

**JOINT REVIEW BY**  
**ALLEN COUNTY CITIZENS FOR THE ENVIRONMENT, INC.**  
**&**  
**BP AMOCO CHEMICAL COMPANY**  
**CONCERNING**  
**THE LIMA [OH] BUTANEDIOL MANUFACTURING PLANT**  
**PLUS ADDITIONAL, SEPARATELY STATED DIVERGING VIEWS**

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## Executive Summary

In 1998, BP Amoco Chemical Company, Inc. (hereafter as “BP”) sought an air permit to install (PTI) from the Ohio Environmental Protection Agency (OEPA) for their new Butanediol (BDO) facility chemical manufacturing process equipment in Lima, OH. The Allen County Citizens for the Environment, Inc. (hereafter as “ACCE”), a local citizen environmental group founded in 1988, appealed issuance of the subsequent permit contending that emissions of volatile organic compounds (VOCs) could be reduced below permitted levels. The appeal action was resolved with a settlement agreement between ACCE and BP.

The settlement agreement provided for process, operation and equipment changes and provided that each party would hire an independent technical consultant to ensure implementation of the elements of the agreement and to evaluate compliance by BP with the air pollution requirements after startup and shakedown.

This Joint Statement and Report is the result of the audit conducted by consultants for ACCE and BP.

### **Audit Activities to Verify Compliance**

On August 30, 2001 and July 15, 2003, environmental consultants for both ACCE and BP conducted an audit of certain plant records, operations, and a brief inspection of the physical plant facility.

Three principle concerns of ACCE including the potential for high emissions during malfunctions, the operation of an automatic waste feed cutoff system, and the management of liquid wastes were addressed and compliance was verified.

One issue identified during the July 15, 2003, audit was a practice, found only at the BDO unit, of excluding hazardous air pollutants that are VOCs from the reported total VOC emissions for malfunctions and excess emission events. As soon as this issue was identified, BP submitted revised reports of excess emissions from malfunctions and bypasses and corrected its annual emission inventory reports.

Several other documents and practices were reviewed by the consultants both during the on-site audits and from documentation provided by BP. Some of the key issues are as follows:

- ▶ *Nitrogen oxide (NOx) emissions and continuous emission monitoring system (CEMS)* – Overall, BP’s quarterly reports show completely problem free, exemplary operation for NOx emissions and NOx continuous monitoring from the

first quarter of year 2002 to the present.

- ▶ *Environmental Compliance of the BDO Flare* – A review of quarterly reporting of the flare shows exemplary operation and performance of the flare as an emission control device since the commencement of BDO operation.
- ▶ *Excess Emissions during Malfunctions* – A review of the excess emissions during malfunctions of the scrubber offgas boiler (SOGB) at the BDO plant showed that on an annual basis these incidents are infrequent.

The records from venting uncontrolled butane oxidation reactor scrubber offgases did not incorporate all venting/bypass emissions, as required. BP submitted revisions to correct errors in reporting both the HAP emissions and the annual emission inventory reports for years 2000 and 2001.

The most important conclusion is that these relatively infrequent venting incidents at the BDO unit, in the aggregate, released only a small fraction of annual permissible emissions for both VOCs and carbon monoxide. None of the venting incident durations were close to the established maximum 24-hour venting limitation contained.

- ▶ *Particulate Matter Emissions from the SOGB* – BP's initial PTI application used an erroneous particulate emission factor for the SOGB. As a result, the facility was permitted as a minor source and a particulate emission limit was incorporated into the permit. Subsequent stack testing and interim measures to address the excessive particulate matter emissions showed that BP could not meet the permitted limitations.

BP submitted an application to OEPA to revise particulate emission limitations for the facility to be a major stationary source for particulate matter. Issuance of the proposed permit revision would increase the allowable hourly emission limit by a factor of over 10 and the annual permissible emissions by a factor of over 11. However, BP and ACCE find that the new particulate emission limitations appropriately reflect technology-based control requirements and will not cause significant deterioration of air quality.

- ▶ *Summary Review of Stack Testing Studies at the BDO Plant* – In general, BP conducted three different types of stack testing studies. These included testing of the BDO plant flare stack, the SOGB exhaust for one or more pollutants, and testing of the SOGB exhaust for NO<sub>x</sub>. Tests of the flare stack showed compliance with both the minimum flare gas heating value and the maximum flare stack tip velocity.

Testing the SOGB exhaust shows that carbon monoxide, NO<sub>x</sub>, VOC, destruction

efficiency, and visible emission limitations were all below permitted levels. As previously discussed, particulate emissions continue to exceed the initial permitted levels, but this matter will be resolved by the proposed permit amendment.

- ▶ *Hazardous Organic NESHAPS (HON) Requirements* – Hazardous Organic NESHAPS (HON) requirements are Federal rules to control emissions of hazardous air pollutants (HAPs) from the Synthetic Organic Chemicals Manufacturing Industry (SOCMI) that affect parts of the BDO unit.
  - ▶ *Leak Detection and Repair* – The very low (less than 0.5%) leak rate or finding of no leaks on regulated fugitive emission components at the BDO plant demonstrates exemplary performance.
  - ▶ *Initial Notification of Compliance Report* – This report identified five HON process vents. The scrubber offgas vent is a HON Group 1 vent and four other process vents from distillation/purification sections of the BDO plant are HON Group 2 vents. All five vents are routed to the scrubber offgas boiler for emission control.

BP determined that it had only two regulated wastewater streams, which would be treated either by incineration in the scrubber offgas boiler or by disposal in a deepwell regulated by the Resource Conservation and Recovery Act. Both disposal options met requirements of the rule. Wastewater is handled in a hard piped system in compliance with the HON wastewater rule.

- ▶ *HON Subpart G Reports* – The auditors also reviewed BP's semiannual HON Subpart G Reports for the period December 1, 2000 to May 31, 2003. The reports list "excused excursions" as defined under the HON rule for purposes of determining compliance. The primary excursions resulted from scrubber offgas bypass events and failure to maintain average daily temperatures in the boiler combustion chamber.
- ▶ *Requirements on Particulate Emission Control from Cooling Towers* – A review of all reports filed by BP shows that the requirement for maximum total dissolved solids in the cooling water recycle has been met continuously since the commencement of operations of the BDO unit.

## **1 Introduction and Forward**

This Joint Statement and Report represents the final workproduct of a joint project between the Allen County Citizens for the Environment, Inc. (hereafter as “ACCE”) and BP Amoco Chemical Company (hereafter as “BP”). This document concerns the operations and air pollution compliance of BP’s new Butanediol (BDO) chemical manufacturing process equipment in Lima, OH.

In 1998, BP sought an air discharge permit to install from the Ohio Environmental Protection Agency (Ohio EPA) for the BDO facility. Ohio EPA held a public hearing and among several hearing commentors, most of whom favored issuance of the permit, was a single dissenting voice with comments from the Allen County Citizens for the Environment (ACCE).

ACCE is a local citizen environmental group founded in 1988 and headquartered in Lima, OH. The purpose of ACCE is to serve as a center for citizen volunteer activity to conduct educational and public information activities, research, advocacy, monitoring activities and organizing on the environmental problems of Allen County, Ohio, with a focus on air, water and land resources and public health protection.

