



SCREENING CHAPTER 15 ENERGY

AGENDA ITEM: NUCLEAR ENERGY

Radiation Protection

Country Session: The Republic of TURKEY
14-15 June 2006



CONTENT

- Regulatory Authority
- Legal Framework
- Emergency / Crisis Management
- Environmental Monitoring
- Public Information



REGULATORY AUTHORITY

Turkish Atomic Energy Authority (TAEK) is the regulatory body for safe use of sources of ionizing radiation, radiation protection, safe management of radioactive waste and safe transport of radioactive material.



LEGAL FRAMEWORK

- **Turkish Atomic Energy Authority Law No. 2690**
(Official Gazette: 13 July 1982, no. 17753)
 - Regulation on Radiation Safety
(Official Gazette: 7 September 1985, no. 18861)
 - Regulation on Issue of Licences for Nuclear Installations
(Official Gazette: 19 December 1983, no. 18256)
 - By-Law on Radiation Safety
(Official Gazette: 24 March 2000, no. 23999)
(revised – Official Gazette: 29 September 2004, no. 25598)
 - By-Law on Nuclear and Radiological Emergency Preparedness
(Official Gazette: 15 January 2000, no. 23934)
 - By-Law on the Licensing and Safety of Gamma and Electron Beam Irradiation Facilities
(Official Gazette: 18 June 1994, no. 21964)



LEGAL FRAMEWORK (CONT'D)

- By-Law on Licensing of the Facilities Including Ionizing Radiation Sources for Therapy Purposes in Medicine
(Official Gazette: 21 July 1994, no. 21997)
- By-Law on the Safe Transport of Radioactive Materials
(Official Gazette: 10 September 1997, no. 23106)
(revised – Official Gazette: 8 July 2005, no. 25869)
- By-Law on Wastes Arising from Use of Radioactive Substances
(Official Gazette: 2 September 2004, no. 25571)
- By-Law on Licensing and Radiation Protection in Industrial Radiography,
(Official Gazette: 8 July 2005, no. 25869)
- By-Law on Quality Assurance and Inspection of Nuclear Installations
(Official Gazette: 13 March 1997, no. 22932)



LEGAL FRAMEWORK

TAEK Law No. 2690

Article 4

TAEK is responsible for licensing, inspection, preparation of legislation and determination of principles concerning radiation protection, nuclear installations and radiation sources and practices, transportation and storage of the radioactive materials; and to perform other related tasks.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety

- Covers the fundamental aspects of radiation safety, particularly authorization and inspection of practices.
- Mostly based on the IAEA and ICRP technical documents and the EURATOM Directives.
- Covers requirements related to occupational, public and medical exposures, transportation, waste and emergency preparedness.
- Revised by amending several articles on patient discharge levels and some requirements for setting local rules by the authorized establishments, etc.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER I Scope, legal base, definitions and exemptions.

Article 1 and 2

- Governmental or private institutions and organizations or persons who keep, use, import, export, transport, store, and trade radioactive materials and radiation equipment are subject to reporting requirements.
- “By-Law covers the issues related to activities to be performed and measures to be taken for protecting people and the environment from harmful effects of all types of radiation sources and facilities that are subject to radiation safety.”



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

Article 5

- Radioactive substances of which concentrations or radioactivity levels do not exceed the levels given in Annex-I and the radiation producing devices that do not exceed the dose rates given in Article 5 are exempted from the provisions of the By-Law .
- It is prohibited to import, export, manufacture, hold, use and store toys, stationeries, clothes, cosmetics, products for household use and similar goods that contain radioactive substances, even within exemption limits.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER II, Section I, Basic Principles of Dose Limitation System Article 7

The dose limitation system used in radiation protection is based on the following three principles

- **Justification of Practices:** Considering the health detriments of exposure, any practice involving ionizing radiation shall not be authorized, unless it produces a net benefit.
- **Optimization of Radiation Protection:** In all practices, radiation exposures shall be kept as low as reasonably achievable, considering economic and social factors.
- **Dose Limitation:** For all exposures to ionizing radiation of individuals under controlled working conditions, the equivalent doses to the related tissue or organ and the effective dose shall not exceed the annual dose limits provided in the Article 10 of the By-Law .

