BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

IN THE MATTER OF:	)	
	)	
CITGO PETROLEUM CORPORATION and PDV MIDWEST REFINING, L.L.C.,	)	
	)	PCB 05-85
Petitioners,	)	(Variance – Water)
	)	
v.	)	
	)	
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
	)	
Respondent.	)	

NOTICE OF FILING

To: See Attached Service List

Please take notice that on March 14, 2005, we filed with the Office of the Clerk of the Illinois Pollution Control Board, an original and nine copies each of the following ***PETITIONERS' POST-HEARING BRIEF REGARDING PETITION FOR VARIANCE IN CONNECTION WITH DISCHARGE OF TOTAL DISSOLVED SOLIDS AND RESPONSES TO ADDITIONAL QUESTIONS FROM BOARD'S TECHNICAL UNIT*** copies of which are hereby served upon you.

CITGO PETROLEUM CORPORATION and
PDV MIDWEST REFINING, L.L.C.

By: _____
One of Its Attorneys

Jeffrey C. Fort
Letissa Carver Reid
SONNENSCHEIN NATH & ROSENTHAL LLP
8000 Sears Tower
233 S. Wacker Drive
Chicago, IL 60606-6404
(312) 876-8000 (Phone)
(312) 876-7934 (Facsimile)

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PETITIONERS' POST-HEARING BRIEF REGARDING PETITION FOR VARIANCE IN CONNECTION WITH DISCHARGE OF TOTAL DISSOLVED SOLIDS AND RESPONSES TO ADDITIONAL QUESTIONS FROM BOARD'S TECHNICAL UNIT

CITGO Petroleum Corporation ("CITGO") and PDV Midwest Refining, L.L.C. ("PDVMR") (hereinafter collectively referred to as "CITGO") have petitioned the Illinois Pollution Control Board (the "Board") for a variance that would authorize the discharge of Total Dissolved Solids ("TDS") subject to certain conditions that have been approved by the Illinois Environmental Protection Agency (the "IEPA" or the "Agency"). CITGO is seeking this water variance as part of a significant environmental project. CITGO has entered into a Consent Decree with the United States Environmental Protection Agency (the "U.S. EPA") and the environmental authorities for four other states including Illinois in order to resolve certain alleged air quality violations and substantially reduce emissions of sulfur dioxide ("SO2") and nitrous oxide ("NOx"). The Lemont Refinery is among three refineries for which substantial emission reductions will be achieved as required by the Consent Decree. The estimated annual SO2 and NOx emission reductions for the Lemont Refinery are 15,000 and 1,100 tons

respectively. (A copy of the Consent Decree executed on January 26, 2005 was submitted previously with CITGO's pre-filed testimony as Exhibit 1.)[1]

In order to comply with the emission requirements of the Consent Decree, CITGO must install a wet gas scrubber in the Fluidized Catalytic Cracking Unit ("FCCU") in addition to substantial support equipment and controls. Accordingly, a major construction project extending approximately 20 months is required. (See Exhibit 2 (a copy of the compliance schedule for the Lemont Refinery in connection with the Consent Decree). See also Exhibit 3, which contains construction permit drawings depicting the new equipment to be installed and a description of the same.) CITGO has included a substantial amount of equipment design adjustments to minimize the environmental effect of wastewater discharges from the wet gas scrubber. Nevertheless, installation of the wet gas scrubber will increase the amount of TDS in the treated wastewater at the Lemont Refinery. (Exhibit 4 is a copy of the petition for a TDS water variance filed with the Board on November 8, 2004.)

