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DESCRIPTION OF NOISE IN THE COMPRESSOR AND GENERATOR AREA AT PT PERTAMINA EP ASSET 3 TAMBUN FIELD – BEKASI

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ABSTRACT

PT Pertamina EP Asset 3 Tambun Field is a state-owned company engaged in Production Exploration, in the process this company has tools that must pay attention to the noise level, namely Compressors and Gensets. Compressors and generators are very influential on hearing loss in workers, therefore efforts to prevent hearing loss must be carried out. The objectives to be known are to know the noise conservation program, Standard Operating Procedures (SOP) in implementing noise conservation, and Implementation of Noise Conservation in Compressor and Genset Areas. This research method uses direct observation, interviews and literature studies. The results show that the Hearing Conservation Program has 7 (seven) components, namely: noise exposure survey, noise control, worker training, personal protective equipment, audiometric examination, recording and reporting, program assessment. The procedure used refers to the Individual Work Procedure (TKI) for Noise Measurement. The implementation of the Noise Measurement Program is carried out by the contractor once every 1 (one) year or every time there is a process change or a new tool. The Hearing Conservation Program must continue to make continuous improvements. It should be noted in monitoring workers in the Genset and Compressor area so that workers always use hearing protection equipment.

Keyword: *Compressor, Generator, Noise, Workers*

1. INTRODUCTION

Noise in the workplace is often a separate problem for workers. Generally, it comes from working machines, generators, and various equipment that moves and contacts metal, compressors, and so on. Unfortunately, many workers are used to the noise, and although they do not complain, health problems still occur, while the effects of noise on health depend on the intensity [1].

According to data from the International Labor Organization, every 15 seconds, a worker dies due to a work accident or occupational disease. Every 15 seconds, 153 workers experience work accidents. Every day 6,300 people die due to work accidents or occupational diseases, more than 2.3 million deaths per year. 317 million accidents occur at work every year more than 1.1 million people die from work accidents or work-related diseases in Asia and the Pacific, the poorest, most unprotected, least informed, and least trained are the most affected [6].

And Occupational accidents and diseases impact not only the lives of individual workers but also the productivity and profits of companies and ultimately on the well-being of the whole society. The ILO is working with them to strengthen national occupational safety and health (OSH), including labor inspections, injury reporting, training and information on occupational accidents, and national OSH campaigns [6].

In addition, the noise hazard can interfere with communication and hearing, and the sound intensity (hearing) is classified as large and a health hazard above 60 dB. Therefore, employees who work in factories with engine noise levels above 60 dB must be equipped with hearing protection. Meanwhile,

around 42.8 carpenters in Semarang found noise to cause fatigue and the rest were influenced by other factors, as well as labor productivity at the noise level of 85 dB decreased by 12% compared to labor productivity at a noise level of 80.3 dB. Noise can also affect an increase in blood pressure because 95% of workers experience an increase in systolic blood pressure and 69% of workers experience an increase in diastolic blood pressure. A noisy workplace can affect workers' hearing and balance causing accidents for workers, psychotic disorders tend to make mistakes thereby reducing work productivity [2].

PT Pertamina EP Asset 3 Tambun Field is a state-owned enterprise engaged in Production Exploration as a Collecting Station which will later be distributed using a pipeline to PT Pertamina RU VI Balongan Indramayu. In the process, this company has tools that must pay attention to the noise level, namely compressors and generators. Compressors and generators are very influential on hearing loss in workers, therefore efforts to prevent hearing loss must be carried out. One of the preventive measures taken to minimize Occupational Diseases is by implementing an industrial hygiene program with regular supervision. In the industrial hygiene program, there is a program for hearing conservation that has another special task, namely noise measurement. With the holding of a hearing conservation program, it is hoped that it can reduce or even eliminate the factors that have a risk in the occurrence of occupational diseases, namely noise [12].

In the description above, it can be concluded that in general and studied the Description of Noise in the Compressor and Generator Areas at PT Pertamina Ep Asset 3 Tambun Field-Bekasi. The objectives to be known are to know the noise conservation program, Standard Operating Procedures (SOP) in implementing noise conservation, and Implementation of Noise Conservation in Compressor and Genset Areas at PT Pertamina Ep Asset 3 Tambun Field-Bekasi.

