

## **SECTION 5A - Subsection 12: Training, Operation Supervision and Maintenance**

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## 12 Training, Operation Supervision and Maintenance

### 12.1 General

The Contractor shall train the operational staff for the duration of the trial operation period of three months prior to substantial completion of the plant. However, the Contractor shall be overall responsible for supervision of operation and maintenance of the MBT Facility for six months after substantial completion of the works (hand over to the final beneficiary) in such a manner that it ensures the required quality as stipulated in Section 5A Subsection 2 and Subsection 4.

Training shall be conducted as described in this section.

Operational staff shall be hired by the Final Beneficiary supplemented by supervision personnel from the Contractor. The Contractor shall specify the necessary operational staff for operation and maintenance of the Facility, including specification of the qualifications of the staff.

As a minimum, the Contractor shall provide the following personnel during the training, operation and maintenance period.

- |                                     |              |
|-------------------------------------|--------------|
| ○ Facility Manager:                 | Full time    |
| ○ Waste Treatment Process Engineer: | 3 man months |
| ○ Mechanical Engineer:              | 3 man months |
| ○ Electrical Engineer:              | 3 man months |

If the proposed Facility Manager is also a Waste Treatment Process Engineer, there is no need to assign an additional engineer and just the Facility Manager.

The supervision of the MBT Facility shall be carried out in an efficient and cost effective manner in accordance with the requirements described hereunder.

Consumables shall be paid by the Final Beneficiary after issuing of the Certificate of Substantial Completion during the Defects Liability Period.

### 12.2 Qualifications, Experience and Training

The Contractor's personnel shall be suitably qualified and have an appropriate level of training and experience in the operation and maintenance of MBT Facilities. The skills to be provided shall be in the areas of, but not confined to:

- Operational management
- Maintenance management
- MBT operation
- Analytical chemistry
- Plant and equipment maintenance
- Instrumentation and telemetry operation and maintenance
- Administration
- Quality systems implementation and management
- Health and safety planning and auditing.

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## 12.3 Training of Operational Staff

### 12.3.1 General

The Contractor shall be responsible for ensuring that the operation and maintenance personnel acquire the skills necessary to operate, maintain service and repair all equipment at the MBT Facility. The Contractor shall also be responsible for ensuring that the operation and maintenance personnel acquire full knowledge of the use of the Operation and Maintenance Manuals.

The Contractor shall prepare a training plan for the approval of the Engineer and submit it to the Engineer at least one month before the intended start of the first training course/commissioning of the Facility. The plan shall contain an outline of the courses, duration, subjects to be taught, documentation to be issued, names and qualifications of instructors etc.

The overall purpose of the training is to enable the staff to:

- Understand the MBT processes
- Operate equipment in an optimal way,
- Improve energy efficiency of the overall plant
- Assess the analyses required for AD treatment performance monitoring
- Carry out the necessary adjustments and corrections,
- Undertake correct preventive and normal maintenance,
- Undertake trouble-shooting and repair of all equipment and auxiliaries installed,
- Adjust all equipment to optimize the facility,
- Operate and understand the SCADA system,
- Select the necessary spare parts,
- Intervene in case of disturbance, and
- Understand environmental aspects in relation to smell, safety, ergonomic working positions etc.

All equipment and manuals needed for the training shall be provided by the Contractor and handed over to the Engineer before commencement of the training.

Personnel having an expert knowledge of the subjects shall undertake the training. Instruction and demonstration shall be given at appropriate levels for skilled and semi-skilled personnel and for plant operators and their supervisors. Separate courses for different categories of staff may be necessary dependent on number of staff to be trained.

The training shall be given in the Turkish language, if necessary by use of interpreters provided by the Contractor. Documentation of the training carried out shall be submitted to the Engineer immediately after the Tests on Completion.

The Contractor shall provide all the necessary training materials and audiovisual aid, inter alia notes, diagrams, films and other training aid, in order to give the possibility to employees to start the self-education retraining courses and to train the shift employees.

The draft training program, short summary of the materials' content and the samples of training materials, as well as CVs of the trainers foreseen shall be included in the submission form. The program provided in the submission form shall include, but not be limited to, the following:

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### **12.3.2 Training subjects in general**

The subjects shall be treated theoretically and practically. Emphasis shall be given on practical exercises, which shall occupy at least fifty (50) percent of the training time.

The practical exercises shall include normal maintenance activities, adjustments, use of tools, measuring equipment and workshop facilities included in the facility.

#### **Process:**

The following disciplines shall be included in the training:

- Basic process design of the MBT (mechanical –biological)
- Principles of basic unit processes
- Principles of process optimization
- Process trouble shooting.

