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KOCAELI INTEGRATED HEALTH CAMPUS PROJECT

Waste Management Plan

Submitted to:

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REPORT



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1.0 PURPOSE AND SCOPE

Waste Management Plan (WMP) includes the identification of waste streams and management actions including minimization, recycling, collection, storage, treatment and disposal of wastes which will be generated during site preparation, construction, operation phases of the Kocaeli Integrated Health Campus Project .("Project")

WMP is developed to identify the measures for minimizing impacts of the wastes generated in all phases of the project.

In construction phase, the contractor; and in operation phase, the operator of the hospital (Kocaeli Hastane Yatırım ve Sağlık Hizmetleri A.Ş.) will fulfil the requirements defined in this WMP by adapting them to their own operations. Each contractor must develop its own WMP with identified water streams, disposal methods, identification of permit requirement and management actions before the start of the construction phase, and then develop the project-specific plans and procedures. Similarly, the operator must develop its own WMP before the start of the operation of the hospital and then develop the project-specific plans and procedures.

It will be ensured that the waste disposal strategy developed for the project through their plan and procedures will follow the following handling hierarchy:

- waste avoidance is the most preferable option;
- minimization of quantities and hazards of waste generated is the second preferred option;
- reuse, recovery and recycling shall be preferred over treatment of waste;
- disposal shall be considered as a last resort;

Basic Principles for Waste Management will be followed:

- Follow-up of wastes with cradle to grave approach;
- Segregation of wastes at source and waste categorization;
- Reuse, recovery and recycling have the priority;
- All wastes should be handled throughout the route and will not be left at site;
- Dumping and burning of wastes are strictly forbidden;
- Waste transportation and disposal should be done via licensed facilities;
- Mixing different waste types is strictly forbidden;
- Waste transportation to the nearest licensed facility to a possible extent.

2.0 ROLES AND RESPONSIBILITIES

The requirements defined in this WMP will be fulfilled in, construction and operation phases by adapting specific activities. In each phases of the project, WMP and procedures aligned with this WMP which explain the way to implement the requirements of this plan will be developed.

In the construction phases, WMP of the contractors will be submitted to operator for approval and should be approved before the start of construction works. Contractors will also develop necessary procedures for the implementation of their management plans. Contractors will make sure that the subcontractors are working in compliance with the requirements of the WMP. They shall refer to as a minimum, the project legislation listed in "Section 3 of Main ESA" and addressed in the document elsewhere, while developing their own WMP. The activities will not be launched before the approval of Operator is obtained for the management plans and



procedures. Contractors will regularly update their WMP as the project needs change or requirements are identified in detail.

In operation phase of the project, the Operator will develop its own WMP and shall refer to as a minimum, the project legislation listed in “Section 3 of Main ESA” and addressed in the document elsewhere, while developing their own WMP, similar to construction phase. The operator will regularly update the WMP as the project needs change or requirements are identified in detail. Necessary procedures and plans will be developed for implementation of the management plan.

In all phases of the project, it is expected to comply with National Laws and shall also confirm to international standards and practices generally prevailing in the health care applications, including relevant Performance Standards of the IFC and Performance Requirements of EBRD. All contractors and the operator are required to ensure that their activities comply with all relevant Turkish legislation and international requirements including but not limited to Chapter 3 of Main ESA.

Contractors and the operator will ensure that all personnel participate in all training program including regular site-specific training sessions on health, safety and environment (HSE) issues including Waste Management.

Specific roles and responsibilities in WMP are given below:

In construction phases:

- Operator will develop and maintain the project health and safety requirements and communicate such requirements to the contractors in an effective manner;
- Operator will monitor (i.e. by auditing and such) the implementation of the WMP and health and safety procedures by Contractors;
- Contractors will be responsible for developing, implementing and maintaining a detailed, project-specific WMP which will fulfil the minimum requirements and precautions defined in that WMP;
- Contractors will be responsible for informing its employees on the requirements of the WMP and health and safety procedures (i.e. training);
- Contractor will be controlling the performance of all subcontractors regard to this WMP, the project-specific WMP and procedures;
- Contractor will be responsible for producing reports with performance indicators for the successful implantation of WMP and communicate to Operator.

In commissioning/operation phase

- A qualified environmental consultant will monitor (i.e. by auditing and such) the implementation of the WMP and health and safety procedures by the operator;
- The operator will be responsible for developing, implementing and maintaining a detailed, project-specific WMP which will fulfil the minimum requirements and precautions defined in this WMP;
- The operator will be responsible for informing its employees on the requirements of the WMP and health and safety procedures (i.e. training);
- The operator will be responsible for producing reports with performance indicators for the successful implantation of WMP.



3.0 REQUIREMENTS OF WASTE MANAGEMENT PLAN

Contractors and the operator will make sure:

- All wastes are segregated and recycling procedures are in place;
- Licensed domestic solid waste disposal areas are identified through communication with the local authorities;
- Licensed hazardous waste disposal area is identified through communication with the local authorities;
- Temporary site waste storage areas are identified and arranged in compliance with local regulations;
- There will be dedicated containers at site for segregated and recycled wastes;
- Waste generation streams specific to the activities will be identified and the disposal methods for these wastes will be defined in compliance with the project regulations;
- Recording and reporting process will be established for the created wastes at sites;
- A strategy will be set up for minimizing the generation of wastes;
- Training requirements will be defined for the personnel on waste minimization, recycling and disposal in the Waste Management Plan and include in the Training Program;
- Good housekeeping procedures will be in place for minimizing the generation of wastes;
- Specific studies on waste management facilities and landfills used will be performed to verify and ensure that they are capable of sustaining additional pressure brought by project without affecting current waste management services.