Dose limits for exposed workers, apprentices and students and members of the public are set in **Section II** of the By-Law . General rules for “Specially Authorized Exposures” are also placed in this section.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER II, Section III, “Classification of Radiation Workplaces” and restrictions for workers, students and visitors.

Article 15

Radiation workplaces are described as the areas where the annual dose is likely to exceed 1 mSv, and are classified according to the radiation levels as follows:

a) Controlled Areas: the area with restricted access and with work carried out under the specific rules regarding radiation protection and the radiation worker likely to be exposed to radiation more than 3/10 of the average annual equivalent dose limits of five consecutive years.

Radiation warning signs shall be available at the entrances and inside of controlled areas.

b) Supervised Areas: the area where 1/20 of the annual dose limits for radiation worker likely to be exceeded but, 3/10 of the doses not expected to be exceeded and where individual dose measurements are not obligatory but environmental radiation monitoring is required.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER III consists of four sections which are occupational, medical, public and emergency exposures and sets the requirements according to types of exposures to ionizing radiation.

Section I - Occupational Exposures

Article 20 defines working conditions for persons who are subject to occupational exposure. In **Articles 22, 23, 24** requirements are given for using personnel dosimeter, protective clothing and equipment, and medical surveillance of workers.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

Occupational Exposure Control

Dosimetry reading and registry services are provided by Sarayköy Nuclear Research and Training Center of TAEK.

Individual Monitoring

Individual monitoring for external radiation is carried out by using films and TLD dosimeters. The total number of workers receiving services are around 21000 per year.

Workplace Monitoring

As part of the licensing procedure, initial workplace monitoring is made by TAEK experts.

Depending on the practice, the institutions have to be equipped with suitable devices for the monitoring of the working places.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER III (Cont'd)

Section II on “Medical Exposures” consists of the Articles given below:

- Radiation protection of patients,
- Justification of medical exposures,
- Optimization of medical exposures,
- Quality assurance in medical exposures,
- Guidance levels for medical exposures,
- Exposures for medical research purposes,
- Dose limitation for volunteers and visitors,
- The patient discharge limits,
- Misadministration of patients.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER III (Cont'd)

Section III regulates the “Public Exposures”.

Articles 34 and **35** are related to the rules on discharge of radioactive substances and requirements for monitoring and inspection of radioactive materials discharged to the environment.

Article 36 sets the rules for sealed radioactive materials. According to this article used sealed radioactive sources shall not be disposed of directly or indirectly to the environment and shall not be transferred by the licensee to other persons or organizations without written notification to TAEK in advance.

On-site final deposition is not allowed for disused sealed radioactive sources. Procedures to return to the manufacturer are initiated, otherwise sources shall be sent to a waste processing facility.

Temporary storage of the radioactive materials in the facility due to obligatory reasons shall be in compliance with the procedures and principles determined by TAEK.



LEGAL FRAMEWORK (CONT'D)

Examination and approval of plans for the discharge of radioactive effluents from nuclear installations

The operator should submit plans for radioactive effluent discharge as a part of the safety analysis report of the installation, which is subject to a thorough assessment and evaluation before granting an authorisation for operation (Articles 14(6) and 14(7) of the Regulation on Issue of Licences for Nuclear Installations, Articles 33-36 of the By-Law on Radiation Safety).

Article 14 - The Preliminary Safety Analysis Report must include the following information :

(6) Measures for radiation protection, radwaste systems, in-service inspection, maintenance and decommissioning

(7) Safety analyses of the facility during normal operation, anticipated operational occurrences and accident conditions.



