UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

SUBJECT: PSD Applicability Determination-Southwestern Public Service Company

FROM: Director, Stationary Source Compliance Division
Office of Air Quality Planning and Standards

Acting Associate General Counsel
Air, Noise and Radiation Division

To: Allyn M. Davis, Director
Air and Waste Management Division, Region VI

Paul Seals
Regional Counsel, Region VI

This is in response to your memorandum dated February 18, 1983 concerning the applicability of PSD to the Southwestern Public Service Company's (SPS) steam electric generating station in Amarillo, Texas. SPS operates a coal-fired steam generating unit subject to the NSPS requirements of 40 CFR 60 Subpart D. SPS is proposing to modify its existing air pollution control system which consists of two electrostatic precipitators (ESP) with 95 percent control efficiency of particulate matter followed by six wet scrubbers which remove enough of the remaining particulate matter to comply with the particulate matter emission standard of the NSPS. The scrubbers also provide a significant effect on the SO2 emissions by reducing their amounts by approximately 40 percent. These scrubbers, however, are not necessary in order for SPS to comply with the SO2 requirements of the NSPS. The control alternative SPS has selected for this purpose is low sulfur coal.

The modification that SPS is proposing is the removal of the scrubbers and an upgrading of their ESP which will maintain their present level of compliance with the particulate matter NSPS. However, removal of these scrubbers will result in an approximate increase of 4400 tons her year of SO2. The question you raise then is, does this modification of the control system constitute a major modification for the purposes of PSD?

Previously it has been determined that this change would not constitute a modification under the NSPS program. The NSPS regulations at 40 CFR 60.14 (e) contain a list which exempts certain changes from consideration as modifications. Included in this list is the provision at 40 CFR 60.14(e) (5) which states:

> "The addition or use of any system or device whose primary function is the reduction of air pollutants except when an emission control system is removed or is replaced by a system which the Administrator determines to be less environmentally beneficial."

Under this provision it was determined that SPS' proposed modification would not be less environmentally beneficial for NSPS purposes since the change contemplated by SPS would still result in compliance with the NSPS for both particulate matter and SO2.

The separate question of PSD applicability arises because the PSD modification provisions do not specifically contain an exemption such as that at Section 60.14(e)(5). After consultation with the Office of General Counsel, we both agree with the rationale presented by the Texas Air Control Board (TACB) in their January 21, 1983 letter to Dick Whittington. TACB believes that since the NSPS regulations provide an exemption from the modification provisions for replacement of control equipment, the PSD regulations must provide this exemption as well. This is because the Clean Air Act Provides in Section 169 (1) (c) that for PSD purposes the term modification shell be defined as that term is defined in Section 111 (a) of the Act relating to NSPS. EPA has interpreted this to mean that for PSD purposes Congress intended the term modification to include all exemptions included in the NSPS regulations promulgated under Section 111 of the Act prior to the date of enactment of Section 169. See 43 FR 26396. The control equipment exemption was promulgated prior to Section 169. Therefore, the term modification in the PSD regulations inherently encompasses the control equipment exemption.

I wish to add, however, that just because it was determined that the change was not less environmentally beneficial under the NSPS program does not mean the same conclusion must be drawn with regard to PSD. Under the PSD program the concern is not solely the application of best technology, but also impacts on air quality from industrial growth. The Region and State must evaluate this situation to ensure there will be no adverse air quality impact before concluding that the control equipment replacement will not be less environmentally beneficial. If this determination can be made, the SPS generating station in Amarillo may be exempted from PSD as a major modification.

If you have any additional questions or comments concerning this response, please contact Rich Biondi of SSCD at 382-2831 or Sara Schneeberg of OGC at 382-7730.