2. LITERATURE REVIEW

According to the Regulation of the Minister of Manpower and Transmigration Number Per.13/MEN/X/2011 Article 1, paragraph 19 Noise is all unwanted sounds originating from production process tools and/or work tools which at a certain level can cause hearing loss [13]. According to the Decree of the State Minister for the Environment No. KEP-48/MENLH/11/1996 Noise is unwanted sound from a business or activity at a certain level and time which can cause disturbance to human health and environmental comfort [8].

Table 1. Noise Threshold Value

Exposure Time		Noise Intensity (dBA)
Magnitude	Units	
8	O'clock	85
4		88
2		91
1		94
30	Minute	97
15		100
7,5		103
3,75		106
1,88		109
0,94		112
28,12		Second
14,06	118	
7,03	121	
3,52	124	
1,76	127	
0,88	130	
0,44	133	
0,22	136	
0,11	139	

Source: Regulation of the Minister of Manpower and Transmigration Number Per.13/Men/X/2011

Table 2. Noise Zone

No.	Zone	Noise Intensity (dB)	
		Recommended max	Max allowed
1	A	35	45
2	B	45	55
3	C	50	60
4	D	60	70

Source: Based on Regulation of the Minister of Health of the Republic of Indonesia number 718 /MENKES /PER/XI /1987

- a. Zone A: Zone designated for research sites, hospitals, health/social care places, and the like.
- b. Zone B: Zone designated for housing, places of education, recreation, and the like.
- c. Zone C: Zone designated for offices, trade, markets, and the like.
- d. Zone D: Zones designated for industry, factories, train stations, bus terminals, and the like.

Noise affects the workforce, ranging from mild confusion such as poor concentration, poor communication, and job satisfaction, to severe disability due to permanent deafness, the impact of noise on the workforce, namely physiological disorders, psychological disorders, communication failures, impaired hearing (deafness) [2]. In identifying noise sources, several noise measuring instruments such as Sound Level Meter (SLM), noise dosimeter (NDM), and octave band analyzers can be used. During the initial walkthrough, SLM helps identify areas with high noise levels. The SLM most widely used for workplace evaluation, is Type 2, operating to the minimum level of precision required by OSHA for noise measurement. These gauges are usually sufficient for general-purpose noise surveys with the readings obtained considered to be within ± 2 dBA of accuracy. The measuring instrument is by SNI 05-2962-1992 and measurement procedures are according to SNI 7231:2009. A noise Dosimeter is used by workers to determine the daily noise exposure dose during work. Noise analysis is carried out based on each job, where workers are exposed to different noises from each other even though they are in the same location [9].

Types of noise are divided into several categories, namely continuous noise: which occurs continuously with a constant spectrum level with a long exposure time of 8 working hours per day or 40 hours per week continuous noise with a broad frequency spectrum (steady state wideband noise) eg engines, fans, kitchens incandescent, continuous noise with a narrow frequency spectrum (steady state narrow band noise) eg circular saws and gas valves. Impulsive noise: which is in the form of a shock, this type of noise is caused by a sound source of collision or explosion, for example, a gun. Single tone noise: dominant at a machine operating frequency causing friction and collisions between surfaces such as pumps, fans, and motors on the machine. Low-frequency noise: Noise in the frequency range 8-100Hz eg trains, large diesel, or power plants. and fluctuating noise: the fluctuation of the sound Pressure Level of the noise is not more than 3-10 dB in a certain period, this noise occurs when a vehicle or airplane passes where the noise level rises and falls rapidly. Intermittent Noise: occurs intermittently at certain time intervals, for example, traffic and the sound of airplanes at airfields [19].

Noise Mapping is a noise mapping that describes the distribution of noise levels in a workplace. A noise map, usually in the form of interpolated isocontours, is a way of presenting the geographic distribution of noise exposure, either in measured or calculated levels. In this book noise mapping is computationally based unless otherwise indicated, Noise mapping is based on a set of algorithms defined in various standards, international (ISO 1993) and national, for a wide range of noise sources including aircraft (ECAC 1997), roadways (UK DfT 1988), Noise mapping algorithms, including source models for road traffic based on harmonization projects, and propagation models based on ISO 9613 (ISO 1993) are described in this section [7].

