

**RESPONSES TO NYSDEC COMMENTS ON THE LTEV OPERATIONS PLAN  
AND THE LTEV TESTING PLAN - FOR SUBMITTAL TO USACOE**

**Operations Plan:**

*COMMENT 1. The Low Temperature Enhanced Volatilization System (LTEVS) must have substantive compliance with RCRA, Subpart X requirements. These regulations were inadvertently omitted from Section 01060 of the Specifications and are applicable to the LTEVS.*

**RESPONSE:** The LTEVS is in essential compliance with RCRA, Subpart X requirements.

*COMMENT 2. The hydrogen chloride gases will be scrubbed using water and sodium hydroxide (if needed). What criteria determine the use of NaOH (amount and duration)? The plan should be more specific in this area.*

**RESPONSE:** The referenced statement in Section 1.0 of the LTEVS Operations Plan, Report and Residuals Management Plan has been revised to delete "(if needed)". The Quench/Scrubber item in Section 2.4 has been expanded to better describe pH control in the scrubber and sump by deleting the last sentence of the section and by adding the following statement: "The pH in the sump is automatically maintained at a near neutral condition (generally a pH of 5 to 9) by the addition of a NaOH solution which is introduced into the sump/scrubber recirculation line as needed via a metering pump. A pH probe which continuously monitors pH in the sump is used to automatically control the caustic metering pump causing it to add caustic when the pH in the sump drops below the set point (usually pH 5). Generally, a solution of about a 25% NaOH is used to maintain pH, however, the concentration of NaOH solution used can vary since the solution will be automatically added in an amount required to maintain the pH at a near neutral condition."

*COMMENT 3. The Pretreatment Stockpiling/Staging Area (PTSSA) and Post Treatment Staging Bins (PTSB) are adjacent to the spill area. Protection from cross-contamination and further prevention of damage to the spill area is mandatory.*

**RESPONSE:** The Pretreatment Stockpile/Staging Area is located within the Spill Area and will be covered with 8 mil poly sheeting. The following statement has been added to the second paragraph in Section 1.1: "The entire Spill Area will be enclosed with silt fencing and will be bermed where necessary to prevent storm water from entering. The Post Treatment Staging Bins will be constructed over (i.e., lined with) 8 mil poly sheeting, fenced off with silt fencing, and covered with 8 mil poly sheeting."

*COMMENT 4. The contractor probably has decided if a power screen is required at the site. Section 1.4.2.c should be edited to reflect this decision.*

**RESPONSE:** Section 1.4.2.c has been edited to delete the words "if needed" which confirms the use of a power screen at the site.

*COMMENT 5. Based on experience with other low temperature thermal desorber units, the Department strongly recommends an enclosure around the discharge conveyor. Fugitive dust from treated soil has been a problem on other sites. The contractor should submit the specifications on these enclosures to the USACOE for approval. If fugitive dust is a problem, these enclosures must be implemented without delay (Section 1.4.2.g, page 1-4).*

**RESPONSE:** Section 1.4.2.g has been revised as follows: "Construct a temporary dust suppression housing around the exit port on the discharge moisturizing auger (specifications for the dust suppression structure appear in Appendix B). A temporary enclosure may also be placed around the control panels located at the ends of the trailers of considered necessary;" See Attachment A, herewith, for a copy of Appendix B which has been added to the Plan Appendices. Appendix B has also been added to the List of Appendices. The specifications in Attachment A for the dust containment structure are, hereby, submitted to the USACOE for approval.

*COMMENT 6. Methods 4, 5, 25A and 26A are stack testing methods with off-site analysis. These are not continuous emission monitors (Table 1.1, page 1-6).*

**RESPONSE:** Table 1.1 in the Operations Plan inadvertently listed the following methods as continuous emissions monitoring (CEM), instead of manual methods:

- Method 4 -- Moisture;
- Methods 1,2 -- Velocity/volumetric flow;
- Method 26A -- HCl; and
- Method 5 -- Particulates.

However, Method 25A ("Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer") for total hydrocarbons (THC) is a continuous method. The method for measuring the target compound, PCE, is SW-846 Method 0030 (as specified in Table 5.3 of the Performance Test Plan) which is a manual method. Table 1.1 has been revised to reflect these changes.

