

Technical Memorandum

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MRPO/LADCO

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Subject: Best Available Retrofit Technology Engineering Analysis for Non-EGU Sources – Summary and Recommendations for Next Steps

This technical memorandum summarizes the work performed to date by MACTEC Engineering and Consulting, Inc. (MACTEC) with regards to developing a Best Available Retrofit Technology (BART) Engineering Analysis for Non-EGU sources for the Midwest Regional Planning Organization (MRPO)/Lake Michigan Air Director's Consortium (LADCO). It should be noted that this work was based on US EPA's proposed Regional Haze Regulations and Guidelines for BART Determinations (69 FR 25184, May 5, 2004) and, as such, should be considered to be preliminary. After USEPA finalizes its BART guideline in April 2005, the MRPO/LADCO member States can proceed with its BART analyses (i.e., finalize list of BART-eligible sources, finalize list of BART-eligible sources which are subject to BART, conduct source-specific engineering analyses, and establish BART emission limitations.)

MACTEC had four tasks under the current contract. First, recommend source categories for evaluation. Second, develop an approach to performing the BART engineering analysis. Third, perform the BART engineering analysis using the approach developed. Finally, prepare a technical report detailing the results of the analysis. Each of these tasks and the work performed is discussed briefly below.

Recommend Source Categories

MACTEC collected information from MRPO/LADCO member States on facilities thought to be BART-eligible. The information provided detailed segment-level emissions along with other information related to start dates, and other information necessary to determine whether the facilities met the criteria for being a potential BART source (i.e., emission levels, type of facility, and operational dates). The data submitted also contained the latitude and longitude information for each unit.

MACTEC consolidated the data from each State into a single database that consolidated all the information sent into a single consistent format. Using that database, MACTEC developed some quality assurance information for the locations of the emission units, using a GIS system. Updated and revised latitude/longitude information was added to the database.

The location information was then used to determine the distance of each unit from several Class I areas. Distances from Seney, Mammoth Cave, Mingo, Dolly Sods, Boundary Waters, and Isle Royale Class I areas were determined for every emission unit. Using the distance data, MACTEC then calculated the Q/d (emissions over distance) value using annual emissions of SO₂, NO_x, and the combined emissions for the two pollutants. EPA had proposed in their May 5, 2004, amendments to the BART provisions of the regional haze rule that Q/d could possibly be used as a screening tool for determining which BART eligible sources are subject to BART (i.e., a source may be exempt from BART if its Q/d value is less than 20 TPY/km). In our screening approach a conservative value of 10 was selected, due in part to the use of actual emissions rather than potential emissions (which were generally unavailable for the sources). Based on the Q/d values calculated, MACTEC identified approximately 25 facilities that had BART eligible emission units. LADCO staff also evaluated these units using CALPUFF modeling and a CAMx source apportionment method. A report on the results of those evaluations was prepared by LADCO in December of 2004 and was entitled “Determining Which BART-Eligible Sources are Subject to BART: Summary”.

The table below summarizes the categories and number of sources by State that were selected for the BART engineering analysis.

BART Category	Number of Facilities					Total
	IL	IN	MI	OH	WI	
22 – Fossil Fuel-Fired Boilers		1	2	4	3	10
11 – Petroleum Refineries	4			1		5
4 – Portland Cement Plants		2	1	1		4
6 – Iron and Steel Mills	1	1				2
21 – Chemical Process Plants	1	1				2
17 – Primary Lead Smelters	1					1
7 – Primary Aluminum Plants		1				1
Total All Categories						25

These 25 facilities comprise about 88 percent of the non-EGU BART-eligible SO₂ inventory (222,722 TPY out of 252,576 TPY) and 67 percent of the non-EGU BART-eligible NO_x inventory (65,357 TPY out of 97,321 TPY).

MACTEC and MRPO agreed that categories 22, 11, 4, 6 and 21 would be evaluated and if sufficient time and resources remained, categories 17 and 7 would be evaluated.

Develop Approach for Performing the BART Engineering Analysis

Once the list of sources was established, MACTEC began preparing the data and the approach to performing the BART engineering analysis. As a first step, MACTEC determined potential controls, their costs and the range of control efficiencies for SO₂, NO_x, and PM emission sources. A spreadsheet with the information on capital cost ranges, annual cost ranges, and control efficiencies for the top three sources (based on control efficiency value) was prepared and provided to MRPO State representatives for review and comment. A revised spreadsheet was submitted in January. MACTEC selected only the top three controls since the revised BART guidelines indicated that not every control technology needed to be evaluated. MACTEC used EPA sources, vendor literature and website information, information from the internet, information from non-U.S. sources, and conversations with vendors to compile the list (and refine the data in the next step).

Once the spreadsheet was prepared, MACTEC then began assessing the data available for each emission unit/facility to determine what data were available to assist in performing the BART engineering analysis. It quickly became apparent that there was insufficient data available with which to perform a source specific BART analysis. In addition, since the BART guidelines were not scheduled to be finalized until April 2005, any evaluations would have to be considered preliminary until final guidelines were established. Thus MACTEC decided to use a “model” facility/emission unit approach to performing the BART engineering analysis. In addition, MACTEC determined that for fossil fuel fired emission units, the approach would evaluate the best control for the fuel that produced the highest emission levels. This approach is consistent with controls that are specific for an emission unit (as opposed to an emission segment).

