AP42 Section:	12.2
Reference:	10
Title:	Memorandum from Ackerman, E., USEPA Region III, to A. Agnew, EPA/OAQPS. Transmitting information on bypassed coke oven gas. April 8, 1991.

#10

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Venting Incidents at USX-Clairton DATE: 4-8-91

FROM: Elizabeth M. Ackerman EMA
Case Development Section (3AT23)

TO: Amanda Agnew
Standards Development Branch

Enclosed for your information is excerpted pages from the Region's Litigation Report which was sent to Headquarters and DOJ for referral purposes. The package contains basic information on Clairton and on the venting violations. We have current breakdown reports; however, we have not had the opportunity to tabulate successive venting incidents in the same fashion as that found in the enclosed Table A so the total is not up-to-date. But, the most recent breakdown report from Clairton does disclose a venting incident on March 27, 1991 lasting 15 minutes at battery B. The cause of that incident resulted from tar build-up which unseated the igniter stack valve causing pressure buildup and thus activating the igniter. We anticipate similar incidents resulting from routine operations.

Table 7 contains the coke oven gas analysis that the agency received from Clairton /its contractor. Based on the analysis, the Region estimated the pollution load during the venting period. Table 7 will give you a sense of what was/are emitted and how much.

Reiterating a point mentioned to you, venting seldom occurs at a coking facility. A normal operating coke facility will vent once every 2 years at most and some facilities seldom or never have a venting situation during the operating life. Clairton's troubles may be due to the coal strike in 1987 and the large number of batteries it operates. Due to the strike, Clairton had to shut down its plant for 7 months and when it came back on it did not check its electrical system for corrosion/defects resulting form the strike interruption. Following start-up, it began to experience electrical failures and thus the large number of venting incidents in 1987 and 1988. During the venting period, Clairton scrambled to inspect, replace and repair its system; since then, only marginal problems have been noted.

From discussions with Ed Wojciechowski of Region V, the venting standards in other Regions may be different if one exists at all, and the venting incidents observed as violation in Region III may be considered acceptable operating practices elsewhere.

Please let me know if you need further information and

assistance. We would be interested in participating in any decisions you may make concerning this matter.

I. SYNOPSIS

USX Corporation is the restructured corporation which subsumed the United States Steel Corporation. USX is divided into four operating units, one of which is the U.S. Steel Division. This case concerns violations of the Allegheny County Health Department's (ACHD) portion of the Pennsylvania State Implementation Plan (SIP) by USX Clairton Works at Clairton, Pennsylvania. At the Clairton facility, there are fourteen coke oven batteries (COB) operable (1-2, 7-9, 19-22, 13-15 and B); however, Clairton is presently operating only ten of the COB's (1-3, 7-9, 15, 19, 20 and B). (Refer to Table C)

The violations at issue are violations of ACHD Article XX Sections 520.H., "Quenching" and Section 530, "Coke Oven Gas."

In the past two years, Clairton has had a number of incidents of emergency venting of raw coke oven gas (COG) and of quenching of hot coke with contaminated water. In response, the Region, on December 5, 1988, issued the facility a Notice of Violation (NOV) for those violations. USX has stated that it is taking and will continue to take remedial actions to resolve these problems, but another venting incident occured on February 5, 1989 and quenching with dirty water continues to occur periodically at the site.

The Clairton Coke Works is one of the facilities covered by the amended Consent Decree in USA et al. v. USX Corporation, No. 79-709 (W.D. PA 9/27/88). That decree did not address the venting and quenching violations that are the subject of this referral. Region III has evidence of violations of that consent Decree, and is evaluating a contempt action as a possible response to those violations. However, the high level of damage to human health and the environment caused by the venting and quenching violations makes the expeditious referral of those violations necessary. The venting and quenching problems are not factually interrelated with the problems of compliance with the existing consent decree.

To resolve these problems, EPA believes it is necessary to obtain an injunction requiring USX to operate its coke oven batteries in compliance with the prohibitions on venting raw coke oven gas and quenching with dirty water contained in the SIP. EPA also wishes to obtain penalties for those violations of the SIP that have occurred this far.

II. STATUTORY BASIS FOR REFERRAL

A. Applicable statutes; cross-media coordination

Sections 113(a) and (b) of the Clean Air Act (CAA), 42 U.S.C. § 7413(a) and (b) authorize EPA to enforce federally approved state implementation plans. The elements of the Pennsylvania SIP are set forth at 40 C.F.R. § 52.2020. The violations at issue are contained in that part of the SIP represented by ACHD Article XX,

limiting the emission of raw COG to the atmosphere and the quenching of hot coke with dirty water. Those provisions are set forth below in pertinent part:

> Section 520 Coke Ovens
>
> H. Quenching. No person shall quench, or allow the quenching of, coke unless the emissions from such quenching are vented through a baffled quench tower and the water used for such quenching is equivalent to, or better than, the water quality standards established for the nearest stream or river by regulations promulgated by the Department of Environmental Resources under the Pennsylvania Clean Stream Law, Act of June 22, 1937, P.L. 1987, as amended, 35 P.S. 691.1 et seq., except that water from the nearest stream or river may be used for the quenching of hot coke.
>
> Section 530 Coke Oven Gas
>
> Except as provided for in Section 520 of this Article, no person shall operate, or allow to be operated, any source in such manner that unburned coke oven gas is emitted into the open air.

III. DESCRIPTION OF DEFENDANT

A. Description of defendant

USX Corporation consists of the following operating units: USS (the nation's largest steel producer at 11.5 million tons in 1987), Marathon Oil (an integrated oil company), Texas Oil & Gas (a producer of natural gas) and U.S. Diversified Group (chemical manufacturing and transportation). U.S. Steel changed its name to USX in 1986 to reflect its move into the oil business. Oil industry activities account for more than 50% of revenues of USX. U.S. Steel acquired Marathon Oil Co. in 1982, and Texas Oil and Gas Corporation in 1986. In 1988, USX's sales consisted of refined products (50%), crude oil and condensate (10%), natural gas (8%), gas gathering (5%), transportation (USX sold the business for $463 million in cash and $125 million in note on December 12, 1988), excise taxes and other items (27%). Its steel mill products include sheet, strips, and tin mill products (62% of 1988 shipments); plates, structural and piling (17%); pipe and tubing (10%); semi-finished (6%); and bars and rods (5%). USX is expected

to see growth in earnings for 1989 as the increased contributions from oil and gas will offset a decline in steel shipments and less buoyant pricing. USX's net income as of 1988 was $756 million.