*COMMENT 7. The parameters recorded during the performance test become the operational limits for the treatment phase. These limits include but are not limited to: maximum processing rate, minimum soil exit temperature, minimum catalyst bed temperature and maximum pressure drop in the baghouse. (Section 1.4.4.4, page 1-7)*

**RESPONSE:** The last sentence in Section 1.4.4.4 has been deleted and replaced with the following statement: "The parameters recorded during the Performance Test will become the operational limits for the treatment phase of the project. These limits include at a minimum the following: 1) maximum processing rate, 2) minimum soil exit temperature, 3) minimum catalyst bed temperature, and 4) maximum pressure drop across the baghouse. Additional limits, based on results of the performance testing, may be prescribed by the NYSDEC."

*COMMENT 8. Has the contractor installed the test holes? If a vibrating screen is necessary, the contractor should submit the as-built for this screen to the USACOE (Section 2.2, page 2-1)*

**RESPONSE:** No test holes will be dug and reference to such test holes has been removed from the plan. A power screen will be used on this site. Specification drawings of

the power screen have been included as Appendix C of the LTEV Operations Plan and are hereby submitted to the USACOE.

*COMMENT 9. A contingency plan is necessary to detail emergency shutdown procedures and to designate the parameters that will trigger cut off of the automatic waste feed (Section 2.6.1, and 2.6.2).*

**RESPONSE:** A new Section 2.6.3, Emergency Shutdown Procedures, has been added to the plan to describe the conditions under which a waste feed cutoff would occur and to identify specific interlocks and set limits that will cause system shutdowns when those limits are violated. Section 2.6.3 contains two new tables, Table 2-1 and Table 2-2 which describe the interlocks on the thermal desorber and the ChloroCat trailers, respectively.

### **Performance Testing Plan**

*COMMENT 1. Section 3.1 the list of applicable state regulations is incomplete. Several of the applicable air regulations have been left out. This process is subject to Parts 201, 202, 211, 212, and 225. Part 201 requires among other things maintenance of air pollution control equipment. Part 202 discusses emissions testing. Part 211 limits air pollution. Part 212 applies to the permit application. The vendor needs to address compliance with these rules and limits. Section 1060 of the Specifications indicates most of these regulations are applicable to the LTEVS.*

**RESPONSE:** The New York State regulations which are potentially applicable to the LTEVS have been added to Section 3.1 and include:

- Part 201:
  - A valid permit to construct is required prior to commencement of construction;
  - Owner must operate source in accordance with all conditions of the permit to construct or certificate to operate;
  - Operate and maintain air pollution control equipment in compliance with applicable regulations;

- Compile and maintain records and provide report upon request of all equipment maintenance or start-up activities when expected to result in violation of applicable emissions standard.
  - Report malfunction resulting in violation of applicable emissions standard within 72 hours of occurrence.
- Part 202:
  - Notify commissioner in writing not less than 30 days prior to emissions testing. Allow free access for commissioner to observe tests.
  - Test report must be provided in triplicate within 60 days of completion of testing.
  - In ozone nonattainment area, submit emissions statement to Department (as specified in Part 202-2.3) if exceed facility reporting thresholds (Table 1, Part 202-2.1).
- Part 211:
  - Opacity restrictions.
- Part 212:
  - Limitation of particulate emissions of 0.050 grains/dscf.
- Part 225:
  - Limitations of fuel sulfur content for oil or coal (not applicable).
  - Continuous monitoring of SO<sub>x</sub> required, except for installation where gaseous fuel is the only fuel burned (as is the case for the LTEVS installation; therefore, not applicable).

*COMMENT 2. Compliance with Subpart X of RCRA needs to be addressed.*

*RESPONSE:* The LTEVS is in essential compliance with RCRA, Subpart X requirements.

*COMMENT 3. As has been discussed with the vendor before, Destruction and Removal Efficiency (DRE) must be calculated. If 99.99% DRE cannot be demonstrated because of detection limit problems, the resulting DRE will be acceptable. We agree that spiking will not be required to demonstrate DRE.*

**RESPONSE:** Refer to the Response to Comment 9 below.

**COMMENT 4.** *Previous federal lead LTTD remediation (Fulton Terminals) required stack testing for Products of Incomplete Combustion (PICs) and Principal Organic Hazardous Constituents (POHCs). The catalytic unit operates at a lower temperature than a thermal oxidizer giving the greater potential for creation of these compounds. Why has EPA not required testing for PICs and POHCs in this case? Has previous testing for these compounds been performed on a different site with similar contamination. At a minimum there must be a discussion of why PICs will not be generated in this process. This information may already exist in other documents but should be referenced because of the disparity with other sites and the controversy over thermal treatment.*

**RESPONSE:** The Products of Incomplete Combustion (PICs) and the Principal Organic Hazardous Constituents (POHCs) that could be generated during treatment at the Claremont site, would be those involving the primary contaminants or constituents found in the soils at the site. The process of Low Temperature Thermal Desorption (LTTD) by nature is not predisposed to form PICs due to the lower temperatures generated by the system and the fact that the compounds do not undergo thermal cracking in a flame zone resulting in the formation of thermal free radicals and possible PIC formation.