4.0 WASTE STREAMS AND DISPOSAL REQUIREMENTS

The waste streams and disposal requirements in the below sections are given for the construction, operating and decommissioning phases of the project.

In the following section a categorization of the wastes is presented referring to the categorization by Turkish Legislation.

4.1 Construction Phase

4.1.1 Excavation Waste

The top soil would be stored separately from the excavation materials and after the construction work is completed, it would be used in the land clearance and rehabilitation works.

2.500.000 m³ of excavation is estimated to be conducted in the construction phase of the project. During the excavation works, necessary amount of bottom cover soil would be excavated and would be stored at the construction site for construction of the buildings.

During these operations, the following provisions indicated in the Regulation on Control of Excavation Soil and Construction Debris regarding the storage of the top soil would be respected:

- The top soil shall be stored in an appropriate area to prevent from being scattered by wind or water streams or other factors, from being mixed with foreign materials and from being deteriorating with respect to original characteristics and necessary protection measures shall be taken;



- The area where the top soil would be stored shall not have more than 5% inclination;
- During the storage of the top soil, possible losses shall be prevented and the quality of the soil shall be maintained;
- If the top soil shall be kept exposed for a long time, it will be ensured that surface is covered with fast growing plants.

The excavation soil that will be taken out during construction phase would at first be accumulated in the construction site in order to be used for backfilling. Remaining excavation soil would be stored on an appropriate location in the construction site and sent to dumping site in İzaydaş region.

The waste material which is occurred from excavation works during the construction phase would not be disposed to the rivers that flows or dry, related to "the River Beds and Floods Decree" Numbered 2006/27 from Prime Ministry.

During all excavation works under the scope of the project, provisions of Regulation on Control of Excavation Soil and Construction Debris and also provisions of the Regulation on Control of Soil Pollution and Contaminated Lands by Point Sources would be complied with.

4.1.2 Domestic Solid Wastes

During the construction phase of the project, maximum 3.500 workers would be employed and domestic solid wastes would be created from these workers. Assuming that daily domestic solid waste per capita is 1.15 kg/person/day¹:

Maximum daily amount of solid waste = 3.500 people x 1.15 kg/person/day x 4.025 kg/day

A construction site that will provide accommodation, messing, and other basic needs for the workers throughout the construction would be installed in the project area. Domestic solid waste from the workers would be collected in closed containers located at various points of the construction site area. These solid wastes would be collected in containers and at certain intervals would be transported to the solid waste collection system belonging to İzmit Municipality and be disposed of.

Domestic solid waste produced under the project would be disposed of according to the "Regulation for the Control of Solid Waste".

4.1.3 Packaging Waste

There would be packaging waste from the packaging materials used in the transport of equipment, from the packaging of the materials used and from the personnel in construction phase of the project.

The packing paper, plastic and glass bottles i.e. packaging wastes will be collected separate from other wastes without considering material used and the source of the material and should be sent to licensed recycling facilities according to the Regulation on Control of Packaging Waste.

The collection of these packaging materials within the construction site sites and their disposal would be done in compliance with the provisions of the "Regulation on Control of Packaging Waste".

4.1.4 Hazardous Wastes

The hazardous wastes that are possibly occurred within the scope of the project during construction phase of the project are fluorescent tubes, cartridges, print toners, filter materials, transformers, paints/varnishes, waste lubricants. These wastes are occurred as a result of machine and equipment usage and hazardous waste produced by domestic usage and other wastes contaminated with these kinds of wastes.

The quantity of the hazardous wastes would be dependent of the activities in the construction site sites and it is not possible to give exact information on the amount of the waste at this stage.

¹Turkish Statistical Institute, 2006 Municipality Solid Waste Statistics



According to the provisions in the Regulation on Control of Hazardous Wastes, the hazardous wastes would be stored temporarily within the construction site separate from other wastes in a closed environment preventing any chemical reaction. After that, these wastes would be sent via licensed transportation vehicles to hazardous waste disposal companies licensed by the Ministry of Environment and Urbanization.

During the storage of hazardous wastes in construction period of the project following provisions indicated in Regulation on Control of Hazardous Wastes will be respected:

- A record shall be kept on the amount of the waste and packaging and labelling of the waste shall be according to the internationally accepted standards required by the environmentally licensed recycling or disposal facility which will receive the waste.
- The Waste Declaration Form indicated in the regulation shall be filled and approved every year by the end of March with the previous year's information using the web based program prepared by the Ministry of Environment and Urbanization and a copy shall be stored for five years.
- The waste would be temporarily stored in durable, leak-proof, safe containers at international standards placed on a concrete area away from the buildings of the construction site, there will be hazardous waste labels on the containers, the quantity and the stored date would be indicated on the container, if the containers are damaged, the waste would be transferred to other containers having the same specifications, containers would always be kept closed, and they would be stored so that the waste does not chemically react.
- All the measures shall be taken for the health and safety of the employees responsible for the collection, transportation and temporary storage of the waste within the facility.
- In order to prevent pollution that happens as a result of accidental spill or by deliberate actions, depending on the type of the waste, location of the incident would be brought to its original condition by latest within a month from the time of the incident.
- Moreover, when waste are spilled by accident or deliberately and in other similar cases, office of the governor shall be informed and a report detailing the accident date, accident location, type and quantity of the waste, cause of the accident, the waste disposal action and rehabilitation of the accident location shall be submitted to the office of the governor.

