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RESEARCH ARTICLE

Ataturk University Vocational School of Health Services Laboratories Risk Analysis Application

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ABSTRACT

Although the levels of risks are different in each business line, the level of risks that may be encountered in workplaces with laboratories is slightly higher. In this study, it is aimed to plan what is necessary for the elimination of risks by making a risk assessment in the laboratories of Ataturk University Health Services Vocational School. In our study, firstly, field observations were made in the laboratories, then the observed hazards and what could happen if they turned into risks were tried to be determined. There are many risk analysis methods available in the literature. L matrix method is preferred because of its practicality and ease of use in field applications. Ethics committee approval was obtained for the research. As a result of the analysis made using the L matrix method, 149 risks were determined, 90 of which were significant risks and 59 were medium-level risks. It has shown that it is necessary to pay attention to issues such as working with chemicals, hygiene, fire, use of hand tools, use of personal protective equipment, working with electricity, occupational health and safety training in the identified risks. Occupational health and safety trainings should be organized more and more frequently than the periods specified in the legislation. The content of these trainings should be arranged more intensively and close to practical life. Planning should be done to ensure a positive safety culture in the workplace. While the plans are being prepared, all parties involved in the realization of production in the workplace should be represented as much as possible.

Contents

1. Introduction

With The unit in which the means of production and the employee are organized together in order to produce goods or services under the responsibility of the employer or employer's representative is expressed as the workplace [1]. The employee's time passes in this workplace during working hours. During work, he encounters many problems arising from both the workplace environment and the surrounding workplaces and the employee. These problems

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are; Occupational accidents that occur while the insured is at the workplace and may disrupt the material and moral integrity of the employee [2]. The problems are also; The disability may appear as an occupational disease due to a recurring reason due to the nature of the job in which the insured person works, or due to the conditions of continuing the work [3].

Hazard is defined as the potential to be damaged by a process in the workplace or by an external effect. Risk refers to the probability of loss that may occur as a result of danger. Risk assessment is defined as the work to be done in order to determine the hazards in the workplace, to evaluate the risks that may occur due to the factors that can turn the identified hazards into risks and to evaluate the risks that may occur due to the hazards, and to decide on the measures to be taken [4]. Although there are different opinions as a result of the studies, it is accepted that 80% of work accidents are caused by employees, 18% are caused by inappropriate conditions, and 2% are caused by unforeseen events [5]. This situation shows that the worker is an important factor in the formation of work accidents and occupational diseases. Therefore, the most important point in the prevention of risks should be precautions for employees.

The main duty of the employer is to protect the employee during the activities carried out in the workplace. In order to achieve this, the employer can apply two different approaches. First, trying to take measures to prevent employees from encountering a similar situation after a work accident or occupational disease occurs, which means a reactive approach. The second is the proactive approach, which is a prevention activity by predicting the occurrence of negative situations that the employee may encounter [6]. A preventive (proactive) approach based on risk assessment in accordance with the rules of law ISO 45001 OHS Management System to be implemented It provides great convenience to institutions and organizations. Risk assessment and management concept ISO this is the main purpose of 45001. To be taken measures resulting from risk assessment made according to the results. ISO 45001 Occupational Health and Management System in institutions and organizations; emerge being prepared for all kinds of risks that may arise, workforce and business days lost and due to this minimizing high costs, satisfaction of employees and customers, production minimizing the costs of fire, explosion, emergencies such as machine failures and shutdowns. be prepared for situations, against official institutions eliminating the risk of legal penalties, other quality compatible with the units, such as efficient and production increase provides advantages [7, 8].

National legislation essentially takes a stance that supports the proactive approach. With this approach, a road map should be drawn in order to eliminate the negativities by carrying out risk assessment studies in the workplaces. The roadmap determination study should not be carried out only by occupational health and safety professionals, but should be made into a study in which employees working at all levels of the workplace are included in the evaluation. As in all workplaces, serious risky situations may occur during work in laboratories. Determining the risks that may develop in the studies to be carried out in the laboratories and taking the necessary precautions will ensure that the students, employees and visitors who will operate in the laboratory are safe.

Vocational school of health services (VSHS) laboratories, which are the subject of our study, provide students with the opportunity to practice in their vocational training. In VSHS; There are six application laboratories in the fields of biochemistry, microbiology, hematology, orthopedic prosthetic orthotics, dental prosthesis technology, audiometry, elderly care and dialysis. Practices in laboratories mostly cover studies aimed at increasing the professional knowledge and skills of associate degree students. Due to the different applications carried out in the laboratories, the variety of work accidents and occupational diseases that employees may encounter is also high. The risks identified by the risk assessment studies should be reduced to acceptable levels. In order to reduce the risks to acceptable levels, analyzes were carried out considering the legislation in our country and the standards set by other international institutions and organizations.

As employers harmonize their workplaces with legislation and standards and make continuous improvement efforts in occupational health and safety activities, workplace stakeholders will be protected.

This risk analysis study was carried out in 6 application laboratories within the vocational school of health services. With the risk analysis study, the hazards that may arise from the application laboratories or other workplace building attachments and the risks that may occur after these hazards were determined, and it was aimed to determine the necessary recommendations on the necessary actions and measures to eliminate the identified risks. It is thought that this study will contribute to the creation of safe working environments in laboratories by taking the precautions specified in the risk analysis form below in order to ensure the safety of people who can work and be found in the laboratory.

2. Material and Methods

Structures Type of Research: The research is descriptive.

Place and Time of the Research: In order to carry out the research, written permission was obtained from Atatürk University Health Services Vocational School Directorate on 19.07.2020 (25615738940-E2000178948). The research was conducted at Atatürk University Vocational School of Health Services between 03.08.2020-18.08.2020; biochemistry, microbiology, hematology, orthopedic prosthetic orthotics, dental prosthesis technology, audiometry, elderly care and dialysis.

Population and Sample of the Research: At Ataturk University Vocational School of Health Services; biochemistry, microbiology, hematology, orthopedic prosthetic orthotics, dental prosthesis technology, audiometry, elderly care and dialysis fields are included in the scope of the study.

Data Collection: The data used in the research were collected between 03.08.2020-18.08.2020.

Evaluation of Data: L matrix method was used in the evaluation of the study. In line with the nature of the activities in the workplace carried out with the risk assessment team; the analysis is carried out by using quantitative and qualitative methods on the basis of globally accepted standards in case of hazards in the area to be analyzed and if they turn into risks. During the evaluation, the workplace is divided into as many departments as possible and the analyzes are completed in a way that covers the entire enterprise. Evaluated risks are listed in order from high risk to low risk depending on the magnitude of the harmful effects of the risks in order to determine the precautions [4].

As a risk analysis method in the study; The L-Type Risk Assessment method (5 x 5 Matrix diagram), which is widely used by occupational health and safety experts, was preferred. Matrix method These matrices are used to rank the magnitude of risks. If the risk is high, the outcome matrix can be used. Thanks to the method, the risks can be graded and the measures that can be taken according to the severity of the situation change [9].

In this study, the hazards specific to VSHS laboratories are determined and the probability of these hazards; As seen in Table 1, the probability of occurrence of the event was determined in accordance with the L-type matrix method by grading from 1 to 5 as very low, low, middle, high, very high.

Table 1 Event Possibility Levels

Degree	Possibility	Rating Digits for Possibility
1	Very Low	Hardly ever
2	Low	Annually, only under normal conditions
3	Medium	Few (a few per year)
4	High	Often (once a month)
5	Very High	Very often (once a week, every day), under normal operating conditions

Severity levels if the dangerous event occurs; L-type matrix method was determined by taking into account the severity levels, as seen in Table 2, by grading from 1 to 5 as very mild, mild, moderate, serious and very serious.

