ILLINOIS POLLUTION CONTROL BOARD
February 25, 1993

VILLAGE OF MATTESON,	)	
	)	
Complainant,	)	
	)	
v.	)	PCB 90-146
	)	(Enforcement)
WORLD MUSIC THEATRE,	)	
JAM PRODUCTIONS, LTD. and	)	
DISCOVERY SOUTH GROUP, LTD.,	)	
	)	
Respondents.	)	

MR. JOSEPH R. PEROZZI AND DAVID A. BRAUER, OF MCGRANE, PEROZZI, STELTER, GERARDI, BRAUER & ROSS, APPEARED ON BEHALF OF COMPLAINANT.

SAMUEL J. VINSON, MICHAEL SCHNEIDERMAN, CHRISTOPHER W. ZIBART AND STEVEN A. LEVY, OF HOPKINS & SUTTER, APPEARED ON BEHALF OF RESPONDENTS.

FINAL OPINION AND ORDER OF THE BOARD (by B. Forcade):

This matter is before the Board on a complaint filed on August 2, 1990, by the Village of Matteson (Matteson) located in Cook County, alleging that noise pollution in violation of Sections 23, 24, and 25 of the Environmental Protection Act (Act) (415 ILCS 5/1 et. seq.)[1] was caused by World Music Theatre, JAM Productions, Ltd. and Discovery South Group, Ltd. (the collective respondents will be referred to as "Theatre", the physical structure or location will be referred to as "the theater") in the operation of an outdoor theater located within Cook County, in Tinley Park, Illinois. On April 29, 1991, the Board issued an interim opinion and order finding Theatre in violation and ordering Theatre to monitor sound levels and recommend potential methods of reducing the sound impact. Additional pleadings and hearings continued through January 22, 1993. This has been a complex and lengthy proceeding including 10 days of hearing and 14 prior Board opinions or orders over a period of two and one-half years. In today's opinion and order the Board reaches its final disposition of this matter.

This opinion will initially discuss the background and procedural history, then proceed to a determination on the claimed noise violations for 1991 and 1992. Last, the opinion will discuss the remedy, the compliance plan, and the requested penalties.

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[1] The Act was formerly codified at Ill. Rev. Stat 1991, ch. 111 1/2, par. 1001 et. seq.

I. BACKGROUND AND PROCEDURAL HISTORY

A. The facility

The facility is an outdoor amphitheater, located at 19100 Ridgeland Avenue, Tinley Park, Illinois. It is approximately 1 mile north of the northwest boundary of the Village of Matteson. The theater faces east toward a large forest preserve. Other land uses in the area include farm land, a golf course, and a drive-in theater. Other than the homes in Tinley Park, residential areas are approximately 1 mile away. These include Matteson, a community of about 11,000 residents, approximately 1 mile to the southeast, and Country Club Hills, with about 15,000 residents, approximately 2 miles to the east.

Theatre's "season" for performances is generally Memorial Day to Labor Day. (Tr. 3 at 492).[2] For 1990, the first season the theater was open, attendance totalled about 457,000 persons, who came to hear 32 performances. (Tr. 3 at 486 and 470). The theater could possibly accommodate 40-50 performances per season. (Tr. 3 at 492). Theatre is a major source of part-time employment, with 650-700 employees, many of whom are local residents.

B. Procedural history

The procedural history in this matter is complex, as this matter has been before the Board for over two years. A complete procedural history can be obtained by referencing the prior 14 Board orders in this matter.

The Board received extensive testimony at three hearings held in Matteson on December 10, 11, and 20, 1990. Witnesses included residents of Matteson and Country Club Hills, Matteson Village Officials, and personnel of Theatre. Based on the

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[2] The transcripts will be referenced as follows; the December 10, 1990 transcript as Tr. 1, the December 11 transcript as Tr. 2, the December 20 transcript as Tr. 3, the June 9, 1992, transcript as Tr. 4, the July 9 transcript as Tr. 5, the July 27 transcript as Tr. 6, the December 16 transcript as Tr. 7, the December 17 transcript as Tr. 8, the January 21, 1993 transcript as Tr. 9, and the January 22 as Tr. 10.

All references to prior Board opinions or orders will simply state order, the date, and page number, e.g., (Order, April 29, 1991, at 6).

evidence submitted at hearing, in an interim opinion and order the Board found that Theatre had violated 35 Ill. Adm. Code 900.101, 900.102 and Section 24 of the Environmental Protection Act on June 2, 3, 27; July 20, 21, 22, 23, 29, 30: October 4, 5, 6, and 7 in 1990. The Board ordered Theatre to hire a sound consultant to perform sound monitoring at two locations, one in Matteson and one in neighboring Country Club Hills. In addition the sound consultant was instructed to prepare a final report on noise levels based on the monitoring data and recommend potential methods of reducing the sound impacts to preclude unreasonable interference. Theatre presented its "Final Report and Control Options" to the Board on August 5, 1991.

In an August 22, 1991, order, the Board noted some deficiencies in the noise data submitted in the final report. This order also ordered that all sound data be submitted to the Board and Matteson. In a September 12, 1991, order the Board reconsidered its order of August 22, 1991. In reconsidering its previous order the Board further explained the deficiencies in the sound measuring techniques used by the consultant. The Board noted that "after reviewing the final report the Board is still unable to determine what, if any, specific additional sound abatement measures are necessary to remedy the noise violations and alleviate the noise complaints." (Order, September 12, 1991, at 7) To determine what additional sound control was required, the Board ordered that additional hearings be held, if Matteson so desired. Matteson elected not to hold any additional hearings. However, Theatre filed Supplemental Comments on March 2, 1992. The Board found Theatre's comments to be unauthorized and held that they would not be considered in the final decision. However, as a result of Theatre's filing, the Board realized that it erred in giving Matteson sole discretion on whether additional hearings were to be held. In a March 26, 1992, order, the Board ordered the parties to conduct additional hearings on possible sound control measurements.

On May 19, 1992, respondent, Discovery South Group (Discovery) filed a motion to postpone hearing. The hearing officer denied this motion and Discovery filed an appeal of the hearing officer's denial with the Board. Discovery sought a 30 day postponement in order to present its case effectively because the hearing would coincide with the seasonal re-opening of the theater, making preparation for hearing difficult and burdensome. On June 4, 1992, the Board affirmed the hearing officer's decision and denied respondents' motion for postponement.[3]

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[3] The Board notes that respondents did not present any witnesses at the hearings held in 1992. The respondents had adequate time in which to prepare for hearing considering the continuing nature of this matter and that subsequent hearings

Hearings were held on June 9, July 9 and 27, 1992, in Matteson, Illinois. On July 30, 1992, the Board granted the parties joint petition to discontinue monitoring. Matteson filed its final brief on September 3, 1992. Theatre filed its brief on September 18, 1992. Matteson's reply brief was filed on September 25, 1992. After various motions by the parties, the Board, by orders of October 29, 1992, November 19, 1992, and December 14, 1992, set additional hearings. Hearings were held December 16, 1992, December 17, 1992, January 21, 1993 and January 22, 1993. Closing arguments were provided on the record rather than by brief.

II. NOISE VIOLATIONS CLAIMED IN 1991-1992

Noise pollution is prohibited by Section 24 of the Act that provides:

> No person shall emit beyond the boundaries of his property any noise that unreasonably interferes with the enjoyment of life or any lawful business or activity,...

The Board regulations implementing the unreasonable interference noise provisions of the Act are found in 35 Ill. Adm. Code 900.101 and 900.102.

> Section 900.101 Definitions
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> * * *
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> Noise pollution: the emission of sound that unreasonably interferes with the enjoyment of life or with any lawful business or activity.
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> * * *
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> Section 900.102 Prohibition of Noise Pollution
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> No person shall cause or allow the emission of sound beyond the boundaries of his property, as property is defined in Section 25 of the Illinois Environmental Protection Act, so as to cause noise pollution in Illinois, or so as to violate any provision of this Chapter.

In effect, these Board regulations adopt a public nuisance provision for noise control using the statutory phrase "unreasonable interference with the enjoyment of life or with any lawful business or activity" as the standard. Theatre has

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were scheduled 30 and 48 days after the completion of the June 9, 1992, hearing.

already been found in violation of these sections of the Act and regulations for specific dates during the 1990 concert season. The Board must determine whether the violations continued during 1991 and 1992.

A. Testimony regarding 1991 noise

Testimony in 1992-1993 focused on two aspects. First, whether sound from the theater caused an unreasonable interference, and second on technical matters regarding sound control and monitoring. The more technical testimony is discussed later.

At the June 9, 1992 hearing, Matteson presented testimony from six residents of Matteson. The residents testified that they continued to hear noise from the theater throughout the 1991 concert season. Residents testified that they could hear the beat of the music inside their house with the doors and windows closed and the television on. (Tr. 4 at 531, 567). The other residents testified to being able to hear words (Tr. 4 at 543, 554), distinguish instruments (Tr. 4 at 543, 589), pick up bits and pieces of songs with words (Tr. 4 at 544) and at times feel like they were at the concert. (Tr. 4 at 542). One resident testified that in the second level of her house she could feel the vibrations of the music. (Tr. 4 at 557). One resident recalls the nights on which the noise could be heard as clear and calm. (Tr. 4 at 545).

Some residents felt that the noise in 1991 was generally less noisy than it was in 1990. (Tr. 4 at 537, 561, 567). The residents however noted that any reduction in the noise was not sufficient because the noise continued at a level at which it was clearly distinguishable. (Tr. 4 at 550, 561).

In the 1992 hearings, some residents could not recall specific dates when they heard noise from the theater during the 1991 season. (Tr. 4 at 565, 586). However, these residents remember hearing noise from the theater on three or four occasions. (Tr. 4 at 566, 587). Paul Landini, who lives 2.4 miles from the theatre remembers hearing noises on June 1, 29, July 2 and August 23. (Tr. 4 at 530). Mark Boyd recalls hearing the noise on June 14, 29 and August 11, 1991. (Tr. 4 at 541). Deborah Perry, testified that she could hear noise from the theater on June 1, 14, 29 and August 3, 1991. (Tr. 4 at 553).

Dan Dubriel, the Village Administrator, discussed a report summarizing the complaints received by the Matteson Police Department during the 1991 season. (I-Comp. Ex. 6)[4] Matteson presented documentation that the Matteson police department continues to receive complaints regarding noise from the theater. Between June 1 and July 13, 1991, the police logged 57 complaints from residents concerning noise from the theater. (I-Comp. Ex. 6). Complaints were logged for the following dates June 1, June 15, June 29, June 30, July 2, July 12 and July 13. (I-Comp. Ex. 6). This report also shows that no complaints were logged for 10 concert dates between June 1 and July 13. (I-Comp. Ex. 6).

State Representative Larry Wennlund offered a public statement at the hearing. Mr. Wennlund noted an unsuccessful attempt by the respondents to pass legislation exempting outdoor theaters from the noise regulations. (Tr. 5 at 836). He also stated that his office is besieged with complaints from the areas surrounding the theater concerning the noise problem. (Tr. 5 at 839). Raymond Fessler, building commissioner of Tinley Park, testified concerning structural changes made at the theater prior to the 1992 season. He testified that personnel of Theatre stated that the changes made to the berm prior to the start of the 1992 were to improve sight line. (Tr. 5 at 845).

Theatre objected to the testimony of the residents as beyond the scope of the hearing. (Tr. 4 at 534, 548). The Board in its March 26, 1992 order to schedule additional hearings stated that the hearings were to address "whether the noise violations still exist and the appropriate sound control techniques to be employed to eliminate any violations." The Board finds the testimony of the residents is within the scope of the hearing as specified in the Board's order.

B. Testimony regarding 1992 noise

At the December 1992 hearings, Matteson presented testimony from a variety of witnesses regarding noise complaints. Those witnesses lived from less than a mile to just over four miles from the theater. They lived in Matteson, Country Club Hills, and unincorporated Cook County. Most of those witnesses

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[4] Exhibits from the 1992-93 hearings were submitted in two sets with similar numbering. For clarity, the exhibits introduced in the summer 1992 hearings (Tr. 4, 5 and 6) will be prefaced with a Roman Numeral I, e.g., (I-Comp. Ex. 1). Exhibits from the December 1992-January 1993 hearings will be prefaced with a Roman numeral II, e.g., (II-Comp. Ex. 1). In addition, the EASI Final Report (Filed August 5, 1991) was reintroduced as an Exhibit at the June 9, 1992 hearing (Tr. 4 at 657; I-Comp. Ex. 10). All references to that document will be as I-Comp. Ex. 10.

described the effects in terms of "we" or "us" to indicate the effect on several family members from the same residence.

Mr. Ronald B. Seltzer testified that he had heard previous concerts but that they were not troublesome. However, he considered the U2 concert exceptionally loud and it prevented him from sleeping even though he put ear plugs in his ears and hid under the pillow. (Tr. 7 at 10-17). He was disturbed by the sound all three nights and registered complaints with the police on two of those nights. He did not register a complaint with police the third night because, "I got the same answer, nothing can be done, so why call again." (Tr. 7 at 17).

Miss Peggy Erickson testified that the U2 concerts were "unbelievable, very loud." She called the Matteson Police because she,"..had the TV on and the air-conditioning running and the windows closed and you could even feel vibrations." She was unable to sleep it was so loud. (Tr. 7 at 18-24).

Miss Renee Freudenheim is a Village Trustee for Matteson. She testified that she received a phone call during the third U2 concert from another Village Trustee, Michael Perry. During that phone call she could hear the receiver blaring music. (Tr. 7 at 27-35).

Mr. Daniel Dubruiel is the Village Administrator for Matteson. He introduced a summary of complaints received by the Matteson Police Department dispatchers regarding loud noises at the theater for the period from July 27, 1992 to September 27, 1992. He normally prepares such documents for the Village Board. (Tr. 7 at 37-58; II-Comp. Ex. 2) That exhibit lists approximately 104 noise complaints from approximately 9 dates in July, August and September. The number of listed complaints and dates includes: one regarding July 31; 23 regarding August 2; two regarding August 8; three regarding August 14; five regarding August 28; one regarding September 2; seven regarding September 3; 61 regarding September 18; and one regarding September 27.

Mr. Richard J. White testified that he could hear the booming and the rumbling from the concert all night. He called the Country Club Hills City Hall and Police Department to register the fact that he was hearing it, feeling the vibrations. He was unable to sleep. It also disturbed his wife's sleep. (Tr. 7 at 59-67).

Mr. Michael Perry is a Village Trustee for Matteson. Mr. Perry testified that he received phone calls as a Trustee throughout the time period regarding noise complaints, just as the Police Department does. He testified that the third U2 concert, September 18, was every bit as loud as any other concert, if not louder, through the three-year process involved in this proceeding. Mr. Perry stated he had pictures rattling on

his walls. He said that his telephone call to Trustee Freudenheim was garbled by noise from the theater. He received 10-15 calls at home from people complaining about the noise from the theater. The noise prevented him from going to sleep until after 11:30. (Tr. 7 at 68-83). He also claims the Bruce Springsteen concerts on September 2 and 3 prevented his parents from sleeping when they visited. Theatre personnel visited him that evening after he called to complain, but they were unable to reduce the noise. Mr. Perry received noise complaint calls on August 22, August 8 and September 18. (Tr. 7 at 92). Trustee Perry believes this Board must adequately address the imposition of civil penalties against Theatre.