One of the critical path items is to obtain a construction permit from the water division of the IEPA. Exhibit 5 is a copy of the application for that construction permit.[2] On December 3, 2004, CITGO submitted the construction permit application, consistent with the overall construction schedule. In preliminary conversations with the water division of the IEPA, CITGO learned of two critical issues that pose challenges for the Consent Decree schedule. First, the IEPA will not grant the construction permit without also issuing a modified National Pollutant Discharge Elimination System ("NPDES") permit. Second, because there has been an exceedance of the TDS standard in the past, in association with snow melt runoff, carrying road salt and similar compounds into the streams, the IEPA could not issue a NPDES permit for this

[1] All exhibits referred to herein were submitted previously with CITGO's pre-filed testimony on February 17, 2005, unless otherwise indicated.

[2] Page 3 (inadvertently omitted from the previously filed Exhibit 5) of the Construction Permit Application for the Purge Treatment Unit (December 2004) is attached hereto as Exhibit 5.

project unless CITGO obtained a variance from the Board. Hence, the variance petition was filed soon after the Consent Decree was lodged.

Finally, a negotiated compliance plan has been completed to the satisfaction of the IEPA and was submitted as Exhibit 7. This compliance plan requires that extensive TDS data be taken from the Des Plaines River at the I-55 Bridge during the winter months. Subsequent to two seasons of stream testing, the Lemont Refinery will be able to size the required holding tank or basin for the wet gas scrubber discharge during periods of high salinity if that option is needed. The project for the retention system would be scheduled to begin by March 1, 2009, with completion expected by the winter season beginning December 1, 2009. During the February 24, 2005 hearing, the IEPA expressed its support for the variance and its conditions based upon the supplemental information submitted by CITGO and entered into this record. Accordingly, CITGO requests that the Board find that: (1) if the instant variance petition is not granted, CITGO will incur an arbitrary and unreasonable hardship; and (2) the variance, if granted, will not result in significant injury to the public or the environment.

STANDARD FOR GRANT OF VARIANCE RELIEF

Pursuant to Section 35(a) of the Environmental Protection Act, the Board has the authority to grant a variance from one of its regulations whenever immediate compliance with such regulation would impose an arbitrary or unreasonable hardship on the petitioner. 415 ILCS 5/35(a) (2004); City of Canton v. Illinois Environmental Protection Agency, 2002 WL 560970, at *1 (Ill. Pollution Control Bd. April 4, 2002). In granting or denying a variance, the Board must balance the hardship of compliance with its regulations on petitioner against adverse environmental impacts. Marathon Oil Co. v. Environmental Protection Agency, 242 Ill. App. 2d 200, 206, 610 N.E.2d 789, 793 (5th Dist. 1993); Monsanto Co. v. Pollution Control Bd., 67 Ill. 2d 276, 292, 367 N.E.2d 684, 691 (1977). The petitioner must establish that the hardship it will

encounter from denial of the requested variance will outweigh any injury to the public or the environment from the grant of the same, ". . . and only if hardship outweighs injury does evidence rise to the level of arbitrary or unreasonable." Marathon Oil Co., 242 Ill. App. 2d at 206, 610 N.E.2d at 793.

THERE ARE NO PRACTICAL ALTERNATIVES THAT WOULD REDUCE THE TDS DISCHARGE CAUSED BY INSTALLATION OF THE REQUIRED WET GAS SCRUBBER; THEREFORE, COMPLIANCE WITH THE BOARD'S EXISTING TDS WATER QUALITY STANDARD WOULD IMPOSE AN ARBITRARY AND SIGNIFICANT HARDSHIP ON CITGO

Section 35(a) of the Environmental Protection Act requires the Board to determine whether CITGO has presented adequate proof that it would suffer an arbitrary or unreasonable hardship if required to comply with the Board's TDS water quality standard. 415 ILCS 5/35(a) (2004); Marathon Oil Co., 242 Ill. App. 2d at 206, 610 N.E.2d at 793. CITGO, the U.S. EPA and the IEPA are parties to a Consent Decree to substantially reduce air emissions. CITGO agreed to these reductions and will invest more than $120 million at the Lemont Refinery. CITGO is subject to substantial penalties if it does not meet the Consent Decree schedule. Installation of the wet gas scrubber will increase the amount of TDS in the Lemont Refinery's treated wastewater.