Typically, the most toxic compounds of concern during incineration are dioxins (TCDD) and furans (TCDF). It can be assumed that if the formation of these compounds is appropriately inhibited or if they are destroyed then the rest of the PICs and POHCs will also be adequately inhibited or treated. The formation of TCDD and TCDF are currently believed to occur when chlorinated hydrocarbons are reformed in the presence of aromatics (or reformed aromatics) after leaving a high temperature zone and then subsequently cooled slowly over a relatively moderate period of time (e.g., as in boiler applications) in the presence of certain metals (referred to as denovo synthesis).

The production of dioxins and furans is inhibited in thermal desorption (ie. LTTD) for two primary reasons. First, chlorinated compounds are not generally "cracked" to their elements or free radical states as they are in the case of thermal incineration. In LTTD the compounds are volatilized "in tact" (i.e. no thermal combustion of the target compounds is taking place in the desorption chamber) and are then catalytically oxidized, thus inhibiting the potential to form PICs. Secondly, catalyst systems similar to the system proposed for the Claremont job have been utilized in Europe specifically for the removal of PICs, PCDD and PCDF (e.g. the Bayer AG plant in Dormagen, Germany). Therefore, even if PCDD or PCDF were formed (which is unlikely) during the desorption process they would be removed in the

catalyst to levels below the stringent European standard of  $< 0.1 \text{ ng/m}^3$  T.E. (STP) as demonstrated in European applications. Attachment B contains a copy of an excerpt from a book published by MECA (Manufacturers of Emissions Controls Association) entitled Catalytic Control of VOC Emissions describing a study of catalytic control of PICs.

**COMMENT 5.**

**RESPONSE:** There was no Comment 5.

**COMMENT 6.** *Continuous CO/CO<sub>2</sub> monitoring is required during operation (Section 5.3.2, page 5-11).*

**RESPONSE:** Continuous CO and CO<sub>2</sub> monitoring will be conducted during operation of the LTEVS as stated in Section 5.1. The first sentence under LTEV Operations in Section 5.3.3 has been revised to read as follows: "During normal operation of the LTEVS, after completion of the Performance Test, continuous monitoring of CO, CO<sub>2</sub> and O<sub>2</sub> will be performed."

**COMMENT 7.** *Table 5.3 of the sampling plan is inconsistent with Table 1.1 of the operations plan and is incomplete. Significant omissions include testing for particulates and VOC..*

**RESPONSE:** Testing of particulates (EPA Method 5) and VOC. (EPA Method 18) will be included in the performance testing, with one sample per test run. Table 5.3 of the Performance Testing Plan and Table 1.1 of the LTEV Operations Plan have been revised to be consistent and to include testing for particulates and VOC..

**COMMENT 8.** *The Contractor discusses shortening sampling time to avoid saturation of the trap during the SW 846 Method 0030 test. While this may be necessary, it will have an adverse impact on detection limit which becomes an issue in attempting to demonstrate a high DRE. The choice of sampling duration must take this into consideration (Section 5.3.1, page 5-9).*

**RESPONSE:** The following paragraphs have been added to the SW846 Method 0030 item under Section 5.3.2: "The typical sampling duration for SW846 Method 0030 is 20 minutes as discussed in the method. Because of the low levels of PCE expected downstream

of the catalyst, the sampling duration has been lengthened to 40 minutes to provide an expected level that is 5 times the detection limit of the method for PCE. A level that is 5 times the DL of the method should be more than adequate to avoid a result that is below the detection limit.

“However, for the high expected level of PCE upstream of the catalyst, the typical 20 minute sampling duration would likely result in saturation of the absorbent, producing results that are biased low. Therefore, to avoid saturation, it is recommended that the sampling time be limited to 10 minutes which is well above the DL of the method but below the upper limit of the method.”

