Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

June 21, 1999

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JUN 22 1999
BUREAU OF
AIR REGULATION

Mr. Walter P. Brussells
Managing Director and Chief Executive Officer
Jacksonville Electric Authority
21 West Church Street
Jacksonville, Florida 32202-3139

Dear Mr. Brussells:

We have received a response from EPA concerning your request for approval of alternate sampling procedures.

Pursuant to the EPA findings, the request for approval to demonstrate compliance using the continuous emissions monitoring systems for nitrogen oxides and sulfur dioxide emissions in lieu of an annual stack test for compliance does not require approval of an alternate sampling procedure in this case. The use of CEMS for continuous compliance is already a requirement of the applicable provisions of 40 CFR 60 Subpart Da. Also, the request for approval to use the continuous opacity monitors as the means to determine compliance with the applicable opacity standard does not require approval of an alternate sampling procedure since it is already allowed as an option in 40 CFR 60.11(e)(5).

The request for approval to use EPA Method 29 results to demonstrate compliance with the applicable emissions limiting standard for particulate matter does not require approval of an alternate sampling procedure. The use of EPA Method 29 for the measurement of particulate matter is already identified as an option in the method and the procedure is the one found in EPA Method 5 which is the particulate method required for this source pursuant to 40 CFR 60 Subpart Da.

We have no problem with the above findings providing all of the conditions of EPA's June 3 letter are met. If you have any questions, please call Martin Costello at 850/921-9511 or write to me.

Sincerely,

Paul J Brandt for:

M. D. Harley, P.E., DEE
P.E. Administrator
Emissions Monitoring Section
Bureau of Air Monitoring and
Mobile Sources

MDH/mh
Enclosure
cc: Al Linero, DEP BAR
Kris Kirts, DEP NE District
Robert Pace, RESD

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

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Bureau of Air Monitoring & Mobile Sources

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4APT-ARB

Mr. M.D. Harley, P.E., DEE
P.E. Administrator
Emissions Monitoring Section
Bureau of Air Monitoring and
Mobile Sources
Department of Environmental Protection
Division of Air Resources Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

SUBJ: Alternative Sampling Procedure Requests for Units 1 and 2 at Jacksonville Electric Authority Northside Generating Station, Jacksonville, Florida

Dear Mr. Harley:

The purpose of this letter is to provide you with a written determination regarding several alternative sampling procedure (ASP) requests contained in the enclosed letter that the Jacksonville Electric Authority (JEA) sent to the U.S. Environmental Protection Agency (EPA) on April 16, 1999. As part of a repowering project for Units 1 and 2 at the Northside Generating Station, JEA will be installing two new circulating fluidized bed boilers, and these boilers will be subject to 40 C.F.R. Part 60, Subpart Da (Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978). Based upon our review of the ASP requests from JEA, we have determined that they are all acceptable if certain conditions are met, and details about the specific requests and the basis for our conclusions are provided in the remainder of this letter.

The first request in the letter from JEA was that they be allowed to determine compliance with the applicable nitrogen oxides (NO_x) and sulfur dioxide (SO_2) standards in Subpart Da using data from continuous emission monitoring systems (CEMS) that will be installed and certified on Units 1 and 2. According to the letter from JEA, the company wants approval to determine compliance with these monitors as an alternative to determining compliance using reference stack test methods. After reviewing this first request, we have determined that using CEMS to demonstrate NO_x and SO_2 compliance under Subpart Da does not actually constitute an ASP since 40 C.F.R. §60.48a requires that CEMS be used for demonstrating compliance with the NO_x and SO_2 standards in this regulation. Since the compliance approach that JEA refers to as alternative to stack testing is actually the compliance method specified in the applicable rule, EPA approval of this approach as an ASP is unnecessary.

The second request from JEA is that they be allowed to use EPA Method 29 test results to demonstrate compliance with the applicable particulate standard in Subpart Da. Method 29, which is a method used for measuring the concentrations of various metals in flue gases, would be an ASP in this instance since 40 C.F.R. §60.48a(e) identifies Methods 5, 5B, and 17 as the ones that are to be used for determining compliance with the particulate emission standard in Subpart Da. Based upon the fact that Section 1.1 of Method 29 indicates that this method can be used for determining particulate emissions if prescribed procedures and precautions are followed, we have determined that the second ASP requested by JEA is acceptable. Specific analytical procedures to follow so that Method 29 can be used to measure particulate emissions in addition to metals emissions are promulgated in Sections 5.3.1.1 and 5.3.2 of the method. So long as JEA follows these procedures, using Method 29 instead of Methods 5, 5B, or 17 to measure particulate emissions from Units 1 and 2 would be acceptable.

The third issue addressed in the letter from JEA is the approach that the company wants to use for determining compliance with the applicable opacity standard during the initial performance test on Units 1 and 2. According to its letter, JEA wants to demonstrate compliance with the applicable opacity standard in Subpart Da using results from the continuous opacity monitors that will be installed and certified on Units 1 and 2. This would be an alternative to using the EPA reference test method for opacity (Method 9) to determine compliance, but the approach proposed by JEA is acceptable since it is an option allowed under 40 C.F.R. §60.11(e)(5) if the owner or operator of an affected facility provides notification at least 30 days in advance of the test.

If you have any questions about the issues addressed in this letter, please contact Mr. David McNeal of my staff at 404/562-9102.

Sincerely,

Douglas Neeley

R. Douglas Neeley
Chief
Air and Radiation Technology Branch
Air, Pesticides and Toxics Management Division

cc: Al. Linero, FDEP
Syed Arif, FDEP

21 West Church Street
Jacksonville, Florida 32202-3139

JEA

April 16, 1999

Gregg Worley
U.S. Environmental Protection Agency
Region IV
61 Forsyth Street, SW
Atlanta, GA 30303

RE: JEA Northside Units 1 and 2 Repowering Project, PSD-FL-265
Request for Approval of Alternative Test Methods under NSPS
And Notification of Use of Continuous Opacity Monitors

Dear Mr. Worley:

JEA recently submitted an application for a Prevention of Significant Deterioration (PSD) air construction permit to the Florida Department of Environmental Protection (DEP) for two new circulating fluidized bed (CFB) boilers to be used to repower existing Units 1and 2 at the Northside Generating Station in Jacksonville, Florida. Those repowered units will be subject to the ~~Subpart Da~~ New Source Performance Standards (NSPS, 40 CFR Part 60). As part of the permitting process, JEA is hereby requesting authority to use alternative methods of compliance for certain parameters, and providing notice that it intends to use continuous opacity monitors for compliance under the NSPS regulations.

Specifically, JEA requests approval to use CEMS's installed, certified, operated, and maintained under the federal Acid Rain Program (40 CFR Part 75) for sulfur dioxide and nitrogen oxides as alternative compliance methods to be used in lieu of the EPA reference method stack tests specified under 40 CFR s. 60.48a. EPA has the authority to approve such alternative methods under 40 CFR s. 60.8(b), provided that such methods are adequate to indicate whether a specific source is in compliance. Because the CEMS's under the Acid Rain Program are relatively accurate to demonstrate compliance, JEA requests approval to use these CEMS's under the NSPS program as well.

In addition, JEA requests approval to use EPA Method 29 to demonstrate compliance with the NSPS particulate matter limit under 40 CFR 60.47a. This test method, which is an EPA reference method under Appendix A of 40 CFR Part 60, should be equivalent to EPA Methods 5, 5B and 17 authorized under 40 CFR s.60.48a.