One important element of ACCE’s criticism of the then-proposed Ohio EPA permit for the BDO project was that it would allow the proposed facility to emit an excessive amount of the pollutants known as volatile organic compounds from a piece of combustion equipment at the site. After hearing from ACCE and making its own analysis, the U.S. Environmental Protection Agency Region V office had a similar criticism. In response, Ohio EPA reduced the amount of allowable volatile organic compounds that the proposed combustion equipment could emit.

ACCE asserted that the reduction provided by Ohio EPA was not enough and the group appealed issuance of the permit. After meetings in late 1998 with the then-BP BDO project manager, John K. Wells, Ph.D., and his staff and BP counsel, the appeal action was resolved with a settlement agreement between ACCE and BP. The settlement agreement provided for certain physical and operational changes to be made by BP in the BDO project and a joint ACCE/BP project to ensure the elements of the agreement were carried out and to evaluate compliance by BP with its air pollution requirements.

The settlement agreement provided that each party would hire an independent technical consultant to verify that BP satisfied all elements of the settlement agreement and to evaluate environmental compliance of the facility after its startup and shakedown operations.

This Joint Statement and Report is the final result of this collaborative auditing effort between ACCE and BP, the first of its kind ever attempted by both parties in this Ohio community. This involvement by BP is also reflective of its corporate health, safety and environment policy which, in part, calls on all members of the BP-Lima team to...

“...consult, listen and respond openly to our customers, employees, neighbors, public interest groups and those who work with us....to raise the standards of our industry.....to openly report our performance, good and bad....and recognize those who contribute to improved HSE and quality performance.”<sup>1</sup>

## **2 Introduction to BP’s Butanediol Manufacturing Facility**

The general public in Lima, OH will recognize the BP Butanediol (BDO) manufacturing plant as the large complex of new-looking chemical production equipment immediately to the west-north-westerly direction viewing from the South Metcalf Avenue bridge over the rail lines in that area.

The BDO complex was constructed at a cost exceeding \$100 million with 800 skilled construction trades employed at the peak of construction activity. Operations of the BDO plant commenced in March, 2000. The facility presently employs between 50 to 75 persons as operators, management, environmental/health/safety and maintenance personnel.

BP’s vision for its very first BDO production plant was to commit to a design embracing economic, environmental and energy efficiencies in the production of BDO using the strengths of existing BP technologies and corporate expertise along with those of BP’s technology development partners.

BP’s goal was to demonstrate the world’s first ever implementation of GEMINOX<sup>TM</sup> technology which combined BP’s expertise and experience with fluidized bed catalytic oxidation reactors with fixed bed catalyst assisted hydrogenation technology from Lurgi Ol-Gas-Chemie GmbH of Germany.

Previous methods of producing Butanediol involved complex, expensive processes and use of difficult to handle or toxic raw materials, such as acetylene and formaldehyde.

For the first time, GEMINOX<sup>TM</sup> technology promised a very simple process for making Butanediol from a readily available material, n-butane, a byproduct of petroleum refining whose use in summer gasoline has diminished due to volatility considerations.

GEMINOX™ technology uses a very simple three step process. Butane is oxidized in a fluidized reactor in the presence of a retarding catalyst designed to direct the oxidation process to produce maleic anhydride. The gases produced in the oxidation reactor are passed through a scrubber in order to recover the maleic anhydride in the form of maleic acid solution. Gases that are not scrubbed out by the recovery scrubber are directed to a scrubber offgas boiler for both destruction and energy recovery to generate industrial process steam. The maleic acid solution is directed to a catalytic hydrogenation process to generate the Butanediol and then a purification section where the Butanediol is separated from water and hydrocarbon byproducts by distillation. The result is high quality and high purity Butanediol for sale to BP's customers.

Because the GEMINOX™ technology process is a simple process, the capital and operating costs of the process are lower than competing processes for making Butanediol. By limiting the number of conversions, transfers and separations required to make Butanediol in the GEMINOX™ process, the overall environmental and energy impacts to produce Butanediol can be reduced. As such, implementation of GEMINOX™ technology for Butanediol production is a key element to BP's worldwide corporate policy commitment to limit its greenhouse gas emissions to the level of 1990 inventories as the company grows its facilities and products into the twenty first century. The development of this simple and elegant approach to making Butanediol is made possible by the advanced, proprietary catalysts developed by BP and Lurgi.

Butanediol and products made from it are valuable commodities used in automotive plastics applications, in polymers for clothing, engineered plastics, personal care products, electronics and a wide variety of other applications. Because Butanediol has been identified by the U.S. Food and Drug Administration as a substance with some abuse potential, BP ensures that only customers who agree to BP's product stewardship policies can purchase this product.

### **3 Significant Elements of the Audit Activities to Verify Compliance with the BP-ACCE Settlement Agreement**

As noted previously, ACCE and BP signed a settlement agreement that involved ACCE ending its appeal to the Ohio EPA of the BDO permit to install in exchange for certain commitments from BP in regard to design and operation of the BDO facility. In this section, we discuss the audit verification of these commitments.

On August 30, 2001 and July 15, 2003, environmental consultants for both ACCE and BP conducted an audit of certain plant records, operations and a brief inspection of the physical plant facility. The audit activities were very useful exchanges of



information and an important trust-building process between BP and ACCE. In this section, some of the results from these audit activities are discussed.

A primary concern of ACCE during permitting of the plant was potential malfunction modes of operation of the facility and the potential for high emissions during these events. One purpose of the settlement agreement was to address these concerns.

During the site audits, consultants to ACCE and BP verified by physical inspection that a previously planned bypass stack at the scrubber offgas boiler was not incorporated in the plant as it was built. In the event that the scrubber offgas boiler goes offline while the Butanediol unit is operating, the process gas exiting the scrubber passes through the boiler although no destruction takes place. There is a pressure-operated relief valve (PRV) located at the top of the offgas scrubber that is necessary as a safety feature for the plant to ensure that the equipment does not exceed design pressure and safety specifications.<sup>2</sup>

ACCE and BP consultants verified the presence of an automatic waste feed cutoff system for the liquid wastes charged to the scrubber offgas boiler. This verification occurred by observation of electrically operated valves at the liquids burner for the scrubber offgas boiler, by dialogue with the plant operators and by observation of the status of this cutoff system and its controlling points during observations of the BDO facility's distributed digital control and operation system. Finally, standard operating procedure operator manuals referencing automatic waste feed cutoff were disclosed for viewing to the auditing consultants.

By review of BP's reports to Ohio EPA and by disclosure of the plants standard operating procedures, ACCE and BP auditors verified that BP has written procedures to direct and comply with the requirement of the settlement agreement that shutdown of the butane oxidation unit take place if outages of the scrubber offgas boiler occur for intervals longer than 24 hours. The auditing consultants have reviewed the exception reports and discussed such events with plant operators and BP Health, Safety and Environment (HSE) officials. The auditing consultants have been convinced that BP's BDO team as an organization takes any outage of even a brief duration of the scrubber offgas boiler and its ability to incinerate waste gases as a very serious matter. The record shows that the number and duration of these events have been infrequent and significantly limited and that any such events receive a diligent and timely response from responsible plant operators and BP officials.

