

Analysis of Enterprise Safety Ideology and Human Error

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Abstract. Based on relevant experience and management practice, this paper summarizes the construction method of good safety ideology in the company, and verifies this method with popular cases this year, and discusses in detail the great role of the company's safety ideology in preventing human error. The unity of knowledge and action, employees themselves establish the correct ideology and practice safe behavior; the company builds a solid safety behavior track, corrects employees' wrong behaviors, and leads the direction of correct behavior. The two are combined to build the overall safety ideology of the company and prevent human errors.

Keywords: Human Error; Safety Consciousness; Experience Feedback; Nuclear Safety Culture.

1. Introduction

In 1990, James Risen of the University of Manchester proposed the Swiss Cheese Theory (SCM). The main idea is: organizational activities are composed of multiple levels, and each level is like a long-short cheese with holes, and insecure factors are like an uninterrupted the light source, when the holes are connected in a line so that the light just passes through, the accident occurs. Hain's Law also proposes a 1:29:300 iceberg model. Any major accident is the accumulation of errors. As the main body of production activities, human beings are also the biggest unstable factor in safe production, and the concept of human error was born. In the production work, any person's mistakes may be the origin of the accident, and it is an objective existence that cannot be eliminated. Therefore, a highly reliable organizational structure is required to collect and analyze the various links of human errors, modify internal behaviors, and design prevention Possible failure modes form a strong internal security ideology, which minimizes the probability of human error.

People at work by emotion, environment and other aspects of the influence, easy to be in an unsafe state, if not timely found correction, it is easy to induce human error. Individuals without good training and safety atmosphere are weak in resistance to human error. In the face of all kinds of emergencies and abnormal emotions, not all of them can firmly implement the safety procedures and rules they have learned. Production work, sloppy, fluky psychology and irritability unsafe behavior is the easiest to generate ideas, sloppy work can be performed through strict procedures and corresponding prevent blunder tools such as rules and regulations to eliminate, which both are due to mistakes in a great deal of uncontrollable factors, need individual and team two levels of effort to weaken. The existence of fluke psychology, intended to challenge the safety bottom line, the essence is too trusting to their own experience of the judgment of risks and hidden dangers or driven by other people's unsafe behavior, in their own poor control and no team reminder constraints, repeatedly touch the bottom line of unsafe behavior, resulting in safety accidents; Irritable, in the face of emergencies or work disputes, often qi and blood upsurge, weaken rational thinking ability, ignore safety details, eager to achieve is often not what it is, irritability often aggravates contradictions and disputes, resulting in irrational behavior. Because of this, independent people are not completely resistant to human error.

Excellent and powerful teams have perfect security ideology, and team members support each other to fight against human error. Qualified teams constantly strengthen the overall safety ideology, and through various means to spur internal members, guide the ideological direction of internal members, and constantly improve their own safety literacy; At the same time, the good atmosphere of internal members and mutual aid atmosphere, the formation of internal mutual aid, mutual reminder of double protection. Human errors are born by human beings, so it is not only necessary to rely on individual efforts to prevent, but also need a reliable and strong team to correct, to find out

the missing, to reasonably allocate resources to fight against possible human errors; And for the human error that has happened, only a strong team can contain the further expansion of the situation, so as to minimize the loss, and form a sound prevention system to avoid the recurrence of similar events.

2. Research on Human Error

Human error is one of the most important causes of system failure or accident. More than 85% of industrial enterprise accidents in the world are directly or indirectly caused by human factors. In China, about 70% of accidents in the nuclear industry are related to human factors. By exploring the mechanism and root causes of human error, we can find improvement measures from the perspective of groups rather than individuals, so as to reduce the probability of human error. In this paper, by discussing the case of human error caused by nuclear power insiders, the cause of the incident is analyzed and the relationship between enterprise safety ideology and human error is explored.

