CAM Technical Guidance Document
Table of Contents

In the following Table of Contents for the CAM Technical Guidance Document, click on the section of interest for downloading instructions. There are also options to download multiple sections or appendices.

Download the entire CAM Technical Guidance Document (zip file format).

Page

1.0 OVERVIEW 1-1
1.1 PURPOSE OF CAM 1-1
1.2 CAM PROCESS 1-2
1.2.1 Applicability Determination 1-2
1.2.2 CAM Submittals 1-14
1.2.3 Review and Approval of CAM Submittal 1-15
1.2.4 CAM Implementation 1-15
2.0 MONITORING APPROACH SUBMITTALS 2-1
2.1 MONITORING APPROACH SUBMITTAL OBJECTIVES 2-2
2.2 ELEMENTS OF A MONITORING APPROACH SUBMITTAL 2-3
2.2.1 Background 2-8
2.2.2 Monitoring Approach 2-8
2.2.3 Justification for Selected Monitoring Approach and Indicator Range(s) 2-14
2.3 SELECTION OF MONITORING APPROACH AND SELECTION OF INDICATOR RANGE 2-18
2.3.1 Selection of Monitoring Approach 2-18
2.3.2 Selection of Indicator Range 2-27
2.4 QUALITY IMPROVEMENT PLANS (QIP's) 2-39

3.0 CAM ILLUSTRATIONS 3-1
3.1 PURPOSE OF ILLUSTRATIONS 3-1
3.2 FORMAT OF ILLUSTRATIONS 3-5
3.3 ILLUSTRATIONS 3-7
3.3.1 General Information 3-7
3.4 PRESUMPTIVELY ACCEPTABLE CAM 3-9

Sections 1 through 3

4.0 TECHNICAL REFERENCE FOR MONITORING EQUIPMENT AND INSTRUMENTS 4-1
4.1 INTRODUCTION 4-1
4.2 TEMPERATURE MEASUREMENT SYSTEMS 4-4
4.2.1 Introduction 4-4
4.2.2 Thermocouples 4-5
4.2.3 Resistance Temperature Detectors (RTD's) 4-18

4.2.4 Infrared (IR) Thermometry 4-24
4.2.5 References for Temperature Measurement 4-28

4.3 PRESSURE MEASUREMENT SYSTEMS 4-30
4.3.1 Manometers 4-31
4.3.2 Mechanical Dial Pressure Gauges 4-34
4.3.3 Pressure Transducer 4-40
4.3.4 References for Pressure Measurement 4-50
4.4 FLOW RATE MEASUREMENT SYSTEMS 4-52
4.4.1 Introduction 4-52
4.4.2 Differential Pressure Flow Measurement Devices 4-52
4.4.3 Magnetic Flow Meters 4-62
4.4.4 Positive Displacement Flow Meters 4-66
4.4.5 Turbine Flow Meters 4-72
4.4.6 Vortex Formation Flow Meters 4-76
4.4.7 Fluidic Oscillating Flow Meters 4-80
4.4.8 Ultrasonic Flow Meters 4-83
4.4.9 Thermal Flow Meters 4-89
4.4.10 Mass Flow Meters (Coriolis) 4-94
4.4.11 Rotameters 4-98
4.4.12 References for Flow Measurement 4-102
4.5 pH AND CONDUCTIVITY MEASUREMENT SYSTEMS 4-103
4.5.1 pH Monitoring 4-103
4.5.2 pH Measurement Stations 4-105
4.5.3 pH Control Systems 4-108
4.5.4 Operation and Maintenance of the pH Measuring System 4-110
4.5.5 Calibration of the pH Meter 4-115
4.5.6 Conductivity Measurement 4-118
4.5.7 References for pH and Conductivity Measurement 4-120
4.6 ELECTRICAL 4-120
4.7 LEVEL INDICATOR 4-120
4.8 MOTION AND ROTATION 4-120

5.0 ANNOTATED BIBLIOGRAPHY 5-1

Sections 4 and 5

Page

APPENDIX A. EXAMPLE MONITORING APPROACH SUBMITTALS
(Revised September 2004 to incorporate Supplements 1 & 2)

A.1a	THERMAL INCINERATOR FOR VOC CONTROL–FACILITY A	A.1a-1
A.1b	THERMAL INCINERATOR FOR VOC CONTROL–FACILITY A	A.1-1
A.2	VENTURI SCRUBBER FOR PM CONTROL–FACILITY B	A.2-1
A.3	CONDENSER FOR VOC CONTROL–FACILITY C	A.3-1
A.4	SCRUBBER FOR VOC CONTROL–FACILITY D	A.4-1
A.4b	SCRUBBER FOR VOC CONTROL – FACILITY Q	A.4b-1

