

# EPA Air Pollution Control Cost Manual

Chapter Updates

December 7, 2016

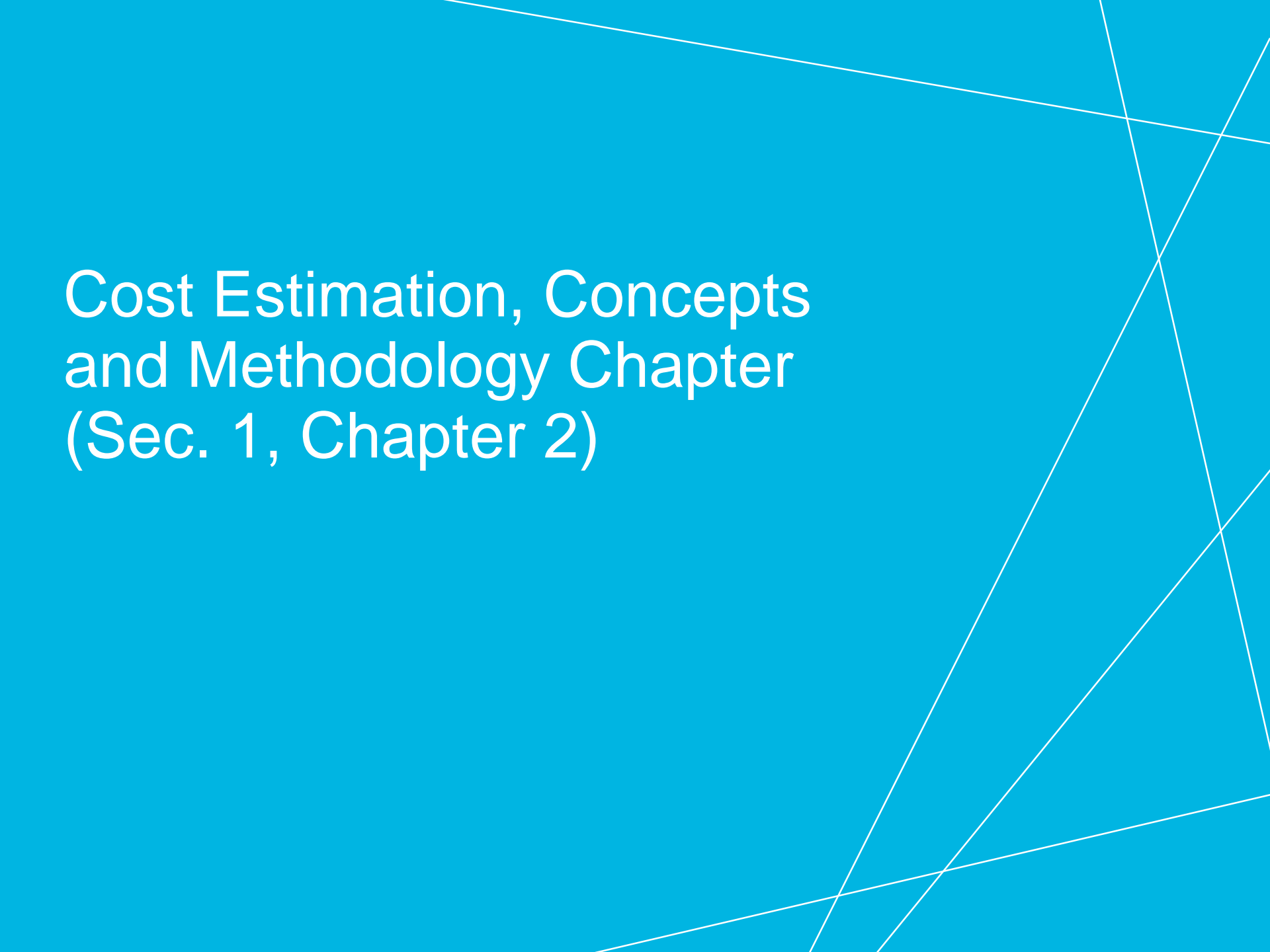
**AECOM**

# EPA Air Pollution Control Cost Manual - Overview

- EPA’s compilation of air pollution control cost information
- Purpose
  - Provide guidance to industry and regulatory authorities for the development of accurate and consistent costs for add-on air pollution control systems
  - Establish a standardized and peer-reviewed costing methodology
  - Presents “study-level” cost information ( $\pm 30\%$ )
- Revision six is underway
  - First edition: 1978
  - Revisions: 1982, 1987, 1990, 1996, & 2003
  - Estimated completion date for Seventh Edition: April 2021

# Seventh Edition Chapters Completed or Under Review

- Chapters completed to date (May 2016):
  - Section 4, Chapter 1: Selective Non-Catalytic Reduction
  - Section 4, Chapter 2: Selective Catalytic Reduction
- Chapters currently issued for public comment (Sept 2016):
  - Section 1, Chapter 2: Cost Estimation, Concepts and Methodology
  - Section 3.1, Chapter 2: Refrigerated Condensers
  - Section 3.2, Chapter 2: Incinerators and Oxidizers
- Public comments on these Chapters due December 21, 2016

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# Cost Estimation, Concepts and Methodology Chapter (Sec. 1, Chapter 2)

## Specific Comments Requested by EPA for Sec. 1, Ch. 2

- Is the methodology in this chapter consistent with best practices for cost estimation of pollution control equipment installation, operation and maintenance?
  - Generally, yes
  - Some issues with specific cost elements or methods
- Is the use of the equivalent uniform annual cost method appropriate?
  - Yes
- Are the cost items included in the definition of capital cost or total capital investment valid?
  - Varies by installation, but generally yes

## General Observations About Sec. 1, Ch. 2

- Cost estimating methodology description:
  - Includes new clarifications/expansion on certain topics
  - Follows almost verbatim the methodology described in the 6th Edition
- New section on “private vs. social costs”
  - Caveat that Manual focuses on private costs
- Interest rate:
  - Recommends using 7% private interest rate to annualize capital cost
  - Rationale: rate used by OMB Circular A-4?
- EPA intends to update 7<sup>th</sup> Ed. cost data to base year 2012
- States that costs in each chapter were developed by surveying the largest possible group of vendors

