

SANKO GEOTHERMAL POWER PROJECT

WASTE MANAGEMENT PLAN

Version	Revision	Date	Prepared by	Checked by	Approved by
Draft	A.0	January 10, 2018	Muhsin Dervişoğulları Environmental Manager	Project Manager	General Manager of Geothermal Investments

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1. SCOPE AND OBJECTIVE

The Waste Management Plan (WMP) defines any potential wastes likely to occur during drilling, construction and operation of Sanko Geothermal Power Plant Project and incorporates appropriate waste management methods for their collection, storage, treatment and / or disposal. WMP covers any wastes occurring as a result of drilling, construction and operation and relevant activities thereof.

The wastes covered by WMP are generated by the following activities:

- Drilling activities,
- Construction and commissioning of all the facilities,
- Both provisional and permanent housing (used during construction) ,
- Secondary works such as provision of equipment, road construction, etc.,
- Operation activities.

WMP defines the method of management of wastes during drilling, construction and operation of the project including:

- how to minimize potential impacts on human health and environment,
- how to achieve compliance with the Turkish regulations and the environmental targets of Sanko,
- how to maintain this possibilities and means for reducing operating costs and any potential obligations that may arise out of waste transport operations.

This plan also guarantees that the waste streams and solid waste materials on the sites will be managed in a proper manner.

1.1. STRUCTURE OF THE WASTE MANAGEMENT PLAN

WMP covers the following headings in addition to this part, which is of an introductory nature containing the definitions of the terms and a glossary thereof:

- Applicable policies and standards,
- Approved waste management facilities,
- Waste disposal sites,
- Waste sources and streams during drilling, construction and operation of Sanko geothermal Power Plant Project,
- Waste management measures and procedures.

1.2. DEFINITIONS

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Waste Management Facility	Structures built to process wastes or store them temporarily or permanently.
Waste management	Segregation, collection, temporary storage, re-cycling, transport, handling, disposal and post disposal control and similar operations of wastes at source based on the respective characteristics and similar activities.
Wastes	Any substances or objects defined by the Turkish laws related with solid wastes, hazardous wastes, medical wastes etc. or any other substances or objects defined in connection with such wastes. Any substances or objects disposed of by Sanko or the contractor or agreed by the contractor for disposal or required to be disposed of by the Contractor.
Contagious / infectious wastes	As defined by "the Regulation on the Control of Medical Wastes" (dated 25.01.2017); for instance, wastes containing bacteria or viruses most probably or contaminated by faeces.
Domestic wastes (medical)	As defined by "the Regulation on the Control of Medical Wastes"; for instance, office wastes and packaging wastes generated by emergency / first aid rooms and clinics.
Inert wastes	Any substances which are not substantially changed, dissolved or incinerated physically, chemically or biologically, which do not have any physical and chemical reactions or any biological degradation or Which do not affect any articles contacted by them to such an extent harming environment or human life, having minor levels of total leakage capability or eco-toxicity and no risks of contaminating surface and ground water in particular (construction and demolition wastes).
Excavated soil, construction and demolition wastes	Any wastes as defined by Article 4 of the Regulation on the Control of Excavated Soil, Construction and Demolition Wastes.
Pathogenical wastes	As defined by "the Regulation on the Control of Medical Wastes" .
Pathological wastes	As defined by "the Regulation on the Control of Medical Wastes" (for instance: limbs, parts of body, animal carcasses, etc.)
Project	Sanko Geothermal Power Plant Project.
Hazardous wastes	Any substances or objects defined by the Turkish laws (Regulation on the Control of Hazardous Wastes dated March 14, 2005, and Regulation on Waste Management dated 23.03.2017)
Solid wastes	Any wastes as defined by the Regulation on the Waste Management
Medical wastes	As defined by the Regulation on the Control of Medical Wastes, for instance: clothes, cotton bars, syringe injections and the like

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Generators (wastes)	Any natural persons or legal entities as defined by the Turkish laws (Regulation on the Waste Management dated March 23, 2017)
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2. APPLICABLE POLICIES AND STANDARDS

2.1. ENVIRONMENTAL POLICIES OF SANKO

A number of policies have been identified by Sanko to provide guidance over any operations carried out. The Declaration of Policy provided below covers the policy underlying the environmental operations:

- Sanko Geothermal Power Plant Project is a scheme attaching priority to the preservation of environment.
- Sanko is responsible for elimination or proper minimization of all the potential adverse affects of the project on environment during implementation of good environmental administrative methods.

Accordingly, all the works will be carried out in compliance with applicable environmental laws and regulations as well as with international engineering approaches and standards in general such that environment is preserved and its quality enhanced. In order to attain this goal, Sanko will:

- conduct top management reviews and inspections on an annual basis as a minimum for the purpose of achieving conformity to any established policies, procedures and applicable environmental laws and regulations,
- maintain a commitment to waste minimization and pollution prevention, and shall incorporate such principles in any definitions of project conditions and performance of project operations,
- define, evaluate and manage any environmental risks, exerting its best efforts to determine and review objectives and targets for operation thereof and minimize the risks of occurrence of any adverse environmental effects,
- be committed to building relationships with authorities, the scientific community and the public to promote the development and communication of innovative, cost effective solutions to environmental problems;
- ensure a commitment to the continuous improvement of the Environmental Management System wherever possible and sustainable.

All Project personnel shall be individually and collectively responsible for adherence to, and effective application of the policies and principles contained in this environmental policy statement.