B. Description of facility

There are 14 operable COBs at USX Clairton Works. These are generally run as units of two or more batteries. These units are: Batteries 1, 2 and 3; Batteries 7, 8 and 9; Batteries 13, 14 and 15; Batteries 19 and 20; Batteries 21 and 22; and single Battery B (which was brought into operation in November 1982). Presently ten batteries are in operation (Batteries 1-3, 7-9, 15, 19, 20 and B with 13 and 14 coming on-line by 1990). The ten batteries produce about 11,000 tons of coke per day; with 13 and 14 coming into operation, production will be raised to 12,600 tons. (Refer to Table C for the production rate at full schedule.)

The coke production at Clairton is used in iron steelmaking. At present, Clairton produces coke for use at USX's Fairless, Pennsylvania; Lorain, Ohio; Fairfield, Alabama; and Mon Valley, Pennsylvania plants. Coke is made of carbon chunks which are formed as a result of the destructive distillation of pulverized coal in an oxygen deprived environment. A coke battery consists of a series of long narrow slot-type ovens with common walls and an integral heating system. Coal is charged into the oven through ports at the top of the oven. There are doors on each side of the oven which are removable. The coal remains in the oven for approximately 18 hours at 2000° F while volatile substances are driven off. The volatile gases from each oven are collected through its own piping offtake and are consolidated in collecting mains which span the length of the battery. Valuable by-products including benzene, xylene, toluene, naphthalene, ammonia, tar, pitch, phenol, carbolic oil, cresol and creosote are recovered from the gases. Once the volatiles are driven off, the carbon structure remains and is known as coke. The coke is removed from the oven by a pushing process. During a "push," the doors at each side of the ovens are removed and cleaned. A pushing ram which is slightly smaller than the oven's cross-section is pushed through the oven from one side to the other (push side to coke side). The coke falls into a "hot car" which is a flat-bed rail car with four walls. The ram is then retracted and the oven doors are replaced. The glowing red coke which is pushed into the hot car then travels down the battery to a quench tower where cooling water is used to quench the hot coke, a process known as quenching. The hot car then travels to the coke wharf (storage area) and empties the coke. The process is then repeated for the next oven in the series.

Gases produced from the coke production process are exhausted through a system of mains. This coke oven gas (COG) is cooled to facilitate the removal of tar and liquids from the COG. The remaining gas is treated in a desulfurization plant, whose principal components are a Claus plant, and a Scotts plant. The

Claus plant removes 85% of the sulfur from the COG, and the Scotts plant removes additional sulfur from the gas, so that it leaves the desulfurization process containing less than 50 grains per hundred dry cubic feet of COG. Some of the gas is used as fuel for firing the COBs (underfire gas); some is used as fuel at other USX plants in the Mon Valley. The liquids removed from the COG pass through an ammonia still, which strips ammonia from the liquid. It is necessary to strip away ammonia from the COG before it moves on to a biological waste treatment plant (bwtp). If not removed, the ammonia would kill the bacteria in the bwtp that attack and denature the organic wastes in the coke plant wastewater. Upset of the bacterial biomass by ammonia requires months of recovery. USX has installed a second ammonia still at Clairton to reduce the prospect that a sudden increase in ammonia loading causes a blockage in a still, which results in a bypass of ammonia laden wastewater to the bwtp, and inactivation of the bwtp.

C. State of incorporation

USX was incorporated in the state of Delaware.

D. Agent for service of process

The Commonwealth of Pennsylvania does not require registered agents. Fed. R. Civ. P. 4(c)(2)(C)(i) permits service of process in the manner prescribed by state law. PA. R. Civ. P. 424 provides for service of process on a corporation by handing an attested or certified copy of process to an executive officer of the corporation or a person in charge at any regular place of business of the corporation or to an agent authorized by the corporation to receive service of process for it.

E. Defense counsel

Dorothy A. Servis, Esquire
Reed, Smith, Shaw & McClay
435 Sixth Avenue
Pittsburgh, Pennsylvania 15219-1886

Leo M. Pruitt, Esquire
USS
600 Grant Street
Pittsburgh, Pennsylvania 15219-4776

F. Identity of other potential defendants

None are know at this time.

IV. DESCRIPTION OF VIOLATIONS

A. Nature of violations

Venting of unburned COG at USX has resulted from failures associated with the electrical and oil pressure systems and the axi-compressor motors. These failures affect the axi-compressors either directly, or indirectly. (Refer to Attachment 2, number 3.) The significance of the axi-compressor is its function as a suction system for the removal of COG. It pulls the COG from the batteries through the collection main to the COG processing plants. When the axi-compressors go down, pressure from destructive distillation of coal builds up and seeks an outlet. This buildup could cause an explosion of the battery and its by-product withdrawal system, offtake piping, collector mains and other systems. To avoid an explosion, the batteries have outlets for the venting of the COG through bleeder stacks located on top of the coke batteries and attached to the collector mains. The bleeder stacks are pressure sensitive so that when pressure builds up at a valve, they open and allow the release of the pressure. This venting will occur until the pressure is reduced by the return to service of the axi-compressor, or when coke temperature falls and distillation cannot continue. The battery following the venting must go through a recovery stage in which the poor quality coke is pushed and pushing and charging schedule is reestablished. The coke produced during a venting is unfit for sale, the batteries are idle while they wait to be recharged, the battery heating efficiency is lost, and the battery suffers from refractory and/or structural degradation when batteries are vented.