A.5 CARBON ADSORBER FOR VOC CONTROL–FACILITY E A.5-1
A.6 RESERVED
A.7 RESERVED
A.8 SCRUBBER FOR PM CONTROL–FACILITY H A.8-1
A.9 WET ELECTROSTATIC PRECIPITATOR FOR PM CONTROL–FACILITY I A.9-1
A.9b WET ELECTROSTATIC PRECIPITATOR FOR PM CONTROL–FACILITY P A.9b-1
A.10 FABRIC FILTER FOR PM CONTROL–FACILITY J A.10-1
A.11 ELECTRIFIED FILTER BED FOR PM CONTROL–FACILITY K A.11-1
A.12 FABRIC FILTER FOR PM CONTROL–FACILITY L A.12-1
A.13 FABRIC FILTER FOR PM CONTROL–FACILITY M A.13-1
A.14 SCRUBBER FOR PM CONTROL–FACILITY N A.14-1
A.15 RESERVED
A.16 CONTROL DEVICE BYPASS–FACILITY R A.16-1
A.17 VENTURI SCRUBBER FOR PM CONTROL–FACILITY S A.17-1
A.18 CARBON ADSORBER FOR VOC CONTROL–FACILITY T A.18-1
A.19a BAGHOUSE FOR PM CONTROL–FACILITY V A.19a-1
A.19b BAGHOUSE FOR PM CONTROL–FACILITY V A.19b-1
A.20 ABSORBER FOR SO_2 CONTROL–FACILITY W A.20-1
A.21 RESERVED
A.22 RESERVED
A.23 RESERVED
A.24 CARBON ADSORBER FOR VOC CONTROL–FACILITY EE A.24-1
A.25 ELECTROSTATIC PRECIPITATOR (ESP) FOR PM CONTROL–FACILITY FF A.25-1
A.26 RESERVED
A.27 FLUE GAS RECIRCULATION (FGR) FOR NO_X CONTROL–FACILITY HH A.27-1

Page

APPENDIX B. CAM ILLUSTRATIONS

B.1 FABRIC FILTERS B-1
No. 1a. FABRIC FILTER FOR PM CONTROL B-3
No. 1b. FABRIC FILTER FOR PM CONTROL B-5
No. 1c. FABRIC FILTER FOR PM CONTROL B-6
No. 1d. FABRIC FILTER FOR PM CONTROL B-7
No. 1e. FABRIC FILTER FOR PM CONTROL B-9

B.2. ELECTROSTATIC PRECIPITATORS B-10
No. 2. ESP FOR PM CONTROL B-11

B.3 WET ELECTROSTATIC PRECIPITATORS B-12

B.4 WET SCRUBBERS B-13
No. 4a. WET SCRUBBER FOR PM CONTROL B-14

No. 5. WET SCRUBBER FOR SO2 CONTROL B-15
No. 6. SPRAY DRYER FOR SO2 CONTROL B-16

B.5 THERMAL OXIDIZERS B-18
No. 11a. THERMAL INCINERATOR FOR CO CONTROL B-20
No. 11b. THERMAL INCINERATOR FOR CO CONTROL B-21
No. 16a. THERMAL INCINERATOR FOR VOC CONTROL B-23
No. 16b. THERMAL INCINERATOR FOR VOC CONTROL B-25
No. 16c. THERMAL INCINERATOR FOR VOC CONTROL B-27

B.6 CATALYTIC OXIDIZERS B-29
No. 18. CATALYTIC OXIDIZER FOR VOC CONTROL B-31

B.7 FLARES B-33

B.8 CONDENSERS B-34
No. 21a. CONDENSER FOR VOC CONTROL B-35
No. 21b. CONDENSER FOR VOC CONTROL B-36

B.9 ELECTRIFIED FILTER BEDS B-38

B.10 CARBON ABSORBERS B-39
No. 23a. CARBON ADSORBER FOR VOC CONTROL B-40

B.11 CYCLONES B-41
No. 24a. CYCLONE FOR PM CONTROL B-42
No. 24b. CYCLONE FOR PM CONTROL B-44
No. 25. GRAVITY COLLECTOR FOR PM CONTROL B-46

B.12 OTHER SO2 CONTROLS B-48

B.13 NOX CONTROLS B-49
No. 32a. SELECTIVE CATALYTIC REDUCTION FOR NOx CONTROL B-50
No. 32b. SELECTIVE CATALYTIC REDUCTION FOR NOx CONTROL B-51

B.14 REFERENCES FOR CAM ILLUSTRATIONS B-52