2.2. WASTE MANAGEMENT POLICIES AND PRINCIPLES

The following waste management principles will be implemented under the project to achieve compliance with the policies of Sanko outlined above:

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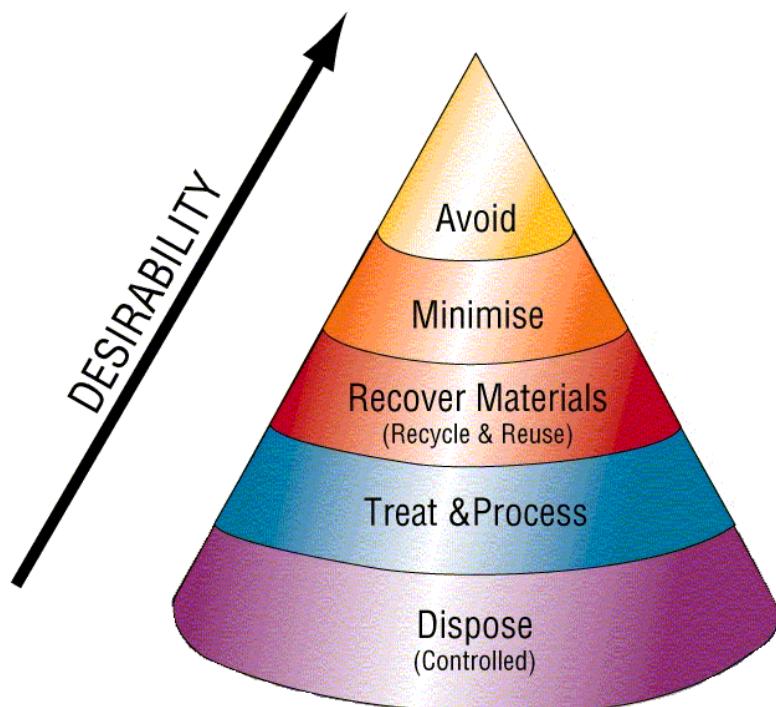
- Waste management hierarchy
- Principle of proximity
- Statutory liabilities
- Employment of most advanced feasible technologies, which do not cause any excessive costs
- The principle of “polluter pays”

Both principles are discussed under the sub-headings below.

2.2.1. WASTE MANAGEMENT HIERARCHY

Figure 2.1 indicates the waste management operations classified according to the order of preferences as the Waste Management Hierarchy.

This hierarchical structure basically emphasizes that prevention of wastes at source and minimization of volumes of wastes generated and any hazards thereof are the practices which must be preferred with priority. In addition, it also notes that re-use, recovery and re-cycling must be preferred after treatment of wastes and that therefore, disposal must be the final option.



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Figure 2.1 Waste Management Hierarchy

2.2.2. PRINCIPLE OF PROXIMITY

In simple terms, the principle of proximity explains that wastes will be managed in the locations nearest to sources (by considering waste management policies and principles). In particular, it notes that countries and regions preferably must be self sufficient in terms of waste management conditions.

2.2.3. STATUTORY LIABILITIES

The principle of statutory liabilities notes that it is a statutory obligation for generators of wastes to guarantee proper management of wastes (whether they are hazardous wastes or not) even after they are transported to a third party. As a matter of fact, this principle stresses the importance of evaluation by waste generators of waste management capabilities of third parties collecting wastes in selection and observation of their operations.

2.2.4. EMPLOYMENT OF FEASIBLE MOST ADVANCED TECHNOLOGIES, WHICH ARE NOT EXCESSIVELY COSTLY

The principle of employing feasible most advanced technologies, which are not excessively costly, means that wastes will be managed by optimum technologies presently available, which would not require excessive spending; in other words, costs of transition to another technology offering better performance than a given technology would not be compared to overall waste management benefits that would be obtained as a result.

2.2.5. PRINCIPLE OF “POLLUTER PAYS”

It basically refers to a requirement on the part of any parties causing pollution to pay costs for reduction of such pollution.

2.3. WASTE MANAGEMENT LEGISLATION

The elements of the Turkish legislation referred to below closely relate to management of wastes which would occur during the project drilling, construction and operation and this legislation must be complied with strictly.

Legislation	Official Gazette Date	Official Gazette Issue	Implications for the Project Stages
Waste Management Regulation	02.04.2015 23.03.2017	29314 30016	<ul style="list-style-type: none"> Disposal of wastes generated by construction staff during construction stage and by operation staff during the operation stage Hazardous wastes generated at construction and operation stages