Through the China Nuclear Power Experience Feedback platform, A total of 154 type A and B incidents reported by China Nuclear Power in the past two years have been identified, and the reasons can be divided into four categories: human cause, management, equipment and management/equipment. The 132 incidents occurred in nuclear power plants were screened and classified into management, equipment and human error, and the human error incidents were further divided into four categories: communication failure, safety awareness/skill level, procedure failure and illegal operation. The specific data are shown in Figure 1. Procedure failure and skill level belong to hardware deficiency, and it is necessary to form a set of continuous absorption and progress, covering a wide range of procedures to guide the operation; For illegal operation and safety awareness caused by the problem, need to be corrected by reward and punishment, effectively promote the implementation of work according to the procedure; If communication fails, team building is used to strengthen employee communication. The above countermeasures should be improved based on the team with a strong security ideology core. Finally, four methods are proposed: discipline, reward and punishment, atmosphere and participation to improve the team security ideology and promote the team to fight against human-caused errors reasonably and effectively.

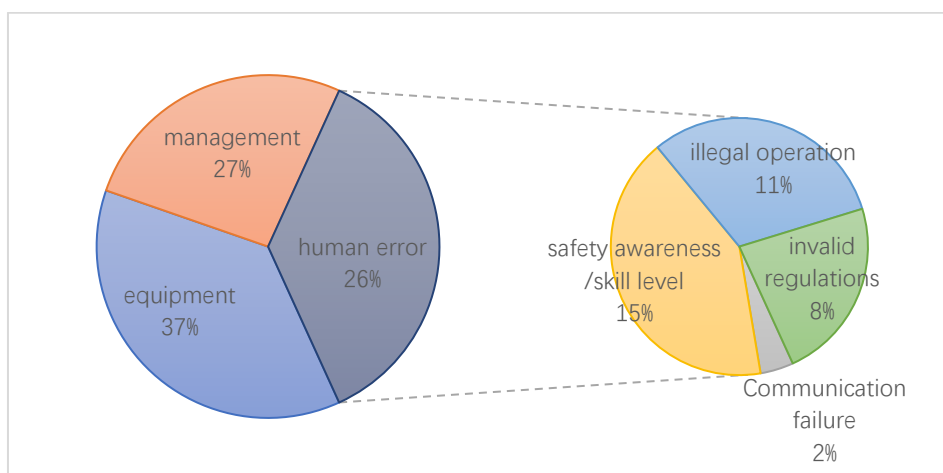


Figure 1. The cause of China's nuclear power A and B incidents in the past two years

3. Methods of Constructing Security Ideology

Thought determines behavior, consciousness determines attitude, and so does the team. As a nuclear power unit, we must always put safety in production first, promote the implementation of safety production from top to bottom, build and implement a safety ideology throughout the company, and project feedback into actual production work to form a double safety of individuals and the company Insurance minimizes the probability of human error. Through the four aspects of a fair and

reasonable reward and punishment system, effective and practical rules and regulations, a team atmosphere of solidarity and mutual assistance, and a sense of participation that encompasses all employees, safety awareness and quality are imprinted on the minds of all employees of the company, thereby forming an overall safety awareness. The shape is shown in Figure 2. Next, the above four construction methods will be analyzed in detail.