Table 2 If the Event Occurs, Violence Levels

Degree	Severity	Rating Steps for Severity
1	Very mild	No loss of working hours, can be fixed immediately, requires first aid
2	Mild	No loss of working day, requires outpatient treatment, requires first aid
3	Middle	Indistinct injury requires hospital inpatient treatment
4	Serious	Severe injury requires long recovery time, occupational disease may develop
5	Very Serious	Death, permanent disability

The following formula was used while determining the numerical values of the risks in the L Matrix method. In order to decide on the acceptability levels of the risks determined by this formula, the L-type matrix method seen in Table 3 was determined by considering the risk levels. In this table, the risk levels are; 1-6 in green, 8-12 in yellow, and 15-20 in red.

RISK = POSSIBILITY X SEVERITY

Table 3 L-Matrix of the acceptability levels of identified risks

Risk			Severity				
			Very	Mild	Moderate	Serious	Very Serious
			1	**2**	**3**	**4**	**5**
Possiblity	Very Low	1	1	2	3	4	5
	Low	2	2	4	6	8	10
	Moderate	3	3	6	9	12	15
	High	4	4	8	12	16	20
	Very High	5	5	10	15	20	25

After the risk analysis studies carried out, measures should be taken according to the degree of risk levels reached by multiplying the probability and severity values specified in the above formula in the risk analysis forms. The action approaches that should be taken as corrective and preventive action at these identified risk levels are given in Table 4. The risk level was determined as 1 insignificant risk, 2-6 acceptable risk, 8-12 moderate risk, 15-20 significant risk, and 25 unacceptable risk. In the decision-making phase, one should always tend to approach the situation where the risk is close to zero.

Ethical Aspect of the Research: Written permission was obtained from Atatürk University Health Services Vocational School Directorate on 19.07.2020 in order to conduct the research (25615738940-E2000178948).

Table 4 Occupational Health and Safety Approaches by Risk Levels

Significance	Risk Level	Occupational Health and Safety Approach Against Risk Prevention
Minor Risk (Very Low)	1	There is no need to plan and record the transactions performed to eliminate the risks.
Acceptable Risk Low)	2,3,4,5,6	There is no need for additional control in eliminating the risks, but the existing controls should be continued.
Moderate Risk (Moderate)	8,9,10,12	In order to reduce the risk level, studies should be started and measures should be taken within a few months.
Significant Risk (High)	15,16,20	In order to reduce the risk level, studies should be started within a few weeks. If the identified risk is not serious enough to require stopping the work, the work should be carried out under the control of authorized persons.
Unbearable Risk (Very High)	25	Work should not be started until the risk is minimized, and if there is ongoing work, it should be stopped immediately. If the risk cannot be reduced despite the measures taken, work should be prevented.

3. Results and Discussion

VSHS The hazards identified in this risk analysis study carried out in laboratories and the possible risks that may arise due to these hazards are shown in Table 5. In the analysis form, the activities carried out in the laboratories or which are likely to develop were examined and the common hazards were discussed together. Also in this form; There are reduced risk values if the people exposed to danger, the precautions to be taken, the legislation information about the danger, the persons who are primarily responsible for the prevention of the hazards, the deadline for the corrective and preventive action, and the recommendations about the elimination of the hazards. In this risk analysis study, a total of 150 risks were identified in 6 laboratories, as can be seen in Table 5. If the grading of risk levels is to be made; 90 significant risks and 60 moderate risks were identified.in Table 5, which is presented in the attached file.

When the limited number of risk analysis studies carried out in the literature of these identified risks were examined, a total of 52 risks were determined by Ersoy and Kaya (2019) using the L Type Matrix Method in 6 laboratories of a public university food engineering. These risks; 6 unacceptable risks, 24 high risk, 19 medium risk and 3 acceptable risks were determined [10]. According to these data, 58% of the risks identified are serious risks, while 60% of the risks identified in our study carry a serious risk. The risk levels of the risks identified as a result of the studies are similar. In addition, it shows the necessity of being more careful during the studies since the risk analyzes for the laboratory have high risk levels. In the study of Plüss [11], it has been shown that very serious accidents can occur in universities as well. Besides the direct effect; economic demands, loss of reputation, research, etc. It can also cause other accidents. It is in every organization's interest to do everything reasonably relevant to prevent such accidents. One tool that helps achieve this is LARA risk management. The LARA approach allows risk avoidance to be more accessible than traditional methods. Using this comprehensive method can help people be aware of the risks they face in their experiments and allocate resources in the most appropriate way to prevent accidents. Although the method has limitations, this method has the ability to contribute to a significant improvement in research and teaching [11].

4. Conclusion

With the analysis carried out in Atatürk University VSHS laboratories, risks were tried to be determined by using the L-type matrix method. Suggestions have been made on corrective and preventive actions (CPA) with various alternatives in order to reduce the identified risks to acceptable risk levels. While planning this CAP; national and international legislation and standards were used.

As a result of risk analysis activities, 150 risks were identified, 90 of which were significant risks and 60 were medium-level risks. It has shown that it is necessary to pay attention to issues such as working with chemicals, hygiene, fire, use of hand tools, use of personal protective equipment, working with electricity, trainings in the identified risks. Below are some suggestions for what can be done to create a safe workplace during the studies to be carried out in the laboratory environment.

• Occupational health and safety managers should plan to ensure a positive safety culture. While the plans are being prepared, all parties involved in the realization of production in the workplace should be represented as much as possible,

• By determining the job descriptions of the employees, the probability of being involved in an occupational accident by doing a job that the incompetent employees should not do, should be reduced,

• Persons with professional qualifications should be employed while finding personnel suitable for their job descriptions. In addition, start-up trainings should be carried out so that new people can adapt to the jobs they will work,

• Employees should be provided with personal protective equipment (PPE) that can eliminate the dangers they may be exposed to due to their work, and they should be provided to use PPE while working. The protective equipment delivered to the employees must be delivered with written minutes,

• The trainings should be organized more and more frequently than the durations in the regulations. The content of these trainings should be arranged more intensively and close to practical life,

• Periodic checks of the machinery and equipment to be used should not be interrupted and only authorized persons should be allowed to intervene in the machine in case of malfunction,

• Electrical installation, fire installation, pressure vessels, etc. in the workplace. Periodic checks of the systems should be carried out,

• Work to be done with chemicals should be carried out with as few people as possible. Material safety data sheets of all chemicals should be accessed and a safe working environment should be established. The properties of chemicals should be taken into account in the storage and appropriate storage should be provided,

• If chemicals are transferred from their original containers to different containers, the new containers must be labeled, the properties of the chemical must be written on the labels,

• When working with chemicals, the body and eyes should be placed in laboratories so that emergency response can be carried out in case the chemical splashes on the employees,

• A suitable disposal method must be determined for the wastes generated in the workplace, the wastes must be separated and stored,

• Hygienic areas should be created throughout the workplace in order to keep employees away from infectious agents. It should be ensured that not only the working areas but also the employees are knowledgeable about personal hygiene and give importance to hygiene,

• Emergency action plans should be prepared on what to do in case of an emergency in the workplace. It should be ensured that emergency exits are marked appropriately in the plans and not kept locked. Deficiencies should be detected

and deficiencies should be eliminated by performing exercises at a frequency not less than once a year,

• Arrangements should be made to enable all devices and systems in the laboratory to be used by disabled people. If there are disabled employees and students in the laboratory, disabled companions should be determined while preparing emergency action plans so that these people can be evacuated easily in case of emergency.