CITGO has investigated methods of avoiding the release of wastewater from the FCCU to the existing wastewater treatment system, including a managed release program with the use of a storm water basin for retention, deep well disposal, and installation of evaporation wastewater treatment technology. None of these alternatives are practical.

At this time, the only option for a managed release program would entail using the storm water basin ("SWB") for retention. The SWB is used to collect site storm water runoff and drainage from naturally existing waterways. A marked increase in storm water volume has occurred due to residential developments near the northwest facility boundary. The runoff from

these developments feeds into the naturally existing waterways that terminate within the Lemont Refinery's boundaries and ultimately end up in the SWB. Due to a special condition in the Groundwater Management Zone Approval Letter, issued by the Bureau of Water Permit section, the SWB water level must be maintained below 12'9" due to the groundwater gradient. Because of the existing difficulties associated with maintaining the water level below 12'9" with the additional burden created by the increased storm water runoff volume from residential developments, to try to retain the wet gas scrubber effluent during periods of snowmelt and deicing would not be a viable option.

As discussed in CITGO's variance petition (Exhibit 7), deep well disposal is not a viable alternative because deep well disposal would constitute a Class I injection well. (See Exhibit 13; see also February 24, 2005 Hearing Transcript at 39:9 - 39:24.) Class I injection wells are not permittable in northeastern Illinois because no cap rock exists over the depth where disposal wells are drilled. (See Exhibit 13.) Technologies for removal of sodium sulfate from a dilute aqueous stream are limited. Electrodialysis has in no case been applied in the chemical or refinery industries on the scale required at the Lemont Refinery. Biological sulfate reduction theoretically is possible; however, biological sulfate reduction will not reduce the overall TDS concentration simply by replacing the sulfate ions with carbonate ions. The concentration of sodium sulfate is too high for reverse osmosis concentration, as scaling problems would develop.

The only technology potentially available would be evaporation. Evaporation is an energy intensive approach, which would result in increased carbon dioxide emissions into the atmosphere. The evaporation process would require a multi-effect evaporator to minimize energy consumption. A falling film evaporator with mechanical vapor recompression ("MVR") is the most energy efficient approach. Subsequent crystallization would produce a dry sodium sulfate by-product. Whether this by-product would be of sufficient purity to have any market

value has not been determined. (See Exhibit 7, attachment A (CITGO's Petition for Variance filed November 8, 2004), which depicts a conceptual process flow diagram of a falling film evaporator with MVR; see also Exhibit 14 (a description of evaporation costs) and February 24, 2005 Hearing Transcript at 40:12 - 40:18.)

The capital cost in 2004 dollars for the application of such technology to this wastewater stream is on the order of $7 million. Operating costs, including depreciation, are estimated at $1 million per year. Forty percent of this $1 million amount represents energy costs. This cost estimate assumes the Lemont Refinery has sufficient steam capacity, and it also assumes that a new boiler will not be required. Moreover, CITGO is not aware of a situation where such a massive evaporation system has been constructed or operated. CITGO also notes the increased energy demand and emission impact that such an evaporation system would require. Additional investigation would be necessary before such an approach could be pursued. (See Exhibit 14.)

Requiring CITGO to install evaporation wastewater treatment for the wet gas scrubber discharges into the wastewater system would impose an arbitrary and unreasonable hardship. Such installation is not practical, and such installation certainly is not practical on the time schedule dictated by the Consent Decree. CITGO is not the cause of any water quality standard exceedance. Further, CITGO is investing substantial monies in the Lemont Refinery to reduce air emissions as well as significantly reducing the overall environmental releases from the Lemont Refinery. In addition, the wastewater discharge at issue is relatively modest; indeed, the relative contribution of this project is within error range of the sampling method. (See February 24, 2005 Hearing Transcript at 35:5 - 36:8.) Hence, requiring control of the increased wastewater discharge would impose an arbitrary and unreasonable hardship on CITGO.