During the 12 venting incidents identified in Table A in the time period of 1987 through 1989, raw, untreated coke oven gas was emitted into the atmosphere for approximately 37 hours and 43 minutes. An analysis of the raw COG during venting[1] is set forth in Table 7, listing the chemicals and their respective loading. Table 7 lists both regulated pollutants and other pollutants included in those releases, including hydrogen sulfide and volatile organic compounds (VOC) - propane, benzene, toluene, acetylene. The total chemical by chemical loading based on 37 hours and 43 minutes of venting is computed in Table 8. Based on these calculations, 157,010 pounds of hydrogen sulfide was emitted. 523,368 and 45,200 pounds of benzene and toluene respectively, were emitted. Approximately four million pounds of VOC's were emitted.

Hot coke is quenched, under normal operating conditions, with processed water from the BWTP, river water, or another source of water meeting water quality standards. When the BWTP is not

---

[1] Attachment 14. The data sheet was provided by USX during the 8-8-89 meeting concerning the possible installation of ignitors for the COBs.

functioning properly, treatment of all the wastewater cannot be achieved. USX can usually treat a portion of the wastewater and retain the rest for treatment after the BWTP is back in operation. However, when USX cannot store all accumulated wastewater for delayed treatment, it will either directly bypass the BWTP and discharge untreated wastewater to Peters Creek or it will send the wastewater to the quench station for hot coke quenching. USX either violates the permitted discharge limitations of the CWA by not sufficiently treating the wastewater via the BWTP, or the CAA by quenching hot coke with the wastewater.

During the 381 days of the quenching episodes identified in Table A, the following pollutants and their respective priority pollutant number were observed to be present (see Table 4): benzene, 004; ethyl benzene, 038; toluene, 086; phenol, 065; acenapthene, 001; acenaphthylene, 077; anthracene, 078; benzo(a)anthracene, 072; benzo(a)pyrene, 073; 3,4-benzo-fluoranthene, 074; fluoranthene, 039; fluorene; naphthalene, 055; phenanthrene, 081; and pyrene, 084. The loading of these pollutants is also calculated in Table 5 and Table 6.

Based on the tonnage of coke produced as stated in USX's responses to the Section 114 information request[2] (see Table 1) and the range of quench water usage per ton of coke (600-1,000 gal/ton) at 10% and 100% dirty water concentration, (Tables 2 and 3) the loading of chemical pollutants from dirty water at 10% and 100% concentration were calculated (see Tables 5 and 6). For example, from the date of the first known episode of quenching with dirty water (3-29-87) to the date of the last (3-20-89) the total tonnage of coke produced was 7,303,507 (Table 1). At 600 and 1,000 gallons per ton of coke, the quench water use for the 7.2 million tons of coke is 4.3 (Table 2) and 7.3 (Table 3) billion gallons respectively. The total weights of benzene that were evaporated into the air due to BWTP failure and the consequent use of dirty water quenching for the period of dirty water quenching would be 217,966 and 363,277 pounds (Table 5) at 10% dirty water concentration and at 600 and 1,000 gallons per ton.

The chemical compounds emitted into the air by venting of raw coke oven gas and quenching of hot coke with dirty water are not regulated. ACHD's Article XX only regulates the acts of raw COG venting and dirty water quenching, and not the release of most of the chemicals emitted by those acts.

B. Date and manner violations identified

The first known venting incident occurred on June 7, 1987. That and subsequent ventings alerted the ACHD and local citizen groups, Groups Against Smog and Pollution (GASP) and Residents

---

[2] Attachment 11

Against Chemical Environment (RACE), that USX was experiencing abnormal COB operation. The ACHD notified the Region. RACE contacted the Region via a letter on March 20, 1988 expressing its concerns over the threat to public health from the ventings. The Region responded by meeting with RACE on April 15, 1988.

The first known quenching with dirty water episode occurred on March 29, 1987. Dirty water quenching continued intermittently until March 20, 1989. Quenching during this period was USX's only method of disposing of wastewater. The ammonia still was experiencing scaling/pluggage problems and could not remove the ammonia from the wastewater. Treatment of the ammonia laden wastewater would result in the upset of the BWTP and wastewater bypass would result in NPDES permit violations.

USX submits system breakdown reports to ACHD and EPA pursuant to § 202 of ACHD Article XX, which requires that failure of air pollution control equipment be reported. (See Section X F.5). These reports constituted formal notice to EPA of the SIP violations addressed in this referral.

C. Dates and duration of violations

The specific dates and duration of the violations are listed in Table A. Table B and Figure B, C and D are graphic displays of the venting and quenching violations. Attachment 16 contains USX's breakdown reports describing the violations and the explanation for the violations.

USX resumed operation after a labor strike in March 1, 1987, during the strike, the batteries were placed on hot idle (6-7 months). USX attributes the varied problems that they have encountered to this period of hot idle. Improvement in the number of venting incidents has been observed for 1989 with only one reported venting incident in February 5, 1989. USX had 28 hours of venting in 1987, 8.5 hours in 1988, and one hour in 1989. Failure of the lubricating system, electrical power supply, motor to the axi-compressors, etc. are being addressed more carefully by the facility. USX has stepped up on its repair and routine maintenance programs in these area.

USX has addressed the solid build-up/scaling problem experienced by the ammonia still. The breakdown of the ammonia still led to the use of dirty water for quenching. To address this quenching violation and the NPDES permit violation, USX has contracted a consultant firm, Keystone Environmental Resources, Inc., to study the overall BWTP operation, which includes the scaling problem and the BWTP upset.[3] USX has also installed a

[3] Attachment 2, sub-attachment number 3: Diagnostic Review Report of the Biological Wastewater Treatment System.

spare fixed ammonia still. At present the ammonia still is back in operation and the BWTP is treating all process wastewater. Since March of 1989, USX has not reported any incidents of quenching with dirty water.

D. Pending regulatory changes

None known.

E. Environmental consequences

The Clairton area is designated non-attainment for the primary National Ambient Air Quality Standard for particulate matter and attainment for sulfur dioxide. The quenching and venting emissions are fugitive in nature and cannot be easily measured.

