ILLINOIS POLLUTION CONTROL BOARD
June 7, 1973

ENVIRONMENTAL PROTECTION AGENCY, Complainant,	)	
vs.	)	PCB 72-164
ALLIED METAL CO., Respondent.	)	

Kenneth J. Gumbiner, Assistant Attorney General for the EPA
Benjamin R. Cohen, Attorney for Allied Metal

OPINION AND ORDER OF THE BOARD (by Mr. Henss)

Allied Metal Co. owns and operates a metal processing plant in a Chicago industrial area for smelting scrap aluminum, zinc and lead. The Environmental Protection Agency alleges that, following December 27, 1971, Allied operated its plant in such manner as to cause or allow the emission of particulate matter, gases and odors in violation of Section 9(a) of the Environmental Protection Act. The Complaint also alleged that Allied had installed new equipment for controlling air contamination or equipment capable of emitting air contaminants, without permit, in violation of Section 3-2.110 of the Rules and Regulations Governing the Control of Air Pollution, and that the Company had emitted excessive particulate matter in violation of Section 3-3.111 of said Rules.

Allied has operated from its present location since 1969. The plant is adjoined on the north by the south branch of the Chicago River, on the east by a number of railroad tracks, on the south by a pipe construction company, and on the west by Canal Street.

In its smelting operations, Respondent uses two reverberatory furnaces, two sweat furnaces, two melting pots for zinc and one for lead, a boring drier, and a device referred to as a "smoke consumer" or after burner (R. 30,60). The after burner serves only the boring drier and one of the sweat furnaces. The two reverberatory furnaces located in the west section of the plant (Complainant's Exhibit #3) are nearly equal in capacity and are used to melt "clean" aluminum (R. 320) at a process weight rate of 2,000 lbs./hour (R. 41) to 2775 lbs./hr. (Complainant's Exhibit #1). In addition to small percentages of silicon and copper metals, varying quantities of aluminum chloride, potassium, aluminum fluoride and magnesium chloride are added as fluxing agents to the aluminum charges. The two sweat furnaces are used to separate aluminum from scrap also containing iron (R. 52,318). One

sweat furnace is located along the north wall of the west section of the plant and the other is located along the north wall of the central section. Both sweat furnaces have identical process weight rates of 1500 lbs./hr. (Complainant's Exhibit #1). The two zinc pots are located in the southwest corner of the central section of the plant and are used to melt high grade zinc and aluminum to produce an alloy metal called Zamac (R. 53,322). The process weight rate for each zinc pot was shown as 2,000 lbs./hr. (Complainant's Exhibit #1). The lead melting pot is located along the northeast corner in the central section of the plant and is utilized to melt scrap lead for ingot formation. The process weight rate for the lead pot was shown as 2,000 lbs./hr. (Complainant's Exhibit #1), but testimony indicated that only about 40,000 lbs./month is actually processed (R. 321). The boring drier is located along the north wall in the eastern section of the plant and is utilized to remove excessive moisture, oils, and combustible material in order to produce "clean" aluminum (R. 321). A process weight rate of 1,000 lbs./hr. was cited for the drier (Complainant's Exhibit #1).

Six fans are located in the roof over the western and central sections at a height of about 75 ft. A plant layout drawing (Complainant's Exhibit #3) shows four fans located over the two reverberatory furnaces and two fans located about equidistant from the sweat furnaces and the zinc pots in the central section. Only four of the fans are operated at any one time (R. 51).

Scrap material is received at the plant in partially compressed 600 lb. bales which readily come apart after the steel banding straps are broken (R. 35). The scrap is sorted on a "dirty or clean" basis (R. 50) by about 10 sorters (R. 34) to determine how much preprocessing is necessary. Among the items listed in the incoming scrap by one witness were pots, pans, bowls, trays, cooking and baking cans, clippings, shavings, pieces of tubing, transmission housings, lawn mower housings, pistons, storm doors, screens, frames, washing machine parts, tubs, radiators, litho plates, license plates and awnings.