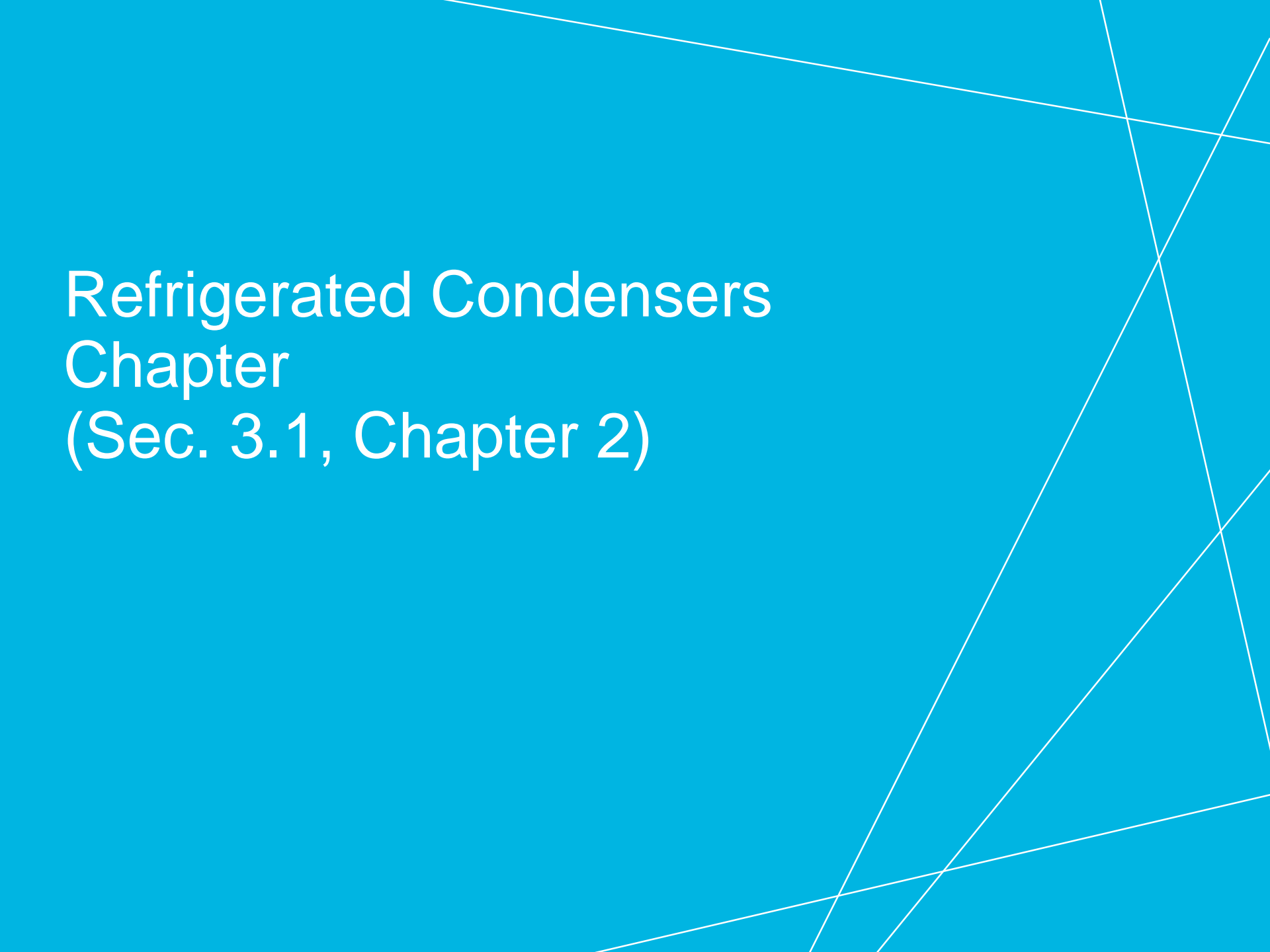
## General Observations About Sec. 1, Ch. 2 (cont'd)

- Includes a discussion about cost indexing:
  - Procedure used to estimate a cost in the current year based on a cost from a previous year
  - States that method should not be used to extend a cost estimate older than five years
    - EPA apparently doesn't follow its own recommendation
- Very little new information about retrofit costs
  - Possible significant omission since many APC systems are installed on existing sources
- Contains new section on different types of construction contracts
  - Not clear why; not used or referred to in subsequent chapters

# Specific Issues With This Chapter

- Cost information development methodology:
  - Statement that costs are developed by surveying large groups of vendors is not accurate
  - Discontinuity with cost index method recommendation
    - Recommended timeframe: five years maximum
    - Use in subsequent chapters: ten or more years
- Appropriateness of recommended 7% private interest rate
- Accuracy of statement that cost data are to be updated to “at least” 2012-base costs
  - Timing of release of other chapters
  - Some chapters will be more than 5 years old when 7<sup>th</sup> edition is complete



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# Refrigerated Condensers

## Chapter

(Sec. 3.1, Chapter 2)

## Specific Comments Requested by EPA for Sec. 3.1, Ch. 2

- What is a reasonable estimate of equipment life for this control measure?
- Is the description of refrigerated condensers complete, up-to-date, and accurate?
- Are the cost correlations, factors, and equations accurate?
- Is the discussion on the effect of fouling on refrigerated condensers accurate?