Further, JEA hereby provides notice as required under 40 CFR s. 60.8(e)(5) that continuous opacity monitor data will be used to demonstrate compliance with the visible emission (opacity) standards under 40 CFR s. 60.42a for the above-referenced units. These continuous opacity monitors will be installed, certified, operated, and maintained under the federal Acid Rain Program (40 CFR Part 75). JEA requests that if there are any discrepancies between the performance specifications under 40 CFR Part 60, Appendix B, and 40 CFR Part 75, that the latter control.

Thank you for considering our request. We are hoping to receive a proposed permit in early May and a final permit approximately 45 days later. We would like to receive a response before the final permit is issued if at all possible and would appreciate any assistance you can provide to expedite this process. Should you have any questions or require additional information to support our request, please call Bert Gianazza with JEA at 904-665-6247.

Sincerely,

Walter P. Bussells
Managing Director & Chief Executive Officer

cc: A. A. Linero, DEP, BAR
Syed Arif, DEP, BAR
Rita Felton-Smith, DEP NE District
Robert S. Pace, RESD
Ellen Porter, USFWS

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4/15/99

21 West Church Street
Jacksonville, Florida 32202-3139

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JUN 16 1999
BUREAU OF
AIR REGULATION

JEA

June 15, 1999

Clair H. Fancy, Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RE: Minor Revision to JEA Northside Units 1 and 2 Repowering Project Air Construction Permit Application and Comments on Proposed Permit No. 0310045-003-AC (PSD-FL-265)

Dear Mr. Fancy:

JEA is in the process of selecting a vendor to supply the sulfur dioxide air quality control system (AQCS) for the Northside Units 1 and 2 Repowering Project. As a result of obtaining information from potential vendors, JEA has recently learned that another option is available for the control of sulfur dioxide emissions. This option is very similar to the systems already described in the air permit application filed with the Department in February and comes with the same emission guarantees as the other systems (a copy of the vendor literature and technical paper is attached). JEA is therefore revising its air permit application to address this other option and requests that it be considered in the Department's final determination to be made within the next few weeks.

Specifically, ABB Environmental Services (ABBES) has proposed an AQCS that they call the Novel Integrated Desulfurization System, or NIDS. The system is essentially the same concept as the Circulating Fluidized Bed Scrubber offered by Environmental Elements that was described in the permit application. ABBES implements the concept in a somewhat different fashion, however, with the most notable difference being that they propose to use four SO_2 reactors per boiler followed by pulse jet fabric filters. Environmental Elements has proposed one reactor per boiler followed by an electrostatic precipitator. Two 120 MW NIDS units have been in operation for four years at the Laziska Station in Poland with measured SO_2 removal efficiencies of 95%. The fabric filters are conventional technology with proven capability to meet our requirements.

We have had discussions with Mr. Arif, the permitting engineer for the project, regarding this new option for the control of SO_2 emissions and based on those discussions do not expect any interruption of the current permitting schedule to result. If after further review you or members of your staff determine that consideration of this information might cause a delay in the schedule, please let Bert Gianazza with JEA know as soon as possible.

Thank you for your continued cooperation and assistance with this project. We have enjoyed working with your staff on this project, and have been impressed with your staff's consideration of our scheduling needs. We look forward to receiving the final construction permit soon. If you have any questions in the meantime, please do not hesitate to contact Mr. Gianazza at 904-665-6247.

Sincerely,

Walter P. Bussells
Managing Director & Chief Executive Officer

Enclosures

cc: A. A. Linero, DEP
Syed Arif, DEP
Cleve Holladay, DEP
Hamilton S. Oven, Jr., DEP Siting
Scott Goorland, DEP OGC
Rita Felton-Smith , DEP NE District
Robert S. Pace, Jacksonville RESD
Gregg Worley, EPA Region IV
Ellen Porter, U. S. Fish and Wildlife Service
Jerry Hebb, U. S. Department of Energy

NID -

A New Dry Flue Gas

Desulfurization System

Stefan Åhman
ABB Fläkt Industri AB
S-351 87 Vaxjo, Sweden

John Buschmann
ABB Environmental Systems
1400 Centerpoint Blvd.
Knoxville, TN 37932-1966

Abstract

This paper describes a New Integrated dry flue gas Desulfurization (NID) System which has been developed by ABB. By the integration of the desulfurization and particulate removal into one unit it is possible to lower costs and to lower the space requirements of the DFGD system.

In addition to the design simplification, the system shows better SO2 removal performance and lime utilizations than existing DFGD systems. The new technology is modular, allowing for flexible system design in any size required. The process was developed at the ABB R&D facilities in Växjö, Sweden during 1994-96.

Tests in pilot plants and a demonstration plant at a Polish power plant were very successful. The first commercial installation (2x 120 MW) was started up in the autumn of 1996. The paper reports on the results of the development efforts and highlights the first commercial experience.

Introduction

The need for a simple and reliable, low cost desulphurization system was identified by ABB as a strategic issue, especially for the emerging markets in Asia and East Europe. A dry flue gas desulphurization (DFGD) technology was assessed to be the preferred method of choice.

The method should be able to achieve at least 80 % SO2 removal on low and medium sulfur coals. The system should further be easy to retrofit at existing sites; it should thus have minimum space requirements. An important feature of the DFGD technology, sometimes not highlighted enough, is the fact that particulate collection of fly ash is facilitated by the FGD system at no extra capital charge. The flue gas temperature after a DFGD system also often allows the flue gas to be passed on to an existing stack without reheat.

All these factors were weighed in as ABB decided to develop the new DFGD system "NID". "NID" is an acronym for "Novel Integrated Desulphurization" indicative of the innovative nature of this FGD technology enabled by the integration of several process steps into one unit.

The development work has followed a very fast track. A decision was made in the spring of 1994 to go ahead with the development after initial conceptual studies.

In June 1994, the Polish power company "Elektrownia Laziska" placed an order with ABB for a fabric filter (FF) after its boiler # 2 for high efficiency collection of fly ash. At this time an agreement was signed between Elektrownia Laziska and ABB to install and test the new NID concept for flue gas desulphurization on one of the compartments of the new fabric filter.
Remaining development work was made at the ABB R&D facilities at Växjö, Sweden, concurrent with designing the demonstration unit. The demo plant was started up in February 1995 and has been in operation for several test periods since that time.

Based on the satisfactory results from the demo plant, Elektrownia Laziska placed orders with ABB for the extension of the NID technology to their two 120 MW boilers (#1 & #2). Both full scale FGD units were commissioned during 1996.

The NID Process

The NID process is based on the absorption of SO2 by a dry absorbent containing quicklime (CaO) or dry hydrated lime, Ca(OH)2. Either of these absorbents may be used or e. g. a fly ash containing an appropriate amount of alkali.

The key parameter to be controlled in any dry FGD process is the humidity of the flue gas. At a relative humidity of 40 - 50 % the hydrated lime becomes activated and absorbs SO2. The relative humidity of the flue gas is increased by the injection of water into the flue gas. In a conventional DFGD process, water and lime is supplied to the flue gas as a slurry (with or without recycle) with a solids content of 35 - 50 %. In the NID process, the same amount of water is injected into the flue gas, but it is distributed onto the surface of dust particles at a water content of only a few percent.
Thus, the amount of absorbent which is recycled is much bigger than in a conventional DFGD process. This means that the surface available for the evaporation is very large. Thus, the time for drying of the dust added to the flue gas is *very* short, which in turn makes it possible to use very small reactor vessels compared to conventional spray dryer technology. The resulting increase of the relative humidity of the flue gas is sufficient to activate the lime for absorption of SO2 at typical DFGD operation temperatures of 20-40 deg F above saturation. Figure 1 below illustrates the steps of wetting and drying the recycled absorbent in a conventional DFGD and a NID system.