#### **Mechanical Operation:**

The following disciplines shall be included in the training:

- Basic principles of mechanical components of MBT (bankers, screens, conveyors, optical separators, etc.)
- Capacities
- Maintenance works
- Tuning in the facility for the optimum performance,
- Basic fault finding and remedy of simple/typical faults
- Reading and understanding the Operation and Maintenance Manuals
- Spare parts
- Safety
- Exercises, practical and theoretical

#### **Electrical Operation**

The following disciplines shall be included in the training:

- Switchboards including control equipment (frequency converters, controllers, instruments etc.)
- UPS system
- Emergency Diesel Generator system
- Basic principles of electrical components (relays, motor starters, ELCBs, etc.)
- Basic fault finding and remedy of simple/typical faults (reset of MCBs etc.)
- Basic principles and operation of the Combined Heat and Power unit
- Maintenance routines
- Detection and remedy of typical faults
- Reading and understanding of diagrams
- Spare parts
- Safety
- Exercises, practical and theoretical.

## **Training Courses**

Theoretical courses are assumed to be carried out separately for each staff category, i.e. electricians and operators. Practical courses may be for both categories.

For each course, a compendium including program, details on the subjects, manuals, exercises (practical and theoretical) shall be prepared. The compendiums shall be submitted to the Engineer for his approval at least fourteen (14) days prior to the start of the particular training course.

The number of approved compendiums to be issued is two to the Engineer and one for each of the trainees. Furthermore, the Contractor shall have completed the draft version of the Operating and Maintenance Manuals before the first course.

### **1st Training Course –Theoretical Introduction**

*Timing:* Before on-the-job training

*Subjects:*

- General layout of the facility
- Principles of function of the major components of the facility
- Methods of operating the facility
- Capacities of the facility
- Unit processes
- Process optimisation
- Check routines
- Operation and maintenance
- Occupational health and safety.

### **2nd Course – On-the-Job Training**

*Timing:* During the running-in period.

*Subjects:*

- Acquaintance with the facility
- Participation in the running-in
- Fault finding
- Automatic and manual operation
- Maintenance requirements
- Safety precautions.

### **3rd Course – Understanding of the Operating and Maintenance Instructions**

*Timing:* During the running-in period (preferably parallel with 2<sup>nd</sup> Course)

*Subjects:*

- Theoretical fault finding procedures
- Operation and maintenance
- Process trouble shooting
- Ordering of spare parts
- Ordering of consumables

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- Checking on capacity of facility
  - Checking on all performance parameters.

#### **4th Course – Re-training**

*Timing:* Approximately 3 months after the 2<sup>nd</sup> and 3<sup>rd</sup> Courses.

*Subjects:* Repetition of all previous subjects with emphasis on subjects wanted by the Engineer.

#### **Duration of Training**

It is proposed that each of the specified courses shall have duration of minimum three (3) days, apart from the “On-the Job” training course together with 3<sup>rd</sup> Course, which shall have the same duration as the running-in period.

#### **Training Location**

Training shall take place at the MBT Facility.

### **12.4 Operation of the MBT Facility**

After issuing of the Certificate of Substantial Completion, the Contractor shall supervise the operation of the MBT Facility with the staff as stated in Section 12.1.

#### **12.4.1 Operating procedures**

The Contractor shall provide a detailed procedure for the operation of the MBT Facility. A detailed control philosophy shall be provided for each process stage and it shall be accompanied by a procedure for each individual item of plant. The operating manuals for the MBT Facility shall be used in the development of the operating procedures. The Contractor shall manage together with the Final Beneficiary staff the operation of the complete treatment works including all plants and associated services (all civil, mechanical, electrical, telemetry and infra-structural items specified in the Contract), on a continuous basis (24 hours).

During the operational period the Contractor shall manage together with the Final Beneficiary staff inspections at regular intervals and maintenance works as described in the Operation and Maintenance Manuals, The Contractor shall also direct, supervise and monitor the Final Beneficiary’s staff for proper operation of the Facility.

#### **12.4.2 Records of data**

Records of the continuous data measured at the station shall be kept at the MBT Facility in electronic and hard copy formats and summary data shall be provided in the monthly report.

#### **12.4.3 Management of consumables**

##### **Energy Management**

The Contractor shall manage together with the Final Beneficiary staff the keeping records of the hours of operation of each item of electrical plant and the total energy usage of the MBT Facility. The Contractor shall put procedures in place to ensure that the treatment processes are optimized, to minimize the energy consumption.

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#### **12.4.4 Recording of unusual or abnormal situations**

Unusual circumstances arising from industrial disputes, accidental spillage, mechanical breakdown, power failure, stoppage for essential maintenance or abnormal weather conditions shall be noted by the Contractor in detail and taken into consideration when interpreting the analytical data from the MBT Facility.

The Contractor shall notify the Employer of any unusual occurrence or incident in respect of the provision of the Operation and Maintenance Works. Notification shall be made by telephone with immediate effect and shall be followed by a written report of the occurrence or incident.

### **12.5 Maintenance of the MBT Facility**

#### **12.5.1 General**

The Contractor shall provide the procedures for the routine, planned, breakdown and repair maintenance of all assets relating to civil, mechanical, electrical and electronic plant, equipment and infrastructure at the MBT Facility.