Risk control in the risk management process consists of 4 steps, namely identification, assessment, control selection, and risk monitoring. When establishing controls or considering changes to existing controls, the consideration is to reduce risk, namely by taking into account the risk control hierarchy, namely 100% elimination of the hazard lost for example redesign. Substitution 75% reduced hazard example tool replacement. Engineering/isolation 50% reduces the hazard. Administration/training 25% reduces harm through people's performance. 5% Personal Protective Equipment (PPE) limits damage/injury controlled using personal protective equipment [3].

3. METHODOLOGY

In this research, it is a qualitative approach using descriptive methods based on field studies and literature or literature review, data collection is using primary data obtained by interviews, observations, and company documentation spontaneously and secondary data obtained in the form of existing company documents. as well as searching for library sources from books, scientific study books, legislation, manuals, handbooks, magazines as well as scientific articles published online and so on. Then a study is carried out with regulations or scientific references about noise. After obtaining the results from the field, data is created, namely qualitative data analysis by describing or describing the data as it is stated in words or sentences about "Noise Description in the Compressor and Genset Area at PT Pertamina Ep Asset 3 Tambun Field-Bekasi".

4. RESULTS AND DISCUSSION

Based on the results at PT Pertamina EP Asset 3 Tambun that the hearing conservation program is carried out once every 1 year. The hearing conservation program has 7 (seven) interrelated and supportive components, namely:

A. Noise exposure surveys are carried out by measuring noise sources in the work environment which include:

1. Noise monitoring in the work environment (Area Monitoring)

2. Individual monitoring (Individual Monitoring)

Monitoring of the work environment is intended to determine the intensity (quantity and quality) of noise in the work environment, this monitoring uses a Sound Level Meter (SLM) without or with frequency analysis. Monitoring of the work environment results in:

1. Noise sources.

2. Analysis of the frequency of noise sources that exceed the NAB.

3. Noise maps and noise contour lines.

Individual monitoring will produce data on the amount of noise exposure received by workers for 8 hours per day or 40 hours per week, using a Noise Dosimeter device. If this tool is not available, a value of 0 (Daily Exposure Dosage) can be calculated manually. From the noise exposure survey, the following data will be obtained:

1. The name of the worker who requires an audiometric examination.

2. Group of workers to be monitored.

3. Data workers require hearing protection devices.

4. Data on the location of workplaces that get exposed to noise exceeds the NAB.

5. Noise in the workplace can interfere with the communication, concentration, and physical health of workers.

6. Noise control data that has been implemented and that needs to be refined.

Noise exposure surveys are carried out periodically with a frequency based on the results of the work environment health risk assessment. In addition to routine operational activities, noise exposure surveys are also carried out during the construction of new projects. All equipment used for noise exposure surveys needs to be calibrated according to the manufacturer's requirements.

B. Technical and Administrative Noise Control

To protect workers from the possibility of exposure to noise above the threshold value, it is necessary to carry out noise control efforts through the following programs:

1. Technical Control

Technical noise control efforts can be done by:

- a. Isolation

- b. Closed process

- c. Blocking noise propagation (shielding)

- d. Dampen vibration to reduce noise

2. Administrative Control

Administrative noise control efforts are:

- a. Working time setting

- b. Workplace settings

- c. Labor arrangements
- d. Education and training of the workforce
- e. Monitoring program
- f. Making updated work procedures
- g. Making stickers, leaflets, booklets, and sign-boards (hazard communication)
- h. Implementation of healthy and safe work practices.

The last effort in noise control is the use of Personal Protective Equipment (Hearing Protection Equipment) which will be discussed next.

C. Job Training

Training is a basic component of the program that needs careful attention because the success of this component will have an impact on changes in the behavior of workers, which will directly or indirectly impact their health.

Strong management commitment is needed to support this program, namely by providing the widest opportunity for workers to organize or attend training related to protecting workers' hearing from noise exposure.

Motivating workers is not only for workers who are at lower levels but for all levels including company management because coaching is the responsibility of workers and company management because coaching is the responsibility of workers and management together. This component is integrated into the civilizing program and promotion of worker safety, health, and motivation by:

1. Organizing courses or training
2. Organizing safety and health talks
3. Organizing discussions, seminars, and exhibitions
4. Creating occupational health promotion through banners, posters, leaflets, and booklets.