LEGAL FRAMEWORK (CONT'D)

Estimates of population doses due to discharges of radioactive effluents

According to Article 9(9) of the “Regulation on Issue of Licences for Nuclear Installations”, the Site Report should contain information regarding “Preliminary studies on radiation exposure of the public due to liquid and gaseous radioactive effluents during normal operation, anticipated operational occurrences and accident conditions. These studies should take into account dispersion patterns of radioactive effluents, present and prospective population distribution, public water supply from regional water sources, regional milk and food production, and radioecology of the region.”



LEGAL FRAMEWORK (CONT'D)

Disposal of radioactive waste

TAEK Law Article 4(f) authorizes TAEK to regulate radioactive waste management activities.

Regulation on Radiation Safety, Article 8 states licensing obligation for radioactive waste facilities.

Radioactive waste is managed in the Cekmece Nuclear Research and Training Center of TAEK by treatment, conditioning and storage.

Source return policy is applied to decrease the amount of waste needs to be processed.



LEGAL FRAMEWORK (CONT'D)

Planned disposal of waste at nuclear installations

Planned disposal of radioactive waste is part of the Safety Analysis Report according to the “Regulation on Issue of Licences for Nuclear Installations,” and subject to examination and approval before an authorisation. Implementation of those plans are also subject to inspection by TAEK.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER III – Section III (cont'd)

Article 37 is related to the “**Natural Radiation**”. Natural radiation levels are monitored, where required, by TAEK with the cooperation of the relevant ministries, institutions and organizations.

Article 38 concerns work activities that involve natural radiation sources and lead to a significant increase in the exposure of workers or members of the public and cannot be disregarded from the radiation protection point of view. Control measures are taken for the flight personnel and mine workers. Workers are informed about the radiation they received and related health risks.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER III – Section IV is related to “**Exposures during an Accident or an Emergency**” and consists of Articles 39 to 49.

The licensee is responsible for preparation of an “Emergency Plan” considering the characteristics of the radioactive sources used in the facilities.

In case of an emergency or an accident, measures shall be taken immediately, and TAEK shall be notified about the situation.



LEGAL FRAMEWORK (CONT'D)

Emergency plans for nuclear installations

According to the Regulation on Issue of Licences for Nuclear Installations:

- The applicant should submit emergency plans as part of the application for an operating licence (Article 26 and 45)
- The applicant should submit instructions and procedures for anticipated operational occurrences and accidents as part of the application for an operating licence (Article 29 and 45).
- The applicant should immediately notify TAEK about accidents and anticipated operational occurrences (Article 34).



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd) CHAPTER III – Section IV (Cont'd)

Safety of Radioactive Sources

Article 47: In case a radiation source is lost, stolen or damaged, the Licensee shall immediately take necessary precautions and notify TAEK about the situation through the fastest means of communication. An on-site investigation is performed by TAEK. Assistance and cooperation of relevant institutions shall be solicited, if required.

In **Articles 48** and **49**, “Intervention Levels” for acute and chronic exposures are given respectively.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER IV covers the rules on authorization of practices and defines responsibilities, procedures and requirements concerning licences, permits, inspection and records.

Licence Obligation

Article 50

It is obligatory to obtain a licence from TAEK to produce, export, import, purchase, sale, transport, store, maintain, repair, install, dismantle, replace, possess and use radiation sources.

If any activity requires any other licence, permit or certificate from any other ministry and/or institution, a licence from TAEK is required as precondition for such licence, permit or certificate.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER IV, Section I also includes procedures for licence application, evaluation of the applications, licence granting, licence renewal, expiration of licence, revocation of licence and termination of licence upon request.

Section II is related to import, export and transport permits and radioactive material delivery conditions.

The persons and organizations licensed to import, export and transport radiation sources are obliged to obtain permits for each transport, export or import activity.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER IV, Section III covers general principles of inspection and evaluation of inspection results.