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Legislation	Official Gazette Date	Official Gazette Issue	Implications for the Project Stages
Water Pollution Control Regulation	31.12.2004 10.01.2016	25687 29589	<ul style="list-style-type: none"> Discharge of wastewater generated by site staff at construction stage and by operation staff during the operation stage
Regulation on Landfill of Wastes	26.03.2010 11.03.2015	27533 29292	<ul style="list-style-type: none"> Drilling mud generated during the construction stage
Waste Oil Control Regulation	30.07.2008 05.11.2013	26952 28812	<ul style="list-style-type: none"> Waste oils generated at construction and operation stages
Waste Vegetable Oil Control Regulation	06.06.2015	29378	<ul style="list-style-type: none"> Waste vegetable oils generated at construction and operation stages
Packaging Waste Control Regulation	24.08.2011	28035	<ul style="list-style-type: none"> Packaging wastes generated at construction and operation stages
Medical Waste Control Regulation	22.07.2005 21.03.2014	25883 28948	<ul style="list-style-type: none"> Medical wastes generated at construction and operation stages
Regulation on the Control of End-of-life Tires	25.11.2006 11.03.2015	26357 29292	<ul style="list-style-type: none"> End-of-life tires generated at construction and operation stages
Regulation on the Control of Waste Batteries and Accumulators	31.08.2004 23.12.2014	25569 29214	<ul style="list-style-type: none"> Waste batteries and accumulators generated at the construction and operation stages
Regulation on the Construction of Septic Tanks at Places Where Sewer Construction is Not Feasible	19.03.1971	13783	<ul style="list-style-type: none"> Septic tanks for the collection of domestic wastewater generated at construction and operation stages
Regulation on the Noise Emission in the Environment from Equipment for Outdoor Use	30.12.2006 06.06.2017	26392 30088	<ul style="list-style-type: none"> Noise levels caused by noise sources within the Project site at the construction and operation stages
Industrial Air Pollution Control Regulation	03.07.2009 20.12.2014	27277 29211	<ul style="list-style-type: none"> Dust emissions at the construction stage and CO₂ emissions at the operation stage
Regulation on Assessment and Management of Air Quality	06.06.2008 05.05.2009	26898 27219	<ul style="list-style-type: none"> Emissions originating from the Facility during the operation stage
Regulation on the Control of Odorous Emissions	19.07.2013	28712	<ul style="list-style-type: none"> Odorous emissions generated during the operation stage
Regulation on Assessment and Management of Environmental Noise	04.06.2010	27601	<ul style="list-style-type: none"> Noise emissions at construction and operation stages

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Legislation	Official Gazette Date	Official Gazette Issue	Implications for the Project Stages
Regulation on Soil Pollution Control and Point Source Polluted Areas	08.06.2010 11.07.2013	27605 28704	<ul style="list-style-type: none"> Risks of soil contamination at construction and operation stages
Regulation on the Control of Excavation Soil, Construction and Debris Wastes	18.03.2004 26.03.2010	25406 27533	<ul style="list-style-type: none"> Transportation and disposal of excavation waste and construction debris at the construction stage
Law on Occupational Health and Safety (6331) (as amended with the Law numbered 7033)	20.06.2012 01.07.2017	28339	<ul style="list-style-type: none"> Health and safety measures to be taken during construction and operation stages
Regulation on Buildings to be Constructed within the Seismic Zones	06.03.2007 03.05.2007	26454 26511	<ul style="list-style-type: none"> Construction works within the scope of the Project

2.3.1. REGULATION ON THE CONTROL OF SOLID WASTES

The Regulation on the Waste Management (WM) refers to employment of low waste technologies although it prescribes use of waste management for prevention any hazards to humans, environment and buildings. WM also incorporates the hierarchy of preferences for re-use, recovery and re-cycling after treatment of wastes as well as disposal of wastes.

Certain particular conditions will be considered:

- any clinical wastes must be separated from those solid wastes of a garbage type and they must be disposed of separately.
- Consumers must not dispose of any batteries or unused medicine / pharmaceutical products jointly with garbage type solid wastes.
- Producers must be held responsible for management of liquid containers and thermo-plastic packages when they become wastes.
- Garbage type wastes (for instance: domestic wastes, food wastes) must be stored and transported such that any dust and odor emission by them is prevented to avoid any hazards on human health and environment.
- It is prohibited regularly to store and dispose of any liquids, fluid sludge, explosives, clinical wastes, animal carcasses, radioactive substances and any other materials or

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agents / substances which may lead to emissions of dust and odor or any other hazardous substances.

- Any excavated soil must be stored in those locations approved by authorities only.
- Permissions for waste management facilities must be obtained from relevant local authorities or municipalities.
- Both construction and operation permissions and operation licenses must be obtained for any incineration systems.

2.3.2. REGULATION ON THE CONTROL OF HAZARDOUS WASTES

The Regulation on the Control of Hazardous Wastes (HWR) meets Articles No 8, 11 and 12 of the Environmental Law of 14/3/2005 and Article No 3 of the Convention of Basel, to which Turkey is a Party. HWR incorporates regulation related procedures concerning hazardous wastes and statutory liabilities for them as well as the principle of polluter pays.

HWR establishes responsibilities related to approval for site selection, receipt of permissions, guaranteeing inspections and satisfaction of the obligations under the Convention of Basel, to which Turkey is a Party. Powers and duties are also assigned to local authorities and municipalities. Concerning waste generators, it imposes a requirement for definition of wastes and maintenance of records thereof, in addition to the general requirements for minimization of waste volumes and provision of safe temporary depots.

There is a requirement to comply with applicable international standards governing waste control. It is required that as a first step, a preliminary license must be held during design and development of treatment and disposal facilities and subsequently, a license is further needed during operation. It is obligatory that operators of waste management facilities must be in possession of relevant qualifications and competence so that they can prepare Waste Management Operation Plans (WMOP's) for operation of their respective facilities as well as for each department of such facilities. HWR clearly demonstrates that documentation of handling and transport of hazardous wastes is vital.

It notes in connection with incineration of hazardous wastes specified by Annex 6 to HWR that all the requirements under Article 33 of the Regulation on the Control of Medical Wastes (RCMW) (which was published in the Official Gazette Issue No 25883 of 22.7.2005 updated by Official Gazette issue no 28945 of 21.03.2014) are duly met.