Training and counseling should be able to provide:

1. An explanation of the physical and psychological impact of workers due to noise and hearing loss.
2. Information on how to select hearing protection devices to be used.
3. Explanation on how to use (fitting), and maintain it.
4. Information about the duties and responsibilities of workers and companies in implementing hearing conservation programs.

For supervision, all training activities must be documented by document and record control procedures.

D. Personal Protective Equipment (PPE) and its use

If technical and administrative controls are not feasible enough to overcome noise problems in the workplace, then the use of personal protective equipment (hearing) needs to be done as a last resort. Hearing protection that can be used is:

1. Earplugs.
2. Earmuffs.
3. Combination of Earplug and Earmuff
4. Helmets.

Hearing protection must be provided by the company and used by workers in noisy areas that equal or exceed the NAB (85 dbA). Workers who work in a noisy area exceeding 100 dbA for 8 hours are required to use ear plugs and ear muffs together. Factors to consider when using Personal Protective Equipment (PPE) for hearing include:

1. Hearing protection is available in sufficient quantities.
2. The quality must comply with the Noise Reduction Rate (NRR) table for each protective device purchased.
3. The condition of PPE must be well maintained and maintained regularly.
4. Its function can overcome noise but does not interfere with communication.

E. Pemeriksaan Audiometri

An audiometry examination is carried out every 1 year to determine the hearing health of workers which is carried out by the medical team of PT Pertamina EP Asset 3 Tambun.

F. Reporting Recording System

All activities related to the program, measurement, and examination results must be recorded and reported in detail so that the relationship between noise exposure and health records can be analyzed

easily and accurately. All records relating to exposure to noise in the workplace need to be kept as follows:

1. Noise survey results
2. The results of the worker's audiometric examination
3. Records of treatment of workers related to noise
4. Records of health education obtained
5. Explanation of the specifications of the personal protective equipment used

The basic data that needs to be in the worker's record include:

1. Name of worker
2. Current employee or job title
3. Location of workplace and amount of noise exposure
4. For audiometric examination:
 - a. Date the auditorium was created
 - b. Audiometry model and type
 - c. Audiometric serial number
 - d. Audiogram reading result date
5. Occupational history and medical history of disease related to hearing loss
6. Clinical examination related to researching the impact of noise on workers.

In this case, Management is responsible for:

1. Provide all accurate and efficient information in the recording and reporting system.
2. Ensuring that all personal data can be properly maintained, conducting a review at certain times.
3. Clear adequate training opportunities for program implementation.

Program implementation must use standard records, be cross-checked, and be properly maintained. Program implementation reports are prepared periodically (once a year), addressed to related functions, and selectively to interested parties. The deviation of the noise inspection result document is 30 (thirty) years, the original of which is kept with the inspection records

G. Hearing Conservation Program Assessment

Periodically the implementation of the hearing conservation program needs to be evaluated to see whether the program is running well. Program evaluation is carried out annually. Assessment of the hearing conservation program will give good results if the program's recording and reporting system run well.

The hearing conservation program at PT Pertamina EP Asset 3 Tambun has 7 (seven) interrelated and supportive programs, namely: Noise exposure survey, Technical and administrative noise control, Worker training, Personal protective equipment for users, Audiometric examination, Recording and reporting and Assessment of the Hearing Conservation program, in this case, the management is committed and fully responsible. These results are in line with Fitriani's research, that the implementation of the Evaluation of a Hearing Conservation Program for workers at Company X has programs that have been attempted but discrepancies are still found based on company standards or regulations such as in the PPE program there are still workers who do not have PPE even supervisors who do not use Earplugs and Earmuffs in areas >95 dB with only Earplugs, this is because there is no disciplinary action, commitment to PPE monitoring and maintenance [4]. And in line with the results of Rahmawati's research, there is a hearing conservation program namely identification and analysis of noise sources, noise control and administrative control, audiometric tests, communication, information, motivation, and education of workers, data recording and reporting and program evaluation, but has not yet evaluated the hearing conservation program, because this special program has not been structured and systematically implemented at PT Petrokimia Gresik [15].