Edward E. Reich William F. Pederson

cc: Peter Wyckoff
Mike Trutna
Tom Diggs

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

February 18, 1983

PSD Applicability Determination: Southwestern Public Service Company

Allyn H. Davis, Director
Air and Waste Management, Region 6

Paul Seals, Director
Regional Counsel, Region 6

Ed Reich, Director
Stationary Source Compliance Division (EN-341)

Bill Pedersen, Acting Associate General Counsel
Air, Noise and Radiation Division (A-133)

Southwestern Public Service Company (SPS) owns and operates a coal-fired steam electric generating station in Amarillo, Texas known as the Harrington Station which is subject to 40 CFR Part 60, Subpart D. SPS is proposing to modify its existing air pollution control system on its Unit 1, which consists of two electrostatic precipitators (ESP) with 95 percent control efficiency of particulate followed by six wet scrubbers which function as particulate control devices. The scrubbers also eliminate approximately 40 percent of the SO2 from the stack gases. This is the same unit which was given an alternate visible emissions limit by EPA at 40 CFR 60.42 (b)(1).

In an effort to reduce opacity from Unit 1, SPS wants to remove its six wet scrubbers and improve the efficiency of its two ESP's. By letter dated December 17, 1981, EPA Region 6 (with Headquarters verbal concurrence) agreed with the Texas Air Control Board that the removal of the scrubbers would not constitute a modification under NSPS based on 40 CFR 60.14(e)(5).

The Texas Air Control Board, by letter dated January 21, 1983 (See Attachment 1), is now asking EPA to agree that the removal of the scrubbers does not constitute a modification under PSD since it did not constitute a modification under NSPS.

The PSD regulations, as amended on August 7, 1980, (40 CFR 52.21) do not contain a provision similar to the exemption found at 40 CFR 60.14(e)(5), and therefore, it appears the increase in SO2 emissions by an estimated 4406 tons/year due to the proposed changes of SPS would be subject to PSD review.

The State, however, argues that the Clean Air Act requires that the same definition of modification be used in both the PSD and NSPS programs and that, therefore, EPA should interpret the PSD requirements consistently with the NSPS requirements and exempt the SPS modification from PSD review.

To assure a uniform national application of the "modification" definition, we are requesting guidance from your offices on whether an exemption such as found at 40 CFR 60.14(e) (5) would also apply for PSD. We would appreciate a response from your offices by March 15, 1983, so we can provide timely guidance to the State and SPS.

TEXAS AIR CONTROL BOARD

6330 HWY. 290 EAST
AUSTIN TEXAS 78723
512 451-5711

January 21, 1983

Mr. Dick Whittington, P.E.
Regional Administrator
Environmental Protection Agency
Region VI
1201 Elm Street
Dallas, Texas

Dear Mr. Whittington:

On December 28, 1982, this Agency was delegated revised responsibilities for implementing the Prevention of Significant Deterioration (PSD) program in Texas. In accepting the delegation of that program, this Agency agreed to consult with the Environmental Protection Agency (EPA) Region VI on questions of interpretation of those standards and to send you a copy of each interpretation made by the Agency.

The purpose of this letter is to advise you of our conclusion that proposed changes to be made by Southwestern Public Service Company (SPS) to the existing air quality control system on Unit 1 at Harrington Station near Amarillo, Texas, would not constitute a modification of the existing facility, subjecting it to PSD review. The reasons for our opinion follow.

Harrington Unit 1 was constructed pursuant to Texas Air Control Board (TACB) Permit C-1388, which was issued on August 28, 1971. The permit limited particulate and sulfur dioxide (SO2) emissions Unit 1 to the New Source Performance Standards (NSPS) promulgated on December 23, 1971. SPS elected to control particulate emissions by using two electrostatic precipitators (ESP) with 95% control efficiency followed by six wet scrubbers which function as particulate control devices. Low sulfur coal was used to control SO2 emissions.

Unit 1 has not been able to consistently meet 20% opacity. SPS has advised this Agency that it believes a significant number of the opacity excursions can be directly correlated to the operation of the scrubbers (copy of SPS' letter dated September 21, 1981 enclosed). In an effort to reduce opacity from Unit 1, SPS has requested permission from this Agency to remove the scrubbers and, concurrently, improve the efficiency of the ESP.