HWR clearly defines basic standards for any facility designs, construction operations, closure and subsequent maintenance. Part Eight of HWR meets the standard conditions governing "cross border transport of wastes" under the Convention of Basel.

2.3.3. REGULATION ON THE CONTROL OF MEDICAL WASTES

The Regulation on the Control of Medical Wastes (RCMW) (dated July 22, 2005) demonstrates the requirements provided below:

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- Part 3: medical wastes are separately collected, stored, transported and disposed of from domestic wastes
- Pathogenous wastes are collected in special plastic red bags, the specifications of which are indicated by Article 13, together with other infected wastes after they are sterilized.
- Disposal of radioactive wastes is carried out subject to the provisions of the by-law concerning the Law on the Turkish Atomic Energy Agency.
- Licenses are issued for waste depots as per Article 18.

Any wastes generated by sources of a medical nature (such as: infirmaries on the construction sites and clinics) will be managed as per RCMW. Such kinds of wastes will be sorted, packaged and disposed of as required by this regulation. Medical wastes and infected wastes will be separately stored from domestic wastes.

2.3.4. ENVIRONMENTAL INSPECTION REGULATION

This regulation lays down the procedures for environmental inspections to be conducted by the Ministry of Environment and Forestry during the stages of building a facility, which involves construction and operation and various other aspects.

- *In the event that it is established during inspection conducted that the prohibitions prescribed by the Environmental Legislation are not adhered to or that the obligations concerning control of solid wastes are not met,*
 - *A time limit of 30 days is granted for performance of corrective action in case wastes of various types are directly or indirectly discharged into recipient media, stored, transported, removed or subjected to other similar operations in violation of the standards and methods established by the relevant applications.*
 - *A time limit of 10 days is granted for introduction of measures for treatment, removal and other similar activities involving any kinds of wastes in a manner not harming environment.*
 - *A time limit of 10 days is granted where information is not regularly and continuously documented on the characteristics and volumes of fuels consumed and wastes resulting thereof and not notified to the Ministry of Environment and Civilization accordingly.*

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3. APPROVED WASTE MANAGEMENT FACILITIES

Presence of approved waste management facilities and assurance that such facilities actually possess the capabilities which can accommodate wastes projected to be generated constitute an inseparable part of waste management. Wastes must be disposed of in countries where they are generated. In addition, cross border transportation of wastes without prior management approval as required by the international agreements is out of the question.

This part outlines disposal of solid wastes and excavated soil, clarifying the procedures for approval of facilities for waste disposal.

3.1. PROCEDURE FOR APPROVAL OF FACILITIES

The site must be taken under evaluation a decision be adopted as regards if the facility is compliant with the Regulation on the Waste Management (which is dated March 23, 2017) so that a given facility may receive "approval".

The obligation regarding waste management in Turkey is exercised by the governors' offices and municipalities. Apart from information on the types and volumes of materials to be excavated, excavation plans and documentation in support of calculations must be submitted to the relevant municipalities or governors' offices.

Domestic wastes

Domestic wastes will be disposed of by licensed solid waste facilities operated by municipalities. Agreements will be made with municipalities prior to the issue of permissions for disposal of wastes. Accordingly, wastes will be taken to licensed waste disposal sites owned by municipalities.

Excavated soil

The procedures related to receipt of approval for facilities to receive excavated soil involve a different procedure. An application form must be submitted to the relevant municipality or governor's office for the purpose of determining a site for disposal of excavated soil. Upon approval of the application form, a protocol is signed. Following this, excavated soil is taken to the designated areas covered by the protocol and disposed of there.

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4. WASTE SOURCES AND STREAMS DURING PROJECT CONSTRUCTION

The defined wastes are categorized under the following main groups of wastes and the planned management options are indicated.

WASTE STREAM	SOURCES	TYPE*	MANAGEMENT OPTION
Aluminum boxes	Largely empty drink boxes	S	Compression and re-cycling
Wet batteries	Used up batteries in machinery and vehicles	H	Re-cycling
Dry batteries	Used up batteries in portable articles such as personal radios and flashlights	H	Re-cycling
Blasted debris	Regions where geological structure requires blasting	S	Disposal in designated scrap disposal sites (locations will be provided); or re-use in appropriate locations as a second option.
Cables / copper	Surplus supplies after construction of facilities and temporary job sites and also at the stage of closure of operation	H	Re-cycling
Containers (having large sizes)	Empty steel barrels	S	Re-cycling
Containers (other)	Empty steel and plastic containers of various sizes	S	Re-cycling
Contaminated soil	Disposal resulting due to spills or by accident	H	Particular treatment - treatment by facilities holding appropriate licenses
Barrel cleaning wastes	Cleaning steel barrels from wastes so that they can be used for other applications	H	Particular treatment - treatment by facilities holding appropriate licenses
Electrical / electronic components		S	Landfill
Electrical equipment (for instance: switchyards)		H/S	Landfill
Filters air / oil	Used filters of machinery and components	H	Incineration
Filters (water)		S	Incineration
Food	Pieces and other organic wastes	O	Landfill
Diesel, gasoline and petroleum wastes Diesel Diesel generator engine oil Various oils (including hydraulic) Vehicle and equipment engine oil		H H H H H	Re-cycling
Glass	Largely empty bottles as a result of domestic wastes	S	Re-cycling
Grease	Wastes of lubrication products and some	S/H	Incineration