*COMMENT 9. The paragraph relative to DRE is very confusing but probably accurate. DRE will be calculated but spiking will not be required. If 99.99% cannot be demonstrated because stack concentrations are below detection, failure to demonstrate 99.99% will not be considered noncompliant. Since the documents reviewed here, do not discuss what DRE is defined as, it should be explicitly stated that it is a comparison between contamination in the soil versus stack emissions (Section 5.3.2, page 5-12).*

*RESPONSE:* The last paragraph in Section 5.3.2 has been modified as follows: “Destruction Removal Efficiency (DRE) will be demonstrated in the Performance Test to be 99.99 percent, as a comparison between PCE contamination in the soil versus stack emissions. The level of PCE in the contaminated soil could potentially be well below the expected levels used to calculate the sampling time needed for SW846 Method 0030 to provide results above the detection limit of the method. If the PCE level in the soil is very low (at least 5 times lower than expected) and DRE cannot be measured, then it will be calculated. Soils will not be spiked with PCE from off site sources to demonstrate DRE.”

*COMMENT 10. What are the data quality objectives for this demonstration testing?*

*RESPONSE:* The data quality objectives for the air emissions measurements that will be performed during the Performance Test are summarized in the following table which has been included in Section 5.6 as Table 5.9: The data quality objectives will be achieved by implementing the QA/QC procedures as outlined in Section 5.6 of the Performance Testing Plan.



### Data Quality Objectives for the LTEVS Performance Testing

| Measurement   | Accuracy,<br>% | Precision,<br>% | Completeness,<br>% |
|---|----------------|-----------------|--------------------|
| Particulate Matter  | +/- 30         | +/- 20          | 100                |
| Volatile Organic Compounds                                  | 70 - 130       | RSD < 50        | 100                |
| PCE   |                |                 |                    |
| NO <sub>x</sub> , THC, CO, CO <sub>2</sub> , O <sub>2</sub> | +/- 5          | +/- 2           | 100                |
| HCl   |                |                 |                    |

*COMMENT 11. The emission testing report must contain a full description of the QA/QC procedures that were followed during the test and whether the data quality objectives were met. Further, a full discussion of any deviation from the proposed testing plan must be included in the report.*

**RESPONSE:** The following paragraph has been added to Section 6.3, Monitoring Program Reports: "The performance test report will include a comprehensive description of the QA/QC procedures that were followed during the Performance Tests. The QA/QC section of the report will include a discussion of whether the data quality objectives were met. A discussion of any deviation from the test plan, either pertaining to test conditions, test methods, or QA/QC procedures, will be documented."

### **Air Permit**

*COMMENT 1. Particulate emissions were omitted from the permit application. The source is subject to Part 212 Regulations. The corresponding emission limit is 0.05 grains/dry standard cubic foot. Testing to verify compliance with this limit is required.*

*RESPONSE:* Testing for particulate emissions using EPA Method 5 will be included in the Performance Tests to verify compliance with the 0.050 grains/dscf emission limit specified in Part 212 of the regulations. Also, see Response to Comment 7 above.