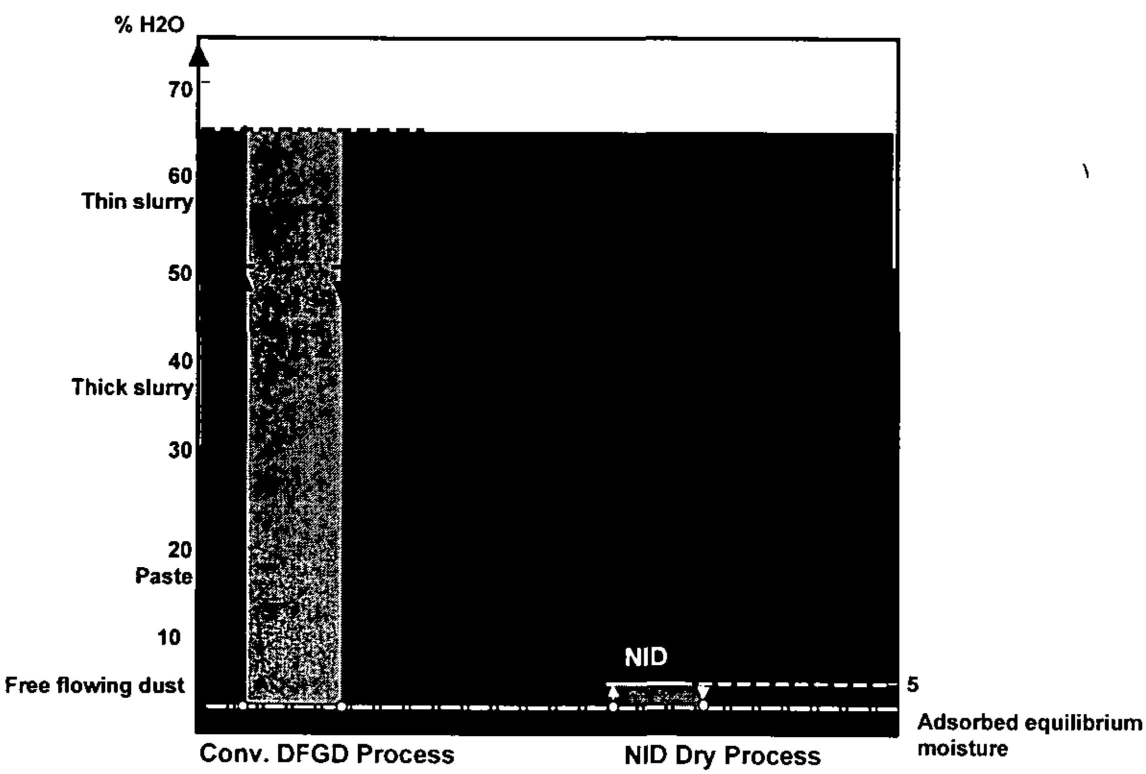


Figure 1. Illustration of difference between slurry based vs. wetted dust based DFGD processes

Water is added to the absorbent in a humidifier prior to its introduction into the flue gas. A unique feature of the NID technology is the fact that *all* recycled absorbent is being subject to wetting and activation in the humidifier, which maximizes the utilization of the recycled absorbent. After the activation/drying step, the dried recycle dust is separated from the flue gas in an efficient dust collector, preferably a fabric filter (FF). From here the dust is again fed to the humidifier, to which make up lime is added as well. Water is fed to the humidifier in a quantity sufficient to maintain a constant outlet flue gas temperature. The control system uses a feed forward signal with back trim, based on the in- and outlet flue gas temperatures, supplemented by a signal indicating the gas flow. The outlet SO2 concentration is controlled in a similar way; the in- and outlet SO2 concentrations plus the flue gas flow determines the lime flow to the system. The main features of the NID process are shown in figure 2 below. As indicated, the FGD waste product accumulates in the hopper of the dust collector, and as the maximum level of the hopper is reached, the waste product leaves the system by overflow.

The NID process is thus characterized by a very high recycle rate, which in turn means that the utilization of the reagent is maximized. As indicated above, the high recycle rate also means that there is a large surface area available for the rapid evaporation of water, which in turn means that the volume of the reactor/dryer for the NID process is an order of magnitude less than the corresponding size of a conventional dry flue gas cleaning system based on spray dryer technology.

Further, the need for sophisticated special equipment is minimized in the NID process. There is no rotary atomizer with its high speed machinery; nor are there any dual fluid nozzles with their need for compressed air. Power requirements for the mixing of the recycle/reagent in the humidifiers are much lower than for the corresponding items in a conventional dry flue gas cleaning system: by comparison rotary atomizers and dual fluid nozzles appear much more complex than the NID humidifier. An important consequence of using humidifiers rather than nozzles or rotary atomizers is that all equipment that needs operator's attention is placed near ground level, in an enclosure common with the fabric filter. This arrangement means lower cost and increased ease of maintenance.

Finally there is no slurry handling with requirements for special pumps etc., since water is added directly to the NID humidifier. The high recycle rate also means that only dry material is handled in the system. The system is thus free from build-ups in gas ducts etc., since there is no wet slurry that can impinge on surfaces in the installation.

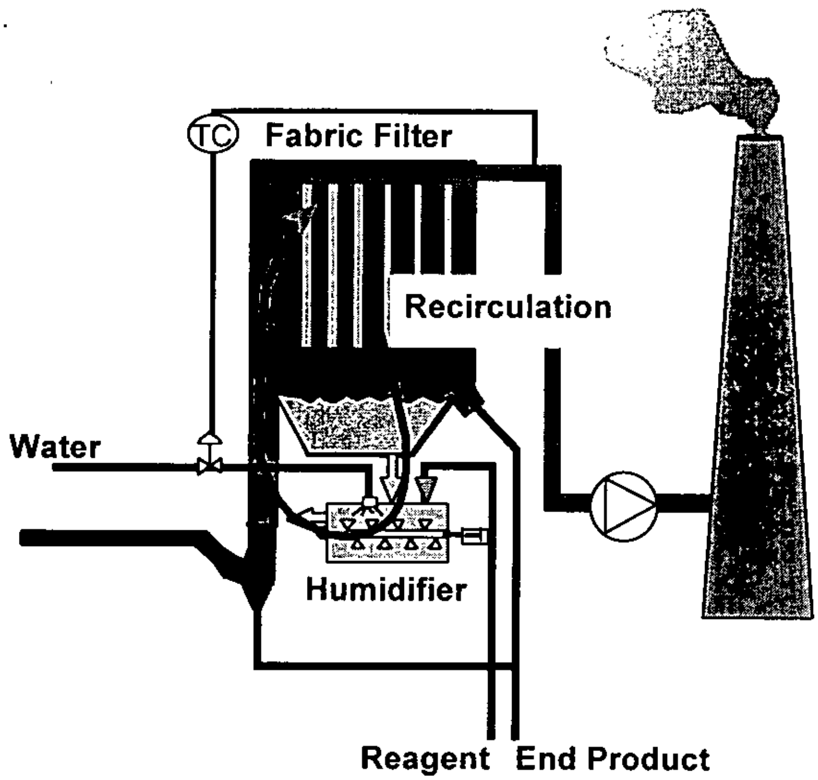


Figure 2. The main features of the NID process: High recycle rate means rapid drying and a small reactor size, paired with a high utilization of the reagent.

The Fabric Filters after Laziska # 1 - 2 boilers

The boilers # 1 - 2 at Laziska are pulverized coal fired ,each rated at a power output of 120 MW. The fuel is domestic bituminous coals from nearby sources.