GRANT OF THE REQUESTED VARIANCE WILL NOT RESULT IN SIGNIFICANT INJURY TO THE PUBLIC OR THE ENVIRONMENT

The hardship to CITGO of compliance with the TDS water quality standard is substantial. At the same time, there is no cognizable benefit to the public or the environment by compelling such compliance.

TDS is composed of a variety of anions and cations, thus, there are no "toxicity" values that can be applied to the generic TDS parameter. For *General Use* waters, TDS, sulfates and chlorides are regulated. The IEPA has indicated that technical data supported elimination of the TDS water quality standard and increasing the sulfate *General Use* limit to approximately 1,800 mg/L. (See Exhibit 10 (information provided to the stakeholders by the IEPA on this issue)). Additional toxicity testing is being completed by the U.S. EPA. If these results are consistent with the IEPA's previous research, the IEPA may propose these changes in water quality standards in the fourth quarter of 2005.

Sodium sulfate, at the proposed levels discharged, will not impact the aquatic community in the Chicago Sanitary and Ship Canal or in the Des Plaines River. (See February 24, 2005 Hearing Transcript at 37:4 - 38:4.) There is no adverse effect on aquatic life due to TDS and sulfate levels projected here. Therefore, the grant of the requested variance will not result in significant injury to the public or the environment. (See also Exhibit 6 (James E. Huff's December 2004 report titled "Impact of CITGO's Proposed Discharge on Water Quality")).

Investigations related to water quality standards for TDS have been conducted by the IEPA and are ongoing by the U.S. EPA. The IEPA has proposed that TDS be removed as a water quality parameter and sulfate water quality standards be increased to 1,800 mg/L. Under these proposed standards, there would be no water quality exceedance even during snow melt conditions. Therefore, there may be no need for further controls on CITGO's TDS wastewater discharge.

Further responses to questions from the Board's technical unit are included in Attachment A hereto.

WHEREFORE, CITGO requests that the Board find that: (1) adequate proof that immediate compliance with the Board's TDS water quality standard would impose an arbitrary and unreasonable hardship; and (2) grant of the requested variance would pose no significant injury to the public or the environment. Finally, CITGO requests that the Board grant the requested variance.

Dated: March 14, 2005

Respectfully submitted,

By: _____
One of the Attorneys for CITGO PETROLEUM CORPORATION and PDV MIDWEST REFINING, L.L.C.

Jeffrey C. Fort
Letissa Carver Reid
SONNENSCHEIN NATH & ROSENTHAL LLP
8000 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6404
(312) 876-8000 (Phone)
(312) 876-7934 (Facsimile)

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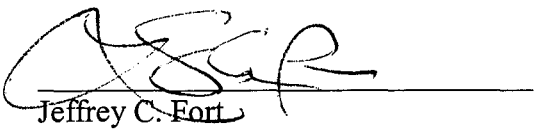
THIS FILING IS BEING SUBMITTED ON RECYCLED PAPER

CERTIFICATE OF SERVICE

The undersigned, an attorney, certifies that I have served upon the individuals named on the attached Notice of Filing true and correct copies of ***PETITIONERS' POST-HEARING BRIEF REGARDING PETITION FOR VARIANCE IN CONNECTION WITH DISCHARGE OF TOTAL DISSOLVED SOLIDS AND RESPONSES TO ADDITIONAL QUESTIONS FROM BOARD'S TECHNICAL UNIT*** via Federal Express, on March 14, 2005.