4.1.5 Waste Batteries and Accumulators

The maintenance process of the vehicles to be used in construction period of the project would be done in authorized services. However, in cases where the maintenance process of the vehicles used in the project are carried out within the construction site area, possible waste accumulators and batteries that come out during construction activities would be stored in a closed containers with a leak-proof floor according to the Regulation on Control of Waste Batteries and Accumulators and batteries shall be delivered to the collection points established by İzmit Municipality or by the companies distributing or selling batteries and waste accumulators shall be delivered to the temporary storage areas established by the companies distributing or selling accumulator products and maintenance companies.

Within the scope of the project, provisions of the Regulation on Control of Waste Batteries and Accumulators and amendments of this regulation shall be complied with.

4.1.6 Medical Wastes

All medical wastes created in the infirmary units of the construction site during construction period of the project shall be disposed of according to the provisions of Regulation on Control of Medical Wastes. The medical wastes would be placed inside red plastic bags which are resistant to tearing, piercing, bursting and carrying; originally from moderate density polyethylene material, with double bottom seam and without



pleats, with double ply thickness of 100 microns, with at least 10 kg holding capacity, carrying on both sides the warning symbol of "International Biohazard" and "ATTENTION! MEDICAL WASTE" with at an easily readable size. The bags would be filled to a maximum of 3/4 capacity and would be tightly closed and when necessary double bagging would be done having the same specifications in order to ensure absolute leak-proofing.

Medical wastes that have cutting and piercing properties would be collected separately from the other waste in a plastic or laminated cardboard or containers having the same specification as piercing, tearing, breaking and bursting resistant, waterproof and leak-proof, could not be opened or tampered with, having the warning symbol of "International Biohazard" and warning of "ATTENTION! CUTTING AND PIERCING MEDICAL WASTE". These collection containers would be filled a maximum of 3/4, would be tightly closed and put into red plastic bags and once the waste boxes are filled, they would absolutely not be compressed, opened, emptied or recycled.

Medical wastes collected in the construction site according to the points indicated in the regulations, would be disposed of by delivering to the nearest health institution or Kocaeli Belediyesi medical waste collection system which is licensed by MoEU. Medical waste that are produced under the project shall be regularly recorded according to the Regulation on Control of Medical Waste, shall be sent to the Provincial Directorate of Environment and Urbanization, these information shall be kept for at least three years and be kept open to examination of the Ministry upon request.

Within the scope of the project, provisions of the Regulation for Medical Waste Control shall be complied with.

4.1.7 Waste Oil

The maintenance process of the vehicles to be used in construction period of the project would be done in authorized services. If any waste oil is produced in the construction site area, the waste oil shall be collected in a closed temporary waste storage area with leak-proof floor and covered with a shelter. The oil collected would be given to a licensed waste oil recovery company according to the Regulation on Control of Waste Oil.

Additionally, waste vegetative oil would occur in the cafeterias of the construction site within the scope of the project. These wastes would be collected separate from other wastes and would be disposed according to the provisions given in the Regulation on Control of Waste Vegetative Oil. The vegetative waste oil shall be collected in a closed temporary waste storage area with leak-proof floor and covered with a shelter. The oil collected would be given to a licensed waste oil recovery company according to the Regulation on Control of Waste Vegetative Oil.

After the delivering of the waste oils to licensed companies, Waste Oil Declaration Form in Appendix-2 of the Regulation on Control of Waste Oil would be filled and sent to the Provincial Directorate of Environment and Urbanization until the end of February of the following year.

4.1.8 Waste Tire

During construction phase of the project, the maintenance activities of the vehicles and construction machines would be done in authorized services. If there is a need to change the tires of these vehicles and machines in the construction site area, the end of life tires that come out would be sent to tire distribution companies or to the authorized transporters.

All provisions in the Regulation on the Control of End of Life Tires would be respected.

4.2 Operating Phase

Between 75% and 90% of the waste produced by hospitals is similar to domestic waste and usually called "non-hazardous" or "general health-care waste". It comes mostly from the administrative, kitchen and housekeeping functions at health-care facilities and may also include packaging waste and waste generated



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during maintenance of health-care buildings. The remaining 10–25% of health-care waste is regarded as “hazardous” and may pose a variety of environmental and health risks. ²

A classification of hazardous health-care waste and examples of the wastes from different sources are summarized in below tables.

Categories of health-care facility wastes³

Waste category	Descriptions and examples
Hazardous health-care waste	
Sharps waste	Used or unused sharps (e.g. hypodermic, intravenous or other needles; auto-disable syringes; syringes with attached needles; infusion sets; scalpels; pipettes; knives; blades; broken glass)
Infectious waste	Waste suspected to contain pathogens and that poses a risk of disease transmission (e.g. waste contaminated with blood and other body fluids; laboratory cultures and microbiological stocks; waste including excreta and other materials that have been in contact with patients infected with highly infectious diseases in isolation wards)
Pathological waste	Human tissues, organs or fluids; body parts; fetuses; unused blood products
Pharmaceutical waste, cytotoxic waste	Pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals Cytotoxic waste containing substances with genotoxic properties (e.g. waste containing cytostatic drugs – often used in cancer therapy; genotoxic chemicals)
Chemical waste	Waste containing chemical substances (e.g. laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; waste with high content of heavy metals, e.g. batteries; broken thermometers and blood-pressure gauges)
Radioactive waste	Waste containing radioactive substances (e.g. unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources)
Non-hazardous or general health-care waste	
Non-hazardous or general health-care waste	Waste that does not pose any particular biological, chemical, radioactive or physical