Ethics Approval

In order to carry out the research, written permission was obtained from Atatürk University Health Services Vocational School Directorate on 19.07.2020 (25615738940-E2000178948).

Declaration of Conflict of Interest

Authors declare that they have no conflict of interest with any person, institution, or company.

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Appendix 1: Risk Analysis Form

Table 5 Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation	P
1	General operation	Ambient measurements	No ambient measurements	Work accident and occupational diseases	4	5	20 (High) Significant Risk	Employees, Students, Visitors	Before starting to work in the laboratory, noise, dust, lighting, organic volatile matter, radioactive material, etc. ambient measurements.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1
2	Working with pressure vessels	Cleaning of areas where pressure vessels are located	Fire	Injury, death	4	5	20 (High) Significant Risk	Employees, Students, Visitors	The areas where the pressure vessels are located should be kept clean and tidy, flammable materials should not be kept. Smoking is strictly prohibited in these areas.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1
3	General operation	Naturel gas	Highly flammable and explosive when mixed with air	Fire, explosion, injury, death	4	5	20 (High) Significant Risk	Employees, Students, Visitors	Natural gas leak detection systems should be available.	Regulation on the Protection of Employees from the Hazards of Explosive Environments	1
4	Working with pressure vessels	Pressure vessels	Explosion of expansion tanks	Injury, death	4	5	20 (High) Significant Risk	Employees, Students, Visitors	Pressure vessels should be checked annually by authorized engineers legally and control reports should be kept. In addition, pressure vessels should not be used until the deficiencies and nonconformities specified in the control reports are eliminated.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1
5	Working with laboratory equipment	Use of PPE	Not using PPE when using laboratory equipment	Work accident, occupational disease	4	5	20 (High) Significant Risk	Employees, Students	PPE suitable for the job should be used.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1
6	Working with laboratory equipment	Lack of body grounding of laboratory devices	Electrical leakage in the bodies of laboratory equipment	Injury, death	4	5	20 (High) Significant Risk	Employees, Students	Body grounding of electrically operated devices and periodic inspection is required.	Electrical Indoor Facilities Regulation, Regulation on Health and Safety Conditions in the Use of Work Equipment	1
7	Working with laboratory equipment	Energy cables of laboratory devices	Stripped of insulation of cables, exposed connection points	Electric shock, fire, death	4	5	20 (High) Significant Risk	Employees	The power cables of all electrical devices must be properly insulated and the connection points must be properly insulated	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1
8	Working with laboratory equipment	Emergency stop button	There is no emergency stop button in laboratory equipment or its location is not accessible	Injury, death	4	5	20 (High) Significant Risk	Employees	Emergency stop buttons of devices must always be kept in working condition..	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments	1

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
9	General operation	Electric	Electric shock, fire from open junction boxes	Injury, death	4	5	20 (High) Significant Risk	Employees, Students, Visitors	Open junction boxes should not be kept in laboratories.	Electrical Indoor Facilitie Regulation
10	Electric panels	Electrical energy out of control due to leakage current	Electric shock due to leakage current	Injury, death	4	5	20 (High) Significant Risk	Employees, Students, Visitors	It should be ensured that residual current relays are installed. Periodic checks should be made with the electrical installation once a year to determine how many ms they fired, and a conformity report should be obtained	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachmen
11	Employees	Display gadgets	Long-term work with display tools	Occupational disease	4	4	16 (High) Significant Risk	Employee working with display tools	Those who work with screened tools should work by taking breaks at regular intervals.	OHS Law No. 6331
12	Storage	Stack height of stored materials	Extremely high material stacking	Work accident, material loss as a result of material overturning	4	4	16 (High) Significant Risk	Employees, Students, Visitors	High material stacking should not be done. It should also be stored in accordance with the types of materials.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachmen
13	General operation	Drinking and utility water	Lack of chemical and bacteriological analysis of drinking and utility water	Infection	4	4	16 (High) Significant Risk	Employees, Students, Visitors	Analysis of drinking and utility water is done. Analysis results of packaged waters are also examined and documented.	Regulation on Health and Safety Conditions in the Use of Work Equipment
14	Employees	Personnel who have not received OHS training	Occupational accident due to lack of education	Occupational disease, work accident	4	4	16 (High) Significant Risk	Employees, Students, Visitors	OHS trainings are completed within the required legal periods according to the hazard class of the employees.	6331, Regulation on the Procedures and Principles of OHS Training of Employees
15	Employees	Personnel who have not received on-the-job training	Occupational accident due to lack of education	Occupational disease, work accident	4	4	16 (High) Significant Risk	Employees, Students, Visitors	If the employees are just starting to work, they should not start the job they will be assigned without completing their induction training.	6331, Regulation on the Procedures and Principles of OHS Training of Employees
16	General operation	Glass surfaces	Breakage of glass surfaces	Injury, death	4	4	16 (High) Significant Risk	Employees	On glass surfaces; cracks, cracks, etc. occurs, it should be replaced with a solid one without delay. In case of glass breakage, the glass pieces are cleaned immediately and the risk of work accidents in the environment is minimized.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
17	Welding operation	Fire	Welding work near flammable and combustible materials	Work accident, explosion, fire	3	5	15 (High) Significant Risk	Employees, Students, Visitors	No flammable materials should be kept near the welding area.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
18	Welding operation	Electric	No grounding	Electrocution	3	5	15 (High) Significant Risk	Employees	It should be worked with grounded welding machines.	Electrical Internal Facilities Regulation, Regulation on Health and Safety Conditions in the Use of Work Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
19	Welding operation	Action space	Toxic gases released as a result of welding in closed rooms such as the workshop environment	Respiratory illness, poisoning	3	5	15 (High) Significant Risk	Employees	If possible, welding works are done outdoors. Ventilation equipment should be used in indoor work.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
20	Working with pressure vessels	Non-compliance with the safety instruction	Interfering with the oxygen cylinders with oily hands and gloves	Work-related injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Work should be done in accordance with the instructions.	Regulation on Health and Safety Conditions i the Use of Work Equipment
21	Working with pressure vessels	Transported materials	Dangerous handling of compressed gas cylinders	Work-related injury	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Tubes should be handled in accordance with the instructions.	Regulation on Health and Safety Conditions i the Use of Work Equipment
22	Working with pressure vessels	Storage	The cylinders are not stored in the open area and in accordance with the legal regulations	Work-related injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Cylinders should be stored in accordance with legal regulations. Full and empty cylinders should be stored separately. Materials should be stored in accordance with their qualifications.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
23	Working with pressure vessels	Machine use and safety instruction	Failure to use flame backfire and leakage valve in the hose of compressed gas cylinders	Work-related injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Cylinders must be fitted with a check valve.	Regulation on Health and Safety Conditions i the Use of Work Equipment
24	Working with pressure vessels	Unsafe acts	Heating LPG cylinders with a torch in cold weather	Work accident, explosion, fire	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Work should be carried out in accordance with the safety instructions.	Regulation on Health and Safety Conditions i the Use of Work Equipment
25	Compresso r use	Machine failure	Explosion due to unsafe use of high pressure compressor	Machine failure, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	The presence of compressor safety must be constantly checked. Periodic checks should not be interrupted.	İş Ekipmanlarının Kullanımında Sağlık ve Güvenlik Şartları Yönetmeliği
26	Compresso r use	Machine failure	Breaking, tearing, bursting, abrasion of high pressure hoses	Machine failure, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Damaged machines should be used after repair.	Regulation on Health and Safety Conditions i the Use of Work Equipment
27	Electric cable use	Electric	Running electrical cables through open spaces	Electrocution , injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Electric cables must be carried above the ground and in the pan.	Electrical Indoor Facilities Regulation, Regulation on Health and Safety Conditions i the Use of Work Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
28	Electric cable use	Electric	Using electrical cables on wet ground / in water	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Electric cables must be carried above the ground and in the pan.	Electrical Indoor Facilities Regulation
29	Electric cable use	Electric	Use of electricity with unplugged open-ended cables	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It should not be used in electrical energy devices with open-ended cables without plugs.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment
30	Electric cable use	Electric	Using unsuitable / damaged plugs and sockets	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Damaged sockets should be used after necessary repairs.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment
31	Electric cable use	Electric	Electric shock from working with old frayed and attached cables	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Old and worn cables should be used after necessary repairs.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment
32	Working with electricity	Lack of vocational training	Handling of employees who are not competent with electrical work	Work accident due to lack of vocational training	3	5	15 (High) Significant Risk	Employees	Personnel without professional qualifications should not be employed and it should be ensured that employees other than the assigned personnel do not interfere with electrical failures	Regulation on the Vocational Training of Persons to be Employed in the Dangerous and Very Dangerous Classes
33	Working with electricity	Electric	Not placing an insulating mat in front of the electrical panel	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Insulating mats should be placed in front of the panel.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment
34	Working with electricity	Electric	Electrical panel covers are not locked	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Covers of electrical panels should be kept locked. The contact information of the personnel who will respond in an emergency should be hung on the boards.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment
35	Working with electricity	Storage	Material storage in electrical panels	Injury due to work accident	3	5	15 (High) Significant Risk	Employees, Students, Visitors	No material should be placed inside the electrical panels.	Electrical Indoor Facilities Regulation
36	Working with electricity	Electric	Using an uninsulated and non-covered outlet	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Insulated and capped cables should be used.	Electrical Indoor Facilities Regulation, Regulation on Health an Safety Conditions in the Use of Wor Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
37	Working with electricity	Storage	Conductive materials around electrical panels storage	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Conductive materials should not be kept near the panel.	Electrical Indoor Facilities Regulation, Regulation on Health Safety Conditions in the Use of W Equipment
38	Working with electricity	Electric	Failure to perform periodic checks of electrical devices	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Periodic checks should be made regularly.	Electrical Indoor Facilities Regulation, Regulation on Health Safety Conditions in the Use of W Equipment
39	Night Studies	Action space	Use of alcohol or drugs during night work	Work-related injury, death	3	5	15 (High) Significant Risk	Employees	Employees who take alcohol and drugs should not be taken to the laboratory.	Labor Law No. 4857
40	Spiral use	Action space	Hand, foot, etc. of the employee's body. cutting off regions	Work-related injury, death	3	5	15 (High) Significant Risk	Employees	Machine guards and the use of PPE should be provided.	Regulation on Health and Safet Conditions in the Use of Work Equipment
41	Electric cable use	Fire	Cable fire as a result of drawing too much current to the cable	Electrocution, injury, death	3	5	15 (High) Significant Risk	Employees	Multiple sockets should not be preferred to prevent fires and enough fire extinguishers should be placed in the laboratory.	Electrical Indoor Facilities Regulation, Regulation on Health Safety Conditions in the Use of W Equipment
42	Working at height when changing lighting elements	Height	Fall due to carelessness	Injury from falling from height	3	5	15 (High) Significant Risk	Employees	No work is done at height without taking the necessary precautions.	Regulation on Health and Safet Measures to be Taken in Workpla Buildings and Attachments
43	Emergency teams	Emergency	Lack of emergency teams	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Employer; Up to 30 employees in workplaces in the very dangerous class, 40 employees in the workplaces in the dangerous class, and 50 employees in the workplaces in the less dangerous class, as determined in the Communiqué that determines the hazard classes in the workplaces; A) Search, rescue and evacuation, b) Firefighting, assigns at least one specially trained and appropriately equipped employee as support staff for each of its subjects. If there are more employees in the workplace, it assigns one more support person for every 30, 40 and up to 50 employees according to the hazard class.	Regulation on Emergencies at Workplaces