Jeffrey C. Fort
Letissa Carver Reid

SERVICE LIST

VIA HAND DELIVERY

Dorothy Gunn
Clerk of the Board
Illinois Pollution Control Board
100 West Randolph Street - Suite 11-500

VIA FEDERAL EXPRESS

Bradley Halloran
Hearing Officer
Illinois Pollution Control Board
100 West Randolph Street
Suite 11-500
Chicago, Illinois 60601

James Allen Day, Esq.
Illinois EPA
1021 Grand Avenue east
P.O. Box 19276
Springfield, Illinois 62794-9276

Exhibit A

ATTACHMENT A

CITGO'S RESPONSES TO ADDITIONAL QUESTIONS FROM ILLINOIS POLLUTION CONTROL BOARD'S TECHNICAL UNIT

1. *Exh. 5, the Construction Permit Application for the Purge Treatment Unit (December 2004), appears to be missing page 3 from the original and copies filed with the Board.*

Page 3 (inadvertently omitted from the previously filed Exhibit 5) of the Construction Permit Application for the Purge Treatment Unit (December 2004) is attached hereto as Exhibit 5.

2. *Flow values for the PTU appear in several places in the testimony and hearing exhibits. Would you please reconcile the flow values below, indicating perhaps which represent PTU influent or effluent. . .*

In designing new process facilities, the loadings are refined as the design proceeds through various stages. In addition, there are design loadings and anticipated actual loadings. Treatment facilities typically are designed with a safety factor, as occurred in the FCCU Wet Gas Scrubber, and is standard engineering practice. Therefore, design loadings typically are above anticipated actual loadings to assure the facilities will not be undersized. The different loadings identified by the Board's technical staff reflect these considerations. Specifically, the 331,000 gpd and 0.33 MGD (which is the same value, just rounded to two significant digits), is a DESIGN value, used for sizing the equipment. The 274,000 gpd is the ACTUAL ANTICIPATED AVERAGE FLOW from the FCCU Wet Gas Scrubber, based on the historical refinery production. As Mr. Harmon testified, currently there are no plans to increase the Lemont Refinery production from the historical level. The 0.38 MGD (and 375,000 gpd, which is the same number, just rounded to two significant digits) was one of the earlier DESIGN AVERAGE FLOW numbers, which subsequently was revised down to 0.33 MGD (or 331,000 gpd), based on further process design work, which allowed for a reduction in water consumption.

3. *Flow contributions to Outfall 001 in addition to the PTU also appear in the hearing exhibits: . . .*

Please indicate what flows constitute the 3.6 mgd at 2,160 mg/L TDS referenced in Exh. 6. In the remaining flows to Outfall 001 listed in Exh. 11, other than the 3.6 mgd and 0.27 mgd shown in Exh. 6 footnote 2, are there any TDS contributions? If so, would you please indicate concentration and flow?

The sources constituting the 3.6 MGD are the same sources listed in Exhibit 11, Pg 1 of 4 of the amended NPDES permit renewal. The 3.6 MGD reflects the typical discharge at low flow stream conditions.

4. *The TDS design loading and concentration are referenced in the hearing exhibits. . .*

The TDS loadings on the PTU of 215,000 lb/day and 274,000 gpd are the anticipated actual average values. This translates into a TDS concentration of 94,000 mg/L. The system is designed, as described above, to handle an average flow of 331,000 gpd. The Schedule N used 76,000 mg/L and a flow of 331,000 gpd, which equates to 210,000 pounds per day of TDS. The minor difference in pounds of TDS per day is due to refined design information. The difference in flow reflects the difference in DESIGN (0.331 MGD) versus ACTUAL ANTICIPATED (0.274 MGD) flows. In summary, the best estimate of anticipated flow and loading at this point is 274,000 gpd containing 215,000 pounds per day of TDS. The sulfates merely are a stoichiometric fraction of this, 67% of the TDS.

Using the loading figures provided in Exh 6 at 2, what would be the TDS concentration in the PTU effluent?

The 274,000 gpd is the same as 0.274 MGD. The concentration from the PTU therefore will be:

(215,000 pounds/day) / (8.34)(0.274 MGD) = 94,000 mg/L

What is the expected concentration of TDS in the effluent from the PTU before it combines with other flows to Outfall 001?

