

# Assessment of Permit to Work System in Selected Oil and Gas Companies in Port Harcourt.

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## ABSTRACT

In line with the purpose of the study, for research questions were framed. The study used the cross-sectional descriptive method with survey. Using systematic sampling method, 3 out of the 33 oil and gas industries with offices based in Port Harcourt were selected from which a total of 130 participants were proportionally selected to suit the sample size for this study. The study used a self-structured questionnaire to collect data. Descriptive statistics were used to analyse the data. The results were presented in percentages, bar charts, weighted mean and grand mean. The results revealed that the current PTW in the selected oil and gas industries in Port Harcourt is effective to prevent hazard and risk at site (mean=3.53). The study also showed that the authorizing person visit the work site to ensure the risk identified and control measures are in place (mean=3.78). It was also reviewed in the study that personnel use the correct PPE as specified in the PTW form (mean=4.23) and implementation of control measures identified in the PTW form is followed while carrying the task (mean=4.31). This study also found out a shortcoming in training as majority claimed that they haven't undergone any form of PTW training of employees despite the fact that majority of the respondents admit that PTW is a key element of safe system of work and training attended is essential to working safely. The study concluded that compliance of permit to work is important to execute the work on site safely. Several areas require improvement to achieve 100% PTW compliance in the future such as issuance, design, risk assessment and control, authorization, mode, monitoring, training as well as commitment from management.

**Keywords:** Permit-to-work, hot-work-permit, cold-work-permit, confined-space-entry

## I. INTRODUCTION

The oil and gas industry are usually associated with inherent hazards, risks and accidents or incidents, capable of causing danger to life, property and the environment. This makes the oil and gas industry one of the most delicate and complex in nature; yet one of the most lucrative industries in the world [6]. For example, the Piper Alpha offshore oil industry disaster (1988) left 167 dead and dozens badly injured [8]., the BP Texas City refinery explosion (2005) resulted in around 15 fatalities [9] and BP Deepwater Horizon Oil Spill disaster (2010) killed 11 workers and 17 workers injured [1].

## II. LITERATURE REVIEW

A PTW system is a formal written system designed to control certain types of work that are identified as potentially hazardous [4]. The Health and Safety Executive defines a PTW system as a formal recorded process used to control work which is identified as potentially hazardous, and also a means of communication between site/installation management, plant supervisors and operators and those who carry out the hazardous work [3]. Permits-to-work (PTW) is essentially a management tool for coordinating and controlling non-routine work processes, such as maintenance, start-up, and trial runs etc. in a potentially hazardous environment [2].

The permits and certificates that are relevant and used in most industries are outlined below [3];

### Hot work permit:

This permit is required for all work involving ignition source such as naked flames, welding, flame cutting, grinding and the use of heat shrink blowers and it is typically colored red. Hot work refers to activities or an operation that involves the application of heat in areas where flammable atmospheres may be present [5].

**Cold work permit:**

Cold work permits are used in hazardous maintenance work that does not involve “hot work”. Cold work permits are issued when there is no reasonable source of ignition, and when all contact with harmful substances has been eliminated or appropriate precautions taken. This permit is coded blue [5].

**Confined space entry permit:**

Once an area has been classified as a “confined space”, a confined space entry permit is required for all entry or work to be conducted in a confined space. Confined space entry certificates are used to specify the precautions to be taken to eliminate exposure to dangerous fumes or to an oxygen-depleted atmosphere before a person is permitted to enter a confined space [5].

**Working at height permit:**

Working at heights” refers to any work-related activity being undertaken at an elevated position, above two metres where there is the potential to fall. Falls from heights can also include working in quarries, pits, wells, excavation and cliffs [5];

**Permit to work process:**

Work permit process is detailed and involves defined roles and responsibilities, hazards and risk associated with the activity, recommended control measures and practical risk reduction strategies to minimize the likelihood of incident and accident. To ensure effective and efficient administration of PTW, comprehensive work planning is required to determine some key factors not limited to list below [7];

- i. The specific task and sequence of activities.
- ii. Type of permit considering combination of processes and other activities in same area.
- iii. The tools and equipment required and safety procedures.
- iv. The areas, system and equipment and potential hazards.
- v. Planned task conflict with other tasks.
- vi. Time required for the task.
- vii. Emergency procedures.

viii. Isolation, atmospheric testing etc.

When work is carried out under the PTW system, all permit to work forms and certificates must be authorized except case of potential or actual loss of life. In this situation, the permit authority may verbally authorize the emergency rescue and then prepare permit to work later. Work cannot be executed under PTW system unless agreed 12 hours in advance or it has been approved by work request, planned maintenance, routine work order, approved planned changed request or other tasks specifically approved by the permit authority [7].

**III. METHODOLOGY**

The design of the study is a cross sectional research design with descriptive survey research method. The study was conducted amongst selected oil production and exploration companies operating in Rivers State. The population of the study comprised a total of one hundred and thirty (130) respondents drawn from three (3) companies in PTW department after an initial pilot examination. Standard research questionnaire was adopted from **Health and Safety Executives (HSE), published protocols and guidelines and other scholarly articles** with the aid of a modified five-point Likert scale. Cronbach Alpha reliability coefficient test was conducted to ensure method for measuring internal consistency of instrument. Thirty (30) respondents which were not part of the sample were used in testing the reliability and a reliability coefficient of 0.926 was obtained which shows strong reliability. Data collected was analyzed quantitatively using the Statistical Package for Social Science (SPSS) computer software version 20 and results presented in tables and charts as frequencies and percentages. Therefore, the aim of this study is to determine the effectiveness of PTW system in accident reduction in the oil and gas industry in Port Harcourt with the purpose of achieving safe execution of work on site.