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
44	Lighting	Emergency	No emergency lighting	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	In case of emergency, escape routes should be properly illuminated.	Regulation on Fire Protection of Buildings
45	Emergency exits	Emergency assembly area	Lack of emergency assembly area	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	During an emergency, the appropriate gathering area where employees, students, visitors can be protected from the dangers of the emergency should be determined and indicated with a sign. The location of the emergency assembly area should be indicated on the emergency plan.	Regulation on Emergencies at Workplaces
46	Emergency exits	Lack of emergency escape routes	No emergency escape stairs	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It is necessary to have a sufficient number and appropriate type of emergency escape stairs in the building.	Regulation on Fire Protection of Buildings
47	Emergency exits	Lack of emergency escape routes	Emergency exit doors not opening in the exit direction	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It is essential that the wings of the escape route doors do not hinder the movement of the users and that the exit doors in the places where the number of users exceed 50 people should be opened towards the escape direction.	Regulation on Fire Protection of Buildings
48	Emergency teams	Emergency	Failure to conduct emergency drills	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	An emergency drill should be conducted at least once a year.	Regulation on Emergencies at Workplaces
49	Emergency teams	Failure to provide first aid	Lack of trained first aid personnel	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	1 person for every 20 people in the less dangerous class, 1 person for every 15 people in the dangerous class, and 1 person for every 10 people in the very dangerous class should receive certified first aid training.	First Aid Regulation
50	Emergency plan	Emergency	No contingency plan	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	The emergency plan should be prepared for all workplaces, starting from the design or establishment phase, by following the stages of identifying emergencies, taking preventive and limiting measures for their negative effects, determining the persons to be assigned, establishing emergency response and evacuation methods, documentation, drills and renewal of the emergency plan.	Regulation on Emergencies at Workplaces

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
51	Fire fighting team	Fire	The firefighting team is untrained	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Firefighting team members should be trained in cooperation and organization with the Fire Brigade by making use of the local fire brigade and civil defense organizations, and their knowledge and skills should be increased with the drills.	Regulation on Fire Protection of Buildings
52	Search and rescue team	Emergency	Untrained search and rescue team	Failure to perform safe evacuation during an emergency	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Firefighting team members should be trained in cooperation and organization with the Fire Brigade by making use of the local fire brigade and civil defense organizations, and their knowledge and skills should be increased with the drills.	Regulation on Fire Protection of Buildings
53	Maintenance and repair activities	Ignition of oil mist	Flash, fire	Injury, death	3	5	15 (High) Significant Risk	Employees	Lighting should be 24volt, ventilation fans should work	Regulation on Fire Protection of Buildings
54	Maintenance and repair activities	Working at height	Material falling during working at height	Injury, death	3	5	15 (High) Significant Risk	Employees	PPE (hard hat) should be used and appropriate markings should be made in the dangerous area.	Health and Safety Signs Regulation
55	Lightning protection	Thunderbolt	Lack of thunderbolt protection device	Fire, electric shock, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	In order to protect buildings against lightning danger, it is essential to fulfill the requirements of the relevant regulations and standards. Adequate connection must be provided so that the electrical charge can be transmitted to the ground without posing a risk to the building or other installations within the building.	Regulation on Fire Protection of Buildings
56	Fire extinguishing systems	Fire	Inadequate fire suppression systems	Failure to respond to fire, material damage, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It is necessary to have a sufficient number of fire extinguishers and fire cabinets. Next to the electrical panel, there should be a carbon dioxide fire extinguisher, system rooms and fire extinguishers for the laboratory that do not harm the devices.	Regulation on Fire Protection of Buildings
57	Fire extinguishing systems	Lack of markup	Failure to show the locations of fire extinguishing systems	Failure to respond to fire, material damage, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Locations of fire extinguishers should be indicated with signs.	Regulation on Fire Protection of Buildings
58	Fire extinguishing systems	Lack of periodic checks	Failure to make periodic checks of the fire extinguishing system	Failure to respond to fire, material damage, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It is necessary to check the fire extinguishers and fire cabinets and other fire extinguishing systems at least once a year.	Regulation on Fire Protection of Buildings

