

Book

2



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PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

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FOR THE USE OF
THE OFFICERS OF THE DEPARTMENT
OF ENVIRONMENT ONLY

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Technical guidance on precommissioning inspection of
industrial effluent treatment systems / Department of
Environment.

TECHNICAL GUIDANCE ON PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

TABLE OF CONTENTS

Chapter	Title	Page
OVERVIEW		2
Chapter 1.0	Prerequisites for Successful Treatment of Industrial Effluents	3
Chapter 2.0	What is Precommissioning Inspection?	3
Chapter 3.0	Elements of Precommissioning Inspection	3
Chapter 4.0	Details of Precommissioning Inspection	4
Chapter 5.0	Precommissioning Report	5
REFERENCES		6
APPENDICES		
I	Report of Precommissioning Inspection of Industrial Effluent Treatment System	7
ACKNOWLEDGEMENT		13

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OVERVIEW

The control of **industrial water pollution** is a major task assigned to the Department of Environment (DOE). In the hierarchy of **waste management approaches** effluent treatment is placed close to the bottom of the hierarchy reflecting its “**non preferred**” choice. Nevertheless in practice, effluent treatment is still an important management strategy to curb water pollution even in developed countries which have implemented vigorous programs in **preventive approaches** such as cleaner production, waste minimization and ISO 14000. In reality, in most circumstances, even though preventive measures have been undertaken, effluent is still generated to a certain extent, hence the need for effluent treatment.

One of the responsibilities of the **Assistant Environmental Control Officers** (*Penolong Pegawai Kawalan Alam Sekitar*) is to conduct inspections of manufacturing facilities to ensure that the **industrial effluent treatment systems** (IETSs) that have been approved have been constructed/installed according to **approved conditions**. The **precommissioning inspection** is a thorough, detailed, unit by unit inspection which requires **technical knowledge** and **skills** as well as **hands-on experience**. This document provides a general guidance on **how to** conduct an effective precommissioning inspection.

Our hope is that systematic precommissioning inspections of IETS will help ensure that IETSs are constructed according to approved plans and conditions, hence will perform satisfactorily.

Department of Environment (Headquarters)
Putrajaya, Malaysia
December, 2006



PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

1.0 PREREQUISITES FOR SUCCESSFUL TREATMENT OF INDUSTRIAL EFFLUENTS

The success of the treatment of industrial effluents is dependent principally on **three prerequisites**, namely:

- (i) adequate **process design**
- (ii) quality **construction** according to approved plans and conditions
- (iii) proper **operation and maintenance**.

The Department of Environment (DOE) has a role to play in ensuring that all of the above prerequisites are met through its **Written Permission** procedure and enforcement program.

The Written Permission procedure involves the first two prerequisites while the **enforcement program** tackles the last one.

2.0 WHAT IS PRECOMMISSIONING INSPECTION?

The Written Permission issued to an applicant invariably contains a host of conditions attached to it. Construction of industrial effluent treatment system (IETS) then commences and it must be planned to be ready before the factory commences operation. Before the factory is allowed to begin operation, **DOE inspectors** would conduct an inspection to verify that the IETS has been constructed according to the **terms and conditions** of the Written Permission. A letter of consent for the factory to begin operation (*surat tiada halangan untuk memulakan operasi*) would then be issued to the factory.

Understandably, precommissioning inspection should be conducted **before** the factory starts operation and before the IETS is 'filled up' with effluents hindering a thorough and meaningful inspection.

3.0 ELEMENTS OF PRECOMMISSIONING INSPECTION

Precommissioning inspection addresses the second prerequisite of **"quality construction according to approved plans and conditions"**. To ensure objective inspection the following elements must be understood thoroughly by the inspectors:

- (i) The **Written Permission approval conditions**, especially those relevant to the **construction stage**
- (ii) The **technical drawings** comprising treatment **process flow diagram, piping and instrumentation (PI)** diagram, etc.

The precommissioning inspection will seek to verify that all conditions attached to the Written Permission have been complied with.

Compliance will include the following:

- (i) All **unit operations** and **unit processes** have been constructed or installed (e.g. reactors, clarifiers)
- (ii) All **associated equipment** that has been designed and approved for installation to ensure proper operation of the unit operations and processes have been installed (e.g. aeration equipment)
- (iii) All **ancillary equipment** and **instrumentation** to ensure smooth operation and running of the unit operations and unit processes and proper operation of the IETS as a whole have been installed (e.g. pH meter, dissolved oxygen meter)

4.0 DETAILS OF PRECOMMISSIONING INSPECTION

What to inspect during a precommissioning inspection? The tasks of a DOE inspector when conducting a pre commissioning inspection can be categorized into two categories, namely the inspection of the '**general conditions**' of Written Permission (WP) and the inspection of the "**technical details**" of the IETS. The details of the two categories of inspection are tabulated in the Appendix I as a checklist. The DOE inspector is required to identify the relevant WP conditions and write down his **observations** in the appropriate columns. Appendix I will also be used as the **Pre commissioning Inspection Report** to be filed in the source file.

4.1 Presence of Consultant & Factory Representatives

Prior arrangement should be made to ensure that the **consultant/contractor** who was responsible for the design/installation of the entire IETS as well as an appropriate **representative of the factory** are present during the inspection. **Clarifications** on certain details of the IETS can be sought from and observation on **non conformance** to WP conditions can be given to the relevant personnel if deemed necessary. It is advisable that the inspector brings along a copy of the relevant documents including the engineering drawings of the IETS that have been approved by the DOE.