**ATTACHMENT A**

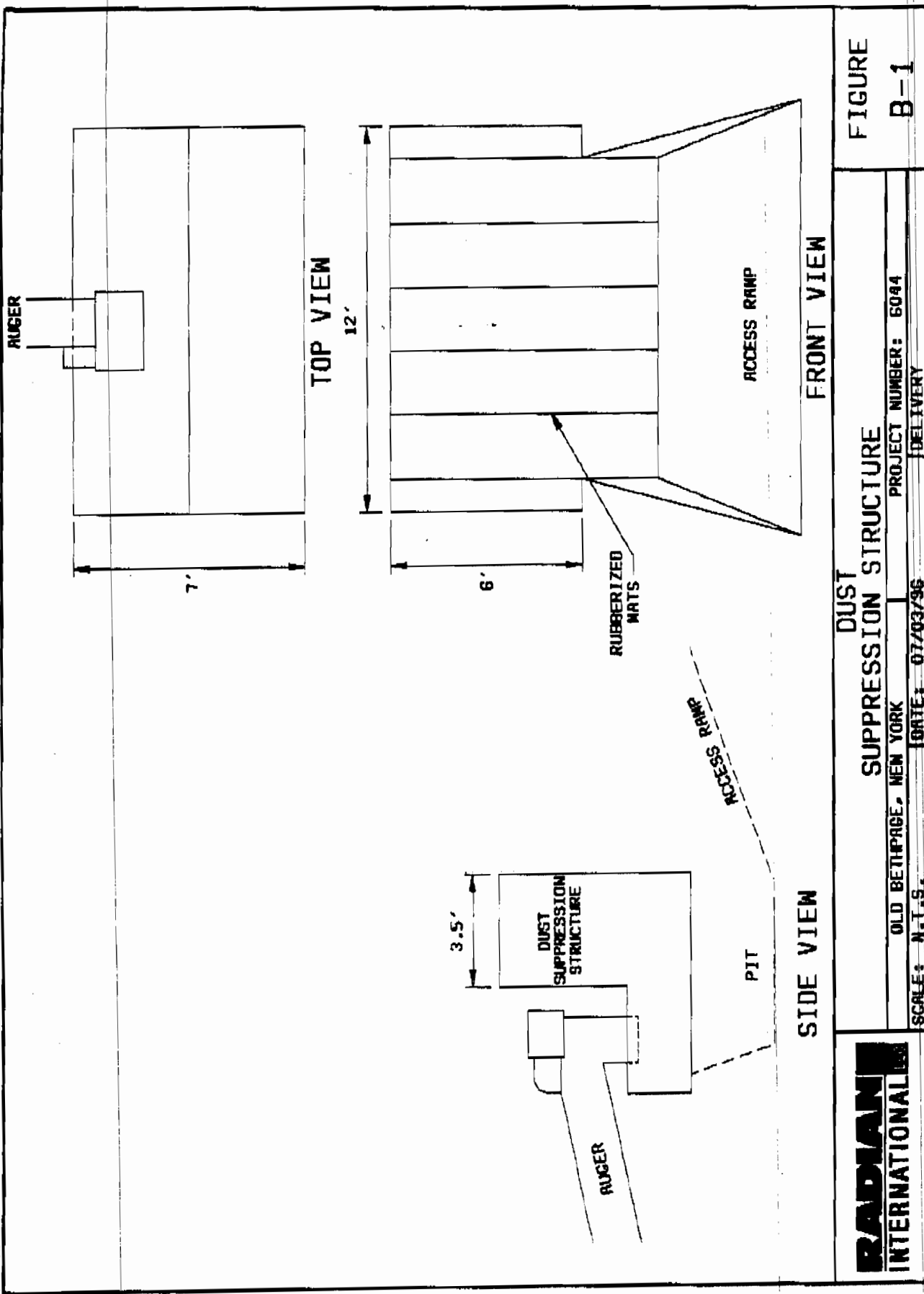
**SPECIFICATIONS FOR LTEVS DUST CONTAINMENT STRUCTURE**

A temporary dust containment/suppression structure will be constructed around the exit port of the discharge moisturizing auger and over a pit with a sloping access ramp. The pit will slope from one end to allow a loader to enter and will have a near vertical back wall to push against when picking up stockpiled soils. At its deepest point the pit will be about 2.5 to 4.0 ft deep, depending on the nature of the terrain and loader access requirements. The dimensions of this structure will be approximately 12 ft wide by 7 ft deep by 6 ft high. The structure will be constructed of 3/8" plywood with 4"x4" support legs and beams and with 2"x4" nailers. A drawing of the structure appears below in Figure A-1 of this Appendix. Fiberglass insulation will be used to insulate and seal the opening where the auger enters the dust suppression structure. Rubberized sheeting or matting (or equivalent) will be hung in strips across the front of the structure to retain dust and still allow a loader bucket to pick up remoisturized soils stockpiled within the structure.

A minimum of 12 high pressure water spray nozzles will be located inside of the dust suppression structure along the top and oriented to produce a fog barrier to inhibit dust from exiting the structure. These nozzles are part of a fog system designed to suppress ultra-fine dust which may be found in the treated soils. The system consists of a high pressure pump module, an atomization line, a manifold line, atomizing nozzles and plugs and auto drain valves.