Ms. Dolores Swan testified that she heard loud music, booming sounds and the vibrations from the theater during the U2 concert. The sounds prevented her from hearing her television and she called the Matteson Police Department and complained because she could not sleep. (Tr. 7 at 100-113).

Mr. Dale Graham is a Trustee for Matteson. He testified that the U2 concert was so remarkable and so memorable for loudness. (Tr. 7 at 114-122).

Mr. Probie Brown testified that one concert, probably the B52s on August 28, was so loud neither he nor his wife could rest so they could get up early for work, so he filed a complaint with the police. (Tr. 7 at 180-187).

Ms. Mary Rea testified that the U2 concert was objectionably loud. The bass sounds bothered her substantially, so she called the police to complain. (Tr. 7 at 246-257).

Mrs. Louise Kelly testified that she heard extraordinarily loud sound levels from the theater on September 15, so she called to complain. She was unable to converse in the house in a moderate tone of voice with the windows open. They were reluctant to close them because it was a warm evening and they have no air conditioning. The second night was also "mind-boggling." The sound was so loud her two year old special needs foster child was unable to sleep. She was unable to hear a moderate tone in her home. Her husband needed to use ear phones to hear the television, she turned the one in the front bedroom off because she couldn't hear it in a moderate tone. (Tr. 7 at 258-268).

Mr. Joseph Rada testified that he called the Country Club Hills Police Department six or seven times to complain of unreasonable, extraordinarily loud sound from the theater from July 27 through October 1, 1992. These specifically included all three U2 concerts. (Tr. 7 at 269-275).

Mr. Mark Boyd testified that Friday, August 14, August 28, and September 18 had unreasonably loud sounds. They prevented his little twelve month old from getting to sleep, and he couldn't carry on a conversation. It also rattled his windows. (Tr. 7 at 276-291).

Ms. Janet Muchnik is Village Manager for the City of Country Club Hills. She testified that, as a result of a request by respondent's counsel, she had compiled records on the number and location of noise complaints to the Country Club Hills Police Department. (Tr. 7 at 292-320; II-Comp. Group Ex. 5; II-Comp. Ex 6). Those compiled records list 154 police complaints about concert events. The dates of complaints and number include 10 regarding August 2; one regarding August 28; one regarding August 29; eight regarding September 2; more than 63 regarding September 15 (the telecommunications operator stopped keeping track); more than 58 regarding September 16 (the telecommunications operator stopped keeping track); and 13 regarding September 18.

One resident testified that during a concert in 1992, vulgar language could be heard from the theater. (Tr. 6 at 153).

Ms. Mary Ellen Stanek testified that the sound from the theater on August 28 and Friday, September 18 could be heard throughout the house and was annoying. (Tr. 7 at 320-334).

Officer Melanie Froncek is a police and fire dispatcher in the Village of Matteson. She described the workings of the 911 emergency telephone system for recording citizen complaints used to produce Complainant's Ex. 2. (Tr. 7 at 334-345).

Mr. Bernard "Dutch" Tindall is a Trustee for Matteson. He testified that the sound from the U2 concert was unreasonably loud, it was so loud that when he put his hand on the door it was vibrating late in the evening. Trustee Tindall and his wife had to leave and go to his son's house due to the noise. He received quite a few calls from local residents about the noise. (Tr. 7 at 345-354).

At the December 17 hearing, Matteson provided testimony by seven witnesses. Ms. Frances Otto testified that the three U2 concerts were unreasonably loud. She stated that she couldn't hear television or people talking across the room. The noise lasted from 7:00 until 11:00 all three nights. Noise from the M.C. Hammer concert on August 22 also disturbed her. (Tr. 8 at 5-19).

Mr. Ken Stanek testified about loud noise from the theater on August 2 and September 18. The low frequencies or bass sounds were the worst. He testified that the most bothersome aspect of the noise was that the windows rattled and that the noise kept

the children from getting to sleep at a reasonable hour. (Tr. 8 at 21-34).

Mr. David Hearns complained about the concerts on August 2, August 28, September 3, and September 18. He said the noise made it difficult to get the children to sleep and adversely impacted conversation and watching television. The noise lasted until 11:30. (Tr. 8 at 34-48).

Mr. Paul Landini testified that on August 2 he found noise from the theater annoying and called the Tinley Park police. He heard noises again on September 3, and September 18 and called Tinley Park Police and Matteson Police. (Tr. 8 at 49-60).

Mr. Roger J. Yule heard loud noise from the theatre on September 3, September 15, and September 18. He called Tinley Park Police and Matteson Police to complain. The sound kept him and his wife from getting to sleep. Once he called the County Sheriff's Department. The sounds sometimes lasted until 11:00 at night. The sounds were so loud he was unable to concentrate to do work in his office at home. (Tr. 8 at 61-70).

Mr. Lyman Anfield was a public witness, not presented by Matteson. Mr. Anfield felt that Theatre should conduct their business so that it is not a nuisance to anybody in the area or to do anybody harm. (Tr. 8 at 73-75).

Miss Marcia O. Sanders was the last citizen to testify at the December 1992 hearings. She was particularly troubled by the U2 concert on September 18. She could hear the impulsive rhythm beats from the music so loudly that she could not hear the school lecture tapes she was attempting to study. Miss Sanders phoned complaints to the Matteson Police. (Tr. 8 at 103-112).

At the hearings in 1993, Theatre presented testimony and evidence, much of which went to technical sound control or sound monitoring aspects. Those are discussed later. Some testimony did go to sound impacts in the community and related matters, those are discussed here.

Mr. Joel Lewitz, a professional engineer from San Francisco testified for Theatre. He stated that he did not believe concert sounds from the theater could possibly shake structures at that distance, one and one-half miles away. He felt levels in excess of 100 decibels would be needed to physically shake a building and that the levels recorded in the community are much closer to ambient, on the order of 50 and 55 decibels. (Tr. 9 at 26-31). Mr. Lewitz felt it was inconceivable that the building would shake or that the windows would vibrate. (Tr. 9 at 113-114).

Mr. Lewitz stated that he did not believe it was likely to have the concert sounds audible inside a house one to three miles away with the windows closed and the air conditioning on. He felt this was not likely to be audible regardless of the performing group or the weather conditions. Mr. Lewitz felt it was possible for concert sounds to be audible inside such houses if everything which contributed to sound (televisions, fish tank pumps, and people walking inside the house) were totally silent. (Tr. 9 at 115-118).

Miss Kim Pretto testified for Theatre. She lives about 2 1/2 miles from the theater and has heard sounds from there several times this summer, but did not find the sounds loud or troublesome. She felt the theater adds to the community by providing jobs and having something on the south side to attend rather than driving north. (Tr. 9 at 171-179).

Mr. Bob Murphy is employed by Theatre as a part-time employee in crowd management. He worked one of the U2 concerts and did not feel the sound level in the theater was louder than any other concert he had worked. He has heard sound from the theater at his home, two and one half miles from the theater, but was not disturbed by it. (Tr. 9 at 180-187).

Mr. Buddy Sokolick is the production manager at Theatre. He is responsible for overseeing the entire concert. He is responsible, along with the sound technician Steve McCarthy, for requesting the artist to turn down the sound if there is an excessive level of noise. Theatre currently limits the artists to a sound level of 105 decibels at the mix location, which is about 100 feet in front of the stage. This restriction is printed in the contract. There are similar rules in effect at other outdoor theaters throughout the country. They feel this is an acceptable level for the artists, the audience and the surrounding communities. If levels exceed 105, they ask the artist to turn it down. Theatre could get some resistance from artists to playing at the theater if the levels were significantly lower. Mr. Sokolick is not aware of any venue with stricter noise limits. (Tr. 9 at 193-202).

Mr. Sokolick has had difficulty getting the artist's engineers to turn down the sound about 10-15% of the time. He then goes to the artist's manager and has been pretty successful with that. Theatre keeps records of the sound levels at the mix. The top of the berm would probably have sound levels of low to mid 90 decibel levels. Sound checks are done randomly, perhaps every ten minutes. The sound engineer also does community sound monitoring for every single show. Usually he would make a record of what the predominant sound in the community would be, in most cases traffic, wind noise and crickets would be loudest. (Tr. 9 at 203-211).

Mr. Jerry Mickelson is a partner in Jam and a partner in World Music Theatre. He negotiates contracts with the talent and is responsible for nearly everything that goes on at the theater. He feels Theatre has set valid restrictions on the artists and these are minimum acceptable standards for most bands. Most of the shows currently on hold for future performances at the theater are also on hold at Poplar Creek and Alpine Valley. If Theatre's restrictions are too severe they will play elsewhere. Poplar Creek and Alpine Valley are watching these proceedings and trying to take advantage of any situations that will be to Theatre's disadvantage and their advantage. According to Mr. Mickelson, if the Board's draft order is adopted he knows they will be out of business, because no musician would tolerate a piece of electronic equipment that would override or turn down the sound levels during a performance, thus removing sound control from the artist. (Tr. 9 at 215-229).

About 420,000 people attended the theater last season. It employs workers from a labor pool of about 1500 people. An average concert employs 600-700 people, many of whom are high school or college age. Theatre presents more than just rock bands. Performing artists include the Illinois Philharmonic and Frank Sinatra. The theater provides a convenient southern location for area residents. (Tr. 9 at 229-231).

Mr. Mickelson prepared a statistical tabulation of noise complaints for the 1992 season based on documents received from the police departments in Matteson and Country Club Hills. (II-Resp. Ex. 2,3). Mr. Mickelson asserts that of the 18 concerts under review, based on data from Country Club Hills, 13 had no complaints, one had eight complaints, one had 10 complaints, and the three U2 concerts had 119 of the 137 complaints. Based on data from Matteson, Mr. Mickelson asserts nine concerts had no complaints, two had one complaint, one had three complaints, one had five complaints, and one had six complaints. He stated that the Lollapalooza concert had 21 complaints and the last U2 concert only had 46 complaints; there were no complaints for the first two U2 concerts. Mr. Mickelson asserts that out of the 11,000 people in Matteson, a minimal number were complaining. Most of the 85 complaints came from the Woodgate and Creekside subdivisions, which contain about 1210 residents. Mr. Mickelson believes that 85 complaints out of 1210 people leaves an awful lot of people from those subdivisions that did not complain and did not testify at the hearings before the Board. (Tr. 9 at 233-247).

Mr. Mickelson was not aware that the Country Club Hills telephone lines became saturated and could not receive additional complaints during the U2 concerts, nor was he aware of any complaints coming from Tinley Park until the hearing. (Tr. 9 at 247-253).

Mr. Mickelson testified that there are several groups on hold for the next season's performances, and the primary consideration is the impact of the Board's final order in this case. If there was an automatic sound override, they would not agree to perform. Inserting a sound level into the contract is acceptable to the groups. At 100 to 105 decibels, the groups haven't rejected the contracts. Theatre finds these levels to be acceptable standard of sound levels that have to be abided by. (Tr. 9 at 259-271).

Mr. Mickelson believes the number of noise complaints has reduced over each of the last three years, and that the U2 concert complaints were the result of unusual atmospheric conditions. This inversion was only in effect for the September 15 and 16 concerts by U2, not for the September 18 U2 concert. He was not aware of any levels above 105 at the U2 concerts, but if something did happen Theatre would be on top of it immediately and most of the time, most of the groups are very cooperative. He does not remember approximately when the 105 decibel limitation went into effect. (Tr. 9 at 288-289).

At the last hearing on January 22, 1993, Theatre presented Mr. Stephen McCarthy, head sound department technician. He does sound monitoring at the theater and in the surrounding communities. His measurements are all on the A-weighted decibel scale using a sound pressure level meter accepted in the music industry. Mr. McCarthy finds typical sound levels at the mix are about 102 to 105 decibels on the A-weighted scale. If performances are louder he asks the artists' sound technician to turn it down and they are usually cooperative. Usually sound levels at the top of the berm are 88, 92, or 93 decibels. He testified that the audience would get pretty upset if during the performance you turned the sound down from 105 to 95 decibels at the mix. He testified that Theatre has received complaints from audience members that they could not hear the music, especially from the hill. (Tr. 10 at 325-335).

Mr. McCarthy conducts community sound monitoring for Theatre. He takes his sound meter and drives through four or five locations throughout Matteson and Country Club Hills taking readings. It usually takes him about 20 minutes to a half hour to complete the circuit. If he hears problems, he will come back and deal with it at the theater. Usually the loudest sounds are traffic, crickets, or planes flying overhead. At the beginning of the concerts he gets weather information from the telephone number which provides aviation flight planning for commercial pilots. During the first two U2 concerts there was a temperature inversion. The third night of the U2 concert, September 18, there was no temperature inversion. Mr. McCarthy testified that he took sound readings from within the theater on all three nights of the U2 concerts and they were within the average norm for sound pressure levels. He testified that in the communities

he did hear sound, it was unusually loud, it was rare to hear music that loud in the communities. (Tr. 10 at 335-381).

Mr. McCarthy does not believe there is value to permanent outside monitoring in the two communities. He believes that monitoring from the mix position and the hill, coupled with weather service information, gives him a pretty good idea where the sound will be heard. He knows that by keeping the sound level below 105 decibels at the mix he really isn't causing much of a sound problem in the communities. (Tr. 10 at 382-400).

Mr. McCarthy described his sound meter as set to average about two seconds worth of data to produce a sound reading. It had several scales allowing measurement from 50 decibels to 130 decibels. He sometimes measures at the berm that is about 200 feet from the mix location. (Tr. 10 at 401-411).

Theatre's next witness was Mr. Ronald Kaplan, a Vice President with American Famous Talent, a musical group booking company. Mr. Kaplan has booked for many performers and is not aware of any location where the facility can turn down the volume during the performance. He is not aware of any sound limitations at Poplar Creek. Mr. Kaplan stated that he has never seen a contract condition allowing the facility to turn down the sound. He has seen contracts where the facility has legal restrictions on sound at Ravinia in Chicago and Wolf Trap in Washington, D. C. They are more classical and contemporary music oriented facilities. Mr. Kaplan has never seen a contract with a sound limitation at either Great Woods or World Music Theatre. He did not book any bands at World Music Theatre in 1992. Mr. Kaplan believes that putting a restriction on noise levels in a contract would have a negative impact on musicians' willingness to perform at that location. (Tr. 10 at 413-460).

Theatre presented Mr. Michael Ellul as a witness. He lives about a mile from the theater. He has never had a problem attending the concerts at the theater nor had a problem at his home with noise. (Tr. 10 at 463-471).

Mr. Daniel Strick testified that he lives closest to the theater, less than a mile. He has not had any noise problems from the theater, and once drove over to the House of Village Trustee Perry during the Springsteen concert. He heard nothing at that time. (Tr. 10 at 472-480).

Mr. Benjamin Scott testified that he lives about two miles from the theater and did not hear disturbing noise from the theater in 1992. (Tr. 10 at 481-484).