In the initial phase, the FFs were supplied for the collection of fly ash only, without the capability for desulphurization. The FFs handle all of the flue gas from the boilers and are capable of treating a nominal gas flow of 2 x 420,000 ACFM.

The FF is the high ratio type using ABB's Optipulse LKP design. The filtration is from the outside of the filter bags, inwards through a dust layer deposited on the surface of the bags and eventually through the felted fabric itself. Cleaning is by sending a pulse of compressed air backwards through the bags, which make the dust fall off the bag into the hopper below. The bags are cleaned to maintain a constant differential pressure drop over the FF. The filter media used is Acrylic which can withstand a max. temperature of 280 deg F. In case of a higher gas inlet temperature, the flue gas is cooled by ambient air dilution to protect the bag material from high temperature excursions. The guaranteed dust outlet emission is a maximum of .012 gr./ACF.

NID Demonstration Plant

The NID demonstration unit was installed on one of the fabric filter compartments of the FF on unit # 2. Initial supportive testing in the ABB R&D Laboratory at Växjö, Sweden, was much focused on the issues of dust wetting and operating performance of the full scale unit. Efficient and homogenous dust wetting is a key issue for the success of the NID process. The wetting aspects were studied separately in a semi-commercial scale humidifier, utilizing a mixture of fly ash and lime. After concluding this study, the humidifier was added to an aerodynamic flow model, which allowed for testing of the combined systems for wetting and dust dispersion into the flue gas. Computational fluid dynamics (CFD) modeling of the process was performed in parallel with the lab work. Information gained from the laboratory testing was then utilized for the design of the demo- and full scale units.

The nominal gas flow of the demo unit was 36,000 ACFM. Depending on the fuel fired, the SO2 content of the flue gas varied between 600 - 1200 ppm. The flue gas temperature was approximately 250 deg F.

The principle of the NID demo installation is shown in figure 3 below.

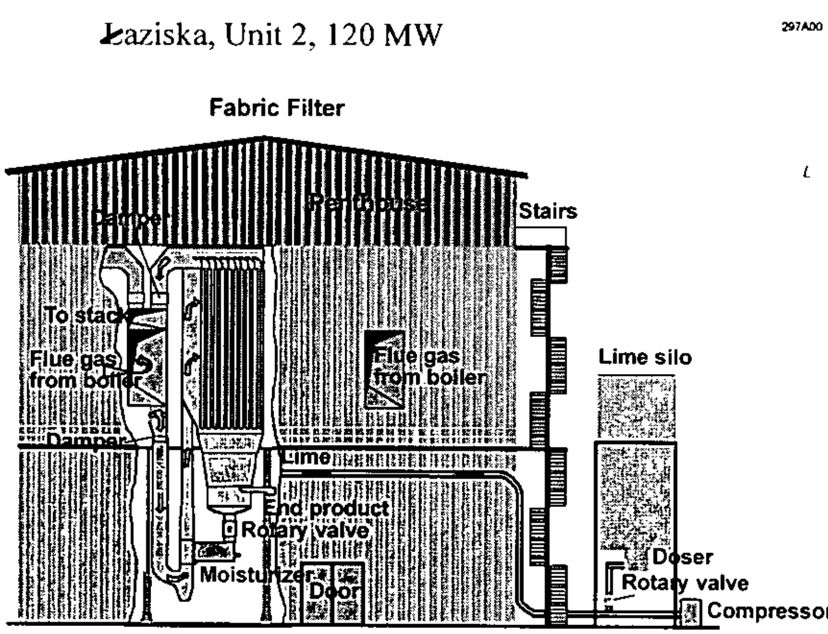


Figure 3: The NID Demo Plant at Laziska Power Station, Poland

The flue gas is taken from a common inlet flue gas manifold into a vertical duct, making up the inlet to the NID reactor. In the reactor, the flue gas is intimately mixed with wetted dust, which consists of a mixture of absorbent and recycled material, i. e. reaction products of SO_2 and absorbent, mixed with fly ash. The NID reactor is connected directly to the FF and the gas thus enters into the set of bags in a horizontal flow pattern. Upon reaching the bags, the particles are separated from the gas. The flue gas passes through the filtration media and is then ducted to the flue gas ID fan. The FF is cleaned by pulses of compressed air, which dislodges dust into the FF hopper. Here make up absorbent is added before the recycled material is sent to the humidifier, placed immediately below the FF hopper. In the humidifier, water is added to the recycled material in a controlled proportion to maintain the desired outlet flue gas temperature. Lime is stored in a 60 ton silo. From the silo the lime powder is transported pneumatically to the FF hopper, and thus introduced into the flow of recycled material. The lime addition is controlled via a signal from an SO2 meter at the outlet duct which sets the speed of a rotary feeder at the silo discharge.

Demonstration test program

Testing of the demonstration plant started in late February 1995. During the test campaigns a set of different operation cases and parameters were investigated. Performance with CaO vs. Ca(OH)2 was explored for various coal qualities. An important task was also to confirm turndown capabilities and pressure drop of the dust dispersion reactor and the mixer performance at high dust throughputs. Special testing of the fabric filter operation and its performance was carried out as well.

After testing was concluded, the demo plant was thoroughly inspected, searching for corrosion, signs of dust build-ups etc. or any other type of possible damages to the process equipment etc..
The results of the intense operation and testing of the NID demo were very encouraging.

The goal stated before the pilot tests started, was to reach at least 80 % SO2 removal efficiency at realistic operation conditions. This efficiency target was reached with good margins at normal test conditions; efficiencies in the 90 - 95 % range were easily and consistently obtained.

The fabric filter in the NID demo plant acts both as a particulate collector and as an additional SO2 absorber. The tests indicated that the fabric filter withstood the very high inlet dust concentration very well and that it would operate without any problems. Measurements of the outlet dust concentration showed that the dust emissions are still maintained at a very low level, in spite of the operation of the NID process. The operation of the humidifier, where lime, recirculated material and water are mixed together, was confirmed to be satisfactory. The system to disperse the absorbent/dust mixture in the inlet duct was also working well; no deposits or other signs of malfunctions were found when inspecting the equipment after operation.

The reagents tested were dry hydrated lime , $Ca(OH)_2$, and quicklime, CaO. There is an advantage to use CaO directly rather than dry slaked $Ca(OH)_2$, due to the additional cost of the latter absorbent. The slaking of the quicklime into the hydrate is integrated in the NID process and no extra slaking equipment is needed. However, if used directly in the process, slightly more CaO is needed than when using $Ca(OH)_2$. The active specie is, however, Ca(OH)2 in both cases, The slaked lime reacts with the sulfur dioxide in the flue gas and the reduction of SO2 occurs both in the inlet duct and in the dust cake formed on the filter bags of the fabric filter.

Figure 4 shows the SO2 removal efficiency at typical test conditions and when using quicklime, CaO, as the absorbent. The fluctuations in the SO2 reduction are due to differences in the inlet SO2 concentrations. (The peaks round 13.20 are due to a deliberate stop of the NID pilot plant.)

