

**DOKUZ EYLUL UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**ENVIRONMENTAL MANAGEMENT
IN INDUSTRIAL PARKS**

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**December, 2010
IZMIR**

ENVIRONMENTAL MANAGEMENT IN INDUSTRIAL PARKS

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M.Sc THESIS EXAMINATION RESULT FORM

We have read the thesis entitled “**ENVIRONMENTAL MANAGEMENT IN INDUSTRIAL PARKS**” completed by **PINAR AKYIL YILMAZ** under supervision of **PROF. DR. AYŞEGÜL PALA** and we certify that in our opinion it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Science.

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ENVIRONMENTAL MANAGEMENT IN INDUSTRIAL PARKS

ABSTRACT

Industrial Parks and Eco-industrial Parks which are formed as part of sustainable and planned development are important for the national economy and preventing environmental effects of industrialization. Because of industrial parks constitute central administration, application of environmental management system on them can be realized more planned and easily.

The goal of an Industrial Park is to improve the economic performances of the participating companies while minimizing their environmental impacts.

İzmir Atatürk Industrial (IAIP) was chosen as a study area. In this region, present situation of the environmental problems have been investigated to determine how wastes are removed currently and to evaluate whether these methods are appropriate for environmental laws by applying questionnaire.

In this study, EMS consisting of the management of environmental impact assessment, wastewaters, wastewater infrastructure facilities, solid wastes, air quality, hazardous and medical wastes, chemical substances and products, noise and fire defense system in Industrial Parks has been developed with the help of computer program. Objectives have been improved according to the EMS. Then, precautionary measures, necessary actions are clarified and their usages for this study have been taken into consideration in detail.

Keywords: Environmental management system, industrial parks.

ORGANİZE SANAYİ BÖLGELERİNDE ÇEVRE YÖNETİMİ

Pınar AKYIL YILMAZ

ÖZ

Sürdürülebilir ve planlı kalkınmanın bir gereği olarak oluşan organize sanayi bölgeleri ülke ekonomisinde ve sanayileşmenin çevreye verdiği zararların önüne geçilmesinde büyük bir yeri vardır. Organize sanayi bölgeleri merkezi bir yapı teşkil ettikleri için çevre yönetim sistemlerinin uygulanması daha planlı ve kolay bir şekilde gerçekleşebilmektedir.

Organize sanayi bölgesinin amacı çevresel etkilerini minimize ederek işletmelerin ekonomik performansını geliştirmektir.

İzmir Atatürk Organize Sanayi Bölgesi çalışma alanı olarak seçilmiştir. Bu alanda, anket uygulanarak çevresel sorunların mevcut durumları incelenmiş, şu an için atıkların nasıl bertaraf edildiği ve çevre mevzuatlarına uygunluğu değerlendirilmiştir.

Bu çalışmada oluşturulan bir bilgisayar program yardımı ile çevresel etki değerlendirmesi, atık su, atık su alt yapı tesisleri, katı atık, hava kalitesi, tehlikeli ve tıbbi atık, kimyasal madde ve ürünleri, gürültü, yangın savunma yönetimlerini içeren çevre yönetimi geliştirilmiştir. Geliştirilen çevre yönetimi kapsamında hedefler belirlenip, alınması gereken önlem ile yapılması düşünülen eylemler açıklanmış ve bu çalışmaların sağlayacağı yararlar üzerinde ayrıntılı şekilde durulmuştur.

Anahtar Kelimeler: Çevre yönetim sistemi, organize sanayi bölgeleri.

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CHAPTER ONE

INTRODUCTION

1.1 Study Overview

With rapidly growing industrialization in Turkey, wastes generated in industries have increased logarithmically over time, and environmental problems resulting from wastes are a global dimension. Industrial development has generated complex wastes, a complexity not only due to the quantity of wastes, but also to their composition (Wei and Huang, 2001). The term industrial waste refers to all wastes produced by industrial operations or derived from manufacturing processes (Abduli, 1996). The rapid population increase and expansion of resource–consumption, combined with industrialization, urbanization, mobilization, agricultural intensification and resource intensive life styles are contributing to worldwide environmental, social and economic crisis (UNEP, 2000).

So Industrial Parks (IPs) has become increasingly critical importance for industrial sustainability. An industrial park is a set of industries, which are grouped in order to obtain the advantages of arrange common services (Barrie Trinder, 1992). An industrial park consists of a piece of land designed specifically to promote industrial activities through integration with transportation facilities and other supportive infrastructure. Firms are attracted to industrial parks to derive and create economic benefit from localization economies such as increased ease of communication, access to a suitable labor pool, and facilities designed to fit their needs. (S.M. Walcott 2009). With the rapid development, industrial parks play a key role in Turkey’s economy. Industrial areas represent an important part of economic strategy in many countries, especially in developed countries where planning and promotion of these areas play a fundamental role in urban planning (John Wiley, 1971).Nevertheless; they have an environmental risk, due to the concentration of environmental problems of each company in a small space. This economic strategy considers that the resources and the absorption capacity of impacts over the

environment are unlimited. This conception has caused an imbalance in the environment that entails a new model of actuation based on the sustainable development that 'meets the needs of the present without compromising the ability of future generations to meet their own needs' (Informe Brundtland Comisio'n Mundial de Medioambiente y Desarrollo, 1987). Its application has enabled the development of tools as the **industrial ecology**, whose target is to improve the environmental behavior of the industry. This discipline establishes an analogy between industrial and natural systems by creation of matter and energy interchange networks between companies. (Prentice Hall, 2003) An application of these concepts is the development of the sustainable industrial parks, which try to increase their economic efficiency and minimize their negative impacts. Green design, pollution prevention, energetic efficiency and material and energy interchange between companies are necessary to get these objectives because these practices minimize resource consumption and waste production (Kapur A, Graedel TE 2004).

As has been discussed, industrial parks are known to lead to environmental problems such as pollution, stress on local natural resources, potential hazards, and health issues for local communities (United Nations Environment Program (UNEP) 2000).

An eco-industrial park is a community of manufacturing and service businesses seeking enhanced **environmental and economic performance** through collaboration in managing environmental and resource issues, including energy, water, and materials. By working together, the community of businesses seeks a collective benefit that is greater than the sum of the individual benefits each company would realize if it optimized its individual performance only. The goal of an EIP is to improve the economic performance of the participating companies while minimizing their environmental impact. (Eco- industrial Parks (n.d.). Retrieved September 21, 2010, from http://www.globallearningnj.org/global_ata/Eco_Industrial_Parks.htm

IPs created as a requirement of planned development, are the most appropriate model in our country in terms of industrialization, in order to minimize damage to the environment. The IPs model is a form of industrialization that our country follows for planned development. Although there are differences in terms of establishment, organization, and type, industrial regions are the regions that hold the right of justice and authority defined for the companies in a particular geographical region, managed by a single authority's body and created by various industries. IPs is an effective tool for industrial development that reduces the cost of infrastructure and mobilizes local and regional economy. So IPs provides economic and social benefits to society. On the other hand, IPs can also generate health and safety hazards for the community by inflicting heavy damage on the environment. (İ.Töröz, S. Meriç, H. Sarıkaya, 2004)

Environmental investment processes need to be carried out more carefully in the long-term planning of IPs. Environmental effects of IPs are arisen as well as business and planning stage. IPs managed badly can cause industrial accidents, such as air and water pollution and noise problems. Creation of environmental management system (EMS) in IPs is critical for avoiding such dangers. It is possible that compatible EMS can be implemented as they constitute a central structure from the point of view of regional organizations. EMS and waste minimization should be developed for each IP by using this advantage. (İ.Töröz, S. Meriç, H. Sarıkaya, 2004)

1.2 Aim of the study

One of the goals of the establishment of IPs is to prevent environmental pollution by means of treatment facilities. In our country, IPs are planned and implemented as a solution of the environmental problems arising with developments in industry.

A field survey was done in the İzmir Atatürk Industrial Park (IAIP). It is aimed to put forward clearly problem areas on every stage of an application and their role in IP application. It was met face to face with authorized people and questionnaire was applied to these people in the companies. It is studied to detect their approaches to

requirements of environmental management in IP and put forward what they understand of environmental management and expose the differences in perception of concepts of EMS.

The last part of the survey; the new method was developed for appropriate environmental management system by using computer program.

The purpose of this research is briefly;

- To reveal whether there exists an appropriate EMS with the help of sample data for the chosen IP.
- To establish what problems are experienced by the subject during application.
- To contribute a solution to the problem by approaching the data.
- To develop computer program for Environmental Management System in IPs with a new point of view. Collecting the data about environmental management information of companies with this computer program, make easier data storage and approaching information of management program.

CHAPTER TWO

INDUSTRIAL PARKS (IPs)

2.1 The Definition of IPs

IPs (Industrial Parks) are defined as *“The good and service production zones, which are formed by allocating the land parcels, the borders of which are approved, for the industry in a planned manner and within the framework of certain systems by equipping such parcels with the necessary administrative, social, and technical infrastructure areas and repair, trade, education, and health areas as well as technology development regions within the ratios included in zoning plans and which are operated in compliance with the provisions of the Law no 4562 in order to ensure that the industry gets structured in approved areas, to prevent unplanned industrialization and environmental problems, to guide urbanization, to utilize resources rationally, to benefit from information and informatics technologies, and to ensure that the types of industries are placed and developed within the framework of a certain plan”* in the Industrial Parks Law numbered 4562 dated April 12, 2000.

2.2 Establishment Purposes of IPs

Establishment purposes of IPs may be summarized as follows;

- Monitoring the industry.
- Contributing to planned development of the city.
- Ensuring that industrialists who recommend products complementary and side products of each other make production together on the basis of a program and production efficiency and profit increase are provided.
 - Generalizing the industry in less developed regions.
 - Monitoring use of agricultural fields in industry
 - Establishing a cheap, reliable infrastructure and common social facilities.
 - Preventing environmental pollution by means of joint treatment plants.

- Ensuring management of the zones by their own supervising bodies under overall supervision of the state

(Industrial Parks applications in Turkey (n.d.). Retrieved June 21, 2009, from <http://www.osbuk.org/docs>)

2.3 Types of IPs

There are four types IPs and they listed as below

- Combined IPs where the industries operating in different sectors
- Specialized IPs where the industries operating in the same industry group and sub-sector within groups of this sector take place
- Private IPs established by private legal entities or real persons
- Small Industrial Parks (SIP)

In addition, IPs defined as using credit from Ministry of Industry and Commerce and not to use credit for general administrative expenses (Industrial parks applications in Turkey (n.d.). Retrieved August 27, 2010, from <http://www.osbuk.org/docs>).

2.4 Duties and Authorities of the Ministry of Industry and Commerce on IPs

Duties and authorities on OIZs of the Ministry of Industry and Commerce responsible for establishment and operation of the OIZs may be summarized as follows

- Managing the place selection, approving and declaring the place selected unanimously as IP area.
- Making it a legal entity by approving the establishment of IP and granting “Certificate of Authority” by following the organ elections,
- Approving the improvements plans and infrastructure projects,
- Making the “Decision of Public Utilities” by examining the expropriation requests,
- Crediting the IPs whose credit requests are approved,

- Auditing any accounts and transactions of IPs when deemed necessary or upon complaint (Industrial parks applications in Turkey (n.d.). Retrieved June 21, 2009, from <http://www.osbuk.org/docs>).

2.5 Industrial Parks in Turkey

There are 263 IPs in Turkey (Retrieved August 1, 2010, from <http://www.osbuk.org>).

2.5.1 IPs Developments and Implementations in Turkey

The industry was determined to be “locomotive sector” in the planned development period starting in 1960 in Turkey and long term targets have been set such as providing economic balance, realizing economic and social development jointly, attaching importance to development and industrialization at a certain speed.

According to the targets set, IPs applications, one of the various incentive measures put into practice for the purpose of developing industry in the country, was initially started in Bursa in 1962 upon the establishment of Bursa IP. Bursa IP was established with the loan provided by the World Bank.

IPs continued in Turkey till 1982 without any legal regulation. “Ministry of Commerce and Industry Funds Regulation” was published in the Official Journal number 17591 and dated January 31, 1982 and enacted for filling the respective regulation gap.

Issues such as the use of fund for the IPs, resource and operation of the fund account, allocation of the credit, land acquisition, return of the credit have been regulated under articles 29-42 titled “IPs and Craft Works and Enterprise Expenses Fund” of the Funds Regulation. Resources have been transferred to the fund from budget of the state budget, and IPs has been supported with credit from this fund.

IPs have been established upon resolution of the Council of Ministers on the basis of the targets in the 5-year development plans in the respective period. 99% of infrastructure investments of the IPs determined to be established upon resolution of the Council of Ministers have been covered from the Ministry Fund, and 1% of them has been provided by the chambers of industry and commerce /chambers of industry or chambers of commerce establishing the IPs.

Arousal of many legal problems due to rapid increase in the number of IPs, their increasing importance in the economic spectrum of the country, and IPs' being unincorporated have made a new legal regulation obligatory. As a result of the long term researches and studies, IPs Law number 4562 was passed by the TBMM (Turkish Grand National Assembly) on April 12, 2000 and it was enacted upon its publication in the Official Journal dated April 15, 2000. "Regulation on Industrial Parks Place Selection" and "Industrial Parks Implementation Regulation" to be prepared as per the respective Law were been enacted respectively upon their publication in the Official Journals with the following numbers and dates: May 21, 2001-24408 and April 1, 2002-24713. The previous regulation has been superseded by "Regulation on Industrial Parks Place Selection" enacted upon publication in the Official Journal number 26759 and dated January 17, 2008 and gained its final version. IPs have still been established and managed on the basis of the respective regulations in Turkey.

"Industrial Parks Site Selection Regulation" dated January 17, 2008 and numbered 26759 in the Official Gazette, "Industrial Parks Implementation Regulation" dated August 22, 2009 and numbered 27327 in the Official Gazette come into force thereby abolish previous related regulations by rearranging due to needs arising during the applications. IPs are already governed by establishing according to related legislation in Turkey (Industrial Parks applications in Turkey (n.d.). Retrieved June 21, 2009, from <http://www.osbuk.org/docs>).

2.5.2 The Status of IPs at Present

As seen in Figure 2.1, from all of the IPs in Turkey; 129 IPs are in the rank of the processing; 49 IPs are in the rank of infrastructure; 21 IPs are in the rank of planning; 28 IPs are in the rank of expropriation, and 29 IPs are in the rank of choosing area. (Physical condition of IPs in Turkey (n.d.) Retrieved August 1, 2010 from <http://www.osbuk.org.tr/index.php?page=content/osbuygulama&id=1>)

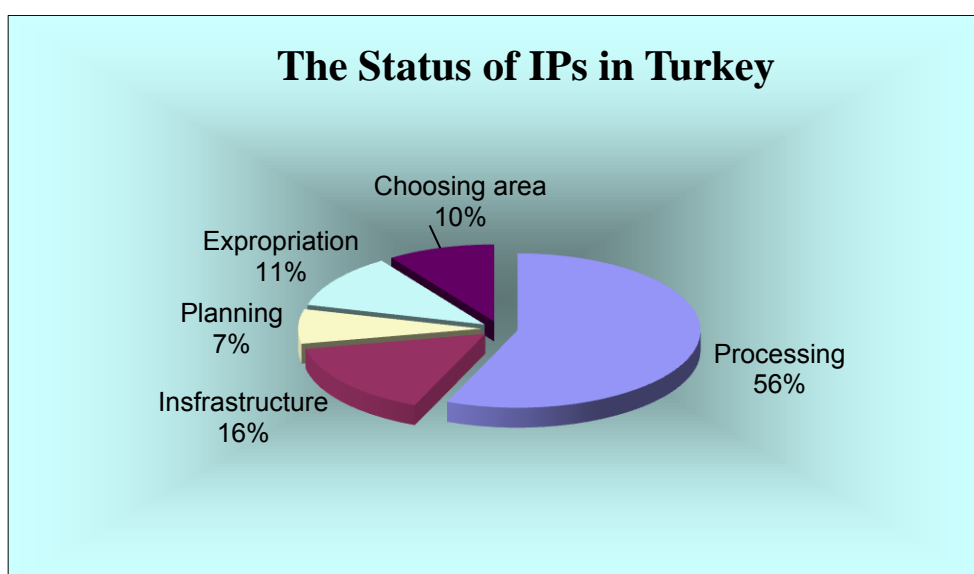


Figure 2.1 The status of IPs in Turkey (OSBÜK, 2010)

2.5.3 The Sectoral Distribution of IPs in Turkey

As seen in Figure 2.2.; there are more sectors in IPs in Turkey.

Figure 2.2; it was formed by aiming the information of IPs in Turkey. The information was taken in web page of IPs Senior Organization (OSBÜK). 176 IPs are evaluated for producing this figure. Prior main sectors that the companies made production mostly in IPs are taken in to account.

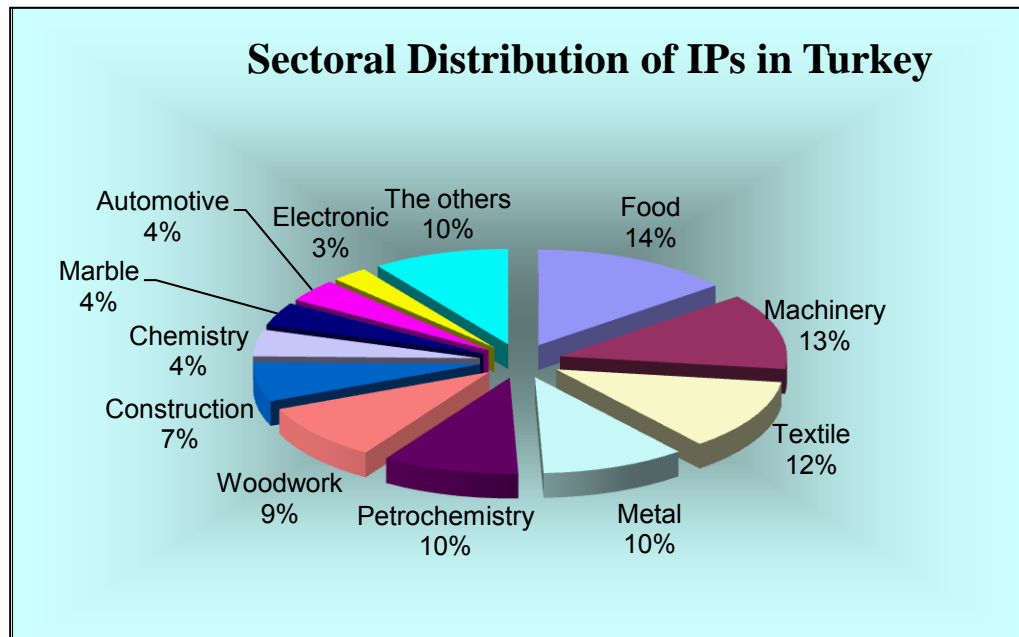


Figure 2.2 The main sector of companies in IPs in Turkey. (Achieved with the aim of OSBÜK data in 2009)

2.5.4 The Statistical Information of IPs in Turkey

According to the results obtained from questionnaire which was applied by Turkish Statistical Institute (TUIK, 2008); infrastructures of 97 IPs were completed, and 116 million m³ of water was used by IPs in Turkey in 2008. 53% of IPs use water taken from well; 18% from stream, 13% from spring, 9% from water network, and 7% from lakes and dams (The water, wastewater and waste statistics of IPs in Turkey, 2008 (March 30, 2010). from <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=6217>)

113 million m³ of wastewater was treated by IPs in Turkey. 55% of IPs use biological treatment, 43% use advanced treatment, and the others use physical or chemical treatment for wastewater treatment. In addition, 11.5 million m³ of wastewater was sent to other wastewater treatment plants for treatment (The water, wastewater and waste statistics of IPs in Turkey, 2008 (March 30, 2010). from <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=6217>)

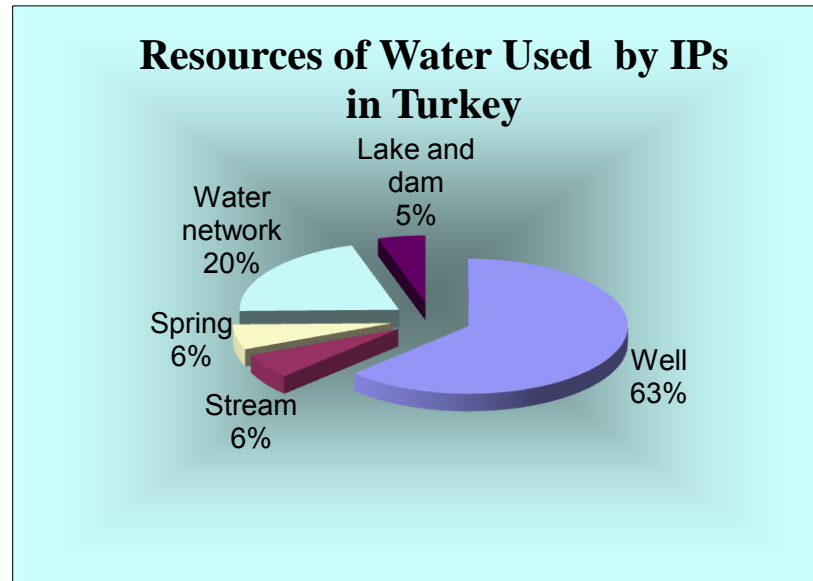


Figure 2.3 The resources of water used by IPs in Turkey (TUIK, 2008)

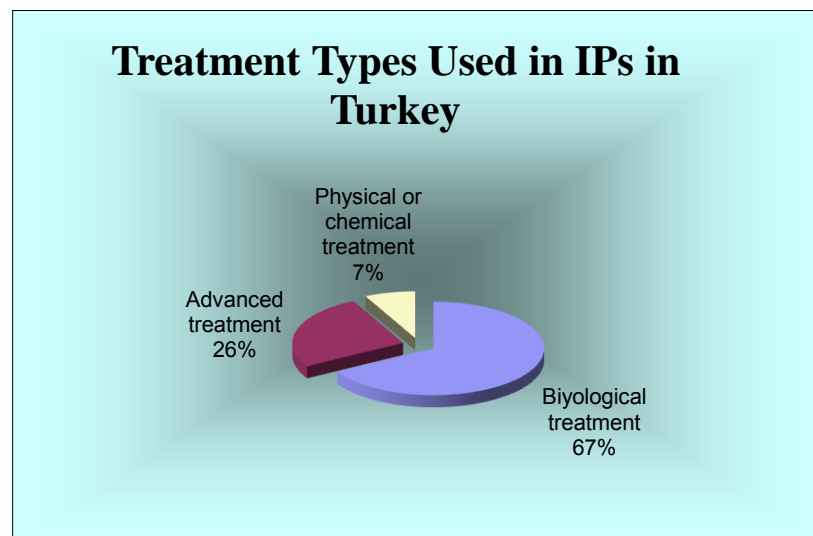


Figure 2.4 The treatment types used in IPs in Turkey (TUIK, 2008)

According to the TUIK 2008 data; $255 \cdot 10^3$ tons solid wastes was collected by IPs in 2008. 45.4% of collected waste was sent to landfill, 27.3% of waste was sent to dump of IPs, 8.5% of waste was sent to municipal dump. The others were disposed with other methods. 15.9 % of collected waste was stored temporarily in the area of IPs. (The water, wastewater and waste statistics of IPs in Turkey, 2008 (March, 30, 2010). from <http://www.tuik.gov.tr/PreHaberBultenleri.do?id=6217>)

Table 2.1 The statistics about water, wastewater and waste in IPs in 2008. (TUIK, 2008)

The number of IPs applied questionnaire	97
IPs which have water network	75
IPs which use municipality water network	14
IPs which have no water network	8
IPs which have wastewater network	79
IPs which use municipality wastewater network	10
IPs which have no wastewater network	8
The amount of water used by IPs (*10 ³ m ³ /year)	116300
The amount of wastewater discharged by IPs(*10 ³ m ³ /year)	153309
With Treatment	112647
Without Treatment	40662
Wastewater Treatment Plant (WWTP)	27
Physical/ Chemical	2
Biological	18
Advanced	7
The Capacity of Wastewater Treatment Plant(*10 ³ m ³ /year)	221215
Physical/ Chemical	4015
Biological	112823
Advanced	104417
The amount of wastewater purified in WWTP (*10 ³ m ³ /year)	112647
Physical/ Chemical	2410
Biological	62382
Advanced	47855
IPs which apply sludge thickening process to sludge	23
The amount of solid wastes collected(*10 ³ tons /year)	255
Hazardous	34
No Hazardous	221

CHAPTER THREE

ENVIRONMENTAL MANAGEMENT SYSTEM IN INDUSTRIAL PARKS

There are several options for the establishment of EMS in IPs.