Another feature of the settlement agreement went to the matter of how BP would deal with liquid wastes generated in the Butanediol production process. These were mostly distillation ends generated in the facility. In the agreement, ACCE had sought to

preclude the disposal of such wastes in the biological wastewater treatment facility for subsequent river discharge available to the BDO plant. The auditing consultants report that one waste generated by the BDO plant that principally contains tetrahydrofuran has been recovered from aqueous waste disposal systems and is being sold to another party rather than being wasted. The auditors report that BP maintains capability to discharge aqueous wastes to the site wastewater treatment facility, but the frequency of this practice is so limited that valving to make such discharges can be maintained in a locked configuration with keys being maintained in the BDO operations facility. BDO facility practice is to direct any liquid wastes that contain sufficient BTU value to either be incinerated in the scrubber offgas boiler, to be sent to deepwell disposal, or to permitted offsite treatment facilities; such wastes are not sent to the site wastewater treatment system for treated river discharge. Plant operators have been commissioned to recycle as is feasible aqueous wastes to internal uses, such as to the offgas scrubber or to cooling water systems. Consulting auditors note that BP has committed in its March 31, 2003 implementation of the BP Waste Minimization Plan to a hierarchical program of pollution prevention, source reduction, waste minimization, recycling, waste treatment and environmentally safe disposal at the BP Lima, OH site as a matter of corporate policy.

The ACCE-BP agreement sought additional progress to reduce VOC emissions beyond what the BDO facility's permit to install allowed. This matter is discussed in a separate section in another section of this report. However, it should be noted that ACCE's original position that available technology for reducing volatile organic compound emissions significantly below what was allowed in the permit to install has been borne out by the performance of the BDO facility since its operations commenced.

Most other elements of the agreement were implemented, including the publication of a newspaper advertisement by BP about the ACCE-BP agreement and commitments, maintenance of a binder at the local library, sharing of information about pending changes in permits, an ACCE project to evaluate portions of the proposed Clean Air Act Title V operating permit dealing with the BDO plant<sup>3</sup> and other features and elements including the hiring of ACCE and BP consultant-auditors and the joint production, review and approval of this report.

During July 15, 2003 joint ACCE-BP audit activities, a systematic practice of excluding hazardous air pollutants that are volatile organic compounds from the reported total VOC emissions for malfunctions and excess emission events was identified. The effect of this practice could potentially leave a misleading impression on regulators or the public viewing these reports. In addition, the practice would likely lead to errors in reporting annual emission inventories for volatile organic compounds. BP HSE officials assured ACCE that this practice has not been carried out at other process groups at the BP Lima, OH complex. As a result of the identification of this problem, BP submitted

revised reports of excess emissions from malfunctions and bypasses and corrected its annual emission inventory reports.

A final commitment of the ACCE-BP settlement agreement involved communication and exchange of information concerning amendments of the BDO plant permit to install and creation of an ACCE project to provide comments on the BDO portions of BP's proposed Title V permit for the BP Lima, OH complex. BP provided ACCE with ongoing information concerning permit amendments concerning sale of the BDO plant's hydrogen production facility, changes in BDO site tank parameters, the addition of a maleic acid loading rack, the dropping of a butane loading facility and the most recent proposal and evaluation of a new particulate emission limitation for the scrubber offgas boiler.

The ACCE project to comment on the BDO-related and general portions of the proposed Clean Air Act Title V operating permit for BP resulted in a filing with the Ohio EPA Northwest District office. A copy of these comments can be viewed at <http://www.sagady.com/workproduct/BPChemTitleVComments.pdf>.

#### **4 Major Themes for Environmental Performance and Compliance Review at the BP BDO Facility**

##### **4.1 Review of Nitrogen Oxide Emissions Performance and Continuous Emission Monitoring Activity Covering the BDO Plant Scrubber Offgas Boiler**

One of the most important reports BP files every quarter for the Butanediol (BDO) facility covers reporting of continuous emissions and parameter monitoring of the two most significant emissions sources at the plant – the scrubber offgas boiler and the flare stack. Federal<sup>4</sup> rules as well as provisions of BP's BDO plant permit to install<sup>5</sup> require the filing of these quarterly reports and the specific content they must show as part of the facility's compliance monitoring requirements.

A considerable focus of the required quarterly reports is on the matter of nitrogen oxide (NOX) emissions and reporting from the scrubber offgas boiler (SOGB). The SOGB must simultaneously limit NOX emissions to 0.10 lbs of NOX per million BTU heat input on a 30 day rolling average basis and also comply with a mass emission rate of 23.0 lbs of NOX per hour. The following table illustrates the most important quarterly report parameters relating to NOX control from the SOGB unit:

**Table A – Multi-Year NOX Emission and Compliance Reporting Summary Table**

Quarter	Days with Hours Exceeding 23.0 lb/hr NOX	Number of Hours Exceeding 23.0 lb/hr NOX	Maximum Hourly NOX Emission, lbs	Percent of SOGB Operating Time Over 23.0 lb/hr	Number of Operating Days when NOX Emissions Exceeded 0.10 lb NOX/MMbtu	Average 30 Day rolling NOX Emissions in lbs NOX/MMBTU	Percent of Operating Time NOX Analyzer Properly Operating and in Calibration
2Q00	9	21	51.9	1.7%	0	0.04	80.61%
3Q00	5	18	31.1	0.9%	0	0.06	89.11%
4Q00	7	28	38.9	1.6%	0	0.04	83.74%
1Q01	2	5	28.4	0.2%	0	0.04	65.23%
2Q01	6	8	34.6	0.4%	0	0.05	67.76%
3Q01	4	33	39.0	1.5%	0	0.04	66.51%
4Q01	0	0	n/a	0.0%	0	0.027	36.65%
1Q02	0	0	n/a	0.0%	0	0.028	99.60%
2Q02	0	0	n/a	0.0%	0	0.030	95.01%
3Q02	0	0	n/a	0.0%	0	0.030	96.53%
4Q02	0	0	n/a	0.0%	0	0.035	99.26%
1Q03	0	0	n/a	0.0%	0	0.032	99.96%
2Q03	0	0	n/a	0.0%	0	0.034	99.93%
3Q03	0	0	n/a	0.0%	0	0.035	98.56%

n/a – Not applicable.

The table indicates that BP achieved continuous compliance with the NOX emission limitation of 0.10 lbs per million BTU ever since plant operations began and that the average of all 30 day rolling averages of emissions was well below the 0.10 limit.

The table indicates that BP had some problems during plant shake-down of the scrubber offgas boiler with meeting the 23.0 lb/hour emission limitation for NOX in 2000 and 2001. However, the amount of time that such emission standard excursions occurred remained below 2% of the operating time for the boiler for the first six calendar quarters of operation of the facility.

The problematic NOX emissions which occurred were generally caused by instabilities in the firing rates of the scrubber offgas boiler brought on by changes in process steam demand from equipment startup and shutdown and occasional shutdowns of the reactor that produces waste gas that is burned in the boiler. After installation of a changed method for monitoring the exhaust gas flow from the scrubber offgas boiler, and after solving some problems with how such monitoring information and related set points was acted upon in the automated distributed data information and control system, no further problems were experienced with meeting the 23 lb/hour limitation. BP has had no further occurrences of excursions over the 23 lb/hour NOX emission limitation since the fourth quarter of 2001.