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
59	Fire extinguishing systems	Fire	Inaccessibility of fire extinguishing systems	Failure to respond to fire, material damage, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It must be ensured that fire extinguishing systems are always accessible.	Regulation on Fire Protection of Buildings
60	Fire detection systems	Fire	Failure to perform periodic checks of the fire detection system	Failure to respond to fire, material damage, injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Periodic checks of fire detection systems should be done at least once a year.	Regulation on Fire Protection of Buildings
61	Storage of flammable liquids	Fire	Flammable and combustible liquids are not stored under appropriate conditions.	Fire, flash, explosion	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Flammable and combustible liquids should be stored in appropriate conditions (ventilation, temperature, unauthorized access, fire detection and extinguishing).	Regulation on Fire Protection of Buildings
62	Air conditioning systems	Air conditioning	No smoke evacuation system	Failure to perform safe evacuation during fire	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It is necessary to ensure that the smoke and hot gases emitted during the fire go out of the building by themselves or are forced out by mechanical means.	Regulation on Fire Protection of Buildings
63	General operation	Cleaning	The lids of the garbage cans are open and there are no garbage bags	Infection	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Cleaning should be done regularly, employees should be informed, garbage cans should be covered, pedaled and bagged. Employees must use gloves.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
64	Cleaning	Chemical cleaning agents used in general cleaning	Poisoning damage to eyes skin contact damage to respiratory organs	Health problems, chemical exposure, death	3	5	15 (High) Significant Risk	Employees	While cleaning, one should not stay indoors for a long time, and the use of more than one chemical by mixing should be avoided. Masks should be used when using chemicals. Chemicals should be out of reach of children. MSDS information should be provided to employees. Chemicals should not be placed in unlabeled bottles. In addition, the lids of chemicals should not be left open for a long time.	Regulation on Safety Data Sheets Regarding Harmful Substances and Mixtures
65	General operation	Chemical products	Penetration of chemical products into the body through the mouth, skin or inhalation	Chemical poisoning	3	5	15 (High) Significant Risk	Employees, Students, Visitors	It should be ensured that chemicals are used in accordance with theirSDS.	Regulation on Safety Data Sheets on Hazardous Substances and Mixtures
66	General operation	Fire	Failure to determine the first to be rescued in a fire	Burning of important documents in fire	3	5	15 (High) Significant Risk	Employees	The first materials to be saved in a fire should be determined.	Regulation on Fire Protection of Buildings
67	General operation	Fire	No fire instructions	Failure to respond to the fire in a timely manner, wrong intervention	3	5	15 (High) Significant Risk	Employees	Fire instructions should be prepared and posted in appropriate places.	Regulation on Fire Protection of Buildings

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
68	Entry-exit to the laboratory	Working in the lab	Presence of uninsured and unauthorized persons in the laboratory	Unexpected accident, injury	3	5	15 (High) Significant Risk	Employees, Students, Visitors	All employees who come to work in the laboratory are insured and a supervisor who knows the field is accompanied by visitors while they are walking around the field.	Labor Law No. 4857
69	Entry-exit to the laboratory	OHS instruction	Non-compliance of the people entering the laboratory	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Employees and visitors who will enter the laboratory should be given instructions and necessary information regarding occupational safety.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
70	Field layout	Nature of stored materials	Stacking of flammable, cutting, conductive materials near the power line	Work-related injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Stored materials should be classified according to their interactions with each other, and materials that will not react should be placed side by side.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
71	Field layout	Lack of warning signs	Lack of information identifying the stacked material	Work-related injury, death	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Summary MSDSs should be posted on the stored materials.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
72	Field layout	Material stacking	Stacking of flammable materials in hot working areas within the working area	Fire	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Material is sorted and stacked according to the type of material during storage.	Regulation on Fire Protection of Buildings
73	Personal protective equipment	Improper personal protective equipment	Use of worn and unprotected personal protective equipment	Unexpected accident, injury	3	5	15 (High) Significant Risk	Employees	Employees should be provided with robust and appropriate personal protective equipment.	Regulation on Health and Safety Conditions in the Use of Work Equipment
74	Information and Education	Lack of vocational training	Lack of work at height vocational training of personnel working at height	Work accident due to lack of education	3	5	15 (High) Significant Risk	Employees	Work at height training is given to the employees according to the requirements of the job they will do.	Regulation on the Vocational Training of Persons to be Employed in the Dangerous and Very Dangerous Classes
75	Health	Lack of periodic health checks	The health of the working person is not suitable for the job	Unexpected accident, injury	3	5	15 (High) Significant Risk	Employees	Personnel whose health conditions are not suitable for the job to be worked should not be periodic controls should be made.	Occupational Health and Safety Law No. 6331
76	Health	Infectious diseases	Failure to vaccinate employees against infectious diseases	Infectious diseases	3	5	15 (High) Significant Risk	Employees	Vaccinations against communicable diseases should be ensured and the protection period of vaccines should be followed to ensure continuous protection of employees against communicable diseases.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
77	Field observation	Lack of control	Lack of field supervision	Unexpected accident, injury	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Field inspections should be carried out, deficiencies should be notified to the employer with field observation reports.	Occupational Health and Safety Law No. 6331