- EMS applied by companies in the region in cases in which IP Management has no authority of controlling environmental companies
- EMS that IP Management applies for their own facilities and services
- EMS including all companies and regional facilities and services in the region

The most appropriate EMS can be applied by all the companies and IP management in IPs regionally. IP Management improves EMS including all the waste management. EMS is formed in Environmental Management Department by environmental engineers in IP Management.

3.1 The Component of Environmental Management Department

Environmental Management Department consists of following stages;

- Environmental Management Unit
- Coordination Department
- Education and Participation Department
- Monitoring Department
- Control and Planning Department
- Research, Development and Risk Assessment Department
- Environmental Information and Data Collecting Department (Ustun, 2005).

3.1.1 Environmental Management Unit (EMU)

In accordance with Environmental Control Regulation the IP Management must establish EMU consisting at least three environmental officers or working of a minimum two environmental officers or taking environmental management service

from authorized environmental consulting firms concerning execution of environmental activities. **IPs have to fulfill this obligation until January 2011.**

The duties of EMU or environmental officer that working around in facility or activity

- a) To determine whether the bring obligations specified in the legislation which came into force at the law or not, by checking facilities or activities regular intervals
- b) To realize internal audit of responsible for facility or activity once a year at least according to the related legislation. In addition they prepare an internal audit report the results of internal audit and represent this report to authorize responsible for facilities or activities and to keep in a sample of management units in company.
- c) To make proposals to the owner / responsible of facility or activity when non-compliance is detected and follow-up whether elimination of non-compliance or not.
- d) To be present at the facility or activity during the audit that is done by the Ministry
- e) To provide the requested information and documents during the audit that is done by the Ministry
- f) Not to disclose the information they learned in nature trade secrets

3.1.1.1 The Operating Principles of EMU

Companies' principles of EMU in IPs Management can be grouped under the following headings.

- To win the support of manufacturer
- To consider environmental, social structure and economic activities within a whole
- To prevent the new pollution
- To provide the sustainability of the natural environment
- To find financial support and planning, taking into account law and regulations
- To support cooperation between companies
- To arrange of training programs for the public working and living in the region

- To produce new projects
- To monitor and adaptation of new technologies (Ustun, 2005).

3.1.2 Coordination Department

Coordination department provide coordination with mutual information flow among the companies in the region and institutions and units related EMU. In addition they send the results taking to planning and control department of EMU to the related ministries. They file information, documentation and studies that came from other related organizations to the region and transfer information and data network.

So the result of their duties;

- To resolve problems and prevent conflicts between different institutions with effective cooperation and coordination network between all related institutions.
- To prevent loss of money and time.
- To establish a strong bond between all institutions with responsibility in the region.

3.1.3 Education and Participation Department

Education and participation department is one of the important departments in EMU. The companies do not have enough information about EMS in IPs.

So their duties;

- To learn views, priorities and environmental awareness of employees working in industrial plants in the region.
- To improve some work programs, projects with people living and working in the region in order to increase environmental awareness.

3.1.4 Monitoring Department

Monitoring department monitor and evaluate air, soil and water pollution permanently in the IPs. They conduct the results of the studies as reports to planning department. The critic points should be formed by the management of IPs for monitoring the pollutant parameters regularly and permanently in IPs. The critic point in terms of pollutant sources should be stated in IPs and measuring stations moving with fully equipment should measure pollutant in the region. So parameters measured of pollutant are collected and evaluated in laboratory of IPs. The result of measuring are transmitted to control and planning department.

3.1.5 Research, Development and Risk Evaluation Department

Research Development and Risk Evaluation Department state the most appropriate method that will provide a result about monitoring and control of pollution more effectively and in shorter time. In addition other duties;

- To develop and implement new production technologies and projects that will make easy the work of EMU.
- To produce and develop projects related to increasing the socio-economic value of environment.
- To make risk analysis and state risk prevention strategies.

3.1.6 Control and Planning Department

Control and Planning Department collect results of the studies and control the related pollutants in the region and evaluate them as well as preparing an environment plan, planning review and updating for IPs in line with the results of the evaluation.

If necessary, they identify more sensitive values of discharge parameters for the conservation of the natural environment than national regulations.

3.1.7 Environmental Information and Data Compilation Department

Environmental Information and Data Compilation Department's duties;

- To collect data and transfer network.
- To compile all work and transmission network.
- To collect and evaluate the results of the audit and monitor of institutions.

3.2 The Component of EMS in IPs

According to IP Implementation Regulation published in the Official Gazette numbered 24713 and dated 04.01.2002 “*wastewater management, wastewater infrastructure facilities management, solid waste management, noise management, weather quality management, dangerous and medical waste management, management of the harmful chemical substances and products, IP fire defense system are included within the scope of IP environment management system.*”

But in IP Implementation Regulation published in the Official Gazette numbered 27327 and dated 22.08.2009 there are no expression about EMS like as the above.

According to IP Implementation Regulation published in the Official Gazette numbered 27327 and dated 22.08.2009 about EMS;

- *IP, put in to practice environmental management system that they will prepare according to related laws*
- *IP, works in coordination related institution for solution environmental problems.*
- *Environmental management system is reviewed by IP once two year or if establishment of new facilities or increasing their capacity of facilities.*

Appropriate EMS applied in IPs contains environmental impact assessment, wastewater management, wastewater infrastructure facilities management, solid waste management, noise management, air quality management, hazardous and medical waste management, chemical substances and products management and fire defense system management as seen in Figure 3.1

- Environmental Impact Assessment Management
- Wastewater Management
- Wastewater Infrastructure Facilities Management
- Solid Waste Management
- Air Quality Management
- Hazardous and Medical Waste Management
- The Chemical Substances and Products Management
- Noise Management
- Fire Defense System Management

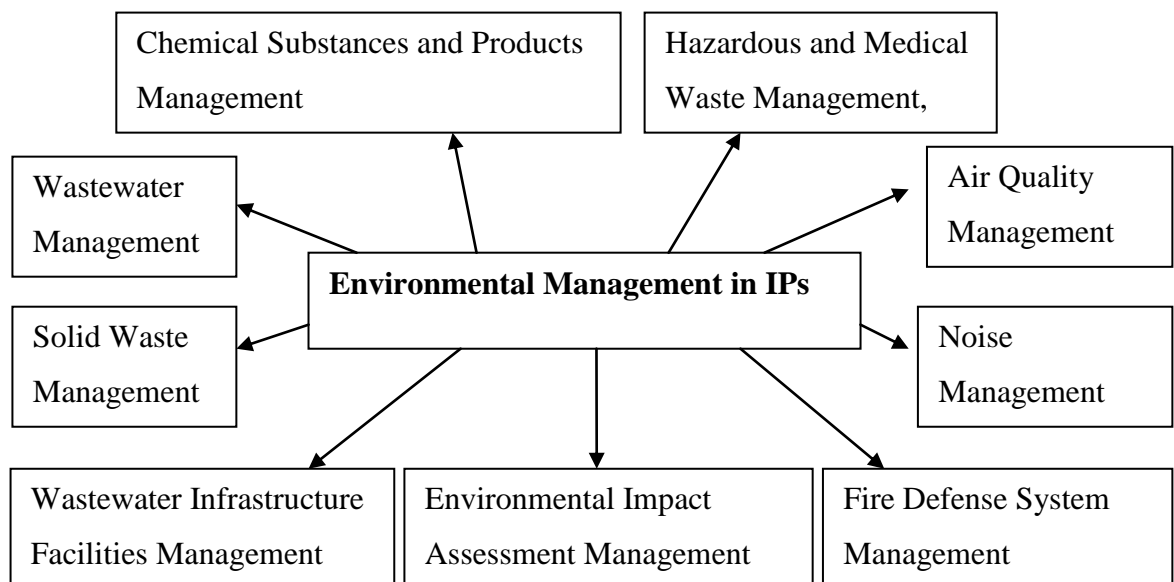


Figure 3.1 The stages of EMS in IPs

3.2.1 Environmental Impact Assessment Management

Procedures will be applied set by the Ministry for projects planned established in the IPs, Specialized Industrial Parks, Industrial Parks, Free Zones, the areas Strategic Environmental Assessment will be held, Fisheries Potential Production Areas and Technology Development Zone (Environmental Impact Assessment Regulations published in the Official Gazette numbered 26939 and dated July 17, 2008)

After the projects of companies are approved by IPs, the companies apply to Provincial Directorate of Environment and Forestry for Environmental Impact Assessment (EIA). Provincial Directorate of Environment and Forestry is authorized to evaluate EIA Regulation within the information IPs. Provincial Directorate of Environment and Forestry reports to IP management that the project what categories taking place in EIA Regulations.

Unless taking EIA decision is required, or EIA positive for the project notified in writing is subject to EIA Regulations by Provincial Directorate of Environment and Forestry, any encouragement, approval, permission or licenses to use the structure cannot be given for this project. As regards the projects subject to EIA Regulations, the authority giving decision EIA positive or EIA negative belongs to the Ministry of Environment and Forests.

Projects subject to EIA regulations complete EIA process by providing points for the related regulations. Companies are obliged to report to IPs positive or negative decision taking in the context of the EIA regulations.

3.2.2 Wastewater Management

“IPs shall be responsible for constructing, maintaining and operating wastewater treatment facilities under the information, supervision, and surveillance of the highest civilian authority of the zone and provided that the provisions of the Water

Pollution Control Regulation published in the Official Gazette numbered 25687 and dated December 31, 2004 are complied with.”

If the IPs are within the municipality boundaries and its wastewaters are connected to the municipality’s wastewater treatment facility, such wastewaters must comply with the municipality’s standards of discharge to the canal. In case of direct discharge to the receiving environment outside the boundaries of the municipality, on the other hand, the Water Products Law published in the Official Gazette numbered 1380 and dated March 22, 1971 must be complied with if such environment is a production field of water products, and if not, conformance to the Water Pollution Control Regulation or the discharge standards established according to regional conditions shall be required. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

According to the article 11th of Environmental Law changed on April 26, 2006; wastewater of the companies, giving industrial wastewater formed as a result of their activities to the receiving environment, is inappropriate and is required to cleanse or dispose the wastewater or get somebody to do this in accordance with standards specified in the regulations and procedures, and alternatively take the foreseen permits.

All of the regulations about wastewater;

- Environmental Law (August 11, 2008 dated and numbered 18132)
- Water Pollution Control Regulation (February 13, 2008 dated and numbered 26786)
- Urban Wastewater Treatment Directive (January 8, 2006 dated and numbered 26047)
- Directive on Water and the Environment of Pollution Caused by Hazardous Substances Control (76/464 / AB) (November 11, 2005 dated and numbered 26005)
- Drinking Water Obtained or planned to Obtain Surface Water Quality Regulation (November 20, 2005 dated and numbered. 25999)

Standards are prepared on the basis of industry separately by taking into consideration the type of industry, small industrial zones, industrial zones and other small businesses established in Turkey.

Mixtures of various industrial wastewaters represent the standards as a group and as a mixed industry sector separately. IPs are evaluated in mixed industry.

In the process of determination process selection and capacity of wastewater treatment plant in IPs;

- A.** More healthy data are obtained by determining the wastewater flow rate and pollution parameters when at least 30% or 40% of industrial parcel go into production in mixed IP.
- B.** Wastewater treatment plant in IP should be constructed in two steps.

After Flow and pollution parameters are detected and process selection first stages of the plant should be done.

When the entire industrial parcel started in production second stage of wastewater treatment plant should be made. In addition, before making second stage of wastewater treatment plant; taking into account the current state flow and pollution of parameters, process the capacity of wastewater treatment plant should be re-evaluated based on new technologies emerging.

C. It seems to be a more realistic approach. Especially as modular planning both of stages of wastewater treatment plant in specialized and mixed IP are used because of tending to show variable of wastewater flow and pollution parameters belonging to IP continuously depending on many factors.

As well as selecting optimal treatment plants in IP in wastewater management system calculating shares of participation of industrial companies in the region to the

initial investment costs, operating costs are extremely important and required. IP Implementation Regulations called as “Contribution of Participants to the Initial Investment and Operating Cost of the Wastewater Treatment Plant “are specified next paragraph in detail in the article.

Contribution of participants to the initial investment and operation cost of the wastewater treatment facility; (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

Companies shall contribute to the investment of the joint wastewater treatment facility based on the flow rate and pollution load ratios to be determined by the board of directors by taking into consideration the size of the parcel at a rate of 25% and the technical characteristics of the wastewater treatment facility at a rate of 75%. Whether or not the participant has put its facility in operation shall not be taken into consideration in the collection of the participation shares in this investment cost.

The participation shares in the operating expenses of the treatment facility, on the other hand, shall be determined by the board of directors by taking the wastewater flow rates and pollution parameters into consideration.

Municipalities shall not collect any wastewater rates under whatever name from the IPs that operate wastewater treatment facilities

IP which have not influent discharge criteria in to the CWWTP, use table 25 in “Water Pollution Control Regulation” is seen Table 3.1

Table 3.1 Wastewater standards in discharge wastewater infrastructure facilities

Parameter	SEWERAGE TREATMENT SYSTEMS RESULT IN FULL TREATMENT WITH THE WASTEWATER INFRASTRUCTURE PLANT	SEWERAGE TREATMENT SYSTEMS RESULT IN DISCHARGE DEEP SEA WITH THE WASTEWATER INFRASTRUCTURE PLANT
Temperature (°C)	40	40
pH	6.5-10.0	6.0-10.0
Suspended Solid (mg/L)	500	350
Oil and grease (mg/L)	250	50
Tar and oils origin petroleum (mg/L)	50	10
Chemical oxygen demand (COD) (mg/L)	4000	600
Biochemical Oxygen Demand (BOD ₅) (mg/L)	-	400
Sulfate (SO ₄ ⁻) (mg/L)	1700	1700
Total Sulfate (S) (mg/L)	2	2
Phenol (mg/L)	20	10
Free chlorine (mg/L)	5	5
Total nitrogen (N) (mg/L)	- ^(a)	40
Total phosphorus (P) (mg/L)	- ^(a)	10
Arsenic (As) (mg/L)	3	10
Total cyanide (Total CN ⁻) (mg/L)	10	10
Total lead (Pb) (mg/L)	3	3
Total cadmium (Cd) (mg/L)	2	2
Total chromium (Cr) (mg/L)	5	5
Total mercury (Hg) (mg/L)	0.2	0.2
Total copper (Cu) (mg/L)	2	2
Total nickel (Ni) (mg/L)	5	5
Total zinc (Zn) (mg/L)	10	10
Total tin (Sn) (mg/L)	5	5
Total silver (Ag) (mg/L)	5	5
Cl ⁻ (Chloride) (mg/L)	10000	-
surface active substances which react Methylene blue (MBAS) (mg/L)	It is prohibited as a principle to discharge that substances non-compliance of biodegradable to Turkish Standards Institute	

3.2.3 Wastewater Infrastructure Facilities Management

The wastewater infrastructure facilities instruction prepared by the IP;

- They shall specify the participants, who shall perform treatment and the amount of wastewater they shall treat depending on the standards of discharge to the canal. Determination of treatment ratios shall be based on laboratory studies and academic reports.

- They shall state that such treatment ratios might be rearranged in case of production increase, change of production technologies, or change of processes.
- They shall include the calculation method for the participation shares in the operation costs of the wastewater treatment facility to be established for the IP (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009).

Right to establish, use, and operate infrastructure facilities in IPs is in the following paragraphs;

- The right and responsibility to establish and operate those required from the infrastructure, general service, social, and similar facilities, such as electricity, drinking and utilization water, and natural gas supply and distribution networks, sewerage and rainwater networks, wastewater treatment facilities, drinking and utilization water treatment facilities, roads inside the IP, communication networks, internet service providers, and sports facilities; to realize their distribution and sales by buying them from public and private agencies; and to establish and operate production facilities within this framework with the aim of meeting the requirements of IPs shall exclusively belong to IPs. However, pre-treatment facilities must be constructed severally in order to reduce the standards of wastewaters to those acceptable by the shared wastewater facility.
- IPs may establish joint-stock companies or become partners of those already established for their activities mentioned in the first paragraph. Contracts of such companies shall include a provision stipulating that the management majority shall remain with the IPs and that this provision may not be amended.

- IPs that are in physical integrity or geographical vicinity with each other may establish or operate joint infrastructure facilities or benefit from those already established under a protocol to be drawn up between them in line with the decisions they shall take in order to meet their infrastructure requirements. Treatment facilities and waste disposal facilities established by IPs may also treat or dispose of wastes from outside the IPs other than their own requirements in order to ensure the economic operation of the facilities, if they have adequate capacities.
- A commission to comprise of the representatives of the Provincial Directorate of Environment and Forestry, the relevant IP, and of either the chamber of industry, chamber of trade and industry, or chamber of trade depending on their presence shall decide whether or not to accept wastes from outside the IP.
- The organizations included in IPs shall be obliged to meet their infrastructure needs from the facilities of the IP. Infrastructure needs may not be met from another facility without the permission of the IP and facilities may not be severally established with this aim. These organizations may not transfer, assign, or allocate the right to use infrastructure facilities allocated to them to other organizations.(IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

Infrastructure management of IP and municipal have to present business delivery plan of wastewater treatment plant to the Ministry by preparing in a year from the date these regulations come into force. Infrastructure management of IP without treatment plants and construction of IP are not started, are required to perform treatment plant construction tender within one year from the date of approval. Take in to operation common treatment plant following three years. In addition are required to. Companies discharging wastewater contains dangerous and harmful substances in the IP, are required to take necessary measures immediately. (Water

Pollution Control Regulation published in the Official Gazette numbered 26786 and dated February 13, 2008)

According to Environmental Law published in the Official Gazette numbered 18132 and dated August 11, 1983);

IP management is responsible for establishment of wastewater infrastructure, maintenance, repair, improvement and operation of wastewater treatment plant in IP.

Companies which take place in IP for their facilities have to take Connection Permission Certificate from the management of IP. The information about Connection Permission Certificate is following paragraph according to IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009

- Companies shall construct the pre-treatment/treatment facility and the inspection chamber if required before the wastewater connection is made to the sewerage system and they shall realize the connection to the sewerage system under the supervision of the IP. Then they shall apply for the “Connection Permission Certificate”.
- Composite samples for 24 hours shall be taken for a maximum period of 30 days upon the start of production and they shall be analyzed by the IP or an institution to be approved by the IP in order to determine the pollution parameters of the facility, provided that the cost of such analyses is paid by the participant.
- The IP shall decide whether or not pre-treatment shall be required by getting checked the conformance of the facility’s wastewater with the “Standards of Discharge to Canal”, which shall be determined according to the wastewater treatment facility inlet parameters.

- The board of directors of the IP shall grant a maximum period of 6 months to the participant to obtain the connection permission certificate. The board of directors of the IP may increase or decrease this period if deemed necessary. The connection permission certificate may not be granted to any participants unless the standards of discharge to the canal are achieved.
- If the participant fails to obtain the connection permission certificate within a maximum period of 6 months, it shall be deemed to have agreed to any sanctions to be applied by the IP.
- The technical and administrative liability for the information included in the connection permission certificate shall belong to the participant.
- The inspection chamber shall be designed with a size that would allow the placement of the flow meter, the pH measuring device, and similar devices of measurement and as specified by the IP. The participant shall be obliged to preserve the treatment center and the inspection chamber in good condition, if any, and to keep the measurement facilities ready for inspection at all times.
- The IP may request the replacement of the technical personnel in charge, whose name is given in the connection permission certificate, whenever it deems necessary.
- The IP may perform or get other to perform the analyses it requests independent from the measurement range specified in the connection permission certificate whenever it deems necessary, provided that the cost of such analyses are borne by the participant.
- If the participant has a wastewater treatment facility, it shall provide the technical information and documents related to such facility to the IP in the form of a report. Any changes that might be made in the capacity or the

process of the wastewater treatment facility shall be notified to the IP in advance. The inlet flow rate and pollution parameter values of the wastewater treatment facility shall be submitted to the IP in the form of monthly reports.

- The IP may require additional measures for the sources, where sudden discharges or spills may take place or which it deems necessary.
- It shall be prohibited to dilute wastewaters with rain waters, cooling waters, lightly polluted washing waters, and similar lightly polluted waters in order to achieve the discharge standards and to eliminate the requirement for pre-treatment. With this aim, the sewerage system in IPs shall be constructed in the form of a detached system. The rain water outlets of the participants shall be connected to the rain water drainage network after the water is passed through stilling basins and oil deflectors.
- No unauthorized official or private persons or organizations may touch the sewerage system, open the manhole covers of the canal networks, excavate the places through which the system passes, displace the networks, construct connection canals, or connect to the network system without the written permission of the IP. Water may not be taken from the sewerage facilities to be used for any purpose what so ever.
- Connection permission certificates shall be valid for periods of three years. Those participants who shall make changes in the production amount and arrangement or type of activity shall be obliged to renew the certificate by applying to the IP.

According to IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009; the wastes, residues, and other substances that shall not be discharged to the sewerage network are listed following paragraph.

1) Substances, which impair the treatment efficiency of the treatment facility and adversely affect the operation of mud facilities or elimination of mud and those, which corrode the wastewater treatment facility or its units, prevent, make difficult, or endanger their functions or maintenance, and harm the personnel working in these facilities as well as the quality of the receiving environment shall be prohibited from being discharged to the sewerage network. The wastes, residues, and other substances listed below may not be discharged to the sewerage network by any means:

- Particularly inflammable and explosive or poisonous substances, fuel oil, gasoline, naphtha, diesel fuel, benzene, solvents, carbide, phenol, petroleum, poisonous substances, oils, greases, acids, alkalis, heavy metal salts, pesticides or similar toxic chemical substances, bloody wastes excluding the diluted blood resulting from processes after washing, and substances carrying pathogens,
- Any substance which can transform to the gaseous phase, create smoke, odor, health risks due to poisonous effects and therefore prevent entrance to the canals, as well as maintenance and repair,
- Hair, feather, fiber, sand, cinder, soil, marble and marble powder, metal, glass, trash, debris, animal feces, kitchen leftovers, cellulose, tar, fodders, sawdust, metal and wood pieces, carcasses, paunch contents, grape pulp, fruit pulp, fermented wastes, mud, ice remnants, paper plates and cups, milk containers, plant wastes, rags, wood, plastics, fertilizers, oil cakes, residues of animal feed, and all sorts of similar solid substances and materials that might cause blockage in the canal network or prevent the normal flow of water and the functioning of the canal,
- Any corrosive substances that would damage or abrade the canal structure, alkalis, acids, wastes with a pH value of lower than 6.5 and higher than 10, which may create a sulphate concentration level of higher than 1,700 mg/L

in the sewerage system they are discharged to, anionic surface active substances of whatever flow rate, which may create foam in the canal network, detergent waters with a concentration level of higher than 400 mg/L,

- Any substances the temperature of which ranges between 5 °C and 40 °C and which, precipitate, solidify, transform into viscous state, or which might create solid or viscous layers on the walls of the canal,
- Substances with radioactive characteristics,
- All wastes classified as hazardous and harmful wastes pursuant to the standards of the World Health Organization and other effective international standards as well as the national legislation and standards,
- When discharge to the sewerage system and to the receiving environment outside the land is concerned, the pre-treatment or treatment facility mud and the mud created in storage and septic tanks,
- All sorts of solid wastes and residues,
- Cooling waters that do not contain contaminating substances without the written permission of the IP.