During the operational period the Contractor shall manage together with the Final Beneficiary staff inspections at regular intervals and maintenance works as described in the Operation and Maintenance Manuals, The Contractor shall also direct, supervise and monitor the Final Beneficiary's staff for proper operation of the Facility.

Maintenance includes measures taken in order to avoid failure of the plants and equipment in addition to repair measures in case of failure.

#### **12.5.2 Maintenance programme**

The Database software formaintenance program to be put in place by the Contractor shall be based on a recognized maintenance methodology. The Contractor shall provide a statement of the methodology he proposes to adapt to the Final Beneficiary for approval, before developing it in detail.

The maintenance regime adopted by the Contractor shall include:

- Schedules for the maintenance of the MBT Facility to include but not be limited to:
  - a complete list of the assets to be maintained
  - the frequency and type of routine and planned maintenance for each asset
  - details of the calibration of all instrumentation
  - a listing of all essential spare parts to be carried
- Methods for dealing with breakdown and repair of assets to include:
  - Call out response times for each asset
  - Communication with the Final Beneficiarywhen breakdowns occur.
- Procedures for the maintenance of the assets incorporating manufacturer's instructions
- Methods for the planned replacement of assets at the MBT Facility
- Records of all maintenance carried out at the MBT Facility, to be kept up to date and held electronically and in paper format at the MBT Facility at all times.

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The Contractor shall ensure that the MBT Facility is kept in a clean and tidy condition at all times and shall incorporate a cleaning routine in the maintenance schedules.

### **12.5.3 Building maintenance**

The Contractor shall manage together with the Final Beneficiary staff the maintenance of the all buildings, contained within the MBT Facility, to keep it in good repair throughout the term of the Contract including:

- Regular cleaning of all internal areas
- Repair or replacement of internal and external fixtures and fittings when they become damaged
- Cleaning of roof guttering and drainage, windows and doors
- Maintenance of ventilation systems.

The Contractor shall be responsible for the replacement of any part of the buildings that become damaged during the term of the Contract, excluding damage caused by a Force Majeure event.

### **12.5.4 Site infrastructural maintenance**

The Contractor shall manage the maintenance of all infrastructures within the MBT Facility, to keep it in good condition throughout the term of the Contract including:

- All road and path surfaces
- Gates and fences
- Water supply facilities
- Road and building drainage
- Landscaped and grassed areas.

The Contractor shall be responsible for the replacement of any part of the infrastructure that becomes damaged during the term of the Contract, excluding damage caused by a Force Majeure event.

### **12.5.5 Lifting mechanisms**

The Contractor shall be responsible for the certification of all mechanical lifting mechanisms used at the MBT Facility and shall ensure that they are in good repair and capable of operating to the required standard at all times. The maintenance required for such mechanisms shall be detailed in the Contractor's maintenance schedules. Certificates for lifting equipment shall be kept at the MBT Facility as part of the Contractor's maintenance records.

## **12.6 Health and Safety**

The Contractor shall comply with all aspects of current Turkish legislation in force or that subsequently comes into force during the term of the Contract.

The Contractor shall maintain and update the Safety File on an ongoing basis.

## **12.7 Contractor/Final Beneficiary Liaison and Communication**

### **12.7.1 Reporting to the Final Beneficiary**

The Contractor shall provide the Final Beneficiary with a monthly report that includes but is not limited to:



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- General commentary on the performance of the MBT Facility
  - Details of failures, breakdowns and non-routine maintenance
  - Tables of analytical data including graphical representations and a discussion of the results
  - Records of sludge management and disposal activities
  - Details of any complaints
  - Schedule of hours run of all operational plants
  - Record of any accidents
  - Records of chemical and energy usage
  - Summary of weather records
  - Any other records or information that may be considered relevant by the Contractor.

The report shall be submitted to the Final Beneficiary, one copy in electronic format and three copies in paper format, within the first 14 days of each month following the month covered in the Report.

The Final Beneficiary may request information, relating to the operation and maintenance of MBT Facility, from the Contractor at any stage during the Operation and Maintenance Period.

### **12.8 Handing Back**

At the date of expiration of the defects liability period, the Contractor shall hand back the MBT Facility to the Final Beneficiary for the future operation and maintenance.

The plant shall be in good and maintained condition and the buildings and external works shall be well maintained.

As a guideline, the Contractor shall prior to the handing back ensure that:

- All mechanical and electrical equipment and installations are well functioning and well maintained
- All metal parts are free from rust and/or oxide
- Any damage to tarmac and paved surfaces has been repaired
- The MBT Facility site is tidy and green areas well gardened
- Rooms in buildings and structures are tidy up and cleaned.

The inspection shall be conducted jointly by the Final Beneficiary and the Contractor with the presence of Employer/Engineer to arbitrate in the event of disagreement.