These sources emit the carcinogenic portions of coke oven emissions. The environmental and health consequences of these violations cannot be determined or even estimated without knowing the duration and magnitude of each individual violation, as well as exposure information for the population at risk. Earlier EPA studies performed for coke oven NESHAP standard development are of some help. These studies estimated that there are 2.3 million people who live within 50 kilometers (30 miles) of Clairton. For purposes of a general risk assessment, EPA has considered this population to be "exposed" to Clairton's emissions. Based on a wide range of scientific studies which are summarized in the Carcinogen Assessment of Coke Oven Emissions, Final Report, EPA-600-6-82-063F and in Coke Oven Emission from Wet-Coal Charged BY-Product Coke Oven Batteries-Background Information for Proposed Standards-August 1985, the estimated maximum risk of contracting lung cancer from the emissions at Clairton (12 batteries operating) for a person who spends a 70 year lifetime within this 30 kilometer radius is 2.6 chances in a thousand. The exposure assumptions used in that risk assessment are based on Clairton operating in compliance with all current air emission regulations and other assumptions described in the source referenced above. Estimated risks from emissions exceeding allowable limits are higher. Further, the estimates are based on the premise of non-overlapping radii of effect. In other words, an assumption was made that those who live in the Clairton radius do not also live in the LTV-Pittsburgh or Shenango radius. There are people who live within the radii of all three facilities. Another limitation of these estimates is that only lung cancer risk is analyzed. Other health effects such as kidney or prostate cancers, and other varieties of respiratory malfunctions which are induced by coke oven emissions were not quantified.

The amounts of carcinogenic or otherwise toxic chemicals released by the venting of raw COG at Clairton is very large. For

example, EPA estimates that the 37 hours and 43 minutes of venting released 523,368 pounds of benzene, 45,200 pounds of toluene, and 157,010 pounds of hydrogen sulfide, among other chemicals. (See Table 8.) While the concentration of toxics released by dirty water quenching is lower than that in raw COG, these violations have persisted over a longer period of time, and therefore the total release of toxics from the quenching is also great. For the period of dirty water quenching addressed in this referral up to 363,277 pounds of benzene may have been released. (See Table 5.)

V. ENFORCEMENT HISTORY AND PRE-REFERRAL NEGOTIATIONS

A. Recent contacts by EPA

In response to violations of the SIP, the Region issued to USX a Notice of Violation (NOV) on December 5, 1988. On January 18, 1989, the Region, ACHD, Pennsylvania Department of Environmental Resources (PADER) and the U.S. Department of Justice (DOJ) met with USX to discuss that NOV. At that meeting, USX outlined the remedial actions that were being taken to address the causes of the violations. Subsequent to the issuance of the NOV, USX experienced one venting incident on February 5, 1989 and 105 days of quenching.

A Section 114 information request was issued to USX on April 11, 1989. USX responded on May 19, 1989. (See Attachments 10, 11.)

USX wrote to Regional Administrator Erickson on June 16, 1989, to describe a variety of activities it purported to be involved in as an effort to improve emissions control at the Clairton Works. That letter described work on the systems involved in the quenching and venting systems that are the subject of this referral. That letter also proposed the installation of igniters on the COB's, an experimental control technology.

On August 8, 1889, the Region, ACHD, PADER and DOJ met with USX to discuss the company's proposal for the installation of a COG flaring/igniter system on the bleeder stacks of the COBs. USX stated that it would install these devices, intended to combust much of the toxic material in COG, if the United States would grant to USX a credit against the remaining road dust penalty fund established by the September 27, 1988 Amended Consent Decree. (See Attachment 14 for further discussion of the igniter meeting.)

B. Pre-referral negotiations

USX and EPA have been engaged in ongoing discussions since 1979 regarding various violations at the Clairton Works, and a Consent Decree was entered in July 10, 1979, and has been modified six times, thus far. On June 16, 1989 USX wrote to EPA describing

a variety of air emissions control activities it has purportedly taken or intends to take at the Clairton Works (see Attachment 12). Among the proposed activities is the installation of "igniters" on the bleeder stacks at the COBs, as discussed in A., above. USX has requested a variety of concessions from EPA in exchange for the installation of the igniters, including EPA's agreement not to seek penalties for the quenching and venting violations that are the subject of this referral. At a meeting on August 8, 1989 between USX, EPA, DOJ, ACAD and PADER, EPA and DOJ advised USX that no such agreement to forego penalties was possible. Another meeting was held September 27, 1989 to further discuss the issue of installation of igniters at Clairton.

C. Contacts by state, local agencies and citizens

The ACHD and PADER have been involved in ongoing discussions with EPA about the violations at the Clairton Works. The Region expects that both ACHD and PADER will intervene in the suit which EPA anticipates will be filed in response to this referral.

Citizens groups in the Pittsburgh area have been active for a number of years in monitoring violations at the Clairton Works and seeking to have the regulatory agencies address the violations they believe exist. The Group Against Smog and Pollution (GASP) and Residents Against a Chemical Environment (RACE) are the most active citizen entities with respect to Clairton.

D. Prior enforcement history

There has been federal enforcement involvement with the Clairton Works since 1973. The Region, PADER, ACHD were involved in the negotiation of the Clean Air Act Consent Decree which was entered in the United States District Court for the Western District of Pennsylvania on July 10, 1979. The decree was entered in settlement of certain alleged violations of the ACHD regulations which are a part of the Pennsylvania SIP. The decree was modified five times over six years, with the sixth and final amendment entered on September 27, 1988. The decree and its six modifications address: control systems for the Homestead open hearth and Edgar Thomson Basic Oxygen Process shops (BOP), installation schedules for the chemico-cars and the installation of a new pushing control system, splitting of stipulated penalties among the agencies, changes in the Administrative Order between USX and PADER concerning the Saxonberg sintering plant, and violations of the COB pushing, doors, lids, charging, offtakes, combustion stacks, desulfurization plant, etc. standards. (Refer to Attachment 13 for further information on the consent decree.)

