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## CREATING SAFETY BEHAVIOURS AND ATTITUDES OF MINE WORKERS IN A WORK PLACE – COMMON WORKERS' WARNING AND INFORMING SYSTEM IN A MINE

TVORBA BEZPEČNÉHO REŽIMU PRÁCE A BEZPEČNÉ POSTOJE HORNÍKŮ NA PRACOVÍŠTI –  
STANDARDNÍ SIGNALIZAČNÍ A INFORMAČNÍ SYSTÉM NA DOLE

### Abstract

This article describes a way of creating safety behaviours and attitudes of mine workers in a work place. It shows organizational procedures increasing a level of worker's safety culture and their active participation in a system of occupational safety management.

### Abstrakt

Článek popisuje zajištění bezpečného režimu práce a bezpečné pozice horníků na pracovišti. Jsou zde naznačeny organizační postupy zvyšující úroveň kultury bezpečnosti horníků a jejich aktivní účast v systému bezpečnostního managementu.

**Key words:** safe behaviour, safe attitude, safety management, warning system, informing system, mine.

### Introduction

Requirements of United Europe in the field of Safety Management at Work show the necessities of raising a level of safety culture and by this to improve the conditions of safe work in enterprises. Higher level of safety culture at work is possible to reach by using safety management systems in which we turn a special attention on the element of workers' active participation. General participation of workers in structures of management system would be possible to reach by using by us proposed Common Workers' Warning and Informing System (PSIO). This system is an original collection of organizational procedures together with a software, which was made in the Safety Management and Ergonomic's Institute of Silesian University.

### Common Workers' Warning and Informing System

Using PSIO procedure increase the level of safety culture and a level of occupational safety by giving a possibility of active involvement in this process to all workers of the underground mine.

Workers participating in this programme (system) know about the following rules:

- Safety is a collective effort of all workers.
- Safety and health are one of the most important needs of a man, that's why I have a right to achieve them
- Participating in the programme I have to obey the safety regulations to assure my own safety as well as safety of colleagues - I demand the same from the others.
- I'm under safety control, but I have a right and duty to evaluate a level of safety in a mine and its realization programme [6].

Mine workers (direct performers of productive processes) often as first people have to deal with negative changes of a safety level in a work place [4,5]. To mark the noticed irregularities and potential

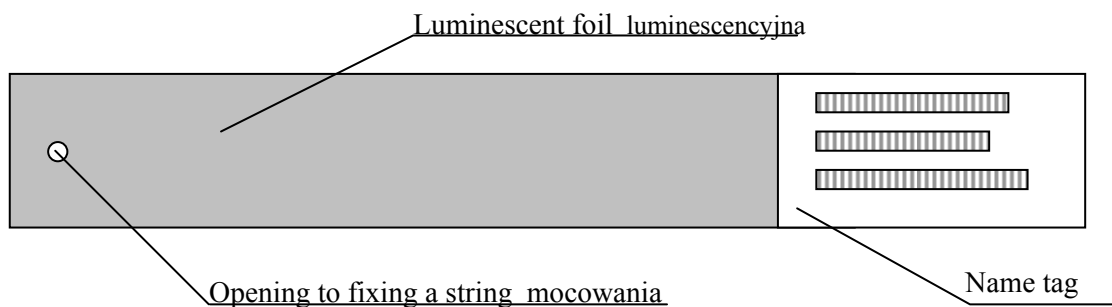
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accidents' places workers should use REFLECTIVE WARNING SIGNALLERS (OSO). In the Safety Management and Ergonomic's Institute many different types of Personal Warning Signallers were elaborate, they fulfil all functional and technical requirements, which condition their proper construction, good visibility and comfortable applying. As a result of simulated optical investigations, in conditions similar to the real conditions of optical investigations, a silver colour "foil" was made, called commonly "Glow-worm". That "foil" reflects a falling light and illuminates white colour very strongly. "Glow-worm" is composed of two elements[2]:

- ❑ luminescent foil
- ❑ name tag with datas



**Fig. 1.** Personal reflective signaller OSO (reversible)

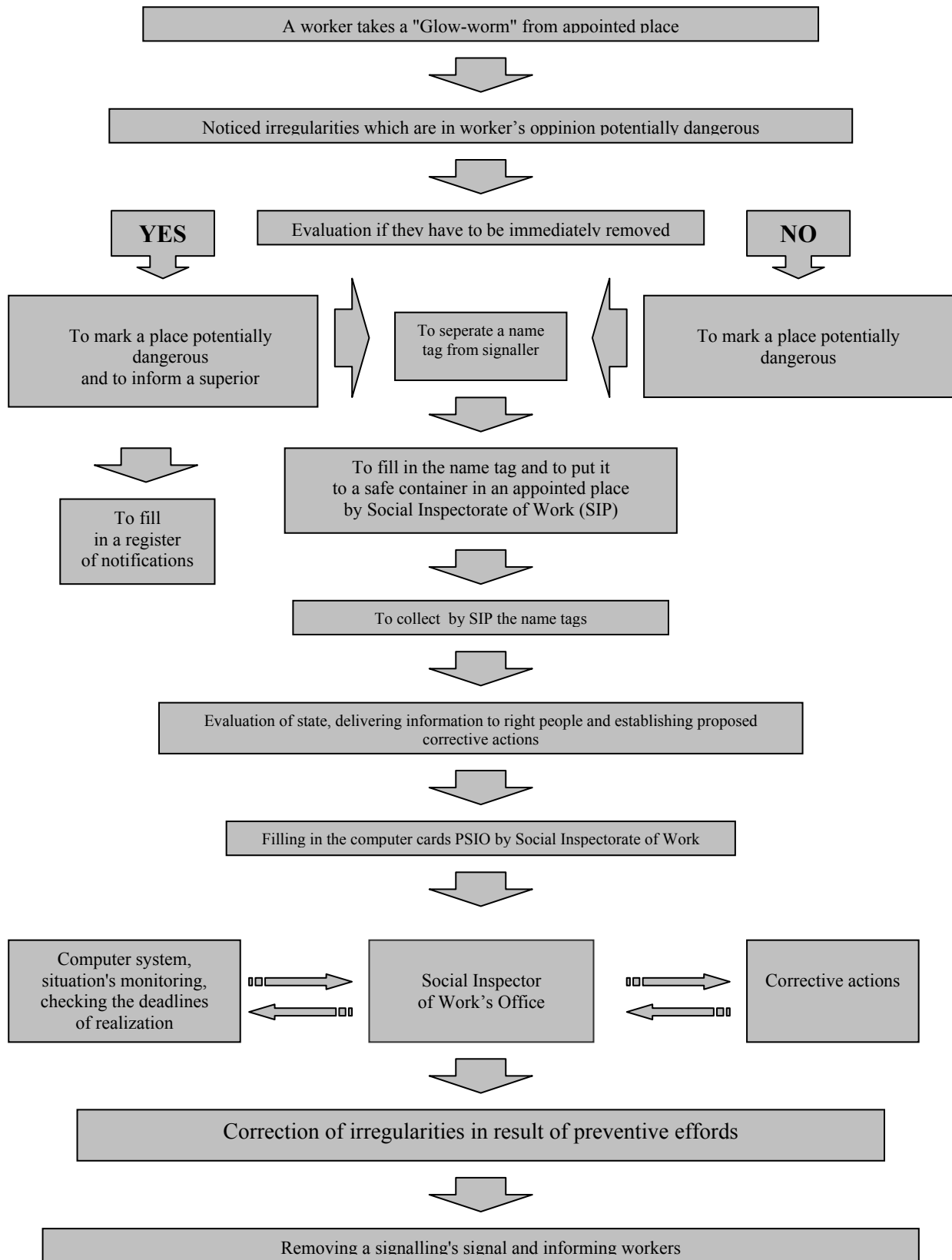
### **Description of procedures and a scheme of system's working**

When we start using PSIO in mines we have to follow a few steps [1, 6]:

1. Execution of training among chosen workers. Then they pass an idea as well as rules of applying a system to other workers.
2. Choosing a place of taking the signallers.
3. Choosing and protecting a place of storing the signallers, it is very important to match special container which protect against the access of the strangers.
4. Making a system popular and well known among all mine workers and creating the best participation's conditions for workers in system for example by pointing a suitable place of taking the signallers as well as returning the name tags.
5. Preparation of computer's service position of Common Workers' Warning and Informing System "PSIO" (computer + printer) as well as making a service training (PSIO).

Demonstrative diagram of system's working is shown on the next page on a drawing 2.

Workers after noticing an irregular situation make their own, subjective opinion of this situation in accordance with well-known rules. Then data about incorrect situation in a place of work are written down to a name tag. Data from a name tag are transferred by the Social Inspector of Work to a Computer Card of Common Workers' Warning and Informing System which is a part of special software.