2) When discharge to the sewerage system and to the receiving environment outside the land is concerned, the pre-treatment or treatment facility mud and the mud created in storage and septic tanks shall be removed to places to be determined by the IP and by taking the appropriate technical measures.

The participant shall be directly liable for any and all damages and losses that might occur if the wastes specified in this article are discharged to the IP sewerage

system. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

3.2.4 Solid Waste Management

Solid wastes resulted from production and kitchen in the IPs

- The Waste Control Instruction prepared by the IP shall specify where and how the disposal of all sorts of wastes created as a result of the activities of the participants shall be realized.
- If the solid wastes created in the IP are discharged to the municipality, the environmental legislation must be complied with.
- Participation shares in the initial investment and operating costs arising from the disposal of solid wastes as well as the calculation method based on the types and amounts of the solid wastes shall be included in the Waste Control Instruction.
- The cost arising from the removal of solid wastes shall be paid by the participant. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

3.2.4.1 House Hold Waste Management

Household wastes resulted from kitchen of the companies are collected by IP regularly.

Household wastes are not thrown away containers of companies that collect solid wastes resulted from industrial plant and realize transport services available in the IP. Regional staff and staff person working in companies must be warned about this issue.

3.2.4.2 Package Waste Management

Companies, who produce package wastes, shall be obliged to collect the plastic, metal, and glass, paper, and carton, composite and similar package wastes, to decompose them at their sources, and give them to the IP. The IP shall collect, store, transport, and utilize these wastes in compliance with the environmental legislation. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

According to Regulation on Packaging and Packaging Waste Control;

Consumers have the liability to store package wastes separately from the other wastes and to make them ready for the collection system as required by the municipality or authorized institution, regardless of the material used (plastic, metal, glass, paper-cardboard, composite and similar materials) and the resource (domestic, industrial, commercial, business). (Regulation on Packaging and Packaging Waste Control published in the Official Gazette numbered 26562 and dated June 25, 2007)

The management of single apartment buildings and apartment blocks is supposed to take necessary measures regarding the storage of package wastes separately from other wastes and giving them to the collection system as required by the municipality or authorized institutions.

Measures are also supposed to be taken by relevant managements as regards the separate collection of package wastes at locations, where the consumer traffic is very high, and where high amounts of package wastes are produced, such as schools, universities, public enterprises and institutions, hospitals, hotels, restaurants, buffets, inter-city bus terminals, airports, railway stations, ports, health institutions, sport halls, business centers and malls, stadiums, etc.

The managements at IP, industrial sites, free zones are supposed to take necessary measures to separately collect the solid wastes. (Regulation on Packaging and

Packaging Waste Control published in the Official Gazette numbered 26562 and dated June 25, 2007 change numbered 27046 and dated November 6, 2008)

3.2.5 Air Quality Management

Disposal of dust, gas emissions, and similar wastes that might cause air pollution as a result of the activities of the participants shall be carried out in compliance with the Regulation on the Control of Air Pollution Caused by Heating, published in the Official Gazette numbered 25699 and dated January 13, 2005, the Regulation on the Control of Air Pollution Caused by Industrial Facilities, published in the Official Gazette numbered 26236 and dated July 22, 2006, and the Instruction on the Protection of Air Quality prepared by the IP based on these Regulations.

Emission permissions shall be obtained at the stage of starting production pursuant to the said regulations. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

IPs are responsible for following directions about Air Quality.

- Regulation on the Control of Industrial Air Pollution published in the Official Gazette numbered 27277 and dated July 3, 2009
- Exhaust Gas Emission Control Regulation published in the Official Gazette numbered 27190 and dated April 4, 2009
- Control of Air Pollution Resulted from the warm Regulation published in the Official Gazette numbered 25699 and dated January 13, 2009
- Regulation related to Reduction of Material which thinning Ozone Layer
- Air Quality Assessment and Management Regulations published in the Official Gazette numbered 26898 and dated June 6, 2009
- Gasoline and Diesel Fuel Quality Directive published in the Official Gazette numbered 25489 and dated June 11, 2009

3.2.6 Hazardous and Medical Waste Management

The IP shall be authorized to ensure the companies' compliance with their obligations and to supervise them within the framework of the Regulation on the Control of Hazardous Wastes, which was published in the Official Gazette numbered 25755 and dated March 14, 2005, and the Regulation on the Control of Medical Wastes, which was published in the Official Gazette numbered 25883 and dated July 22, 2005.

Companies shall store their hazardous wastes and medical wastes, if any, on a temporary basis, get them transported by licensed carriers, and disposed of in licensed facilities.

In order for immediate response to be given at the time of any accident, the storage containers must be constructed above the ground. A waste collection depot shall be constructed in order to prevent the polluted water from leaking into the underground and from polluting the soil in the surroundings. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

3.2.7 Chemical Substances and Products Management

IP is authorized to ensure that the companies fulfill their responsibilities as per the "Regulation on Control of the Harmful Chemical Substances and Products" to follow the same procedures.

The harmful substances and products are stored as per the conditions laid down by the Regulation on Control of the Harmful Chemical Substances and Products.

The stores where the harmful chemical substances and products are kept are equipped with necessary systems such as heat, isolation, protection from lightning,

air conditioning, fire defense and constructed with the materials in compliance with the purpose of considering the damages to be caused by the substances stored.

In the IPs with an established fire organization, the participants practice the measures to be taken against the fires and explosions requested by the fire department.

IP are responsible for following regulation related to Chemical Substances and Products such as hazardous wastes.

- Regulation on Classification Packaging and Labels of Hazardous Substances and Preparations
- Regulations on Preparation and Distribution of Safety Data Sheet Related to Dangerous Substances and Preparations
- Regulation on Restrictions Relating to Some of Hazardous Substances, Preparations and Production of Goods, Market Supply and Use the

3.2.8 Noise Management

Noise levels that shall occur as a result of the activities of the participants shall be lowered in compliance with the Regulation on the Assessment and Management of Environmental Noise, which was published in the Official Gazette, numbered 26809 and dated March 7, 2008, and the Instruction on the Noise Control Instruction prepared by the IP based on this Regulation. (IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009)

According to Regulation on the Assessment and Management of Environmental Noise;

Total environmental noise level emitted to the environment from multiple businesses, shop and workshop area where similar businesses and Organized or Specialization Industrial Zone may not exceed background noise level more than the range of 7-10 dBA in terms of noise indicators L_{eq} . Total environmental noise level

is determined by the devolution of municipal borders and related municipality in contiguous areas and; special provincial administrations made the transfer of powers except in contiguous areas Provincial Directorate of Environment and Forestry, if not done by taken into consideration the number of people affected in the areas exposure noise, noise source and the distance between noise sensitive location and the other factors. (Regulation on the Assessment and Management of Environmental Noise published in the Official Gazette numbered 26809 March 7, 2008)

As seen Table 3.2 every company in IP or Specialized Industrial Parks are required to provide limit values according to Regulation on the Assessment and Management of Environmental Noise published in the Official Gazette numbered 26809 March 7, 2008

Table 3.2 Environmental noise limit values for industrial facilities in companies.

Areas	L _{noon} (dBA)	L _{evening} (dBA)	L _{night} (dBA)
Every companies in IP or Specialized Industrial Zone	70	65	60

3.2.9 Fire Defense Management System

The IPs prepare and apply the directives stating the acts and deeds necessary in the situations calling for emergent intervention such as being protected from security, fire and disaster in compliance with the industrial structure, geographical position and similar conditions. Besides they may establish fire department as per article ANNEX-9 of the Civil Defense Law number 7126 and other respective legislations. In this case fire safety and efficiency applications are carried out by their own fire defense groups.

CHAPTER FOUR

THE RESEARCH AREA: IZMIR ATATURK INDUSTRIAL PARK

4.1 Material and Method

Izmir Ataturk Industrial Parks was chosen as study area. In addition Denizli IP EMS information involved Appendix 4.

A study of questionnaire which is one of the most frequently referenced in this way, is selected as a means of data collection in research.

It was considered that section of questionnaire applied to businesses as possible were composed of questions helping the aim of the study.

As more than one question given for testing some hypothesis, opportunity was presented to companies for writing a comment more freely and more detailed in comments section including similar questions.

Prepared questionnaire consists of three sections and has a total of 40 questions (Appendix 1).

The first section of the questionnaire is included with company information, such as the company's products, size, employment capacity, production technology, natural resources and energy usage.

In the second section; there are questions prepared about waste management information. The questions in this section were asked to identify how they evaluate their wastes and what they do on this issue in terms of laws and environment.

The third section of questionnaire prepared contains environmental management information. It can put forward information about environmental management and what they do in practice concerning environment.

In the last part of the open-ended questionnaire includes two questions. In companies, it is required to reach if there are missing issues with this section that authorities will report their views easily in a way and requested to support the data in a multiple-choice questionnaire.

Firstly, the management of IP was informed about the thesis and the questionnaire planned implementation by meeting face to face.

Then it has been admitted to the regional office of IAIP with an official letter to implement the survey.

The information of all the businesses about sector distribution of the industries, addresses, telephone, fax and mail is taken from the management of IAIP. In additionally settlement plan belongs to the region is taken too.

The firstly it was preferred to fill by viewing face to face survey questions. The companies were called and were tried to get appointments related to units of environmental management in companies. The questionnaire was sent to e-mail addresses of companies that could not be reached for various reasons. To allow participation, it has been met with company officials by calling and informed about purpose of the survey. The survey was initially scheduled to be applied to all enterprises. But after negotiations with companies, some companies refused to participate in the survey in any way. It was gone to way of providing data from companies' different sizes and sectors for healthy assessment. For this purpose, the sectoral distribution of companies in organized industrial zone was taken into consideration. So companies from every sector were included in terms of varieties of their wastes. IP's management is more sensible than the industrialists. Because some of companies don not allow to their information be used.

It has experienced problems with companies applied questionnaire about taking companies' information

Some companies did not want to be used their company's name, refused to give information the number of people working, water and electricity information with the idea of will have problems some public institutions due to the information they provide information.

It has experienced difficulty access to digital data regarding energy, raw materials, waste belonging to companies. Therefore, the rate of the answer of these questions is rather low in the region. It is not known how much of the water used in the industry facilities or household. The data drawn from some companies has been checked with the data determined values scientifically on this subject. For example, daily water consumption 200 L / per capita, amount of solid waste 1 kg / per capita are based on such as values. Only one method could not be applied in research because the companies are not willing to participate in the survey apart from a few companies. Some companies which can be reached are applied questionnaire by discussing face to face. The questionnaire was left to companies which cannot be reached. After they had completed the questionnaire, it was collected. 35 companies from different sectors were reached and applied questionnaire. Only 35 companies contributed to the research strictly.

SPSS is a computer program used for statistical analysis. Between 2009 and 2010 the premier software for SPSS was called PASW (Predictive Analytics SoftWare) Statistics. SPSS was used in the evaluation of questionnaire information. Different assessment methods were used according to the nature of questions when the questions the questionnaire to companies applied the assessment. Open-ended questions were subjected to separate reviews. Multiple-choice questions organized into two types in themselves. In the evaluating multiple-choice questions which can choose only one option percentage zone diagrams have been used. The questions aiming at measuring the level of significance were evaluated as multiple choice questions because some companies circled only one option. While evaluating the

answers given to these questions, the evaluation was performed by taking the first-priority value into consideration.

A computer program was developed for EMS. The section of EMS and waste management information were involved. Data storage should be formed and approach EMS easily.

4.2 The Research Area: Izmir Ataturk IP (IAIP)



Figure 4.1 A satellite image of IAIP

IAIP in the North West of the center of Izmir, is located on an area in north and south the old road built of Çiğli Airport. The land covers an area approximately $7\,000\,000\text{ m}^2$ (700 ha). Bigger area in the Figure 4.1 shows boundary of IAIP, small area shows Centralized Waste Water Treatment Plant of IAIP.

IAIP, is one of the most modern and the biggest industrial park of Turkey (Figure 4.1). It was put in to operation in 1990. The region, is located at a distance of 25 km to city center, 35 km to Adnan Menderes Airport, 20km to Izmir Alsancak Harbor.

526 factories are still producing in IAIP and 200 companies of total are exporting. There are 15 foreign-owned companies in this region. 30 000 people are employed in the companies (M.Karadaş personal communication 10.10.2010).

The companies are mainly are concentrated on machinery, metals, electrical and electronic sectors, plastics, food, textiles, clothing, chemicals, in the IAIP.



Figure 4.2 An appearance from IAIP

There are 600 industrial plots changing size between 1000 m^2 (0.1 ha) to $90\,000 \text{ m}^2$ (9 ha) in the region. Some of the companies are seen in Figure 4.2

Table 4.1 The areas in IAIP

The name of the area	The measurement of area (m ²)
Industrial Plots	4* 10 ⁶ (400 ha)
Social and Administrative Facilities	12* 10 ⁴ (12 ha)
Sports Fields	15*10 ⁴ (15 ha)
Centralized Waste Water Treatment Plants	2*10 ⁵ (20 ha)
Infrastructure Reserve Areas	12*10 ⁴ (12 ha)
Power Plant	4*10 ⁴ (4 ha)
Roads, Public Parking Lots and Green Areas	237*10 ⁴ (237 ha)
Total Area	700*10 ⁴ (7 ha)



Figure 4.3 Fire and swimming pool of IAIP

Above seen Figure 4.3 swimming pool was built in 2009. This pool is used for fire if it is required. The capacity of pool is 2000 m³ .The other pictures of related pool are given Appendix 2.

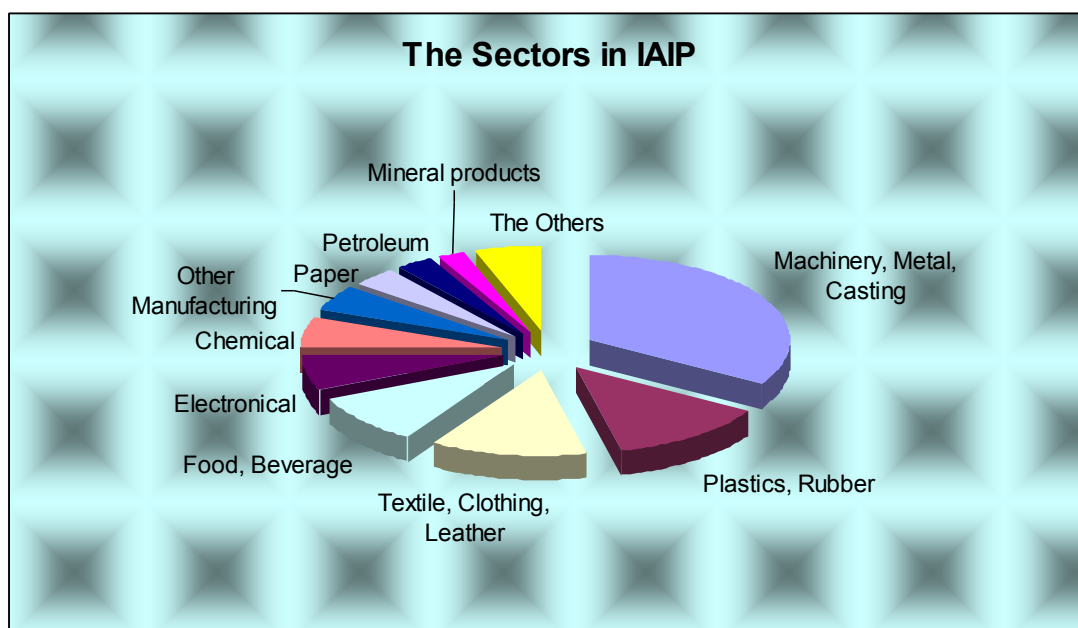


Figure 4.4 The sectors in IAIP (IAIP Management)

Table 4.2 The sectoral distribution of companies in IAIP (IAIP Management)

The Sectors in IAIP	The number of company
Machinery, Metal, Casting Industry	148
Plastics, Rubber Industry	57
Electricity, Electronic Industry	30
Furniture Industry	8
Food, Beverage Industry	42
Tobacco Industry	1
Textile, Clothing, Leather Industry	55
Wood Products Industry	1
Paper Products Industry	16
Petroleum Industry	14
Chemical Industry	25
Pharmacy Industry	5
Mineral Products Industry	10
Other Transportation Tools Industry	8
Other Manufacturing Industry	22
Total	442

4.3 The Result of the Questionnaire in Research Area

4.3.1 Production Information

4.3.1.1 The Sectors of Companies

Sectoral distribution of companies in IAIP are seen in Table 4.2. The sectors are seen Figure 4.4 too.

4.3.1.2 The Number of Workers in Companies

Learning the number of workers, will be useful for determining amount of domestic water consumed daily and solid waste formed. Distribution the number of workers in companies in IAIP is located in Table 4.3

Table 4.3 The number of workers in IAIP

The number of workers	The number of company
1-25	3
25-50	9
50-100	3
100-200	12
Over 200	7
No Answer	1
Total Number	35

4.3.1.3 The Technology of Companies

From the companies attended in research; 9 companies have been using technology for 1-years, 8 companies have been using technology for 5-10 years, 10 companies have been using technology for 10-15 years, and 7 companies have been using technology for over 20 years.

It can be seen from the Table 4.4 that technologies used by 50% of companies are very old.

Table 4.4 The time of using technology by the companies in IAIP

Year of technologies in produce used by companies	The number of Company
1- 5	9
5-10	8
10-20	10
Over 20	7
No answer	1
Total	35

Sixteen companies replied that there is no alternative technology about their way of production. On the other hand sixteen companies answered 'yes' this question. So their opinion is alternative technology in their production. Their priorities in choosing alternative technology of production are very important in terms of approach of companies in industrial parks about environment and giving the first clues of practices in this regard. 32 companies preferred reduce of product prices primarily when they choose an alternative product technology as can be understood from the Table 4.5. Only one company stated that environmental aspects are the most important factor on choosing alternative product technology.

Table 4.5 The reasons of choosing alternative technologies in IAIP

The advantages	Number of companies
The Reduce of product prices	32
The reduce of the stage of production	2
Environmental aspects	1
Total	35

From the companies which changed their process in production until now; 17 companies changed their process in production as a result of research-development, 13 companies changed their process in production by buying a new material and only 2 companies changed it because of affect of pollutant. (Table 4.6)

Table 4.6 The reason of change of technology in IAIP

The reason of change of technology	Number of companies
Research-Development	17
Buying a new material	13
Affect of pollutant	2
No answer	3
Total	35

4.3.1.4 The Use of Natural Sources

Many of companies do not know the amount of water used by the companies during the production. It has been trying to learn their priorities on this issue, their approaches using natural sources effectively and efficiently and the use of recyclable resources.

Every company in IAIP uses water for domestic purposes and industrial purposes by means of network of the city. Only one company treated wastewater forming a section of production with advance treatment and use treated water again in a portion of manufacturing.



Figure 4.5 The water network in IAIP

Water network as seen Figure 4.5 in IAIP was renewed in 2005. It applied for companies to distribute water continuously, high quality and appropriate pressure with renewal of the network. Water quality is being controlled in certain points of the network regularly by doing chemical and bacteriological analysis of water in laboratories.

Drainage network of 75 km and consist of 9 pump stations in IAIP are available to protect against floods and flooding as seen Figure 4.6



Figure 4.6 The rain water network in IAIP

Table 4.7 The amount of domestic water in IAIP

Amount of domestic water (ton / year)	The number of companies
Under 10	11
10-100	15
100- 1000	1
No answer	8
Total	35

As seen Table 4.7 eight companies do not know the amount of domestic water which they used. Besides the number of the companies which do not know the amount of industrial water used in the production, is more (Table 4.8). Learning the amount of the water used industry and domestic; contribute learning the amount of the wastewater formed in companies. Most of the authorities of companies applied questionnaire in IAIP do not know how much the water used for domestic or industry.

Table 4.8 The amount of industrial water in IAIP

Amount of industrial water (ton / year)	The number of companies
Under 10	3
10-100	7
100- 1000	7
Over the 1000	1
No answer	17
Total	35

4.3.1.5 The Use of Energy Sources

As can be seen from the Table 4.9, 51% of companies use natural gas in the IAIP. As seen Figure 4.7 natural gas distribution lines in the region was completed in 2004. Approximately $19 \times 10^6 \text{ m}^3$ / month natural gas is used in the region.

Table 4.9 Energy sources in IAIP

Energy sources	The Number Of Companies
Coal	2
Fuel oil	1
Lpg	1
Natural gas	18
Coal +Natural gas	1
Fuel oil + Natural gas	1
The others	10
No answer	1
Total	35



Figure 4.7 The natural gas network in IAIP



Figure 4.8 Ataer energy power plants in IAIP

Other energy source they use is electricity. Ataer Power Plant (Figure 4.8) meets the power needs of companies in IAIP. Its capacity of the annual electricity production is 440 million kWh. Installed capacity of power plant is 120 MW. The amount of electric used by companies seen Table 4.10

Table 4.10 The amount of using of electric in IAIP

The amount of using of electric (10^3 kW/ year)	The number of companies
10- 100	4
100- 500	6
500- 1000	2
1000- 10000	10
Over 10000	1
No answer	12
Total	35

The purpose of the question about the factors that have influenced the choice of their energy sources is to learn how to be effective environmental factors in this regard.

As can be seen Table 4.11, 80% of companies preferred the economic factor in choosing fuel. Only two companies thought that pollutant effects of fuel are the most important factor in choosing fuel.

Table 4.11 The reason of choosing energy sources

The reason of choosing energy sources	The number of companies
Economic factor	28
To be with less waste	1
Decreased bit pollutant effects	2
Easy reached	3
No answer	1
Total	35

4.3.2 Waste Management Information in IAIP

Various data were provided such waste types, quantities and how evaluate wastes of companies in IAIP by means of questions asked in this part of the survey. It is tried to evaluate how they are approaching legal and environmental issues with the help of these basic information related to waste management.

4.3.2.1 Wastewater Management

Percentage of response to the questions asked about the average amount of waste and waste types is low. The companies have difficulty discriminating between domestic and industrial wastewater.

Twenty companies stated that they have liquid waste, some of which are the water used in production. (Table 4.12)

Table 4.12 The amount of wastewater

Amount of Liquid waste	The number of companies
1- 10	6
10- 100	3
100- 1000	2
Over 1000	5
Unknown	4
No answer	15
Total	20

Wastewater features in the industry are very diverse according to the technical and material used in production, some of which are dissolved organic matter that causes the reduction of dissolved oxygen, suspended solids, heavy metals, cyanide, and toxic organics e.t.c.