According to the Regulation of the Minister of Health of the Republic of Indonesia number 718/MENKES/PER/XI/1987 concerning Health-related Noise that sources of noise originating from industrial activities, trade, development, power generating equipment, transportation equipment, and household activities and so on are muted or otherwise, must not generate noise, thus exceeding the noise requirements. Maintenance and monitoring of noise levels must comply with maintenance guidelines that have been established to solve problems, responsibilities, and authorities [14].

This company is committed to providing safe work and a healthy environment that meets or exceeds standards. Occupational Health and Safety Act, Regulations and codes to protect employees, visitors,

contractors, companies, property, and the environment [17]. According to the author's assumption that the hearing conservation program is very important as an effort to minimize or even eliminate the danger from noise sources in the company, there must be a commitment from company management to implementing the program properly, the importance of the overall role of workers and related parties is disciplined in carrying out work by applicable regulations, as well as the existence of maintenance and supervision in each program as a reference for evaluation so that sources of noise hazards can minimize the impact on workers and the surrounding environment.

Based on the results of the noise measurement procedure at PT Pertamina EP Asset 3 Tambun which is by the TKO (Organizational Work Procedure) Monitoring the Health Quality of the Work Environment No B-056/A3/EP8000/2016-S0 which is carried out 1 (one) time a year due to noise on compressors and generators exceeding 85 dB and every 3 (three) months PT Pertamina EP Asset 3 Tambun conducts noise measurements by internal parties to monitor if there is a change in noise level which is always irregular due to weather constraints.

Implementation Qualification :

1. Minimum education D3 or equivalent.
2. Trained to operate noise measuring instruments and able to analyze.
3. Has a HIMU Certificate (Hygiene Industri Muda).

Work instruction :

1. Determine the measurement sampling point, provided that:
 - a. Closed Workplace (Reverberant Field): X and Y axis directions, the noise source is the central point. Distance range between 3 – 5 m.
 - b. Open Workplace/Free Field: Follow the 6 wind rose directions (ACGIH: Noise Measurement Standard Procedure), 60° angle, with the noise source as the central point. The distance between the points is 3 – 5 m.
2. Prepare the measurement equipment and perform the following steps:
 - a. Perform instrument/SLM calibration with an acoustic calibrator, before and after use at an output of 94 dB or 114 dB at a frequency of 1000 Hz.
 - b. Adjust the weighting of the response time of the measuring instrument with the characteristics of the sound source being measured (S for a relatively constant sound source or F for a shock sound source).
 - c. Check the battery is in Full Charge condition.
 - d. Use an SLM cover, to avoid possible exposure to extreme temperatures and vibrations.
3. Prepare for sampling. Prepare at least 2 people to carry out sampling with the following tasks:
 - a. Operator 1 for SLM readings, temperature, wind direction, and speed.
 - b. Operator 2 is in charge of assisting operator 1 in tracing paths, making plant plots, and recording measurement results.
 - c. Provide layout/site maps, measurement results recording forms, and appropriate PPE to the sampling operator.
4. Take measurements using the following procedure:
 - a. Take measurements on all noise sources first.
 - b. Take measurements at the noise source without using the octave band and with the octave band at a frequency of 31.5 – 16 kHz.
 - c. Determine the distance of noise intensity measurement is 1 m from the noise source.
 - d. Take measurements at the sampling points to create noise contours.
 - e. Position the tool/instrument facing the operator with a tilt angle of 60° and the height of the tool parallel to the operator's ear.
 - f. Place the tool/instrument in a safe place to block the operator's position.
 - g. The reading of the measurement results is based on the noise figure on the SLM monitor. Select the sound pressure level (SPL) or equivalent continuous sound pressure level (Leq).
 - h. Record measurement results, identify background noise, and monitor environmental conditions (temperature, wind direction, and speed).
 - i. Take measurements at night, for activities that run for 24 hours each day, to get a comparison of noise levels during the day and night.