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	domestic greases		
Insulation	Surplus supplies for installation of insulation materials	H	Landfill
Bulbs	Used incandescent and fluorescent bulbs	H	Re-cycling (Special treatment is required if fluorescent bulbs are in large quantities)
Medical	Sharp objects such as needles and cotton bars	M	Incineration
Packaging materials	Plastics, paper, hardboard and the like	S	Re-cycling
Paper and hardboard	Office and domestic wastes	S	Re-cycling / Incineration
Plastic bottles	Water containers, of which some are industrial but which are largely disposed, and other domestic materials	S	Re-cycling
KKM and clothes	Disposed personnel protective clothes, overalls, boots, rags, etc.	H/S	Incineration
Waste water	Waste water originating from construction sites and temporary facilities	L	Collection in multispan impermeable cess pit tanks and subsequent transport to Manisa Municipality Wastewater Treatment Plant by vacuum tankers
Site drainage water	Storm water collection	L	Pumping it into the trench on the side position by using straining / settlement techniques in line with Ministry of Environment and Cilization (MOEC) requirements
Concrete mixing waste water	Concrete breaking	L	Collection in the sedimentation pools and subsequent disposal
Excavation wastes	Surplus excavated soil and supplied fill materials	I	Re-use / storage
Steel	Surplus volumes of materials from construction of facilities and temporary job sites as well as the stage of closure of operation	S	Re-use / storage of useful components for forthcoming works and re-cycling for the remainder.
Stones / fences / gates / passages	Temporary stone pathes; temporary fences, gates, passages, etc.	I/S	Re-use in the field if it is possible.
Surplus soil and rock	Fill and corrective activities	S	Re-use if possible / provision to a licensed waste disposal facility
Rubber	Worn vehicle tires	T	Re-cycling

* I=Inert; H=Hazardous; S=Solid; L=Liquid; O=Organic; M=Medical

Waste management will be carried out in line with the table provided above:

Solid wastes:

Recovery / Re-cycling:

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Substances to be subjected to priority recycling (for instance: paper, hardboard, plastics, glass, metals) will be separated from domestic solid wastes for recovery / recycling to an appropriate extent.

Landfill :

Landfill of domestic solid wastes, which cannot be recycled, may be achieved in present Landfill facilities (owned by third parties). Disposal sites for the project will be designated by the Municipalities of Salihli and delivery will be made to the disposal sites to be designated by the municipalities as defined by Part 5.6 and Part 5.7, with the contractor being responsible for transportation.

No wastes will be disposed of or buried on the site. Wastes will never be allowed to be disposed of on the construction camp site, on the public roads or neighboring areas or inside the rivers in any manner contrary to laws. Wastes, plants and garbage will not be allowed to be incinerated on the site.

Hazardous and non-hazardous solid wastes expected to be generated during the drilling, construction and operation stage are domestic solid waste from construction staff, excavation debris, packaging wastes, recyclable solid waste end-of-life tires, waste batteries and accumulators and drilling mud.

Non-hazardous Solid Waste

Domestic solid waste is generated by the project personnel as a result of various consumptions of the field staff. Considering that the number of field staff will be 84 and taking the daily waste generation per capita value as 1.25 kg/person-day, as indicated by Turkish Statistical Institute's 2014 data for Manisa province, the total domestic solid waste generation by the field staff will be 105 kg/day.

Recyclable wastes such as glass, paper and plastics will be segregated from other wastes and stored temporarily on site for eventual recycling process. Non-hazardous solid waste other than recyclables will be stored in containers and will be disposed by Salihli Municipality. All solid non-hazardous wastes will be disposed according to the Waste Management Regulation.

Excavated soil will be re-used for backfilling, landscaping and site leveling purposes. Hence, no excavated soil will be transported and stored outside the Project area. Temporary storage of the excavated material will be performed providing the generation of drainage pathways to underlying aquifers. The height of the stockpiles will not exceed 5 m and the stockpiles will be dampened especially during dry and windy weather in order to prevent dust emissions. If excess material occurs it will be disposed in a landfill approved by Manisa Municipality.

Hazardous Waste

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During the all phases of the Project hazardous waste will mainly be contaminated packaging wastes, contaminated protective material and waste oil. In case, it is inevitable to perform maintenance of the construction vehicles on site, minor amounts of waste oil will be generated at the site. Oil change of the vehicles will be conducted by machine experts or service staff on leak-proof surface within the construction site, therefore a possible soil contamination will be prevented. Generated waste oil will be collected in safe leak-proof containers, stored in an area with a concrete surface and a proper secondary containment to prevent potential spills and leakages reaching to the soil and groundwater. Waste oil will be disposed in accordance with the Waste Oil Control Regulation.

Hazardous waste generated due to Project activities will be waste drilling muds in case they are determined as hazardous according to the analysis.

Domestic Solid Waste

Domestic solid waste in the operation stage is generated as a result of various consumptions of the operation personnel. According to the EIA Report domestic solid waste generation for 27 personnel will be 33.75 kg/day.

Domestic solid waste will be collected and stored in the Project area and disposed by Salihili Municipality according to the requirements of Waste Management Regulation. Furthermore, recyclable waste (i.e. glass, plastics, glass) will be collected separately at source as indicated in Article 5 of the Waste Management Regulation.