CHAPTER IV, Section IV

Recording and record keeping obligations are set in **Article 69**. Real persons, public and private institutions or organizations within the scope of the By-Law are obliged to keep records relating to personnel, radiation sources, radioactive wastes and accidental exposures. These records shall be preserved for 30 years.



LEGAL FRAMEWORK (CONT'D)

By-Law on Radiation Safety (Cont'd)

CHAPTER V covers the articles on violation of the legislation and insurance liability.

Enforcement

If it is determined that the activity is carried out **without a licence or the licence conditions are violated** or any other provision laid down in the By-Law are not complied with, TAEK applies to proper authorities to initiate **legal action**.



LEGAL FRAMEWORK (CONT'D)

Authorisation of nuclear installations

According to Article 4e of Turkish Atomic Energy Authority Law, TAEK grants authorisation for siting, construction and operation of nuclear power and research reactors and other fuel cycle facilities.

According to Regulation on Issue of Licenses for Nuclear Installations, siting, construction and operation of all nuclear fuel cycle facilities, from mining of uranium ores to nuclear reactors and waste management facilities, require authorisation from TAEK.

Even though decommissioning is not explicitly declared, all authorisation activities on environmental safety regarding nuclear installations are also within the responsibilities of TAEK.

All exploitation facilities for uranium mining are considered nuclear installations by the Regulation.



LEGAL FRAMEWORK (CONT'D)

Authorisation of nuclear installations (Cont'd)

TAEK Law Article 4e

TAEK has a duty:

“To grant approval, permit and licences related to siting, construction, operation and environmental safety of nuclear power and research reactors and **nuclear fuel cycle facilities**; to perform necessary inspections, to restrict the operation in case of non-compliance with the conditions of the permit or licence; to suspend or revoke the permit or licence and to make recommendations to the Prime Minister for the shut down of those installations; to prepare necessary technical legislation for these purposes.”



LEGAL FRAMEWORK (CONT'D)

Regulation on Issue of Licences for Nuclear Installations

Establishes principles and procedures for licensing of nuclear installations

Article 2:

Defines “nuclear installations” subject to licensing

Nuclear Reactor Facilities:

1. Training reactors,
2. Research reactors,
3. Materials testing reactors,
4. Test reactors,
5. Prototype reactors,
6. Reactors for heat production,
7. Reactors for electrical power production.



LEGAL FRAMEWORK (CONT'D)

Regulation on Issue of Licences for Nuclear Installations (Cont'd)

Article 2: (Cont'd)

Nuclear Fuel Cycle Facilities:

1. Mining, milling and refining facilities,
2. Conversion facilities,
3. Enrichment facilities,
4. Nuclear fuel element fabrication facilities,
5. Reprocessing facilities for used fuel elements,
6. Radioactive waste management facilities (including ultimate storage)



LEGAL FRAMEWORK (CONT'D)

Regulation on Issue of Licences for Nuclear Installations (Cont'd)

Articles 4-49:

Defines licensing procedures, steps and processes in licensing, content of required submissions for applications, licensing conditions, etc.

Three-step licensing:

- 1- Site license
- 2- Construction license
- 3- Operation license

Articles 49-55:

Defines rules and procedures for revoking or limiting the license, regulatory inspection, re-start of operation, modifications, etc.



LEGAL FRAMEWORK (CONT'D)

Examination and approval of plans for installations and siting

The Regulation on Issue of Licences for Nuclear Installations states the procedures to be followed for examination and approval of plans for nuclear installations and their siting.

Each licensing stage requires submission of plans and relevant safety reports, a thorough examination, assessment and evaluation of these plans and generation of reports before approval. Contents of these plans and reports are defined in the Regulation.



LEGAL FRAMEWORK (CONT'D)

Protection against exposures or radioactive contamination beyond the perimeter of nuclear installations

The operating license of a nuclear installation requires the operator to demonstrate the adequacy of measures taken for protecting the public from undue exposure during normal circumstances.