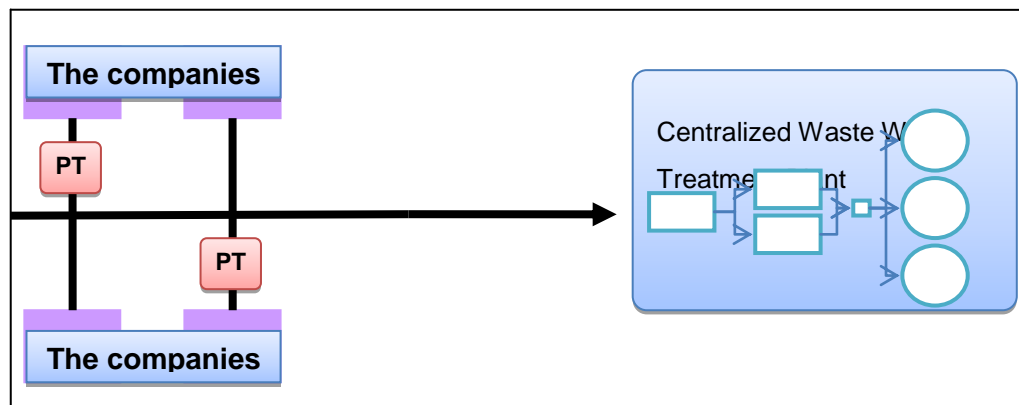


Figure 4.9 Wastewater treatment plant schemas

If the value of wastewater going out the companies is higher than the value of access in wastewater treatment plant of IAIP; the companies have to build pre treatment (PT) plant (Figure 4.9).

Table 4.13 The existence of Pre- Treatment

Pre-treatment	The number of companies
There is a pre-treatment	9
There is no pre-treatment	26
Total	35

Nine companies have the pre-treatment in IAIP (Figure 4.13). The types of pre-treatment are below in Table 4.14. The companies with pre-treatment are food, textile, machine, and package, mining and metal industry. The companies' discharge points are different from each other. (Table 4.15)

Table 4.14 Types of pre-treatment of companies

Types of pre-treatment	The number of companies
Physical treatment	5
Chemical treatment	3
Biological treatment	1
No Treatment	26
Total	35

Table 4.15 The way of discharge of pre-treatment

The way of discharge	The number of companies
Sewage system	5
Reuse	1
IAIP	3
No pre-treatment	26
Total	35



Figure 4.10 CWWTP of IAIP

Wastewaters are created by companies are collected in the sewerage system and conducted CWWTP in IAIP. The wastewater is purified in wastewater treatment plant without harmful to the environment. Wastewater treatment plant has a total treatment capacity of $21 \cdot 10^3 \text{ m}^3/\text{day}$ seen Figure 4.10. CWWTP is built in two stages. First section's capacity is $12 \cdot 10^3 \text{ m}^3 / \text{day}$ and the second section has treatment capacity of $9 \cdot 10^3 \text{ m}^3 / \text{day}$

Because some companies do not provide input criteria of CWWTP, they built pre-treatment process. Input criteria of CWWTP seen in Table 4.16

Table 4.16 Input criteria of CWWTP

Parameter	Maximum daily 2-hour composite mg/L	24-hour composite mg/L
Suspended Solids	200	200
Oil and grease	100	100
Cadmium, Cd	1.5	1.5
Heksavalent chrome, Cr ⁺⁶	0.5	0.5
Total Chrome, TCr	3	3
Copper, Cu	5	2
Lead, Pb	2	2
Nickel, Ni	4	4
Zinc, Zn	7	7
Mercury, Hg	0.2	0.2
Total Cyanide, TCN	2	0.5
Fluoride	300	300
pH	6- 10	6- 10
Phenols		
COD	1050	

CWWTP of IAIP consists of physical, chemical, biological and sludge treatment. The wastewaters of coming from 150 companies are treated by CWWTP. 60 companies in IAIP have pre-treatment plant for treating wastewater. After drying beds the treatment sludge is disposed in Çimentaş (Cemetery Factory) in Izmir. Treated wastewater is discharged old Gediz river bed. The treated discharged water should comply the values of Table 19 in Water pollution Control Regulation published in the official gazette numbered 25687 and dated December 31, 2004 given in Table 4.17

Table 4.17 Mixed industrial wastewater discharge standard of receiving media (Small and large industrial parks and other industries that cannot be made to determine sectors)

Parameter	Composite Sample 2-hour mg/L	Composite Sample 24-hour mg/L
Chemical Oxygen Demand (COD)	400	300
Suspended Solids (SS)	200	100
Oil and grease	20	10
TotalFluoride	2	1
Total Chrome	2	1
Chrome (Cr ⁺⁶)	0.5	0.5
Lead (Pb)	2	1
Total Cyanide (CN ⁻)	1	0.5
Cadmium (Cd)	0.1	-
Iron (Fe)	10	-
Fluoride (F ⁻)	15	-
Copper (Cu)	3	-
Zinc (Zn)	5	-
Mercury (Hg)	-	0.05
Sulfate (SO ₄)	1500	1500
Total Kjeldahl-Nitrogen	20	15
Fish Biotest (ZSF)	10	10
pH	6-9	6-9

4.3.2.2 Solid Waste Management

Solid wastes consist of domestic solid wastes and industrial solid wastes. Domestic solid wastes are formed wastes in the kitchen during the day. Industrial solid wastes occur during the production. If industrial solid wastes include hazardous material they are evaluated within the hazardous waste management.

All companies attended in the research, accept having solid wastes except for seven companies. Companies have difficulty discriminating between domestic and industrial solid wastes.

Table 4.18 The state of solid wastes

Solid wastes	The number of companies
There is solid waste	27
There is no solid waste	7
No answer	1
Total	35

Table 4.19 The amount of solid wastes

Amount of solid wastes (Ton /year)	The number of companies
1- 10	5
10- 100	7
100- 1000	4
Over 1000	2
Unknown	17
Total	35

As seen in Table 4.19; only 18 companies have known the amount of their industrial solid wastes. Four companies having more than 100 tons of industrial waste are from the automotive, food and tobacco processing industries. Only two companies having solid wastes more than 1000 tons are from the mining and food industry.

Solid waste arises from production processes and kitchen waste. These solid wastes are divided into hazardous or the solid wastes without hazardous material. The wastes without hazardous material are waste packaging and kitchen waste. As seen in table 4.20, thirty-one companies separate their solid waste. Solid wastes are evaluated separately in these companies.

Table 4.20 The separation of solid waste

Separation of Solid Waste	The number of companies
Separation of solid waste	31
No separation of solid waste	3
No answer	1
Total	35

A protocol was signed between IAIP, Izmir Metropolitan Municipality IZGEP Waste Collection and Recycling for the purpose of eliminating packaging waste, reducing environmental pollution without harming the environment after new regulations came in. According to the protocol between IAIP and IZGEP, Metropolitan Municipality, glass, metal, plastics, beverage cartons, paper, cardboard, etc. from companies within IAIP will be collected separately from other waste and re-cycled back into the system. Packaging waste will be disposed of by IZGEP rubbish-collection vehicles on specific days.

Municipal waste resulted from facilities in the region is collected with the three pieces of compressed garbage truck regularly six days a week and transported to Metropolitan municipal dump.

Table 4.21 Assessment of solid waste

Assessment of solid waste	The number of companies
Licensed company	12
İZGEB	1
Selling	5
Recycling among companies	5
Landfill	1
No Answer	11
Total	35

According to this research, the waste of fifteen companies is being re-used by other companies. For example, solid waste from the mining industry is being re-used as the raw material of the ceramics industry. So many wastes are being recycled.

Whereas nine companies are close to the companies to which their waste is given as raw material, another thirteen of the companies are far away. 22 companies gave the answer to this question as relating to the distance involved, but 15 companies said that their waste *is* re-used by other companies. Following table shows other solid waste management examples (Table 4.22).

Table 4.22 Solid waste management examples in IAIP

Activity	Waste Types	Amount of Waste	Disposal Methods
Wheel Manufacturing Industry	Rubber	1.2 tons /year	Harmandalı Landfill
Printing Postcards and Invitations	1. Packing boxes with ink 2. Contaminated cloth 3. Developer liquid of bath	1.1500 kg 2. 1500 kg 3. 600 kg	1. Recycling 2. Disposal 3. Recycling
Water Meters Manufacturing	1. Biological waste 2. Industrial waste	1. 500 kg /year 2. 1500 tons /year	1. Sewage system 2. Giving the company which recycle wastes
Production of Equipment Over Vehicles	1. Hydraulic oil waste 2. Machine oil waste	1. 100 L /year 2. 200 L /year	1. Recovery 100 % 2. Incineration
Iron and Steel Industry	1. Paper work wastes 2. House hold wastes 3. Iron and steel wastes		1. Selling 2. Garbage 3. Selling
Manufacturing of PVC Door and Window	PVC wastes	100 kg/day	Selling to companies which recycle wastes
Production of refined salt	1. Processing waste content mineral 2. Waste oil	1.3-5 tons /month 2. 700 tons /year	1. Harmandalı landfill 2. Incineration
Sticker	Paper wastes	110 kg/day	Harmandalı landfill
Automotive Industry	1. Mineral-Based Hydraulic Oils without chlorine 2. Iron sawdust 3. Aluminum sawdust 4. Iron scrap		Wastes have been collected separately in sources since April 1, 2009

Table 4.22 Solid waste management examples in IAIP (continue)

Activity	Waste Types	Amount of Waste	Disposal Methods
Production of printing inks	1. Package including hazardous wastes 2. Other organic solvents 3. Waste Paint Or Solvent Removing Varnish 4. Ink sludge 5. Contaminated Absorbent	1. 20933.5 kg/year 2. 17300 kg /year 3. 21700 kg /year 4. 840 kg /year 5. 1940 kg /year	Send wastes to recycling plant.
Candles Manufacturing	Cartoons	25 kg/day	Send wastes to companies contracted.
Automotive Industry	1. House hold wastes 2. Industrial wastes		Recovery
Textile Industry	Sludge Wastes	14.1 ton	Harmandalı Landfill
Production of table and chair	1. Contaminated packaging, 2. Chrome sludge, 3. Waste oil	1. 300 kg 2. 100 kg 3. 75 kg	1. Incineration 2. Incineration 3. Refined
Aluminum Industry	1. Aluminum machining 2. Aluminum ramat 3. Waste oil 4. Chemical treatment sludge	1. 20933.5 kg/year 2. 17300 kg /year 3. 21700 kg /year 4. 840 kg /year	Recycling and Incineration
Manufacturing of air conditioner central	Scrap	10 tons /year	Selling
Plastics Industry	1. Domestic wastes 2. Mixed wastes 3. Mixed chemical wastes 4. Iron wastes 5. Scrap without iron 6. Plastics wastes 7. Chemical wastes	1. 51550 kg/year 2. 154970 kg/ year 3.99644 kg/ year 4. 53818 kg/ year 5. 4066 kg/ year 6. 340886 kg/ year 7. 40940 kg/ year	Disposed by municipality, IAIP and private sector.
Production of Spice-Pulse	Soil and straw	18 tons /year	Harmandalı Landfill
Production of Hemodialysis Solution	1. Domestic waste 2. Raw material package wastes 3. Purified wastewater wastes	1. 5 kg/day 2. 3 kg/ day 3.250-300 tons/ year	1. Garbage 2. Recycling company 3. Sewage of IAIP

Table 4.22 Solid waste management examples in IAIP (continue)

Activity	Waste Types	Amount of Waste	Disposal Methods
Clutch Manufacturing for vehicle	1. Contaminated packaging, 2. Boron Oil, 3. Contaminated sawdust, 4. Sandblasting waste	1. 200 kg/year 2. 1500 kg/ year 3.1500 kg/ year 4. 350 kg/ year	Recovery
Manufacturing carpet	1. Food waste, 2. Yarn waste, 3. Garden and plant waste	1. 8 kg/day 2. 10 kg/ day 3.2 tons/ year	1. Garbage 2. Harmandalı Landfill
Leather Industry	Leather wastes	20 tons	Garbage
Textile Industry	Scrap and pumice	70 tons / year	Harmandalı Landfill
Manufacturing small house tools	1. Package wastes consisting hazardous material 2. Package wastes consisting hazardous material 3. Waste Paint Or Solvent Removing Varnish 4. Plastics wastes 5. Other Hydraulic Oils	1. 0.62 tons/ year 2. 12.899 tons/ year 3.0.2 tons/year 4. 5.549 tons/year 5. 0.72 tons/ year	Giving the company which recycle wastes
Manufacturing of mineral oil	1. Package wastes consisting hazardous material 2. Waste oil	1. 30 tons/ year 2. 5 tons/ year	Giving the company which recycle wastes
Manufacturing Machinery and Motor Vehicle Parts	1. Organic wastes 2. Package wastes	10 kg /day	1. Garbage 2. Collecting
Automotive Industry	1. Oil wastes 2. Package wastes consisting hazardous material	1. 3.5- 4 tons/ year 2. 4 tons/ month	Recycling of Waste Oil with Regeneration with refining

4.3.2.3 Air Quality Management

Any substance that changes the natural composition of air is called as the air pollutants. The emission emitted by the pollutant sources (homes, industry, vehicles) to the environment is the pollutants in the gas or powder.

Four companies surveyed stated that they have gas wastes, which are food, metal and package industries (Table 4.23). Three companies surveyed stated that they do

have gas wastes but do not know their amount of gas wastes. One company from metal industry stated the amount of gas wastes.

Table 4.23 The State of Gas Waste

Gas waste	The number of companies
There is gas waste	4
There is no gas waste	29
No answer	2
Total	35

Twenty companies take measurement in their stack. Because of lots of companies use natural gas as fuel, they have no air pollution in large scales.

Table 4.24 Measurement of gas waste

Stack measurement	The number of companies
Measured	20
Not measured	7
No answer	8
Total	35

According to the Regulation on Air Quality Control Resulted from the Industry Regulation published in the Official Gazette numbered 27277 and dated July 03, 2009, companies have to take emission permit for establish and operate the company in list A and B of Annex 8.

Companies, which do not provide limit values specified according to the pertaining regulations about emission measurements and disturb neighboring agencies and environment because of releasing intense emission, are required to provide the emission limit values and establish and operate flue gas treatment systems for resolving complaints of other companies in IAIP.

Many companies in IAIP use natural gas as their fuel of choice in their process. Therefore, the companies do not cause air pollution caused by fuel. They regularly carry out stack measurement once a year.

4.3.2.4 Hazardous Waste Management

Sixteen companies surveyed stated that they have hazardous wastes, which are food, metal, textile, machine, energy, automotive, tobacco, PVC and package industries (Table 4.25)

Table 4.25 The State of hazardous waste

Hazardous waste	The number of companies
There is hazardous waste	16
There is no hazardous waste	18
No answer	1
Total	35

Within hazardous waste management; every company dispose of their hazardous wastes formed in the companies in IAIP are disposal through licensed companies within Hazardous Waste Control Regulation. Every company disposes of hazardous wastes with licensed companies themselves in IAIP.

Metropolitan municipality, municipality, persons, or corporate bodies as duly authorized will be jointly and severally responsible for rendering medical waste to be made harmless through a process of sterilization, incineration, or disposal by storage. Accordingly, İzmir Metropolitan municipality is responsible for medical waste management.

Table 4.26 The Evaluation of Hazardous Waste

The Evaluation of Hazardous Waste	The number of companies
Evaluating hazardous waste	16
Not evaluating hazardous waste	19
Total	35

Hazardous wastes formed in the companies in IAIP are disposal through licensed companies.

4.3.2.5 Recycling Studies in Companies

Four companies stated that their solid waste is recycled by them. Two companies stated that their liquid waste is recycled by them.

A company from the textile industry re-uses 54 tons of solid waste a year. Two companies from the plastics industry re-use 5 tons of solid waste and 1200 tons of polyethylene pellets in a year.

A food industry company re-uses 1000 m³ of wastewater in a year. Only one mining industry company re-uses both solid and wastewater. 45*10⁴ tons of solid waste and 1500 m³ of wastewater are re-used in a year in this company. Recycled waste and number of the companies are seen Table 4.27.

Table 4.27 Recycled waste in companies

Recycled Wastes	The number of companies
Solid waste	4
Liquid waste	2
No Answer	29
Total	35

4.3.3 Environmental Management Information in IAIP

In the last part of the questionnaire, questions were asked about environmental management in companies in IAIP. The data was obtained concerning environmental approaches of the industrialists and IP Management with answers of these questions.

4.4.3.1 Certificate or Documentation Information (ISO 9000/14000, Environmental Impact Assessment, Discharge and Emission Permit)

Due to the pertaining regulations, after completion of all requested information and documents, granting the authority of Opening and Working Permits to the companies which will be established in IAIP belongs to IAIP.

Companies are required to apply to IAIP in accordance with the related regulations to obtain the Opening and Working Permits.

IAIP examines the application files of the companies and present them to the Management Committee after the approval of the Regional Director. Following the decision by the Management Committee, license is granted to the companies in question by IAIP Management. The companies granted the Opening and Working Business Permits are controlled by IAIP Management.

After the projects are approved by IAIP, the companies apply to Izmir Governorship Provincial Directorate of Environment and Forestry for Environmental Impact Assessment (EIA). Izmir Governorship Provincial Directorate of Environment and Forestry is authorized for the evaluation of EIA Regulation within the information IAIP. Provincial Directorate of Environment and Forestry reports that the project what categories taking place in EIA Regulations to IAIP.

Table 4.28 Certificate or documentation information

Certificate or Documentation	The number of companies
ISO 9001	8
ISO 9001 + EIA	1
ISO 9001 + EIA+ Emission Permit	1
ISO 9001 + EIA + Discharge Permit	1
ISO 9001+ EIA + Emission and Discharge Permit	1
ISO 14000	1
ISO 14000 + ISO 9001 + EIA	3
ISO 14000 + ISO 9001 + Emission Permit	1
ISO 14000+ ISO 9001 +Emission and Discharge Permit	1
ISO 14000+ EIA+ Emission and Discharge Permit	1
EIA	2
EIA+ Emission Permit	1
EIA + Discharge and Emission Permit	3
Discharge Permit +Emission Permit	3
All of them	2
None	5
Total	35

Unless taking EIA decision is required, or EIA positive for the project notified in writing is subject to EIA Regulations by Provincial Directorate of Environment and Forestry, any encouragement, approval, permission or licenses to use the structure cannot be given for this project.

For projects subject to EIA Regulations, decision of EIA positive or EIA negative giving authority belongs to the Ministry of Environment and Forests. Projects subject to EIA regulations complete EIA process by providing points for the related regulations. Companies are obliged to report to IAIP decision taking positive or negative in the context of the EIA regulation

As seen from table 4.28, two companies have all the certified documents, yet five companies have none.

4.3.3.2 *The Presence of Environmentally-friendly Technology*

The majority of companies in IAIP (85.7%) answered "yes," to the question: "Can there ever be environmentally-friendly Technology?" (Table 4.29) Although environmental factors are not priorities for industrial organizations in the region, these organizations are aware that they can change to environmentally-friendly technology.

Table 4.29 The presence of environmentally-friendly technology

Friendly technology	The number of companies
There is a e-friendly technology	30
There is no e-friendly technology	4
No Answer	1
Total	35

4.3.3.3 *Environmental Dimensions on Product Labels*

Where product labels of thirty companies included environmental information on IAIP, four companies stated that environmental information is not on product labels. (Table: 4.30)

Table 4.30 Environmental information on product labels

Environmental Information On Product Labels	The number of companies
There is environmental information on product labels	30
There is no environmental information on product labels	4
No Answer	1
Total	35

4.3.3.4 Ownership Information about Environmental Management Systems

The majority of enterprises (68.6%) have information about EMS in IAIP (Table 4. 31)

Table 4.31 Ownership information about EMS

Information About EMS	The number of companies
Known EMS	24
Unknown EMS	11
Total	35

Table 4.32 The importance of environmental management systems in terms of the marketplace

The importance of EMS in terms of the marketplace	The number of companies
EMS are important for marketplace	26
EMS are not important for marketplace	9
Total	35

Eleven companies had no information about Environmental Management; six of these stated that Environmental Management is important for the national and international marketplace (Table 4.32).

Twenty four companies had information about Environmental Management; six of which stated that Environmental Management was not important for the national or international marketplace.

Very few of these companies were having problems in the internal or external market.

It was observed that in companies where an environmental engineer works:

Table 4.33 Environmental engineer in companies

Environmental Engineer in Companies	The number of companies
There is an environmental engineer	4
There is no environmental engineer	31
Total	35

Lastly; there are environmental engineer in only 4 companies from 35 companies (Table 4.33).

CHAPTER FIVE

RESULT AND DISCUSSION

In this chapter; present environmental management conditions in IAIP are stated, and a new Environmental Management System, including all companies, regional facilities, and services in region have been suggested. In addition, a computer program, through which EMS will be applied easily, has been developed for the most appropriate environmental management system.

5.1 Environmental Management System in IAIP

5.1.1 The Management of IAIP



Figure 5.1 The management building of IAIP

Social facilities such as cafes and sports plants are located in a wide area in the region behind management building (Figure 5.1). There are nursery, emergency, dispensary, banks, mosque, apprenticeship training center, petrol station in the region too. In addition Fair Space introducing of facilities of companies was built for visitors.

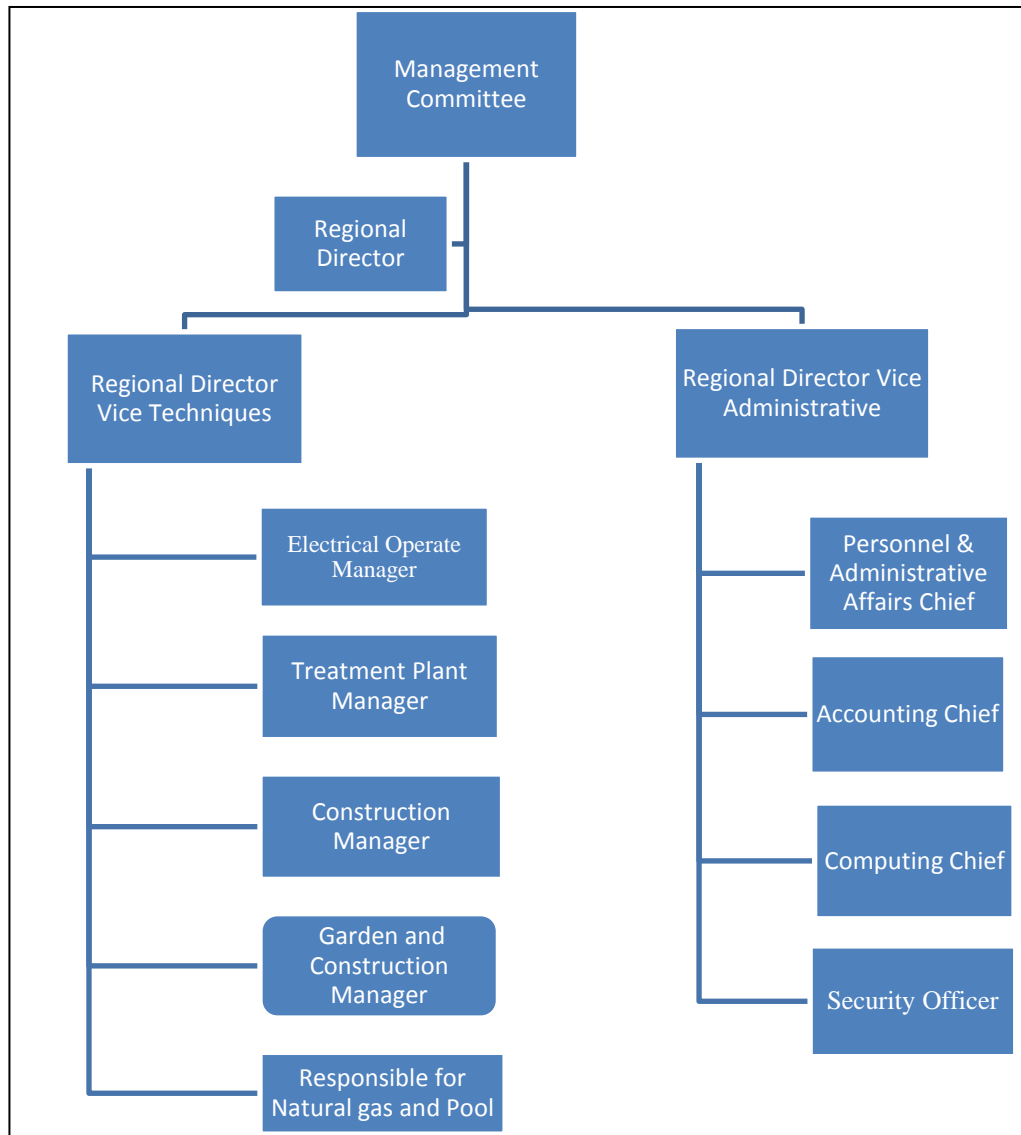


Figure 5.2 The management structure of IAIP

The way of IP Management is summarized in above Figure 5.2 Present Management System consist of solid waste management, air quality management, water management.