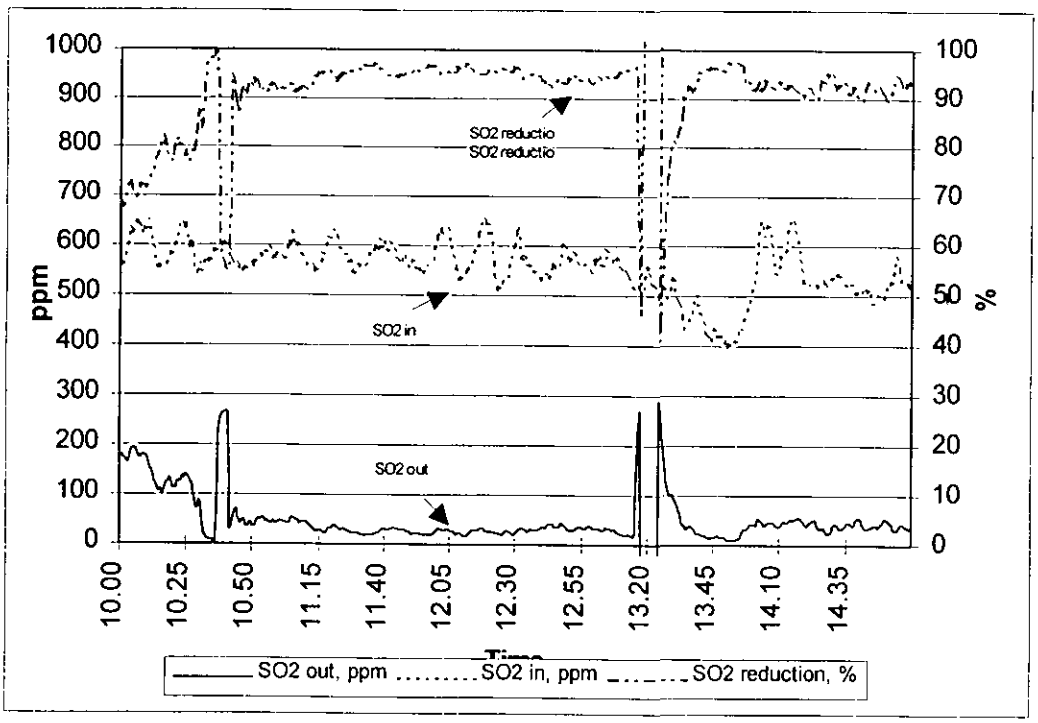


Figure 4. Example of SO2 in- and outlet concentrations and SO2 removal efficiency when using CaO as the absorbent.

During the pilot test campaign, runs were made with both process water (cooling tower blow-down) and drinking water quality. The results show that process water has some negative impact on the slaking process compared to the use of drinking water. The difference can, however, be compensated by adding some extra lime.

The operation and testing of the NID demo plant at the Laziska power plant was an extremely important step in the development of the NID process for desulphurization of flue gases from coal fired boilers. The goal of a minimum SO2 absorption of 80 % was achieved with very good margins. Likewise, the dust emissions were very low, according to the testing done at site.

The experience gained also strongly indicated that the process can be accomplished in the equipment as designed; the remarkably small reactor volume and the integrated features of the process were demonstrated to take place without any secondary problems like dust build ups etc..

Full Scale Application of the NID Technology

General

For the full scale plant, it was decided to install a commercial type dry lime hydrator. Although the operation on quicklime alone was proven in the demo, it was felt that this additional new process feature would add unnecessary risk to the project. A flow sheet of the full scale installation is shown in figure 5 below.

Certain other scale-up and modifications of equipment were necessary for the full scale plant.
The flue gas from the boiler to the FF is transported in two main flue gas ducts, each with its individual ID flue gas fan. Each main flue gas duct then branches off into two FF compartments, which each can be isolated by inlet and outlet dampers. This means that there are four separate FF compartments; each of which is equipped with a hopper for recycled dust from the FF bags. From each of these four hoppers the recycled dust is fed with rotary feeders to the humidifiers. Finally, after wetting in the humidifiers, the recycled dust is fed back into the inlet ducts via short air slides. This arrangement allows for partial load operation by taking compartments/mixers off line. See figure 6 below.

Quicklime is fed from a silo into the dry hydrator, from which the dry hydrated lime is pneumatically transported to the two FGD units.

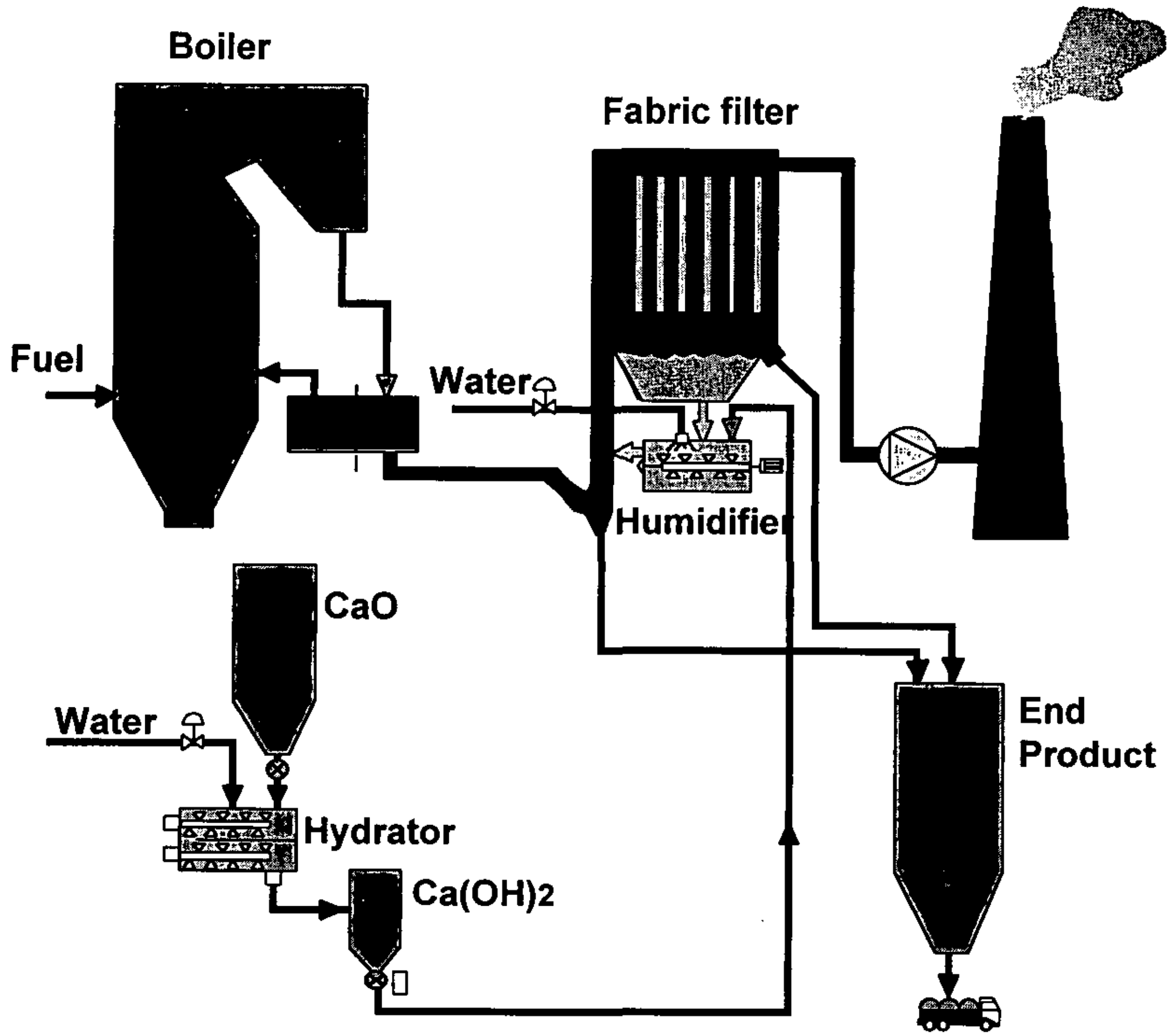


Figure 5. The NID process as configured at the Laziska Power Station in Poland.