Examples of health-care waste from different sources ⁴

Major sources (hospitals and medical centers)

² WHO, Safe Management of Wastes from Health-Care Activities, 2014

³ WHO, Safe Management of Wastes from Health-Care Activities, 2014

⁴ WHO, Safe Management of Wastes from Health-Care Activities, 2014



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	Sharps	Infectious and pathological waste	Chemical, pharmaceutical and cytotoxic waste	Non-hazardous or general waste
Medical ward	Hypodermic needles, intravenous set needles, broken vials and ampoules	Dressings, bandages, gauze and cotton contaminated with blood or body fluids; gloves and masks contaminated with blood or body fluids	Broken thermometers and blood-pressure gauges, spilt medicines, spent disinfectants	Packaging, food scraps, paper, flowers, empty saline bottles, non-bloody diapers, non-bloody intravenous tubing and bags
Operating theatre	Needles, intravenous sets, scalpels, blades, saws	Blood and other body fluids; suction canisters; gowns, gloves, masks, gauze and other waste contaminated with blood and body fluids; tissues, organs, fetuses, body parts	Spent disinfectants Waste anaesthetic gases	Packaging; uncontaminated gowns, gloves, masks, hats and shoe covers
Laboratory	Needles, broken glass, Petri dishes, slides and cover slips, broken pipettes	Blood and body fluids, microbiological cultures and stocks, tissue, infected animal carcasses, tubes and containers contaminated with blood or body fluids	Fixatives; formalin; xylene, toluene, methanol, methylene chloride and other solvents; broken lab thermometers	Packaging, paper, plastic containers
Pharmacy store	-	-	Expired drugs, spilt drugs	Packaging, paper, empty containers
Radiology	-	-	Silver, fixing and developing solutions; acetic acid; glutaraldehyde	Packaging, paper
Chemotherapy	Needles and syringes	-	Bulk chemotherapeutic waste; vials, gloves and other material contaminated with cytotoxic agents; contaminated excreta and urine	Packaging, paper
Vaccination campaigns	Needles and syringes		Bulk vaccine waste, vials, gloves	Packaging
Environmental services	Broken glass		Disinfectants (glutaraldehyde, phenols, etc.), cleaners, spilt mercury, pesticides	Packaging, flowers, newspapers, magazines, cardboard, plastic and glass containers, yard and plant waste
Engineering			Cleaning solvents, oils, lubricants, thinners,	Packaging, construction or



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Major sources (hospitals and medical centers)

	Sharps	Infectious and pathological waste	Chemical, pharmaceutical and cytotoxic waste	Non-hazardous or general waste
			asbestos, broken mercury devices, batteries	demolition waste, wood, metal
Food services				Food scraps; plastic, metal and glass containers; packaging

Amount of wastes which would be created from the Project can be estimated from "Total and infectious waste generation by type of health-care facility of USA"⁵:

Total health-care waste generation for rural general hospitals = 6,40 kg/bed/day

Infectious waste generation for rural general hospitals = 2,03 kg/bed/day

Total daily health-care waste = 6,40 kg/bed/day x 1.180 bed = 7.552 kg/day

Total infectious waste = 2,03 kg/bed/day x 1.180 bed = 2.395 kg/day

All types of wastes should be collected and disposed separately from each other in accordance with the Turkish Legislation. Therefore, a waste management system would be developed in the hospital and a waste management team would be identified. Main principles of the waste management system from creation to transportation of the wastes are listed below:

- Health-care waste would be generated in a medical area and should be segregated into different fractions in accordance with its type, based on their potential hazard and disposal route, by the person who produces each waste item;
- Separate containers should be available in each medical area for each segregated waste fraction; waste containers when filled should be labelled to help managers control waste production;
- Closed local storage would be installed and hazardous and non-hazardous wastes would not be mixed during collection, transport or storage;
- Staff would be educated to understand the risks and safety procedures for the wastes they are handling.

4.2.1 Medical Wastes

Medical wastes are the most important type of wastes which will be created during the operation of the project. Medical wastes are classified into three main groups according to the Regulation for Medical Waste Control:

- Infectious waste

⁵ WHO, Safe Management of Wastes from Health-Care Activities, 2014



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- Sharps
- Pathologic waste

The main strategy of waste management of medical wastes is to separate all medical wastes from other hazardous wastes (such as chemical wastes or radioactive wastes) and non-hazardous general waste. However, to provide a minimum level of safety to staff and patients, each type of medical wastes would be collected separately. Waste management methods used for each type of medical waste in operation phase of the project is summarized below:

Medical Waste Management Methods of the Hospital Project⁶

Type of Medical Waste	Contents	Segregation Options	Disposal Options
Infectious Waste	Includes waste suspected to contain pathogens (e.g. bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. Includes pathological and anatomical material (e.g. tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.	Yellow or red colored bag / container, marked "infectious" with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved	Izmit Belediyesi and/or licensed medical waste sterilization/disposal plants
Sharps	Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	Yellow or red color code, marked "Sharps". Rigid, impermeable, puncture-proof container (e.g. steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled "infectious waste"	Izmit Municipality and/or licensed medical waste sterilization/disposal plants
Pharmaceutical Waste	Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (e.g. drug bottles vials, tubing etc.).	Brown bag / container. Leak-proof plastic bag or container.	Izmit Municipality and/or licensed medical waste sterilization/disposal plants

Main points in medical waste management activities are given in following parts of the report. A detailed Waste Management Plan will be prepared in the operation phase of the project, which specifies separate

⁶ IFC EHS Guidelines for Health Care Facilities, 2007



collection and storage, equipment and vehicles used in waste storage and transportation activities, waste types and quantities, frequency of collection, temporary storage systems, cleaning and disinfection of collecting equipment, measures and actions during accidents, responsible staff etc., according to the Regulation on Control of Medical Wastes.