Mr. Jerry Mickelson sponsored two exhibits. Both were letters from talent agents regarding problems their clients may have with any sound limitations imposed on Theatre. (Tr. 10 at 488-505; II-Resp. Ex. 4, 5).

In rebuttal, Matteson offered the testimony of Michael Perry to state that there has been no period of monitoring on his property since EASI ceased monitoring there on July 30, 1992. (Tr. 10 at 507).

Matteson offered an Arapahoe Colorado noise ordinance affecting Fiddler's Green concert facility into evidence. (Tr. 10 at 511-522; II-Comp. Ex. 7).

As a final matter, there was testimony, in the form of public comment, from State Representative Larry Wennlund, of the 38th District, regarding a January 19, 1993 attempt by Theatre to secure, through the General Assembly, an exemption from the noise standards and regulations of the Pollution Control Board for its facility. (Tr. 10 at 309-315). Theatre objected that such statements were irrelevant and would contaminate the record, and that any such efforts were protected under the First Amendment.

C. Final briefs

Matteson filed its Brief on September 3, 1992. Matteson's brief summarizes and characterizes the testimony presented since the interim opinion and order as it pertains to noise complaints and noise nuisance violations. Matteson argues that the testimony supports a Board finding of continued violation of the unreasonable interference standard. The brief reviewed the technical testimony and urged possible alterations to the existing physical plant, increased good-faith on the part of Theatre, reduced averaging times, use of neutral and better trained monitoring personnel, increased low frequency monitoring, and use of an instant feedback system. Matteson specifically requested imposition of civil penalties and establishment of preset sanctions for future violations.

Theatre, in its brief filed on September 18, 1992, states that Matteson has not demonstrated that additional sound control is necessary. Theatre contends that the testimony of the residents is insufficient to show interference. Theatre argues that the testimony at the hearings in 1992 was not as extensive as that received at the hearings in 1990. Theatre argues that additional sound control is not necessary since the witnesses noted a reduction in sound levels from 1991 to 1992 and fewer complaints were received from the residents. Theatre contends that a reduction in the noise is evidenced by the fact that fewer residents testified in 1992 and fewer complaints were received during the 1991 season. Theatre asserts the testimony does not

meet the specificity and severity necessary to show a violation. Additionally, Theatre strongly contests any implication from the evidence of Dr. Fleisher that any numerical noise standards were violated. Theatre rejects arguments relating to good faith or trained personnel. Theatre urges the Board to determine that no noise violations have occurred, discontinue monitoring and dismiss the proceeding.

In its September 25, 1992 reply, Matteson argues that Theatre's position is clear - deny and delay. Matteson continues to support finding violations, long-term monitoring with a feed back loop, fine tuning the L_{eq} standard measurement time, and structural changes at the facility. Matteson argues that certain legal action in the Circuit Court of Cook County, City of Country Club Hills v. World Music Theatre, et. al., 92 CH 9059, supported their position.[5]

D. Closing arguments on the record

At the end of the January 22, 1993 hearing, the parties provided closing arguments on the record. Matteson asserted that it had carried its burden of proof by providing 21 residential witnesses claiming noise nuisance in the period since the interim opinion and order. Matteson noted that many of the witnesses testified that they did not file complaints. Therefore, the statistical data regarding recorded complaints may not reflect the full character of the problem. Matteson asserted that the complaints met the requirements for specificity and severity to qualify as unreasonable interference. The closing argument endorsed the two location feedback system, with modified averaging times. Matteson questioned the reliability of testimony supporting Theatre and argued against any self-policing policy. Matteson endorsed the Colorado ordinance and requested prompt action by this Board that would include monetary sanctions.

In closing arguments, Theatre asserted it had no chance to win this case because the Board would not look at the evidence and the equity involved. Theatre contends that the 1992 season was almost complaint free, excepting one or two strange nights. Theatre argues the evidence is inadequate in specificity, credibility, and severity to justify a finding of unreasonable interference. Theatre argues that the Board is attempting, by an impermissible process, to craft new regulations in this contested case. The draft order, Theatre believes, is an attempt to recklessly grasp for easy solutions that will strangle the Theatre's lifeblood of popular performers. Theatre argued

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[5] The Board has not relied upon the documents relating to that court action in today's decision.

against impulsive noise controls. Finally, Theatre asserted the Board should not consider claims of foul language by the performers or efforts regarding legislative amendment as they are protected by the First Amendment.[6]

E. Discussion

As a preliminary matter, the Board notes certain significant conflicts in the testimony. Mr. Joel Lewitz, a professional engineer from San Francisco testified on behalf of Theatre. He did not believe that concert sounds from the theater could possibly shake structures at that distance, one and one-half miles away. He felt levels in excess of 100 decibels would be needed to physically shake a building and that the levels recorded in the community are much closer to ambient, on the order of 50 and 55 decibels. (Tr. 9 at 26-31). Mr. Lewitz felt it was inconceivable that the building would shake or that the windows would vibrate. (Tr. 9 at 113-114). He also stated that he did not believe it was likely to have the concert sounds audible inside a house one to three miles away with the windows closed and the air conditioning on. He felt this was not likely to be audible regardless of the performing group or the weather conditions. For concert sounds to be audible inside such houses he believed everything which contributed to sound (televisions, fish tank pumps, and people walking inside the house) must be totally silent. (Tr. 9 at 115-118).

This testimony is in substantial conflict with virtually all of the complainant's testimony presented by citizens from Matteson, and Country Club Hills. The Board finds there was a substantial amount of credible testimony of shaking and vibrations in the affected homes. One resident testified that in the second level of her house she could feel the vibrations of the music. (Tr. 4 at 557). She called the Matteson Police because she ,"..had the TV on and the air-conditioning running and the windows closed and you could even feel vibrations." (Tr. 7 at 18-24). There was substantially more testimony of vibrations. See, for example, (Tr. 7 at 59-67), (Tr. 7 at 68-83), (Tr. 7 at 276-291), (Tr. 7 at 345-354), and (Tr. 8 at 21-34).

Not all of the testimony on vibrations was citizen testimony. Mr. Greg Zak from the Illinois Environmental Protection Agency testified extensively about sound causing vibrations in homes. (Tr. 6 at 46, 48, 51, 112-113; Tr. 7 at 132-133).

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[6] The Board has not relied in any manner upon the content of the music or any references to possible legislative activity in reaching its decisions in this matter.

In a similar manner, the Board has difficulty with Mr. Lewitz's testimony that concert sounds would be inaudible inside the home. The testimony in this record is simply too numerous to cite that concert sounds were clearly audible inside the home, interfered with conversation and too loud to allow watching television or sleeping. In one instance it even prevented a resident from sleeping even though he put ear plugs in his ears and hid under the pillow. (Tr. 7 at 10-17).

The Board notes that Mr. Lewitz's testimony was premised upon concert source levels of 50-55 decibels as measured in the residential community. (Tr. 9 at 29). Yet, actual measured values are much higher. On an audio tape contemporaneously recorded, Dr. Fleisher described his observation of the sound level meter during the June 29, 1991 concert, as measured at the subdivision in question at about 10:11 pm:

> Again the LED on the sound level meter is responding and moving synchronistically with the bass drum hits. I think there's no question that there's a correlation between bass drum hits. Again typically the music is causing, especially the bass drum, causing sound level meter to dance. Oh it's definitely clearly going to about 71 or 72 dB linear with bass drum kicks. I say over all between 60 and 70 dB linear and occasional bass drum kicks, when they seem to be especially solid, it'll kick the level up to 71 or 72 dB linear.
> (I-Comp. Ex. 9).

That particular concert did not generate nearly as many citizen complaints as the September 15, 16, and 18 concerts, which may have generated higher numerical sound values. The Board finds against the testimony of Mr. Lewitz on the issue of vibrations and audibility of sounds inside the home.

F. Conclusions

Today the Board readopts the "unreasonable interference" interpretations articulated in our interim opinion and order, specifically including the judicial interpretation in Ferndale Heights Utilities Company v. Illinois Pollution Control Board and Illinois Environmental Protection Agency, (1st Dist. 1976) 41 Ill. App. 3d 962, 358 N.E. 2d 1224. The First District Court held the regulatory nuisance language to be constitutional since sufficient standards could be comprehended from reading Section 24, the Board's regulations, and the guidelines for enforcement cases found in Section 33(c) of the Act. The Court affirmed the Board's finding of unreasonable interference with the enjoyment of life, in light of adequate testimony describing the noise;

explaining the type and severity of the interference caused by the noise; and indicating the frequency and duration of the interference. Despite conflicting testimony, the Court upheld the Board's finding that the interference was unreasonable.

The testimony of the residents since the Board's interim opinion and order shows that noise from the theater continues to interfere with the residents' enjoyment of life. Based on the testimony above, the Board finds that sound transmissions from the Theatre's property caused an interference with the enjoyment of life in that it interfered with sleep, watching television, working at home, studying, making telephone calls, home conversation, and other normal lifetime activities.

The Board also finds that, on several dates, sound from the theater has abused the communities to such an extent that calls to the police have overloaded emergency response telephone lines for hours at a time. The calls have also forced those communities to redeploy police officers from areas where they might otherwise be needed. (See particularly II-Comp. Ex. 2, II-Comp. Gr. Ex. 5 and II-Comp. Ex 6). Complainant's records show over 250 noise complaints to police in Matteson and Country Club Hills regarding concert events. (II-Comp. Ex. 2, II-Comp. Ex. 6). Respondents' records show 237. (II-Resp. Ex. 2, II-Resp. Ex. 3). These tabulations do not include any complaints which could not get through on September 15 and September 16 because the Country Club Hills emergency lines were knocked out for several hours (II-Comp. Gr. Ex. 5), nor do they include calls which did get through on those two dates but were not recorded for tabulation because the operators were too busy to enter information into the computer records. (Tr. 7 at 309-311, II-Comp. Ex. 6).

The Board finds sufficient evidence to conclude that noise from the theater caused substantial interference on the following dates during the 1991 concert season: June 1, 14, 29, July 2, 12, August 3, 11 and 23. During the 1992 season the Board finds the evidence supports substantial interference on the following dates: August 2, September 2, 15, 16, and September 18. This occurred primarily in Matteson and Country Club Hills.

These dates do not include all dates for which there was citizen testimony of noise disruption, nor all the dates upon which there were multiple calls to police telephone lines. These only include the dates where the Board believes that complainant's clearly have made a showing of more than "trifling interference, petty annoyance or minor discomfort." Wells Manufacturing Co. v. PCB, (1978) 73 Ill. 2d 226, 383 N.E. 2d 148, 150.

No interference was found for dates in 1992 earlier than July 27 because no testimony was presented for those earlier periods.

On one additional matter, the Board must note its serious concern with the cavalier approach Theatre has espoused regarding this noise problem. Certainly, Theatre was aware of the frequency and magnitude of complaints to municipal officials and the police regarding noise. (II-Comp. Gr. Ex. 5; II-Resp. Ex. 2, II-Resp. Ex. 3). From the earlier hearings and this Board's Interim Opinion and Order, Theatre should have been aware that the local residents and the Board took those complaints very seriously. Theatre had technicians monitoring sound at the same location and same time as complainant's witness, Dr. Fleisher; both had identical instrumentation, they were set up the same and they recorded the same analytical results within margins of recording error. (Tr. 4 at 611-613). Therefore Theatre should have had the same analytical data regarding sound levels in the community as did complainants.

Despite ongoing knowledge of the objective and subjective nature of the sound problem, Theatre's testimony reflects an attitude that the problem has been resolved and that the complaints are insignificant:

> I think based on the information we get from the weather service and the metering we get from the mix position at the top of the hill, it gives us -- from that we have a pretty good idea where we're going to be hearing sound... But we'd know by keeping the sounds, you know, keeping the sound pressure level down to 105 or so at the mix position. If we kept it within restraints, we knew we really weren't causing much of a sound problem in the communities.
> (Tr. 10 at 399-400)

Theatre had discontinued community monitoring for the first U2 concert because, "we don't have any sound problems". (Tr. 10 at 385-386). After reviewing the 1992 complaints, Mr. Mickelson asserts that out of the 11,000 people in Matteson, a minimal number were complaining. Most of the 85 complaints came from the Woodgate and Creekside subdivisions, which contain about 1210 residents. Mr. Mickelson believes that 85 complaints out of 1210 people leaves an awful lot of people from those subdivisions that did not complain and did not testify at the hearings before the Board. (Tr. 8 at 233-247).

Theatre's declaration that they "don't have any sound problems", came just 49 days after the Board's July 1992 hearings concluded. Those hearings produced many citizen complaints and a

Matteson police tally of 57 complaints from the 1991 season. (I-Comp. Ex. 6). That declaration came just two days after the last of the Matteson Village Administrator's three letters of August 7, September 4, and September 14, listing a total of 26 complaints. (II-Comp. Gr. Ex. 5).

The Board absolutely rejects the idea that this sound problem is under control or that the impacts are minimal. Over 250 complaints to police is not minimal. When 7% of the population (85 out of 1210) of one subdivision 1 1/2 miles from the theater is sufficiently motivated to call the police about noise, and sufficiently lucky to get through the clogged emergency telephone lines, the problem is neither under control nor minimal.

The Board specifically readopts the evaluation of the Section 33(c) factors in the interim opinion and order dated April 25, 1991. That evaluation is modified by the discussion of technical practicability and economic reasonableness contained in the remedy section of this opinion (See Section 33(c)(4)) and the evaluation of the previously described testimony to the effect that Theatre has not yet achieved the reduced sound levels necessary to avoid substantial annoyance throughout the community (See Section 33(c)(5)).

In regard to technical practicability and economic reasonableness, specifically including the discussion in the remedy section of this opinion, the Board finds that there is an obvious and imminently practical method of sound control that will lead to elimination of the unreasonable interference complaints - - sound control at the source. The Board believes that use of the octave band sound monitoring at the source and two residential locations will allow that sound control to be tailored to provide the least intrusion on sound levels at the theater, and still control for unusual atmospheric conditions. The Board finds the cost of purchasing and utilizing the sound monitoring equipment is reasonable under the circumstances here today.

Contrary to Theatre's assertions, the purpose of the sound monitoring and volume control is not to turn down the sound after it has already become too loud. The purpose is to become aware of sound levels in the community from the moment the concert begins, usually with the warm up group. As sound levels are monitored in the community and begin to approach numerical limits, sound control can be employed to prevent sound levels from rising to offensive levels in the first place. The purpose is preventing problems in the first place, not allowing offensive levels to continue and then making dramatic sound reductions that would offend the concert audience. Most of Theatre's arguments relating to audience distress involve dramatic sound reductions in mid-concert. A monitoring and sound control program oriented

to prevention, rather than dramatic remediation, would mitigate many of those concerns.

Theatre has strongly argued that a requirement for a feedback system that would remove volume control from the artist would absolutely put Theatre out of business. The Board today is not adopting such a mandatory feedback system, nor requiring physical changes to the structure. This decision is based largely on testimony from Theatre's witnesses. Theatre is free to pursue those options, or any other options, should it so desire.