Although the scrubbers' function is to control particulate emissions, they also eliminate approximately 40% of the SO2 from the stack gases. Consequently, their removal would increase SO2 emissions from 6,209 to 10,615 tons per year, although the increased level would still meet the 1971 NSPS SO2 limitation. Operation of Unit 1 without the scrubbers would not cause any change in the total emissions of suspended particulate but should result in significantly lower opacity. The reduction in opacity would occur as a result of a decrease in emissions of fine particulates, which are of special concern to many environmental health experts because they penetrate farther into the lungs and are therefore much more difficult to remove.

By letter dated December 17, 1981, Dr. Allyn M. Davis, Director of the Air and Waste Management Division of EPA, advised this Agency that the removal of the scrubbers would not constitute a modification under the NSPS program. The remaining question is whether the removal of the scrubbers constitutes a modification for PSD purposes notwithstanding the inapplicability of NSPS.

Part C of the Clean Air Act (the Act) requires that major emitting facilities on which construction is commenced after August 7, 1977, must have permits. "Construction" is defined in Section 169(2)(C) of the Act as follows:

> Section 169. "For purposes of this part -
>
> . . . (c) The term 'construction' when used in connection with any source or facility, includes the modification [as defined in Section 111(a)] of any source or facility." (emphasis added)

"Modification" is defined in Section 111(a) as "any physical change in, or change in the method of operation of, a stationary source which increases the amount of any air pollutant emitted by such source or which results in the emission of any air pollutant not previously emitted."

Although the statute clearly requires that the same definition of modification be used in both the PSD and NSPS programs, EPA has adopted regulations defining the term differently for each program. The NSPS definition in 40 CFR 60.14(a) essentially restates the statutory definition; paragraph (e) then enumerates several transactions that are not, by themselves, considered modifications. EPA determined that the SPS proposal fell within the terms of 40 CFR 60.14(e) (5) which refers to the removal or replacement of emission control systems. The PSD rules on modification in 40 CFR 52.21(b) (2) vary from 40 CFR 60.14 in that there is no specific provision similar to 40 CFR 60.14(e) (5).

Ordinarily, we would conclude that the absence of a provision such as Section 60.14 (e) (5) from the PSD regulations requires that PSD new source review apply even though NSPS does not. In the present case, however, applying PSD, but not NSPS, directly contradicts the Act's provision that the same definition apply in both programs.

It is significant that "modification" was specifically defined in the NSPS provisions of the Act, which was enacted prior to the PSD program. In setting up the procedures and criteria to be used in making the determination of NSPS applicability, EPA promulgated Section 60.14(e) (5) on December 16, 1975. 40 Fed. Reg. 58420. In 1977, Congress enacted the PSD portion of the Act, providing that the definition of "modification" be the same as the NSPS definition.

It is a well established principle of statutory construction that a legislative body in enacting statutory provisions is cognizant of previous judicial and administrative constructions concerning existing law, and does so with great care for the precise language which must be used to achieve the desired result. Congress, then, was knowledgeable of Section 60.14(e) (5) when it enacted the PSD portion of the Act and clearly intended the PSD definition of "modification" to be the same as the interpretation given modification in the NSPS regulations. Therefore, EPA should interpret its PSD regulations consistently with its interpretation of its NSPS regulations and conclude that the above transaction does not constitute a "modification" for purposes of the PSD program.

Consequently, it is the opinion of this Agency that the elimination of the scrubbers would not constitute a

modification of the existing facility and would not subject Unit 1 to PSD review. Please advise us by February 15, 1983, if you do not concur with this interpretation.

Sincerely,

Bill Stewart, P.E.

Executive Director
Enclosure

cc: Mr. John L. Blair, Chairman

SOUTHWESTERN PUBLIC SERVICE COMPANY
P.O. BOX 1251 . AMARILLO, TEXAS 79170 . 806-378-2121

Certified Mail #796609

September 21, 1981

Mr. Bill Stewart
Executive Director
Texas Air Control Board
6330 Hwy. 290 East
Austin, TX 78723

Re: Harrington Station Unit One
Letter from Ladd to Stewart 4/14/81
Letter from Bell to Ladd 8/19/81

Dear Mr. Stewart:

Please find attached documentation submitted for the consideration of the Texas Air Control Board in making a determination that removal of the scrubber, coupled with sufficient other improvements at Harrington Unit 1, will not be less environmentally beneficial than the existing control system.