While BP strives to operate in compliance with its requirements to the best of its ability, operational problems will sometimes occur which can cause problems in complying with permit and rule requirements. Although some non-compliance with the 23 lb/hour NOX limit occurred with early operations of the boiler, neither U.S. EPA nor Ohio EPA deemed this non-compliance to be significant enough to issue any notice of violation. Excess emissions below 2% of operating time will not generally draw the enforcement and compliance attention of either U.S. EPA or Ohio EPA.

The results in the table for the first seven quarters for the percent of operating time that the NOX continuous emissions analyzer on the scrubber offgas boiler was operating and properly calibrated is not up to the performance standard that BP has set for the BDO project. In general, BP should be able to achieve at least 95% uptime for proper operation and calibration of these measurement devices and BP has been achieving this goal continuously since the first quarter of year 2002.

BP had previously reported higher percentage uptimes for the NOX continuous monitoring instrument. However, after experiencing a problem with the monitor failing a relative accuracy test for the first time in September of 2001 and after conducting an

internal audit of continuous emission monitor operations and calibration practices, BP published revised quarterly reports for 2Q00 through 3Q01.

A notable feature of these revised reports was a significant increased downtime on acceptable operations of the NOX continuous emission monitor on the scrubber offgas boiler exhaust. BP environmental managers became aware of significant periods when the quality indicators of the NOX continuous emission monitor did not meet specifications because of instrument calibration “drift” or lack of gas for testing the calibration of the span of the monitors. In the absence of alarms for the plant operators, there was not always awareness of when drift problems meant that the continuous emission monitors needed attention. These periods are considered by federal rules to be “out of control” periods when continuous monitor results are not considered to be of sufficient quality and accuracy. In February 27, 2002, BP published revised reports reflecting the “out of control” periods which were not provided in previous reports.

BP has resolved all of these continuous emission monitoring problems. A subsequent repeat of a relative accuracy test monitored by Ohio EPA district office personnel showed compliance with required quality objectives in December of 2001. An alarm has been installed to notify plant operators when monitor drift or calibration problems are such that operator attention is required.

Overall, BP’s quarterly reports show completely problem free, exemplary operation for NOX emissions and NOX continuous monitoring from the first quarter of year 2002 to the present.

#### **4.2 Quarterly Reporting on Environmental Compliance of the BDO Flare**

BP operates a steam-assisted flare at the BDO Plant that receives non-condensable gases, tank and process vessel pollutant losses and emergency pressure relief from process vessels throughout the BDO complex. The BDO flare is subject to federal new source performance standards<sup>6</sup> and requirements for controls of hazardous air pollutants from synthetic organic chemical production processes.<sup>7</sup> The most important part of these federal rules requires that reporting be done on the uptime of the flare as a percentage of process operating time, the uptime of the system for monitoring the presence of a flame in the flare, periods when the flare is not operated, periods when waste gases are diverted from the flare and excess emission periods.

A review of quarterly reporting on the flare shows data indicating near uniform flare availability and monitoring system uptime at 100% and no incidents during process

operating time when the flare was not operated, gases were diverted from the flare or the flare had excess emissions.

As a result, this review shows exemplary operation and performance of the flare as an emission control device since the commencement of plant operation.

**4.3 Summary Review of Excess Emissions During Malfunctions**

A principal purpose of the scrubber offgas boiler at the BDO plant is to control offgases generated during butane air oxidation processes that are not otherwise removed from the reactor gas flow by the scrubber that recovers maleic acid from the output of the oxidation unit. If this incineration/energy recovery boiler is not stable as a result of loss of flame, loss of combustion air, loss of boiler feedwater or other problem, then waste gas flow to that boiler is passed through the boiler without destruction of the constituents in the offgas. In general, this type of event poses the greatest potential for uncontrolled emissions from the BDO unit of volatile organic compounds, hazardous air pollutants (HAPs) and carbon monoxide.

A review of all such incidents on an annual basis shows that these incidents are infrequent and the data based on BP reports<sup>8</sup> is shown in the following table:

Table B – Annual Summary of Venting and Emissions

Year	Number of Venting Incidents	Number of Days with Venting	Total Duration of Venting (minutes)	Maximum Venting Event Duration (minutes)	Total VOC Emissions (including HAP) (lbs)	Total HAP Emissions (lbs)	Total Carbon Monoxide Emissions (lbs)
2000	1	1	64	64	374	124	11201
2001	10	6	415	130	2425	804	72632
2002	0	0	0	0	0	0	0
2003	3	3	262	96	1531	508	45855

The data in the table above reflects revised figures that were discovered during this BP/ACCE combined audit on July 15, 2003. Prior reports had excluded the aggregate amount of hazardous air pollutants from the total of volatile organic compounds. A subsequent revised report filed by BP with Ohio EPA on July 28, 2003 provided the corrected results.

The next table provides additional overall perspective about the record of venting of uncontrolled butane oxidation reactor scrubber offgases:

Table C: Original Annual Reported Emissions, Bypasses Not Included

<b>Year</b>	<b>Total Venting Time as a Percentage of Total Source Operating Time</b>	<b>Total VOC Emissions from Venting as a Percentage of BDO Plant Total Annual Reported VOC Emissions</b>	<b>Total VOC Emissions from Venting as a Percentage of N006 Total Annual Reported VOC Emissions</b>	<b>Total Carbon Monoxide Emissions from Venting as a Percentage of Plant Total Annual Reported Emissions</b>	<b>Total Carbon Monoxide Emissions from Venting as a Percentage of N006 Annual Reported Emissions</b>
2000	0.05%	0.08%	0.09%	21%	63%
2001	0.117%	3.7%	27%	78%	146%
2002	0.0%	0%	0%	0%	0
2003	0.055%	n/a	n/a	n/a	n/a

n/a Data not available for calculation

Table C is based on information provided for the BDO portions of what BP reported for its Ohio EPA annual emission inventory report for years 2000, 2001 and 2002 for the BDO unit.<sup>9</sup> Consulting auditors suspect, and BP verifies, that the spreadsheet results provided are for “usual and ordinary” calculated annual emissions and do not incorporate all venting/bypass emissions. The year 2000 and 2001 spreadsheet reports for carbon monoxide and other pollutants did not incorporate venting-related emissions admitted by BP due to bypass. For example, CO bypass emissions exceed the spreadsheet CO reported annual emissions in 2001.

As a result of the July 15, 2003 audit, BP submitted revised annual emission inventory reports for years 2000 and 2001 on July 28, 2003. Table D presents the data in the revised reports which includes all venting/bypass events.