## General Observations About Sec. 3.1, Ch. 2

- Update appears to primarily correct typographical errors from the previous edition
- New paragraph on condenser fouling
  - This information does not appear to be used in the cost development section
- Equipment costs presented:
  - 6<sup>th</sup> Edition costs (1990 base year) updated to current year using price indexing method
    - At odds with recommended five-year limit on this method
  - Apparently no attempt made to get more current vendor quotes
  - Costs are for new installations; no costs presented for retrofits

# Refrigerated Condenser Equipment Cost Comparison

– Refrigerated condenser design data:

- Single stage system:
- Operating temperature: -50°F
- Chiller load: 2.5 tons

## Cost Manual Estimate vs. Recent Vendor Quote

Control Cost Manual Estimate	\$82,300
Vendor Budget Quote (November 2016)	\$370,000

# Possible Responses to Specific Comments Requested

## – Equipment life?

- 15 years is used in cost examples in this chapter
- Recommend obtain industry and vendor input on this point

## – Process description accurate?

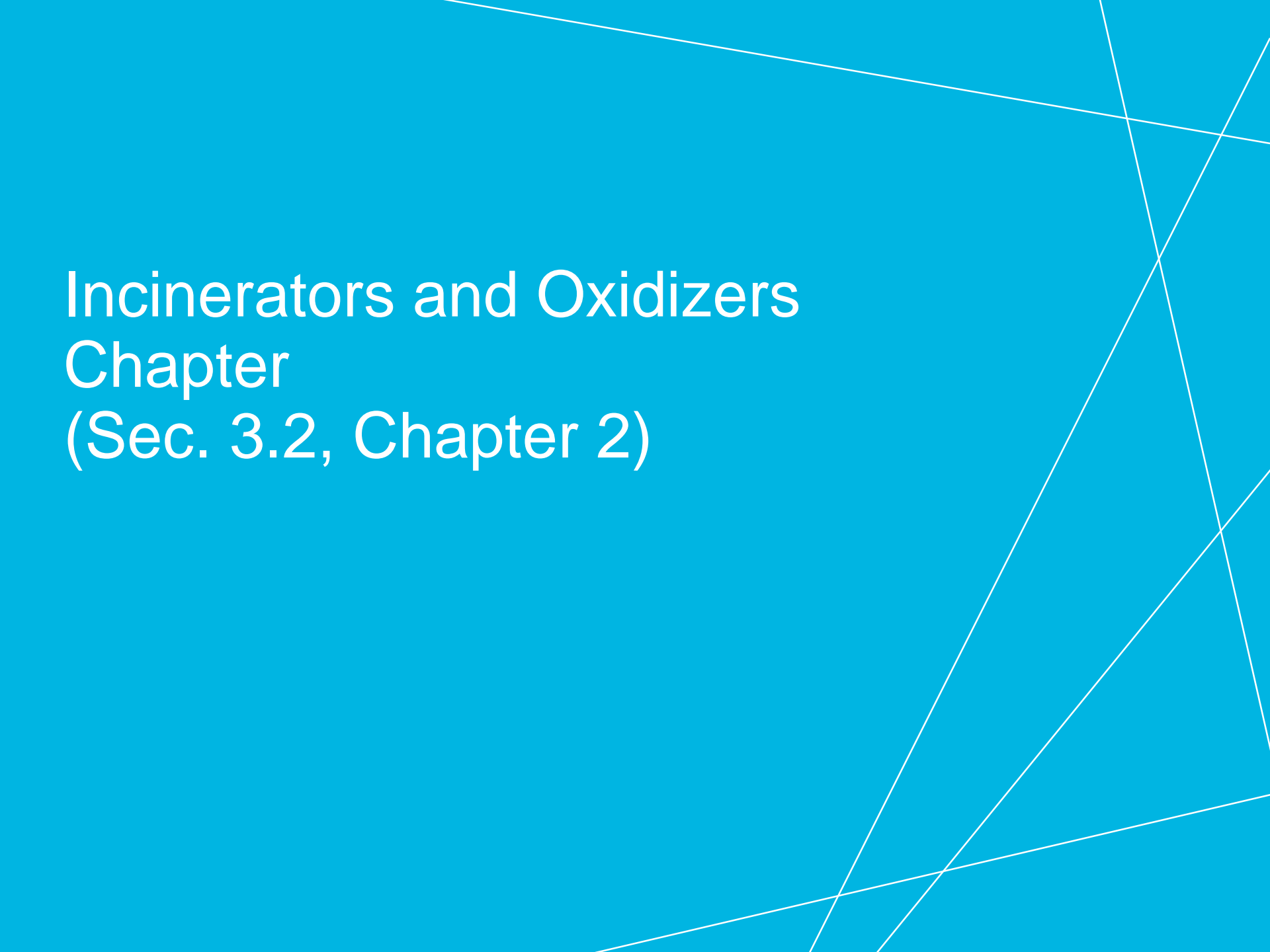
- Yes

## – Accuracy of cost data?

- Does not follow EPA's own recommendation on price indexing
- Cost data from only two vendors provided – not “large” group
- Equations not accurate (based on limited current data)

## – Condenser fouling?

- Discussion is accurate; not clear how it is used

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# Incinerators and Oxidizers

## Chapter

(Sec. 3.2, Chapter 2)

## Specific Comments Requested by EPA for Sec. 3.2, Ch. 2

- What is a reasonable estimate of equipment life for this control measure?
- Are the descriptions of incinerator and oxidizer technologies complete, up-to-date, and accurate?
- Are the cost correlations, factors, and equations for incinerators and oxidizers accurate?
- Are the estimates of VOC destruction efficiencies for incinerators and oxidizers accurate?

## General Observations About Sec. 3.2, Ch. 2

- New distinction between “incinerators” and “oxidizers”
  - Oxidizers: RTOs, RCO, etc. used for gaseous VOC control
  - Incinerators: solid waste combustion units