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
78	Laboratory studies	Laboratory hygiene	Lack of hygiene	Infection	3	5	15 (High) Significant Risk	Employees, Students, Visitors	Laboratory benches should be covered with water-proof and disinfectant-resistant, easy-to-clean materials. After working in the laboratory, the working environment should be cleaned and disinfected to prevent contamination.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
79	Laboratory studies	Laboratory hygiene	Lack of hygiene	Infection	3	5	15 (High) Significant Risk	Employees, Students	There should be sinks where every employee in the laboratory can wash their hands, and the necessary hygiene conditions should be provided in these sinks. Hand washing instructions should be prepared and posted on the sides of the sink to be followed at the end of the work or when leaving the laboratory.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
80	Laboratory studies	Eye and body shower	Lack of eye and body shower	Infection, injury	3	5	15 (High) Significant Risk	Employees, Students	In all laboratories, eye wash and body shower must be actively usable and marked so that everyone can see it. Clean water and waste water connections must be made and actively usable.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
81	Laboratory studies	Working with cutting tools	Failure to take necessary precautions while working with sharp tools	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	Opening of sharp or penetrating tools or equipment should be prevented and it should be ensured that they are kept in a protective cover. Sharp or piercing tools or equipment should be checked at appropriate intervals before and after use.	Regulation on Health and Safety Conditions in the Use of Work Equipment
82	Laboratory studies	Use of laboratory equipment	Unsafe use of laboratory equipment	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	Turkish user manuals should be obtained from the manufacturer for the devices and the machines should be used in accordance with this manual. The user manuals of the devices provided by the manufacturer are correct and safe for use, maintenance, etc. Additional instructions for use should be provided in cases where it is considered not sufficient to obtain information on the subject.	Regulation on Health and Safety Conditions in the Use of Work Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
83	Laboratory studies	Use of laboratory equipment	Unsafe working with laboratory equipment	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	It should be ensured that special devices, hand tools or technical apparatus are used only by specially trained employees and by taking the necessary precautions. Laser-operated devices, hand tools or technical apparatus should only be used by specially trained employees by using the necessary PPE, avoiding the exposure of themselves and other employees to the rays, and taking the necessary precautions.	Regulation on Health and Safety Conditions in the Use of Work Equipment
84	Laboratory studies	Working with fume hoods	Unsafe operation with fume hoods	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	Periodic maintenance of fume hoods should be done. The performance of fume hoods should be checked with measurements and their filters should be cleaned when necessary. In cases where fume hoods are not used, such as for maintenance or calibration, a label stating that fume hoods are not used should be affixed. There should be an existing air flow indicator on the fume hood.	Regulation on Health and Safety Conditions in the Use of Work Equipment
85	Laboratory studies	Working with chemicals	Unsafe working with chemicals	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	The markings on all chemical containers must comply with the relevant legislation. It should be ensured that non-hazardous or less hazardous chemicals are used instead of hazardous chemicals, and that non-hazardous or less hazardous chemicals are always purchased when purchasing. It should be ensured that safer chemicals (e.g. in liquid or granular form) are used instead of chemicals with physical properties (e.g. in spray or powder form) that can seriously threaten the health of workers, and this preference should be checked at every purchase.	Regulation on Health and Safety Conditions in the Use of Work Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
86	Laboratory studies	Working with chemicals	Unsafe working with chemicals	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	Employees should be informed not to use dangerous chemicals that do not have a manual suitable for laboratory conditions or for which the instructions for use have not been prepared yet. Storage conditions of chemical substances are followed, these materials should be stored away from heat, light and other materials.	Regulation on Health and Safety Conditions in the Use of Work Equipment
87	Laboratory studies	Working with chemicals	Unsafe working with chemicals	Work accident, injury	3	5	15 (High) Significant Risk	Employees, Students	Chemicals containing oxide components are renewed at certain times, and those whose shelf life has expired should be disposed of according to the rules. All chemical containers should be kept closed. Special procedure should be applied in accordance with the legislation regarding the removal of chemicals. When working with chemicals, fume hood should be used. Substances whose exposure limit value is determined in the relevant legislation should be checked periodically with workplace environment measurements.	Regulation on Health and Safety Conditions in the Use of Work Equipment, Regulation on Health and Safety Precautions in Working with Chemicals
88	Laboratory studies	Studies with biological agents	Unsafe work with biological agents	Work accident, infection, occupational disease	3	5	15 (High) Significant Risk	Employees, Students	Necessary organizational arrangements should be made to keep the number of employees who are or may be exposed to biological factors as low as possible. Work processes and technical control measures should be arranged in such a way as to prevent the spread of biological agents or to ensure their minimum presence in the environment. It should be ensured that medical and biological wastes are safely collected, stored and removed from the workplace, and safe and special containers should be used after they have been processed appropriately when necessary.	Regulation on Health and Safety Conditions in the Use of Work Equipment, Regulation on Prevention of Exposure Risks to Biological Factors

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
89	Fire	Pressure vessels	Unsafe use of pressure vessels	Fire, explosion, injury, death	3	5	15 (High) Significant Risk	Employees, Students	Considering the characteristics of the gas used, all electrical installations such as tables, switches, sockets, pipes should be designed and installed in accordance with the relevant regulations and relevant standards. The main shut-off valve, which will cut the gas in case of any danger in the rooms where gas cylinders are located and the devices where they are used, and the main circuit breaker and main electrical panel to cut the electrical current should be located in an easily accessible place, except for the environments where the gas cylinders are located and used.	Regulation on Health and Safety Conditions in the Use of Work Equipment, Regulation on Fire Protection of Buildings
90	General operation	Use of laboratory equipment	Lack of device operating instructions	Work accident, injury, death	3	5	15 (High) Significant Risk	Employees, Students	Instructions for use of all working devices should be prepared and hung near the device where employees can see them.	Regulation on Health and Safety Conditions in the Use of Work Equipment
91	General operation	Air volume	Insufficient air volume per person	Infection, occupational disease	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	The air volume per person is above $10m^3$. Shift system should be provided.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
92	Soyunma Yeri	Lack of hygiene	Lack of lockers	Infection	3	4	12 (Middle) Moderate Risk	Employees	A hygienic environment should be created by having two separate compartments or two separate clothes cabinets next to each other in order to store work clothes and external clothes in separate places in places where they work with damp, dusty, dirty, dangerous substances and similar works.	Safety and Health Signs Regulation
93	Toilets, sinks, showers	Storage	Outdoor storage of cleaning supplies in toilets, sinks, showers	Infection	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Cleaning materials should not be stored outdoors in toilets, sinks and showers. It should not be used under sinks for storage. Separate cabinets should be provided for storage outside the Toilets, Sinks and showers.	Safety and Health Signs Regulation
94	General operation	Glass, metal, etc. with pointed corners. surfaces	Glass, metal, etc. with pointed corners. hitting surfaces	Injury, death	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Protective measures should be taken against sharp-edged objects or devices. Dangerous objects should be removed. Sharp corners should be covered with protectors.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
95	General operation	Blinds curtains	Biological risks from dusty and dirty blinds	Infection, allergy	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Jalousie curtains should be cleaned at regular intervals to prevent the formation of allergies and infections.	Safety and Health Signs Regulation, Hygiene Regulation
96	Prolonged sitting	Office equipment	Failure to comply with ergonomic rules	Waist and neck ailments	3	4	12 (Middle) Moderate Risk	Employees	Rest and office equipment should be ergonomic. In addition, in the studies performed at the screen, 5-10 minutes should be taken for each hour, the eyes should be rested, and one should get up and move from the sitting position.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
97	General operation	Office equipment	Not fixing shelves, cabinets	Injury, death	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Shelves and cabinets must be fixed to the wall and at the appropriate height. Precautions should be taken to prevent material from falling from the shelves, the material of the shelf should not be glass. Measures should be taken to prevent glass materials placed in cabinets and shelves from falling and harming users.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
98	Laboratory	Spraying laboratories	Not fixing shelves, cabinets	Disease transmission, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Regular spraying and trap installation throughout the laboratories, etc. These pests should be prevented from being present in the building and its immediate surroundings.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
99	General operation	Working indoors	Painting indoors	Occupational disease	3	4	12 (Middle) Moderate Risk	Employees	Adequate ventilation should be provided in the closed areas to be painted, and then the painting process should be started.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
100	General operation	Working indoors	Diseases transmitted through the respiratory tract	Disease transmission, death	3	4	12 (Middle) Moderate Risk	Employees	In case of an infectious disease through the respiratory tract, ventilation and air conditioning systems should not be operated in the working area, natural ventilation should be used. The risk of transmission should be prevented by maintaining social distance between employees. Mask, visor, protective clothing, etc. It should be studied using PPE. As much as possible, work should be carried out in digital media. Office equipment used should be cleaned frequently.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
101	General operation	Working indoors	Painting indoors	Occupational disease, fire	3	4	12 (Middle) Moderate Risk	Employees	Paint will not be done alone in closed areas, there must be an observer. While painting in closed areas, the area will be sufficiently illuminated and 24 Volt electricity should always be used for lighting.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments k
102	Laboratory	Facade cladding	Cracking, falling of the facade cladding	Injury, death, property damage	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	As a result of improper mounting of the facade cladding material on the walls, breaks occur from time to time and this sharp-edged material falls to the ground. Falling material may cause serious injury to employees, students and visitors around the building. For this reason, it should be ensured that this material is installed securely against replacement or falling. Otherwise, there is a risk of accident.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments k
103	Air conditioners	Air conditioner outdoor units	Being open and low around the air conditioner outdoor units	Injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	The perimeter of the air conditioner outdoor units located outside the building is wire mesh, etc. should be closed and people's access to this area should be prevented.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments k
104	System rooms	Cooling of system rooms with air conditioner	Overflow of air conditioner waste water from the container	Electric shock, fire, property damage	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Waste water of air conditioners in system rooms and laboratories should be given to the sewer system, and overflow pools can be built to prevent overflows that may occur if they are placed in a container. Otherwise, the devices may be damaged by waste water and incidents may occur that may result in electric shock to employees.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments k
105	General operation	Unused devices	Hazards that may occur due to out-of-use	Work accident	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	For unused and broken devices, faulty device or unused device warning signs are made to reduce the risk of accidents that may arise from these devices.	Safety and Health Signs Regulation