Theatre also argues that to lower the sound levels beyond the present level of 105 decibels at the mix may result in a substantial loss of performers. The Board makes several observations about this argument. First, there is no clear evidence when that requirement became effective, or how it has affected community noise levels. Measurements are not taken continuously, but only at random times. No record of those values has been submitted to the Board to show compliance existed at the times of citizen complaints, especially the September U2 concerts. Second, it is readily admitted that the levels are frequently exceeded and that Theatre personnel must request the artists' sound engineer to lower the volume. In 10-15% of the cases this is not successful and the matter must be pursued with higher level management. In short, there is no technical trail of records that would allow the Board to determine the numerical sound values on a minute by minute basis. As a result, the Board is unable to evaluate how much of the time the level is exceeded during each performance, and what contribution that has to the community complaints. For that reason, the Board will order specific sound monitoring at the mix location.

The Board notes that Theatre has consistently sought to hold numerical noise measurements used against it to the highest standards of scientific measurement, data recording, and reliability - on a moment to moment basis. (Resp. Brief pp. 6-8). Yet, Theatre's measurements to show efforts at compliance consist of unrecorded occasional numerical measurements that are not submitted as evidence, with candid admission that those levels are frequently exceeded.

Second, it is entirely possible that <u>strict</u> compliance with the limit of 105 decibels would eliminate many citizen complaints, and that lowering the limit to <u>strict</u> compliance with 100 decibels would eliminate even more. Theatre has indicated that the level of 100-105 decibels is not a level readily rejected by its existing performers. (Tr. 8 at 259-271). Certainly, the record shows that many groups perform there without causing noise complaints. If Theatre finds that it is necessary to lower the mix levels to below 100 decibels to achieve compliance, then Theatre will have to bear the

consequences of that action. Theatre chose the present location and stage design for the facility long after the residents had established the community. There is testimony that the location and design may not be appropriate for the proximity of adjacent communities. (Tr. 4 at 651-659, 680-681). The Board specifically rejects the idea that Theatre has the right to unreasonably interfere with the safety and reasonable exercise of daily activities in adjacent communities under the guise of artistic freedom.

Based upon this evaluation, the Board concludes that Theatre's sound emissions caused unreasonable interference with the enjoyment of life at the locations and dates described above, in violation of 35 Ill. Adm. Code 900.101 and 900.102 and Section 24 of the Environmental Protection Act.

The testimony from the residents demonstrates that Theatre continues to be in violation of the nuisance standard of the Board's noise regulations up to and including the end of the 1992 concert season. Theatre has not presented any evidence concerning any measures that it has taken after the close of the 1992 season to correct the noise violations or the effect these measures have had in reducing the amount of noise from the theater. Absent evidence to show that the noise problem at the theater has been subsequently corrected, the Board finds that additional sound control measures are required.

III. REMEDY

A. Legal framework

The Board has found nothing in federal Constitutional law that would impair today's order. The U.S. Supreme Court has ruled that the constitution does not prohibit government from regulating noise from concerts. The Court upheld New York City's requirement that only the city's sound system, operated by a city engineer, could be used for amplification in a Central Park bandshell. See Benjamin R. Ward v. Rock Against Racism, (1989) 491 U.S. 781, 109 S. Ct. 2746, 105 L. Ed. 2d 661:

> The city's regulation is also "narrowly tailored to serve a significant government interest." Community for Creative Non-Violence, 468 U.S. at 293, 104 S. Ct. at 3069. Despite respondent's protestations to the contrary, it can no longer be doubted that government "ha[s] a substantial interest in protecting its citizens from unwelcome noise." City Council of Los Angeles v. Taxpayers for Vincent, 466 U.S. 789, 806, 104 S. Ct. 2118, 2129, 80 L. Ed. 2d 772 (1984) (citing Kovacs v. Cooper, supra); see Grayned, supra, 408

> U.S., at 116, 92 S. Ct. at 2303. This interest is perhaps at its greatest when government seeks to protect "'the well-being, tranquility, and privacy of the home'", Frisby v. Schultz, 487 U.S. at _____, 108 S.Ct. at 2502 (quoting Carey v. Brown, 447 U.S. 455, 471, 100 S. Ct. 2286, 2295, 65 L. Ed. 2d 263 (1980))....

To achieve control of excessive noise, the courts have allowed narrowly tailored regulation of amplified music. The courts have approved prohibiting amplification altogether, Carew-Reid v. Metropolitan Transportation Authority, (2nd Cir. 1990) 903 F. 2d 914; mandating that only city employees may determine the volume of the amplifier, Benjamin R. Ward v. Rock Against Racism, (1989) 491 U.S. 781, 109 S. Ct. 2746, 105 L. Ed. 2d 661, and specifically endorsing numerical limitations on the sound levels, Carew-Reid v. Metropolitan Transportation Authority, (S.D. N.Y. Jan. 5, 1990) No. 89 Civ. 7738 at 16-17, rev'd on other grounds 903 F. 2d 914 (2nd Cir 1990). See also, 10 Pace Law Review 633 (1990); 11 Pace Law Review 643 (1991); 1 Seton Hall Constitutional Law Journal 451 (1991). The Board finds that the remedy articulated today is narrowly tailored to serve that legitimate government interest.

The Board is specifically not mandating any effort to control the sound mix at the source. So long as the overall volume of the performance is reduced to an acceptable level at the receiving location (including attainment of the numerical limits), Theatre is free to select any sound mix it chooses. See Ward, Supra, at 109 S. Ct. 2759-2760. Also, changes in the mix can change the character of the music (Tr. 9 at 50).

Theatre has argued that reduced volume may impair its ability to attract performing groups or satisfy audience demands. The Supreme Court has specifically rejected this argument, "That the city's limitations on volume may reduce to some degree the potential audience for respondent's speech is of no consequence, for there has been no showing that the remaining avenues of communication are inadequate. [Citations Omitted]" Ward, Supra at 2760. See also, Carew-Reid, Supra at 919, "The First Amendment, however, does not guarantee appellees access to every or even the best channels or locations for their expression. [Citations Omitted]."

In a similar vein, the Board has found nothing in Illinois general case law or interpretations of the Illinois Environmental Protection Act that would conflict with today's order. Theatre's primary argument against sound control involves factually unsupported assertions that it is not technically feasible and economically reasonable to satisfy audience demands and avoid local resident's noise complaints under all atmospheric

conditions. However, lack of a technologically feasible or economically reasonable method of reducing the pollution is not an absolute defense to a finding of violation by this Board. Wells Manufacturing Company v. Pollution Control Board, (1978) 73 Ill. 2d 226, 383 N.E. 2d 148. As stated by the Court in Chicago Magnesium Casting Co. v. Pollution Control Board, (First District, 1974) 22 Ill. App. 3d. 489, 317 N.E. 2d 689 at 692:

> The petitioner interprets Section 33 to mean that, if it is not technically practicable or economically reasonable to reduce or eliminate the pollution, there can be no violation. Such an interpretation would mean that a government would be powerless to restrict pollution regardless of its severity, even if it endangered lives so long as it was technically impracticable for an individual to continue to operate without polluting. This is a dangerous principle and manifestly unacceptable. We agree, rather with the Agency position that economic reasonableness and technical practicability are but two factors to be considered by the Board in determining whether or not the Act has been violated.

Today's opinion and order has found credible evidence that police and emergency telephone lines are disrupted for extended periods by complaints regarding the theater's noise.

> For the second night in a row, there were so many complaints that the City's emergency lines were knocked out for several hours. If a citizen experiencing a heart attack or situation that placed him in danger were to attempt to place a call to the Country Club Hills Police Department, he might have had to wait more than ten minutes to get through the lines. An officer had to be pulled off street patrol in order to handle the volume of calls. This situation is intolerable!
>
> Letter from Janet R. Muchnik. City Manager, Country Club Hills, to Mr. Christopher W. Zibart, Attorney for Respondent, Dated September 17, 1992 (II-Comp. Group Ex. 5)

This is virtually identical to the testimony received regarding the 1990 season from Ms. Muchnik and Mayor Welch (See Order, April 29, 1991 at 14-16, 22-24). This comes alarmingly close to the "endangered lives" contemplated by the First District in Chicago Magnesium Casting Co., Supra.

Theatre's assertion that atmospheric conditions may adversely affect sound propagation does not present an adequate basis for declining to control the sound at the source. Many federal and state environmental control programs require individual sites to establish pollutant controls based upon rare adverse conditions. For example, facilities discharging to navigable waters must control pollutants so as not to cause a water quality standard violation under drought conditions. The design value is the lowest average 7-day stream flow in the last ten years. 35 Ill. Adm. Code 302.102-302.103. In a similar manner, federal and state governments have programs for control of ozone and particulate matter. Ambient concentrations of these pollutants are significantly affected by meteorological conditions such as high winds or hot sunny days. (See R82-14 pp 1-2, October 14, 1987). Design values for the control programs are based upon rare days with such adverse conditions. Theatre's argument only demonstrates that its noise propagation may be affected by atmospheric conditions. The Board cannot reasonably contemplate that no one will need access to emergency telephone lines in the surrounding communities on days of poor atmospherics.

Theatre further argues that the Board lacks the authority to impose limitations upon Theatre that are different from the existing regulatory language. Theatre argues that a site-specific rule making process is required to establish such limitations. The Board disagrees. The Board notes that this is an "unreasonable interference" nuisance case. No regulation is all encompassing. Such regulations would be difficult if not impossible to craft. Yet, government and citizen initiated enforcement actions to stop "unreasonable interference" represent a substantial portion of the Board's enforcement docket each year. Under Theatre's argument the Board's order in such cases could provide no relief, save monetary penalties and simple language to cease and desist.

The Board's authority to impose specific controls on a case by case basis is well established in Illinois law. In a similar "unreasonable interference" case the First District stated:

> Although the Act does not require the Board to promulgate regulations or determine standards in advance of a hearing, plaintiffs contend that the adoption of a Board regulation governing odors emitted by inedible rendering processes and the failure to adopt comparable regulations for printing processes is a denial of equal protection of the laws. It is true that manufacturers who engage in inedible rendering processes are now able to measure their odor emissions against a Board regulation, and plaintiffs cannot. But we

believe plaintiffs have failed to show that this distinction is so unreasonable as to be constitutionally impermissible.

The legislature has granted to the Board the authority to make regulations, and it has made the exercise of that authority discretionary. (Ill. Rev. Stat. 1971, ch. 111 1/2, par. 1010). Consistent with the terms of the Act, the Board may, in our opinion, choose either to promulgate regulations or to develop standards in the course of case-by-case enforcement proceedings, as we have stated above, and in Mystik. The Board is presumed to have the expertise to determine which aspects of the pollution problem are most susceptible to fixed regulations and most worthy of the expenditure of time and money necessitated by the procedure for promulgation of substantive regulations. (Ill. Rev. Stat. 1971, ch. 11 1/2, par. 1026 et. seq.). As the legislature's delegate, the Board may, like the legislature, "take one step at a time, addressing itself to the phase of the problem which seems most acute * * *." Williamson v. Lee Optical of Oklahoma, Inc., 348 U.S. 483, 489, 75 S. Ct. 461, 465, 99 L. Ed. 563.

Furthermore, to require the Board to adopt regulations for all types of pollution, or even for all sources of odors, would result in a subversion of the legislative policy of leaving the promulgation of regulations to the discretion of the Board. It would also discourage the Board from adopting any regulations at all unless the entire field of pollution could be regulated at the same moment, a colossal and time-consuming undertaking which could meanwhile deprive the State of some anti-pollution proceedings, and deprive some alleged polluters of whatever benefit might accrue to them through the issuance of pre-hearing regulations.

W. F. Hall Printing Company v. Environmental Protection Agency, (First District, 1973) 16 Ill. App. 3d 864, 306 N.E. 2d 595.

The court reached a similar conclusion in Mystik Tape v. Pollution Control Board, (First District, 1973) 16 Ill. App. 3d 778, 306 N.E. 2d 574. The Board finds no legal impediment to developing site-specific numerical limitations, within this

contested case proceeding, which would apply to Theatre premised upon the finding of substantial and long-term violations of the nuisance provisions.

Additionally, the standards adopted today are certainly not unique. The numerical limitations are those from long-standing Board regulations. They apply to all SLUCM Class B facilities, not just Theatre. The time-averaging period of five minutes is at least consistent with the averaging times that applied throughout Illinois before adoption of the one-hour averaging time in R83-7, In the matter of : General Motors Corp. Proposed Amendments to 35 Ill. Adm. Code 900.103 and 101.104 January 22, 1987. In addition, the Board has noted in prior orders that the R83-7 proceeding and underlying support documents make it clear that one-hour averaging may not be best suited for all types of noise sources. As Theatre itself admitted in the 1991 Final Report, "The L_{eq}, or equivalent sound pressure level (SPL) based on time averaged energy or intensity, can be a very useful environmental metric. However, the one-hour measurement period stipulated in Section 900.103 proved to be unrealistically long for the conditions encountered at these measurement sites." (I-Comp. Ex. 10, at 5). Additionally, Complainants submitted an Arapahoe County, Colorado Ordinance applicable to another concert theater that calls for a 15-minute L_{eq} averaging period. (II-Complainant's Ex. 7). Under the circumstances, the Board believes that the order adopted today is supported conceptually, factually, and legally.

B. Technical matters

Extensive testimony has been provided during the course of this proceeding by both Theatre and Matteson regarding the technical issues concerning sound monitoring and control options. Dennis Fleisher, a sound consultant who performed sound monitoring for Matteson, provided extensive testimony on his sound measurements at hearings held on June 6 and July 9, 1992. Greg Zak, noise technical advisor with the Illinois Environmental Protection Agency provided testimony concerning sound monitoring standards at the hearing held on July 27, 1992. Dr. Fleisher and Mr. Zak both provided comments on the control options presented in the report submitted by Theatre to the Board on August 5, 1991. Mr. Zak also provided comments on the feasibility of the Board's proposed compliance plan at hearings held on December 16 and 17, 1992. Joel Lewitz, a sound consultant representing Theatre, provided testimony concerning the Board's proposed compliance plan at the hearing held on January 21, 1993. Mr. Stephan McCarthy, World Music Theatre's sound department head technician provided testimony at the hearing on January 22, 1993.

The Board will evaluate the technical matters in five segments: (1) the sound monitoring and control options presented in Theatre's 1991 Final Report; (2) the sound monitoring conducted by Matteson; (3) the Board's October 29, 1992 draft compliance plan; (4) Discussion, and (5) Conclusions

1. The sound monitoring and control options in Theatre's 1991 Final Report

Theatre's 1991 Final Report (I-Comp. Ex. 10) presents the results of the sound monitoring and recommendations to control sound levels emanating from the theater. The report includes sound data monitored during 22 performances from June 1, 1991 to July 21, 1991.

The sound monitoring data presented in Theatre's report were evaluated by the Board in its previous orders (August 22, 1991 and September 12, 1991) and also discussed at hearings. The Board found that the sound monitoring data do not fulfill the objectives stated in its interim order of April 25, 1991, due to difficulties with raw data collection and preservation. Upon reviewing Theatre's report, Mr. Greg Zak pointed out several deficiencies regarding the measurement of ambient sound and method of sound measurements. (Tr. 6 at 26-30.) He stated that in his opinion, the sound monitoring data would not meet the standards of the Illinois Environmental Protection Agency as far as the type of evidence that would be presented at a hearing. (Tr. 6 at 30.)