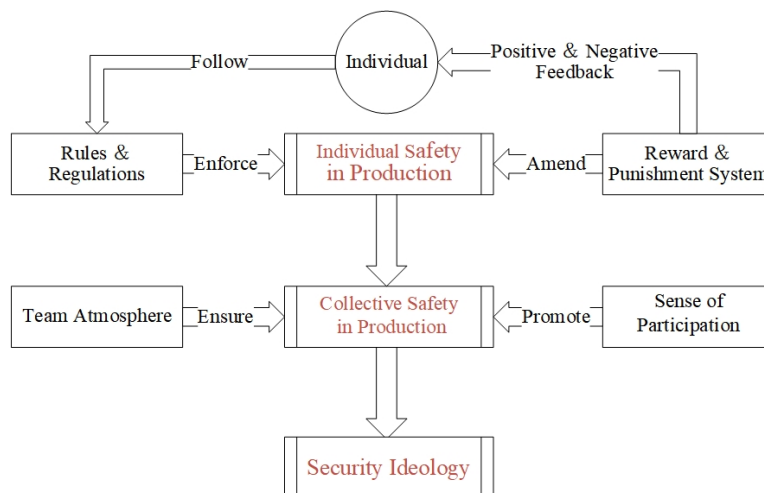


Figure 2. Security ideology construction process

3.1 Fair and Reasonable Rewards and Punishments

The ancient's cloud: the good reward, the wicked punishment, the country will rule; Modern companies pay attention to the use of reward and punishment system from both positive and negative aspects to ensure the enthusiasm and standardization of employees, positive incentive system to mobilize the enthusiasm of employees, negative incentive punishment measures to standardize and correct employee behavior. Just as the saying goes, "respect a good person and all the good people will be pleased; punish a bad person and all the bad people will be afraid", production safety also needs a fair and reasonable reward and punishment system. Incentives, penalties and rewards should be ensured to be consistent with safety behavior and to reinforce behavior and outcomes that reflect the primacy of nuclear safety. As a nuclear power unit, work safety is included in the performance assessment, and quantitative assessment is carried out through the violation and deviation of the red and yellow lines of nuclear power. At the same time, each unit implements the policy of commendation and reward for the advanced individuals or teams in safety, and forms and improves the multi-level work safety reward and punishment system. Fair and reasonable reward and punishment system, that is, based on reasonable rules and regulations, open and transparent reward and punishment, the implementation of effective reward and punishment measures, reward those who firmly implement safety policies and safety culture, punish all acts of damaging safety.

China's nuclear power industry has implemented a graded violation management system, involving industrial and radiation safety, quality and environmental protection, and has formed a management system covering all aspects of safety in production. Punishment measures are strictly enforced in accordance with regulations and the system is fair. The incentive measures mainly rely on the internal of each company. At present, our company implements the dual safety incentive measures of on-site reward and daily work reward for nuclear power overhaul: In the nuclear power overhaul work, the production inspection team and the safety supervision team will implement incentive measures in parallel to encourage the staff to strictly observe the safety bottom line and to find and solve safety problems. With the help of the double audit of the project team and the site management department, the public will be publicized and rewarded. Daily work, reward safety ability improvement behaviors such as writing safety regulations and safety articles, which are included in monthly and annual assessment. The combination of the two, constitute the annual

production safety assessment system, and then achieve fair and reasonable reward and punishment measures.

3.2 Effective and Practical Procedures

No rules, no fangyuan, no procedures, no production. As the biggest uncontrollable factor of production safety, human factors need to be restrained by a comprehensive and effective framework to ensure the implementation of the correct production mode, and use procedures to fight against risks and post-accident treatment. The implementation of effective and practical procedures include: standardize the execution behavior of people, ensure the stable operation of equipment, rapid and effective post-accident treatment.

Establish a set of procedures covering all production work and updating in real time: production workflow, equipment operation procedures, procedures used for work execution, accident emergency plans, etc., to ensure that all risk operations have rules to follow. On the basis of the operation rules to follow: refine the division of work, simplify the operation process, with standard operation to fight against human factor trap, the formation of a set of standardized operation process; Identify operational hazards, deduce risk source accidents, and form a complete set of risk identification and emergency response plans based on practice and experience feedback in advance; Focus on the application of experience feedback learning, solidify good experience, learn advanced management system and working mode, and form a set of experience absorption and spontaneous learning mechanism. With the production work guidance rules as the root, standardized process as the direction, supplemented by a set of emergency risk identification and treatment system, absorbing good internal and external experience and system, the final construction covers the whole process of "PDCA" regulation system, to combat human error in all aspects.

3.3 Atmosphere of Solidarity and Mutual Assistance

Excellent teams focus on close cooperation. They can use their own wings to protect everyone in the team before facing the danger source of human error, and face the challenge as a whole. Therefore, strong teams can improve the upper and lower limits of individual resistance to human error. In order to improve the risk prevention and countermeasure's ability of the team and enhance the positive feedback of the personal safety awareness within the team, it is necessary to establish a good team atmosphere, and spontaneously form the solidarity and mutual assistance atmosphere of "all for one and one for all" within the team, improve the fetters of the team members, and strengthen the commonness of the members to jointly confront human error.