**IV. RESULTS AND DISCUSSIONS**

**Table1 Descriptive statistics of the variables used to examine the level of awareness of the PTW system**

	N	Minimum	Maximum	Mean	Std. Deviation
Permit to work is a key element in safe system of work	121	1	5	3.99	1.165
The current list of authorized PTW signatories displayed at the PTW station/office	121	1	5	3.70	1.424
PTW system is frequently use/assess in my organisation	121	1	5	4.39	.943

The current PTW system is effective to prevent hazard and risk at site	121	1	5	3.53	1.336
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This objective seeks to examine the level of consciousness of the use of PTW system among the employees in the oil and gas industries in Port Harcourt. From the results obtained, 55 (45.5%) of the participants, which is a majority strongly agreed that they aware of the permit to work system as a key element in safe system of work. The results also showed that 71 (58.7%) of the participants strongly agreed that PTW is frequently used/assessed in their organization out of which 34 (28.1%) strongly agreed and 43 (35.5%) agreed that the current PTW system is effective to prevent hazard and risk at site. Although 25 (20.7%)

disagree to that assertion. It can also be seen from table 4.1 using the mean score value that the participants are in agreement that the permit to work is a key element in safe system of work (mean=3.99), are aware that the current list of authorized PTW signatories are displayed in the organization (mean=3.70), agrees that PTW system is frequently used/assessed in their organization (mean=4.39) and asserts the current PTW system is effective to prevent hazard and risk at site (mean=3.53). These responses show a high level of awareness of the PTW system in the selected oil and gas industries assessed.

**Table 2 Descriptive statistics on the factors affecting the performance of the PTW system**

	N	Minimum	Maximum	Mean	Std. Deviation
Have you received any form of PTW training or awareness in your organisation	121	1	2	1.60	.493
Permit training attended is adequate to work safely	121	1	5	3.73	1.000
Personnel uses the correct PPE as specified in the PTW form	121	1	5	4.23	.883
All hazards associated with the work are identified in the PTW and necessary precautions specified through a risk assessment or JHA.	121	1	5	1.80	1.410
Implementation of control measures identified in the PTW form is followed while carrying the task	121	1	5	4.31	.742
Revalidation are carried out during shift change or if there is any change to the condition of permit	121	1	5	3.89	.751

This objective identified some of the factors affecting the performance of the PTW system in the selected oil and gas industries. From the results obtained, 57(47.1%) agreed that permit training attended is adequate to work safety. 55(45.5%) strongly agreed that employees use the correct PPE as specified in the PTW form. 62(51.2%) agreed and 51 (42.1%) strongly agreed that implementation of control measures identified in the PTW form is followed while carrying out a task however, 72(59.5%) of the participants

claimed they have not undergone any form of PTW training and 43(35.5%) disagreed that all hazards associated with the work are identified in the PTW and necessary precautions specified through a risk assessment or JHA and this adversely affects the performance of the PTW system in the selected oil and gas industries. It can also be seen from table 4.2 that the participants are in agreement that permit training attended is adequate to work safely (mean=3.73), Personnel uses the correct PPE as specified in the PTW form (mean=4.23),

Implementation of control measures identified in the PTW form is followed while carrying the task (mean=4.31).

## V. CONCLUSION

It is important to stress that a healthy workforce is vital for sustainable socio-economic development on a local, national and global level. The results of the study show that compliance of permit to work is important to execute the work on site safely. Several areas require improvement to achieve 100% PTW compliance in the future such as issuance, design, risk assessment and control, authorization, mode, monitoring, training as well as commitment from management.

## VI. RECOMMENDATIONS

From the review and analysis of this research, we recommend that end users' incorporation during design, training of competent issuers, incorporation of joint risk assessment, introduction of electronic PTW and clarity unambiguity are key to ensuring safe work conditions in the oil and gas industries.

## REFERENCES

- [1]. Alkhaldi, M, Pathirage, C and Kulatunga, U. (2017). The role of human error in accidents within oil and gas industry in Bahrain.
- [2]. Chowdhury Mohammad Touhid Amin, S. R. S. (2017). Permit-to-work ( ptw ) system : a case study of bangora gas plant permit-to-work ( ptw ) system
- [3]. Enya, A. (2018). Permit to Work HSE in Brief. (October 2016).
- [4]. Faicd, K. (2012). The Calculated Benefits of Electronic PTW Systems White Paper. 1–14.
- [5]. HSE. (2005a). Guidance on permit-to-work systems.
- [6]. Nangih, E. (2017). Safety Practices and Performance of Oil and Gas Servicing Companies in Nigeria : Empirical Evidences from Selected Companies in Portharcourt. 7(4), 177–181. <https://doi.org/10.6007/IJARAFMS/v7-i4/3482>
- [7]. Nwagbara, C. R. (2019). Evaluation of Permit to work system as hazard control tool in high risk activities.
- [8]. Singh, B., Jukes, P., Poblete, B., & Wittkower, B. (2010). 20 Years on lessons learned from Piper Alpha. The evolution of concurrent and inherently safe design. *Journal of Loss Prevention in the Process Industries*, 23(6), 936–953.
- [9]. Theophilus, S. C., Esenowo, V. N., Arewa, A. O., Ifelebuegu, A. O., Nnadi, E. O., & Mbanaso, F. U. (2017). Human factors analysis and classification system for the oil and gas industry ( HFACS-OGI ). *Reliability Engineering and System Safety*, 167(April 2016), 168–176. <https://doi.org/10.1016/j.res.2017.05.036>