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation	
106	General operation	Subcontract or service procurement	Failure of the companies to fulfill their legal responsibilities in terms of occupational health and safety.	Legal losses, labor and workday losses, material losses	3	4	12 (Middle) Moderate Risk	Employees	Necessary measures should be taken in terms of occupational health and safety in service procurement from subcontractors. Contract clauses regarding the occupational health and safety of the employees of the other party should be prepared in outsourcing services. The documents related to the occupational health and safety trainings, assignments of employee representatives/occupational health and safety supervisors, and health examinations of the subcontractor employees who will take part in the works to be carried out within this scope should be checked and included in the contract. Who will provide the personal protective equipment should be specified in this contract and it should be complete. sağlanmalıdır.	Occupational Health and Safety Law No. 6331	1
107	General operation	Orientation training	Failure to receive orientation training	Work accident, injury, death	3	4	12 (Middle) Moderate Risk	Employees	When the employees are new to the job, first of all, the on-boarding training (orientation training) in which the field and equipment they will work in is introduced. Personnel who receive this training should be provided with occupational health and safety basic training as soon as possible.	Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees	1
108	General operation	Job descriptions	Employees not having job descriptions and being employed in a job other than job description	Work accident, injury, death	3	4	12 (Middle) Moderate Risk	Employees	Job descriptions of all personnel are made in detail, on-the-job training is given about the job to be done, and they should not be employed in a job that requires expertise other than the job description.	Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees	1
109	General operation	Use of mercury equipment	Release of mercury as a result of damage to mercury equipment	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	Mercury-free equipment should be preferred. The wastes in the environment should be stored safely and removed from the environment without creating any risk. Stored waste must be recycled.	Regulation on the Protection of Buildings	1
110	General operation	Fluorescent materials and equipment	Not storing fluorescent waste in a separate place (box)	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	The wastes in the environment should be stored safely and removed from the environment without creating any risk.	Regulation on the Protection of Buildings	1

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
111	General operation	Harmful chemicals	Spillage of harmful chemicals	Unexpected accident, injury, poisoning	3	4	12 (Middle) Moderate Risk	Employees	The spread of harmful chemicals should be prevented by using spill and spill kits suitable for the types of harmful chemicals. Employees' spill spill kit etc. They should be informed about the spread of chemicals and exercises should be done about their use.	Regulation on the Protection of Buildings
112	General operation	Indicator marking	Maximum working pressures not indicated with signs on all gauges	Unexpected accident, injury, poisoning	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Appliances, pressure vessels, temperature etc. By marking the maximum operating values of the indicators for that device, an early warning is made for dangerous works.	Regulation on Health and Safety Conditions in the Use of Work Equipment
113	Disabled employment	Markings for disabled employees	No markings for disabled employees	Work accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	It should be ensured that a warning strip is applied at the beginning and ends of the stairs, interior stairs, ramps at the entrance of the building, a warning surface should be applied in front of and behind the building entrance door, and this surface should be connected with a guide track until the consultation.	Communique on Procedures and Principles Regarding Employment of Disabled, Ex-Convicts and Victims of Terrorism, TS91111 Standard
114	Disabled employment	Elevation difference	Finding the level difference between the building and its surroundings	Work accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Eliminating the level difference (maximum 0.6 cm according to TS 9111) at the building entrance, WC entrances and room entrances, reducing the slope of the existing ramp at the building entrance (if the maximum height is 100 cm according to TS 91111, the maximum slope is 5%) to 5% must be provided.	Communique on Procedures and Principles Regarding Employment of Disabled, Ex-Convicts and Victims of Terrorism, TS91111 Standard
115	Disabled employment	Platforms	Inappropriate ramps and platforms in and around the building	Work accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	It should be ensured that the floors that cannot be accessed by elevator are accessed by a platform or ramp for the disabled, and the slope of the existing ramp at the entrance of the building (if the maximum height is 100 cm according to TS 91111, the maximum slope is 5%) should be reduced to 5%.	Communique on Procedures and Principles Regarding Employment of Disabled, Ex-Convicts and Victims of Terrorism, TS91111 Standard
116	Disabled employment	Usage areas of disabled people in and around buildings	The use of disabled people in and around the buildings is not in accordance with the standards	Work accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	In the disabled toilets in the building, there are toilet bowls, washbasins, disabled WC entrance doors, etc. It should be ensured that it is designed in accordance with the TS 91111 standard.	Communique on Procedures and Principles Regarding Employment of Disabled, Ex-Convicts and Victims of Terrorism, TS91111

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
117	Personal Protective Equipment	Use of PPE	PPE without CE certificate	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	Employees are provided with CE certified personal protective equipment. It should be used for its intended purpose.	Regulation on Health and Safety Conditions in the Use of Work Equipment
118	Information and Education	Lack of education	Site hazards of visitors lack of knowledge about	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Visitors who will enter the laboratory should be informed about occupational safety.	Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees
119	Personal Protective Equipment	Cleaning	Failure to maintain and clean the personal protective equipment used by the employee	Disease	3	4	12 (Middle) Moderate Risk	Çalışanlar	Employees must use their own PPE and keep it clean.	Regulation on Health and Safety Conditions in the Use of Work Equipment
120	Field Layout	Material stacking	As a result of stacking in dark areas, materials falling on employees, rolling	Work accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	The areas where the material is stacked should be illuminated.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
121	Laboratory	Arrangement, order	As a result of the messy and unorganized laboratory, tripping, falling	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Laboratories should also be kept orderly in order not to cause work accidents.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
122	General operation	Weather conditions	Thermal conditions are not suitable for operation	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	It should be ensured that the employees work in accordance with the thermal conditions.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
123	General operation	Noise	Exposure of personnel to loud noise	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	Employees in noisy environments should use ear protection.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
124	General operation	Tobacco products	Smoking in areas with flammable materials	Fire, injury	3	4	12 (Middle) Moderate Risk	Employees	Tobacco products are not used in areas where flammable materials are present.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
125	General operation	Lighting	Insufficient or excessive lighting	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	Adequate lighting should be provided in laboratories.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
126	General operation	Medicine cabinet	Absence of medicine cabinet or lack of contents	Unexpected accident, injury	3	4	12 (Middle) Moderate Risk	Employees	Medicine cabinets with necessary medicines should be available in the laboratory.	First Aid Regulation