EPA has reason to believe that USX is in violation of some provisions of the existing consent decree at Clairton. This belief is based on reports of inspections at Clairton by ACHD, which found various violations of the decree. The Region is presently

analyzing the data that ACHD has provided to determine the appropriate response to these consent decree violations. Because of the complexity of the consent decree in question, the large number of elements of the COB process that are subject to the decree, the fact that many of the violations are recordkeeping violations which USX has asserted it will partially cure by providing missing records, and the shortage of EPA program staff, it is not known when Region III will be able to form a position on the proper response to the violations of the consent decree in question.

EPA believes it is necessary to immediately refer the new violations of the SIP addressed in this document. The principal reason for this urgency is the great environmental harm associated with venting raw COG and quenching hot coke with dirty water. Without minimizing the significance of emission from other parts of the coke production process, it is necessary to respond quickly to the venting problems at Clairton, in particular. During a venting of raw COG, great clouds of dark smoke rise over the area of the plant. Pittsburgh area citizen groups are active in monitoring these emissions, and reporting apparent violations to Allegheny County. The concern of local citizens is well founded, since these venting episodes release enormous quantities of VOCs, some of which are known carcinogens. (See IV.A., above and tables 7 and 8.)

Filing a complaint seeking relief for the SIP violations referenced in this document should not cause problems with any contempt motion that the Region may request at a later date for violations of the existing decree. The venting and quenching violations deal with systems at Clairton Works not addressed in the existing decree, and the violations of the SIP addressed herein - ACHD Article XX § 520.H and 530, were not addressed in the action underlying that decree.

VI. INJUNCTIVE RELIEF

A. Steps to achieve compliance

USX has taken a number of actions purportedly intended to remedy the problems leading to venting of raw COG. USX has described these actions in a letter to EPA (see Attachment A). As discussed in Section IV.A., above, these venting incidents cause a substantial loss of income to USX, which therefore has an economic incentive to motivate its remedial action on this problem. EPA does not know at this point the nature of additional operational steps, or of additional controls, that might be required to prevent venting in future. As mentioned in Section V.A., above, USX has proposed the installation of igniters that would burn vented COG before the gas is released to the environment. The igniters are a new technology that would destroy

most of the carcinogenic or otherwise toxic gases released during a venting episode. However, ACHD Article XX, Section 530 prohibits the combustion of COG under virtually all circumstances. Therefore, while the igniters are a promising solution to much of the problem presented by venting raw COG, their use would not prevent a violation of the SIP. With respect to the offtake and venting elements of their COB, EPA will seek to require that an independent expert, acceptable to the agency, conduct a study of those systems. The study would determine if any additional equipment updating is required for those systems, and if proper levels of maintenance are being provided. If additional equipment and/or maintenance improvements are required, EPA would seek an expeditious, enforceable schedule for the implementation of those requirements.

As discussed in Section IV.A., and V.D., above, USX quenches with dirty water to avoid violating the Clean Water Act by discharging wastewater to a nearby creek. The United States recently entered into a CWA Consent Decree with USX. United States v. USX Corporation, No. 88-7346 (E.D. PA June 20, 1989). That decree requires that USX conduct a study of its wastewater treatment facility, and subsequently take the actions recommended by that study and required to insure that the treatment facility "...is in good working order and operating in an efficient manner to achieve the terms and conditions of (this) Consent Decree and USX's NPDES permit...". The Consent Decree does not establish a time certain by which the wastewater treatment plant shall be in such "good working order". The resolution of the quenching problems at Clairton almost certainly require that the water treatment plant work reliably, since it is not feasible to construct sufficient impoundment to store dirty water produced at the plant over an extended period. It is likely that the water treatment system will be operating reliably by the time this case is filed, since USX has already made major improvements to the system, including the installation of a spare ammonia still and a spare Claus plant. (See Attachment 13.) If all control systems are deemed adequate, the injunctive relief sought with respect to the quenching violations might merely be to order USX not to violate the SIP, adding the force of a court order to the mandate provided by the Clean Air Act. There have been no known quenching violations since March of 1989.

B. Feasible alternatives

None.

C. Cost and technology considerations

USX has installed a substantial amount of equipment directed towards increasing the reliability of those systems whose failure has caused the venting and quenching episodes at the Clairton Works (see Attachment 12). USX asserts it has spent approximately $6

million thus far on these system maintenance and upgrade activities.

The study decribed in III.A., above, of the systems implicated in the venting violations would cost an estimated $100,000.

USX has proposed the installation of "igniters" on the COB bleeder vents, as discussed at VI.A., above. This technology is not in use at any COB in this country, although igniters are apparently used at a number of facilities in Europe. This system would cost approximately $3 million to install at Clairton, according to USX. The igniters would be intended to be used only if there was a venting incident, despite the presence of improved venting control systems. The use of igniters might well be environmentally beneficial, if they destroy most toxic compounds in COG prior to release to the environment as USX data indicates that they do. However, the use of igniters appears to be barred by ACHD Article XX Section 530, which provides in pertinent part that "...no person shall flare, mix or combust coke oven gas...". EPA, ACHD and PADER met with USX on August 8, 1989 to discuss the igniter proposal, and another meeting is scheduled for September 27, 1989 to continue that discussion.

VII. PENALTIES

A. Proposed civil penalty and legal authority

Section 113(b) of the Clean Air Act, 42 U.S.C. § 7413(b), provides the Administrator of EPA with the authority to commence civil action against certain violators to recover a civil penalty of up to $25,000 per day for each violation. EPA issued a revised Clean Air Act Stationary Source Civil Penalty Policy on March 25, 1987 which applies the penalty criteria enumerated in Section 113(b) of the Act to the facts presented by particular enforcement actions. That guidance is intended to be limited to pretrial settlements of enforcement actions. The penalties as calculated in accordance with the policy are intended to provide deterrence through penalties that remove the economic benefit of noncompliance and reflect the gravity of the violation(s).