4.2.1.1 Waste Segregation

Segregation methods should be clearly set out in the waste-management plan of the facility. It is important that the waste-management requirements are supported and enforced by senior staff and managers.

Management and Supervision personnel should be aware of the relevant legislation how to implement waste audits, possible problems and take pre-emptive remedial action. Medical staff and waste handlers should understand the reasons for, and operation of, segregation practices, waste auditing, spill management, and accident and injury reporting. Training should be repeated periodically to ensure that all staff is reminded of their responsibilities.

The management is responsible for seeing that segregation rules are enforced and waste audits carried out to quantify the amount of waste being produced. Also, segregation posters for medical and waste workers help to raise knowledge about segregation practices and improve the quality of separated waste components

The hospital management would be responsible for making sure there is a suitable segregation, transport and storage system, and that all staff adheres to the correct procedures. Segregation of medical wastes is under the responsibility of the person producing each waste item and Segregation should be carried out by the producer of the waste as close as possible to its place of generation, i.e. in a medical area. Under the conditions where the classification of a waste item is uncertain, as a precaution it should be placed into a container used for hazardous infectious waste. The appropriate waste containers should be placed in each medical and other waste-producing area in the facility to allow the staff to segregate and dispose of waste at the point of generation, and thus reducing the need for staff to carry waste through a medical area.

The medical wastes should be placed inside bags and containers which are resistant to tearing, piercing, bursting and carrying; originally from moderate density polyethylene material, with double bottom seam and without pleats, with double ply thickness of 100 microns, with at least 10 kg holding capacity, carrying on both sides the warning symbol of "International Biohazard" and "ATTENTION! MEDICAL WASTE" with at an easily readable size. The bags would be filled to a maximum of 3/4 capacity and would be tightly closed and when necessary double bagging would be done having the same specifications in order to ensure absolute leak-proofing.

Waste containers would have well-fitting lids, either removable by hand or preferably operated by a foot pedal. Both the container and the bag should be of the correct color for the waste they are intended to receive and labelled clearly. The containers should be large enough for the quantity of waste generated at that location during the period between collections to increase the segregation success. The results of the waste audits can be used to determine whether the size, number or the location of the containers are enough for the purposes.

Medical wastes that have cutting and piercing properties (i.e. sharps) would be collected waste in a plastic or laminated cardboard or containers having the same specification as piercing, tearing, breaking and bursting resistant, waterproof and leak-proof, could not be opened or tampered with, having the warning symbol of "International Biohazard" and warning of "ATTENTION! CUTTING AND PIERCING MEDICAL WASTE". These collection containers would be filled a maximum of 3/4, would be tightly closed and put into red plastic bags and once the waste boxes are filled, they would absolutely not be compressed, opened, emptied or recycled.

- Other principles that would be followed are: Containers are segregating hazardous and non-hazardous health-care wastes could be located close together, wherever possible.
- Containers for infectious waste would not be placed in public areas.



- Static bins are better to be located as close as possible to sinks and washing facilities where most staff will deposit gloves and aprons after treating patients.
- If there is a known communicable all waste used in and around the patient would be classed as an infection risk and placed in infectious waste container.

4.2.1.2 Waste Collection

Basic principles to be followed during waste collection are:

- Collection times would be fixed and appropriate to the quantity of waste produced in each area of the hospital.
- Other types of wastes would not be collected at the same time or in the same trolley as medical wastes.
- Waste bags and sharps containers should be filled to no more than three quarters full.
- Plastic bags would never be stapled but may be tied or sealed with a plastic tag or tie.
- Replacement bags or containers would be available at each waste-collection location so that full ones can immediately be replaced.
- Waste bags and containers would be labelled as described above.
- Collection would be daily for most wastes, with collection timed to match the pattern of waste generation during the day.

4.2.1.3 Waste Storage

Medical wastes generated in the hospital would be stored separately in a waste storage area where all hazardous wastes of the hospital are stored. Each type of wastes would be kept in containers which prevent wastes to be mixed. From here, the waste can be kept away from patients and public access before removal, then collected conveniently and transported to a disposal facility. All waste containers in the storage area would be clearly labelled and the area would be preferably lockable. Following measures will be taken in the waste storage area⁷:

- Waste would be stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs;
- Wastes would be stored in closed containers away from direct sunlight, wind and rain;
- Secondary containment systems would be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment;
- Adequate ventilation would be provided where volatile wastes are stored.

Medical and hazardous waste storage activities would be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes:

- Provision of readily available information on chemical compatibility to employees, including labelling each container to identify its contents;

⁷ IFC EH&S Guidelines, General EHS Guidelines: Environmental Waste management, 2007, 2007



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- Limiting access to the waste storage areas to employees who have received proper training;
- Clearly identifying (label) and demarcating the area, including documentation of its location on a facility map or site plan;
- Conducting periodic inspections of waste storage areas and documenting the findings;
- Preparing and implementing spill response and emergency plans to address their accidental release;
- Avoiding underground storage tanks and underground piping of hazardous waste.