**Fig. 2.** General diagram of warning system's working and informing about a place and a type

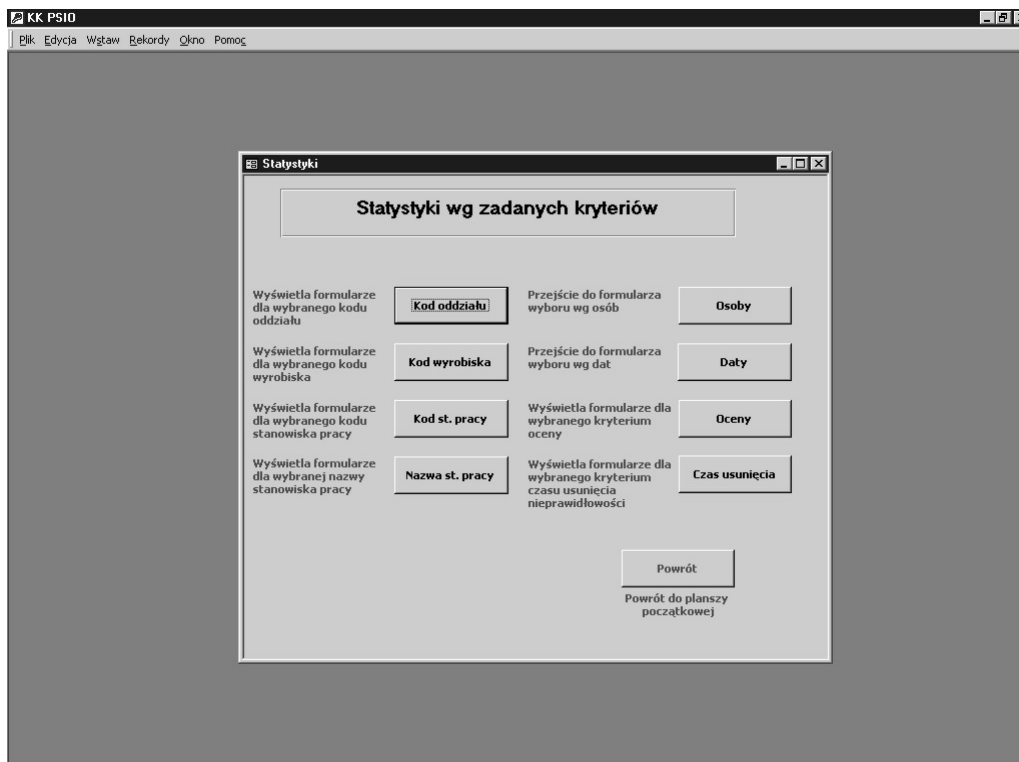
## Software

A special software for needs of PSIO was made in the Safety Management and Ergonomic's Institute of Silesian University. Thanks to this software a co-ordinator of system's work has possibilities of:

1. Continuous observation of system's work - projection on a monitor's screen announcements about notified irregular situations.
2. Possibility of grouping and presenting (projecting) data according to definite criteria such as:
  - Places.
  - Time.
  - Kind of irregularity.
  - Opinions about potential effects of this irregularities.
  - Rank of this irregularities.
3. Warning and reminding about continuous state of incorrectness.

Picture 3 shows one of the modules of computer program PSIO which displays and analyses statistic.

Certain elements of programme are modified to special operator's preference. By special modules it is possible to connect PSIO with different data bases working in the mine, thanks to this they are fully compatible to "PSIO" [3, 6].



**Fig. 3.** Module of computer programme PSIO displaying and analysing statistic

## Results

Basing on observation of system's functioning in a mine we can affirm that the system is working correctly and it is favorably seen by workers. The improvement of work's process was based on the system which eliminates many irregularities - potentially dangerous, the most often irregularities are listed below[6]:

- A clutch and a brake in gin put out of adjustment.
- Too low hanged rail on junction of small railway.
- Too low placed flameproof valves.
- A torn lock of casing at railway station.
- A lack of covering plate of channel on a way of staff.

Very difficult passage to a working face because the moguls (unevenness) were flooded.

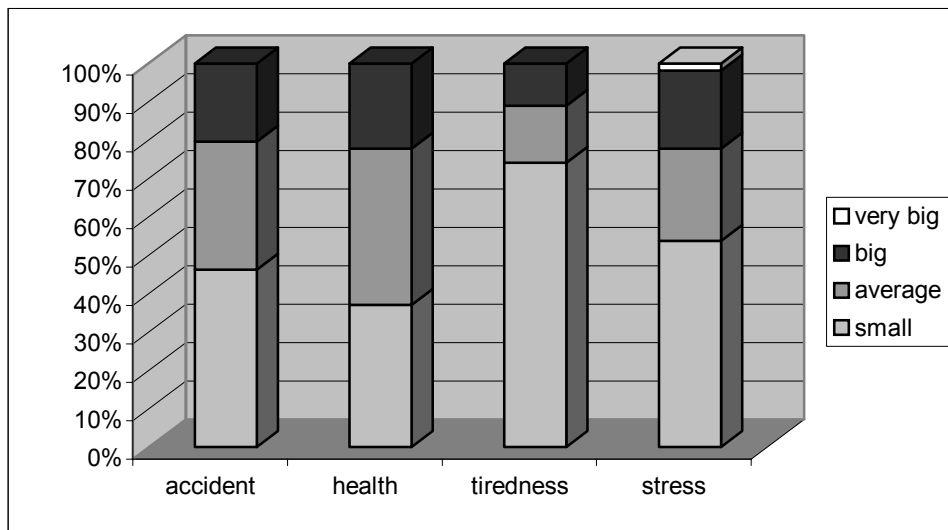
Workers during the identification of irregularities made opinions in scale:

- Small.
- Average.
- Big.
- Very big.

Following parameters caused by one of irregularity:

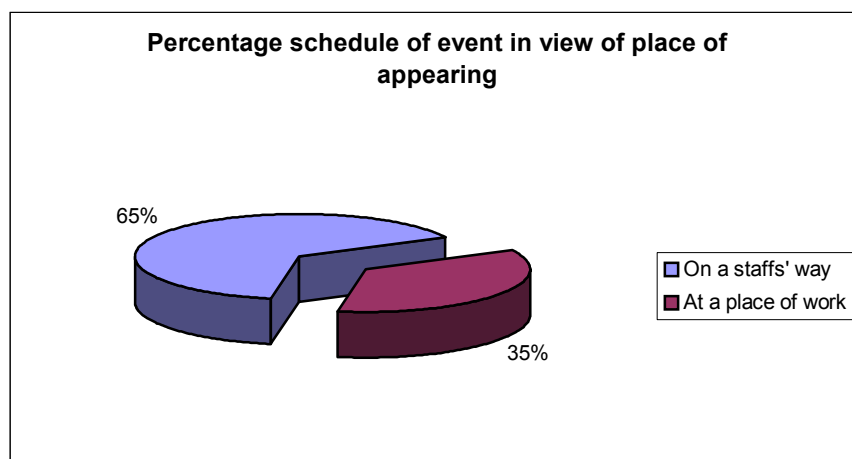
- Possibility of incident.
- Possibility of health hazard.
- Difficulty causing tiredness.
- Difficulty causing nervousness (stress).

The next graph presents a breakdown of percentage values showing the opinions about notified irregularities depending on evaluated parameters.



**Fig. 4.** Composition of percentage opinions' values of notified situation by workers in dependence from estimated parameters

One of the most interesting thing is a place where those irregularities were seen, most of them weren't notified at a place of work but on a staffs' way. It is shown on the next graph.



**Fig. 5.** Percentage schedule of events in view of place of appearing

## Conclusion

Thanks to corrective workings, irregularities are removed immediately almost in all cases, and there where it isn't possible to correct it so fast, workers are informed by "glow-warm" sign about the existing and possible danger.

A worker placing reflective signaller turns everybody's attention on a problem and he analyses irregularities, and what is the most important he improves a level of work's safety . Using PSIO procedure is a cheap and easy way of creating a safe maintenances and attitudes of workers in a place of work. After using a "glow-worm" worker has a possibility of following operations taken by technical services. Taking a part by workers in procedures of applying "glow-worm" signs makes them fill responsible for a level of safety at work, by this they are active participants in process of work's safety management and it also increase a level of safety culture in mine. Proposed procedure has also essential information value, because it makes possible to use information from workers to create a data-base of irregular situations potentially dangerous. Those information have a huge meaning in creating a safety conditions of work in enterprise - mine.

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## Resumé

Díky nápravným postupům je možno téměř ve všech případech odstranit odchylky pozice horníků na pracovišti. Není-li to možné provést rychle, jsou pracovníci rychle informováni pomocí "glow-warm" o existujícím a možném nebezpečí.

Pracovník aplikující reflexní signalizační štítky (pásky) se analýzou odchylek zabývá, čímž zlepšuje úroveň bezpečnosti práce. Použití postupu PSIO je tak levný a jednoduchý způsob zajištění bezpečného chování a také přístupu pracovníků k jejich práci. Po použití „glow-warm“ má navíc pracovník možnost provést následné operace prostřednictvím technických služeb. Zainteresování pracovníků při aplikaci „glow-warm“ štítků je činí plně odpovědnými za úroveň bezpečnosti práce, čímž se stávají aktivními účastníky bezpečnostního managementu. Předkládaný postup zvyšuje úroveň kultury bezpečnosti v dole a poskytuje důležité informace pro databázi havarijních stavů – potenciálních nebezpečí. Tyto informace jsou velmi cenné pro zajišťování bezpečných důlních pracovních podmínek.

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