    - Entire new subsection included on solid waste incinerators
- New information about RTOs
  - Field-erected and package units now available
  - “Puff” issue (uncombusted emissions resulting from flow direction change)
- New section on flameless thermal oxidizers (no cost data)
- Cost curves presented for oxidizers:
  - Same as in the 6<sup>th</sup> Edition, updated to current year using price indexing method
  - Original cost quotes from late 1980’s (25+ years old)
  - No new vendor cost data



## General Observations About Sec. 3.2, Ch. 2 (cont'd)

- New section on “incinerators”:
  - Cost data for sewage sludge incinerators only
  - Presents cost data from 2003 – 2010 (> 5 years old)

# Oxidizer Equipment Cost Comparison

## – Oxidizer design data:

- Nitrogen-inerted spray dryer exhaust
- Process exhaust gas rate: 200 acfm
- Process exhaust temperature: 100°F
- VOC load (worst-case): 108 lb/hr

### Cost Manual Estimates vs. Recent Vendor Quotes

	RTO	Cat Ox
Control Cost Manual Estimates	\$241,000	\$101,500
Vendor Budget Quotes	\$325,000	\$230,000

# Possible Responses to Specific Comments Requested

## – Equipment life?

- 20 years used in cost examples (4 – 6 years for catalyst)
- Equipment life depends on severity of service
- Recommend industry or vendor input on this point

## – Descriptions accurate?

- Yes

## – Cost data accurate?

- Oxidizer and incinerator cost data presented do not follow EPA's own recommendation on price indexing (original data is >5 yrs old)
- Oxidizer equations and charts not accurate based on current vendor quotes

## Possible Responses to Specific Comments Requested (cont'd)

- VOC destruction efficiencies accurate?
  - Contains same discussion about destruction efficiency and residence time as in 4<sup>th</sup> edition
  - 98% for non-halogenated organics referenced
  - Vendor guarantees are typically at this level

# Summary

- Chapter updates: minor revisions, nothing major
- Recycles same cost data as in previous edition, updated to current year
- Cost indexing method used is not consistent with recommendation
- Cost estimates using Manual equations are lower than recent vendor quotes

# Thanks!

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**AECOM**