About 40 persons are presently employed at Allied Metal. The plant operates three shifts per day, 7 days per week, 48 to 50 weeks per year (R. 50). Respondent's $5.5 million sales per year is about 1% of the total annual sales in the country of the secondary aluminum industry (R. 307-308).

Before getting to the substantive issues, we need to resolve one procedural matter. Respondent's Attorney, Mr. Cohen, stated on the first hearing date (R. 13) that he had requested subpoenas for three witnesses and that he had not had any response to the subpoenas at that time. Two of the witnesses later testified for Respondent at the second hearing. However, the third person subpoenad, Mr. Samuel Elovitz of the Chicago Department of Environmental Control, never did testify. Complainant's Exhibit #3 reveals the following sequence of events:

January 9, 1973 - Hearing Officer Stentz issued a subpoena for Mr. Elovitz.

January 11, 1973- Hearing date.

January 12, 1973- Delivery date of subpoena as shown by certified mail receipt.

January 15, 1973- Letter from Sidney M. Marco, Director - Enforcement Division, Chicago Department of Environmental Control, stating that Mr. Elovitz had been on sick leave on January 12, 1973 and had not opened certified letter containing the subpoena until January 15, 1973. The letter also stated "appearances for sworn testimony by employees of this Department are made on advice of the City Corporation Council... at the time of such appearances, our people are represented by Council from the Corporation Council's office. Sufficient notice is usually given so that time may be had to make these arrangements".

It was unfortunate that Mr. Elovitz received the subpoena too late to testify on January 11, 1973, but Respondent had over a month to subpoena the witness again before the final hearing and chose not to do so. The fault was Respondent's.

The Agency's case on the Section 9(a) charges rests with the testimony of two workmen employed near the Allied plant. Both work within 150 to 250 feet of the plant (R. 64, 166) with one being at his work site about three times each day between 7 a.m. and 3:30 p.m. (R. 64) and the other being near the plant from 7 a.m. to 3 p.m. five days per week (R. 166). Both workmen readily identified Respondent's plant as the source of the smoke they observed (R. 65, 170). Mr. Hoffmann testified that the smoke caused him to experience "smarting of the eyes and the burning in the chest" (R. 79). Mr. Kuntz testified that "if it [smoke] comes in my direction, it makes my eyes smart, it makes me cough, choke on it" (R. 168). They said they experienced this discomfort quite a few days each week (R. 79). Hoffmann stated that he knew the difference between the odor of diesel fumes and the odor from the Allied plant and was not confused by other odors in the area (R. 90, 100). Respondent attempted to show that Mr. Kuntz had confused automobile emissions from Canal Street (R. 179) industrial emissions from nearby plants (R. 184) and diesel emissions from barge and train traffic. Kuntz denied this. (R. 184)

Throughout the cross-examination and later in Closing Argument, Respondent attacked the credibility of the two Agency witnesses as "vague and untenable", because they did not know the exact number of railroad tracks to the east of Respondent's plant. Why should they? Hoffmann testified that "there are considerable tracks" (R. 84). Kuntz said "I have never counted them" (R. 177). This does not diminish the impact of testimony that smoke had unreasonably interfered with the enjoyment of life.

Respondent also called two people who work in the general vicinity of the Allied plant. A Shop Superintendent at an adjacent building testified he had observed light smoke coming from the plant, but that the smoke did not bother him in any way. Although he could not see the plant stacks from his office, he had observed the smoke when he walked around his own plant (R. 197) and from his automobile while driving to and from work (R. 198). The other defense witness, a bridge-tender, testified he had a clear view of the plant. He had never seen any smoke coming from the plant, but had observed "steam" (R. 272). He also testified that he had not been bothered by the "steam".

We believe that the Agency has provided sufficient proof that Respondent's plant has caused air pollution in violation of Section 9(a).

