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EVACUATION ROUTE ANALYSIS AND ACTIVE FIRE PROTECTION SYSTEMAT UNIVERSITAS NEGERI PADANG

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Abstract: *Attention and handling in disaster mitigation efforts. According to Law no. 24 of 2007 concerning Disaster Management, fires are categorized as natural disasters as well as non-natural disasters based on their causes. This indicates that fire disasters, apart from being affected by physical or natural conditions, can also occur due to human negligence as the cause. There are four fire safety components, namely fire protection facilities, fire engine access, life-saving facilities and Fire Safety Management Building (MKKG). Various fire incidents that occur can be caused by the absence or ineffective functioning of early detection systems, fire extinguishing systems and rescue systems. Therefore, it is important to know how to assess the availability of types of active fire protection system tools at the main campus of Universitas Negeri Padang as an effort to improve fire prevention and management. This study uses mixed methods (quantitative and qualitative) with a descriptive approach by determining the category of the condition level of the active protection system.*

Keywords: *Fire, Mitigation, Fire Protection.*

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I. INTRODUCTION

Fire is a type of disaster that is quite potential, leaving huge losses if it does not get enough attention and handling in disaster mitigation efforts (Lubis et al., 2019 and Umar 2021). According to concerning Disaster Management, fires are categorized as natural disasters as well as non-natural disasters based on their causes (Umar., Dewata et al., 2018). This indicates that fire disasters, apart from being influenced by physical or natural conditions, can also occur due to human negligence as the cause (Du & Zhu, 2012; Umar., 2017. Umar et al., 2018., Umar 2021 and Zhu & Li, 2021). In disaster mitigation, apart from the physical (natural) aspect, it turns out that the human (social) aspect must also receive special attention (Giofandi & Nizam, 2018; Giofandi & Sekarjati, 2020; Giofandi et al., 2020, and Umar., 2021).

Various fire incidents that occur can be caused by the absence or ineffective functioning of early detection systems, fire extinguishing systems and rescue systems (Tanachawengsakul et al., 2016, Umar., 2018 and Umar et al., 2019). The sources that trigger fires in the workplace or other places of activity are electricity, lightning strikes, welding (construction work), use of flammable materials and liquids, chemical reactions, sparks, friction and cigarettes (Wei et al., 2020 and Umar., 2021).

Fires in high-rise buildings are more deadly and detrimental (Augustijn-Beckers et al., 2010), besides fire handling at high-rise buildings is more difficult and risky than other locations where fire disasters occur (Fekete et al., 2020). Disasters can occur at any time and of course will cause a lot of losses (Giofandi & Umar, 2021). Many fire incidents occur in high-rise buildings due to the low level of prevention and occupational health systems in high-rise buildings (Rahardjo et al., 2019). In accordance states that building safety requirements include the requirements for the building's ability to support loads, as well as the building's ability to prevent and cope with fire hazards and lightning hazards (Sirimongkonlertkul & Phonekeo, 2012).

Based on the background, it becomes the basis for conducting research on the assessment of the availability of types of active fire protection system tools at the main campus of Universitas Negeri Padang as an effort to improve fire prevention and management.

II. RESEARCH METHOD

This study uses mixed methods (quantitative and qualitative) with a descriptive approach. The data collection technique used in this research is the field study method as follows: observation. Data collection techniques include questionnaires, field surveys and documentation By using the formula (Mustika et al., 2018 and Barlian et al., 2019), as follows:

$$P = \frac{f}{n} \times 100\%$$

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Information :
P : Percentage sought

F : Number of facilities

N : Number of sub variables

Determining the condition level category of the active protection system refers to the building fire safety inspection (Karimah et al., 2016; Silva & Lestantyo, 2019). The condition of each component or part of the building must be assessed and evaluated (Kristiyanto, 2012; Reshy Amtria Destina et al., 2020). The value of the condition of the building fire protection component is divided into 3 levels, namely:

- Good : "G" (with the equivalent value of B is 100).
- Enough : "E" (with the equivalent value of C is 80).
- or Less : "L" (with the equivalent value of K is 60).

The criteria in Table 2 are used as practical reference material for assessing the condition of building fire protection carried out by building management officers.