4.2.1.4 Waste Transport

Transportation of medical wastes to disposal sterilization/plants will be done by licensed medical waste transportation trucks according to the Regulation on Control of Medical Wastes. Medical wastes would not be transported with other wastes.

4.2.1.5 Waste Disposal

Medical wastes created from the hospital would be disposed of by delivering to Kocaeli Municipality medical waste collection system and/or licensed medical waste sterilization/disposal plants. Medical waste that are produced under the project shall be regularly recorded according to the Regulation on Control of Medical Waste, shall be sent to the Provincial Directorate of Environment and Urbanization, these information shall be kept for at least three years and be kept open to examination of the Ministry upon request.

Licensed medical waste sterilization/disposal plants close to Project area are listed below:

Licensed Medical Waste Sterilization/Disposal Plants

Name of the Plant	Province	License	Distance to the Hospital
Sas Grup Çamur Susuzlaştırma Dış Tic.Ltd.Şti. İzmit Şubesi	Kocaeli	Medical Waste Sterilization Plant	5 km

4.2.1.6 Hazardous Wastes

The hazardous wastes that are possibly occurred during operation of the hospital project are pharmaceutical wastes (expired medicals), cytotoxic wastes, chemical wastes (laboratory reagents, film developer, expired disinfectants, solvents etc.), contaminated packages and other wastes (air filters, cartridge/toner), insulating materials etc.).

According to the provisions in the Regulation on Control of Hazardous, the hazardous wastes would be stored temporarily within the construction site separate from other wastes in a closed environment preventing any chemical reaction. After that, these wastes would be sent via licensed transportation vehicles to hazardous waste disposal companies licensed by the Ministry of Environment and Urbanization.

During the storage of hazardous wastes during operation of the hospital, following provisions indicated in Regulation on Control of Hazardous Wastes will be respected:

- A record shall be kept on the amount of the waste and packaging and labelling of the waste shall be according to the internationally accepted standards required by the environmentally licensed recycling or disposal facility which will receive the waste.
- The Waste Declaration Form indicated in the regulation shall be filled and approved every year by the end of March with the previous year's information using the web based program prepared by the Ministry of Environment and Urbanization and a copy shall be stored for five years.



- The waste would be temporarily stored in durable, leak-proof, safe containers at international standards in waste storage area placed on a concrete area away from the buildings, there will be hazardous waste labels on the containers, the quantity and the stored date would be indicated on the container, if the containers are damaged, the waste would be transferred to other containers having the same specifications, containers would always be kept closed, and they would be stored so that the waste does not chemically react.
- All the measures shall be taken for the health and safety of the employees responsible for the collection, transportation and temporary storage of the waste within the facility.
- In order to prevent pollution that happens as a result of accidental spill or by deliberate actions, depending on the type of the waste, location of the incident would be brought to its original condition by latest within a month from the time of the incident and all the expenses for this shall be borne.
- Also, when waste are spilled by accident or deliberately and in other similar cases, office of the governor shall be informed and a report detailing the accident date, accident location, type and quantity of the waste, cause of the accident, the waste disposal action and rehabilitation of the accident location shall be submitted to the office of the governor.

4.2.1.7 Radioactive Waste⁸

The radioactive wastes that are possibly occurred during operation of the hospital project are unused liquids from radiotherapy or laboratory research, contaminated glassware, packages or absorbent paper, urine and excreta from patients treated or tested with unsealed radionuclides, sealed sources etc.

Radionuclides used in health care are in either unsealed (or open) sources or sealed sources. Unsealed sources are usually liquids that are applied directly, while sealed sources are radioactive substances contained in parts of equipment or encapsulated in unbreakable or impervious objects, such as pins, “seeds” or needles.

Radioactive health-care waste often contains radionuclides with short half-lives (i.e. half of the radionuclide content decays in hours or a few days); consequently, the waste loses its radioactivity relatively quickly. However, certain specialized therapeutic procedures use radionuclides with longer half-lives; these are usually in the form of small objects placed on or in the body and may be reused on other patients after sterilization. Waste in the form of sealed sources may have a relatively high radioactivity, but is only generated in low volumes from larger medical and research laboratories. Sealed sources are generally returned to the supplier and should not enter the waste stream.

The waste produced by health-care and research activities involving radionuclides and related equipment maintenance and storage can be classified as follows:

- Sealed sources;
- Spent radionuclide generators;
- Low-level solid waste (e.g. absorbent paper, swabs, glassware, syringes, vials);
- Residues from shipments of radioactive material and unwanted solutions of radionuclides intended for diagnostic or therapeutic use;
- Liquid immiscible with water, such as liquid scintillation counting;
- Residues used in radioimmunoassay, and contaminated pump oil;

⁸ WHO, Safe Management of Wastes from Health-Care Activities, 2014



- Waste from spills and from decontamination of radioactive spills;
- Excreta from patients treated or tested with unsealed radionuclides;
- Low-level liquid waste (e.g. from washing apparatus);
- Gases and exhausts from stores and fume cupboards.

The waste management system of the hospital will include details about radioactive wastes. First step of the radioactive waste management would be minimizing volume and activity of the wastes. Hence, all possible measures would be taken to reduce radioactive waste volume and activity.