Southwestern requests the TACB to make a determination that the changes in the air quality control system (AQCS) if successful, will not constitute a modification as defined in 40 CFR 60.14 (e) (5) under the New Source Performance Standards and the Prevention of Significant Deterioration Regulations and to so advise the Environmental Protection Agency.

In the event that these determinations are made by the TACB and EPA and the changes in AQCS are successful, then Southwestern intends to request from the TACB issuance of an operating permit which will allow operation of Harrington Unit 1 without the scrubber.

Please feel free to call Olon Plunk at 806-378-2194 if you have any questions.

Cordially,

Kenneth L. Ladd
Manager, Licensing and
Environmental Affairs

Attachment

cc: W. T. Seitz
Pat Finn Walker
E. T. Manning

SPS REQUEST TO TACB

FOR

ADMINISTRATOR DETERMINATION OF REMOVAL

OF

SCRUBBER AT HARRINGTON UNIT 1

SEPTEMBER, 1981

INTRODUCTION AND BACKGROUND

Harrington Station, located near Amarillo, Texas; is Southwestern Public Service Company's (SPS) first coal-fired facility. The Texas Air Control Board (TACB) issued construction Permit #C-1388 on August 28, 1973. Unit 1, which is a 360 Mw unit, began operation in 1976 and was the first steam electric power plant in Texas to burn Western coal. During the design stages a few power plants in other states were burning Western coal and problems were developing in controlling mass emissions of particulate from these sources. The best available control technology for particulate at the time of initial construction for coal- fired plants was generally accepted to be electrostatic precipitators. Coal from the western states generally has a very low sulfur content. This low sulfur content allows the coal to be combusted without significant degradation of air quality by sulfur dioxide. Unfortunately, this low- sulfur content characteristic has an adverse effect on collection of fly ash by electrostatic precipitator.

SPS became aware of these particulate collection problems through contacts with other utilities and as a result, studied some of the plants that were experiencing difficulties. In an effort to solve the problem of fly ash collection, SPS selected an air quality control system (AQCS) that consisted of two 95% efficient Research-Cottrell electrostatic precipitators (ESP) for primary fly ash removal and a final removal system consisting of six wet particulate scrubbers supplied by Combustion Engineering Company, Inc.

OPERATION OF AQCS

The operation of the AQCS system is best explained by referring to a flow diagram (see Figure 1). The coal is ground to a powder before being blown into the boiler. As the burning coal releases its chemical energy, ash is formed. The ash takes two forms: one is called "bottom ash" which, as it is formed, drops to the bottom of the boiler furnace. It is estimated that about 20% of the total ash in the coal will take the form of bottom ash and be collected as rocks which are broken-up and flushed with water to a disposal area. The second form of ash is a material of face powder consistency and is called "fly ash". About 80% of the total ash will be fly ash. The fly ash is easily blown out of the boiler furnace by the flow of flue gas.

PRECIPITATOR

An electrostatic precipitator removes the fine particulate from the boiler flue gas by passing all the particulate laden gases through a strong electromagnetic field (refer to Figure 1). The dust or particulate becomes a charged particle and is attracted to a collection surface that has the opposite charge. The collection surface is periodically cleaned by a "rap" operation whereby the particles are dropped into hoppers beneath the ESP unit. This operation may appear simple, but the mechanism is very complex and all the exact forces involved are not yet defined. The design grain loading is 2.0 grain/SCF at the inlet and approximately 0.1 grain/SCF at the outlet. The two units contain 9,472 discharge electrodes and 1,184 collector plates. Based upon the

actual gas flow the specific collecting area (SCA) is approximately 250 ft2/1000 ft3 per minute.