The formation of a good team atmosphere mainly from two aspects: person-person, and team-individual. Good emotional basis between people is the premise of mutual help, and the correct behavior of a team is based on the accurate cognition of rules and regulations. With the help of open and transparent reward and punishment mechanism, considerate humanistic care, appropriate team building activities and unified team goals, we can strengthen the win-win cooperation within the team, balance the competitive relationship, and promote all team members to move forward towards the set goals. On the other hand, the team can give internal members enough positive feedback: good incentive mechanism, good at fighting against external unstable factors and strong absorption and learning ability, improve the sense of belonging and sense of achievement of internal members, staff growth and team goal unity, forming a good atmosphere of solidarity and mutual assistance.

3.4 Sense of Participation in Production Safety

Improve the dual sense of participation of employees and management, establish a longitudinal safety voice channel, systematically organize and establish an experience feedback system, promote party members and cadres to take the lead, and improve all organizational mechanisms conducive to safe production. Employees can enhance their sense of participation and strengthen their awareness of personal safety through experience feedback, various safety improvement projects and safety production incentive mechanism. The management to perform the "four grassroots": on-site office at

the grassroots, evaluation and incentive at the grassroots, humanistic care at the grassroots and learning and research at the grassroots; Improve the effectiveness of communication between the upper and lower levels, and promote the level of production safety awareness.

Establish a set of experience feedback systems: collection, reflection, promotion and reward; Actively collect industry related experience feedback, not limited to safety production, broaden horizons, form a safety culture awareness, technical ability improvement and management system of experience feedback collection system, and integrate into their own production, to achieve multi-dimensional improvement; And establish a subdivided level of experience feedback reward system, improve the effective and practical implementation of safety culture experience feedback incentive degree. On the other hand, the safety behavior of employees is also worthy of attention. With the help of the attention from the upper level, rewards and punishments, rules and regulations and team atmosphere construction can be better implemented. Organize regular communication and improve communication channels between superiors and subordinates; Self-improvement, combined with on-site work, for the general direction and overall awareness of learning. Work together, build smooth communication channels, enhance the sense of participation of all staff: I in production safety, I for production safety, production safety for me.

4. Security Ideology Application

Consciousness determines behavior. From individuals to companies, they are all dominated by their own (individual/group) awareness. Individual level awareness determines employee level safety awareness and behavior habits; corporate level safety culture atmosphere determines collective level safety production The degree of emphasis and safety behavior orientation. After all, security ideology is ideological and has a certain utopian nature. If it is to be implemented, it is necessary to use the four methods discussed above to shape and solidify, and its application is shown in Figure 3.