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**ATTACHMENT B**

**CATALYTIC CONTROL OF THE PRODUCTS OF  
INCOMPLETE COMBUSTION (PICs)**

**EXCERPT FROM**

**CATALYTIC CONTROL OF VOC EMISSIONS**

# CATALYTIC CONTROL OF VOC EMISSIONS

*A Cost-Effective,  
Viable Technology  
for  
Industrial, Commercial  
and  
Waste Processing Facilities*

A Guidebook  
Provided as a Service to Government, Industry and the Public by  
MECA  
Manufacturers of Emission Controls Association

## CATALYTIC CONTROL OF VOC EMISSIONS

68

### *Air Toxic Case Studies*

#### **STUDY 1:**

#### **Cost-Effective Destruction of Trichloroethylene Emission from Soil Venting**

Catalytic oxidation has been used with high effectiveness for the destruction of Trichloroethylene (TCE) at a former military site located in the South Coast Air Quality Management District in Southern California. In this application, the initial TCE concentration from a soil venting unit was 4,000 parts per million by volume.

The catalytic oxidizer, with a 200 SCFM flow rate over a halocarbon destruction catalyst, had a TCE destruction efficiency of greater than 99%. In its first 150 days of operation, 20,000 pounds of TCE was catalytically oxidized. By the end of the first year, 40,000 pounds of TCE had been destroyed.

In this soil venting application, catalytic control proved far less expensive than a possible alternative, carbon adsorption. Estimates indicated that for this alternative, seven pounds of carbon would be required for each pound of TCE adsorbed. At an estimated \$2.00 per pound, the carbon material required to adsorb 20,000 pounds of TCE would have cost \$280,000. Additional costs would have been required for disposal of the contaminated carbon.

The operating cost for the catalytic destruction of TCE consisted of fuel and neutralizer for the HCL



### Air Toxics

(hydrochloric acid) absorbed. Assuming \$5.00 per million BTU, fuel cost for this application was approximately \$2,635 - about one percent of the estimated \$280,000 cost of carbon for the carbon adsorption alternative.

69

Thermal incineration for this application would have generated equally dramatic cost differences. Similar technology, for example, would be required for a source having an exhaust flow rate of 40,000 SCFM, containing 1000 parts per million by volume of benzene. With 70% heat exchange, the cost for fuel to operate a thermal incinerator for such a source would be \$444,000 to provide the necessary 1,460° F for 99% combustion. By comparison, fuel cost to achieve 99% destruction using catalytic oxidation in the same application would be approximately \$48,000 per year. Catalyst replacement cost would also be a factor, but for a clean system, the catalyst would last well in excess of three years. Even with periodic catalyst replacement, the total operating cost for catalytic oxidation would be roughly one-fourth the operating cost for thermal incineration.

### **STUDY 2:**

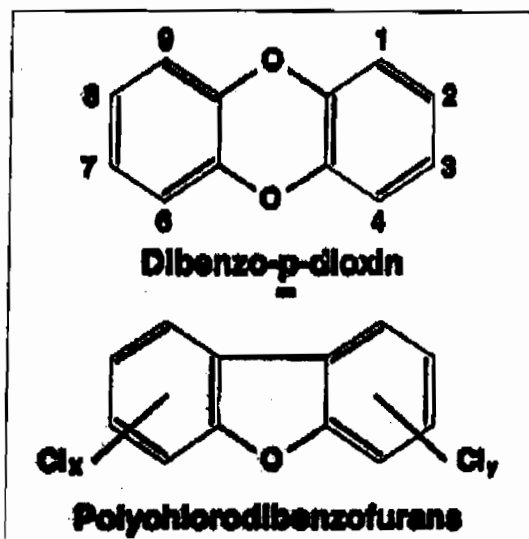
#### **Catalytic Control of the Products of Incomplete Combustion (PICs)**

Polychlorinated dioxins and furans are extremely toxic compounds that are formed in thermal incineration processes where chlorinated compounds are present. In

## CATALYTIC CONTROL OF VOC EMISSIONS

70

FIGURE 12  
POLYCHLORINATED DIOXINS/FURANS



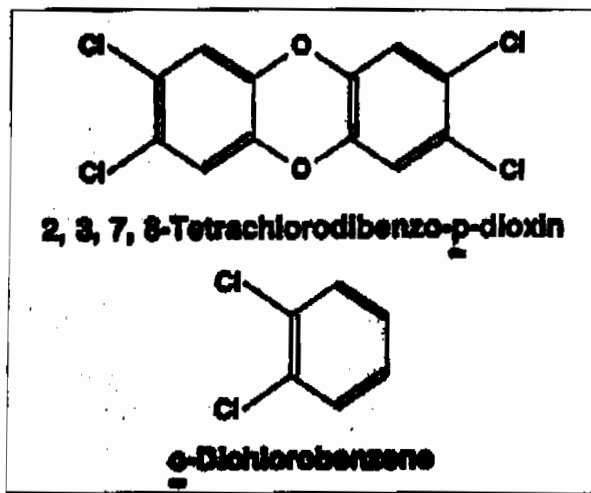
municipal solid waste incinerators and medical waste incinerators, dioxins and furans are normally formed and emitted with the exhaust.