The scrubber system is a difficult system to design and keep operating. It is, in reality, a chemical plant inside the power plant. When the flue gases with some fly ash are exposed to spraying water, the whole atmosphere inside the scrubber becomes corrosive, muddy and subject to the formation of scale deposits as hard as concrete. The proper operation of this "chemical plant" requires careful control of many chemical reactions.

SCRUBBER

The operation of a wet scrubber may best be understood by "following" the path of a parcel of flue gas through the scrubber. The 350 degrees F gases and fly ash are cooled to about 280 degrees F by heat extractors and the heat is saved for later use. As the parcel of flue gas enters the scrubber, it is hit by an initial spray of scrubber spray water just under the marble bed. This further drops the temperature to about 140 degrees F. Some the fly ash drops into the large tank under the scrubber. The parcel moves up through a turbulent marble bed and at the same time is sprayed with thousands of gallons per minute of scrubber spray water. Carbon dioxide and sulfur dioxide gases are dissolved into the spray water. In the marble bed the particles of fly ash are contacted by the spray water. The fly ash and spray water fall into the large tanks under the scrubber. The wet flue gas continues up the scrubber where it moves through the mist eliminators where the remaining solids and moisture droplets are removed. The next step in the process reheats the gas above the dew point to about 200 degrees F to prevent condensation from

forming in the ducts, fans and the 250-foot stack. The heat required to dry the parcel of flue gas that was collected and saved in the first stage is now used to heat the wet exiting flue gas. The result should be a clean, dry gas ready for the atmosphere.

HARRINGTON UNIT 1

The AQCS for Harrington Unit 1 has been quite successful in meeting mass emissions of particulate. A New Source Performance Test (NSPS) conducted on July 19, 1977 by SPS revealed the following: .045 lbs/1,000,000 Btu input and .054 lbs/1,000,000 Btu input. However, the unit has had problems meeting the opacity standard (20%). The U. S. Environmental Protection Agency (EPA) recognized these problems and set the NSPS for opacity at 35% with one 6-minute average per hour of 42% allowed for this unit as provided for under 40 CFR 60.11 (e).

SPS petitioned the Texas Air Control Board (TACB) for an alternate standard; however, prior to granting the alternate standard, the TACB requested further testing. Based upon past experience and recent critical examination SPS believes that a significant number of opacity excursions can be directly correlated with scrubber operation. Because of opacity problems associated with the scrubber and the significant cost savings to SPS ratepayers, SPS's goal is to improve precipitator operation to the point that all environmental standards can be met without operation of the scrubber.

SPS believes that advances in the electronics industry and the electrostatic precipitator industry may allow improvements to the existing precipitator so that compliance

with the NSPS and the TACB 20% opacity standard may be achieved. Before SPS can pursue the possibility of discontinuing the operation of the scrubber at Harrington Unit 1, it is necessary to demonstrate that the additional particulate control achieved by the electrostatic precipitator is not less environmentally beneficial than continued operation of the scrubber. This is required to avoid the possibility of the source being defined as a modification as defined in 40 CFR 60.14 (e) (5) with respect to New Source Performance Standards and Prevention of Significant Deterioration.

IMPROVED ENVIRONMENTAL QUALITY

SPS believes there are three factors which could contribute to improved environmental quality in the event that the scrubber is shut down. First, discontinued use of the scrubber, even with the use of low- sulfur coal, will probably result in increased SO2 emissions. Even then, however, higher ambient concentrations of SO2 will not be continuous because of an increase in stack gas temperatures from approximately 180 degrees F to 350 degrees, because higher stack gas temperatures result in increased plume buoyancy affecting the overall plume rise. The increased plume rise ultimately contributes to lower ambient concentrations of SO2 for worst case meteorological conditions. See "Methodology", below. The second factor which could contribute to improved environmental quality is the elimination of approximately 17 tons/day of scrubber sludge. Annual quantities produced by Unit 1 are presented in Table 1.