Table D: Revised Annual Reported Emissions, Bypasses Included

<b>Year</b>	<b>Total Venting Time as a Percentage of Total Source Operating Time</b>	<b>Total VOC Emissions from Venting as a Percentage of BDO Plant Total Annual Reported VOC Emissions</b>	<b>Total VOC Emissions from Venting as a Percentage of N006 Total Annual Reported VOC Emissions</b>	<b>Total Carbon Monoxide Emissions from Venting as a Percentage of Plant Total Annual Reported Emissions</b>	<b>Total Carbon Monoxide Emissions from Venting as a Percentage of N006 Annual Reported Emissions</b>
2000	0.05%	0.08%	0.09%	17%	39%
2001	0.117%	3.6%	21%	44%	59%
2002	0.0%	0%	0%	0%	0
2003	0.055%	n/a	n/a	n/a	n/a

n/a Data not available for calculation as of report preparation.

The most important conclusion to draw from the tables above is that these relatively infrequent venting incidents at the BDO unit in the aggregate released only a small fraction of annual permissible emissions for both volatile organic compounds and carbon monoxide. Based on the auditing consultants knowledge and experience of other industrial plants and the frequency of venting incidents that can occur in petroleum refineries and petrochemical plants, the infrequency and short duration of venting incidents at the BP BDO unit represent exemplary performance in controlling such incidents. This record at the BDO unit is also further evidence of BP’s commitment to controlling venting and releases from the standpoint of limiting emissions of greenhouse gases from their industrial processes.

BDO plant operators are trained that any outages of the scrubber offgas boiler and the resulting venting that occurs are very serious matters requiring quick and expeditious resolution and attention.

Finally, noting the settlement agreement between BP and ACCE, none of the venting incident durations came at all close to the maximum 24 hour venting maximum limitation contained in the agreement as BP’s commitment.

#### **4.4 Particulate Matter Emissions from the BP BDO Plant Scrubber Offgas Boiler**

When BP applied for an Ohio EPA permit to install for the BP Butanediol plant, BP used an emission factor of 0.003 lbs of PM-10 per million BTU of heat input<sup>10</sup> and claimed as appropriate for an incinerator. This factor was accepted by Ohio EPA and resulted in projected PM-10 emissions of 0.51 lb per hour and 2.23 tons per year, based on filterable-only particulate test methods. Given that the facility was permitted as a minor particulate source, that stringent limits were proposed and that there was no pre-existing particulate matter air quality problem, ACCE did not contest such particulate emission limitations when it filed comments on the original proposed permit.

The BDO plant scrubber offgas boiler was thus considered as a minor source under federal and state air pollution permitting regulations and the same emission projections were incorporated into the permit as enforceable emission limitations.

On September 13, 2000, BP conducted the first stack test for particulate emissions from the scrubber offgas boiler (emission unit N006). The test results indicated that the actual particulate emission rate was 4.64 lbs per hour, which exceeded the 0.51 lb/hour limit contained in the permit to install for the BDO plant.

On July 16, 2001, Ohio EPA issued a Notice of Violation to BP based on the September 2000 stack test. BP issued a timely response to the NOV indicating an intent to retest in the future after a comprehensive evaluation of its process and fuels powering the scrubber offgas boiler.

In its response to the NOV, BP also indicated for the first time that it might be impossible to meet the 0.51 lbs per hour limit and that the underlying emission projections that were originally used in the process to obtain the permit to install might be in error. The nature of the PM emission projection did not account for the differences between natural gas (the basis of the projection) and the actual input fuels to the emission unit, which included water-vapor-saturated scrubber offgas (which would also include considerable carbon monoxide), vacuum ejector outputs from downstream distillation processes and liquids associated with burning wastes. These inputs to the boiler combustion area would potentially include higher molecular weight compounds, compounds with a greater proportion of carbon to total molecular weight, compounds subject to coking reactions and aerosols that might pose “quenched effects” on a localized basis in the combustion area. BP’s response to the NOV thus laid the beginning of a valid basis for revising upward the permissible technology-based particulate emission limitation in the underlying permit to install.

Although existing analysis of the problem was incomplete, BP nevertheless committed to some interim measures which would constitute available methods and technologies for addressing the excessive particulate matter emissions. These included replacement of insulation in ductwork between the boiler and the stack, insulation of the boiler preheater to deter condensation in the scrubber offgas fed to the boiler combustion area and a complete inspection of the boiler, stack and ductwork to determine whether corrosion, loose materials or deterioration of coatings was contributing to the PM emission problem. Later, BP committed to and installed a “knock-out pot,” in the ductwork feeding scrubber offgas to the boiler. This device uses impingement of scrubber offgas to remove entrained aerosols and liquids found in that gas process stream. Such aerosols/liquids might contribute to highly localized combustion quenching in the boiler combustion area or might introduce large diameter aerosols of high molecular weight hydrocarbons which would not completely combust and thus form carbonaceous particulate matter in the boiler exhaust.

From December 4, 2001 through August 29, 2002, 5 of 17 stack tests for filterable particulate emissions indicated particulate emissions in excess of the 0.51 lb per hour rate.<sup>11</sup> By BP’s admission, many of these tests were not conducted at or near the maximum process production rates. The later tests included the beneficial influences of the remedial measures to which BP had made commitments. Eleven additional particulate emission stack tests conducted in December, 2002 and May of 2003 all showed filterable particulate emissions in excess of the 0.51 lb per hour rate, with the highest being 2.79 lbs per hour filterable PM emissions.

BP has thus taken all reasonable and prudent measures<sup>12</sup> to further control particulate matter from the scrubber offgas boiler. Notwithstanding these efforts, BP was still not able to meet the original 0.51 lbs per hour emission limitation. As a result, both Ohio EPA and BP agreed there was adequate basis for BP to submit a request to revise the underlying technology determination and emission limitation contained in the BDO plant permit to install.

On October 15, 2003, BP submitted an application to Ohio EPA to revise particulate emission limitations for the BDO plant. Specifically, the application sought to increase the scrubber offgas boiler permissible emissions from 0.51 lb per hour and 2.23 tons per year for filterable particulate matter to 5.8 lbs per hour and 25.40 tons per year particulate matter for the combined total of filterable and condensible particulate matter. The application also sought more stringent limits on two other sources and a revised PM limit for the hydrogen plant (owned and operated by another company).

Under the October 15, 2003 application, the entire BDO plant would now be considered a major stationary source for particulate matter as emissions would exceed the threshold for major source definition of 15 tons per year. Under rules for major stationary sources, BP was required to include a demonstration of best available control technology for particulate matter and an air quality impact assessment. Review of the application shows that add-on particulate emission control equipment considered under a “top down” approach to setting BACT emission limits would not be economically achievable because of excessive costs per ton of PM emission reduction outside of ranges that U.S. EPA would consider appropriate for economical implementation of control technologies. In addition, other sources of a similar nature to the scrubber offgas boiler with similar process exhaust gas streams do not presently incorporate add on controls for particulate matter, so considerations of common industry practice and technology transfer do not mitigate for such add-on particulate emission controls.

Although issuance of the proposed permit revision would increase the allowable hourly emission limit by a factor of over 10 and the annual permissible emissions by a factor of over 11, such emissions will not cause significant deterioration of air quality. An air quality impact assessment found that any increase in community ambient concentrations of 10 micron particulate matter was less than what is considered in EPA regulations to be a *di minimis*, insignificant amount for both annual and 24 hour averaging times. Allen County is currently considered to be in attainment with National Ambient Air Quality Standards for 10 micron or less particulate matter as measured by 3 samplers north east of BP and Premcor. This status will not be jeopardized by operations of the BDO plant and its particulate matter emissions.

