of 1,984 hours. With an assumed allowance of 240 hours, the effective fund was 1,744 hours. The simplified 250-day calculation produced 1,760 hours, exceeding the calendar-based 2026 figure by 16 hours.

The number of facilities alone is insufficient to assess annual supervisory workload. Legally permitted inspection frequency by facility fire risk group and the total labour input required for each supervisory activity must also be included. Annual frequency coefficients may be applied to Groups 1–3, while Group 4 calls for a needs-based approach. At least four night-time supervisory activities per year should also be accounted for separately where required.

The study proposes an integrated calculation approach for estimating annual labour input, workload utilisation and the required number of inspectors. It links the facility register, the frequency of supervisory activities, the time required for each activity and the inspector's effective annual working time fund within a single framework.

Official MES statistics for 2023 reported 55,615 scheduled inspections, 37,801 follow-up inspections, 115,845 operational inspections and 13,035 fire prevention assessments, demonstrating the substantial place of unscheduled and operational activities in state fire supervision. The associated time expenditure must therefore be recorded separately when estimating an inspector's total annual workload.

From a scientific and practical perspective, it would be appropriate to introduce routine recording of time spent on supervisory activities in the MES system using inspectors' electronic service records. Time spent preparing, travelling to facilities, conducting on-site work, providing advice, preparing documents and entering data into information systems should be recorded separately. The accumulated empirical data could then support regular refinement of labour-input standards by territory and facility category.

The proposed methodology can serve as a practical instrument for evidence-based workforce planning within state fire supervision, balanced allocation of facilities among inspectors, identification of overloaded sectors and determination of staffing requirements. The approach enables planned supervisory workloads to be compared with available working time and can improve the basis for management decisions.

References

- [1] A. B. Akhmedov, State Fire Supervision, Part I: Textbook. Tashkent, Uzbekistan: Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan, 2025, 270 p. (in Uzbek).
- [2] A. B. Akhmedov, State Fire Supervision, Part II: Textbook. Tashkent, Uzbekistan: Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan, 2025, 211 p. (in Uzbek).
- [3] A. B. Akhmedov, “Inspections by state fire supervision authorities: Protection of entrepreneurs’ rights and the effectiveness of supervision,” Fire and Explosion Safety, no. 1(18), pp. 385–389, 2025 (in Uzbek).
- [4] A. B. Akhmedov, Fire Prevention and the Organisation of Supervision: Teaching Manual. Tashkent, Uzbekistan: Academy of the Ministry of Emergency Situations of the Republic of Uzbekistan, 2025, 260 p. (in Uzbek).
- [5] A. B. Akhmedov, I. G‘. Xajiyev, and M. R. Doschanov, “The role of state fire supervision authorities in ensuring fire safety,” Fire and Explosion Safety, no. 1(18), 2025 (in Uzbek).
- [6] Ministry of Emergency Situations of the Republic of Uzbekistan, “Reports on the activities of the Ministry of Emergency Situations.” [Online]. Available: <https://gov.uz/oz/fvv/sections/favqulodda-vaziyatlar-vazirligi-faoliyati-bo-yicha-hisobotlar>. Accessed: Aug. 30, 2026 (in Uzbek).
- [7] Ministry of Emergency Situations of the Republic of Uzbekistan, “Activities undertaken to ensure fire safety in 2023.” [Online]. Available: <https://gov.uz/oz/fvv/news/view/8786>. Accessed: Aug. 30, 2026 (in Uzbek).
- [8] Ministry of Emergency Situations of the Republic of Uzbekistan, “‘Urgent 60 Days’ preventive campaign to prevent fires during the summer season, July 1–August 30,” Jul. 6, 2026. [Online]. Available: <https://gov.uz/oz/fvv/news/view/188892>. Accessed: Aug. 30, 2026 (in Uzbek).
- [9] Ministry of Emergency Situations of the Republic of Uzbekistan, “Statistics on emergencies that have occurred.” [Online]. Available: <https://gov.uz/oz/fvv/sections/sodir-bo-lgan-favqulodda-vaziyatlar-statistikasi>. Accessed: Aug. 30, 2026 (in Uzbek).
- [10] Ministry of Emergency Situations of the Republic of Uzbekistan, “Indicators of emergencies and fires in the first half of 2026 compared with the corresponding period of the previous year,” Jul. 16, 2026. [Online]. Available: <https://gov.uz/oz/fvv/news/view/194238>. Accessed: Aug. 30, 2026 (in Uzbek).
- [11] B. M. Genkin, Organisation, Standardisation and Remuneration of Labour at Industrial Enterprises, 3rd rev. and expanded ed. Moscow, Russia: Norma, 2005, 448 p. (in Russian).
- [12] O‘. T. Muzafarov, M. N. Musaev, I. U. Madjidov, M. R. Doschanov, and A. T. Ochilov, “National and international experience in fire prevention,” in Proc. International Conference on Developments in Education, Bursa, Turkey, Jan. 20, 2025 (in Uzbek).
- [13] Organisation for Economic Co-operation and Development (OECD), OECD Regulatory Enforcement and Inspections Toolkit. Paris, France: OECD Publishing, 2018, 56 p., doi: 10.1787/9789264303959-en.
- [14] Republic of Uzbekistan, Labour Code, Law No. LRU-798, Oct. 28, 2022, as amended. [Online]. Available: <https://lex.uz/docs/-6257288>. Accessed: Aug. 30, 2026 (in Uzbek).
- [15] Republic of Uzbekistan, Law on Fire Safety, Law No. LRU-226, Sep. 30, 2009, as amended. [Online]. Available: <https://lex.uz/docs/-1521661>. Accessed: Aug. 30, 2026 (in Uzbek).
- [16] Ministry of Internal Affairs of the Republic of Uzbekistan, Order No. 228 of October 28, 2018, Approving the Instruction on the Organisation and Implementation of Activities of State Fire Supervision Authorities, registered with the Ministry of Justice on Dec. 11, 2018, under No. 3097, as amended. [Online]. Available: <https://lex.uz/docs/-4104692>. Accessed: Aug. 30, 2026 (in Uzbek).
- [17] President of the Republic of Uzbekistan, “On establishing additional non-working days and transferring rest days during the celebration of official dates in 2026,” Decree No. DP-257,