Table 1

Year	Tons of sludge produced
1978	10,311
1979	6,584
1980	6,170

These quantities are represented on a dry basis; actual tonnages are approximately 40% higher due to water content. This is a significant quantity of sludge each day and it is presently being landfilled on site. The sludge material is actually a low grade gypsum (calcium sulfate). Its marketability is poor and as a result, SPS has not been as successful in developing any market for this sludge. In the event that the scrubber can successfully be shutdown this significant amount of scrubber sludge will not be produced.

The third factor which could improve environmental quality is the possibility of improved opacity. As previously discussed, recent critical examination of operations at Harrington Unit 1 reveals a correlation between a significant number of opacity excursions and scrubber operation. These are primarily due to low flue gas temperatures resulting from the scrubber operations and sootblowing of the heat extractor and scrubber reheaters (see Figure 1). Discontinuing use of the scrubber may help achieve lower opacity.

It is submitted that the combination of these three factors satisfies the "not less environmentally beneficial criteria."

METHODOLOGY

SPS performed computer dispersion modeling for Harrington Station during the earlier permitting process for the facility. This modeling was performed with the EPA CRSTER model

and a copy of the modeling was previously submitted to the TACB. CRSTER Model is a single source computer program designed to simulate atmospheric dispersion processes for the purpose of calculating ambient concentration levels of atmospheric contaminants. CRSTER has the capability of predicting both short-term and long-term concentrations. We understand that the TACB executed an expanded version of TEM-8 modeling, utilizing a full year of Amarillo meteorology. TEM-8 (Texas Episodic Model Version 8) is a Fortran computer program developed by the TACB designated to predict ground level, short-term concentrations of atmospheric pollutants.

A review of the modeling, with the EPA's CRSTER model, indicates that day 309 exhibits the meteorology which creates the highest ambient concentrations of SO2 for the 24-hour averaging time. Results of TACB modeling also indicate day 309 is the day that meteorology causes the highest ambient concentrations. In addition, the expanded version of TEM-8 predicts that day 334 results in the highest 3-hour average concentration of SO2 with the existing operation.

Based upon the previous SPS results with the CRSTER program and the TACB expanded TEM-8 model, SPS performed additional modeling using the TEM-8 model with meteorological data from day 309 and day 334 of the 1964 Amarillo weather data. This modeling was determined for two cases, first with the scrubber in service and second, with the scrubber not in service. The highest concentrations predicted by the modeling is presented in Table 2.

Table 2

Averaging Time	W/O Scrubber ug/m3	W/Scrubber ug/m3	NAAQS ug/m3
3 hr.	58.4	64.1	1300
24 hr.	21.0	13.1	365
Annual	0.47	0.59	80

Under these worst case conditions for the existing scrubber operation, and based upon the 3-hour averaging time, ambient concentrations of SO2 are actually less with the scrubber off than with continued scrubber operation. These concentrations are approximately 5% of the secondary ambient air quality standard. However, for the worst case 24-hour averaging time, the operation without the scrubber is higher than with scrubber operation. These ambient concentrations of SO2 are only 5.8% of the primary ambient air quality standard.

The 24-hour worst case does not appear to be a significant representation of the average ambient air quality because of the annual average results. The annual average concentration has been predicted by using the Texas Air Control Board TCM-2 model. TCM-2 (Texas Climatological Model Version 2) is a Fortran computer program developed by the TACB designed to predict ground level, long-term concentrations of atmospheric pollutants. This model also predicts a smaller highest concentration without the scrubber than with the scrubber. This is due to the fact that under most meteorological conditions the additional plume rise will cause the ambient concentration to be less, even though the emission rate may be higher. These concentrations are 0.6% of the annual standard without the scrubber and 0.7% with the scrubber.

CONCLUSIONS

Operation of Harrington Unit 1 without the scrubber will have no significant adverse impact upon ambient air quality. In fact, annual average and worst case 3-hour average concentrations of SO2 are predicted to be less. Discontinued use of the scrubbers at Harrington Unit 1 will also result in the reduction of approximately 17 tons/day of scrubber sludge, making land resources available for other uses.

HARRINGTON UNIT No. 1

Air Quality Control System Schematic Flow Diagram

Figure 1

(Is Located Here)