The majority of Respondent's equipment had been installed in 1969. Testimony concerning the alleged permit violation centered around the 1971 installation of two zinc pots. Allied had not applied for permits since it believed the emissions from the two pots were of such minimal quantity so as not to be considered an air pollution source. However, the law does not give Respondent the right to make that judgment. Permits are required for all equipment capable of emitting an air contaminant. Respondent did not produce any valid State permits for any of its equipment. Since permits were required by Section 3-2.110 of the rules at the time he originally installed his equipment and have been required at all times since, we find that Respondent did install equipment capable of emitting and/or controlling air contaminants without valid State permit.

The remaining portion of this case concerns particulate emissions and undoubtedly provides the largest area of disagreement between the two sides. After the filing of the Complaint, Allied hired George Sterba , Basic Engineering, Inc. to study the emission problem. Sterba did not conduct complete stack testing, but used what he called a "modified procedure of a formal test" (R. 382). Sterba concluded that his test indicated compliance with emission criteria and so informed Allied officials. Allied used this test during the hearings as evidence of their compliance with regulations.

Emissions from the plant were calculated by an Agency engineer to be as follows:

ALLOWABLE lbs./hr.	ACTUAL lbs./hr.	EXCESS lbs./hr.
15.1 (R. 120)	26.729 (R. 121)	11.63 (R. 121)

The Agency did not at any time conduct a stack test at Respondent's plant. The emissions listed above were calculated using AP-42, Compilation of Air Pollutant Emission Factors, and information supplied by Respondent. These calculations revealed that the two reverberatory furnaces and at least one sweat furnace were Allied's major sources of particulate emissions.

Allied contends that allowable emissions were 14.37 lbs./hr. (Comp. Ex. 1) and that their maximum emission rate would be between 5.36 and 8.2 lbs./hr. (R. 466).

The methods and results of the Sterba modified test were criticized by the Agency. Sterba conducted the test alone without notifying the EPA on June 9, 1972 (R. 381). No Agency witness observed the test. His testimony revealed that six fans are located in the roof, and exhaust air upward through short six foot stacks. Each stack had a cross sectional area of 19.63 sq. ft. (Comp. Ex. 1). This would then mean that the stack diameter was approximately 5 ft. and indicate that withdrawal sampling was conducted within 6 ft. of a fan operating at 22,000 cfm (R. 398). The Agency stack sampling expert, Fred Smith, in referring to this procedure stated: "The proximity of the fan to the point of sampling might possibly very seriously interfere with the flow of the air, gas and the particulate concentration therein, affecting the representativeness of the sample" (R. 586). Further, in Section 42 of the ASME Power Test Codes we note the following:

> "The inlet duct of a fan may be preferable to the outlet duct for the reason that a fan in operation acts as a separator to a considerable extent. That is, the passage of dust-laden gas into and through a fanwheel tends to concentrate dust at the periphery of the casing scroll and at a point adjacent to the back plate or center plate of the wheel, thus causing a condition of stratification, as well as turbulance, to carry into the outlet duct."

The Sterba test was conducted during a 25-30 mph wind (Comp. Ex. 1) which the Agency expert testified would "further tend to bias or make it difficult to obtain a representative sample from that particular location" (R. 586). Sterba testified that the wind conditions experienced during the testing "would have no effect" (R. 399) on the accuracy of his measurements.

Sterba tested two of the six stacks, and made only one measurement per traverse (R. 406). The Agency expert cited this procedure as "not normal procedure" (R. 586). The appropriate procedure is outlined in the Appendix-Test Methods Section of the Federal Register, Volume 36, Number 247, December 23, 1971, Part II, titled "Standards of Performance for New Stationary Sources", page 24882:

> 21.1 Select a sampling site that is at least eight stack diameters downstream and two diameters upstream from any flow disturbance such as a bend, expansion, contraction, or visible flame.
>
> 2.1.2 When the above sampling site criteria can be met, the minimum number of traverse points is twelve (12).
>
> 2.1.3 Some sampling situations render the above sampling site criteria impractical (as here). When this is the case, choose a convenient sampling location and use figure 1-1 to determine the minimum number of traverse points.