As noted above, Theatre's 1991 Final Report also includes an evaluation of a number of options for controlling sound emissions from the theater. The feasibility of implementing one or more of these options is summarized as follows:

Berm or Barriers for Sound Attenuation

This option involves increasing the height of the present berm or adding a wall on top of the berm. (I-Comp. Ex. 10 at 10). The report notes that in order to be effective, the barrier would need to block the line of sight from the venue to the measurement point. (I-Comp. Ex. 10 at 10). Based on the layout of the site, an additional 48 feet would have to be added to the present berm structure to break the sight line. (I-Comp. Ex. at 11). The report notes that increasing the berm by this height is impractical due to space limitations and structural and safety problems. (I-Comp. Ex. 10 at 11). The cost of building a structure 48 feet high is approximated at 2.7 million and would have an adverse effect on the sound within the theater. (I-Comp. Ex. 10 at 11). Moreover, a berm or a barrier might produce sound-reduction under favorable conditions and have little effect under unfavorable weather conditions such as northwest wind or an

evening temperature inversion. (I-Comp. Ex. 10 at 12). In view of this, the report does not recommend a berm or a barrier as a viable sound control option. (I-Comp. Ex. at 13).

All three experts who provided testimony in this proceeding on the report, Dr. Fleisher, Mr. Zak and Mr. Lewitz, agree with the findings of Theatre's report. Dr. Fleisher believes that any modification to the berm would be unreasonable and expensive. (Tr. 4 at 680). Mr. Zak and Mr. Lewitz both noted that any type of barrier would have a negligible effect due to atmospheric problems of refraction and focusing. (Tr. 6 at 109 and Tr. 9 at 130-131).

Enclosure of the theater

This option involves the construction of a structure that would completely enclose the theater. (I-Comp. Ex. 10 at 12). Enclosing the theater would reduce the seating capacity. (I-Comp. Ex. 10 at 12). The mechanics of enclosing the theater create a multitude of design and engineering problems. (I-Comp. Ex. 10 at 12). The report concludes that enclosure is not structurally or financially feasible. (I-Comp. Ex. 10 at 13).

Dr. Fleisher notes that leakage is the most significant cause of bad sound isolation. (Tr. 4 at 691). He also states that the theater has a big leakage problem that can only be corrected by a significant enclosure. (Tr. 4 at 691). Dr. Fleisher believes that a full enclosure option is the best solution but notes that the financial aspects of such a project may make it impractical. (Tr. 4 at 709). Mr. Zak also sees enclosure as a possible solution to contain the noise but notes that the cost of enclosing the theater may rule out the option. (Tr. 6 at 15).

Added Absorption

One option is the application of sound absorption materials around the performance stage and covered seating areas of the theater to reduce sound emanating from the stage. (I-Comp. Ex. 10 at 15). Theatre's 1991 Final Report notes that significant sound energy escaping from the rear of the venue is reverbent in nature, and such energy can be reduced by the application of sound absorption materials. (I-Comp. Ex. 10 at 14-15) The cost of adding absorption materials is estimated to be between $70,000 and $150,000 plus labor and installation. (I-Comp. Ex. 10 at 15). The report concludes that installation of adequate sound absorptive material possibly coupled with membrane damping would significantly reduce the reverbent component of the total sound energy. (I-Comp. Ex. 10 at 15).

Dr. Fleisher clarified the report's findings that application of absorption material would result in a noticeable reduction of reverbent sound energy only if it is exactly equal to the direct sound energy coming from the loudspeakers. (Tr. 4 at 686-687). Dr. Fleisher noted that some absorptive material was present around the stage area in the theater but that there was so little that it was basically ineffective. (Tr. 4 at 685). Mr. Zak finds sound absorption not to be a viable option since the costs would be high for a small reduction in sound level. (Tr. 6 at 16). Mr. Lewitz also stated that even if sound absorption material is added to 100 percent of the stage house, it would have an insignificant effect on the concert sound levels measured in the community. (Tr. 9 at 127).

Turn Down Lawn System

The sound level of the theater's reinforcement system covering the lawn area could be reduced to decrease the sound leaving the theater. (I-Comp. Ex. 10 at 17). However, the report notes that an investigation has shown that this would have little effect because the lawn system is not a major component of the sound energy leaving the theater. (I-Comp. Ex. 10 at 17).

Dr. Fleisher expressed his concern of crowd reaction to a reduction in the sound level to the lawn area. (Tr. 4 at 701). Mr. Zak believes that it is necessary to turn down the entire system and not just the lawn system. (Tr. 6 at 16).

Sound Control at the Source

This option involves the reduction of the sound pressure levels at the source and would require a combined sound and meteorological monitoring station be set up at one or more locations. (I-Comp. Ex. 10 at 16). A trained technician would be required to man the station. (I-Comp. Ex. 10 at 16). Data collected at the monitoring station would be sent back to the mixing engineer at the theater, who would adjust the sound to the allowable level. (I-Comp. Ex. 10 at 16). The technician would monitor the sound levels using his ears and report any excess levels via a cellular phone. (I-Comp. Ex. 10 at 16). A monitoring station would cost in excess of $30,000 plus the cost of a trained technician. (I-Comp. Ex. 10 at 16).

Theatre's 1991 Final Report recommends a sound control strategy based on the concept of sound control at the source. (I-Comp. Ex. 10 at 20-22). This recommendation involves the installation of microphones at the perimeter of Theatre's property connected to frequency analyzer to measure the sound leaving the venue. The sound pressure levels measured at the microphone would be transmitted back to the theater. Theatre personnel would have complete control over the system. The

report further recommends the use of a trained roving technician to provide additional information on the noise conditions to the theater. Using the data from the microphones and the roving technician, the mix engineer would adjust the sound level accordingly.

Dr. Fleisher believes that there would be an enforcement problem with many groups. (Tr. 4 at 699). He noted that many groups want to run their own sound. (Tr. 4 at 699). He also noted the problem in determining the monitoring site. (Tr. 4 at 699). Dr. Fleisher also agreed that a system to control sound at the source can exist if there was instantaneous feedback to someone controlling the sound at the theater and if that person cooperates in reducing the sound levels. (Tr. 4 at 702-703). Mr. Zak believes that sound control at the source is a possible solution. (Tr. 6 at 16). However, he noted the possibility of complaints from patrons of the theater. (Tr. 6 at 51). He also noted that an acceptable level would need to be agreed upon. (Tr. 6 at 64).

Mr. Zak provided literature on a automatic feed back system. (I-Pub. Ex. 2). The system involves placing microphones in sensitive areas to measure sound level, the information from the monitoring station is fed back to the mixing engineer. Using the data the sound engineer can make the necessary adjustments to reduce the sound. He believes that this type of system would "avoid the ambiguity and possible prejudice and human error on the part of having a roving technician" calling in to Theatre. (Tr. 6 at 65).

2. Sound monitoring conducted by Matteson

Dr. Fleisher conducted sound monitoring at the request of Matteson to verify the monitoring being conducted by Theatre. (Tr. 4 at 612). According to Dr. Fleisher, the instrumentation and measurement procedures were in accordance with the appropriate standards. (Tr. 4 at 611). The monitoring site was located in the back yard of Mike Perry's home at 24 Wedgewood, in the Woodgate subdivision, in Matteson. (Tr. 4 at 617). The record indicates that Dr. Fleisher monitored sound levels in Matteson during three concerts on June 1, 14, and 29, 1991. (Tr. 4 at 616 and Tr. 5 at 736-737).

Dr. Fleisher stated that the sound data from the June 1, 1991 concert (Jonathan Brandmier) was not significantly different from the ambient level. (Tr. 5 at 737). Dr. Fleisher also noted in his sound measurement report that the subjective evaluation by ear and the sound measurement meter were in good agreement. (Comp. Ex. 13). He reported that during most of the monitoring period he did not hear excessive loud sounds from the theater and the sound measurements verified his subjective observations. On the June 14 concert night (Rush), Dr. Fleisher noted that he did

not report any sound measurements since he found that sound from the theater was not measurable. (Tr. 5 at 738). He also stated that he did not hear any sounds from the theater during the entire four and a half hours he was at the monitoring site. (Tr. 5 at 741).

Dr. Fleisher stated that sound from the theater was clearly audible during the entire monitoring period on the June 29, 1991, concert night (AC/DC). (Tr. 4 at 617). He stated that he could hear when a song began and ended, when instruments like drums, base and lead guitars were being played, and when singing began and ended. (Tr. 4 at 617). Dr. Fleisher noted that he prepared a report of the objective data from the monitoring instrumentation and his subjective observations. (Tr. 4 at 619-620). He stated that he analyzed the sound data in terms of 1-hour L_{eq} and the highest average peak level. (Tr. 4 at 624). Dr. Fleisher explained that he prepared graphs comparing the monitored sound levels with the maximum allowable night-time sound levels (Board standard) and the ambient noise levels. (Tr. 4 at 626-627). The graphs show both the octave band center frequencies and A-weighted decibel sound level (dB(A)). (Tr. 4 at 625-626 and I-Comp. Ex. 7 and 8). Dr. Fleisher stated that the graph of the 1-hour L_{eq} data shows that the monitored sound levels exceeded Illinois EPA levels (Board standards) in five out of nine octave band center frequencies. (Tr. 4 at 629). However, he noted that the sound levels from the theater were not corrected for the ambient noise levels. (Tr. 5 at 759).

3. Comments on the Board's October 29, 1992 draft compliance plan

The Board proposed a draft compliance plan based on the information in the record and solicited comments on the feasibility of implementing such a plan to reduce sound impacts to reasonable levels. (Order, October 29,1992 at 4). The proposed plan contemplated the use of a feedback sound monitoring system, numerical standards based on 5-minute L_{eq}, and procedures for collecting ambient sound data. Both Matteson and Theatre provided extensive testimony and comments on the Board's proposed compliance plan at hearings held in December, 1992 and January, 1993. Mr. Greg Zak testified on behalf of Matteson and Mr. Joel Lewitz testified on behalf of Theatre. These comments are reviewed in this section as they relate to the main items of the Board's plan.

Sound Monitoring

The Board's proposed compliance plan required Theatre to establish sound monitoring at a minimum of two locations using instrumentation that would provide instant feedback to Theatre for purposes of octave band sound control during concerts.

Mr. Greg Zak's Comments

Mr. Greg Zak who testified on behalf of Matteson indicated that he had a discussion with the representative of Grozier Technical Systems, a manufacture of sound level management system, regarding the requirements of the proposed compliance plan. (Tr. 7 at 156). Based on this discussion and other investigations, Mr. Zak believes that equipment is available to properly monitor sound from the theater in accordance with the Board's compliance plan. (Tr. 7 at 157).

Mr. Zak provided a description of the feedback sound monitoring system along with the cost estimate of implementing such a system. (Tr. 7 at 157-166). Essentially, the sound monitoring system consists of microphones placed at the receiving sites and near the theater, and a main computer system located in the theater that monitors and integrates all the data. Mr. Zak stated that by placing microphones at both the receiving Class A residential land and near the theater, the sound levels in both locations can be monitored simultaneously. (Tr. 7 at 161-162). Mr. Zak noted that the microphones near the theater provide some protection to the Village in that if the volumes were not turned down, those microphones would indicate no drop in level. (Tr. 7 at 162).

The sound measurement data from the microphones would be transferred to the main computer via two phone lines at each monitoring site. (Tr. 7 at 158). One phone line would be used to transmit the data from the microphone to the main processing system and the second phone line would transmit data in the form of an audio signal. (Tr. 7 at 159). The operator of the system can listen to the audio signal to find out what is occurring at the neighborhood and also record the audio data using a digital audio tape (DAT) recorder. (Tr. 7 at 159). Mr. Zak stated that the tape recording of the audio signal will provide an accurate record of exactly what the microphone picked up and that could be tied into the 5-minute L_{eq} measurements. (Tr. 7 at 159). He notes that having an audio record is an advantage to Theatre since it prevents noises in the neighborhood from being classed as a potential violation. (Tr. 7 at 160).

Regarding the monitoring of the feedback sound data to control sound levels at the theater, Mr. Zak stated that under

normal weather conditions out of the two sites in the community only one site may have a potential problem depending on the wind direction and atmospheric conditions. (Tr. 7 at 233). So, he stated that very shortly into the concert, a person monitoring the feedback data will realize that one of the two sites is not really of significance and concentrate on the site that may have a potential problem. (Tr.7 at 234). Mr. Zak noted that sound levels would be displayed on the computer screen along with the line of exceedance. Once that line of exceedance is approached or exceeded, then one would reduce the volume to prevent any further exceedence during that particular song. (Tr. 7 at 234). Mr. Zak stated an operator must also hear what is taking place at the microphone in order to make any volume adjustments to account for extraneous noise. (Tr. 7 at 235-236). He recommended that the person monitoring the feedback system have ear phones to listen to the audio from the problem site. At the same time, he must also monitor the computer screen which displays the sound levels on a real time basis. (Tr. 7 at 237).

Mr. Zak stated that the system is designed to be tamper proof and someone at Theatre can operate the system and still have a fairly high certainty of valid data being taken. (Tr. 7 at 167). He estimated the cost of instrumentation, installation and training for Theatre personnel to be approximately $80,000. (Tr. 7 at 166). Mr. Zak noted that the $80,000 estimate represents a one time cost and does not include ongoing costs for employing two people to monitor the feedback system. (Tr. 7 at 207-208).

Mr Zak also recommended that the Board should seriously consider the impact of impulsive noises and include a requirement for monitoring potential impulsive noise. (Tr. 7 at 166). He noted that a strip chart recorder would show the dB(A) variations on a second to second basis on a paper strip and indicate whether or not the level allowable for impulsive noise was being exceeded. (Tr. 7 at 166-167). Mr. Zak stated that strip chart can be used to check or verify the validity of DAT recording. (Tr. 7 at 169).

Regarding the actual sound monitoring required by the proposed compliance plan, Mr. Zak stated that some of the requirements of 35 Ill. Adm. Code 951.100 et. seq. are not applicable. (Tr. 7 at 199). He suggested that the Board specify the applicable requirements rather than a general reference to Part 951. (Tr. 7 at 200).

Mr. Joel Lewitz's comments

Mr. Joel Lewitz stated that the proposed sound monitoring system is impractical and will not yield valid or useful data. (Tr. 9 at 30). Mr. Lewitz stated that for acquiring valid community noise measurement data, the sound levels being recorded must be at least 10 to 15 decibels higher than the ambient. (Tr.

9 at 36). Mr. Lewitz stated that this basic assumption applies to the operation of the Grozier equipment (feedback system). (Tr. 9 at 37). He noted that previous measurements around the theater have indicated that the sound levels are very close to ambient. Therefore, Mr Lewitz believes that the data will be useless since it will not be possible to distinguish the sound levels from the noise source and ambient noise.