Firstly; Environmental Management Trees were created, as seen in Figure 5.3. Subheads are formed in accordance with the component of Environmental Management System. In order to reach the management program easily, it was grouped as sectoral. Every company carrying out activities in different sectors is involved in the environmental management program.

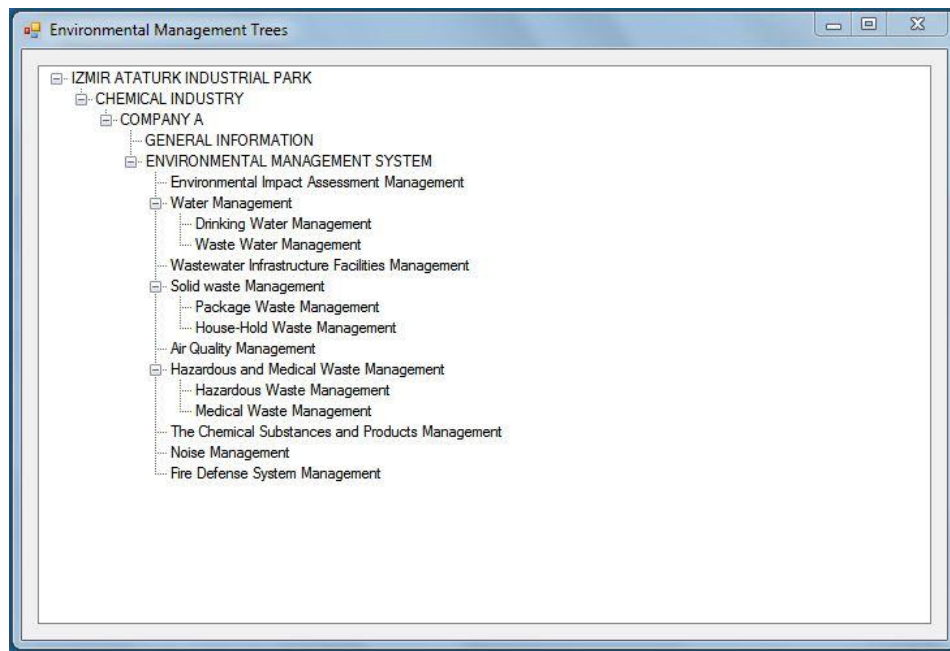


Figure 5.3 The environmental management trees

Before environmental management information, general information is given in this program (Figure 5.4). General information includes information of company's name, address, phone, fax, e-mail, country, island, parcel, map number, coordinate information, tax department and number, industry chambers number, passport number of facility authority, nace code, production sector, production capacity, number of shift, number of workers, total area. Subheads of environmental Management System in computer program are created as environmental impact assessment management, wastewater management, wastewater infrastructure facilities management, solid waste management, noise management, air quality management, hazardous and medical waste management, chemical substances and products management and fire defense system management.

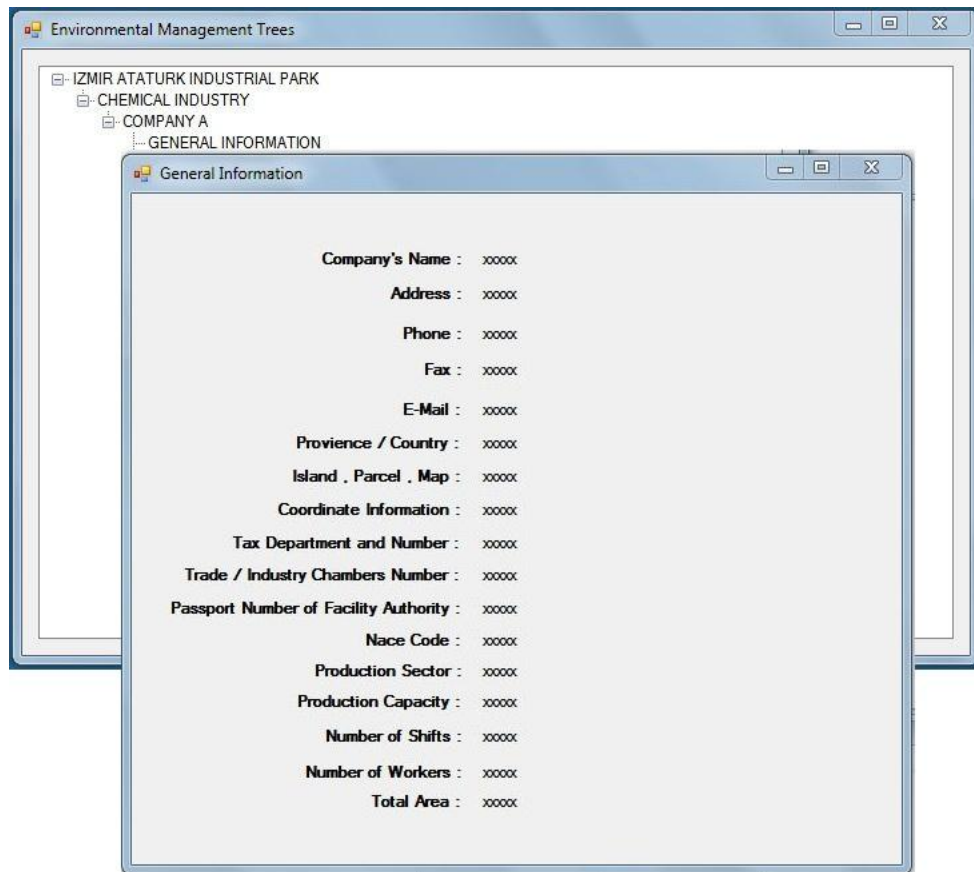


Figure 5.4 The general information table of the company in management program

5.1.2 Environmental Management Unit in IAIP

In accordance with Environmental Control Regulation dated 21.11.2008, numbered 27061 in the Official Gazette the IP Management must establish EMU consisting at least three environmental officers or working of a minimum two environmental officers or taking environmental management service from authorized environmental consulting firms concerning execution of environmental activities. IPs has to fulfill this obligation until January 2011.

EMU is required to fulfill the requirements of the Regulation about Permit and License to be taken according to the Environmental Law. This regulation came into force on April 1, 2010

Environmental permit consists of emission, wastewater discharge, noise control, deep sea discharge, and discharge of hazardous substances permit which should be taken in accordance with the Environmental Law. Environmental license is a technical adequacy consisting of waste collection, recycling, recovering, and their disposal.

Environmental Management Unit consists of two environmental engineers in IAIP. Environmental Management System has not been set locally in IAIP yet.

5.1.3 Environmental Impact Assessment Management in IAIP

Due to the pertaining regulations, after completion of all requested information and documents, granting the authority of Opening and Working Permits to the companies which will be established in IAIP belongs to IAIP.

Companies are required to apply to IAIP in accordance with the related regulations to obtain the Opening and Working Permits.

IAIP examines the application files of the companies and present them to the Management Committee after the approval of the Regional Director. Following the decision by the Management Committee, license is granted to the companies in question by IAIP Management. The companies granted the Opening and Working Business Permits are controlled by IAIP Management.

After the projects are approved by IAIP, the companies apply to Izmir Governorship Provincial Directorate of Environment and Forestry for Environmental Impact Assessment (EIA). Izmir Governorship Provincial Directorate of Environment and Forestry is authorized for the evaluation of EIA Regulation within the information IAIP. Provincial Directorate of Environment and Forestry reports that the project what categories taking place in EIA Regulations to IAIP.

Unless taking EIA decision is required, or EIA positive for the project notified in writing is subject to EIA Regulations by Provincial Directorate of Environment and Forestry, any encouragement, approval, permission or licenses to use the structure cannot be given for this project.

For projects subject to EIA Regulations, decision of EIA positive or EIA negative giving authority belongs to the Ministry of Environment and Forests.

Projects subject to EIA regulations complete EIA process by providing points for the related regulations.

Companies are obliged to report to IAIP decision taking positive or negative in the context of the EIA regulation.

The screenshot displays two overlapping windows from the 'Environmental Management Trees' application. The background window shows a tree structure with the following nodes: IZMIR ATATURK INDUSTRIAL PARK, CHEMICAL INDUSTRY, COMPANY A, GENERAL INFORMATION, ENVIRONMENTAL MANAGEMENT SYSTEM, and Environmental Impact Assessment Management. The foreground window, titled 'Environmental Impact Assessment Management', contains a form with the following fields and values:

Field	Value
Which Table Responsible for	Appendix 1
Document	Yes
Date	12/08/2000
Building Permit	Yes
Occupancy Permit	Yes
Environmental Permit	Yes
Opening and Operating Licenses for Business	Yes

At the bottom of the dialog box are 'Cancel' and 'Save' buttons.

Figure 5.5 Environmental impact assessment management tables in management program

5.1.4 Water Management in IAIP

Water Management divided in two sections as drinking water and wastewater management.

As seen Figure 5.6 subheads was formed as resources, quantity, analysis and discharge of drinking water in drinking water management. This information should be storage in database of computer program regularly. Environmental Information and Data Compilation Department store up the data obtained in EMU.

The image shows two overlapping windows from a software application. The top window, titled "Environmental Management Trees", displays a hierarchical tree structure. The tree starts with "IZMIR ATATURK INDUSTRIAL PARK", which contains "CHEMICAL INDUSTRY", which in turn contains "COMPANY A". Under "COMPANY A", there are several sub-items: "GENERAL INFORMATION", "ENVIRONMENTAL MANAGEMENT SYSTEM", "Environmental Impact Assessment Management", "Water Management", and "Drinking Water Management". The bottom window, titled "Drinking Water Management", is a data entry form. It has several input fields: "Resources" (with "Spring" entered), "Quantity" (with "120 m3" entered), "Analysis" (with "Yes" entered), and "Discharge Point" (with "Sevage System" entered). There are "Cancel" and "Save" buttons at the bottom of the form.

Figure 5.6 Drinking water management tables in management program

The companies use the water production and daily use in kitchen, toilet, and bath. If using the treated water in production is required, the companies treat the water before production.

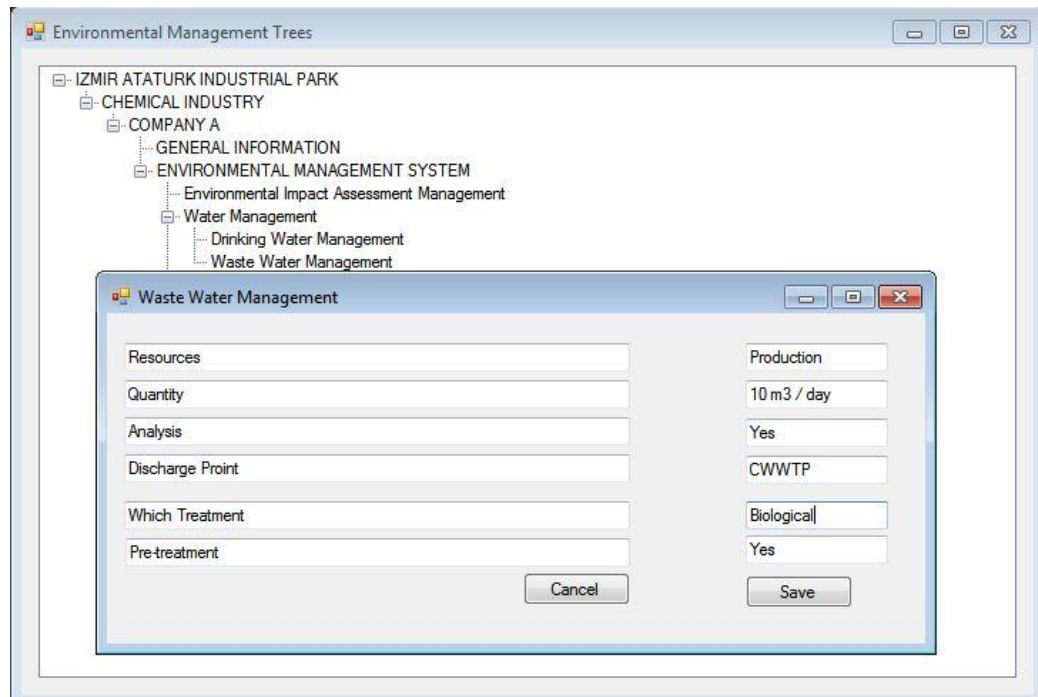


Figure 5.7 Wastewater management tables in management program

Suggested wastewater management table in management program is given in Figure 5.7. The same stages are followed for wastewater management like drinking water management. Additionally; treatment types of pre-treatment plant of company is located in wastewater management program.

Domestic and process wastewater are created by companies are collected in the sewerage system and conducted CWWTP in IAIP. Wastewater Connection and Price Plan Regulation is arranged by the IAIP Management. The wastewater is purified in wastewater treatment plant without harm to the environment. Wastewater treatment plant has a total treatment capacity of 21 000 with m^3/day . CWWTP is built in two stages. First section's capacity is $12 \cdot 10^3 \text{ m}^3/\text{day}$ and the second section has treatment capacity of $9 \cdot 10^3 \text{ m}^3/\text{day}$.

Because some companies do not provide input criteria of CWWTP they built pre-treatment process. The input criteria of wastewater treatment plant in IAIP are seen Table 4.16

CWWTP of IAIP consists of physical, chemical, biological and sludge treatment. Wastewater treatment plant sludge dried in the drying beds. After drying beds the sludge is disposed in Çimentaş in İzmir. Treated wastewater is discharged old Gediz stream bed. The water discharged provide the values of Table 19: Mixed Industrial Wastewater Discharge Standard of Receiving Environment (Small and Large Industrial Parks and Other Industries that cannot be made to determine sectors) in Water pollution Control Regulation published in the Official Gazette numbered 25687 and dated December 31, 2004

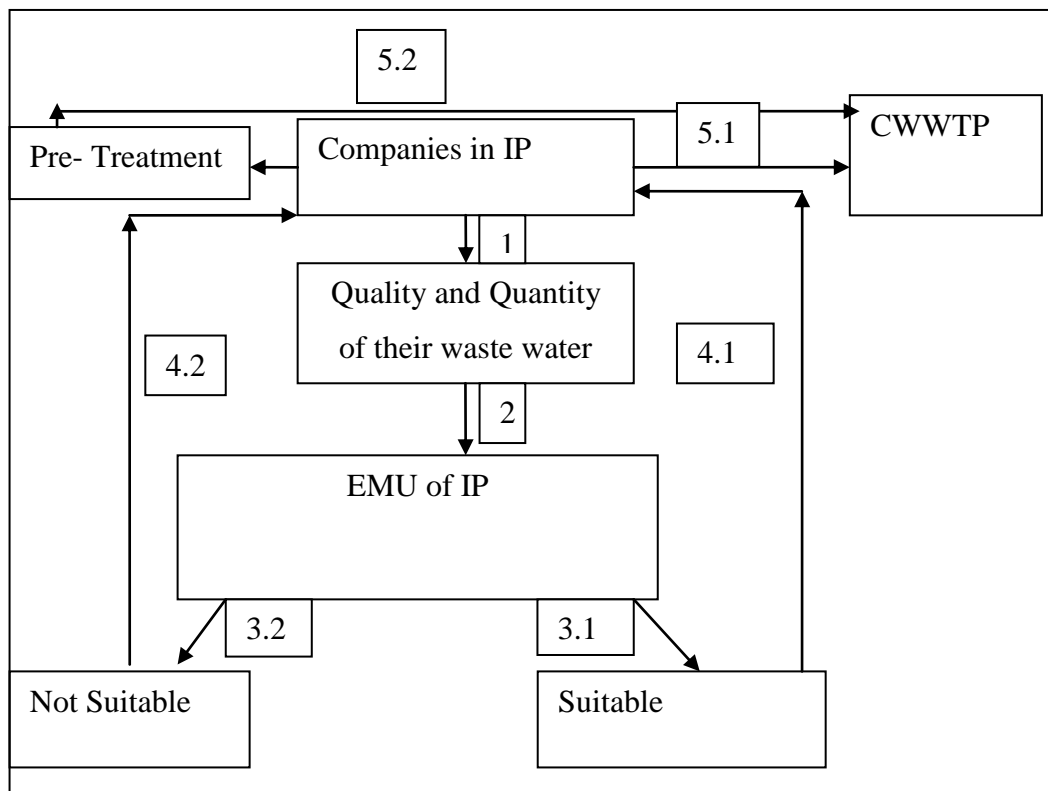


Figure 5.8 Water management in IPs

Environmental Management System proposed firstly; water sources and discharge points of companies should be known by the EMU of IPs. It is important that quality and quantity of wastewater in the companies is determined. As seen Figure 5.8 which is proposed management system; all of the information about wastewater should be reported to the EMU of IPs. Environmental Information and Data Compilation Department collect the information about wastewater from each company in the EMU of IP.

The quality and quantity of wastewater caused by all kinds' activities in the production and consumption of companies should be determined by authorized personnel in IP. Environmental engineers in EMU in the IP management take the composite samples and measure the flow rate of wastewater by setting up the automatic sampling device and the flow meter device in a place where the wastewater is discharged. Every discharge point for measurement should be stated fairly. If discharge points are not stated, companies should detect wastewater sources by using valves.

Wastewater samples are taken and flow measurement is made by IPs. In values of sampling specified are documented in Environmental Information and Data Compilation Department.

The analysis of wastewater of companies in IP should be done by licensed laboratory or the laboratory of IP regularly.

IP management should prepare the wastewater management plan or wastewater regulation relating to only IP and the companies should comply with wastewater regulation of IP. Input parameters should be formed about Centralized Waste Water Treatment Plant (CWWTP) in IP. The companies that output parameters of their wastewater are not suitable with input parameters of CWWTP of IP have to build pre-treatment plant. IP management should lead to companies about wastewater management.

Routine checks of the companies in IP will be within IP's management program. During the inspection and control, sudden evacuation will be brought a sudden load to plants. It is required that these companies take the precautionary and necessary measures.

It is required that the use of the well is kept under control, and counters must be installed in these wells. It is required that the audit team should have sufficient equipment, and personnel should be formed and authorized by IP.

There must be laboratory analysis done continuously in CWWTP. If required, technical support is requested from Provincial Directorate of Environment and Forestry. Monitoring the routine of the companies in Monitoring Department in EMU in IP will prevent some of the possible problems in CWWTP.

5.1.5 Wastewater Infrastructure Facilities Management in IAIP

Every company in IAIP is required to have a connection to the sewage system and use these facilities. An area which is to be built is obliged to make the connection at least six months.

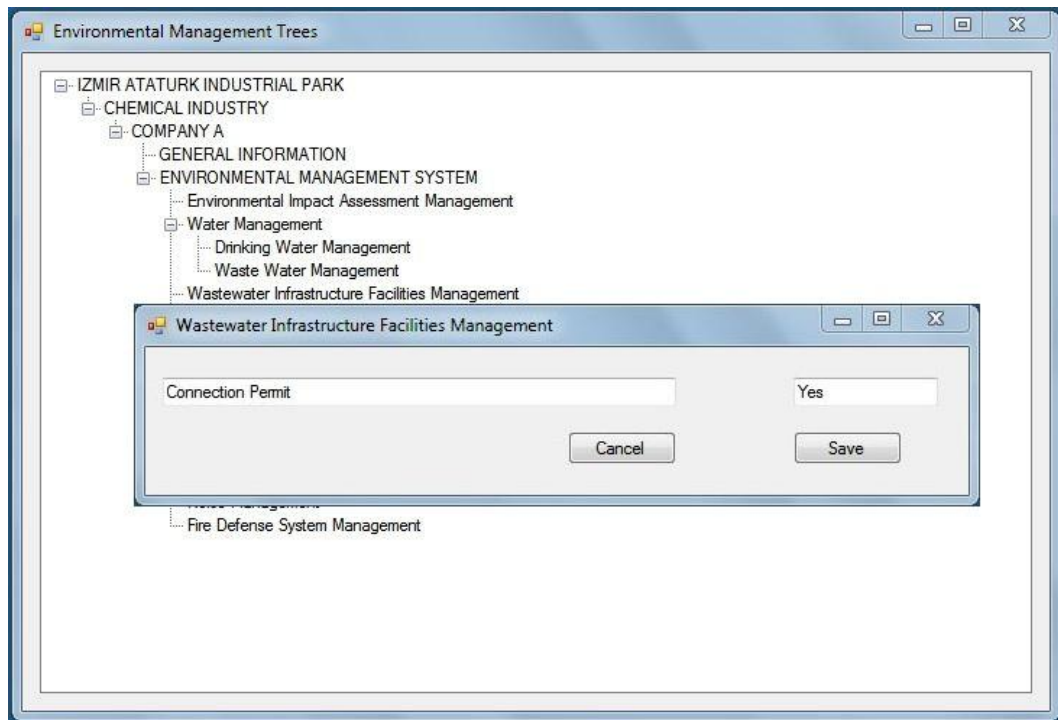


Figure 5.9 Wastewater infrastructure facilities management table in management program

There is only one question for connection permit in wastewater infrastructure management program as it is given in Figure 5.9. If more information about wastewater infrastructure management is required, it should be taken in this program.

5.1.6 Solid Waste Management in IAIP

Solid waste management divided in to two sections as package waste management and household waste management.

Within package waste management; a protocol was signed between Izmir Metropolitan Municipality, IAIP, and IZGEP ; Waste Collection and Recycling company for the purpose of collecting packaging waste, and ehe amount of total solid waste reducing. According to the protocol between Metropolitan Municipality, IAIP and IZGEP glass, metal, plastics, beverage cartons, paper, cardboard, etc. from companies within IAIP will be collected separately from other solid waste and re-cycled back into the system. Packaging waste will be disposed of by IZGEP rubbish-collection vehicles on specific days.

Within household management; Municipal waste produced from facilities in the region is collected with the three pieces of compressed garbage truck regularly six days in a week and transported to Metropolitan municipal landfill area.