Packaging Waste

Packaging waste generated during the operation stage are composed of recyclable materials such as metal, paper, plastics and glass. Packaging waste will be collected in separate containers in order to be reintegrated into the economy without exposed to any chemical or biological process. In addition, compliance with the Packaging Waste Control Regulation will be ensured for their management during the operation stage.

Liquid wastes:

Waste water which will develop as a result of the project implementation will originate from the basic operations indicated below:

- Domestic wastes from the temporary site (well drilling and camp site)
- Water from drilling activities
- Waste water from workshops, offices and laboratories
- Domestic wastes from operation building
- Construction site drainage system water

During the construction stage, water demand will consist of potable water and water to be used for dust emission prevention. Potable water will be supplied as demijohns. Domestic

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water for the workers and water for dust suppression will be provided by the two wells established by the former owner of the land within the Project area. Sanko Enerji has applied to DSİ for the transfer of the ownership of the wells.

A total of 100 personnel is planned to be working in the scope of the construction phase for various works and periods, however number of personnel working at the same time will not exceed 84.

Total number of persons engaged: 84

Water required: 0.203 m³/person/day (Turkish Statistical Institute, 2014)

Total water requirement: 0.203 m³/person/day x 84 persons = 17.52 m³/day

It is assumed that approximately 52.5 m³ water per day will be used for construction activities for preventing dust emission.

Regarding the drilling works; 48 personnel is expected to be operating daily.

Total water requirement: 0.203 m³/person/day x 48 persons = 9.744 m³/day

Water is also required during drilling works. Exact amount of required water cannot be determined due to various factors such as drilling fluid and geological units, however based on the previous drilling studies 630 m³ water is estimated to be used during drilling according to the EIA report. The drilling fluid will be stored in mud storage tanks after solid material is removed and the fluid is re-used afterwards. Therefore water consumption of 14 m³/day will occur in order to supplement the required water during drilling activities. Water required for drilling works are supplied from available wells or surface water sources at the drilling locations after DSİ consent and if there are no wells available, water will be transferred by tankers.

Wastewater Generation:

Only domestic wastewater will be generated during construction stage activities. Considering domestic waste requirement is 17.52 m³/day for 84 personnel, waste water generated is estimated to be below 17.52 m³/day. Domestic wastewater generated at the construction stage will be collected in a septic tank in compliance with the Regulation on the Construction of Septic Tanks at Places Where Sewer Construction is Not Possible. If the number of employees exceeds 84, waste water treatment plant will be established for the Project according to the requirements of the Regulation on Water Pollution Control. Below parameters are expected for the domestic waste water generated during construction phase of the Project according to the EIA report:

Expected Domestic Wastewater Parameters

Parameter	Concentration (mg/l)
pH	6-9

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Parameter	Concentration (mg/l)
Suspended Solids	200
BOD	200
COD	500
Total Nitrogen	40
Total Phosphorous	10

Test Waters:

Test drillings are conducted in order to prove the commercial viability of potential resources. Drilling works are the same for both the production wells and reinjection wells. Type of the wells is decided according to the efficiency assessment of the wells based on properties such as temperature, flow rate and pressure. During the drilling works, liquid drilling mud which is the mixture of different type of chemicals with water will be employed in order to carry rock cuttings to the surface and also lubricate and cool the drill bit. Impacts of drilling mud is provided in the following section. .

Rotary drilling is used for the wells within the scope of the Project. Casings of three different diameters were employed during drilling of wells which have diameters of 20", 13 3/8" and 9 5/8". At the end 7" production pipes are employed to convey the geothermal fluid to the surface. Cement is applied around the casings and in this way in order to contain the geothermal fluid is contained and uncontrolled generation of geothermal fluid or vapour is prevented. The casings at shallow depth prevent loose near-surface material collapsing into the well and casings with intermediate diameter will support successive wellheads.. Casings and concrete wall around casings prevent groundwater and geothermal fluids intervene with each other. No discharge to aquifer will occur due to Project activities.

It is planned to extract 420 tonnes/hour geothermal fluid for 15 MW capacity from wells with a depth of 2500-3000 m. Geothermal fluid extracted from the production wells will be reinjected to the original reservoir through reinjection wells. It is planned to construct an impermeable collection pond to be used in case of any failure during reinjection, operation of the power plant or during maintenance of the wells. The capacity of the collection pond is planned to be 1400 m³ with the estimation of use of 1400-1500 tonnes/hour geothermal fluid at maximum for a potential capacity increase of the power plant to 50 MW. The capacity of the pond is calculated based on the estimation that the system will stop maximum for 1 hour duration. If the volume of the collection pond is exceeded due to malfunction, extraction of geothermal fluid will be stopped. Geothermal fluid collected in the pond will be reinjected back to the system by reinjection pump. Geothermal fluid discharge to any kind of environment will be prevented during the whole Project lifetime.

Drilling Mud:

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Drilling mud will be generated as a result of drillings. Drilling mud will be elevated to the ground collecting solid particles. Drilling mud will be sieved for foreign substances and then passed through solid-liquid separator (decanter). Liquid part is pumped back to the mud tankers to be reused. Solid substances on the other hand, are sent back to waste mud pond. The solid material passing through the decanter has some amount of water content therefore collected as liquid waste in the drilling mud pond. Liquid drilling mud is settled in the pond providing solid substances to deposit.