Mr. Lewitz stated a feedback monitoring system also affects the ability to exclude extraneous and transient sounds. He stated that it would be difficult and awkward for someone monitoring sounds with headphones to identify transients and exclude them from measured data. (Tr. 9 at 41). Mr. Lewitz also expressed concerns regarding tampering of data and equipment in a remote feedback system. (Tr. 9 at 45). He believed that it would be very easy for someone to make noise near the microphone and render the data useless. (Tr. 9 at 46). Mr. Lewitz noted that a listener will have to be monitoring very carefully to know when a system is being tampered with. (Tr. 9 at 46).

Mr. Lewitz also provided comments on noise control options available to Theatre. He stated that viable options include sound control at the source and physical changes at the venue such as barriers and berms (Tr. 9 at 56-57). Mr. Lewitz stated that he believes that Theatre has reduced the noise levels to the lowest level of audibility as possible. (Tr. 9 at 58). Mr. Lewitz stated that in addition to the measures that have been already implemented, the best thing that Theatre can do is monitoring. (Tr. 9 at 137). He stated that from his perspective monitoring sound levels at various points within the venue in combination with the other elements already implemented by Theatre is the best solution to address the noise problem. (Tr. 9 at 138).

Mr. Lewitz provided testimony concerning the atmospheric effects on sound propagation. He stated that temperature inversion has a significant effect on noise propagation. (Tr. 9 at 58). He explained that when cooler air is above warmer air, sound energy will tend to rise out of the theater, but when it reaches the inversion layer, i.e. when temperature layers reverse, sound energy will "defract" and come back down to a receiver at a distance. (Tr. 9 at 59). In effect, sound skips over some intermediate location between where its generated and where it is heard. (Tr. 9 at 59).

Mr. Lewitz also provided comments on the nature of the concert sounds. He stated that the concert sound is not impulsive, but rather steady state and continuous. (Tr. 9 at 60).

Mr. Mike McCarthy's comments

Mr. McCarthy does not believe there is value to permanent outside monitoring in the two communities. He believes that monitoring from the mix position and the hill, coupled with weather service information, gives him a pretty good idea where the sound will be heard. He knows that by keeping the sound level below 105 decibels at the mix he really isn't causing much of a sound problem in the communities. (Tr. 10 at 382-400).

Measurement of Ambient Sound

The proposed compliance plan required ambient sound data to be collected on days or evenings when no concert is being conducted during hours when concerts would typically occur. The plan allowed the averaging of sound data collected on three monitoring dates.

Mr. Greg Zak's comments

Mr. Greg Zak stated that the using sound data from three different dates is a prudent way to establish ambient. (Tr. 7 at 137). However, he offered a number of clarifications and suggestions to the procedure proposed in the compliance plan. First, the sound data from three different dates must be averaged on an energy basis since an arithmetic average will result in an inaccurate ambient level. (Tr. 7 at 137). Second, an attempt should be made to take ambient data when the wind is blowing from the theater towards the receiving microphones. (Tr. 7 at 138). This ensures that ambient is taken as close as possible to those conditions that would exist when music is actually played and its fair to Theatre. (Tr. 7 at 142). Third, both daytime (before 10 pm) and nighttime (10 pm and after) data must be taken. Fourth, ambient data must be taken on an annual basis since it may be affected by new structures and developments. (Tr. 7 at 139). Fifth, it may be a good idea for the village to have a representative present when the actual data is taken to verify the ambient level. (Tr. 7 at 140). Finally, the ambient levels must be measured on the basis of L_{eq} averaging with a reference time of 5 minutes in 10 second blocks and extraneous noise sources must be discarded. (Tr. 7 at 148).

Mr. Zak also testified that taking ambient measurements on the evenings of the concert is complicated and it will require a well qualified consultant to perform such measurements. (Tr. 7 at 145). He stated that the level of expertise to measure ambient data on a non-concert night would be less and World Music Theatre personnel may be trained to perform the monitoring. (Tr. 7 at 146).

Mr. Joel Lewitz's Comments

Mr. Lewitz stated that the proposed ambient measurement procedure is less attractive compared to measuring ambient just prior to or just after the concert. (Tr. 9 at 83). He also stated that collecting ambient data shortly before or shortly after the concert is not the best way. (Tr. 9 at 83). Mr. Lewitz stated that it is possible to measure the ambient sound level during the concert as long as it is done during a break or intermission when music is not audible. (Tr. at 163). He also stated that the ambient may be measured over a very short period of time. (Tr. 9 at 166).

5 Minute L_{eq} and Numerical standards

The proposed compliance plan requires all sound measurements to be based on L_{eq} averaging using a reference time of 5 minutes and specifies the Board's allowable octave band sound pressure levels at 35 Ill. Adm. Code 901.102(a) and 901.102(b) as the numerical standard.

Mr. Greg Zak's comments

Mr. Greg Zak stated that he supports the numerical octave band limits proposed by the Board. (Tr. 7 at 134). He noted that since prior testimony has indicated that residents have experienced problems relating to low frequency sounds, attention must be given to the low frequency part of the spectrum. (Tr. 7 at 132).

Regarding the 5 minute L_{eq} averaging, Mr. Zak stated he supports the Board's conclusion and that it is the best method of quantifying the noise impact on the residential area due to the nature of the sound emissions. (Tr. 7 at 135). He noted that since performances last significantly less than one hour, a more accurate record could be produced by taking five minute measurements in ten second blocks, rather than the one hour measurements. (Tr. 7 at 136).

Mr. Joel Lewitz's Comments

Mr. Lewitz did not endorse the octave band limits proposed by the Board. (Tr. 9 at 169). He stated that he preferred broad band measurements (dB(A)). (Tr. 9 at 169). However, Mr. Lewitz agreed that if any kind of monitoring is required, a standard has to be set in a law or regulation or the whole thing is a waste of time. (Tr. 9 at 169). Mr. Lewitz stated that the 5 minute L_{eq} averaging is stricter, but the hourly L_{eq} is more appropriate. (Tr. 9 at 149). He noted that L_{eq} averaging is done on a energy basis and therefore, the quite periods between songs or during breaks will not have a great influence on the hourly average.

(Tr. 9 at 148). Mr. Lewitz stated that very loud sound levels would dominate and determine the L_{eq}. (Tr. 9 at 148).

Mr. Mike McCarthy's comments

Mr. McCarthy described his sound meter as set to average about two seconds worth of data to produce a sound reading on the A-weighted decibel scale (dB(A)). It had several scales allowing measurement from 50 decibels to 130 decibels. He sometimes measures at the berm that is about 200 feet from the mix location. (Tr. 10 at 401-411).

Other comments

The Board notes that the issue of L_{eq} averaging is also discussed in Theatre's report and Dr. Fleisher's testimony. Theatre has stated in the 1991 Final Report that:

> The L_{eq}, or equivalent sound pressure level (SPL) based on time averaged energy or intensity, can be a very useful environmental metric. However, the one-hour measurement period stipulated in Section 900.103 proved to be unrealistically long for the conditions encountered at these measurement sites. Averaged over an hour, sound energy emitted from Theatre tended to become "submerged" in the time-averaged ambient sound energy. (Comp. Ex. at 5).
>
> ...we observed the sound emitted from Theatre to change from totally inaudible to clearly audible, to totally inaudible again in a matter of 10 or 15 minutes. (I-Comp. Ex. 10 at 9).

Dr. Fleisher stated that a typical concert performance will have a tune lasting 3 to 5 minutes and a break of 30 seconds to three minutes between tunes. (Tr. 4 at 644). In addition, he noted that usually there will be 40 minutes of performance followed by a 20 minute break. (Tr. 4 at 645). Dr. Fleisher noted that his tape recordings documented the periods when the band had stopped playing. (Tr. 4 at 645). He stated that an averaging time in the range of 1 to 5 minutes would yield a fairly good representation of the sound levels. (Tr. 4 at 647).

5. Discussion

Upon the review of the technical testimony, the Board finds that there is a consensus among the sound experts representing both Matteson and Theatre regarding broad issues concerning the

theater's noise problem such as method of noise control, sound monitoring, and numerical standards. The sound experts agree that: (i) sound must be controlled at the source; (ii) monitoring must be an integral part of the sound control system; and (iii) the compliance plan must include a numerical enforcement standard. However, the Board finds that there are differences of opinion as to the specific aspects of implementing a sound control plan.

Sound control options

The feasibility of implementing one or more of the sound control options considered in Theatre's report (I-Comp. Ex. 10) were discussed at hearings. Upon review of the testimony, the Board finds that sound control at the source is the most viable option for reducing noise from the theater. The Board notes that the experts for both Theatre and Matteson agreed that sound control at the source is a workable option. (I-Comp. Ex. 10 at 20-22, Tr. 4 at 702-703, Tr. 6 at 16, Tr. 9 at 56, and Tr. 10 at 399-400). The other options that require physical changes such as enclosing the theater, building a berm or a barrier, or adding absorption material were ruled out by the sound experts as either too costly or ineffective.

The Board believes that Theatre can control the sound level in the theater by operating the entire sound system at the appropriate level, so as to provide adequate sound to all its patrons and limit the amount of sound leaving the theater and reaching the surrounding residential areas.

Regarding the Grozier type feedback system contemplated in the Board order of October 29, 1992, the Board notes that Mr. Zak made a strong case for implementing such a system to reduce noise from the theater. However, the Board is not fully convinced that a feedback system is the most appropriate sound control option and has concern regarding the workability of the system. The Board's concerns are related to: the problems associated with the correction of sound levels for extraneous and transient sounds from a remote location; and the implications of reducing sound levels at specific frequencies during a concert. An operator of a feedback system will have to make corrections for transient and extraneous sounds by monitoring the sounds from the microphone through ear phones. Even though it is conceivable that such corrections may be made from a remote location, the Board recognizes that it may pose problems for an operator to collect valid data and make sound adjustments on a real time basis. The Board also notes that the record indicates reducing sound levels only at particular frequencies during a performance (real time) would result in a change in the concert sound. (Tr. 9 at 109-110).

Therefore, the Board will not mandate the use of a feed back system at this time. Instead, the Board will allow Theatre to craft its own sound control protocols to comply with the standards prescribed in today's order. However, if Theatre wants to utilize a feed back system, the Board notes that it does not have any objections, as long as the standards of this order are met.

The Board notes that the system contemplated in today's order offers all of the advantages of the feed back system. Technicians in the field operating the sound monitoring equipment will be aware of the sound levels on an every five minute basis. Theatre already has a CB system set up to communicate with field monitoring locations. (EASI August 19, 1991, Response to Board Order, page 2). Alternatively, cellular telephones allow instant communications with Theatre. Thus, Theatre can be informed on a very rapid basis on any changes in sound levels and informed when those levels approach the limitations established in today's order.

Sound Monitoring

The value of monitoring and its ability to detect and quantify problems is well established. As the noise expert from the Illinois Environmental Protection Agency, Mr. Greg Zak, testified:

> It appears in the testimony there's a problem, and it's been my experience in twenty years of doing this that I've never run across a situation where I couldn't measure it, so I suspect if this problem exists, it can be measured.
> (Tr. 6 at 50)

There is little dispute that sound pressure levels can be recorded with validity under the procedures and conditions present here. As stated in Theatre's 1991 Final Report, ANSI S1.13-1971 provides that valid source sound levels can be measured directly (without regard to ambient sound levels) when the source sound level at the recording location exceeds ambient by 15 decibels or more. When the source sound level is 4 - 14 decibels louder than ambient, mathematical procedures may be employed to derive valid source sound levels, If the source sound levels do not exceed ambient levels by at least 4 decibels, meaningful measurements are deemed infeasible. (I-Comp. Ex. 10, at 5,7).

There is ample evidence that for concerts with complaints, sound levels exceed those minimums, and are in fact, measurable in the community. As Dr. Fleisher stated in his audio tape narrative:

> It is now 1 minute into measurement #8. The more or less ambient level, the band is stopped now, is around 55 dB linear. I just had a car drive by. That brings it up to 58 to 60 dB linear. The band is still not playing. Occasional car drive-bys bring the level up to about 60 dB. The Band has just begun playing again. The level on the meter is now kicking up clearly above 60 db. Drum kicks are bringing it up to, again in a fast setting, above 65 unquestionably, and pieces up to about 70, and clearly above 69 dB with the bass drum.
>
> * * *
>
> Again the LED on the sound level meter is responding and moving synchronistically with the bass drum hits. I think there's no question that there's a correlation between bass drum hits. Again typically the music is causing, especially the bass drum, causing sound level meter to dance. Oh it's definitely clearly going to about 71 or 72 dB linear with bass drum kicks. I say over all between 60 and 70 dB linear and occasional bass drum kicks when they seem to be especially solid, it'll kick the level up to 71 or 72 dB linear. So if that is any indication, we may have increased just a tad. (I-Comp. Ex. 9)

The testimony and information presented by both Matteson and Theatre indicate that sound monitoring must be an integral part of any sound control program that would be imposed on Theatre. (Tr. 7 at 161-162, Tr. 9 at 137-138 and I-Comp. Ex. 10 at 19). Except for Mr. Lewitz and Mr. McCarthy, the other sound experts and Theatre's 1991 Final Report recommended that sound levels should be monitored both within the vicinity of the theater and in the surrounding communities. Mr. Lewitz and Mr. McCarthy recommended that sound monitoring must be conducted only at various points within the theater. However, the Board notes that they did not provide any rationale for not requiring monitoring in the surrounding communities.

The purpose of crafting a remedy in the present context is to reduce the impact of sound levels from the theater on the surrounding communities. Therefore, community noise measurement

data will be vital for the success of a compliance program. In this regard, testimony of Dr. Fleisher clearly established the linkage between the theater activities and the elevated sound levels in the surrounding communities. (I-Comp. Ex. 9). Dr. Fleisher's subjective recording of what he was hearing at the monitoring site corresponded to the objective measurements taken by the sound measurement meter.

In addition, the record suggests that the propagation of sound can be affected significantly by changing atmospheric conditions such as wind direction and temperature inversions. (Tr. 6 at 109 and Tr. 9 at 59). Therefore, the Board believes that objective data collected at the perimeter of the theater will not be adequate to predict sound propagating from the site to the surrounding communities.

Based on the above discussion, the Board finds that sound monitoring is an essential component of the compliance plan. Further, the Board finds that sound levels must be monitored at the theater and in the affected communities. The Board believes that such data will be extremely useful to Theatre in: devising and implementing a control strategy to meet the applicable standards; and demonstrating to the affected communities that it is not violating the applicable standards.

One equally important function of sound monitoring pertains to monitoring at the mix. Throughout this proceeding there has been speculation as to what portion of the noise impact results from the actual sound levels within the theater structure (i.e., are some concerts, or portions thereof, just exceptionally loud) and what portion of the impact derives from atmospheric conditions. Sound levels within the theater structure are controlled from the mix. By mandating monitoring at the mix, information will be produced, for the first time, to conclusively answer this question on a five-minute by five-minute segment basis as well as on a concert by concert basis. By collecting octave band information at the mix all parties will be able to focus on whether low frequency sounds are more troublesome. Since the sound levels at the mix are expected to greatly exceed ambient, the presence of a technician to exclude corrupted data is likely to be unnecessary.