The 274,000 gpd is the same as 0.274 MGD. The concentration from the PTU therefore will be:

(215,000 pounds/day) / (8.34)(0.274 MGD) = 94,000 mg/L

5. *Exh. 6 at 2 indicates the sulfate design loading from the PTU to the receiving stream is 142,000 lbs/day. Exh. 14 at 1 uses a sodium sulfate loading of 304,000 lbs/day to calculate costs for a falling film evaporator. Would you please describe the reason behind using a higher loading to calculate the evaporator costs?*

Exhibit 6 presents the anticipated average loadings to the receiving stream. Exhibit 14 is the DESIGN loading for the equipment. The 304,000 pounds per day of sodium sulfate is equivalent to 205,000 pounds per day as sulfate. As explained in the earlier questions, equipment design takes into account maximum loadings, and not just the average loadings.

Exhibit B

2. PROCESS DESCRIPTION

A purge stream from the WGS containing ammonia will be directed to a new building (120 feet long and 45 feet wide) located east of the existing wastewater treatment plant. The purge treatment unit (PTU) is sized to handle a maximum flow rate of 300 gpm, and a design average flow rate of 230 gpm. Two WGS technologies are still under consideration. One system includes sulfite oxidation step as an integral part of the WGS. The second system includes an oxidation step external to the WGS. If the later is selected, an external air oxidation step will be added to the PTU producing sodium sulfate. The WGS that includes an oxidation system integral to the WGS is likely to be selected, so the process description presented herein assumes describes this system.

The conversion of sodium sulfite to sodium sulfate (sulfite oxidation) occurs in the base of the WGS instead of an external PTU. Caustic is added to the scrubbing solution and recirculated through external educators that draw the required air for oxidation. Caustic is also used to adjust the pH from the WGS operating range (6.2 to 9.0) to the range of 9-9.5. The oxidation system includes facilities to reliably control the pH of the oxidation system. The oxidized purge stream from the WGS is sent directly to the Auto-Pulse Tubular Backpulse Filter, one normally operating and one spare to ensure uninterrupted service. The Auto-Pulse Filter removes suspended solids from the purge stream. Internals for the filter will be made from 316L SS. Plant air will be supplied to the filter to provide the pulsating necessary to accommodate solids removal. A bypass line is provided which will be utilized when the filter is being pulsated with plant air.

The sludge from the Auto-Pulse Filter is sent to a new Sludge Tank through a gravity flow line. Two sludge pumps (one spare) are provided to pump the sludge from the tank to the two Oberlin Filters, one normally operating and one spare to ensure uninterrupted service. Plant air will be supplied to the Oberlin filter to help facilitate the solids dewatering. The filtrate from the Oberlin Filter will be sent through a new line to a new Dewatering Basin Sump where it will be collected and them pumped by two new Dewatering Basin Sump Pumps (one spare) back to the line going into the Auto-Pulse Filters. The Dewatering Basin Sump and the associated pumps will have 316L SS as the material of construction. There is also a recirculation line provided to send the filtrate to the inlet line of the Oberlin filters. The Oberlin filter system is elevated such that the dry solid cake discharge can be collected to 20 cu yd roll off boxes that can then be trucked to a landfill for disposal.

All piping around the Auto-Pulse Filter system, the Oberlin Filter system and the Dewatering Basin sump will be 316L SS.

The effluent from the Auto-Pulse Filter, which will contain less than 15 mg/L Total Suspended Solids, will be sent to a new open top PTU Effluent Tank that will be equipped with a new Agitator. Both the agitator and tank will have carbon steel as their material of construction. A new sodium hypochlorite storage tank will also be provided. The tank will be equipped with two new metering pumps (one spare). These pumps will send sodium hypochlorite to the PTU Effluent Tank. Ammonia reduction will be facilitated through the breakpoint chlorination process controlled by Oxidation-Reduction Potential (ORP) probes. The PTU effluent will