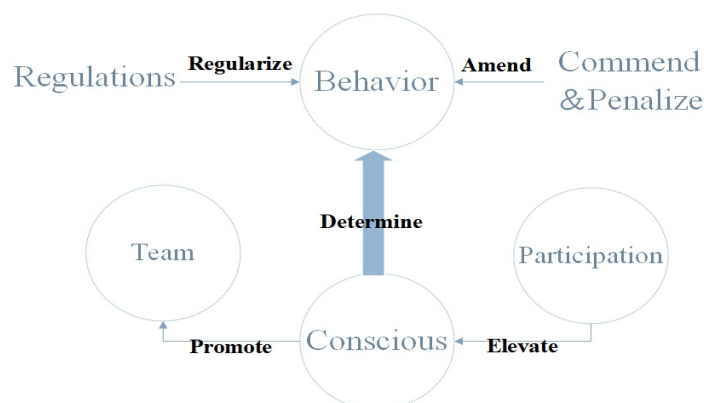


Figure 3. Application of security ideology

Rules and regulations directly determine human behavior, and only by establishing a complete system of rules and regulations can human behavior be fully standardized. As a nondestructive testing unit, our company has learned from domestic and foreign experience to build a perfect nondestructive testing field work procedures: inspection procedures, combined with work and internal and external practice at any time to upgrade the version, to ensure timeliness and accuracy; The standardized process guides the work, categorizes and unify the work process, and forms standardized operation methods covering the whole work process, including filling in the field standard record form, filling in the standard pre-work, post-work and shift activity record form, equipment preparation, working process and other standardized methods; Emergency plan and safety procedures, the possible risks and security risks are analyzed in advance and dealt with afterwards. Actions for correction at the same time, the implementation of fair, reasonable rewards and punishment system: for overhaul of the excellent team, outstanding individuals and part-time security officer of the assessment, and further into individual review monthly and annual appraisal, appraisal way by the project team

presented combined with joint recognition, pay attention to the recognition of all safety related right beneficial behavior; The daily work pays attention to the commendation of the improvement of safety culture, including the compilation and upgrading of safety regulations, safety skills competition, the compilation of safety culture-related articles and other multiple ways, emphasizing the commendation of the improvement of safety production culture.

Among current enterprises, Huawei's corporate culture is highly respected, especially its "Wolf culture". Ren Zhengfei once said that enterprise development is to develop a Wolf: keen sense of smell; An indomitable and desperate offensive spirit; The sense of group struggle. With the support of this corporate culture, today's mighty "China Empire" was created. Huawei's success model is difficult to replicate, but we can see the strong internal atmosphere to support the team: internal trust; Unimpeded communication; Mutual cooperation and solidarity; The whole team moves forward precisely towards the established goals. It is this team cohesion that makes them support and move forward, and this internal atmosphere of the team is also very powerful when it is projected into our safety production: Our company carries out the work mode of teamwork in the field overhaul project, and the assessment unit is refined to the project team, which implements the incentive mechanism of the project team and gives full play to the initiative of the team. "Have sprung up in recent overhaul, overhaul JNG T112 enlarge inspection weld knife team" and "overhaul party shock brigade" outstanding team, in one of the most difficult key positions in inner cut spine is: to reduce the high dose area operation time, conditions of inspectors to take the initiative to paste the weld mark, facilitate subsequent operations personnel to reduce search and check the time; Keep communicating with each testing method group to ensure smooth and orderly testing process; The operation strictly carries out the star self-inspection principle, accepts the quality bottom line, guarantees the quality and quantity to complete the work. A strong ideology casts a strong team, and a strong team casts a strong company. Safety ideology accelerates team construction, and a healthy and strong team strictly implements safety behaviors, and promotes the progress of team health and safety.

The updating of regulations, the justice of rewards and punishments and the construction of team atmosphere are inseparable from the participation of all employees. We have set up a complete experience feedback system to encourage good practice and experience feedback: promote good practice, experience feedback implementation to people, reward technical improvements, real-time update outdated procedures and systems. The management attaches great importance to grass-roots work. During the overhaul, they actively communicate with each project team on site, visit all the work sites of the project team, always pay attention to major risk operations, effectively improve their participation, and thus ensure the justice of rewards and punishments.

5. Conclusion

The definition of nuclear safety culture is the sum of the various characteristics and attitudes of the unit and the individual, and the unit and the individual build consistent safety habits. The formation of team safety ideology and the formation of the company's safety production atmosphere do not rely on a few empty words or various documents, but through multi-level and multi-faceted surrounding every employee of the company: rules and regulations guide employees' safety behavior; procedures and rules regulate employees' correctness Production operations; the reward and punishment system corrects deviations in employee behaviors, encourages safe behaviors, encourages the discovery and resolution of safety problems, and guarantees strict implementation of the rules and regulations during production; experience feedback system to consolidate experience and lessons, implement good practices, and improve all employees A sense of participation in safe production. The unity of knowledge and action, employees themselves establish the correct ideology and practice safe behavior; the company builds a solid safety behavior track, corrects employees' wrong behaviors, and leads the direction of correct behavior. The two are combined to build the overall safety ideology of the company and prevent human errors.

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