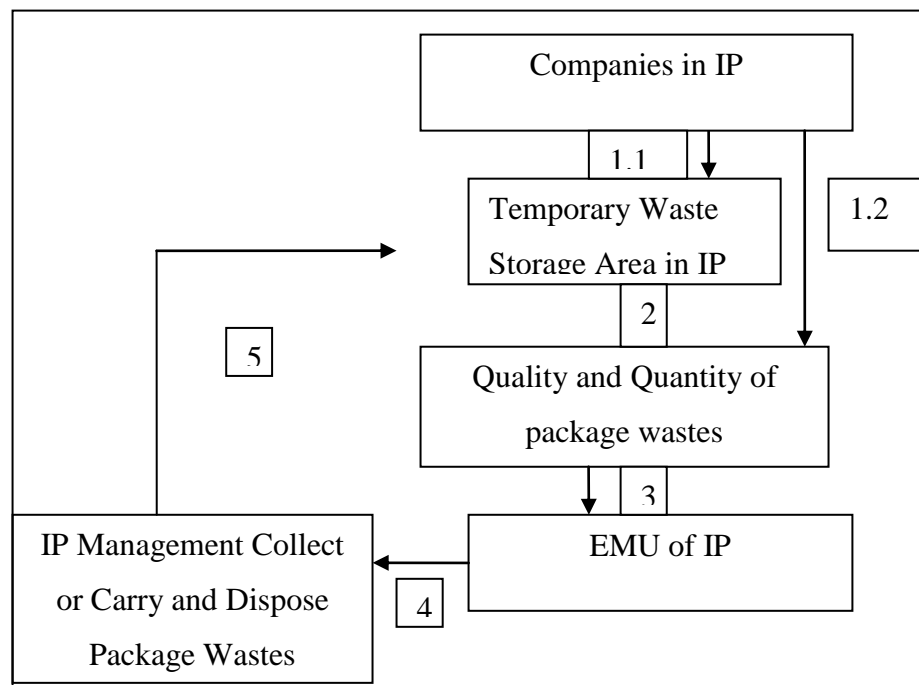


Figure 5.10 Package wastes management

According to IP Implementation Regulation published in the Official Gazette numbered 27327 and dated August 22, 2009; companies in IAIP, who produce package wastes, shall be obliged to collect the plastic, metal, and glass, paper, and carton, composite and similar package wastes, to decompose them at their sources, and give them to the IAIP. The IAIP shall collect, store, transport, and utilize these wastes in compliance with the environmental legislation.

Within the package and solid waste management;

- Environmental Information and Data Compilation Department collect the information about package and household wastes from each company in the EMU of IP. It is required that detailed inventory of waste is formed by determining characteristic of each company. For example; resources, quantity, analysis and disposal method of package waste are known for package waste management as seen in Figure 5.11.

The image shows a software interface with two windows. The top window, titled 'Environmental Management Trees', displays a hierarchical tree structure. The tree is expanded to show the following levels: IZMIR ATATURK INDUSTRIAL PARK, CHEMICAL INDUSTRY, COMPANY A, GENERAL INFORMATION, ENVIRONMENTAL MANAGEMENT SYSTEM, Environmental Impact Assessment Management, Water Management (subdivided into Drinking Water Management and Waste Water Management), Wastewater Infrastructure Facilities Management, Solid waste Management, and Package Waste Management. The bottom window, titled 'Package Waste Management', contains a data entry form with the following fields: Resources, Quantity, Analysis, Disposal, Production, 3 tons, Yes, and Licenced Company. There are 'Cancel' and 'Save' buttons at the bottom of the form.

Figure 5.11 Package wastes management table in management program

- Each company should monitor unnecessary waste formation stages of production from input of raw materials to output of raw material as product and keep the report. It is important step for waste minimization.
- The areas should be created to collect waste to be stored when it is required in IP for package waste management. So temporary waste storage area in IP should be formed for collecting package wastes and transporting regularly and disposing appropriately.(Figure 5.10)
- In addition, it should be created personnel served in the IP in the department of solid waste collection and transportation and provided these people to be awareness about periodic training and waste, waste types, legal disposal methods, waste to be collected, collection, transportation and recycling in the EMU in the management of IP.
- If budget and required area are provided by companies in IP, IP management may produce compost from household wastes. Compost of household wastes can be use in the garden as soil conditioner. Quantities of household wastes are known regularly with the computer program and analysis of household wastes should be done every month for evaluating household wastes within composting processing. Household wastes management table in management program within the computer program is seen in Figure 5.12

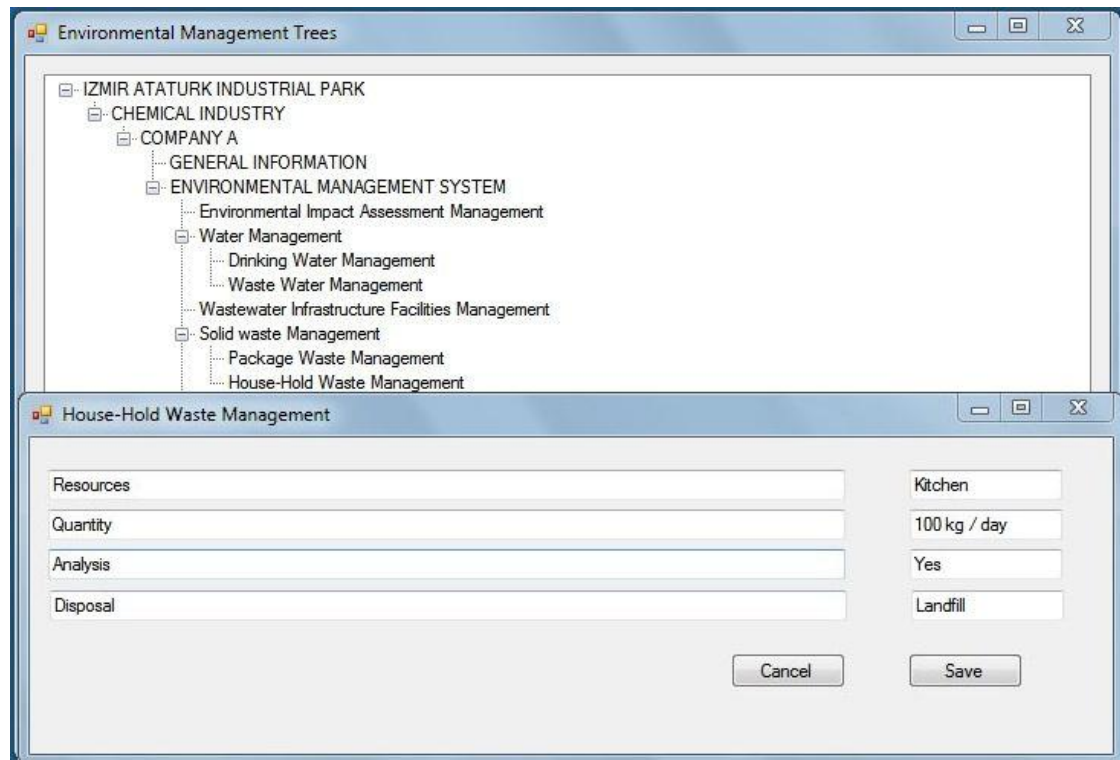


Figure 5.12 Household wastes management table in management program

5.1.7 Air Pollution Management in IAIP

According to the Regulation on Air Quality Control Resulted from the Industry Regulation published in the Official Gazette numbered 27277 and dated July 03, 2009, companies have to take emission permit for establish and operate the company in list A and B of Annex 8.

Companies, which do not provide limit values specified according to the pertaining regulations about emission measurements and disturb neighboring agencies and environment because of releasing intense emission, are required to provide the emission limit values and establish and operate dust and flue gas treatment systems for resolving complaints of other companies in IAIP.

Many companies in IAIP use natural gas in their process. Therefore, the companies do not cause air pollution caused by fuel. They regularly carry out stack measurement once a year.

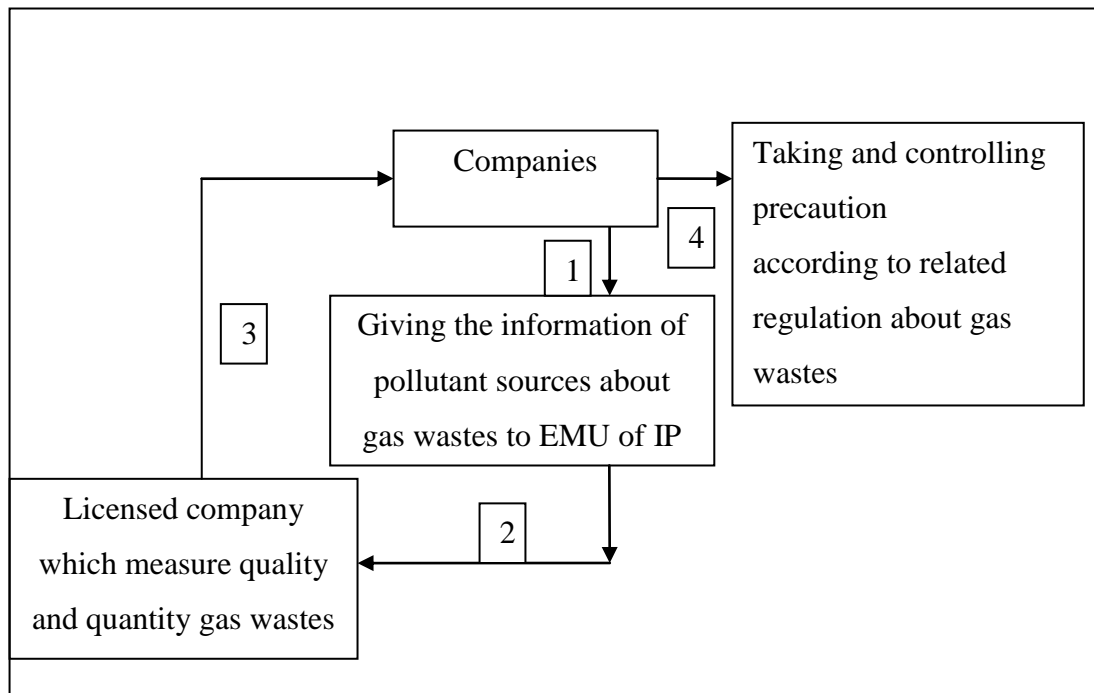


Figure 5.13 Air quality management

In proposed environmental management program as seen in Figure 5.13, companies transmit the information of pollutant sources about gas wastes to EMU of IP. Environmental Information and Data Compilation Department collect the information about gas wastes. The information is resources, quantity, analysis and measurement of air pollutant (Figure 5.14). IP management communicates Licensed Company which measure quality and quantity of gas wastes in companies. IP management takes required information about gas wastes such as measurement date and shares this information with companies. The companies take related measurement and if required take measurement according to related regulation about gas wastes. There should be measuring stations which are moving with fully equipment should measure air pollutant in the area. So parameters measured of air pollutant are collected and evaluated in laboratory of IP. The result of measuring should be transmitted to control and planning department. So gas wastes management is provided.

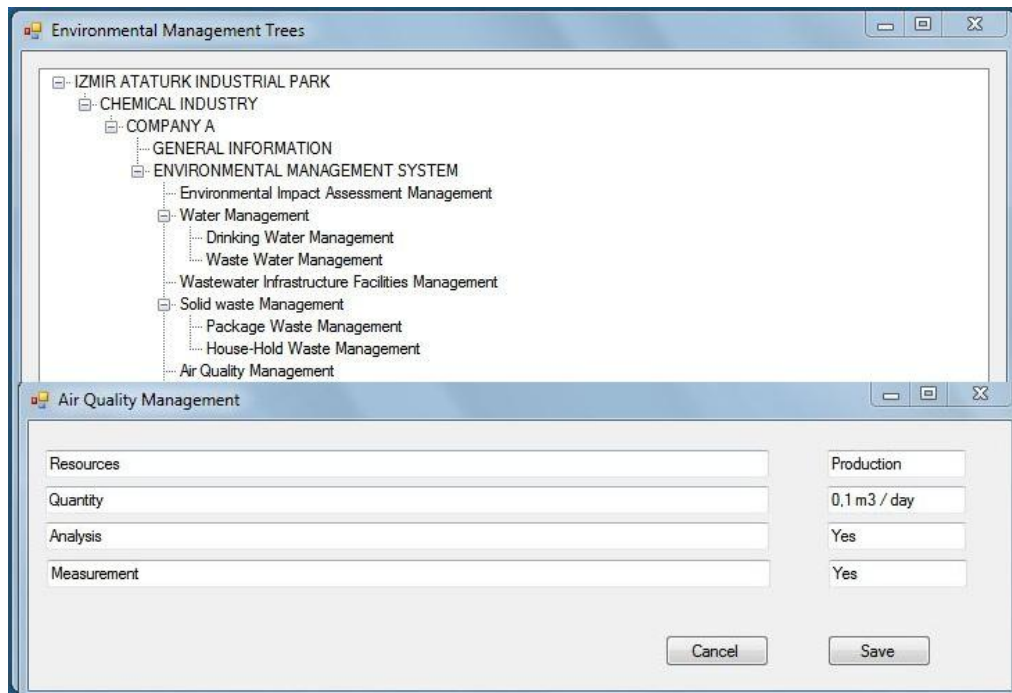


Figure 5.14 Air quality management table in management program

5.1.8 Hazardous and Medical Waste Management in IAIP

Hazardous and medical waste management is divided in to two parts as hazardous waste management and medical wastes in proposed computer management (Figure 5.15 and 5.17).

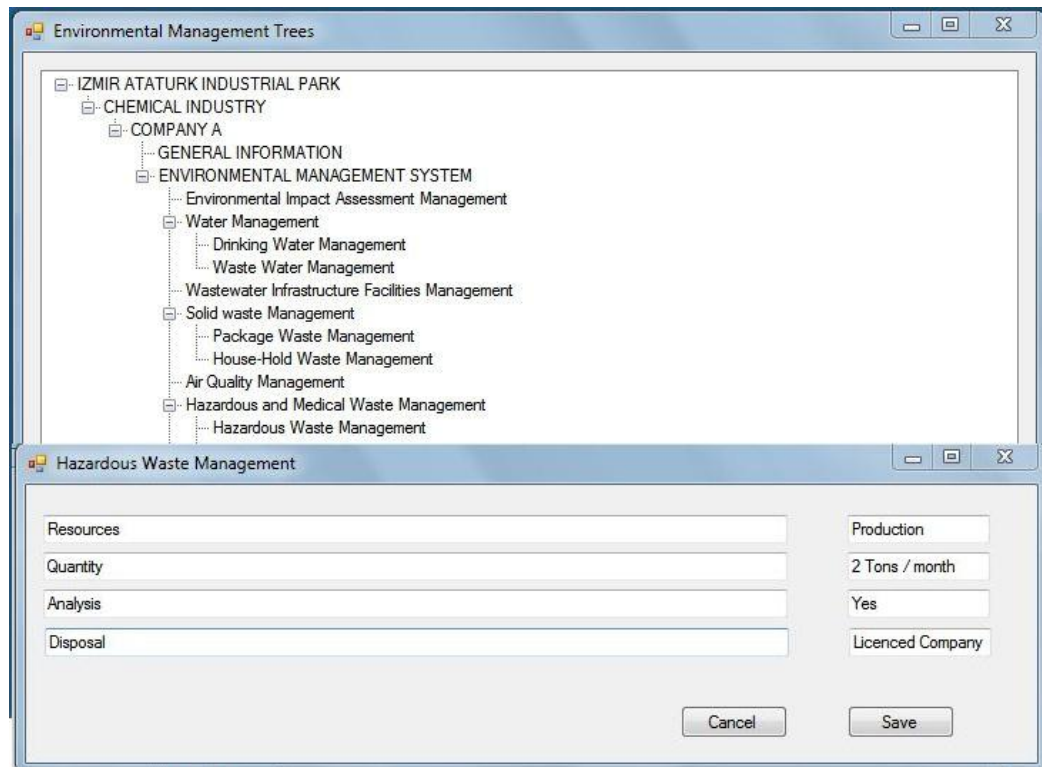


Figure 5.15 Hazardous waste management table in management program

Hazardous waste management is one of the important problems in the companies in terms of disposal and harmful affects to the environment. Generally hazardous wastes resulted from production in companies. It is required by the companies that the quantity of wastes should be kept to minimum.

Hazardous waste collection, transportation and disposal are some of the most important problems in IP. Most of the industrial facilities have hazardous wastes. The most important task in this regard should determine types of waste emerging and annual amount of hazardous waste. As a result of inventory study, it must often be made hazardous waste, should be collected from the point that hazardous waste results from industrial plants and accumulated in temporary storage area in the companies according to legal regulations. After hazardous waste collection on a regular basis, the waste should be sent to recycling facilities with transportation vehicles licensed. However, the disposal of hazardous waste, by which is complex and difficult. When taken into consideration there is not more facilities disposed hazardous waste, especially for companies that produce hazardous waste, should

establish safe temporary storage areas under no environmental risk according to related regulation (Figure 5.16)

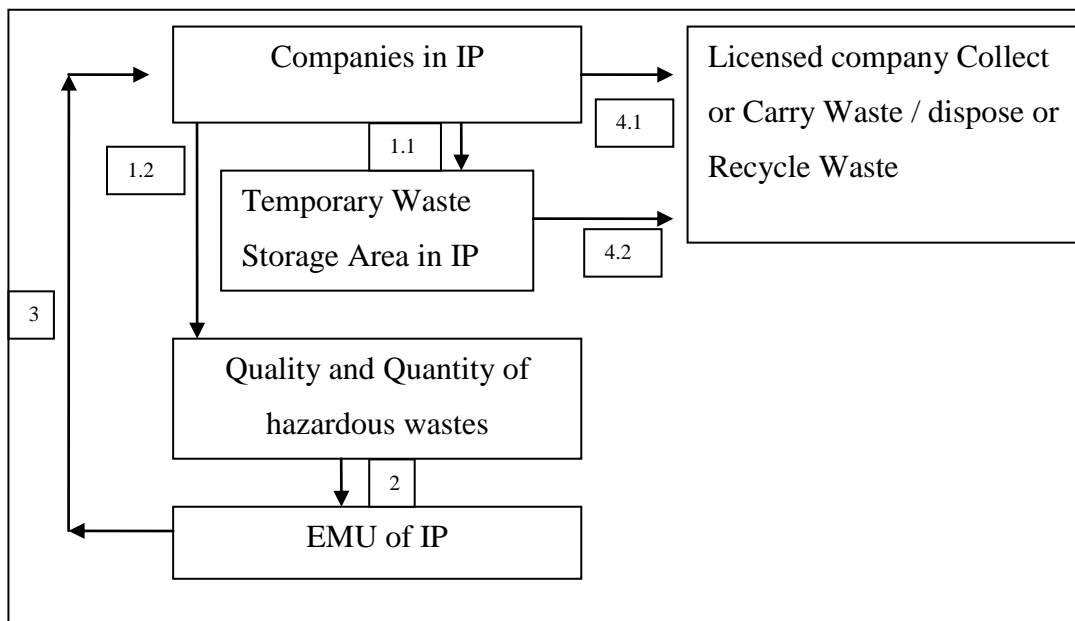


Figure 5.16 Hazardous waste management in IP

Within hazardous waste management; every company dispose of their hazardous wastes formed in the companies in IAIP are disposal through licensed companies within Hazardous Waste Control Regulation. Every company disposes of hazardous wastes with licensed companies themselves in IAIP.

Waste generators shall be liable to;

- Take measures to minimize waste generation,
- Ensure the waste management to minimize the harmful effects of wastes to human health and environment by the direction of this Regulation authorities, to take approval from governer's office by preparing the three years waste management plan in six month from the date of enforcement of this Regulation,
- Take permissions from governer's office for temporary storage of wastes in their facilities by the direction of this Regulation authorities,

- Enroll about wastes generated by them, make license recovery to send wastes or make appropriate packing and labeling accepted by international standards which are asked for disposal facility,
- Cover the expenses to evaluate characteristic of waste,

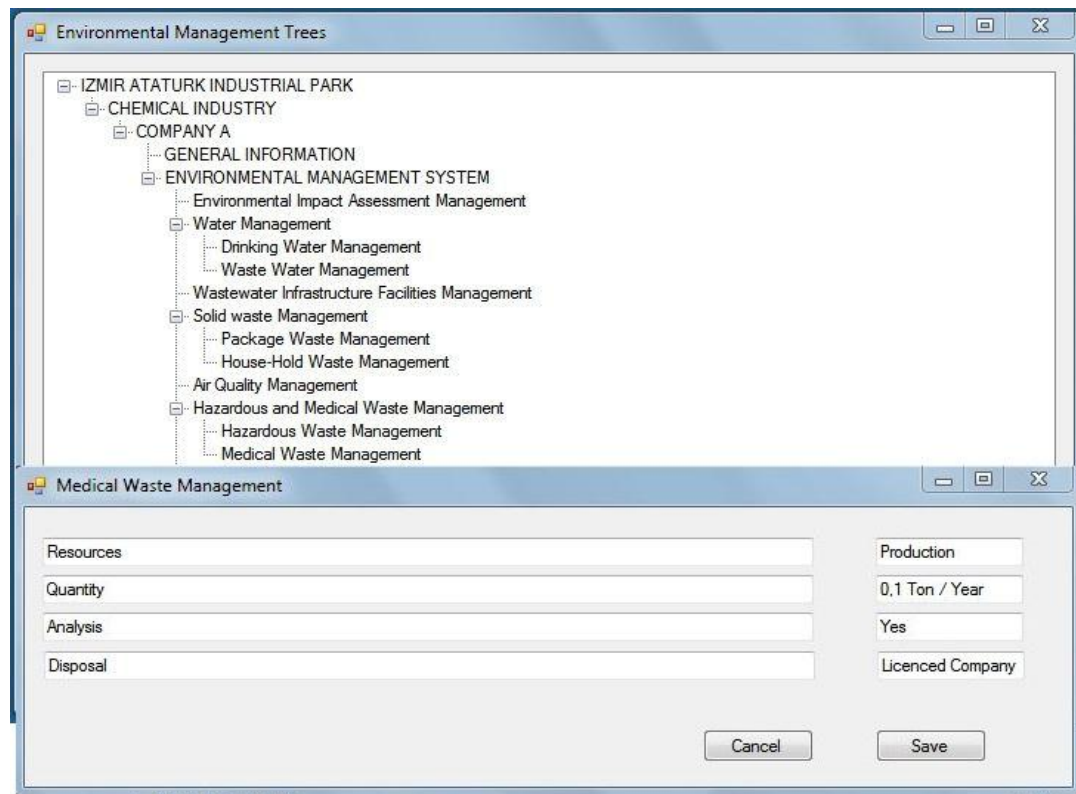


Figure 5.17 Medical waste management table in management program

- Companies which produce medical waste, responsible for collecting, accumulating, transporting, and disposing of medical waste at source and separately from other categories of waste
 - Parties generating, transporting, or disposing of medical waste shall be liable, without need to prove negligence on their part, for any damages stemming from any environmental pollution or deterioration caused by medical waste.
 - Companies in IPs responsible for management of medical waste shall be under obligation to take measures as necessary for mitigation of any possible harmful impact of such waste on the environmental or human health.

- Resources of medical waste shall be under obligation to cover for the costs as necessary for disposal of waste that they generate.
- Resources, quantity, analysis and disposal method of medical waste are located in the medical waste management table in management program as seen in Figure 5.17.