The Board believes that sound monitoring should be required for the next three years. Theatre has been in operation for three years and has caused noise violations for various dates during that entire period. If Theatre can operate violation free for the next three years, then the monitoring portion of today's order should terminate. If not, the Board can address whether subsequent monitoring should occur in any future order.

Digital audio tape (DAT) recording of the sound monitoring will be required at each of the three locations. By employing a dual channel unit the appropriate narrative of field conditions can be recorded (such as the audio tape narrative in I-Comp. Ex. 9), and time-coding can be employed to ensure correlation with other units. (See, Tr. 7 at 211). Use of DAT recording will allow time correlation with citizen complaints (Tr. 7 at 238-239), and may allow re-analysis of concert noise at a later time if the original data is lost or questions arise about credibility of the monitoring as performed by Theatre.

The real time analyzers that are appropriate for such measurements are discussed in the record. A Larson-Davis unit can be set up for around $10,000. There are other units that are somewhat less expensive. Mr. Zak recommended about $15-20,000 per instrument. (Tr. 6 at 115-116). Therefore, equipment purchases to establish monitoring at the mix and two community locations would cost from less than $30,000 to about $60,000. No costs have been provided in the record relating to equipment rental fees or relating to sound consultant charges for monitoring.

Overall, the Board believes the equipment costs of such a three location monitoring system would be less than the $80,000 associated with the Grozier type system discussed in the draft order. Both systems would have costs for personnel. Theatre did not raise any specific objections to the Grozier type system based upon the equipment or personnel costs.

One other issue concerning sound monitoring that the Board would like to address is the reporting of sound monitoring data. The Board notes that the manner in which the sound monitoring data was presented in the Theatre's Final Report (I-Comp. Ex. 10) made it extremely difficult to make any meaningful interpretation of the data. In order to avoid any future problems, the Board will specify reporting requirements in today's compliance plan.

The Board will require Theatre to prepare a sound monitoring report for each concert event. Such a report will present sound monitoring data from all the three monitoring stations. The data summaries for each monitoring station must include: the weather conditions, the raw (uncorrected) octave band measurements, the ambient sound level, corrected L_{eq} measurements, and the subjective observations made by the technician during the monitoring period. Theatre will be required to maintain all the original data files, DAT recordings and reports at the site for a period of five years from the date of this order. The Board will also require Theatre to provide a copy of the sound monitoring report to the complainants.

Measurement of ambient sound

The record shows that meaningful evaluation of noise data depends, to a large extent, on the quality of background or ambient data. (Tr. 6 at 28). It further supports the idea that ambient data should not be collected immediately before and after the concert since the traffic noise associated with the concert may corrupt the ambient noise data. (See, for example, I-Comp. Ex. 11, at 2, notes 19-21). Therefore, the options for collecting ambient data is to measure ambient levels on non-concert nights or during the concerts when music is not audible. The Board had proposed that ambient be measured on non-concert nights during hours when concerts would typically occur. (Order, October 29, 1992).

Mr. Greg Zak who testified on behalf of Matteson supported the concept of measuring ambient on non-concert nights. (Tr. 7 at 137). However, Mr. Lewitz who represented Theatre noted that the best way to measure ambient would be during the concert event. (Tr. 9 at 163). The Board recognizes that measuring ambient during the concert when music is not playing would be the ideal method. However, given the nature of the concert performances, the Board agrees with Matteson that measuring ambient during concerts is complicated and may require the services of a qualified sound consultant. Since ambient sound level is crucial for measuring the actual sound levels from the theater, the Board will require ambient to be measured on non-concert nights to avoid any corruption of ambient data by either traffic noise or concert sounds.

The Board also notes that it will be incorporating the clarifications and suggestions made by Mr. Zak concerning the ambient measurement procedure. Specifically, the Board will require ambient data: collected on different dates to be averaged on an energy basis; to be measured when wind is blowing from the theater towards the monitoring site; to be measured during both daytime (before 10 pm) and nighttime (after 10 pm); to be measured on an annual basis; to be measured on the basis of L_{eq} averaging with a reference time of 5 minutes. In addition, Theatre must notify the complainants of the dates on which it will be collecting ambient data prior to such monitoring.

The Board believes that this procedure would result in an advance determination of representative ambient sound levels for each octave band at a particular time-frame.

5-minute L_{eq} and numerical standards

The Board's regulations require that all sound measurements presented to the Board be taken on the basis of equivalent sound levels (L_{eq}) with a reference time of one hour. The one hour

averaging time is specified for monitoring continuous, reasonably steady sounds. However, the record clearly indicates that the concert sound cannot be classified as continuous and reasonably steady in nature. (Tr. 4 at 644-645). It is a common practice for groups to perform for forty minutes, take a twenty minute break and return for another forty minutes. Each song will last for a few minutes and there is dead time between songs. Due to the duration of the concert sound from the theater it appears that the use of the one hour reference time for averaging sound levels is inappropriate. The Board notes that it is not viewing concert sound as impulsive (See, Tr. 9 at 60-61), but rather as a variable intensity continuous sound. As recited in Section 3.1.5 of the ISO document quoted in the Board Opinion adopting the one-hour L_{eq}:

> If the noise varies with time in a more complicated manner than is appropriate for the use of Table 1, the equivalent sound level L_{eq} should be obtained, for example from a statistical analysis of the time history of the A-weighted sound level.
> R83-7, In the matter of : General Motors Corp. Proposed Amendments to 35 Ill. Adm. Code 900.103 and 101.104 (January 22, 1987), Opinion at p. 12.

Theatre's report and the sound consultants representing Matteson recommended that an averaging time shorter than one hour must be used to measure the concert sounds. (Comp. Ex. at 5, Tr. 4 at 647, and Tr. 7 at 135). Dr. Fleisher recommended the use of an averaging time in the range of one to five minutes. Mr. Lewitz, who testified on behalf of Theatre, stated that an averaging time of one hour is more appropriate. He stated that the energy averaging that is done to determine L_{eq} will not be significantly affected by periods when music is not playing. The Board notes that even though energy averaging dampens the effect of lower sound levels, the frequent no-sound periods between songs and breaks between sets will be reflected in the L_{eq} values. The Board believes that due to the pattern of noise emission from the theater, the use of a shorter averaging period is appropriate. Based on the information in the record relating to duration of songs and intermissions during concerts, the Board believes that an averaging period of 5 minutes is reasonable to obtain meaningful sound data.

Regarding the numerical standards, the Board has not been presented with data that measures the level of the sound which disturbs local residents. In its order of October 29, 1992, the Board suggested allowable sound levels for each octave band as articulated in 35 Ill. Adm. Code 901.102 (for the appropriate SLUCM class). Matteson and Theatre agree that a standard should

be set. Mr. Greg Zak supported the adoption of the numerical standards proposed by the Board. Mr. Lewitz who testified on behalf of Theatre stated that he preferred A-weighted broad band measurements. Theatre's representatives also noted that recently they have been enforcing a 105 decibel limit at the mix point to control sound impact on the surrounding community.

The Board notes that Theatre did not present any sound data to show the impact in the community of limiting sound at the mix to 105 decibels. Therefore, the Board will not consider setting a standard at the mix point. Also, since residents in surrounding communities have experienced problems relating to low frequency sounds, the Board believes that sound limits on specific octave bands would be more appropriate than a broad band A-weighted sound limit.

Complainants' residences are primarily houses intended for occupancy as separate living quarters as defined by the SLUCM. (35 Ill. Adm. Code 901.101(a) Appendix B-1). Therefore, according to SLUCM, the affected properties fall under Class A. The record indicates that the theater property is Class B. (Tr. 7, at 127-131). Therefore, the Board believes that allowable octave band sound levels prescribed at 35 Ill. Adm. Code 901.102 for receiving Class A land, from a Class B source, would be reasonable standards. The Board notes one typographical error in the octave band levels contained in its order of October 29, 1992. The daytime level for 250 hertz was incorrectly listed as 64 decibels, the correct level from Section 901.102 should be 57 decibels. The correct level of 57 is reflected in today's order.

6. Conclusions

Based on the evaluation of the technical information and testimony in the record, the Board concludes that the sound emissions from Theater during certain concerts result in elevated sound levels in the surrounding communities. Even though atmospheric conditions influence sound propagation, the Board finds that the operation of the theater's sound system at very high volumes to be the primary cause of the community noise problem. The Board concludes that the sound levels in the surrounding communities can be reduced to acceptable levels by requiring Theatre to implement sound control at the mix (source) in combination with sound monitoring, and specifying the maximum allowable source sound levels in the receiving community. The specifications relating to these components are articulated in the compliance plan section.

IV. COMPLIANCE PLAN

Sound control

Theatre shall control the sound levels at the mix (source) so as to not exceed the allowable octave band sound pressure levels specified in this plan. Theatre may use any appropriate strategy to control the sound levels as long as it complies with the requirements of this plan. For example, Theatre may use a feedback system to implement sound control, make physical changes to the structure, or make necessary contractual provisions with the acts that perform at the theater to assure that the allowable sound levels are not exceeded at adjacent communities during concerts.

Sound Monitoring

Theatre shall monitor the sound levels in the surrounding community and at the mix location during concert events for a period of 3 years beginning with the concert season of 1993. Theatre shall conduct monitoring in accordance with this compliance plan.

Monitoring Locations. Theatre must monitor sound levels both in the surrounding communities and within the theater at the mix location. Theatre shall establish at least two monitoring stations, one in Matteson and the other in Country Club Hills. The exact locations of these sites shall be selected by the complainants. Only the sound levels measured at monitoring locations in the communities shall be used to show compliance with the standards prescribed in this order.

Instrumentation. Theatre shall use instrumentation that conforms with the regulations at 35 Ill. Adm. Code 900.103 and 951.102 to measure sound levels at each location. The instrumentation must be capable of measuring the full spectrum of sound frequencies specified in the Board regulations simultaneously and present the data in terms of L_{eq} averaging as defined at 35 Ill. Adm. Code 900.101. The instrumentation used by EASI (Theater's consultant) and Dr. Fleisher appear to be good examples of sound level meters that conform with the applicable regulations. Theatre shall also record the audio signals at the monitoring locations in the communities simultaneously with the sound pressure levels. Theatre shall use dual channel digital audio tape (DAT) recorders to record the audio signals. One channel shall record the audio signals. One channel shall be used to record time coding as to when the data blocks begin and end. In addition, this channel shall be used to record the narrative description of ambient conditions during the sound recording such as whether concerts are audible or inaudible, and a description of the duration and

character of any transient sound which corrupts any of the 10 second data blocks. A good example of such narrative recording is I-Comp. Ex. 9. If Theatre believes ambient conditions at the mix are not significant, it may choose to not record the narrative track for this location, but the audio signals must be recorded as well as some method of time coding in five minute blocks that could be used to correlate data from the mix with the residential data.

Measurement procedures. Theatre shall make all measurements by using procedures specified in 35 Ill. Adm. Code 900.103(b), except that sound measurements shall be based on L_{eq} averaging using a reference time of not more than 5 contiguous minutes comprised of sound data measured in 10 second blocks. Sound levels must be recorded for a period of time not to exceed five minutes, whether or not music is playing. Should ambient conditions corrupt one or more 10 second data blocks, those data blocks may be discarded, and the remainder of the valid data in that measurement period shall be utilized for L_{eq} averaging. The 5 minute L_{eq} will be determined by averaging not more than 30 10-second measurements on an energy basis. For example, Theatre may choose to begin data collection on the hour and record for 4 minutes and 30 seconds and then utilize the last 30 seconds for data capture and storage purposes, as did Dr. Fleisher. This would result in 12 measurement periods per hour. Alternatively, Theatre may choose to collect data for the full five minutes and then employ a brief period for data capture and storage. This would produce slightly fewer measurements per hour. The same method and time blocks shall be used at all three locations. Regardless of which method is employed, and despite any discarded 10 second data blocks, the remaining raw data shall be used to determine the 5 minute L_{eq} for purposes of correcting for ambient and comparison with the numerical standards to determine violations. If Theatre believes an entire 5 minute data period is so corrupted by ambient noise as to be rendered useless, it shall so mark the data. Theatre may choose to set the mix location recorder for continuous unattended recording of 5 minute periods if it so desires. During each monitoring event, Theatre shall measure the wind speed and direction, ambient temperature, and barometric pressure.

Measurement of Ambient. Theatre shall establish the ambient sound levels at each octave band for the two monitoring stations located in the surrounding communities. The ambient sound levels shall be established prior to the beginning of each concert season and shall be used for correcting sound levels recorded during the concert. Theatre may choose whether to collect ambient data for the mix position. Theatre shall establish the ambient sound levels according to the following procedure: (i) ambient data shall be collected when wind is blowing from theater-towards the monitoring station on non-concert nights; (ii)

ambient level shall be based on L_{eq} averaging using a reference time of 5 minutes comprised of sound data measured in 10 second blocks; (iii) ambient data collected on 3 monitoring dates may be energy averaged to establish the ambient level; and (iv) ambient data shall be collected to establish both daytime (before 10 pm and nighttime (after 10 pm) ambient. Prior to measuring the ambient levels, Theatre shall notify the complainants of the dates on which it will be collecting ambient data.

Reporting requirements

Theatre shall prepare a sound monitoring report for each concert event. Such report shall present the sound data collected at each monitoring point. Such report shall include all the relevant information needed to evaluate the sound level data. At a minimum, the sound monitoring report must include the following information relating to each residential monitoring location: (i) the weather conditions; (ii) a data summary or sheet which contains the printout of the raw (uncorrected) octave band measurements for each 5 minute measurement period (I-Comp. Ex. 11 is an example of a good reporting form, if the times of each data block were provided); (iii) a data summary or sheet which specifies the ambient sound level which will be used to correct each 5 minute data block (the same form as used for the raw data; however, this sheet may not change from concert to concert, unless Theatre remeasures the ambient); (iv) a data summary or sheet which provides the corrected sound levels for each five minute measurement period in each octave band using the same reporting form as for raw data (the form should specify the applicable numerical limits and specifically highlight any numerical value which exceeds those limits); and (v) any subjective observations made by the technician during the monitoring period.

It would be particularly helpful if Theatre could provide the information for each violation of the numerical limits in graphical form, such as in I-Comp. Ex. 8. For the mix location, Theatre may simply provide the raw data in 5 minute blocks for each octave band or it may provide information using the same process of raw data, ambient, and corrected data as described above. If the instrumentation can easily provide it, Theatre should also include 5 minute L_{eq} data in single value dB(A) and 5 minute linear peak values as was done in I-Comp. Ex. 11, in addition to the mandatory octave band information.

Theatre shall provide the complainants with a copy of the sound monitoring report for each concert event within 3 days of such an event. Theatre shall also provide the complainants with a copy of the DAT recording upon request. Theatre shall maintain all the original data files, DAT recordings, and reports at the site for five years from the date of this order.

Failure to conduct proper monitoring, prepare reports, or maintain data will constitute a violation of this Board order and subject Theatre to possible sanctions under 35 Ill. Adm. Code 101.280.

Allowable octave band sound pressure levels

Theatre shall not cause or allow the emission of sound to any receiving Class A land which exceeds any allowable octave band sound pressure level specified in Section 901.102 for a Class B source, when measured using five minute intervals at any point within such receiving Class A land.