- j. If the measurement results at night are the same as those during the day, there is no need to carry out night measurements. The mechanism and calculation of noise levels during the day and night refer to Appendix 2 of Kep.Men.LH No.48 of 1996 concerning Noise Level Standards.
5. Create a noise contour in the following manner:
 - a. Record the measurement data at each measurement point on the map of the work location area (up to the fence/outer boundary of the work area and/or until the noise level reaches 85 dB) and the surrounding environment (up to the noise level reaches 55 dB) which has been prepared.
 - b. Record the measurement result data at each measurement point onto the work location map that has been prepared.
 - c. Connect the noise points, which have the same noise level so that a contour will be formed.
 - d. Draw contour lines with different decibel (dB) intervals of 3 or 6 dBA and so on.
 - e. Draw contour lines according to monitoring requirements to monitor the work environment.
 - f. Give a different color line to distinguish the noise gradation contained in the area. The red color represents the highest noise level, while the green color represents the lowest noise level. The contour for the work area is ≤ 85 dB and the contour for the environment is approx. ≤ 55 dB.

The procedures at PT Pertamina EP Asset 3 Tambun are by the TKO (Organizational Work Procedure) Monitoring the Health Quality of the Work Environment No B-056/A3/EP8000/2016-S0, which is carried out 1 time a year due to noise at the compressor and generators exceeding 85 dB and every 3 (three) months PT Pertamina EP Asset 3 Tambun conducts noise measurements based on noise figures on the SLM monitor and applicable regulations. This is in line with the research of Sugandi et al, noise level is measured using a sound level meter near the operator's ear and 2 meters from the sound source, which is done both when there is no load and when there is a load referring to the applicable government regulations namely does not exceed NAB. Perform data collection 5 repetitions with 5 readings at each repetition of 1-minute intervals and record the measurement results in the measurement table [18]. this is also in line with the research of Najikh et al, noise measurements in the area around the compressor unit at PT Lapindo Brantas Inc were carried out using a Sound Level meter (SLM). Measurement points are carried out every 3 meters with a height of 1.5 m by JIS Z8731 (ISO 1996-12) obtained a measurement result of 102.8 dBA in the compressor area which is stated to exceed the Quality Standard value of 55 dBA for industries close to residential areas [10].

According to the Regulation of the Minister of Health of the Republic of Indonesia number 718/MENKES/PER/XI/1987 concerning Health-related Noise in this ministerial regulation, what is meant by zone D noise which is intended for industry, factories, train stations, bus terminals and the like, according to the noise level zone D the recommended maximum noise level is 60 dBA and the maximum allowed is 70 dBA [14]. And based on the Regulation of the Minister of Manpower and Transmigration Number Per.13/Men/X/2011 concerning the Threshold Value of physical factors and chemical factors in the workplace that the standard hazard factor in the workplace as intensity in daily work for a time not exceeding 8 hours a day or 40 hours a week. The NAB of noise is set at 85 decibels A (dBA) [13].

According to the author's assumption, the noise measurement procedure at PT Pertamina EP Asset 3 Tambun has been carried out and conforms to the applicable noise measurement standards. Based on the implementation results from field observations, the hearing conservation program has been implemented and the control program has been implemented, such as the implementation of a hazard control hierarchy, namely, substitution to replace damaged devices allows for additional sources of noise, engineering to install dampers in the source area and/or install a noise source safety sign in the area. administration, such as using safe work procedures, maintenance of machinery and equipment, training and supervision for workers, limiting exposure time using job rotation, and using protective PPE such as earplugs and earmuffs in good functioning condition, using PPE according to needs and maintenance. Even though the noise control implementation program was not realized 100%, it has already exceeded half of its target of 80%. The results of the hearing conservation program will be collected in the annual report of Monitoring the Quality of the Work Environment (Industrial Hygiene). The HSSE Aspect Work Plan at the Tambun Collecting Station (SP) with the Industrial Hygiene work plan and Action Plan, namely:

1. Biomonitoring 100 for noise for workers exposed to HR medic data from HSSE with a target number of 2 times and realized 2 times, progress is 100% and carried out as soon as possible.

2. Compilation of a hearing conservation program with a target number of 1 (one) time and realized 1 (one) time, the progress is 100%.
3. Implementation of 100% Hearing Control: Hearing Conservation. If the target is 100% and 80% is realized, the progress is 80%.

When measuring noise in the generator and compressor area at EP Tambun using a Sound Level Meter (SLM) noise level meter and GPS as a determinant of the coordinates. At the time of measurement, several sample points were obtained for data collection along with the noise level at each sample point.