There are several secondary legislation regarding the safety of nuclear installations that are mostly based on IAEA Safety Standards Series documents and the legislation of developed countries (e.g. USNRC 10 CFR 20, 50, 100 and USNRC Regulatory Guides).



LEGAL FRAMEWORK (CONT'D)

Records of environmental monitoring data

Records to be kept related to measurements of external exposure, estimates of intakes of radionuclides and radioactive contamination as well as the assessment results of doses received by reference groups and by the general population.

Recording and reporting is required of environmental monitoring data from research reactors. Requirements on records and reports for research reactors are laid down in the TAEK regulatory document “Records and Reports for Research Reactors”.

A technical study on requirements on records and reports for nuclear power plants is currently under way.



LEGAL FRAMEWORK (CONT'D)

Outside workers

A technical study to adopt an EU Directive on the operational protection of outside workers exposed to the risk of ionising radiation during their activities in controlled areas has been prepared and submitted for approval. To make arrangements for implementation, coordination will be established with the Ministry of Labour and Social Security.



LEGAL FRAMEWORK (CONT'D)

High activity sealed sources and orphan sources

Article 21 of the Regulation on Radiation Safety states that, in case of loss and theft of radiation sources, necessary measures are promptly taken by the responsible officials and the situation shall be promptly notified to TAEK.

- All scrap metal importing facilities have stationary and mobile radiation detection systems and emergency plans.
- TAEK trains the staff of metal processing facilities.
- Main border passages to Turkey are monitored by radiation detection systems.



LEGAL FRAMEWORK (CONT'D)

Shipments of radioactive substances and waste

Transport of radioactive materials are regulated by the By-Law on Safe Transport of Radioactive Materials that complies with 1996 edition of Regulations for the Safe Transport of Radioactive Material of the IAEA. A legislation that would comply with an Euratom Regulation and a Directive is under preparation.



EMERGENCY MANAGEMENT / CRISIS MANAGEMENT

By-Law on Prime Ministry Crisis Management Center

(Official Gazette: 9 January 1997, no. 22872)

(Amended Official Gazette: 21 August 2002, no. 24853)

Crisis Management Center

- main responsible organization for wide scale emergency management
- operates under the supervision of Prime Ministry
- not a permanent organization
- acts as a coordination center among ministries and governmental authorities relevant to the disaster
- responsible for all kind of disasters including **large scale** nuclear and radiological emergencies.



EMERGENCY / CRISIS MANAGEMENT (CONT'D)

TAEK is the leading organization for wide scale nuclear emergencies within **the Crisis Management Center (CMC)**.

TAEK gives advices for protective measures and the measures are implemented in coordination with the other relevant agencies. Protective measures like sheltering, evacuation, distribution of iodine tablets, decontamination are recommended by TAEK, decided by CMC and executed by the related ministries and other entities.

All non-crisis nuclear and radiological emergencies are handled by TAEK Emergency Preparedness and Coordination Unit.



EMERGENCY / CRISIS MANAGEMENT (CONT'D)

TAEK Emergency Response Center, operating under the Emergency Preparedness and Coordination Unit, is connected to the national and international information centers on-line, i.e., IAEA, INES and RESA (Early Warning Environmental Radiation Monitoring System of TAEK). At present, 67 on-line EWERMS stations are in operation.



EMERGENCY / CRISIS MANAGEMENT (CONT'D)

By-Law on Nuclear and Radiological Emergency

(Official Gazette: 15 January 2000, no. 23934)

By-Law prescribes duties and responsibilities of different organizations which may participate in nuclear or radiological emergencies.