B. Penalty analysis/calculation

The economic benefit is a measure of what the corporation gains by failing to comply with the regulations. It addresses the costs which are delayed and/or avoided by noncompliance. The economic benefit is computed using the "Methodology for Computing

The statutory maximum penalty amount provides for up to $25,000 per day for each day USX was in violation of the SIP. USX has had 12 reported days of emergency venting incidents and 381 days of reported quenching episodes. The maximum statutory penalty amount is therefore $9,825,000.

See Table 9 for calculations of penalties. In addition to the $1,814,000 economic benefit calculation referenced above, the economic benefit portion of the penalty has been calculated using three other sets of assumptions. Table 9 includes the situation referenced above, in which it is assumed there was delayed installation of $6.055 million in controls, and a $75,000 benefit for delayed O&M costs (Scenario IV). This scenario reflects the Region's present best understanding of the economic benefit to USX associated with the violations in this referral. Scenario III assumes deferred costs of $6.055 million in controls and $50,000 in O&M; Scenario II assumes no economic benefit from deferred controls, and $75,000 in deferred O&M; and Scenario I assumes the economic benefit results only from $50,000 in deferred O&M. These other scenario are provided since there is some question about when or if USX should have been required to install the additional controls in question. It should be mentioned at this point in the report that USX sustains substantial economic losses each time a venting of raw COG occurs, as discussed in section IV.A., supra.

The preliminary deterrent amount (PDA) which the Region proposes is $2,058,000 dollars. It would like to open negotiations for settlement at the initial minimum penalty settlement amount (IMPA) of $2,129,980 dollars.

C. Present financial condition of defendant

See discussion in section III.A.

VIII. MAJOR ISSUES

A. Issues of national or precedential significance

As discussed above in section VII.A., USX has proposed the use of "igniters" on the Clairton Works bleeder stacks to combust the raw coke oven gas that is released during venting incidents. The use of these igniters at Clairton would represent the first such use at a COB in the United States. The Region's initial impression is that the igniters would be environmentally beneficial. However, the use of igniters appears to be prohibited by the PA SIP, which for Allegheny County includes the provision that "...no person shall flare, mix or combust coke oven gas...". ACHD Article XX, Section 530. The Region has not yet devised a strategy that would permit the use of igniters in the face of the existing regulation. The prospect of a settlement that provides forebearance from enforcing this prohibition against igniters while

a SIP revision is promulgated might be one possible resolution, but this and other issues arising from the proposed use of igniters at Clairton will require a substantial further dialogue at EPA. One possibility to consider is permitting or even encouraging (through, e.g., penalty credits) the installation of igniters while retaining and even enforcing the prohibition against combustion of COG.

B. Bankruptcy petitions

None are known or anticipated at this time.

IX. SIGNIFICANCE OF REFERRAL

A. Primary justification for referral

USX is a significant violator as that term is defined in the January 12, 1983 Guidance on Implementation of the 1982 Deadline Enforcement Policy issued September 20, 1982. Coke oven gas, which is emitted during the venting incidents, was listed as a hazardous air pollutant under Section 112 of the Clean Air Act, 42, U.S.C. § 7412 on September 19, 1984. This action against USX meets the criteria for referral identified in EPA's April 11, 1986 Timely and Appropriate Response Guidance which established certain time frames for acting on violations of SIP standards once they have been identified. Furthermore, the highly toxic nature of raw coke oven gas makes it important for the agency to use the coercive mechanism of a federal court order to maximize the prospect of USX taking appropriate measures to prevent the release of those gases.

B. Program strategy

This action will help to maintain the air quality in the area of the Clairton Works. In addition, it is important to maintain the integrity of the air enforcement program by seeking relief for significant violations of the SIP.

C. Agency priority

The agency has declared the resolution of compliance issues at significant violators to be a major enforcement priority. In addition, the existence of the coke oven gas NESHAP listing suggests a strong agency interest in reducing hazardous emissions from coke ovens.

D. Program initiatives outside of stated strategy

Not applicable.

E. Relation of referral to previous or concurrent case or actions

TABLE A

CONTAMINATED WATER QUENCHING EPISODES

APPLICABLE STANDARDS: ALLEGHENY COUNTY HEALTH DEPARTMENT RULES AND REGULATIONS, ARTICLE XX SECTION 520.H.

CONTAMINATED QUENCHING

START DATE	END DATE	NUMBER OF DAYS
03-29-87	05-15-87	48
05-15	06-25	41
07-07	07-26	20
08-01	08-20	20
11-30	12-18	19
01-17-88	1-17-88	1
03-14	05-04	52
06-06	07-01	26
10-17-88	03-20-89	154
	TOTAL	381 DAYS

COKE OVEN GAS (COG) VENTING EPISODES

APPLICABLE STANDARD: ALLEGHENY COUNTY HEALTH DEPARTMENT RULES AND REGULATIONS, ARTICLE XX SECTION 530.

TIME AND LENGTH OF COG VENTING

DATE	FROM	TO	VIOLATION
06-07-87	11:00 PM	5:00 AM	6 HR.:00 MIN.
07-07	3:30 AM	6:40 AM	3 HR.:10 MIN.
07-07	10:45 PM	5:30 AM	6 HR.:45 MIN.
07-09	10:30 PM	5:30 AM	7 HR.:00 MIN.
09-25	11:45 AM	3:00 PM	3 HR.:15 MIN.
10-14	9:00 AM	11:00 AM	2 HR.:00 MIN.
03-11-88	3:00 AM	7:00 AM	4 HR.:00 MIN.
05-31	4:15 PM	4:30 PM	0 HR.:15 MIN.
07-15	8:05 PM	10:07 PM	2 HR.:02 MIN.
11-10	8:40 PM	9:40 PM	1 HR.:00 MIN.
11-24	1:38 PM	2:55 PM	1 HR.:17 MIN.
02-05-89	5:15 PM	6:14 PM	0 HR.:59 MIN.

TOTAL DAYS = 11 TOTAL = 37 HR.:43 MIN.