For the Project 100 Lt of drilling mud is expected to be generated for 1 m drilling. Average depth of the drilling wells is estimated to be 2,500 m therefore the amount of drilling mud at each drilling location is calculated as follows:

Amount of drilling mud: $100 \text{ Lt/m} \times 2500 \text{ m} = 250,000 \text{ Lt} = 250 \text{ m}^3$

Mud ponds with dimensions 60 m x 6.5 m x 3 m with side slope are established for storage of mud at each drilling location. Each pond is covered with impermeable material such as geomembrane and has 1,170 m³ capacity which is above the calculated value above. Mud collected in the pond is settled providing the deposition of solid substances. Waste mud is analyzed for categorization according to the requirements of the Circular on the Disposal of Drilling Mud and Wastes Generated from the Physical Treatment of Chromium Minery (dated 2012/15) and the Regulation on Landfill of Wastes (Official Gazette dated 26.03.2010, no: 27533). If the waste is deemed hazardous waste, it will be disposed according to the requirements of the Circular on the Disposal of Drilling Mud and Wastes Generated from the Physical Treatment of Chromium Minery.

If the waste mud is determined as inert and/or non-hazardous waste then the mud ponds will be filled with excavation debris and covered with the vegetative soil which was stripped and stored separately during land preparation.

After the drilling mud is deposited, remaining water on the mud is evaporated or discharged by vacuum truck if drilling mud is determined as non-hazardous or inert. If the mud is classified as hazardous then the water on the mud is collected into IBC tank and disposed according to the requirements the Regulation on Waste Management.

Inert construction wastes:

Excavated materials will be used in service road fills and landscaping works.

Medical wastes:

There will be an infirmary established at the Power Plant for the personnel. Besides health institutions close to the Project area will be applied if required. Salihli State Hospital is at a distance of 4.5 km to the Project area.

According to the EIA Report 10 kg/year medical waste is estimated to be generated. Medical waste which will be generated as a result of on-site first aid applications for injuries; they will

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be collected, transferred, stored and disposed of in compliance with the Medical Waste Control Regulation.

Hazardous wastes:

Hazardous wastes to be generated during operation phase of the Project is expected to be contaminated materials due to maintenance activities, contaminated packaging material wastes, waste electronics, fluorescent and waste toner and cartridge.

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End-of-life Tires

Maintenance of the vehicles to be used during the operation stage will be performed at authorized technical stations therefore end-of-life tires are not expected to occur at the Project area. In case there are in the area tires will be sent to licensed companies for disposal in accordance with the Regulation on the Control of End-of-life Tires.

Waste Batteries and Accumulators

Waste batteries generated during the operation stage will be separately collected in the waste battery containers found at the Project site and periodically will be sent to a Waste Battery Recycling Plant. Compliance will be ensured with the Regulation on the Control of Waste Batteries and Accumulators.

There will be no accumulator replacement within the Project area. Empty accumulators generated in compulsory cases will be sent to firms to be replaced with full ones as stated in the Regulation on the Control of Waste Batteries and Accumulators.

Waste Oils

Waste oil is expected to be generated due to transformer oil used in the switchyard and substation. Maintenance of the transformers will be provided by authorized service companies and disposal of the waste oil will be conducted according to Waste Oil Control Regulation.

Waste oil is generated as a result of maintenance of vehicles and equipment. In case of waste oil generation during an oil change, it will be stored and disposed off in accordance with the Waste Oil Control Regulation. Vehicle maintenance will be conducted periodically on a daily, weekly and monthly basis, and oil leakage will be avoided by using drip pans.

Waste vegetable oil is not expected to be generated since food service will be outsourced during operation phase of the Project. In case of waste vegetable oil generation compliance with the Waste Vegetable Oil Control Regulation will be provided.

Hazardous material will be stored in leak proof containers on impermeable ground. Spill kits will be available at the site for immediate response. MSDS for chemicals will be available for the workers.

Explosive wastes:

Wastes of explosives purchased for use during the project will be stored in their original containers but they will specifically be labeled as wastes. They will be managed and disposed as recommended by manufacturers in line with the Turkish legislation. Any explosive wastes

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located within the boundaries of the project site will be specifically identified for disposal by competent authorities.

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5. WASTE MANAGEMENT MEASURES AND PROCEDURES

5.1. DUTIES AND RESPONSIBILITIES

The project construction contractor(s) will be deemed “owner(s)” of any wastes (including domestic and sanitary wastes) generated by drilling and construction activities and they will thus be held accountable for proper management of such wastes.

Sanko and its contractors will take any measures to prevent generation of wastes and minimize both volumes and hazards of such wastes generated. It will be ensured that the contractor guarantees proper identification of any wastes generated and storage until collection / transportation activities, which are not agreed on for re-use, recovery, re-cycling, treatment and / or disposal thereof.

Although Sanko and the contractor may employ third parties for collection, recovery, re-cycling, treatment and / or disposal of wastes, it is responsible for monitoring the activities of such third parties thus employed to ensure selection of licensed / authorized contractors, proper management of wastes and treatment and disposal operations thereof.

In case Sanko and the contractor will provide and operate any waste management facilities, it must then guarantee that such facilities comply with applicable Turkish legislation, having proper licenses and / or authorization and further that they are manufactured and operated as per the foregoing legislation.

Sanko will also conduct compliance inspections periodically.

5.2. WASTE MANAGEMENT TRAINING

Sanko and the contractor must ensure that all of its employees are aware of all the relevant elements of WMP and that they are adequately trained so that they can perform their duties and functions as part of waste management. Personnel files will have pertinent records on the training status of all the employees.