Lime is also added to the each of the humidifiers and the waste product is taken out from the FF hopper via an overflow weir into mechanical conveyors, which also pass through the bottom part of the inlet ducts. The latter as a precaution, should any fallout of dust occur below the injection point of the recycled material. The conveyors transport the waste material to a end product silo, from which it is pneumatically conveyed to a landfill or is collected by silo trucks for utilization as a filler in coal mines.

All humidifiers are placed on a common level below the FF hoppers. This means that they are all easily accessible for inspection and service.

There are two main control loops, one for the addition water to the humidifier for temperature/moisture control of the outgoing flue gas, the other one for the outlet SO2 concentration based on a feed forward signal with back trim.

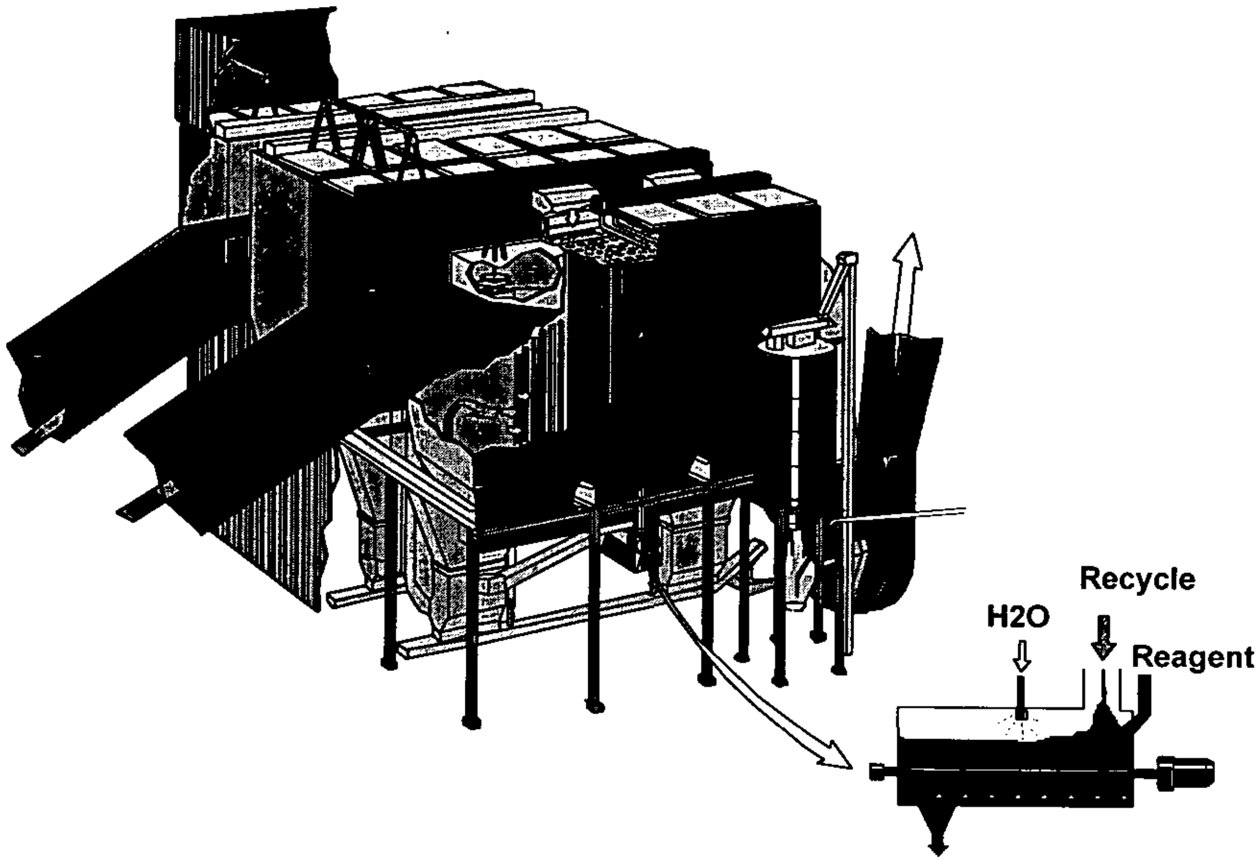


Fig 6. NID installation at Unit # 2, Laziska Power Station, Poland

Operational Experience

The commissioning and testing of the full scale plant took place in several steps. In February 1996, the first full scale humidifier was installed at the NID system at unit #1. A series of aerodynamic testing and optimization efforts followed. It was concluded that the operation of the FF-hopper/rotary feeder/humidifier was as expected. Changes were made in the automatic start-up sequence to facilitate a smooth initial operation after bringing the NID on line. It was further confirmed that the pressure drop over the unit was fully within expectations from the laboratory model testing and the CFD-modeling. In August 1996 all four gas paths of unit # 1 were successfully brought on line. The start up of unit # 2, followed later in the autumn of 1996.

As always when applying a new technology in full scale, some operational problems have appeared. When analyzing the flow pattern at the FF inlet, it was concluded from the laboratory flow model testing, that some high velocity areas existed. As a precaution, wear protection plates were added to minimize the possible adverse effect of dust erosion of the front bags at the FF inlet. However, after some 1000 hours of operation in the NID mode, it became apparent that the protected area had to be increased, since some front bags were found to be damaged by erosion. The problem was alleviated by installing additional bag shielding; since this arrangement was installed, no further bag damages have been reported.

Another area which has caused occasional problems is the dry lime hydration with subsequent storage and pneumatically transport. The dry lime hydrator is per se commercially available, however, the application of this type of equipment in a flue gas desulfurization system is very scarce.

The problems encountered are caused by the fact that lime quality often varies and that typical operation of a lime hydrator in the lime industry is manual. Several modifications in this area have been made. First, the control system of the hydrator has been modified, and is now supplemented by regular manual sampling of hydrated product. In addition to this, the silo for the hydrated lime has been modified including a change out of the rotary feeders, supplying the hydrated lime to the pneumatic transport lines. The rotary feeders originally provided did not seal tightly enough to accurately meter the lime feed.

Guarantee performance testing was carried out in the spring of 1997 and all guarantee points were met successfully.

Summary

The NID dry flue gas desulphurization system has been developed through the phases of idea, conceptual designs, laboratory testing, field demo, and the first full scale application in a very short period of time. In spite of the time pressure the targets set for the development work have been exceeded and the technology is now being commercially implemented. A next generation of NID with still further optimized features is also under way. Recently ABB obtained an order for a NID system to be installed in a 35 MW diesel power plant to be fired with high sulfur oil. This is only one of many additional applications where the NID technology will be used in the future.