TABLE 7

COKE OVEN GAS ANALYSIS

USX CLAIRTON DATA SHEET OF 8-8-89

BASIS - ONE TON OF COAL

COKE OVEN GAS	12,000 SCF
LIGHT OIL	3.36 GAL/TON
WATER IN COAL	130 LB
COKE YIELD	0.7 T/T OF COAL
COAL USE AT USX ('88)	3,962,781 TON

SUBSTANCE	UNTREATED COG FROM THE BLEEDER STACK LBS/TON COAL	UNTREATED COG LBS/HR	IGNITOR EFFLUENT LBS/TON
CARBON	1.5	964.4	1.5
HYDROGEN	34	21,860.6	TRACE
NITROGEN*	6.7	4,307.8	2,727.9
CARBON MONXIDE ND	48.2	30,990.6	4.8
CARBON DIOXIDE ND	20.9	13,437.8	778.6
WATER VAPOR**	475.9	305,983.9	1,155.7
SULFUR DIOXIDE	0	0.0	13.0
SULFUR TRIOXIDE	0	0.0	0.001
HYDROGEN SULFIDE	6.6	4,243.5	0.1
NITROGEN PEROXIDE	0	0.0	0.09
AMMONIA	6.5	4,179.2	TRACE
HYDROGEN CYANIDE	2.1	1,350.2	TRACE
HEAVY HYDROCARBONS C_xH_x	34.6	22,246.4	1.73
PARAFIN SERIES:			
METHANE ND	118.5	76,190.6	TRACE
ETHANE ND	11.7	7,522.6	TRACE
PROPANE	1.1	707.3	TRACE
BUTANE	0.7	450.1	TRACE
OLEFIN SERIES:			
ETHYLENE	17.3	11,123.2	TRACE
PROPYLENE	3.5	2,250.4	TRACE
BUTENE	2.9	1,864.6	TRACE
PENTENE	0.6	385.8	TRACE
AROMATIC SERIES:			
BENZENE	22	14,145.1	TRACE
TOLUENE	1.9	1,221.6	TRACE
XYLENE	0.2	128.6	TRACE
MISCELLANEOUS GASES:			
ACETYLENE	0.4	257.2	TRACE
TAR ACIDS - C_xH_xOH	0.7	450.1	TRACE
TAR BASES - C_xH_xN	0.5	321.5	TRACE

SOLVENTS	0.7	450.1	TRACE
NAPTHALENE	7	4,500.7	TRACE
TAR ABS OIL	1	643.0	TRACE

• NITROGEN - INCLUDES N_2 FROM COMBUSTION AIR
** WATER VAPOR - INCLUDES H_2O OF SATURATION

THE AMOUNT OF EFFLUENT GENERATED IS CALCULATED BY MULTIPLYING THE TONS OF COAL CHARCED DURINGA A UNIT OF TIME BY THE EFFLUENT PER TON OF COAL. CLAIRTON WORKS DAILY STATS '88 15,431 TONS COAL; 10,863 TONS COKE.

TABLE 8

COKE OVEN GAS ANALYSIS

USX CLAIRTON DATA SHEET OF 8-8-89

BASIS - ONE TON OF COAL

COKE OVEN GAS	12,000 SCF
LIGHT OIL	3.36 GAL/TON
WATER IN COAL	130 LB
COKE YIELD	0.7 T/T OF COAL
COAL USE AT USX ('88)	3,962,781 TON

VENTING EMISSION BASED ON THE FLARING DATA SHEET

SUBSTANCE	EMISSION OF UNTREATED COG LBS/HR	LBS FOR 37 HRS
CARBON[a]	964	35,684
HYDROGEN	21,861	808,842
NITROGEN*	4,308	159,389
CARBON MONOXIDE	30,991	1,146,652
CARBON DIOXIDE	13,438	497,200
WATER VAPOR**	305,984	11,321,403
SULFUR DIOXIDE	0	0
SULFUR TRIOXIDE	0	0
HYDROGEN SULFIDE	4,244	157,010
NITROGEN PEROXIDE	0	0
AMMONIA	4,179	154,631
HYDROGEN CYANIDE	1,350	49,958
HEAVY HYDROCARBONS C_xH_x	22,246	823,115
PARAFIN SERIES:	0	0
METHANE	76,191	2,819,051
ETHANE	7,523	278,337
PROPANE	707	26,168
BUTANE	450	16,653
OLEFIN SERIES:	0	0
ETHYLENE	11,123	411,558
PROPYLENE	2,250	83,263
BUTENE	1,865	68,989
PENTENE	386	14,274
AROMATIC SERIES:	0	0
BENZENE	14,145	523,368
TOLUENE	1,222	45,200
XYLENE	129	4,758
MISCELLANEOUS GASES:	0	0
ACETYLENE	257	9,516
TAR ACIDS - C_xH_xOH	450	16,653
TAR BASES - C_xH_xN	321	11,895
SOLVENTS	450	16,653
NAPHTHALENE	4,501	166,526
TAR ABS OIL	643	23,789

[a] CARBON:
15431 TPD * D/ 24 HR *CARBON FLARE STACK EFFLUENT = 964 LBS/HR
964 * 37 HRS= 35,684

* NITROGEN - INCLUDES N2 FROM COMBUSTION AIR
** WATER VAPOR - INCLUDES H2O OF SATURATION

ATTACHMENT 17

COKE OVEN GAS GENERATION AND TREATMENT

Gases evolving from the destructive distillation of coke are recovered in a system of gas mains. The gases pass out of the oven chamber through ascension pipe and into gooseneck which connects through a damper valve into the collection main. The collection main serves an entire battery of ovens, running parallel with the battery and extending above it on both sides (for a double collecting main operation). The gas and vapors ordinarily leave the oven at temperatures in the range of 600° C - 700° C (1100° - 1300° F) and are cooled by spraying with flushing liquor in the goosenecks and further cooled by spraying with flushing liquor at different points along the collection main. The gas and remaining vapors pass from the collection main through one or more cross-over mains into the suction main. A pressure-regulating valve, automatically controlled, is located in each cross-over main. The uniform flow of gas and vapors into the system is accomplished by the charging of coal into the ovens at regularly prescribed intervals and the withdrawal of the evolved gas at a constant rate. This constant rate of removal of the gas is controlled by varying the speeds of the turbines and exhausters which pull the gas away from the ovens and by automatic pressure regulators in the cross-over main. These pressure differentials are maintained by the use of either low speed positive turbo or centrifugal type exhausters designed to remove the gases and vapors at a controlled rate.