Existing particulate emission performance of the scrubber offgas boiler indicates little or no visible emissions of particulate matter from the boiler stack. During audit visits on August 30, 2001 and on July 15, 2003, consultants did not observe any visible emissions of particulate matter from the scrubber offgas boiler stack. In continuing practice, given the use of gaseous and very limited liquid fuels in this combustion unit, visible emissions will simply not be a problem from this particular emission unit stack.

On December 17, 2003, the Ohio Attorney General, acting on behalf of Ohio EPA, filed a complaint in the Allen County Court of Common Pleas that addressed, in part, the inability of the BDO plant to meet its original particulate matter emission limitation. Concurrently with the filing of the complaint, a consent judgement between the Ohio Attorney General was also entered with the Court that settled the case with a schedule for compliance on the BDO plant that required the filing of the application for a revised particulate emission limit. In addition, the consent judgement required payment of a civil penalty of \$100,500 by BP. The consulting reviewers for this report did not have access

to the Ohio Attorney General's penalty calculation, so we are unable to determine the basis of the apportionment of penalties between the BDO particulate emission matter and other matters raised in the consent judgement which were of substantial importance.

#### **4.5 Summary Narrative Review of Stack Testing Studies at the BDO Plant**

In general, three different types of stack testing studies have been conducted at the BP BDO plant in response to requirements found in the facility's permit and the requirements of federal and state regulations. These include testing of the BDO plant's flare for requirements concerning minimum gas BTU content and maximum tip exit velocity, testing of the scrubber offgas boiler (SOGB) exhaust for one or more pollutants in order to determine compliance with emission limitations and testing of the SOGB exhaust for nitrogen oxides in order to determine the relative accuracy of the NOX continuous emission monitor on that stack.

All such stack testing studies were done by stack testing firms well known for their work in this area. All stack testing reports are reviewed by Ohio EPA personnel in the Northwest District Office. Some stack tests were observed by Ohio EPA personnel from the NW District Office. Consulting auditors have no information indicating that Ohio EPA stack test reviewers had any objections that the stack testing contractor did not follow published and/or required methodologies or did not conform to required quality assurance/quality control procedures for the several stack testing studies conducted at the BDO plant. Because of limitations on available resources, consulting auditors did not undertake a comprehensive review of the stack testing studies to determine their conformance to required methods and QA/QC procedures.

##### **4.5.1 Testing of the BDO Plant Flare Stack**

The first stack test of the flare stack was conducted on October 25, 2000. This test determined that the average flare gas heating value properly exceeded the minimum value of 300 BTU per standard cubic foot. However, the test also mistakenly showed that the flare tip velocity averaged 165.9 feet per second which, if correct, would have improperly exceeded the maximum allowed value (as determined by a calculation) of 60 feet per second. Subsequently, the maximum tip velocity was recalculated and shown to meet the regulatory requirement of less than 60 feet per second.

On March 5, 2001, a second flare stack test was conducted. Again, the flare gas heating value criteria was met in compliance with the 300 BTU per standard cubic foot

requirement. The US EPA required test method showed a calculated flare exit velocity of less than 59 feet per second. Using a non-approved flow rate assessment method during the same test, flare sample port velocity values of 62 to 68 feet per second were reported which resulted in a calculated tip velocity of 18 feet per second.

On June 7, 2001, BP petitioned both U.S. EPA and Ohio EPA for a "...waiver from the requirement for conducting performance testing for the maximum permitted exit velocity for the flare located at BP's Butanediol (BDO) manufacturing plant..." The conditional waiver was from a requirement at 40 CFR 60.8(b)(54). The request was based upon BP's engineering calculations which showed that the maximum tip velocity could not exceed 25 feet per second. US EPA has granted waivers to other companies with similar documentation, but denied BP's request. BP believes the denial was due to confusion because of the above stack test results.

On August 29, 2002, another flare stack test was conducted using newly installed sample ports where engineering calculations determined that flow rate could be measured as a unique value. This time, the test showed compliance with both the minimum flare gas heating value and the maximum flare stack tip velocity.

#### **4.5.2 Compliance and Relative Accuracy Tests at the Scrubber Offgas Boiler**

On September 5, 2001, a relative accuracy test was conducted on the carbon monoxide, oxygen and nitrogen oxide continuous monitors and the stack flow monitor. The CO, stack flow and stack oxygen tests passed the relative accuracy test, but the nitrogen oxide monitor failed its maximum requirement for 20% relative accuracy at 37% as measured.

The first compliance stack test at the BDO plant scrubber offgas boiler was conducted on September 13, 2000. This test combined a performance test to determine compliance with the permit emission limitations with a relative accuracy test to determine the measurement accuracy of the continuous emission monitor for nitrogen oxides and carbon monoxide and the continuous stack oxygen monitor.

The September 13, 2000 stack test was conducted when plant operations were not within 95% of plant operating capacity, so future stack tests would be necessary to demonstrate final compliance. During the stack test, the average filterable particulate emissions were 3.66 lb/hr, exceeding the permitted rate of 0.51 lb/hr. Carbon monoxide, sulfur dioxide, volatile organic compounds and nitrogen oxides were well below

permitted emission limitations. The measured VOC destruction efficiency at 99.9% was exemplary and exceeded the minimum permitted requirement.

During the September 13, 2000 relative accuracy tests, the carbon monoxide monitor failed the standard protocol on relative accuracy, although operation of this monitor is voluntary and not required by permit or regulation.

A relative accuracy test conducted on August 29, 2002 showed the oxygen, nitrogen oxide, carbon monoxide and volumetric flow monitors as passing all protocol requirements.

On December 4-6, 2001, a diagnostic stack test was conducted for the SOGB when it was operated in boiler-only mode running on either refinery fuel gas or natural gas. Three of 4 test runs exceeded the particulate emission limit of 0.51 lb/hour. All mass rate emissions for nitrogen oxides and carbon monoxide were well below permitted emission limitations.

On December 12, 2001, a diagnostic stack test for particulate emissions was conducted and showed the SOGB exhaust to be in compliance with the permitted 0.51 lb/hr particulate emission limitation.

On December 20, 2001, a compliance test for volatile organic compounds, carbon monoxide, sulfur dioxide, nitrogen oxides and particulate matter was conducted. The average destruction efficiency for volatile organic compounds was 99.98% in two tests, exceeding required performance parameters. Filterable particulate matter exceeded permitted emission limitations. Carbon monoxide, nitrogen oxides, sulfur dioxide and volatile organic compound emissions were all well below permitted mass rate emission limitations.

On July 16, 2002, a particulate stack test was conducted. One of three runs exceeded the filterable particulate emission limitation.

On August 27-29, 2002, a diagnostic stack test was conducted focusing on both filterable and condensable particulate matter. All six tests showed particulate emissions exceeding the 0.51 lb/hr emission limitation

A compliance stack test was conducted on December 10-12, 2002. This test was done both with and without firing of liquid materials to the SOGB. As with prior tests, the permitted filterable particulate emission rate was exceeded. Carbon monoxide, nitrogen oxides and volatile organic compound emissions were all well below permitted

emission limitations. Control efficiencies for acrylic acid and methanol were greater than 99% and visible emissions were at 0.0% opacity.