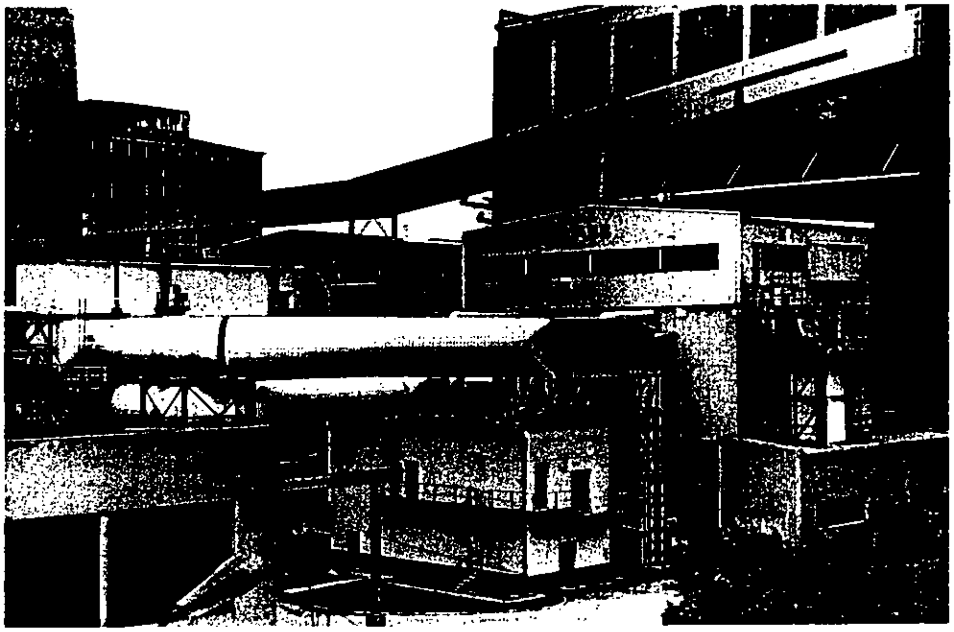
The NID technology offers a simple, low cost desulphurization system with high performance, minimum space requirements and easy access. The fact that the combined full scale plant for the removal of fly ash and SO2 can be fitted into the space of the existing electrostatic precipitators may also be of particular interest for further application of the NID technology for retrofit situations.

Acknowledgment

The kind support by Elektrownia Laziska in all matters, irrespective if small or big, is gratefully acknowledged by all ABB personnel involved in the NID development effort.

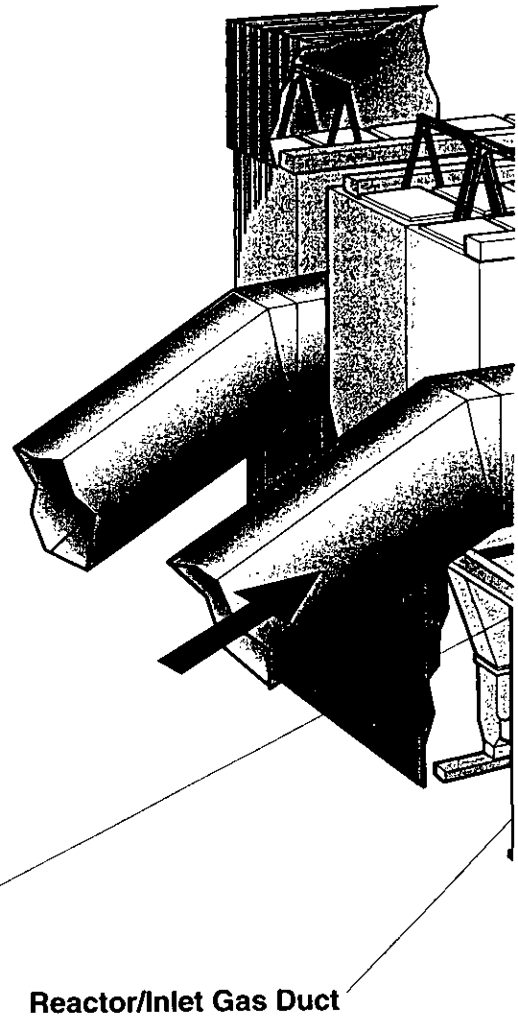
NID System

Dry Flue Gas Desulphurization



NID Technology*

The New Integrated Desulphurization (NID) system is a dry Flue Gas Desulphurization (FGD) process based on the reaction between SO_2 and $Ca(OH)_2$ in humid conditions. The process utilizes an innovative combination of knowledge from many years of ABB experience in spray drying FGD systems and other dry processes in flue gas cleaning.



Advantages of NID

- Lower investment cost
- Less maintenance due to less equipment
- Reduced power consumption
- Compact reactor design housed under the particle collector
- No precollector required
- Low reactive reagent can be used
- High SO_2 removal efficiency

The SO_2 efficiency is high, 90 to 95% with lime stoichiometries on par with conventional spray drying FGD.

Fabric Filter/Reactor

The use of fabric filter is a distinct advantage in a dry FGD system. The cooled humid flue gas provides excellent filtration and reaction conditions, resulting in the following advantages:

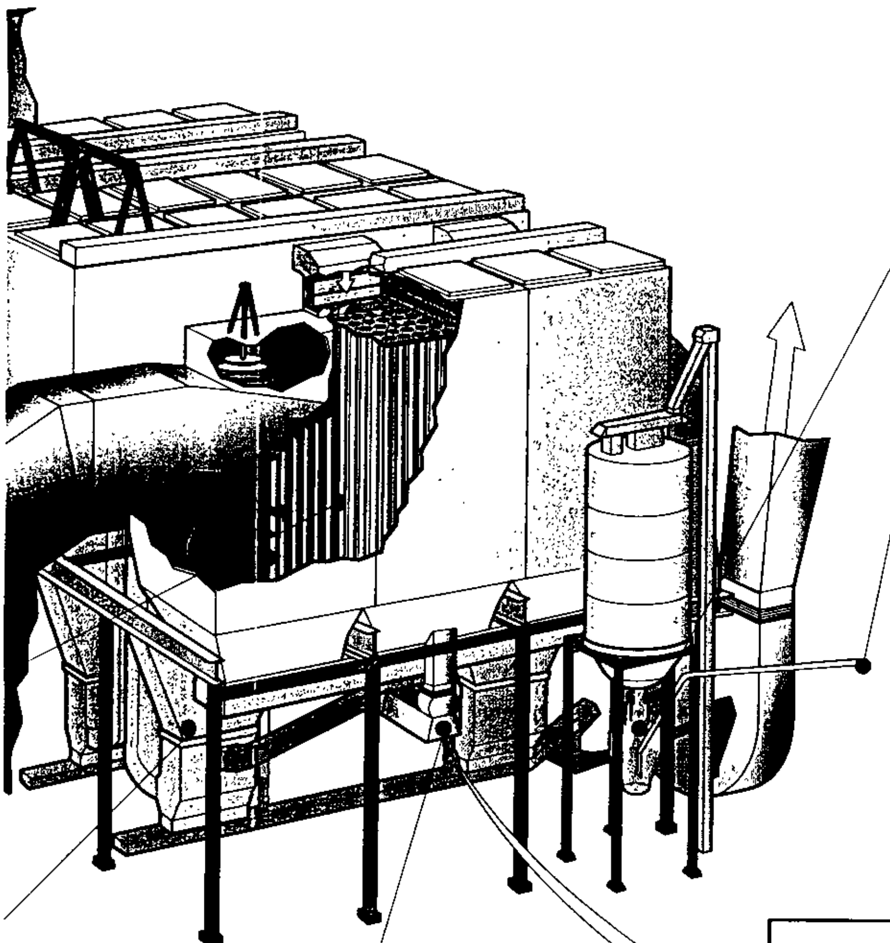
- very low particulate emissions (not sensitive to coal type and a minimum of submicron toxics)
- additional gas sorption (SO_2, HCl, SO_3, HF) in dust cake

Reactor/Inlet Gas Duct

The moist fine powder recycle solids provide instantaneous gas cooling and humidification when efficiently distributed in the hot flue gas. The reactor is intergrated with the inlet duct to the fabric filter and its volume is reduced to a minimum. The volume is less than 20 % of a conventional spray dryer or fluidized bed reactor. The reaction and drying time is less than two seconds at this location.

Photo front page: NID system installed after 2x120 MW boilers at the Laziska Power Plant, Poland.