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
127	Hand Tool Use	Unsafe acts	Leaving power tools running	Work-related injury	3	4	12 (Middle) Moderate Risk	Employees	No power tool should be left running.	Regulation on Health and Safety Conditions in the Use of Work Equipment
128	Hand Tool Use	Working with hand tools	Unsuitable hammer, cuts, etc. using hand tools	Work-related injury	3	4	12 (Middle) Moderate Risk	Employees	Do not work with unsuitable hand tools, damaged hand tools should be used after they are repaired.	Regulation on Health and Safety Conditions in the Use of Work Equipment
129	Hand Tool Use	PPE	Splash of parts when using hand tools	Work-related injury	3	4	12 (Middle) Moderate Risk	Employees	PPE should be used.	Regulation on the Use of Personal Protective Equipment at Workplaces
130	Hand Tool Use	Machinery protective equipment	Cut formation as a result of the use of hand tools without protective cover	Work-related injury	3	4	12 (Middle) Moderate Risk	Employees	While using hand tools, it should be worked with the protectors attached.	Regulation on Health and Safety Conditions in the Use of Work Equipment
131	Welding studies	PPE	Inadequate personal protective equipment in welding works	Work-related injury	3	4	12 (Middle) Moderate Risk	Employees	PPE suitable for the work should be used.	Regulation on the Use of Personal Protective Equipment at Workplaces
132	Laboratory studies	Test rigs	Failure to control experimental setups	Work-related injury, death	3	4	12 (Middle) Moderate Risk	Employees, Students, Visitors	In order to prevent accidents during the experiments, the test setup should be checked, if there are any problems, the actual test studies should be carried out after they are detected and precautions are taken.	Regulation on Health and Safety Conditions in the Use of Work Equipment
133	Sabotage	Psychosocial risks	Employees do not know how to behave in the face of any threat, attack or theft	Work-related injury, death	3	4	12 (Middle) Moderate Risk	Employees, Visitors	Employees should be trained to create a sense of self-confidence, emergency practices and their behavior should be known to all employees. Especially security guards should be trained on sabotage.	Law on Private Security Services
134	Doors and entrances	Lack of marking	Photocell glass doors and mechanical doors are not marked as easily noticeable by employees	Work-related injury	2	5	10 (Middle) Moderate Risk	Employees, Students, Visitors	Mechanical, photocell glass doors should be marked in such a way that employees can easily be noticed.	Regulation on Health and Safety Conditions in the Use of Work Equipment
135	Manual material handling	Transport	Trip and fall during manual material handling	Fall, injury	3	3	9 (Middle) Moderate Risk	Employees	Care should be taken during manual material handling.	Occupational Health and Safety Law No. 6331
136	Hand Tool Use	Unsafe acts	Cuts, hitting other employees as a result of the employee's carelessness while using a hammer	Work-related injury, death	3	3	9 (Middle) Moderate Risk	Employees	Careful work should be done.	Regulation on Health and Safety Conditions in the Use of Work Equipment

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
137	General operation	Ergonomic operation	The work area of the workplace is very cramped, there is not enough free space to work safely.	Skeletal musculoskeletal diseases	2	4	8 (Middle) Moderate Risk	Employees	Musculoskeletal diseases due to working in the same position, injuries and occupational accidents may occur as a result of employees hitting or dropping materials and equipment in a cramped environment. The working area should be arranged in a safe and wide enough area to enable working.	Regulation on Health and Safety Conditions in the Use of Work Equipment
138	General operation	Ergonomic operation	Lifting loads, pushing or pulling equipment such as boxes, packages, material service trolleys are not done in appropriate positions	Back and waist injuries, work accidents	2	4	8 (Middle) Moderate Risk	Employees	Lifting loads, pushing or pulling equipment such as boxes, packages, material service trolleys should be done in appropriate positions.	Regulation on Health and Safety Conditions in the Use of Work Equipment
139	General operation	Ergonomic operation	Sofa chair etc. equipment not suitable for the job	Musculoskeletal disorders and occupational disease	2	4	8 (Middle) Moderate Risk	Employees	It should be ensured that the chairs used by the employees are adjustable (height, back, armrest).	Regulation on Health and Safety Conditions in the Use of Work Equipment
140	General operation	Ergonomic operation	Employees working in inappropriate positions in the working environment and situations that require them to work in the same position for a long time	Musculoskeletal disorders and occupational disease	2	4	8 (Middle) Moderate Risk	Employees	Ambient conditions that require employees to work in inappropriate positions should be regulated, they should be prevented from working in the same position for a long time, and small rest breaks should be given.	İş Ekipm Regulation on Health and Safety Conditions in the Use of Work Equipment
141	General operation	Ergonomic operation	Employees having to reach or bend over great distances while doing their jobs	Musculoskeletal disorders and occupational disease	2	4	8 (Middle) Moderate Risk	Employees	Necessary ergonomic conditions should be provided to prevent employees from reaching too far in the workplace.	Regulation on Health and Safety Conditions in the Use of Work Equipment
142	General operation	Health checks	Failure to follow the periodic eye examinations of personnel working with screened tools	Eye disorders	2	4	8 (Middle) Moderate Risk	Employees	Arrangements should be made for eye examination once a year and working with screened devices.	Regulation on Duties, Authorities, Responsibilities and Trainings of Workplace Physicians and Other Health Personnel
143	General operation	Occupational health and safety training	Lack of basic occupational health and safety training	Injury, accident and death as a result of unconscious work	2	4	8 (Middle) Moderate Risk	Employees	Training should be provided on issues that may threaten work safety, such as the use of personal protective equipment, legal rights and responsibilities of employees, identification of hazards in the workplace, safety, training-related documents are recorded.	Regulation on the Procedures and Principles of Occupational Health and Safety Training of Employees

Table 5 (Continued). Risk Analysis Form

Sequence	Action	Hazard Resources	Hazard	Risk	P	S	Crude Risk Values	Exposures	Precautions to Take	Relating to Legislation
144	General operation	Thermal comfort	Failure to provide suitable thermal conditions	Loss of work force, work accidents as a result of carelessness	2	4	8 (Middle) Moderate Risk	Employees	It is ensured that the ambient temperature is at a level suitable for the work they do and the physical power they spend during the working period. In cases where the ambient temperature cannot be changed due to the nature of the work performed, employees should be protected from excessive heat or cold.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
145	Walls	Wall hanging objects	No fixing to the wall	Work accident, injury	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	Wall mounted/hanging clocks, pictures, maps, fire extinguishers etc. must be protected against falling.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
146	Ceilings	Ceiling mount materials	Failure to fix the additions to the ceiling	Work accident, injury	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	Suspended ceiling, ventilation duct lighting equipment should be secured against falling and injuring people during tremors.	Regulation on Health and Safety Measures to be Taken in Workplace Buildings and Attachments
147	General operation	Dangerous Goods Safety Advisor (DGSA)	Absence of HSSC and DGSA	Work accident, injury, administrative fines	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	The chemical and biological materials used in the laboratory should be examined and it should be determined whether there will be a hazardous substance safety consultant (HSSC) in the laboratory. In addition, if HSSC will be kept, it should be ensured that a dangerous goods activity certificate (DGAC) is obtained.	Communique on Dangerous Goods Safety Consultancy
148	General operation	Waste management	Improper waste management	Work accident, injury, occupational disease, administrative fines	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	A directive should be prepared in accordance with the regulations for the disposal of wastes generated as a result of chemical and biological materials used in the laboratory. Waste must be disposed of safely in accordance with this directive.	Waste Management Regulation
149	laboratory studies	Working with chemicals	Unsafe working with chemicals	Work accident, injury	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	Employees should use safer chemicals and products. Chemical products must be manufactured to perform their coveted function while minimizing their harmfulness. In addition, safer solvents and auxiliaries should be used. The use of excipients should be made unnecessary whenever possible and harmless when used.	Regulation on Health and Safety Conditions in the Use of Work Equipment
150	General operation	Waste management	Improper waste management	Work accident, injury, occupational disease, administrative fines	2	4	8 (Middle) Moderate Risk	Employees, Students, Visitors	Appropriate neutralizations should be carried out regarding the waste generated in the laboratory and discharged to the sewer. Necessary infrastructure works should be carried out to prevent the accumulation of wastewater and flooding on the basement floors of the building.	Waste Management Regulation