On May, 21, 2003, a compliance stack test was conducted for multiple pollutants. Particulate emission results in three runs and the resulting average all exceeded the filterable particulate emission limitation by a factor of greater than 4. Nitrogen oxides were well below the permitted emission rate. Under a circumstance of relatively high carbon monoxide emissions, but still in compliance with the permit requirements, other tests for hydrocarbons and hazardous air pollutants were completed. Volatile organic compound destruction efficiency averaged 99.996%. Destruction efficiency for acrylic acid and methanol were 99.85% and 98.29%, respectively. Liquid waste destruction efficiency was shown to average 99.96%.

#### **4.6 Hazardous Organic NESHAPS Requirements for Leak Detection and Repair**

BP is required to conduct a leak detection and repair (LDAR) program at the BDO plant under 40 CFR Section 63, Subparts H as part of the Hazardous Organic National Emission Standards for Hazardous Air Pollutants (known as the "HON"). Under the LDAR program, a portable volatile organic compound analyzer capable of detecting volatile compounds down to 500 ppm is used to detect leaks at all valves, pumps, compressors, agitators, connectors and screwed connectors in gas/vapor and light liquid service. The most recent LDAR report shows that BP had 1474 valves in gas/vapor and light liquid service and 218 pumps in light liquid service. A report from the second semi-annual period of 2000 showed 673 gas/vapor and light liquid connectors were monitored (none were leaking).

Consulting auditors reviewed about half of the semi-annual reports BP files with EPA Region V Office of Air and Radiation, including the most recent report available for the first semi-annual period of year 2003. The semi-annual reports reviewed uniformly show no leaks at all at BDO plant pumps in light liquid service and 0-4 leaks at valves in gas/vapor and light liquid service. All of the identified leaks were repaired promptly.

The very low (less than 0.5%) leak rate or finding of no leaks on regulated fugitive emission components at the BDO plant is exemplary performance, although such performance would be expected in a relatively new plant with new components and state-of-the-art materials.



#### **4.7 Other Hazardous Organic NESHAPS Requirements**

The HON requirements at 40 CFR 63 Subpart G cover the control of hazardous air pollutants from process vents, storage vessels, transfer operations and process wastewater. BP files reports semi-annually addressing these requirements. In this section consulting auditors present the most notable features, such as exceptions from expected operating conditions, contained in each report filed to date.

##### Initial Notification of Compliance report for time prior to December 1, 2000

This report identified 5 HON process vents. The scrubber offgas vent is a HON Group 1 vent and 4 other process vents from distillation/purification sections of the BDO plant are HON Group 2 vents. All five vents are routed to the scrubber offgas boiler for emission control. HON rules require that group 1 vents either be incinerated at 98% destruction efficiency or emission controls applied so that discharged gases do not exceed 20 ppm by volume. BP chose the latter option and stack testing demonstrated that the 20 ppmv limit was met. BP noted, however, that unanticipated problems with the BDO plant limited the production rate to approximately 50%, thus further compliance tests would likely be forthcoming. The stack test established that a minimum combustion temperature to be maintained in the scrubber offgas boiler was to be greater than 1450 degrees F and that this temperature would be monitored by three separate thermocouples.

BP notes that two hazardous air pollutant vents not controlled by the scrubber offgas boiler are directed to the flare for control and that an October 25, 2000 flare test met requirements for minimum flare gas heating value and maximum flare tip velocity

BP determined that it had no HON regulated loading racks, loading arms or loading hoses. BP determined that it only had a single regulated storage vessel for the tetrahydrofuran/water solution and this was a HON group 2 tank and such tanks are only subject to recordkeeping requirements.

BP determined that it had only two regulated wastewater streams, which would be treated either by incineration in the scrubber offgas boiler or by disposal in a deepwell regulated by the Resource Conservation and Recovery Act. Both disposal options met requirements of the rule. Wastewater is handled in a hardpiped system in compliance with the HON wastewater rule.

HON Subpart G Report, 12/01/2000 to 5/31/2001

This report notes a 51 minute event on 5/16/2001 when scrubber offgases were bypassed due to low combustion air in the scrubber offgas boiler. The report contains an erroneous reference (typographical) to a “51 hours” event. Consistent with the typographical error of a “51 hours” event, the control device reliability was reported as 98.83%. BP corrected the report to reflect the 51 minute event and the control device reliability of 98.98%. An exception is noted for events occurring on 01/17/2001, 01/20/2001, 05/12/2001 and 05/16/2003 when the average daily combustion temperature was less than 1450 degrees F for a total of 21 hours during the reporting period. The longest interval was 14 hours on 01/17/2001.

This report contains a table of “excused excursions” as defined under the HON rule for purposes of determining compliance.<sup>13</sup> The table shows the number of excused excursions under the HON Rules going from 6 in the first semi-annual period of reporting in year 2000 to 1 in the sixth period for June 1, 2003 through November 30, 2003 and for subsequent semi-annual periods. Under the HON rules, if a source operates during periods of startup, shutdown and malfunction in accordance with its established startup, shut down and malfunction plan, then the excursion event is not a violation of the rule and doesn’t count toward the excused excursions.

The temperature exceptions of January 17, 18 and 20 in 2001 were deemed to be excused excursions.

HON Subpart G Report for 06/01/2001 to 11/30/2001

This report contains several typographical errors on the end date, showing year 2002 instead of year 2001.

A bypass exception is noted for June 21, 2001 with 3 hours of bypass of the scrubber offgas boiler for the group 1 butane oxidation recovery scrubber offgas vent. This event is noted as an excused excursion.

The report notes an exception concerning a BDO organic waste tank #63 with a defect in the mechanical shoe seal and a subsequent tank drainage and tank degassing on 10/22/2001. The tank was inspected and placed back in service on 12/01/2001.

HON Subpart G Report for 12/01/2001 through 05/31/2002

This report notes exceptions for bypass events for scrubber offgases on December 9, 10, 11 and 23 in 2001. There was a total of 329 minutes of bypass for these 4 dates in a total of 8 distinct events. For the same dates, the report notes a total of 10 hours in 6 distinct events of failure to maintain the average daily temperatures for the scrubber offgas boiler combustion box to be at least 1450 degrees F.

HON Subpart G Report for 06/01/2002 through 11/30/2002

No exceptions and/or bypasses are noted at all for required reported parameters. A compliance flare stack test was noted during the period.

HON Subpart G Report for 12/01/2002 through 05/31/2003

This report notes an exception associated with the failure of a primary thermocouple for monitoring the temperature of the scrubber offgas boiler combustion area. Compliance with the rule requirements was established by the backup thermocouples in this combustion area.

In this report new required minimum combustion temperatures for the scrubber offgas boiler were established by stack tests. For 12/01-11/2002, the required minimum is 1450 degrees F; for 12/12/2002 through 05/21/2003, the required minimum was 1483 degrees F; for 05/22/2003 and afterward, the required minimum temperature was 1487 degrees F.