Referring to this by-law, implementation instructions of TAEK Emergency Response Center covers the following items:

- description of the emergency organization
- emergency preparedness activities
- protective measures
- intervention levels
- contact points of national and international organizations
- notification procedures



EMERGENCY / CRISIS MANAGEMENT (CONT'D)

Other Related Legislation on Nuclear and Radiological Emergency

- Law on Civil Protection
(Cabinet Decree: 9 June 1958, no. 7126; Official Gazette: 13 June 1958, no. 9931)
- By-Law on Individual Commitment, Evacuation, Deconcentration and Planning in Civil Protection, (Cabinet of Ministers: 5 June 1964, no. 6/3150)
(Official Gazette: 18 July 1964 no. 11757)
- Instructions on the Establishment, Duties and Operations of Civil Protection Warning and Radiological Protection Organization
(Date of Issue: 16 September 1974)



ECURIE

European Community Urgent Radiological Information Exchange

ECURIE agreement was accepted and duly signed by EC and TAEK on 26 July 2005. The agreement is to be ratified.

After ratification CODECS system will be installed for the ECURIE purposes.



ENVIRONMENTAL MONITORING

Samples (soil, water and foodstuffs) taken by the ministries of Environment and Forestry and of Agriculture are analysed in the laboratories of TAEK for the purpose of environmental monitoring. Sampling program covers the entire country and aims to compile all necessary data on the background environmental radiation which also enable necessary information to be used for dose assessments in case of an emergency.

67 EWERMS stations monitor the air dose rates continuously. Data taken from this system are planned to be posted to EURDEP (European Radiological Data Exchange Platform).



ENVIRONMENTAL MONITORING (CONT'D)

Since the Chernobyl nuclear accident, monitoring of radioactive contamination of foodstuffs and feeding-stuffs has formed a routine part of monitoring, taking into account the limits recommended by the IAEA. TAEK also determines and assesses radon levels in residential and working areas



ENVIRONMENTAL MONITORING (CONT'D)

Foodstuff Regulations / Post-chernobyl Accident

After the Chernobyl nuclear accident, foodstuffs to be **exported** are monitored and certified for radioactive contamination by the research centers of TAEK, taking into account the limits recommended by the Council Regulation.

For the **import** of foodstuffs, there is a control mechanism established by Undersecretariat of Foreign Trade in coordination with TAEK, according to the principles laid down in the relevant EU legislation.



ENVIRONMENTAL MONITORING (CONT'D)

Foodstuff Regulations / Future Accidents

This issue has been included in the implementation instructions of TAEK Emergency Response Center.

Same provisions will be inserted into the By-Law on Nuclear and Radiological Emergency, which is under revision.

Appropriate mechanisms for sampling, monitoring and restricting the sale of contaminated foodstuffs or feeding-stuffs have been established in the By-Law on Nuclear and Radiological Emergency. According to this regulation, TAEK is responsible for monitoring, the Ministry of Agriculture is responsible for sampling and the Governor of the province is responsible for the restriction of foodstuffs and feeding-stuffs in case of any nuclear accident or other radiological emergency.



PUBLIC INFORMATION

This subject is covered by the By-Law on Nuclear and Radiological Emergency. "... TAEK performs all kinds of training activities by posters, brochures, magazines, books, etc. publications and mass media tools such as radio, television in order to inform the public on measures to be taken in case of dangerous situations, on the effects of radiation and similar issues. TAEK cooperates with Ministry of Internal Affairs, Ministry of Health, Ministry of National Education, Ministry of Agriculture and Village Affairs, Ministry of Environment and other ministries, institutions and their affiliates during those activities..."

This subject is also covered by the implementation instructions of TAEK Emergency Response Center.



TECHNICAL STUDIES

- Technical study on a By-Law on Radiation Protection of Outside Workers
- Technical study on a By-Law on High Activity Sealed Sources and Orphan Sources
- Technical study on a By-Law on Laying Down Basic Safety Standards for the Protection of the Health of Workers and the General Public Against the Dangers of Ionizing Radiation



Thank You For Your Attention