5.1.9 Chemical Substances and Products Management in IAIP

Environmental Information and Data Compilation Department collect the information about harmful chemical substances such as resources, quantity, analysis, disposal method and products from each company in the EMU of IP (Figure 5.18). It is required that detailed inventory of harmful chemical substances and products is formed by determining characteristic of each company.

The screenshot displays two windows from the 'Environmental Management Trees' application. The top window shows a tree structure for 'IZMIR ATATURK INDUSTRIAL PARK' with the following hierarchy:

- IZMIR ATATURK INDUSTRIAL PARK
 - CHEMICAL INDUSTRY
 - COMPANY A
 - GENERAL INFORMATION
 - ENVIRONMENTAL MANAGEMENT SYSTEM
 - Environmental Impact Assessment Management
 - Water Management
 - Drinking Water Management
 - Waste Water Management
 - Wastewater Infrastructure Facilities Management
 - Solid waste Management
 - Package Waste Management
 - House-Hold Waste Management
 - Air Quality Management
 - Hazardous and Medical Waste Management
 - Hazardous Waste Management
 - Medical Waste Management
 - The Chemical Substances and Products Management

The bottom window, titled 'The Chemical Substances and Products Management', contains a data entry form with the following fields:

Resources	Production
Quantity	0,1 Ton / Year
Analysis	Yes
Disposal	Licenced Company

Buttons for 'Cancel' and 'Save' are located at the bottom right of the form.

Figure 5.18 Chemical substances and products management table in management program

5.1.10 Noise Management in IAIP

Companies in the IAIP are required to comply with noise levels specified in the Environmental Noise Assessment and Management Regulation dated 04.06.2010, numbered: 26701 in the *Official Gazette*.

Companies have to make noise measurements for determining the noise level anticipated in relevant regulations in the noise source in IAIP.

The company's manufacturing, using, selling, and operating machinery, tools, equipment and transport vehicles as known noise source have to take the necessary measures, make noise measurements regularly and document them.

If the companies exceeded the prescribed limit values as a result of noise measurement making in plant and outside of plant the companies are responsible for taking the necessary measures for the prevention of noise in IAIP. So Noise Management is divided two parts as indoor noise management and outdoor noise management (Figure 5.20, Figure 5.21)

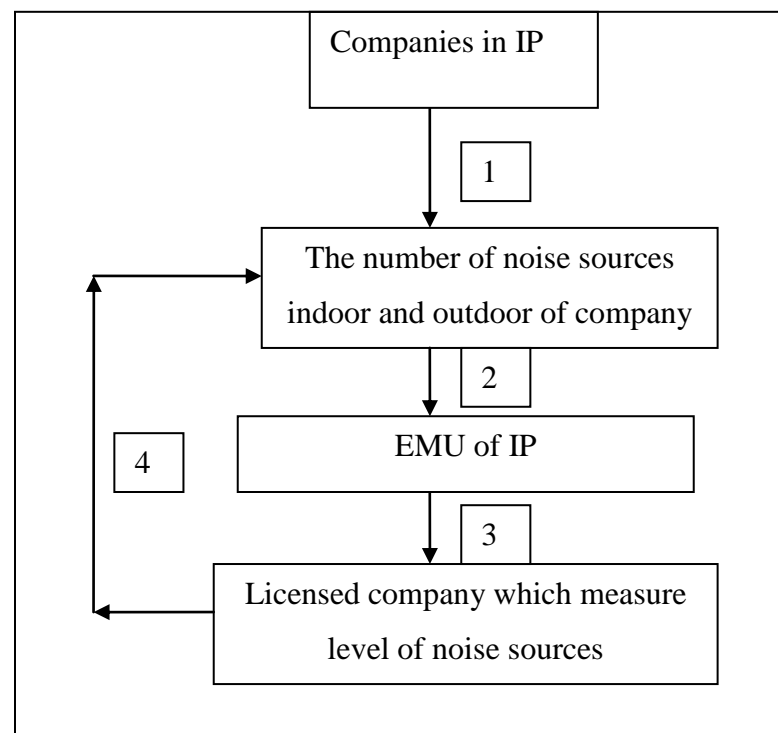


Figure 5.19 Noise management in IP

Within Noise Management;

Environmental Information and Data Compilation Department collect the information about noise resources from each company in the EMU of IP (Figure 5.19). It is required that detailed inventory of resources is formed by determining characteristic of each company.

Companies in the IP are required to comply with noise levels specified in the Environmental Noise Assessment and Management Regulation dated 04.06.2010, numbered: 26701 in the Official Gazette.

Companies have to make noise measurements for determining the noise level anticipated in relevant regulations in the noise source in IP.

The company's manufacturing, using, selling, and operating machinery, tools, equipment and transport vehicles as known noise source have to take the necessary measures, make noise measurements regularly and document them.

If the companies exceeded the prescribed limit values as a result of noise measurement making in plant and outside of plant, the companies are responsible for taking the necessary measures for the prevention of noise in IP.

Monitoring department monitor and evaluate permanently noise pollution in critic points and conduct the results of the studies as reports to planning department regularly in IP.

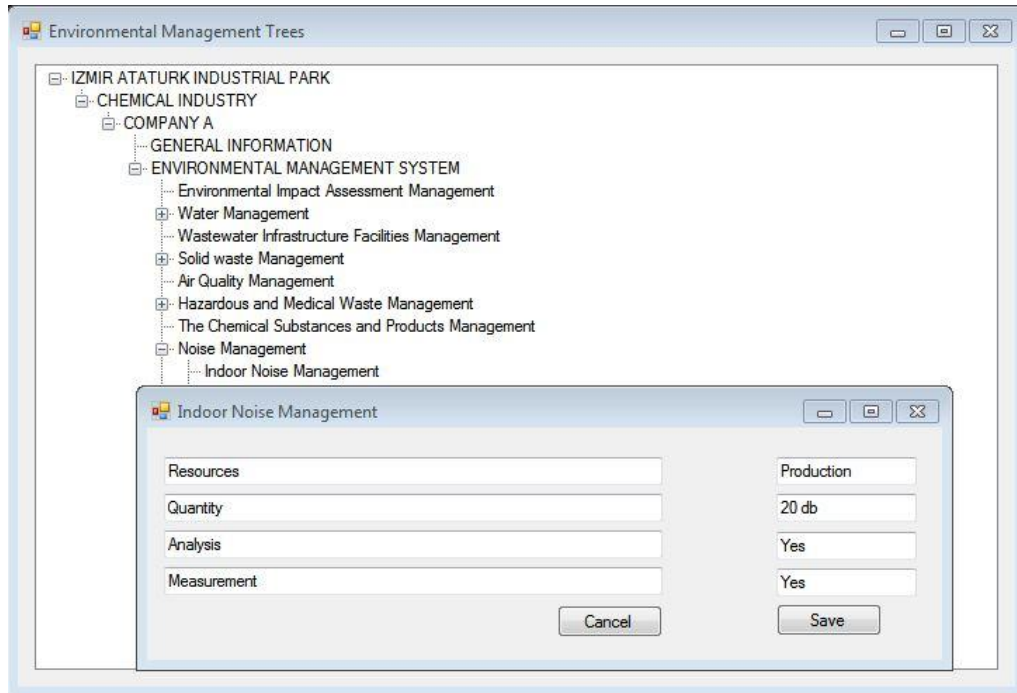


Figure 5.20 Indoor noise management table in management program

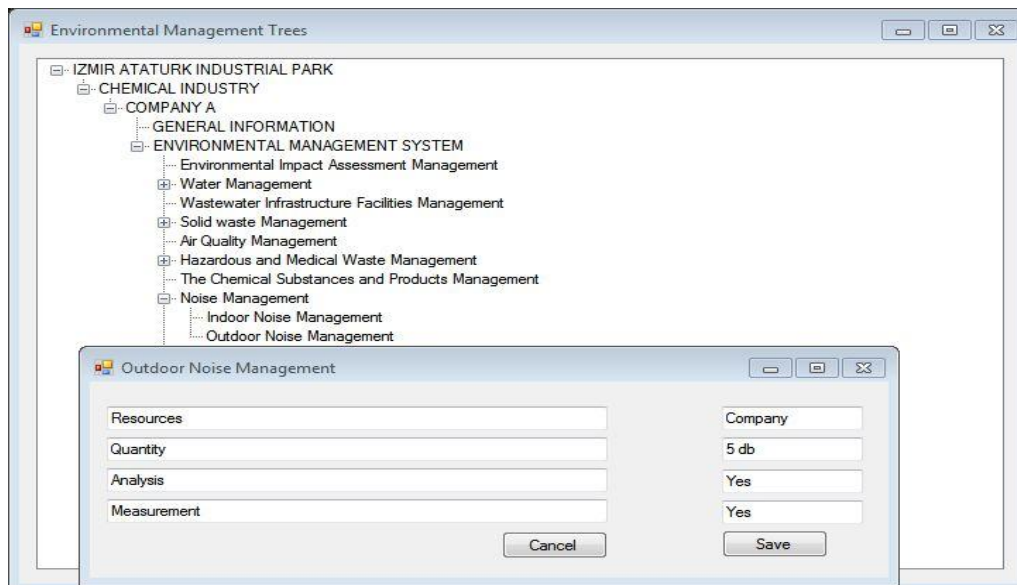


Figure 5.21 Outdoor noise management table in management program

5.1.11 Fire Defense System Management in IAIP

Information about fire defense system will be involved in computer program such as fire pool. There is a fire system in IAIP. Management table related fire defense system in management program is seen in Figure 5.21.

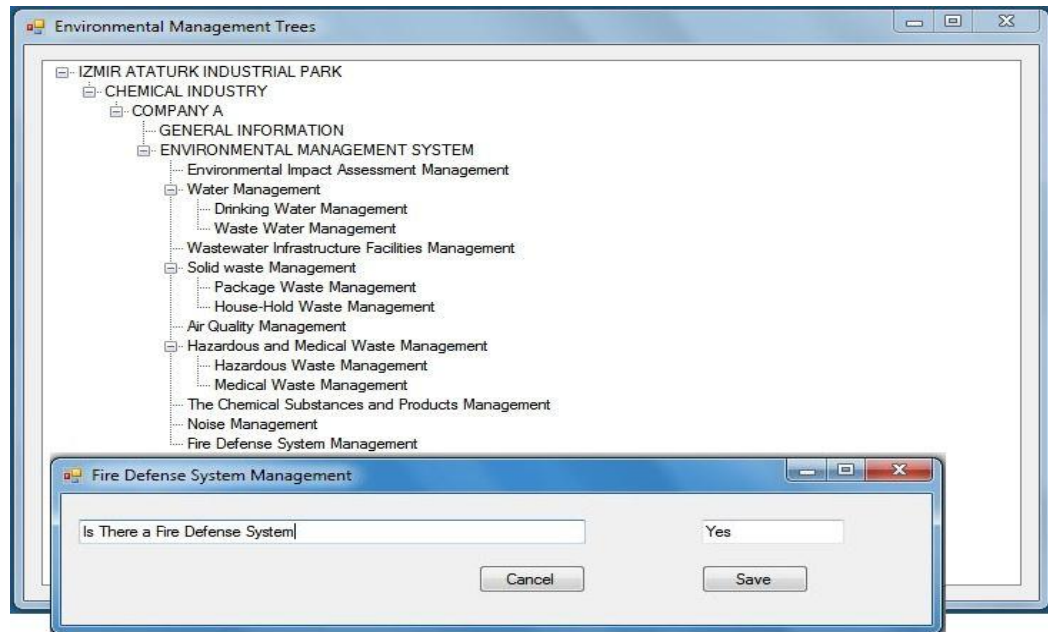


Figure 5.22 Fire defense system management table in management program

CHAPTER FIVE

CONCLUSION

Industrial Parks are important for the purposes of sustainable and planned development, for the national economy, and to prevent environmental effects of industrialization. Because industrial parks constitute central administration, application of environmental management system on them can be realized more schemingly and easily.

IP created as a requirement of planned development are the most appropriate model in our country in terms of industrialization, in order to minimize the damage to the environment. The IP model is a form of industrialization that our country follows for planned development. Environmental management systems and waste minimization should be developed for each IP by using this advantage.

According to the results obtained from questionnaire which was applied by Turkish Statistical Institute (TUIK) in 2008; infrastructures of 97 IPs were completed, and 116 million m³ of water was used by IPs in Turkey in 2008. 53% of IPs use water taken from well; 18% from stream, 13% from spring, 9% from water network, and 7% from lakes and dams. 113 million m³ of wastewater was treated by IPs in Turkey. 55% of IPs use biological treatment, 43% use advanced treatment, and the others use physical or chemical treatment for wastewater treatment. In addition, 11.5 million m³ of wastewater was sent to other wastewater treatment plants for treatment. According to the data; 255*10³ tons solid waste was collected by IPs in 2008. 45.4% of collected waste was sent to landfill, 27.3% to the dump of IPs, and 8.5% to the municipal dump. The others were disposed through other methods. 15.9 % of collected waste was stored temporarily in the IPs' areas.

There are several options for the establishment of EMS in IPs.

■EMS applied by companies in the region in cases in which IP Management has no authority of controlling environmental companies

- EMS that IP Management applies for their own facilities and services
- EMS including all companies and regional facilities and services in the region

The most appropriate EMS can be applied by all the companies in IPs. IP Management improves EMS including all the waste management. EMS is formed in Environmental Management Department by environmental engineers in IP Management.

In accordance with Environmental Control Regulation, the administration of IP must establish EMU consisting of at least three environmental officers, employing at least two environmental officers, or taking environmental management service from authorized environmental advisory firms concerning the execution of environmental activities. IP has to fulfill this obligation until **January 2011**. EMU is required to fulfill the requirements of the Regulation about Permit and License to be taken According to Environmental Law dated 21.11.2008, numbered 27061 in Official Gazette. This regulation consists of environmental permit and environmental license. Environmental permit consists of gas emission control, solid waste, wastewater discharge, noise control, deep sea discharge and discharge of hazardous substances permit, which should be taken in accordance with Environmental Law. Environmental license is a technical adequacy consisting of waste collection, recycling, recovering, and their disposal.

The proposed parts of Environmental Management Department consist of Environmental Management Unit, Coordination Department, Education and Participation Department, Monitoring Department, Control and Planning Department, Research and Development & Risk Assessment Department and Environmental Information and Data Compilation Department. The duties of these parts of EMU should be clearly stated by the IP management.

The most appropriate EMS should consist of environmental impact assessment, wastewater management, wastewater infrastructure facilities management, solid waste management, noise management, air quality management, hazardous and

medical waste management, chemical substances and products management and fire defense system management.

A field survey was conducted in the İzmir Atatürk IP (IAIP). The questionnaire could be applied to 35 companies from 100 companies. Only 35 companies contributed to the research strictly. The questionnaire was carried out face to face with the authorized figures in the companies. This questionnaire has aimed at eliciting their approaches required in the environmental management in IP and pointing out what they understand of environmental management and how they perceive the differences in the concepts of EMS.

According to the results of the survey;

Their priorities in choosing alternative technology of production are very important in terms of companies' approach in industrial parks about environment and giving the first clues of practices in this regard. 32 companies preferred to reduce the product prices primarily when they have to choose an alternative for the product technology. Only one company stated that environmental aspects are the most important factor on choosing the alternative product technology. Of all the companies which changed their production process until now, 17 companies changed their process in production as a result of research-development, 13 companies by buying a new material, and only 2 companies because of affect of pollutant. 80% of the companies preferred the economic factor in choosing fuel. Only two companies thought that pollutant effects of fuel are the most important factor in the choice of fuel.

Percentage of response to the questions asked about the average amount of waste and waste types is low. The companies have difficulty discriminating between the domestic and industrial wastewater. Nine companies from 35 companies applied questionnaire in IAIP have the pre-treatment. The companies with pre-treatment serve in food, textile, machine, and package, mining and metal industry.

Centralized Wastewater Treatment Plant (CWWTP) of IAIP consists of physical, chemical, biological and sludge treatment. The wastewaters coming from 150 companies are treated by CWWTP in IAIP. Totally; 60 companies in IAIP have pre-treatment plant for treating wastewater. After the sludge drying beds recycling of the treatment sludge is disposed to Çimentaş (Cemetery Factory) in Izmir. Treated wastewater is discharged in old Gediz river bed. The treated discharged water should be compatible with the values of Table 19 in Water Pollution Control Regulation dated 13.02.2008, numbered 26786 in Official Gazette.

Within solid waste management, only 18 companies know the amount of their industrial solid wastes. Four companies having more than 100 tons of industrial waste are from the automotive, food and tobacco processing industries. Only two companies having solid wastes more than 1000 tons are from the mining and food industry. A protocol was signed between IAIP, Izmir Metropolitan Municipality IZGEP Waste Collection and Recycling for the purpose of collecting and recycling of packaging waste and the solid waste volume reducing. According to the protocol between IAIP and IZGEP, Metropolitan Municipality, glass, metal, plastics, beverage cartons, paper, cardboard, etc. disposed from the companies within IAIP will be collected separately from other wastes and re-cycled back into the system. According to this research, the waste of fifteen companies is being re-used by other companies. For example, solid waste from the mining industry is being re-used as the raw material of the ceramics industry. So many wastes are being recycled.

Within the gas waste management, four companies stated that they have gas wastes, which are food, metal and package industries. Three companies surveyed stated that they do have gas wastes but do not know their amount of gas wastes. One company from metal industry stated the amount of gas wastes.

Within the hazardous wastes management; sixteen companies surveyed stated that they have hazardous wastes, which are food, metal, textile, machine, energy, automotive, tobacco, PVC and package industries.

Within the recycling studies in companies in IAIP, four companies stated that their solid waste is recycled by them. Two companies stated that their liquid waste is recycled by them. A company from the textile industry re-uses 54 tons of solid waste a year. Two companies from the plastics industry re-use 5 tons of solid waste and 1200 tons of polyethylene pellets in a year. A food industry company re-uses 1000 m³ of wastewater in a year. Only one mining industry company re-uses both solid and wastewater. 45*10⁴ tons of solid waste and 1500 m³ of wastewater are re-used annually in this company.

Within the environmental management, two companies have all the certified documents, yet five companies have none. Nineteen companies do not have EIA document. Only nine companies from 35 companies own ISO 14001 Environmental Management Standard. Eleven companies had no information about Environmental Management; six of these stated that Environmental Management is important for the national and international marketplace.

Twenty four companies, six of which stated that Environmental Management was not important for the national or international marketplace, had information about Environmental Management.

There is not environmental management system including all of the companies in IAIP regionally. Environmental Management System can not be applied regionally in IPs because of financial deficit. In addition, IP Management does not have the controlling and sanction authority on companies about EMS application.

As the final part of the thesis, new methods are developed for the most appropriate environmental management system by using a computer program. The computer program was developed for the most appropriate environmental management system. EMS will be applied easily thanks to this computer program. Firstly; Environmental Management Trees were created. Subheads were formed according to the components of Environmental Management System. In order to reach the management program easily, it was grouped as sectoral. Every company

carrying out activities in different sectors is involved in the environmental management program. Before the environmental management information, general information is given in this program. General information includes information of company's name, address, phone, fax, e-mail, country, island, parcel, map number, coordinate information, tax department and number, industry chamber number, passport number of facility authority, nace code, production sector, production capacity, number of shift, number of workers, total area. Subheads of EMS in the computer program are created as the environmental impact assessment management, wastewater management, wastewater infrastructure facilities management, solid waste management, noise management, air quality management, hazardous and medical waste management, chemical substances, products management, and fire defense system management. It will be approached to environmental management system program for entering data about environmental system.

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**APPENDIX 1 : QUESTIONNAIRE APPLIED TO COMPANIES IN IZMIR
ATATURK INDUSTRIAL PARK.**

Sayın Katılımcı;

Dokuz Eylül Üniversitesi Çevre Mühendisliği Anabilim dalı yüksek lisans tezi kapsamındaki Organize Sanayi Bölgelerinde Çevre Yönetimi Anketi , çevresel etmenlerden kaynaklanan ve üretim, pazarınızı etkileyen hususları belirleyerek en uygun çevre yönetimi uygulaması amacıyla hazırlanmıştır. Bu anket verileri, hem akademik bir çalışmada hem de ilgili kuruluşların sorunlarınızın çözümüne yönelik olarak önlem almalarını sağlamak için kullanılacaktır

Firmanızla ilgili tüm bilgilerin gizli tutulacağı bu ankete katıldığınız ve doğru verilere ulaşılmasında sağladığınız katkılar için teşekkür ederiz.

Araştırmacı : Pınar AKYIL

Danışman : Prf Dr. Ayşegül PALA

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ORGANİZE SANAYİ BÖLGESİ ÇEVRE YÖNETİMİ ANKET FORMU

I. Bölüm

Üretim Bilgileri

1. İşletmeniz sektörü nedir ?

2. İşletmenizde kaç kişi çalışıyor? Vardiya varsa lütfen belirtiniz.

3. Üretimde kullandığınız teknolojiyi kaç yıldır kullanıyorsunuz.

a. (1-5) b. (5-10) c. (10-20) d. (20- den fazla)

4. Üretim için kullandığınız yöntemin alternatifi bir yöntem var mı?

a. Evet () b. Hayır () c. Bilmiyorum ()

5. Aşağıdakilerden hangisi kullandığınız avantajı yönetime yeni bir alternatif yöntem geliştirmek için öncelikle hangi yöntem değişikliği yapmanızı sağladı?önem sırasına göre sıralayınız.

a. Üretim maliyetlerinde azalma () b. Üretim basamaklarında azalma ()

c. Atıkta azalma () d. Çevresel etkenler ()

6. Şimdiye kadar üretime yönelik kullandığınız proses/proseslerin birinde ya da bir aşamasında değişiklik yaptınız mı?

a. Evet () b. Hayır ()

7. Cevabınız evetse neden/nedenleri

a. Ar-ge sonucu () b. Yeni ekipman alınması ()

c. Fazla hammadde Kullanımı () d. Atık / Kirletici etkisinin çok olması ()

8. Evsel / Endüstriyel su kaynaklarınız nelerdir ?

a. Şehir Suyu () b. Nehir, göl suyu ()

c. Kuyu suyu () d. Arıtılmış atık su () e. Hepsi ()

9. İşletmenizde suyu hangi amaçlarla nerelerde kullanıyorsunuz. Miktarı ile belirtiniz ?

a. Evsel (.....m³/gün) b. Endüstriyel (.....m³/gün)

11. Enerji kullanım miktarınız nedir ? (Ortalama yıllık tüketiminiz)

a. Elektrik (.....Kw/Yıl) b. Yakıt (.....Ton/Yıl)

12. Hangi cins yakıt kullanıyorsunuz?

a. Kömür() b. Fuel Oil () c. LPG () d. Doğal Gaz () e. Diğer ()

13. Yakıt seçiminizde belirleyici olan nedir? (Önem derecesine göre sıralayın)

- a. Ekonomik faktörler ()
- b. Az atıklı olması ()
- c. Kirlenici etkisinin azlığı ()
- d. Temininde kolaylık ()

14. Ürünleriniz başka bir işletme tarafından hammadde olarak kullanılıyor mu?

- a. Evet () b. Hayır ()

15. Ürün/ürünlerinizi kullanan işletme sizin yakınınızda mı yer alıyor ?