The report disclosed a total of 23 distinct events on 12 different dates with a total of 157 hours when the scrubber offgas boiler was not operated at the required minimum temperature demonstrated by stack test to comply with emission limitations. Of the 12 different dates, on only two of these exception dates was the combustion temperature not maintained at or above 1425 degrees F (but less than the required minimum). On two dates for a total of 5 hours, the average temperature was at 1316 degrees F and 1260 degrees F. Even at such temperatures considerable destruction of volatile organic compounds in scrubber offgases will continue in the scrubber offgas boiler.

The report notes an exception with 3 different bypass events when scrubber offgases were not directed to the boiler. There was a total of 4.37 hours of venting on 02/15/2003, 03/07/2003 and 05/09/2003. However, it should also be noted that the

05/09/2003 bypass event which was reported in the 2Q03 report was not disclosed in BP's correction report for July 28, 2003 revising the VOC emission projections to include all HAP emissions.

The report notes that 6 of the events covering failure to maintain the required minimum combustion temperature were considered unexcused excursions which would be in violation of the HON requirement. This violation has not been the subject of any U.S. EPA or Ohio EPA notice of violation or enforcement action. Consulting auditors agree that the effect on the control of pollutants in scrubber offgases from events where the temperature was maintained above 1400 degrees F but not at the required minimum temperature as demonstrated by a stack test would be minimal.

#### **4.8 Requirements on Particulate Emission Control from Cooling Towers**

BP is required to control particulate emissions from cooling towers by limiting the total dissolved solid content of cooling water circulated in these units. Total dissolved solids must be less than 3500 milligrams per liter. A review of all reports filed by BP shows that this requirement has been met continuously since the commencement of operations of the BDO unit.

In addition, it should also be noted here that BP installed a more efficient mist eliminator to reduce such particulate emissions than was originally required with the original permit to install. The mist eliminator that was ultimately incorporated by BP meets state of the art requirements for controlling spray mist and drift from wet cooling towers.

### **5 Separately Stated Views**

#### **5.1 Separately Stated Views of BP**

BP appreciates the thorough review of environmental performance for the Butanediol unit prepared by the consultants. This report accurately reflects BDO unit performance in the 3 years since we introduced this new technology. This audit impartially reports things we did well and those where we made mistakes. We appreciate the balance with which our achievements and our errors are presented and we are grateful for the audit team's recognition of our continuous improvement over the three years of operation.

As first envisioned, the ACCE/BP audit was to be conducted within 6 months of commissioning the BDO unit. ACCE and BP delayed the audit until the plan for the SOGB compliance project for particulate matter was complete. BP feels that the additional time afforded both parties the opportunity to build trust and establish credibility through on-going dialogue and information sharing. We believe that this foundation will be helpful to both ACCE and BP in our future relationships. [Written by Alice Boomhower, BP HSE Advisor]

## **5.2 Separately Stated Views of Allen County Citizens for the Environment**

### The Matter of an EPA Enforcement Action

On June 12, 2002, the U.S. Environmental Protection Agency issued a Notice of Violation to BP which alleged, in part, that the facility commenced construction of the BDO before the effective date of the Ohio EPA permit to install which had been issued. EPA alleged that BP began setting forms and reinforcing steel and pouring concrete before the effective date of their permit. Other EPA allegations of violations were also made in this NOV about the BP BDO facility.

Pursuant to correspondence and meetings between EPA and BP, all of the allegations of violations concerning the BDO facility were resolved to both EPA's and BP's satisfaction without further enforcement activity, except for the allegation of commencing construction on the facility before the effective date of its permit to install.

On September 25, 2003, EPA issued an Administrative Complaint and Notice of Opportunity for a Hearing to BP which addressed, in part, the commencement of construction issue.

Although ACCE-BP were involved in a joint audit involving environmental compliance at the BDO facility, BP has not provided ACCE with any written information concerning this EPA enforcement action concerning the BDO facility. This is a departure from understandings about disclosure between the parties during this audit. All of the written information ACCE has gained about this enforcement action has come from U.S. EPA by both informal methods and formal FOIA requests.

The commencement of construction issue of concern to U.S. EPA was resolved in May 2004 with payment of a \$30,000 penalty.

Confidentiality Issues

Although the joint ACCE-BP audit has been successful, considerations of confidentiality that have occurred throughout the original BDO permitting and into the audit raise important policy issues. BP has asserted claims of confidentiality over matters that constitute emissions data as defined by the Clean Air Act and EPA regulations and guidance or that would be necessary in order for citizens to maintain an air pollution enforcement action. While these problems were surmounted during the audit through negotiation and certain procedures, continued emphasis by BP on declaring information elements that are not eligible for confidential treatment in future permit proceedings will likely generate future problems.

**ENDNOTES:**

1. BP Lima Health, Safety, Environment and Quality Policy; Revision 9, March 31, 2003
2. According to BP HSE Supervisors for the BDO project, off-gases have never relieved through the PRV to date.
3. A copy of comments by ACCE filed with the Ohio EPA concerning the BDO portions of the BP Clean Air Act Title V permit can be viewed at:  
<http://www.sagady.com/workproduct/BPChemTitleVComments.pdf>
4. 40 CFE Subpart Db, Sec. 60.40b, *et seq.*, 40 CFR 60 Appendix B, Performance Specification 40 CFR 60 Appendix F; 40 CFR 60.49 40 CFR 60.615(j)(3), 40 CFR 60.615(j)(2), 40 CFR Subpart III 60.610, 40 CFR Subpart NNN 60.660; 40 CFR Subpart RRR 70.700, 40 CFR Subpart G Sec. 63.110 & sec 63.118, 40 CFR Subpart NNN Sec 60.660 and 60.665
5. PTI-1250 - F.2(a)(iv)(ac); D.2(b)(ii); D.2(b)(ic); D.2(b)(v); D.2(iii)
6. 40 CFR 60, Subpart NNN Section 60.665
7. 40 CFR 63, Subpart G, Section 63.118
8. July 28, 2003 Letter from Charles Treloar to Ohio EPA NW District Office, SOGB N006 Clarification of Historial Reported Bypass Emissions
9. Spreadsheets provided by Alice E. Boomhower, BP HSE Manager; Spreadsheets EIS\_BDO Emissions00.xls; EIS\_BDO Emissions01.xls; EIS\_BDO Emissions02(working).xls
10. See Page 34 of the July 24, 1998 BP application for a permit to install (Revision #2). Reviewers are unable to located an AP-42 reference for the emissions factors claimed in the application to be for an “incinerator.” However, an August 20, 2001 BP response to an Ohio EPA Notice of Violation indicates that the original emission factor “...was derived from a 1995 US EPA emission factor for combustion of natural gas.”
11. BP Scrubber Off-Gas Boiler/Incinerator Diagnostic Testing spreadsheet, undated.
12. One additional measure discussed for decreasing both filterable and condensable particulate emissions would be to increase the temperature of the scrubber offgas boiler combustion zone. However, this measure was not done as there is a tradeoff between decreasing PM emissions and increasing nitrogen dioxide emissions. Such trade-offs must considered in determining appropriate technology-based emission limitations under consideration of the environmental impact of a specific process technology design and operating parameter.
13. See 40 CFR 63.152(c)(2)(ii)(C)