- Dec. 24, 2025. [Online]. Available: <https://president.uz/oz/lists/view/8832>. Accessed: Aug. 30, 2026 (in Uzbek).
- [18] President of the Republic of Uzbekistan, “Decision on the celebration of Ramadan Hayit,” Mar. 18, 2026. [Online]. Available: <https://president.uz/oz/lists/view/9019>. Accessed: Aug. 30, 2026 (in Uzbek).
- [19] President of the Republic of Uzbekistan, “Decision on the celebration of Qurban Hayit,” May 20, 2026. [Online]. Available: <https://president.uz/oz/lists/view/9233>. Accessed: Aug. 30, 2026 (in Uzbek).
- [20] Cabinet of Ministers of the Republic of Uzbekistan, “On approval of the regulation on state fire supervision,” Resolution No. 272, Oct. 4, 2013, as amended. [Online]. Available: <https://lex.uz/docs/-2249465>. Accessed: Aug. 30, 2026 (in Uzbek).
- [21] B. Vaxabov and A. Akhmedov, “Determining the dynamics of the number of fires using the least squares method,” *Fire and Explosion Safety*, no. 2(15), pp. 107–112, 2024 (in Uzbek).
- [22] International Organization for Standardization, ISO 31000:2018 Risk Management—Guidelines. Geneva, Switzerland: ISO, 2018, pp. 1–16.
- [23] International Organization for Standardization, ISO 45001:2018 Occupational Health and Safety Management Systems—Requirements with Guidance for Use. Geneva, Switzerland: ISO, 2018, pp. 1–42.
- [24] National Fire Protection Association, NFPA 1: Fire Code. Quincy, MA, USA: NFPA, 2024 edition.
- [25] International Labour Organization, Guidelines on Occupational Safety and Health Management Systems (ILO-OSH 2001). Geneva, Switzerland: ILO, 2001, pp. 1–36.