V. PENALTY

Section 42 of the Act authorizes the Board to impose a civil penalty for violations of the Act or Board regulations. Effective September 7, 1990, Section 42(h) allows the Board to consider various factors if a penalty is to be imposed. These considerations include: the duration and gravity of the violation, the presence or absence of due diligence to comply or secure relief, any economic benefits accrued through a delay in compliance, the amount that will deter future violations and aid in voluntary compliance, and other previously-adjudicated violations. (415 ILCS 5/42(h)(1992).) Since hearing in this matter was after the effective date of Section 42(h), those factors may be considered in assessing any penalty. (See People v. Sure-Tan (April 11, 1991), PCB 90-62). The Board has previously reviewed penalty matters in great detail, (See, Illinois Environmental Protection Agency v. Allen Barry, (May 1, 1990), PCB 88-71.)

Matteson requested that the Board impose a penalty if Theatre does not comply in a timely fashion. (Comp. Br. at 18; Closing Arguments, Tr. 10 at 530, 544, 558). The Board in its interim opinion made no finding concerning the imposition of a penalty but noted that a penalty would be discussed at a later date. In its brief Matteson suggests that pre-set sanctions of a progressive nature be assessed against Theatre for delayed responses in reducing the sound at the source. (Comp. Br. at 18). However, Matteson provides no reasoning on why an incremental penalty would be appropriate. Further, Matteson does not suggest a starting level or incremental amount for the penalty. The Board is not constrained by Matteson's recommendations concerning a penalty.

Based on the nature of this violation and the history of this proceeding, the Board finds it appropriate to assess a penalty at this time. While the Board finds merit in imposing an incremental penalty to deter future violations, due to the particulars of the present situation an automatic incremental penalty may be inappropriate. Section 42(a) of the Act allows

violation and an additional penalty, not to exceed $10,000 for each day the violation continues. In determining the appropriate amount of any penalty the Board reviews the factors in Section 42(h) of the Act.

The Maximum Penalty Based on the present record, the Board has found thirteen dates of violation in 1990, eight dates of violation in 1991, and five dates of violation in 1992. This is a total of twenty-six (26) dates of violation. The total maximum penalty is (26 x $50,000.00) $1,300,000.00.

A. The duration and gravity of the violation

Theatre has been found in violation of the noise nuisance regulation on 13 dates during the 1990 season, eight dates during the 1991 season, and five dates during the 1992 season. Theatre has only operated during the three seasons. The Board has chosen not to include the 1990 violations in determining the penalty. All noise violations found after the date of the Board's interim opinion and order have been included in the penalty determination. The noise violations have been substantial. Particularly, the U2 concerts in September 1992 disrupted emergency communications telephone lines for several days.

B. The presence or absence of due diligence to comply or secure relief

Testimony on the operation of the theater was presented during the hearings in 1990 and 1993. However, Theatre provided no testimony to support exactly how the recommendations in its 1991 Final Report would lead to compliance with the Act and Board regulations. The violations found in 1991 and 1992 demonstrate that those recommendations do not lead to compliance. Theatre contends that it modified the berm and theater structure in late 1991, but has failed to show the effect of these modifications. Violations continued in 1992. No modifications have been identified after the last violations in 1992. As late as January 22, 1993, Theatre contends it can control the noise and is not causing community problems. The three U2 concerts show that statement is not accurate. In short, Theatre has not demonstrated how or when it will comply.

In addition, Theatre failed to conduct and report sound monitoring data as specifically required by Board order. As stated in the Board's September 12, 1991 Order at 6, "Respondent seems to have chosen a data collection and analysis protocol that ensures no demonstration of compliance or non-compliance with Section 901.102 could be made, regardless of the sound levels." In evaluating the sound data from Theatre, Mr. Greg Zak found great fault with data that shows ambient sound levels as higher than the combined ambient and source. He stated that a lot of the quality he would have expected to see is not there; there is

no indication in any of the data gathering that great care was taken to collect only uncontaminated data; that he would not turn out data of that quality; that he would not accept such data from someone who worked for him; and that the data would not meet the standards for evidence. (Tr. 6 at 27, 28, 31, 98, 99, and 111). Further, Theatre was instructed to submit the data from all sound monitoring from April 25, 1991 to July 30, 1992 to the Board and the complainant:

> The Board today Orders Theatre to immediately ensure that all sound measurements acquire, maintain, and preserve a complete time history of the sound levels during each monitoring period, for each octave band (i.e., a time-varying sound level or L_{eq} Spectra). This data shall be preserved and copies conveyed to the Board and to Matteson on a weekly basis. Also, the monitoring process shall record sufficient narrative information to allow the Board to determine whether sound from Theatre is inaudible, audible, clearly audible, etc. (Emphasis Added).
> (Order, August 22, 1991, at 2-3)

The Board has not received any data for the period from July 21, 1991 through July 30, 1992. This represents over a year's worth of concerts for which monitoring should have been performed, and the monitoring data submitted to the Board. Theatre has presented no evidence to convince the Board that it is seriously attempting to monitor or to control this noise pollution problem in a diligent manner.

C. Any economic benefits accrued through a delay in compliance

Theatre has been able to delay any expenses associated with controlling the sound level, such as equipment and personnel. Theatre has operated for two additional seasons after being found in violation. However, Theatre has also incurred the expense of hiring a consultant to monitor each concert and study the problem. The record presently contains no information on Theatre's economic status, or the economic benefit derived from those groups that have performed while Theatre was causing noise pollution.

D. The amount that will deter future violations and aid in voluntary compliance

Financial information on the operation of Theatre is not included in the record. The Board cannot presently determine how much economic advantage accrued to Theatre through the

performances which caused unreasonable interference. The Board believes a $1000.00 penalty per day of violation will aid in voluntary compliance.

E. Other previously-adjudicated violations

The Board has chosen not to include the 1990 violations in establishing this penalty. However, once those violations were determined by the Board, the violations in 1991 and 1992 become significant, as knowledge of the prior 1990 violations existed.

Considering all of the above factors, the Board assesses a penalty of $1000.00 per day of violation in 1991 and 1992 for a total of $13,000.00. This is one per cent (1%) of the maximum calculated penalty. The Board declines, at this time, to establish a schedule for future fines as requested by Matteson. The Board could conceive of situations where the future monitoring (at the mix and in residential areas) shows substantially louder performances are the primary basis of the violation. Similarly, the data could disclose little source noise reduction after violations are detected. Those circumstances could lead to substantially different penalties than situations demonstrating quieter performances and significant efforts at source noise reduction.

Today's penalty determination is also premised on future compliance by Theatre. Should the 1993 season equal the 1992 violations in frequency and severity, the Board would be disposed to assess a substantially greater civil penalty than the $1000.00 per day of violation imposed today. Should future violations be brought to this Board for adjudication, the board would be inclined to look specifically at the financial benefits which accrued to Theatre for such performances. The Board would be inclined to remove any economic benefit which resulted from a concert causing the character and severity of violation recounted in this opinion.

VI. CONCLUSION

The Board believes the ordered compliance program will provide the best opportunity for a long term solution to the noise problems which prompted this proceeding. First, the order clearly articulates Theatre's duty to comply with both the narrative regulatory nuisance standard and clear, objective, measurable, numerical limits that Theatre must meet at the receiving locations. Second, the order provides for quality long-term sound monitoring at both the source and two receiving locations. This will provide the only realistic information to show how much of the noise impact is caused by the volume of the source, and how much is caused by other factors such as weather. It will also provide the only meaningful data on sound levels during each concert and from concert to concert. If any future

during each concert and from concert to concert. If any future concerts cause substantial noise complaints, both Theatre and complainants should be able to determine easily and quickly whether unusual weather or unusual sound volume was the primary cause. In any future legal action to enforce sound limitations before this Board or another tribunal, such information could be evaluated in aggravation or mitigation of the purported violation. Third, this opinion and order establishes that civil penalties can and may be used to assure future compliance by Theatre.

This opinion constitutes the Board's finding of facts and conclusions of law in this matter.

A. Motions for reconsideration

In its December 17, 1992 Motion to Continue Evidentiary Hearings, Theatre requested the hearings be continued to not later than January 31, 1993, and stated that timing of the Board's order would not adversely affect compliance so long as the final order is entered prior to March 31, 1993. (Motion, at 2). The Board construes that decision deadline to include any motions for reconsideration. To meet that schedule, the Board must shorten the time for filing and responding to any motion for reconsideration beyond the times contained in 35 Ill. Adm. Code 101.246. The Board grants Theatre until 4:30 pm March 12, 1993 to file any such motion, and grants Matteson until 4:30 pm on March 19, 1993 to respond. All such filings must be received at the Board's offices by the specified time. The filings shall be served on the opposing party by facsimile, or other expedited delivery, in addition to regular service. The Board notes that Theatre has chosen the dates for the final hearings and chosen the dates for final Board action.

ORDER

1. World Music Theatre, JAM Productions, Ltd. and Discovery South Group, Ltd. (Theatre) are found to have violated 35 Ill. Adm. Code 900.101 and 900.102 and Section 24 of the Environmental Protection Act on the following dates in 1990:

   June 2, 3, 27; July 20, 21, 22, 23, 29, 30; October 4, 5, 6, and 7.

   and the following dates in 1991:

   June 1, 14, 29, July 2, 12, August 3, 11 and 23.

   and the following dates in 1992:

   August 2, September 2, 15, 16, and 18.

2. Theatre shall cease and desist from future violations of 35 Ill. Adm. Code 900.101 and 900.102 and Section 24 of the Act.

3. Theatre is directed to conduct sound monitoring during concert events in accordance with the above opinion for a period of three years from the date of this order.

4. Theatre shall establish at a minimum, three monitoring stations, one at the theater (mix level) and the other two in Matteson and Country Club Hills. The complainants shall select the exact locations of the monitoring stations in the communities.

5. Theatre shall measure the sound levels at each monitoring station using instrumentation that conforms with the regulations at 35 Ill. Adm. Code 900.103 and 951.102. Theatre shall also record the audio signals at all three monitoring locations using dual channel digital audio tape (DAT) recorders. Theatre shall record the audio signals on one channel, and time coding and any narrative description on the second channel.

6. Theatre shall make all measurements by using procedures specified in 35 Ill. Adm. Code 900.103(b), except that sound measurements shall be based on L_{eq} averaging using a reference time of not more than 5 contiguous minutes comprised of sound data measured in 10 second blocks.

7. Theatre shall establish ambient sound levels prior to the beginning of each concert season for correcting sound levels measured during concerts. Theatre shall notify the complainants of the dates on which it will be collecting ambient data prior to measuring the ambient levels. Theatre shall establish ambient for the two monitoring stations located in the surrounding communities in accordance with the following:

   a) ambient shall be established for each octave band;

   b) ambient data shall be collected when the wind is blowing from theater towards the monitoring station on non-concert nights;

   c) ambient level shall be based on L_{eq} averaging using a reference time of not more than 5 minutes comprised of sound data measured in 10 second blocks;

   d) ambient data collected on 3 monitoring dates may be energy averaged to establish the ambient level; and

e) ambient data shall be collected to establish both daytime (before 10 pm) and nighttime (after 10 pm) ambient.

8. Theatre shall prepare a sound monitoring report for each concert event. Such a report shall include all the relevant information needed to evaluate the sound level data collected at each monitoring point. At a minimum, the sound monitoring report must include the following information relating to each monitoring location:

a) weather conditions;

b) a data summary or sheet which contains the printout of the raw (uncorrected) octave band measurements for each 5 minute measurement period (I-Comp. Ex. 11 is an example of a good reporting form, if the times of each data block were provided);

c) a data summary or sheet which specifies the ambient sound level which will be used to correct each 5 minute measurement (the same form as used for the raw data; however, this sheet may not change from concert to concert, unless Theatre remeasures the ambient);

d) a data summary or sheet which provides the corrected sound levels for each five minute measurement period in each octave band using the same reporting form as for raw data (the form should specify the applicable numerical limits and specifically highlight any numerical value which exceeds those limits);

e) any subjective observations made by the technician during the monitoring period; and

f) For the mix location, a data summary or sheet which provides the raw data in 5 minute blocks or it may provide information using the same process of raw data, ambient, and corrected data.

9. Theatre shall provide the complainants with a copy of the sound monitoring report for each concert event within 3 days of such an event. Theatre shall also provide the complainants with a copy of the DAT recording upon request. Theatre shall maintain all the original data files, DAT recordings, and reports at the site for five years from the date of this order.

10. Theatre shall not cause or allow the emission of sound to any receiving Class A land which exceeds any allowable octave band sound pressure level specified in the following

table, when measured on the basis of L_{eq} averaging with reference time of 5 minutes at any point within such receiving Class A land.

Octave Band Center Frequency (Hertz)	Allowable Octave Band Sound Pressure Levels (dB) of Sound Emitted to any Receiving Class A Land	
	Daytime	Nighttime
31.5	72	63
63	71	61
125	65	55
250	57	47
500	51	40
1000	45	35
2000	39	30
4000	34	25
8000	32	25

Daytime shall consist of the hours between 7:00 am and 10:00 pm, local time. Nighttime hours shall be the hours between 10:00 pm and 7:00 am, local time.

11. Nothing in this order shall prohibit Matteson from conducting its own sound monitoring in accordance with the provisions of this order.

12. Theatre shall make any necessary contractual provisions with the acts that perform at the theater to assure that the allowable sound levels are not exceeded.

13. Theatre shall pay the sum of One Thousand Dollars ($1000.00) per day of violation in 1991 and 1992, for a total penalty of Thirteen Thousand Dollars ($13,000.00), within 30 days of the date of this Order. Such payment must be made by certified check or money order payable to the Treasurer of the State of Illinois, designated to the Environmental Protection Trust Fund, and must be sent by First Class mail to:

    Illinois Environmental Protection Agency
    Fiscal Services Division
    2200 Churchill Road P.O. Box 19276
    Springfield, IL 62794-9276

Theatre shall also write its Federal Employer Identification Number or Social Security Number on the certified check or money order.

Any such penalty not paid within the time prescribed shall incur interest at the rate set forth in subsection (a) of Section 1003 of the Illinois Income Tax Act, (35 ILCS 5/1003)[7], as now or hereafter amended, from the date payment is due until the date payment is received. Interest shall not accrue during the pendency of an appeal during which payment of the penalty has been stayed.

IT IS SO ORDERED.

J. Theodore Meyer concurred.

Section 41 of the Environmental Protection Act (415 ILCS 5/41 (1992).) provides for appeal of final orders of the Board within 35 days. The Rules of the Supreme Court of Illinois establish filing requirements. (But see also 35 Ill. Adm. Code 101.246, Motions for Reconsideration, and Castenada v. Illinois Human Rights Commission (1989), 132 Ill. 2d 304, 547 N.E. 2d 437.) Today's Opinion and Order specifically limits the time for motions for reconsideration.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the 15th day of January, 1993, by a vote of 6-0.

Dorothy M. Gunn

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board

[7] The Illinois Income Tax Act was formely codified at 1991, Ill.Rev.Stat. ch. 120 par. 10-1003.