Table 3. Genset Noise Measurement Results

Noise Intensity (dB)	Coordinate point	
	Y	X
93	-6.133666667	107.0296389
77	-6.133638889	107.0296944
85	-6.133861111	107.0295
80	-6.133611111	107.0297222
80	-6.133916667	107.0294444
80	-6.133611111	107.0294444
77	-6.133666667	107.0296944
77	-6.133805556	107.0294167
85	-6.133694444	107.02975
98	-6.133722222	107.02975
85	-6.134	107.02975
85	-6.133916667	107.0295833
85	-6.133972222	107.0296389
85	-6.133916667	107.0295833
80	-6.13375	107.0297778
77	-6.133694444	107.0298333
77	-6.133805556	107.0298056
77	-6.133694444	107.0298056
80	-6.133722222	107.02975
80	-6.134	107.0295833
80	-6.133972222	107.0296944
80	-6.133944444	107.02975
77	-6.133944444	107.0297778

Source: PT Pertamina EP Asset 3 Tambun

In the data obtained above, there are different noise intensities between 77-93 dB which are carried out at the 2 closest and far points in the generator area, then the data is processed into the Surfer Software automatically in the form of a contour map or noise mapping with the correct color. specified in the Individual Work Procedure (TKI) Noise Measurement NO. C-022/A3/EP8000/2014-SO REVISION 1 namely green, yellow, orange, and red and there is a code number for the noise intensity.

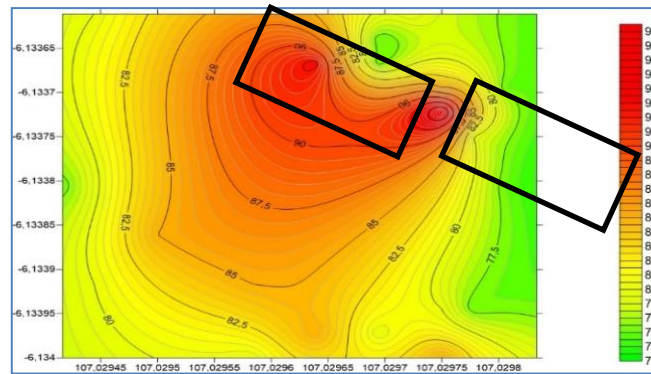


Figure 1. Genset area noise mapping

Table 4. Compressor Noise Measurement Results

Noise Intensity (dB)	Coordinate point	
	Y	X
97	-6.133027778	107.0296667
95	-6.132833333	107.0294444
95	-6.133083333	107.0296667
85	-6.133055556	107.0293611
85	-6.133027778	107.0294444
85	-6.133138889	107.0296389
85	-6.133111111	107.0296667
85	-6.133	107.0296667
85	-6.132805556	107.0296389
80	-6.132833333	107.0298333
80	-6.133083333	107.0297778
80	-6.133083333	107.0298056

Source: PT Pertamina EP Asset 3 Tambun

The data obtained above obtained results with noise intensities between 80-97 dB which were carried out at the 2 points closest and farthest in the compressor area. The data is then processed into the Surfer Software, an image that looks like a contour map with the color that has been determined in the Individual Work Procedure (TKI) for Noise Measurement NO. C-022/A3/EP8000/2014-SO REVISION 1, the safe zone for the noise hazard is described, namely green, yellow, orange to red and the limit to the noise level is recorded.

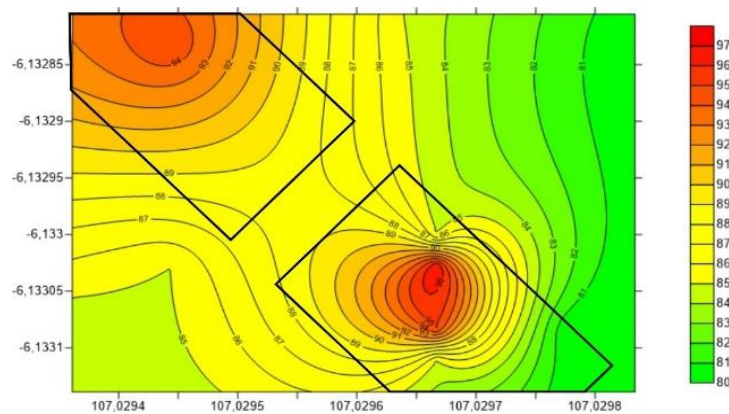


Figure 2. Noise Mapping of the Compressor area

At the time the measurement activities were carried out, there were several findings regarding the lack of realization of this hearing conservation program, such as:

1. There are still workers who do not wear hearing protection devices.
2. Noise Mapping collapsed because it was not installed properly.
3. There is no Noise Mapping, only the stand board.
4. Lack of installation of marking tags that the area has noise that is more than 85 dB.