- a. Evet () b. Hayır ()

II. Bölüm

Atık Yönetimi Bilgileri

1. Endüstriyel atık türleriniz ve miktarları? (Miktarları bilmiyorsanız bilmiyorum diye belirtiniz)

- a. Sıvı (.....Ton/Yıl) b. Gaz (.....Ton/Yıl)
- c. Katı (.....Ton/Yıl) d. Diğer (.....Ton/Yıl)

2. İşletmenizde ön arıtma(atıksu) tesisiniz var mı ?

- a. Evet () b. Hayır ()

3. Cevabınız evetse ön atıksu arıtma tesisinde kullanılan arıtma çeşidi? (Birden fazla işaretleyebilirsiniz)

- a. Fiziksel () b. Kimyasal () c. Biyolojik () d. İleri Arıtma ()

4.Ön arıtmanız varsa deşarj şekli nedir?

- a. Kanalizasyon ()
- b. Alıcı Ortam ()
- c. Geri Kullanım () (Nerede kullanıldığını belirtiniz)
- d. Diğer ()

5. Atık su deşarj ölçümleri yapıyor mu?Yapılıyorsa hangi sıklıkta ?

- a. Evet () b. Hayır ()

6. İşletmenizdeki ortalama katı atık miktarları?(günlük)

- a. Evsel (sosyal kullanım amaçlı atıklar)
- b. Endüstriyel (Üretim prosesi sonucu oluşan atıklar)

7. Tehlikeli atık kapsamına giren atığınız var mı?

- a. Evet () b. Hayır ()

8. Cevabınız evetse bu atıklar için arıtma ya da uzaklaştırma işlemi uyguluyor musunuz?

a. Evet () b. Hayır ()

9.İşletmenizden çıkan katı evsel ve endüstriyel atıklarınızı ayırıyor musunuz?

a. Evet () b.Hayır ()

10. Katı atıkların geri kazanımı ile ilgili bir sisteminiz var mı?

a. Evet () b. Hayır ()

11. Endüstriyel katı atıklarınızı nasıl değerlendiriyorsunuz

12.Baca ölçümü yaptırıyor musunuz?cevabınız evetse hangi sıklıkla yaptırıyorsunuz?

13. İşletmeniz atıkları bir başka sanayi tarafından kullanılabilir mi?

a. Evet () b. Hayır ()

14. Atıklarınızı kullanan işletme sizin yakınızdaki mı yer alıyor ?

a. Evet () b. Hayır ()

15. Arıtılmış atık su veya geri kazanılan başka bir atık kullanılıyorsa miktarı ?

..... Ton/Yıl, m³/Yıl

III. Bölüm

Çevre Yönetimi Bilgileri

1. ÇED belgeniz var mı?

a. Evet () b. Hayır ()

2. Aşağıdaki belgelerden hangisine sahipsiniz ? Belgeleri aldığımız yıl ile belirtiniz.

a. Atık su deşarj izni, Yıl () b. Emisyon izni , Yıl ()

c. ÇED raporu, Yıl () d. ISO 9001 Yıl ()

e. ISO 14000 Yıl ()

3. Çevre dostu teknoloji olabilir mi?

a. Evet () b. Hayır ()

4. Ürünlerinizin etiket bilgilerinde çevresel etkileri ile ilgili bilgiler yer alıyor mu?

a. Evet () b. Hayır ()

5. Çevre Etiketi, Yeşil Ürün sizin sektörünüz içinde söz konusu olabilir mi?

a. Evet () b. Hayır ()

6. “Çevre Yönetim Sistemleri” hakkında bilginiz var mı?

a. Evet () b. Hayır ()

7. Çevre Yönetim Sistemine sahip olmanın ulusal/uluslar arası pazarınız açısından önemi var mı?

a. Evet () b. Hayır ()

8. İç ya da dış piyasada çevresel parametre eksikliğinden kaynaklanan sorunlar yaşadınız mı?

a. Evet () b. Hayır ()

9. İşletmenizde çevre mühendisi çalışıyor mu? Birden fazla ise belirtiniz.

10. OSB’lerinde “Çevre Yönetimi” gerekli midir? Nedenleri ile kısaca açıkla mısınız ?

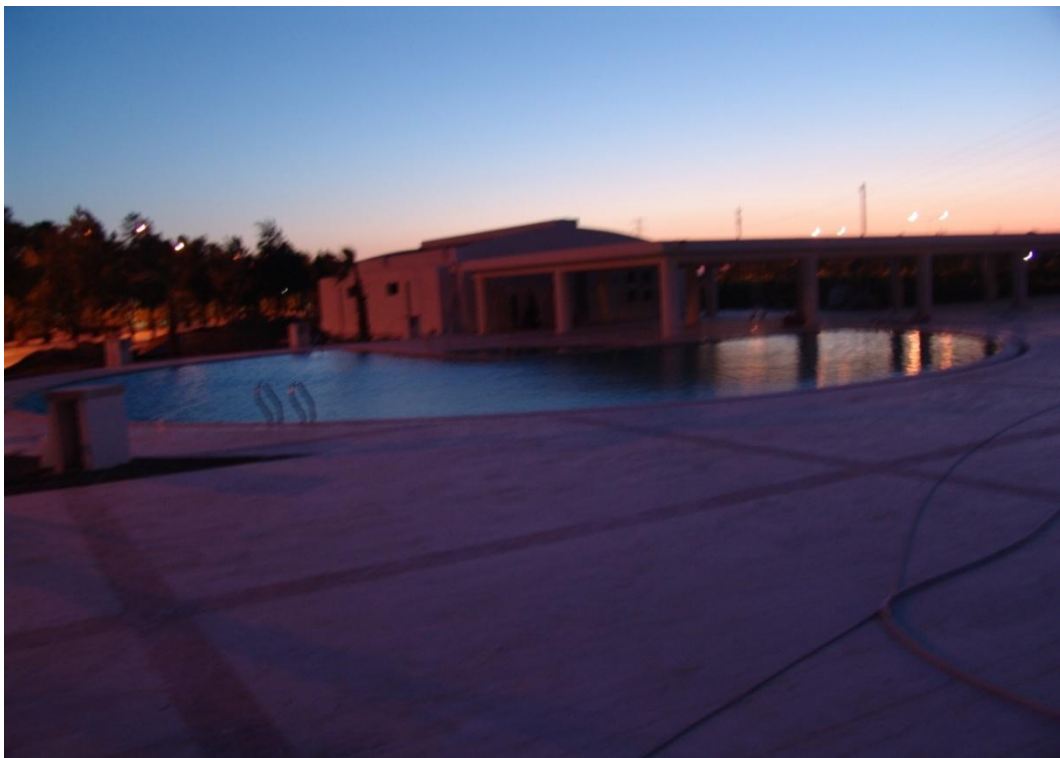
11. OSB’lerinde çevresel açıdan bütünsel bir yönetim anlayışının uygulamaya sokulmasının önündeki engeller hakkındaki düşünceleriniz nedir?

Anketi Doldurana

Adı Soyadı :

APPENDIX - 2: SWIMMING AND FIRE POOL FOTOS





APPENDIX – 3: REQUIRED DOCUMENTS FOR LICENCE OF CONSTRUCTION

1. Petition stating request to IAIP , company officer must sign.
2. CERTIFICATE OF LAND OR LAND ALLOCATION
3. ZONING STATUS; should be taken from IAIP.
4. APPLICATION PLAN (APPROVED CADASTRAL)
5. ZONING LINE should be taken from IAIP.
6. Grade plan should be taken from IAIP.
7. GROUND SURVEY AND GEOTECHNICAL REPORT: will be taken from by the relevant professional chamber.
8. ARCHITECTURAL PROJECT
9. STATIC PROJECT
10. STATIC ACCOUNTS
11. ELECTRICITY PROJECT
12. PLUMBING PROJECT
13. HEAT INSULATION PROJECT
14. FIRE PROJECT
15. SHELTER PROJECT is required for structures greater than 800m².
16. CERTIFICATE OF SHELTER (APPROVED BY COUNTY CIVIL DEFENSE
17. The ENVIRONMENTAL IMPACT ASSESSMENT report will be taken from Directorate of Environment Province.
18. Project designers CERTIFICATE OF REGISTRY (FOR WORK), will be taken from the relevant professional chamber
19. Project designers REGISTRATION OFFICE
20. SOLID WASTE AND WATER SURVEY FORMS (may be provided under Downloads on web site.)
21. WORK FLOW CHART AND DESCRIPTION REPORT
22. DOCUMENT COPY OF BUILDING INSPECTION PERMIT
23. Residence document of CONSTRUCTION AUDIT
24. SERVICE AGREEMENT of CONSTRUCTION AUDIT
25. WRITING CONTRACT of CONSTRUCTION AUDIT
26. INFORMATION FORM related to construction

27. RECEIPT OF STAMP DUTY PAYMENT RESULTING FROM AGREEMENT
of CONSTRUCTION AUDIT

28. BANK Receipt OF SERVICE FEE OF CONSTRUCTION AUDIT

29. CONTRACTOR AGREEMENT

30. CONTRACTING DOCUMENTS (Registration and Tax Record)

31. CONTRACTOR CONTRACTING OF NOTARY

32. Numeric (will be taken from Cigli Municipality)

33. COMMERCIAL ESTABLISHMENT PERMIT

34. Site chief contract, certificates of diplomas and professional chamber

35. It is required that plants which should not be established according to Industrial Parks Regulations.

PERMISSION TO USE DOCUMENTS FOR CONSTRUCTION

1. Petition stating request to IAIP , company officer must sign
2. Certificate of completion from Building Control establishment,
3. Unrelated document from Social Security
4. Certificate of unbound from Yamanlar Tax Office
5. If there is refuge, compliance letter from Directorate of Civil Defense
6. Channel to permit from IAIP
7. Fire report

İNŞAAT RUHSATI ALMAK İÇİN GEREKLİ BELGELER :

1. İAOSB'ye Talebi belirten bir dilekçe , Firma yetkilisinin imzalaması gerekmektedir.
2. TAPU VEYA TAPU TAHSİS BELGESİ
3. İMAR DURUMU : İAOSB'den alınmalıdır.
4. APLİKASYON KROKİSİ (KADASTRO MD. ONAYLI)
5. İMAR HATTI İAOSB'den alınmalıdır.
6. KOT KROKİSİ İAOSB'den alınmalıdır.
7. ZEMİN ETÜDÜ VE GEOTEKNİK RAPOR : İlgili meslek odasından onaylı olacaktır.
8. MİMARİ PROJE
9. STATİK PROJE
10. STATİK HESAPLAR
11. ELEKTRİK PROJESİ
12. SIHHİ TESİSAT PROJESİ
13. ISI YALITIM PROJESİ
14. YANGIN PROJESİ
15. SIĞINAK PROJESİ 800m2 den büyük yapılar için gereklidir.
16. SIĞINAK BELGESİ (İLÇE SİVİL SAVUNMA MD. ONAYLI)
17. ÇED RAPORU Çevre İl müdürlüğünden alınacaktır.
18. PROJE MÜELLİFİ SİCİL BELGESİ (İŞİN ADINA) İlgili meslek odasından alınacaktır
19. PROJE MÜELLİFİ BÜRO TESCİLİ
20. KATI ATIK VE SU ANKET FORMLARI (Web sayfamızdaki Dosya İndir bölümünden alabilirsiniz.)
21. İŞ AKIM ŞEMASI VE AÇIKLAMA RAPORU
22. YAPI DENETİM İZİN BELGE SURETİ
23. YAPI DENETÇİ İKAMETGAHLARI
24. YDK HİZMET SÖZLEŞMESİ
25. YAPI DENETİM TAAHHÜTNAMESİ
26. YAPIYA İLİŞKİN BİLGİ FORMU

27. YDK SÖZLEŞMESİNDEN DOĞAN DAMGA VERGİSİNİN ÖDEME DEKONTU

28. YDK HİZMET BEDELİ BANKA DEKONTU HalkBankası İAOSB şubesi
16000008 nolu hesap

29. MÜTAHİT SÖZLEŞMESİ

30. MÜTEAHHİTLİK BELGELERİ (Sicil ve Vergi Kaydı)

31. MÜTEAHHİT NOTER TAAHHÜTÜ

32. NUMARATAJ (Çiğli Belediyesinden alınacak)

33. İŞYERİ KURMA İZİNİ

34. Şantiye şefi sözleşmesi, diploma ve oda belgeleri

35. Kurulacak tesisin OSB yönetmeliğinin 93. maddesinde belirtilen tesislerden olmaması gerekmektedir.

YAPI KULLANMA İZİNİ ALMAK İÇİN GEREKLİ BELGELER :

1. İAOSB'ye Talebi belirten bir dilekçe , Firma yetkilisinin imzalaması gerekmektedir.
2. Yapı Denetim Kuruluşundan iş bitirme belgesi
3. SSK'dan ilişkisiz belgesi
4. Yamanlar Vergi Dairesinden ilişkisiz belgesi
5. Sığınak var ise Sivil Savunma Müdürlüğünden uygunluk yazısı
6. İAOSB'den kanal bağlantı izin belgesi
7. İtfaiye raporu

APPENDIX- 4: DENIZLI INDUSTRIAL PARK

DENIZLI INDUSTRIAL PARK

The region, is located at a distance of 18 km to city center. Denizli IP in the North West of the center of Denizli, The land covers an area approximately 4 360 000 m²

There are 184 industrial plots changing size between 5000 m² to 110 000 m² in the region. Denizli IP Plan are seen in Figure 1

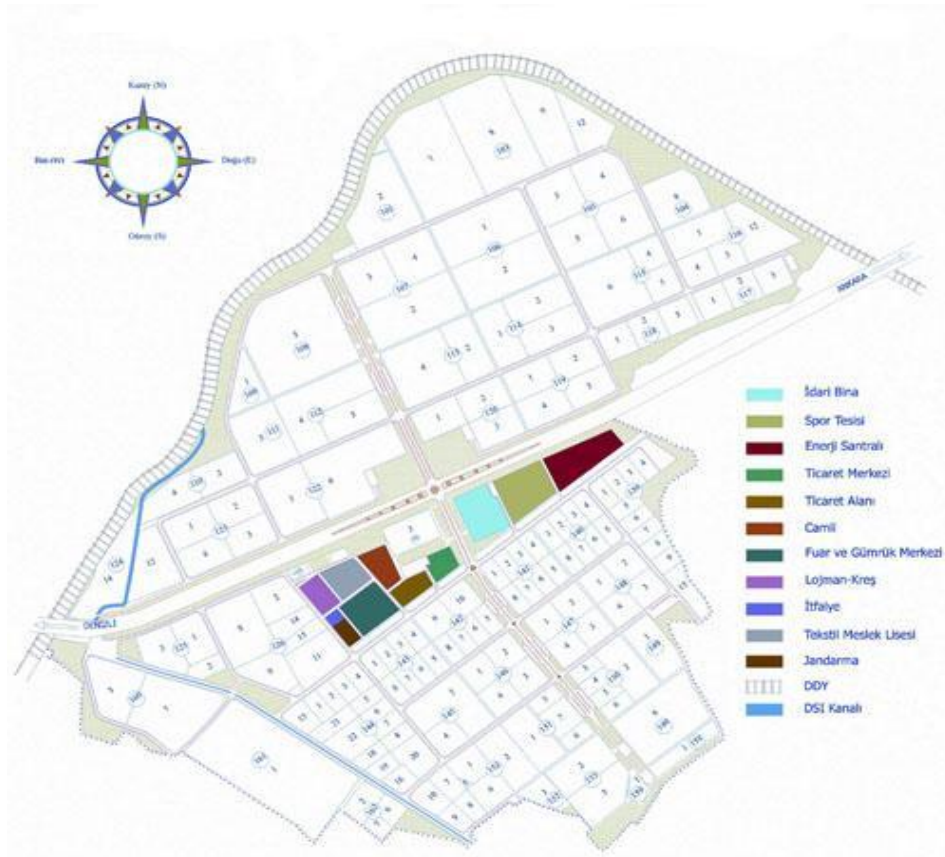


Figure 1 Denizli IP Plan

Table 1 The sectoral distribution of Denizli Industrial Parks

	Sectors	Companies				Total
		Operation	Construction	Project	Break of production	
1.	Textile					
a.	Weaving and Clothing Industry	67	1	12	23	103
b.	Spinning Industry	7	--	--	1	8
2.	Chemical Industry					
a.	Textile, Dye,	15	--	--	7	22
b.	Other Chemicals Industry	2	--	--	--	2
3.	Plastic Industry	--	--	--	2	2
4.	Agricultural Tools-Machine Industry	2	--	--	4	6
5.	Non-ferrous Metal Industry	3	1	1	1	6
6.	Glass Industry	4	--	1	--	5
7.	Paper and Cleaning Products Industry	3	--	--	1	4
8.	Iron and Steel Industry	6	--	1	4	11
9.	Metal goods Industry	2	--	1	--	3
10.	Electricity and Steam Generation Plant	3	--	--	--	3
11.	Marble Industry	4	--	2	--	6
12.	Food Industry	1	--	--	--	1
13.	Vocational- Science-Measurement Control	1	--	1	--	2

1. The Management of Denizli IP

Companies are required to apply to Denizli IP in accordance with relevant regulations to get Opening and Working Business Permits. Denizli IP examines the application file of companies and present to the Management Committee after the approval of the Regional Director. As a result of the decision Management Committee license is given to the companies. Companies given Opening and Working Business Permits is followed by Denizli IP and controlled by the Provincial Directorate of Environment and Forests within information of Denizli IP.

2. Environmental Management Unit in Denizli IP

In accordance with Environmental Control Regulation the IP Management must establish EMU consisting at least three environmental officers or working of a minimum two environmental officers or taking environmental management service from authorized environmental consulting firms concerning execution of environmental activities. IPs have to fulfill this obligation until January 2011 (Official Gazette, dated 21.11.2008, Numbered 27061).

Environmental Management Unit consist of two people, one of which environmental engineer. Environmental Management System given in Environmental Control Regulation published in Official Gazette, dated 21.11.2008, Numbered 27061, has not been set locally in Denizli IP yet.

3 Environmental Impact Assessment Management in Denizli IP

Procedures will be applied set by the Ministry for projects planned established in the IPs, Specialized Industrial Zones, Industrial Zones, Free Zones, the areas Strategic Environmental Assessment will be held, Fisheries Potential Production Areas and Technology Development Zone (Environmental Impact Assessment Regulations published in the Official Gazette numbered 26939 and dated July 17, 2008).

After the projects of companies are approved by IPs, the companies apply to Provincial Directorate of Environment and Forestry for Environmental Impact Assessment (EIA). Provincial Directorate of Environment and Forestry is authorized to evaluate EIA Regulation within the information IPs. Provincial Directorate of Environment and Forestry reports that the project what categories taking place in EIA Regulations to IP management.

Unless taking EIA decision is required, or EIA positive for the project notified in writing is subject to EIA Regulations by Provincial Directorate of Environment and Forestry, any encouragement, approval, permission or licenses to use the structure cannot be given for this project.

Projects subject to EIA regulations complete EIA process by providing points for the related regulations. Companies are obliged to report to IPs positive or negative decision taking in the context of the EIA regulations.

4 Wastewater Management in Denizli IP

In september 2010 values; 1500 m³ / hour wastewater as an average value were produced by companies in Denizli IP.

Denizli IP Regional Management is responsible for construction, maintenance and operation wastewater infrastructure provided that the standards of Water Pollution Control Regulation dated: 13.02.2008, numbered : 26786 in *Official Gazette*) under the information control and surveillance of Denizli Governorship Province Directorate of Environment and Forestry.

The discharge limits to wastewater infrastructure plant of companies in Denizli IP should not exceed 'Discharge Standards to Channel' specified according to input parameters of Centralized Waste Water Treatment Plant(CWWTP).

CWWTP was taken in to operation in 31.12.1997. The design capacity of treatment plant of Denizli IP is projected as 42 000 m³/day.

Companies in Denizli IP have to make connection their sewage system to CWWTP. Domestic and industrial quality all wastewater in the Denizli IP is collected combined channel and are brought by gravity to inlet structures of treatment plant. Rain water is collected in a separate channel and are discharged with a closed drainage system that is approximately 1 400-meter. CWWTP of Denizli IP consists of physical, chemical, biological and sludge treatment. Influent wastewater quality criteria of CWWTP in Denizli IP seen in Table 2. Wastewater treatment plant sludge is transported to Denizli landfill as inert waste in Denizli. Treated wastewater is discharged to the Sarıçay. Treated wastewater quality should provide the values in Discharge Standard of Receiving Environment Mixed Industrial Wastewater (Small and Large Industrial Zones and Other Industries that can not be made to determine sectors) in Table 19 in Water pollution Control Regulation published in the Official Gazette numbered 25687 and dated December 31, 2004.

Table 2 Influent wastewater quality criteria of CWWTP in Denizli IP.

PARAMETER	Quantity	
Chemical Oxygen Demand (COD)	1500	mg /L
Biochemical Oxygen Demand (BOD)	350	mg /L
Suspended Solids (SS)	320	mg /L
Oil and grease	60	mg /L
TotalFluoride	7	mg /L
Total Chrome	1	mg /L
Chrome (Cr ⁺⁶)	0.5	mg /L
Lead (Pb)	1	mg /L
Total Cyanide (CN ⁻)	0.5	mg /L
Cadmium (Cd)	0.1	mg /L
Iron (Fe)	5	mg /L
Fluoride (F ⁻)	5	mg /L
Copper (Cu)	15	mg /L
Zinc (Zn)	3	mg /L
Mercury (Hg)	0.1	mg /L
Sulfate (SO ₄)	2000	mg /L
Total Kjeldahl-Nitrogen	40	mg /L
Fish Biotest(ZSF)	-	
Temperature	40	⁰ C
pH	8.5-10.5	

Nineteen companies some of which dye house do not provide input criteria of CWWTP and they have to build their pre-treatment process.

5 Solid Waste Management in Denizli IP

Every company in Denizli IP has to dispose glass, metal, plastics, beverage cartons, paper, cardboard wastes by signing a protocol with a licensed waste disposal company. Most of the companies in Denizli IP dispose their package wastes by

transmitting Vatan Company that is licensed by The Minister of Environment and Forest about package wastes in Denizli IP.

Municipal waste resulted from facilities in the region is collected with the three pieces of compressed garbage truck regularly six days in a week and transported to Metropolitan municipal landfill.

6 Air Pollution Management in Denizli IP

According to the Regulation on Air Quality Control Resulted from the Industry Regulation published in the Official Gazette numbered 27277 and dated July 03, 2009, companies have to take emission permit for establish and operate the company in list A and B of Annex 8

Companies that not to provide limit values specified related regulations about emission measurements and disturb neighboring agencies and environment due to release intense emission, are required to provide the emission limit values and establish and operate flue gas treatment systems for resolving complaints of other companies in Denizli IP.

7 Hazardous Waste Management in Denizli IP

So hazardous wastes formed in the companies in Denizli IP are disposal through licensed companies within Hazardous Waste Control Regulation. Denizli Varil that is licensed company for disposing hazardous liquid wastes.

8 Noise Management in Denizli IP

Companies in the Denizli IP are required to comply with noise levels specified in the Environmental Noise Assessment and Management Regulation (*Official Gazette*, Date:04.06.2010, No: 26701)

Companies have to make noise measurements for determining the noise level anticipated in relevant regulations in the noise source in Denizli IP.

The company's manufacturing, using, selling, and operating machinery, tools, equipment and transport vehicles as known noise source have to take the necessary measures, make noise measurements regularly and document them.

If the companies exceeded the prescribed limit values as a result of noise measurement making in plant and outside of plant the companies are responsible for taking the necessary measures for the prevention of noise in Denizli IP.