4.2 Sequence of Inspection

A logical sequence of inspection would be to start from the factory **manufacturing/processing area** and verify that the **effluent drainage system** captures all **points of effluent generation** as identified earlier in the application. This is then followed by inspecting the **unit operations** and **processes** one at a time as shown in the approved **treatment process block diagram** and **design drawings**. As the inspector moves along the treatment flow scheme, have the consultant brief all the details of the unit operations and processes and have him state categorically that the relevant WP conditions as well as the technical details furnished in the **proposal** have been **complied** with.

5.0 PRECOMMISSIONING REPORT

The inspectors of the Department of Environment conducting the precommissioning inspection will use the form illustrated in Appendix 1 as the precommissioning report to be submitted to the supervisor for further action.

REFERENCES

- Eckenfelder, W. W. 1989. *Industrial Water Pollution Control*. 2nd ed. McGraw-Hill, Inc. Singapore.
- Metcalf and Eddy. 1991. *Wastewater Engineering-Treatment, Disposal and Resue*. Singapore.
- Water Environment Association. 1987. *Activated Sludge, Manual of Practice #9*.

Report Of Precommissioning Inspection Of Industrial Effluent Treatment System

NAME OF FACTORY _____

ADDRESS _____

FILE NO _____

DATE OF INSPECTION _____

A. GENERAL CONDITIONS

WP Condition Number (Nombor Syarat KB)	Condition (Syarat)	Comply* (Mematuhi)	No.* (Tidak)	Observation /Remarks (Pemerhatian/Catatan)	Proposed Action (Syor Tindakan)
6	Separate stormwater and effluent drains (<i>Parit air hujan dibina berasingan dari sistem saliran effluen</i>)				
7	Installation of flowmeters (<i>'Flow meter' di pasang di saliran masuk dan keluar sistem pengolahan</i>)				
8	Identification of final discharge point (<i>Tanda pengenal "Takat Pelepasan Terakhir" dipasang</i>)				
26	Labelling of unit operations and processes (<i>Unit proses dan unit operasi IETS di sediakan label pengenalalan</i>)				
9	Spare parts on hand (<i>Peralatan ganti disediakan</i>)				
21	Competent operator identified (<i>Operator berkompeten untuk ETS dikenalpasti</i>)				

* Check / where relevant

PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

B. TECHNICAL DETAILS

No.	Unit	Observation/ Remarks	Proposed Action
1.0	Preliminary/pretreatment		
1.1	Screen a. type: (static/vibrating, rotary) _____ b. dimension: _____		
1.2	Equalization tank a. type: _____ b. dimension: _____ c. aerator: (type, units, etc.) _____		
1.3	Primary clarifier a. type: _____ b. dimension: _____ c. weir length: _____		
2.0	Biological treatment		
	AS <input type="checkbox"/> EAAS <input type="checkbox"/> TF <input type="checkbox"/> RBC <input type="checkbox"/> Oxidation pond <input type="checkbox"/> Aerated lagoon <input type="checkbox"/> SBR <input type="checkbox"/> Others (specify): _____		

No.	Unit	Observation/ Remarks	Proposed Action
2.0	Biological treatment		
2.1	Aeration tank (AS, EAAS, SBR) a. type (rectangular/circular): _____ b. dimension: _____ c. pH meter: _____ d. DO meter: _____ e. Aerator (type. No of units, etc): _____		
2.2	Secondary clarifier a. type: _____ b. dimension: _____ c. weir length: _____		
2.3	Trickling Filter (TF) a. Type (rectangular/circular): _____ b. Dimension: _____		

PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

No.	Unit	Observation/ Remarks	Proposed Action
2.0	Biological treatment		
2.4	Rotating Biological Contactor (RBC) a. Disc dimension: _____ b. Other details: _____ Oxidation ponds a. Pond dimension: _____ d. Aerator (type, No of units, etc): _____		
2.6	Aerated Lagoon a. Lagoon dimension: _____ b. Aerator (type, No of units, etc): _____		

No.	Unit	Observation/ Remarks	Proposed Action
3.0	Chemical Treatment		
3.1	Precipitation for heavy metals removal a. Precipitation tank dimension: _____ b. Mixer: _____ e. pH meter: _____ f. Coagulation tank dimension: _____ g. Mixer: _____ h. Clarifier type: _____ i. Clarifier size: _____ j. Weir length : _____		
3.2	Ion exchange column a. Column dimension: _____ b. Method of determining breakthrough time: _____ c. Regeneration method (onsite/offsite): _____ d. If on site, concentrated metal solution to treatment or electrowining process? _____		

PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS

No.	Unit	Observation/ Remarks	Proposed Action
4.0	Advanced Treatment		
4.1	Activated Carbon column a. Column dimension: _____ b. Method of determining breakthrough time: _____ c. Regeneration method (onsite/Offsite): _____ d. If on site, regenerant sent back for treatment?		

DISCUSSION AND RECOMMENDATION

I recommend that Letter of No Objection to Commence Operation be Issued:
(Saya syorkan Surat Tiada halangan Memulakan Operasi dikeluarkan):

Yes
(Ya)No
(Tidak)

Name of DOE Inspector: _____

Date of Inspection: _____

Signature: _____

ACKNOWLEDGEMENT

The Department is especially grateful to Ir. Dr. Shamsudin Ab. Latif, Deputy Director General (Development) for taking the initiative to write a series of **Technical Guidance Documents**, some for the use of DOE officers and some for the industries. It is our fervent hope that widespread use of these documents will value-add DOE's enforcement work, as well as industries' practices in pollution control. The final goal is to improve **regulatory compliance** and consequently, achieve a better **environmental quality** for all.

NOTES

NOTES

PRECOMMISSIONING INSPECTION OF INDUSTRIAL EFFLUENT TREATMENT SYSTEMS



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