Figure 1-1 shows that a stack test this close to the exhaust fan should have used at least 45 traverse points for testing. Sterba used only one. Perhaps this is why Sterba chose to call his test "modified". It most certainly does not meet the test criteria.

Section 44 of the Power Test Codes states: "It is not likely that the accuracy of a test will be impaired as the result of sampling the gases at an excessive number of points in the duct. On the other hand, error will probably be introduced if the points are too few".

Allied's operation is cyclical and emissions will vary from time to time, depending on the nature of the work being done. Sterba apparently did not test for emissions during a complete work cycle. He stated that his test report would not have changed whether the actual collection time was 20 minutes or 40 minutes (R. 410-411). However, the Power Test Codes, Section 48 states:

> "At least two runs should be made at each basic rate, although this is not mandatory. The duration of the runs shall be governed by operating conditions, number of sampling points, and the number of samplers operated. If possible, the samplers should be operated a minimum of 10 min. at each point and there shall be at least two complete circuits of the points. <u>If operation is cyclic, each run shall cover at least one cycle of operation</u>".

We do not believe that 20 minutes sampling on one stack and 10 minutes on another stack follows any recognized standard for stack sampling and most certainly not for a cyclical operation such as Allied's.

Sterba admits that his results could be in error by 200% (R. 429). This Board recognizes the importance of a valid stack test in comparison to emission factors, however we are forced to hold that the Sterba test was not a valid source of emission data in this case.

Allied's next defense involves the introduction into evidence of a Certificate of Operation from the City of Chicago's Department of Environmental Control (Respondent's Exhibit 13). Presumably, this document was introduced to show that Respondent's plant was being operated at least in accord with Chicago regulations. The Agency opposed the introduction of the document as irrelevant.

Two employees of the Chicago Department of Environmental Control were called as witnesses during the Agency's rebuttal case. One of the witnesses, Guiseppe Rocca, indicated that the Allied Certificate of Operation had been issued through computer error and had later been withdrawn (R. 538). Rocca said he informed the Company that he "couldn't grant a Certificate of Operation for the two aluminum reverberatory furnaces and the aluminum sweat furnace because I felt that they were not in compliance". (R. 537-538)

In any event the issuance of a permit by Chicago would absolutely not relieve Allied from Compliance with State Regulations.

Allied's final defense fell to Charles Licht, a consulting engineer, who had prepared Allied's Operating Permit application forms in late 1972. Licht had been required to prove that the Allied plant was not in violation (R. 455).

In order to utilize Sterba's test results, Licht had developed a theory to explain where the emissions from the equipment went, if not out the roof of the plant. Licht calculated the plant's expected total emission using standard emission factors, and then explained the reasoning which led to his "settling chamber theory" (R. 456): "Because of the unique nature of this particular plant and the fact that this entire operation is conducted within an old boilerhouse with a 75 ft. high ceiling, we then took the position that the building itself was functioning as an air pollution control device, and that the amount of air being vented from the building by means of the roof fans would pretty well establish the maximum particle size which could be drawn up to the roof fan and thus leave the building and thus become a pollutant."

Licht's calculations reveal that with two fans operating, a vertical velocity of 0.08 ft./sec. would be generated which, when used in conjunction with a plot of Terminal Setting Velocity vs. Particle Diameter (Comp. Ex. 9), yielded a maximum particle size of 18 micron that would be lofted. Licht calculated that this would represent 14.37% of the total particle mass generated which would mean that the following maximum rate of emission loft would be expected (Amended Exhibit "B") of Comp. Ex. #1):

Reverberatory Furnaces	0.618 lbs./hr. each
Sweat Furnaces	1.56 lbs./hr. each
All Pot Furnaces	1.0 lbs./hr.
Total Plant Emissions	5.36 lbs./hr.