Physical, biological, chemical specifications of the wastes would be determined in order to find proper waste management steps. Radioactive wastes are classified according to radioactivity level and half-life of radioisotopes as very short life, very low level, low level, medium level and high level in accordance with the Regulation on Management of Radioactive Wastes published by Turkish Atomic Energy Authorization.

Radioactive waste would be stored in containers that prevent dispersion of radiation, and stored behind lead shielding. Waste that is to be stored during radioactive decay would be labelled with the type of radionuclide, date, period of time before full decay and details of required storage conditions.

The decay storage time for radioactive waste differs from other waste storage, because the main target will be to store the waste until the radioactivity is substantially reduced and the waste can be safely disposed of as normal waste. A minimum storage time of 10 half-life times for radioisotopes in wastes with a half-life of less than 90 days is a common practice. Infectious radioactive waste should be decontaminated before disposal. Sharp objects such as needles, Pasteur pipettes and broken glass should be placed into a sharps container. Liquids associated with solid materials, such as assay tube contents, should be decanted or removed by decay time. All radioactive labelling should be removed on any items to be disposed of.

Storage places would be equipped with sufficient shielding material, either in the walls or as movable shielding screens. The storage would be clearly marked with "RADIOACTIVE WASTE", and the international hazard label would be placed on the door. The waste storage area would be constructed in a manner that renders it flame-proof and should have such surfaces on floors, benches and walls that allow proper decontamination. An air-extraction system and radioactive monitoring system would be put in place. According to the Regulation on Management of Radioactive Wastes, if maximum doses of critical groups in operation conditions exceed 10 μ Sv per year, environmental monitoring program should be implemented.

Transportation of the radioactive wastes from waste storage area to disposal site and disposal would be conducted by firms authorized by Turkish Atomic Energy Authorization. The regulation on Secure Transfer of Radioactive Materials and the Regulation on Management of Radioactive Wastes would be implemented during transportation and disposal.

4.2.1.8 Domestic Solid Waste

During the operation phase of the hospital project, approximately 8.000 people in a day, staff employed in the hospital and people providing service, would create domestic solid waste. Assuming that daily domestic solid waste per capita is 1.15 kg/person/day:

Maximum daily amount of solid waste = 8.000 people x 1.15 kg/person/day x = 9.200 kg/day

Domestic solid waste would be collected in closed containers located at various points inside and outside of the hospital. These solid wastes would be collected in containers and at certain intervals would be collected by İzmit Municipality and be disposed of.

Domestic solid waste produced under the project would be disposed of according to the "Regulation for the Control of Solid Waste".



4.2.1.9 Packaging Waste

There would be packaging waste from the packaging of the materials used and from the personnel in the hospital project.

The packing paper, plastic and glass bottles i.e. packaging wastes will be collected separate from other wastes without considering material used and the source of the material and should be sent to licensed recycling facilities according to the Regulation on Control of Packaging Waste.

The collection of these packaging materials within the construction site sites and their disposal would be done in compliance with the provisions of the "Regulation on Control of Packaging Waste".

The maintenance process of the vehicles to be used in construction period of the project would be done in authorized services. If any waste oil is produced in the construction site area, the waste oil shall be collected in a closed temporary waste storage area with leak-proof floor and covered with a shelter. The oil collected would be given to a licensed waste oil recovery company according to the Regulation on Control of Waste Oil.

4.2.1.10 Waste Vegetative Oil

Waste vegetative oil would occur during cooking activities in the hospital. These wastes would be collected separate from other wastes and would be disposed according to the provisions given in the Regulation on Control of Waste Vegetative Oil. The vegetative waste oil shall be collected in a closed temporary waste storage area with leak-proof floor and covered with a shelter. The oil collected would be given to a licensed waste oil recovery company according to the Regulation on Control of Waste Vegetative Oil.

After the delivering of the waste oils to licensed companies, Waste Oil Declaration Form in Appendix-2 of the Regulation on Control of Waste Oil would be filled and sent to the Provincial Directorate of Environment and Urbanization until the end of February of the following year.

4.2.1.11 Waste Batteries and Accumulators

Waste batteries which come out in the hospital would be stored in a closed containers with a leak-proof floor according to the Regulation on Control of Waste Batteries and Accumulators and batteries shall be delivered to the collection points established by İzmit Municipality or by the companies distributing or selling batteries and waste accumulators shall be delivered to the temporary storage areas established by the companies distributing or selling accumulator products and maintenance companies.

Within the scope of the project, provisions of the Regulation on Control of Waste Batteries and Accumulators and amendments of this regulation shall be complied with.

5.0 WATER USE AND WASTE WATER

5.1 Water Supply

The water supply for construction activities will be from municipality network.

During the construction phase of the project, maximum 3.500 workers would be employed and water demand would be used from these workers. Assuming that daily water demand per capita is 150 L/day (State Planning Organisation, 2007):

Maximum daily amount of water to be used= 3.500 people x 150 L/day x = 525 m³/day.

The primary and the only source of water for operation phase consumption will be the municipality network.

In the case of groundwater consumption the water physico-chemical and microbiological quality will be ensured to be in line with national and WHO (World Health Organization) standards through appropriate treatment and monitoring.

The water storage during operation phase will be in raw water tank, consumption water tank, treated water tank, irrigation water tank, cooling water tank and fire water tank.



WASTE MANAGEMENT PLAN

There will be sand filters before the water storage and the water in raw water tank, consumption water tank and fire water tank will be chlorinated for disinfection.