* Patents pending



Compact Design/Small Footprint

Complete FGD process within the footprint of the fabric filter.

New installations – NID without precollector

Retrofit – convert the existing precipitator support structure and filter casing to NID.

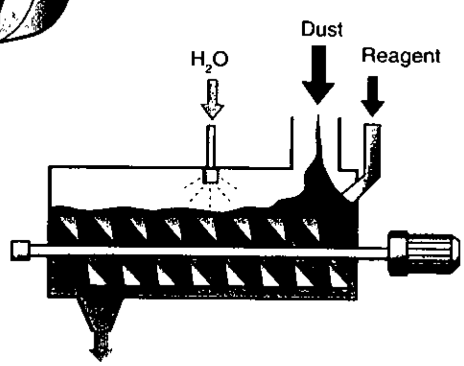
End Product Handling System

A conventional ABB dense phase pneumatic system can be utilized thanks to the low water content in the end product. Silo storage of the end product has been verified.

End Product

The end product is a dry powder which will harden when adding water, thus consisting of a pozzuolanic mixture of fly ash with calcium sulphite/sulphate, -hydroxide, -carbonate, -chloride, etc., such as for conventional dry FGD end products. The properties enable easy landfilling, but also for use in the following applications:

- backfilling of mines
- landfilling
- sealing layers
- road beds



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Mixer/Humidifier

One of the most essential parts of the NID process is the patented mixer, or dust humidifier. The equilibrium moisture content in the dust from the fabric filter is increased a few percent by the addition of water distributed uniformly into the entire dust flow.

The humidified powder solids in the mixer continue to behave as a free-flowing powder, without stickiness, to enable even distribution of the moist powder into the flue gas for SO_2 absorption.

Reagent and Recirculation Concept

The reagent is quick lime, CaO, which is dry slaked to hydrated lime, $Ca(OH)_2$, the real reaction partner to SO_2. Since the recirculated material is 95% or more in solids content, very high recirculation is attained, 30 to 50 times or higher, ensuring high utilization of the lime.

Precipitator Retrofit to NID at the Laziska Power Plant, Poland

Existing electrostatic precipitators at the Laziska Power Station in Poland have been successfully retrofitted by installing fabric filters. In the second phase of the plant's refurbishment program, the fabric filters integral parts were transformed into a low-cost FGD system.

Laziska was searching for an alternative low-cost dry FGD technology to extend the life of the plant's existing boiler systems. The power station chose ABB as the most qualified partner, thanks to ABB's extensive experience in dry absorption technologies for different applications.

Basic Plant Data (same for Unit 1 and 2)

Power production	2 x 120 MW
Main fuel	Coal, max. 1.4% S
Flue gas flow	2 x 518,000 Nm^3/h
Temperature, max.	165°C
SO_2 inlet	1,500 – 4,000 mg/Nm^3
SO_2 removal efficiency	80% (guaranteed)
SO_2 removal efficiency	95% (measured)
Reagent	CaO
Dust load, inlet NID	22,000 mg/Nm^3 (no precollector)
Dust emission, outlet NID	50 mg/Nm^3 (guaranteed)
Dust emission, outlet NID	15 mg/Nm^3 (measured)
End product utilization	Stabilisate / fire prevention in coal mines
End product conveying	Dense phase pneumatic system
Conveying distance	1,200 m (tested)

Laziska NID Process scheme

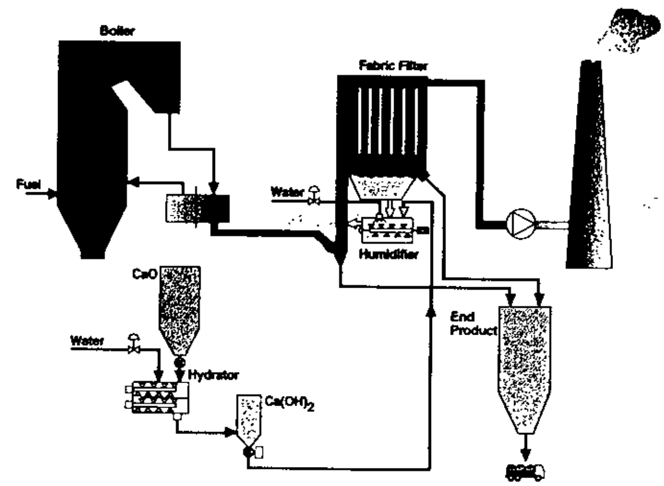

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ABB

For further information you can also contact:

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Post-it™ brand fax transmittal memo 7671	# of pages ► 2
To Syed Arif	From Bert Gianazza
Co.	Co.
Dept.	Phone #
Fax #	Fax #

21 West Church Street
Jacksonville, Florida 32202-3139

JEA

April 16, 1999

Gregg Worley
U.S. Environmental Protection Agency
Region IV
61 Forsyth Street, SW
Atlanta, GA 30303

RE: JEA Northside Units 1 and 2 Repowering Project, PSD-FL-265
Request for Approval of Alternative Test Methods under NSPS
And Notification of Use of Continuous Opacity Monitors

Dear Mr. Worley:

JEA recently submitted an application for a Prevention of Significant Deterioration (PSD) air construction permit to the Florida Department of Environmental Protection (DEP) for two new circulating fluidized bed (CFB) boilers to be used to repower existing Units 1and 2 at the Northside Generating Station in Jacksonville, Florida. Those repowered units will be subject to the Subpart Da New Source Performance Standards (NSPS, 40 CFR Part 60). As part of the permitting process, JEA is hereby requesting authority to use alternative methods of compliance for certain parameters, and providing notice that it intends to use continuous opacity monitors for compliance under the NSPS regulations.

Specifically, JEA requests approval to use CEMS's installed, certified, operated, and maintained under the federal Acid Rain Program (40 CFR Part 75) for sulfur dioxide and nitrogen oxides as alternative compliance methods to be used in lieu of the EPA reference method stack tests specified under 40 CFR s. 60.48a. EPA has the authority to approve such alternative methods under 40 CFR s. 60.8(b), provided that such methods are adequate to indicate whether a specific source is in compliance. Because the CEMS's under the Acid Rain Program are relatively accurate to demonstrate compliance, JEA requests approval to use these CEMS's under the NSPS program as well.

In addition, JEA requests approval to use EPA Method 29 to demonstrate compliance with the NSPS particulate matter limit under 40 CFR 60.47a. This test method, which is an EPA reference method under Appendix A of 40 CFR Part 60, should be equivalent to EPA Methods 5, 5B and 17 authorized under 40 CFR s.60.48a.

Further, JEA hereby provides notice as required under 40 CFR s. 60.8(e)(5) that continuous opacity monitor data will be used to demonstrate compliance with the visible emission (opacity) standards under 40 CFR s. 60.42a for the above-referenced units. These continuous opacity monitors will be installed, certified, operated, and maintained under the federal Acid Rain Program (40 CFR Part 75). JEA requests that if there are any discrepancies between the performance specifications under 40 CFR Part 60, Appendix B, and 40 CFR Part 75, that the latter control.

Thank you for considering our request. We are hoping to receive a proposed permit in early May and a final permit approximately 45 days later. We would like to receive a response before the final permit is issued if at all possible and would appreciate any assistance you can provide to expedite this process. Should you have any questions or require additional information to support our request, please call Bert Gianazza with JEA at 904-665-6247.

Sincerely,

Walter P. Bussells
Managing Director & Chief Executive Officer

cc: A. A. Linero, DEP, BAR
Syed Arif, DEP, BAR
Rita Felton-Smith, DEP NE District
Robert S. Pace, RESD
Ellen Porter, USFWS

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