Licht compared his total plant emission rate with the Sterba test and concluded that the two sets of figures were compatible. He then calculated the worst possible emission rate that would occur if all four fans were operating and found this to be 8.30 lbs./hr., still substantially below the allowable emission rate.

The settling chamber theory seems the only one capable of explaining away any excessive particulate emissions. Many settling chambers are in general use as control devices throughout the country although this is our first experience with a "settling chamber" which includes the working and living space of plant employees.

However, these calculations also are faulty.

First, we note that the roof fans were the factors initially used by Licht in his calculation of the lofting velocity (R. 505). When asked if there were any other factors which are significant, Licht answered "There may be" (R. 505). Licht failed to include the effects caused by thermal uplift over the furnaces (R. 506), even though he knew the velocity at the 75 ft. level due to thermal effects would be 204 ft./min. (R. 509). According to Licht's testimony, this velocity would cause particles of larger than 18 microns to be lofted (R. 511). Licht also admitted that he had not calculated the uplift velocity due to a pressure differential existing between the inside and outside of the furnaces (R. 510).

In rebuttal, the Agency presented calculations showing that:

1. 97% of Allied's emissions are between 0-44 microns.

2. The settling velocity for 44 micron particles is 0/45 ft./sec. and 100 micron particles is 2.5 ft./sec., and

3. The calculated velocity between heights of 70 ft. and 74 ft. due to a combination of thermal conduction and fan draft would range from 4.64 ft./sec. to 15.53 ft./sec.

Thus the Agency concluded that since the calculated uplift velocities exceeded the settling velocity of all particles emitted from the furnaces, all of Allied's emissions were emitted to the atmosphere (Comp. Ex. 10).

The Agency also theorized that the natural draft through the Allied plant causes it to act, not as a settling chamber, but in the opposite manner as a venting hood (R. 616).

Thus we are presented with two theoretical sets of calculations, each contradictory of the other, and upon which we are to make a sound judgment. Respondent takes the position that its building acts as a settling chamber, thus capturing the majority of emissions within the building environment, and avoiding a particulate violation. The Agency takes the position that the building acts as a hood to vent all of Respondent's emissions through the roof, thereby causing Respondent to be in violation of particulate emission regulations.

The weight of the evidence convinces us that the large majority of the emissions go out the roof. Respondent's "settling chamber" theory is based upon an erroneous calculation. It also fails to explain how the Allied employees could continue to work in a settling chamber atmosphere containing particulates exceeding 600 lbs. per day. It is difficult to believe that Respondent would attempt compliance with our regulations by risking the health of employees or by deliberately placing the Company in jeopardy with the OSHA regulations. We do not find in the record a satisfactory answer to the question of where the particulate matter goes if not out the roof. The entire record convinces us that Respondent is in violation of the particulate emission regulations as charged.

For the violations found in this Opinion, we impose a monetary penalty in the amount of $2,500. It is our desire that Respondent cease and desist from those violations, but we do not wish to order the plant closed. We will at this point order Respondent to submit a plan to this Board and to the EPA to bring Respondent into compliance with the regulations. The plan should be submitted in sixty days and it should be designed for compliance in six months.

ORDER

It is ordered that:

1. Respondent is adjudged guilty of causing air pollution, violating the permit requirements and allowing excessive particulate emissions as charged in the Complaint. Respondent shall pay to the State of Illinois by July 23, 1973 the sum of $2,500.00 as a penalty for the violations found in this proceeding. Penalty payment by certified check or money order payable to the State of Illinois shall be made to: Fiscal Services Division, Illinois EPA, 2200 Churchill Drive, Springfield, Illinois 62706.

2. Respondent shall, within 60 days, submit a plan to this Board and to the EPA for bringing its operations into compliance with the statute and the regulations governing particulate emissions. The plan should be designed for compliance within six months of this Order.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion and Order was adopted this 7th day of June, 1973 by a vote of 4 to 0.

Christan L. Moffett