Tabel 1. Tabel Proteksi Kebakaran Bangunan

Score	Suitability	Reliability
> 80 –100	According to requirements	Good
60 –80	Installed, but there is a small part Incorrect Installation	Enough
< 60	requirements	Less

Source: Balitbang PU, 2005

III. RESULT AND DISCUSSION

The results of the analysis of the availability and condition of the active protection system contained in the building at Universitas Negeri Padang are presented in the following table:

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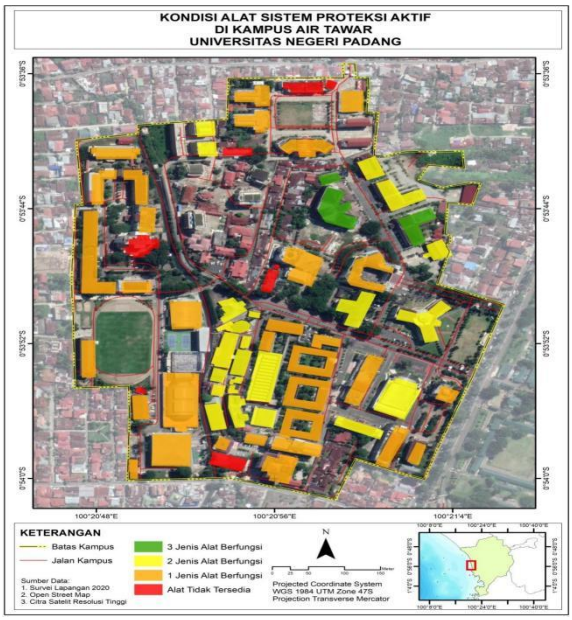

Figure 1. Condition Map of Active Protection System Tools

Table 1.Conditions of Diversity of Active Protection System Types Based on Functioning Tools

No	Function (Type)	Number of Buildings (Units)	Percentage (%)
1	5	0	0
2	4	0	0
3	3	4	10
4	2	9	22,5
5	1	17	42,5
6	0	10	25

Source: Analysis, 2020

Table 1. shows the diversity of active protection systems according to the equipment that functions, this level of diversity is not complete because of the 41 buildings studied the percentage of buildings from 4 types of protection systems that function, 4 buildings that have 3 types of equipment that function with a percentage of 10%, 9 buildings which has 2 types of tools with a percentage of 22.5%, and 17 buildings that have 1 type of tool that functions with a percentage of 42.5%. 10 buildings that do not have a complete active protection system with a percentage of 25%.

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Figure 2. Fire Evacuation Route at Main Campus of Universitas Negeri Padang

The Active Protection Systems that function at Universitas Negeri Padang are Light Fire Extinguishers , Hydrants and Alarms. Buildings that have a functioning active protection system will be described in table 1.Figure 2. Explaining related to evacuation routes shows that at the Faculty of Engineering it is on the football field, Faculty of Sports Science, at the Faculty of Languages and Arts it is on the highway in front of the language and arts building, at the Faculty of Economics it is in the field of Labor High School, at the Faculty Sports Science

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passes through the Beaver Pond building and is located in front of the UNP exit gate, the Faculty of Education passes through the New Rectorate Building, the Faculty of Social Sciences is in front of the Faculty of Education building and the High School Labor field, the Faculty of Mathematics and Natural Sciences is located at the football field of the Faculty of Sports Science, at the Faculty of Tourism and Hospitality through the Auditorium Building and the Al-Azhar Mosque, in the General Course it is in the field of Labor High School, in Postgraduates it can pass beside the Faculty of Economics building and is also located on the football field of the Faculty of Science sports.

The central library building is located in the west as seen from the map and adjacent to the Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, the building which was established in 1994 functions as a library which stores many books and archives that are very important as references. The Central Library of Universitas Negeri Padang was built with five floors, the library building is one of the buildings that contains many combustible elements, considering that paper materials are widely found in libraries, and paper is classified as class "A" fire, so that in a library building a complete protection system is needed.

IV. CONCLUSIONS

The availability of an active protection system to deal with fire disasters at the Main Campus of Universitas Negeri Padang according to the level of diversity is incomplete because of all buildings only 1 building has 5 types of active protection systems, namely the Central Library building, other buildings have less than 5 types of active protection systems. Then the availability of rescue facilities according to the level of diversity at Main Campus of Universitas Negeri Padang is not yet complete.

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