The water will be softened before it goes to cooling water tank from the raw water storage tank. The water in the cooling water tank will be dosed with biocide, corrosion inhibitor and pH equalizers to prevent sedimentation in the tank.

There will be UV filters for microbiologic disinfection on the lines for consumption water. There will also be activated carbon filters after pressurization on water consumption lines.

The water that will be used in producing steam and pure steam that will be supplied to the laboratory, sterilization and laundry sections will be subject to softening, pre-filtration and reverse osmosis.

There will be a water treatment package unit for hemodialysis department.

The water supplied to pure steam system will be in compliance with the following criteria:

Table 1 Water supply criteria for pure steam production

Parameter	Value
Ammonium	0,2 mg/l
Heavy metals substitute	0,1 mg/l
Chloride	0,5 mg/l
Nitrate	0,2 mg/l
Residue on evaporation	30,0 mg/L
Phosphate	0,1 mg/l
Silicate	0,1 mg/l
Electrical conductivity at 250C	35,0 \wedge S/cm

The amount of water to be used for operation of the hospital will be designed for the consumption figures calculated in line with:

- 2006 International Plumbing Code
- ASHRAE HVAC Application 2007 CH. 49 Table 8".
- CIBSE Guide G Public Health Engineering

The calculation assumptions for the required water amount are presented in the following table.

Table 2 Water Amount Calculations

Item	Data
Number of Bed	1.180 beds
Water consumption per bed	200 l/day
Total Inpatient water consumption	236 m ³ /day



WASTE MANAGEMENT PLAN

Item	Data
Number of Companion	500 people
Water consumption per companion	50 l/day
Total companion water consumption	25 m ³ /day
Number of patients at polyclinic	8.000 People
Water consumption per patient at polyclinic	20 l/day
Total water consumption at polyclinic	160 m ³ /day
Number of emergency patients	250 people
Water consumption per emergency patients	50 l/day
Total water consumption for emergency	12,5 m ³ /day
Number of Medical Staff	300 people
Water consumption per day	50 l/day
Total water consumption for medical staff	15 m ³ /day
Number of service personnel	1.000 people
Water consumption per day	50 l/day
Total water consumption for service staff	50 m ³ /day
The number of kitchen dish	8.000 meal
The water consumption per dish	12 l/dish
Total water consumption at kitchen	96 m ³ /day
Laundry washing capacity	6.000 kg/day
The water consumption per washing	7,5 l/kg
Total water consumption at laundry = 15m ³ /gün	45 m ³ /day
TOTAL	640 m ³ /day
Total Capacity for 3 days with 10% safety	1.920 m ³

5.2 Wastewater

The domestic wastewater during construction will be collected by the municipality sewage network.

During the construction phase of the project, maximum 3.500 workers would be employed and wastewater would be used from these workers. Assuming that daily domestic wastewater production per capita is 150 L/day (State Planning Organisation, 2007):

Maximum daily amount of domestic wastewater= 3.500 people x 150 L/day x = 525 m³/day (assuming worst case of; the supplied amount of water is converted to wastewater at a ratio of 1/1).

During operation phase, wastewater from departments will be collected via different piping systems and discharged directly into the municipality sewer system, except for the wastewater that is contaminated with radioactive substances (i.e. from nuclear medicine department) which will be collected separately and/or subject to neutralization prior to being discharged into the sewer system. It is important to note that several conditions are set for liquid wastes contaminated with radioactive substances in the Regulation on Wastes Generated upon Usage of Radioactive Substances (OG date/no: 02.09.2004/25571) related to discharging this type of wastewater into the sewer system. These conditions as given below will need to be met during the operation phase:

- Liquid wastes that remain within the limit values set forth in the regulation can be discharged by diluting into the sewer system from a sink having a standard radioactive substance mark and this sink shall not be used for work other than radioactive studies.



- Liquid wastes containing radioactive substances above the limits set forth in the regulation are kept in waste holding systems whose projects are approved by the TAEK. After being kept in holding systems, the liquid wastes can be discharged into the sewer system if they remain within the limit values set forth in the regulation.
- All radioisotopes in liquids (that are to be released into the sewer system) should be soluble and dispersible. If the liquid waste contains solid particles or precipitates that are not soluble, the liquid waste should be filtrated prior to discharging into the sewer system.
- Acidic solutions containing radioisotopes should be neutralized prior to discharging into the sewer system.
- If the liquid waste having radioactivity contains hazardous substances or other chemical substances, permits should be obtained by the license owner (described as the institutions that obtained a license from the TAEK for keeping and using radioactive substances as per the Radiation Safety Regulation – it is expected that the responsibility will lie with MoH) from authorities as per the Environmental Law and relevant legislation before discharging into the sewer system.

6.0 KEY PERFORMANCE INDICATORS

The performance indicators for the monitoring of the implementation of the waste management plan will be as follows. Project HSSE procures and plans should also be referred for the performance indicators:

- Waste disposal records (amount, date, disposal authority, disposing party)
- Site plans with segregation areas
- Records of recycled waste (type, amount)
- Good housekeeping
- Awareness of the staff on waste handling requirements
- Number of training hours for waste handling
- Site inspection records

7.0 REFERENCES

- WHO, Safe Management of Wastes from Health-Care Activities, 2014
- B. Aylin Alagöz, Günay Kocasoy, Meltem Kılıç, Boğaziçi University, Institute of Environmental Sciences, the Evaluation of the Medical Waste Control Regulation of Turkey in Comparison with the E.U. Environmental Directives.



Report Signature Page

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