The approach developed only looked at add-on controls. Trading programs were not looked at. In addition, few process changes were evaluated. Fuel switching was discussed briefly for a couple of categories but was not explored in depth. Other process changes (e.g., pollution prevention) were not looked at in this work.

Perform the BART engineering analysis using the approach developed

With the data for the various controls and control costs assembled, MACTEC began implementing the engineering analysis using the model emission unit/facility approach. Four analyses were prepared: boilers (category 22), cement, iron and steel and petroleum refineries. Chemical facilities (category 21) units were combined with the boilers analysis

since all emission units identified as being BART eligible at chemical facilities were boilers. Each report summarized the operations of a model facility, looked at potential controls identified for those sources and the expected control level, evaluated the range of costs and the cost effectiveness. A series of spreadsheets were developed for use in calculating the costs for each type of facility/emission unit evaluated. The spreadsheets were created to be flexible enough that source specific data could be added to them at a later time to produce cost estimates that were more specific to the particular facility/emission unit.

Finally a recommended BART control was developed for each emission unit. MACTEC solicited data from the States on existing controls so that existing controls could be accounted for to the extent possible. Data was received from all States except for Illinois. That information was used to assist in determining the BART control.

Prepare a technical report detailing the results of the analysis

The approach to boilers was developed first (since that category had the largest number of facilities/units). A draft version of the report was prepared and submitted for review to the MRPO State contacts. Review comments were received from Indiana and Wisconsin. MACTEC addressed these comments in a separate memo and incorporated some of the information from those comments into the document.

Separate stand-alone documents for each of the four categories evaluated (boilers/chemical facilities, cement, iron and steel, and petroleum) were developed and final drafts were submitted to MRPO.

Next Steps/Future Directions

As indicated above, this BART engineering analysis is considered to be preliminary. There are several important steps that remain that must be addressed before a final source specific BART analysis can be performed. In addition, there are other items that should be addressed to assist in the determination of BART controls for affected facilities. Finally there are some approaches to these steps that could be taken should MRPO desire to do so. The “next steps/future directions” that MACTEC recommends are provided below.

1. After USEPA finalizes its BART guideline in April 2005, the MRPO/LADCO member States should review and finalize the list of BART-eligible sources, and then apply the appropriate air quality analyses to determine which BART-eligible sources are subject to BART.
2. Refinement/collection of better operating data from the facilities in the list of sources needing evaluation. This will enable a significant improvement in the estimates of control costs and a better evaluation of the technical feasibility of controls. An additional element to this would be to determine if the emissions from some of the emission units are correct. For example during this preliminary study, MACTEC found that over 2000 tons of NO_x was being attributed to hydrochloric acid tanks at an iron and steel facility. After consultation with the State, it was determined that this

source was not a NO_x emitter. Similarly, emission units at petroleum refineries were found to have significant emissions that appeared to contradict Title V operating permit limits. Obtaining better data on the operational characteristics and emissions will require substantial involvement of the MRPO States.

3. Involvement of the facilities in the BART engineering process. Other RPOs (e.g., VISTAS) have made preliminary determinations of BART and then provided those proposed controls to each facility, asking them to provide evidence as to why a particular control could not be utilized to control a particular pollutant. This substantially improves stakeholder involvement in the BART process, but requires a thorough review to ensure that the evidence is solid. If MRPO decides to go this route MACTEC suggests that not only do the facilities evaluate the suggested controls, but if they find that those controls cannot be employed, they suggest alternatives for each pollutant.
4. Additional effort to identify pollution prevention alternatives to the BART add-on controls suggested in this study. Part of this effort could be coupled with item 2 (if implemented) by asking for the facilities to evaluate pollution prevention alternatives to add-on controls. In addition to pollution prevention, a more thorough evaluation of fuel switching for fuel fired emission units should be performed.
5. Refinement of cost estimates to be reflective of various “flavors” or specific implementation of a broad type of control. For example, specific use of limestone forced oxidation (LSFO) as a specific type of wet FGD and more specific costs for these more specific types of controls. Development of these types of cost would enable MACTEC to tie the costs more to a specific value rather than a range of costs and control efficiencies. To implement this however will necessitate improved data on operations at each emission unit (see item 1) and will also like require the cooperation of vendors in trying to produce more specific costs. Vendor cooperation will be critical to the success of this step.
6. Evaluate the use of emission trading as an option for BART. The preliminary BART guidelines allow for the use of emission trading to satisfy BART requirements. However there are a number of issues related to a trading program that meets the BART requirements. CENRAP has recently released a document detailing some of the issues related to a regional haze trading program that would include BART. The report “Market-based Emissions Trading and Regional Haze: Overview of Issues”, dated January 28, 2005 would serve as a starting point for the evaluation. The items listed in the “Conclusions and Next Steps” portion of that document would be used as the basis for developing the evaluation. MACTEC recommends waiting on this evaluation until the final BART guidelines are proposed.
7. Further evaluation of VOC sources. Many of the BART-eligible emission units identified had small VOC emissions. Many of these sources are likely not to be cost effective to control and/or the controls that would be implemented are controls that would increase the emissions of other regional haze pollutants (e.g., flares for NO_x). The applicability of controls to these types of sources needs additional specific investigation. In particular for VOC sources, existing controls need to be better identified for the BART-eligible emission units.