A schematic of the basic cokemaking and coke gas cleaning plants is shown in Figure 2. The COG generated in the batteries is separated from flushing liquor and tar before it flows to the primary coolers. The tar is separated from the flushing liquor in the tar decanters. The major part of the flushing liquor is recirculated back to the batteries; the excess, which is a major source of contaminated process wastewater generated, is treated at the wastewater treatment plant.

The axi-compressors pull COG from the battery through the primary coolers. This cooling enhances separation of tar and liquor from the COG. The gas from the primary coolers is further cooled in final coolers with sprays of water. Tar is also pumped into these final coolers for the removal of naphthalene from the gas and recirculating water. This water is separated from tar and is treated for ammonia removal in a superstill. The superstill treated water is cooled in spiral heat exchangers before circulating back to the final cooler.

The cooled, cleaned COG from the final coolers flows through the Phosam Absorbers (PA) where ammonia is taken out of the gas by spraying it with a solution of mono-ammonium phosphate (M-AP). The ammonia in the gas reacts with M-AP and converts it to diammonium phosphate (DP). This fouled gas solution of M-AP and DP and some unwanted chemicals including cyanide and sulfur compounds then

flows through a series of units to strip off ammonia and acid gases and convert the DP back to M-AP. The solution is then recirculated back to the PA for further use.

The COG from the PA flows to the main regenerators where the gas is cryogenically processed to remove light oil and acid gases leaving hydrogen and methane. The steps involved in this cryogenic process generate three different streams of gases:

a) underfire gas, which is used as fuel gas for underfiring the batteries (40%),
b) downriver gas which is used as fuel at other USX plants (55%) and
c) sublimation (sub) gas (5%).

The sub gas is further treated cryogenically for the removal of cyanide and light oil. The remaining subgas is then treated in a vacuum carbonate desulfurization plant (VCD) before it is used for underfiring. The acid gas generated from the desulfurizer is treated in a Claus plant which converts the stripped hydrogen sulfide to elemental sulfur.

COG is a by-product of coke manufacturing. The steel industry uses 90% of the total COG generated. For many years, COG and other coal chemicals were wasted in the coke manufacturing. Today, the production of COG and other by products of coke production form a significant part of the income generated from the coke production process.

COG is produced during the carbonization or destructive distillation of bituminous coal in the absence of air. The reactions occurring during the carbonization of coal for the production of metallurgical coke take place in three steps:

(a) Primary breakdown of coal at temperatures below 700°C (1296°F) yields decomposition products some of which are water, oxides of carbon, hydrogen sulphide, hydroaromatic compounds, paraffins, olefin, phenolic, and nitrogen-containing compounds.

(b) Secondary thermal reactions among these liberated primary products as they pass through hot coke, along hot oven walls and through highly heated free space in the oven involve both synthesis and degradation. A large evolution of hydrogen and the formation of aromatic hydrocarbons and methane occur in the stage above 700°C. Decomposition of the complex nitrogen-containing compounds produces ammonia, hydrogen cyanide, pyridine bases and nitrogen.

(c) Progressive removal of hydrogen from the residue in the oven produces hard coke.

During carbonization, from twenty to thirty-five percent by weight of the initial charge of coal is evolved as mixed gases and vapors which pass from the ovens into the collecting mains and are processed through the coal-chemical recovery section of the coke plant to produce coal chemicals. When the production of coke is accomplished in modern by-product coke ovens with equipment for recovering the coal chemicals, one ton of coking coal in typical American practice yields about the following amounts of coke and coal chemicals, depending upon the type of coal carbonized, carbonization temperature and methods of coal-chemical recovery,:

	Per Metric Ton	Per Net Ton
Blast Furnace Coke	600-800 kg	1200-1400 lb
Coke Breeze	50-100 kg	100-200 lb
Coke Oven Gas	296-358 m^3	9500-11500 ft^3
Tar	30.3-45.4 litre	8-12 gal
Ammonium Sulphate	10-13.8 kg	20-28 lb
Ammonia Liquor	56.8-132.5 litre	15-35 gal
Light Oil	9.5-15.1 litre	2.5-4 gal

COG contains the following fixed gases (at 760 mm (29.92 in.) pressure and 15.5° C (60° F)):

	% by volume
hydrogen, H_2	55.4
methane, CH_4	28.4
ethane, C_2H6	3.3
carbon monoxide, CO	5.6
carbon dioxide, CO_2	1.4
hydrogen sulphide, H_2S	0.6
oxygen, O_2	0.4
nitrogen, N_2	4.3
and illuminants	0.6

(which are essentially unsaturated hydrocarbons, such as ethylene, C_2H_4; propylene, C_3H_6; butylene C_4H_6; and acetylene, C_2H_2. (Refer to Table 7 for an analysis of the constituents of COG.)

COG contains the following substances that are liquids at ordinary temperatures and pressures:

(a) Ammonia Liquor (primarily the water condensing from the gas), an aqueous solution of ammonium salts of which there are two kinds-free and fixed. The free salts are those which are decomposed on boiling to liberate ammonia. The fixed salts are those which require boiling with an alkali such as lime to liberate the ammonia.

(b) Tar, the organic matter that separates by condensation from the gas in the collector mains. It is

a black, viscous liquid, a little heavier than water. The following general classes of compounds may be recovered from tar: pyridine, tar acids, naphthalene, creosote oil and coal-tar pitch.

(c) Light Oil, a clear, yellow-brown oil somewhat lighter than water. It contains varying amounts of coal-gas products with boiling points from about 40°C to 200°C. benzene, toluene, xylene and solvent naphthas are the principal products recovered from it.