The implementation of field observations after measurements and noise mapping was carried out in the compressor and generator area, there was a very high noise value, namely > 85 dBA for the compressor and generator. So, noise measurement must be well planned and implemented as well as efforts to control the noise hazard. This program is carried out every 1 (one) year or when there is a change in equipment and is carried out every 3 (three) months by the company's internal parties. Hearing conservation programs have been implemented and control programs have been implemented such as control of substitution, engineering, administration, and PPE. Even though the noise control implementation program was not realized 100%, it has already exceeded half of its target of 80%. The results of the hearing conservation program will be collected in the annual report of Monitoring the Quality of the Work Environment (Industrial Hygiene).

This is in line with Handoko's research, regarding noise control in building areas carried out by simple special methods using sound-absorbing materials such as gypsum board on ceilings and room dividers for interior noise while exterior noise is done by creating a high enough noise barrier. with a wall coupled with the construction of an embankment or mound as a silencer for vehicles and creating blanket noise from the sound of splashing fountains in the pool is enough to reduce noise [5].

And this research is also in line with Setyaningrum et al, concerning noise control in the mining company fabrication area for noise control isolation, engineering, administrative engineering, and the use of PPE and supervision of its use carried out [16].

According to Svinarky et al, Occupational safety and health risk control is an effort to control potential hazards found in the workplace, risk control is carried out after determining risk priorities, control methods can be applied based on hierarchy and control locations, control efforts start from the highest effectiveness to low, namely elimination, substitution, technical control, administrative control, and PPE, this adjusts risk priorities [20]. And according to Napitupulu's, Management of gas/emissions and noise, every day is managed by the industrial service section and the environmental monitoring and management section controls investors who have an impact on the environment, both gas/emissions. Carry out control of generators, vehicles, and construction of every investor and road user [11].

According to the author's assumption, the application of noise measurements is carried out according to the procedures in the applicable regulations, namely with a NAB limit of no more than 85 dB. If the company's noise level exceeds the maximum limit, several hearing conservation programs and risk control efforts are made with a good commitment from the company so as not to cause or exacerbate noise hazards for workers or the surrounding environment, the importance of coordination and sustainability of related parties both from workers who are disciplined in following safe work regulatory procedures, monitoring, recording routine studies in areas where there is a possibility of noise hazards, as well as continuous monitoring and evaluation so that possible hazards can be followed up immediately.

5. CONCLUSION

5.1. Conclusion

1. The Hearing Conservation Program has 7 (seven) interrelated components, namely:
 - a. Noise exposure survey
 - b. Noise control technically and administratively
 - c. Worker training
 - d. Personal protective equipment for users
 - e. Audiometric examination
 - f. Recording and reporting
 - g. Program assessment.
2. The procedure used refers to the Individual Work Procedure (TKI) for Noise Measurement NO. C022/A3/EP8000/2014-SO REVISION 1 HSSE PT Pertamina EP.

3. The implementation of the Noise Measurement Program is carried out once every 1 year or every time there is a change in process or a new tool. Implementation has been well implemented and structured.

5.2. Recommendation

The Hearing Conservation Program, especially in noise measurement, must continue to make continuous improvements so that the program is growing and getting better.

1. In the procedures, a good work plan has been arranged, good work procedures. However, several procedures are not detailed in their explanations, so the improvement of procedures needs to be done so that the procedures are well structured and detailed.
2. The implementation of the measurement program has been carried out well, but several obstacles must be considered, such as:
 - a. Monitor workers in the Genset and Compressor area so that workers always use hearing protection equipment.
 - b. Fixed Noise Mapping boards that fell off or weren't installed properly.
 - c. Increases the >85 dB noise tag at some points.

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