Dioxins and furans are part of a larger group of toxics commonly referred to as products of incomplete combustion, or PICs. Because catalytic oxidation occurs at much lower temperatures than thermal incineration, PICs are not created when chlorinated exhaust streams are catalytically oxidized. In fact, catalysts are used to destroy PICs.

Northern European nations, including Germany and more recently Sweden, Austria and Switzerland,

**Air Toxics**

**FIGURE 13**  
**DIOXIN SURROGATE**



have adopted the world's toughest emission standard for dioxin and furan emissions from incineration processes: 0.1 nanogram toxic equivalents per cubic meter. In order to meet this standard, European municipal and medical waste incinerators may need to install catalytic oxidizers to remove the PIC emissions.

Given the very toxic nature of these compounds, safer substitutes are used for laboratory testing. The chemical structures of polychlorinated dioxins and furans are shown in Figure 12; in essence they are a pair of chlorinated benzene molecules connected by oxygen atoms. In the laboratory, the safer compound commonly used to simulate dioxins and furans is ortho-dichlorobenzene; its structure, shown in Figure 13,

### CATALYTIC CONTROL OF VOC EMISSIONS

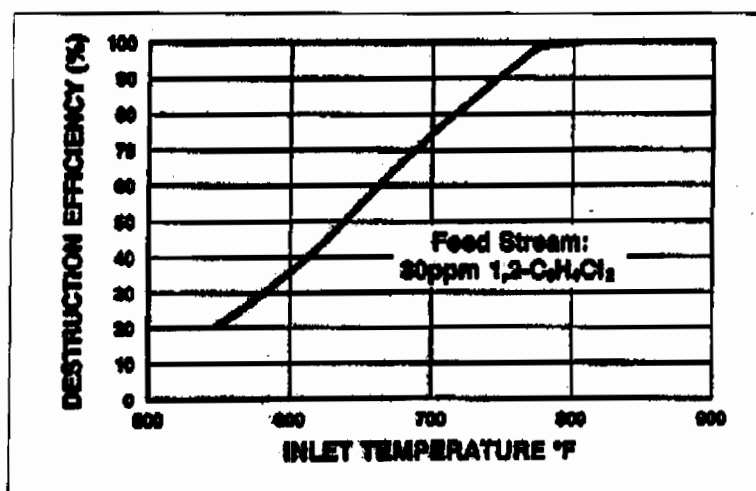
72

shows how ortho-dichlorobenzene is used to represent the right-hand and left-hand portions of the dioxin molecule. The oxygen bonds are the easiest part of the compound to oxidize; if a catalyst can destroy ortho-dichlorobenzene, we may assume it will be able to destroy dioxin.

Figure 14 shows that at 750° F, more than 99% of 1, 2 dichlorobenzene can be destroyed catalytically. An independent test laboratory, chosen to analyze the exhaust from a catalytic oxidation site for PICs, reported the results shown in Table 11. For an inlet concentration of organic chloride in excess of 12,000 parts per million, actual dioxin and furan concentrations after

FIGURE 14

#### DESTRUCTION OF DICHLOROBENZENE



### Air Toxics

TABLE 11  
TEST RESULTS - PIC DESTRUCTION  
(High Resolution Analysis)

| PIC               | Emissions<br>ng T.E./M <sup>3</sup> |
|-------------------|-------------------------------------|
| Furans            | 0.0000038                           |
| Dioxins           | 0.00104                             |
| Total Measured    | 0.00104                             |
| European Standard | 0.1                                 |

73

catalytic removal were measured at one one-thousandth nanogram toxic equivalents per cubic meter, or about one-hundredth of the European standard.

Catalytic oxidation technology continues to evolve. We anticipate further improvements in the performance of existing catalysts and discoveries of new materials that will display significant catalytic performance. By comparison with alternative technologies, catalytic oxidation offers significant cost and operational advantages; we expect these, too, to increase as catalytic oxidation technology evolves in the coming years.