5.3. WASTE GENERATION

Any reasonable measures must be taken in order to prevent waste generation and minimize both volumes and hazards of such wastes. Any wastes generated will be identified, classified and documented as per applicable Turkish legislation.

5.4. SAMPLING AND CLASSIFICATION OF WASTES

Sanko and the contractor shall identify any wastes generated by conducting sampling, checking, tests and analyses so that wastes are classified as per Turkish legislation and the following points may be determined:

- whether wastes are hazardous, solid or “inert”
- The method of waste management

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5.5. COLLECTION AND STORAGE OF WASTES

Wastes will be collected and temporarily stored at the Waste Collection Points (WCP) in line with a procedure providing safety and awareness about environment. Suitable waste containers will be made available at the waste generation points in order to facilitate safe and environmentally sensitive temporary storage. All the containers will clearly be marked according to their contents. Waste collection frequencies will be minimum twice a day and more in windy weather, depending on weather conditions. At the end of each working day, the person in charge of each team will be sure before leaving the area of activities for which he / she is responsible that the area is left clean and that wastes generated have been transported to the Waste Collection Areas in line with this plan.

5.5.1. WASTE COLLECTION AND TEMPORARY STORAGE POINTS

WCP's will have separate storage containers for major recyclable materials (plastics, glasses, ferrous and non ferrous metals) and for other wastes such as oils, chemicals and batteries requiring sorting. Care will be paid to ensure that chemicals are held in separate containers to prevent any chemical reaction.

5.5.2. WASTE TRANSPORTATION

Wastes will be transported from waste generation locations / temporary depots by enclosed special vehicles in a manner not polluting the environment in respect of appearance, odor, dust, leakage and other similar factors. Collection operations will be scheduled as frequent as required to prevent excessive accumulation of wastes. Properly licensed companies will be hired for transport of hazardous wastes.

5.6. MONITORING WASTE MANAGEMENT ACTIVITIES

Movements of wastes from the Waste Collection Points (WCP's) will be monitored and documented by Sanko and the contractor, with the following information taken under record:

- Identification of WCP's
- Dates of collection
- Times of collection
- Type(s) of waste
- Definitions of wastes to an extent containing information on their physical / chemical properties and relative rates as required
- Volume(s)
- Particular waste management procedures
- Vehicle control
- Load safety control

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- Name and signature of WCP chief
- Identification of destination for the disposal plant
- Date of delivery
- Time of delivery
- Checking differences between the type(s) and volume(s) of wastes
- Name and signature of vehicle driver

Records will also be maintained on the transport of waste water from the impermeable cess pit tanks located on the site to Manisa Municipality Treatment Plant.

5.7. INSPECTION AND AUDIT

Any Waste Collection Points (WCP) for waste management as well as any designated Landfill areas and any other relevant facilities will periodically be inspected and audited in terms of compliance with the established operating procedures, regulation requirements and project policies. Appendix 1 provides “Checklist for Waste Management Inspection and Audit Control” to be used by Environmental Inspectors.

Inspection forms will be developed for this purpose. Inspection records will be maintained and they will be kept ready for inspection of Sanko by the regulatory authorities in Turkey.

APPENDIX 1

Check-List for Waste Management Inspection and Audit

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Subject of the Inspection Checklist	To be completed as follows		
	0	1	2
	Needs immediate attention	Needs attention	Compliant or not applicable
1 Are hazardous and non-hazardous wastes segregated?			
2 Does the waste inventory indicate the source of waste?			
3 Does the waste inventory have records on the dates, times and shipment reference numbers of waste transfers?			
4 Does the waste inventory have records on the types of wastes?			
5 Does the waste inventory have records on the volumes of wastes disposed?			
6 Does the waste inventory have records on the destination of wastes and the name and telephone number of transport company hired?			
7 Does the waste inventory have records on the methods of disposal for respective types of wastes?			
8 Does the waste inventory have records on the copies of the National Waste Transport Forms?			
9 Are all the wastes stored on the designated storage sites?			
10 Are there any signs of leakage / dripping out of waste containers?			
11 Do the waste containers have any signs of corrosion or damage?			
12 Are the waste depots are fenced off (by fences, barriers, etc.) ?			
13 Are wastes stored in a safe manner such that they may not be disturbed by animals?			
14 Are all the containers compatible for the wastes they contain?			
15 Are the covers of the waste containers closed?			
16 Are solid and liquid wastes stored separately?			

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17	Are the waste containers labeled according to the wastes they contain?			
18	Are there any worn labels?			
19	Are there National Waste Transport Forms for all the wastes going to disposal plants?			
20	Are the National Waste Transport Form signed by the persons in charge?			
21	Is the contractor registered with the Ministry of Environment and Forestry as a Generator of Hazardous Wastes and is it aware of its obligation to prepare and submit waste declarations to the ministry every year?			
22	Are there any dedicated areas for washing transmixers? Is washing water discharged into surface water?			
23	Are there any sedimentation pools near the concrete mixing plants? Are the sign posts in place around the concrete washing zones?			
24	Are the employees interviewed by you trained on waste management?			
25	Are the employees interviewed by you aware of their responsibilities regarding waste management?			
26	Has the contractor sub-let transport of waste to the disposal plants? If yes,			
	a. Does the sub-contractor hold a valid waste transfer license?			
27	Has the contractor ever visited the waste disposal plant? Has it ever inspected such a plant?			
28	Are all the records maintained and filed?			