



COMPREHENSIVE RISK ANALYSIS AND PREVENTION AT RIO TINTO MINERALS

1. Case metadata

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2. Organisations involved

Rio Tinto Minerals Austria – Naintsch Mineralwerke GmbH

3. Description of the case

3.1. *Introduction*

Mining involves a large number of different activities. The activities related to mining can entail risks related to hazards or threats (downside risks) or possibilities and potentials (upside risks). The Rio Tinto Minerals Austria – Naintsch Mineralwerke GmbH wanted to manage all sources of risk proactively and effectively through competent risk management. Although workplaces are subject to a basic risk analysis under the workplace evaluation required by law, this does not necessarily examine non-routine activities or day-to-day activities not classified as hazardous *per se*.

3.2. *Aims*

Since all employees have the right to leave their workplace at the end of work in the same state of health in which they began work, all risks must be controlled and, where possible, eliminated. The comprehensive risk assessment system of the company was designed to cover *all* activities carried out within the enterprise as well as the associated potential risks. Therefore, the statutory risk prevention system was expanded to include the risk assessment tools which were developed both within and outside of the company. The variety of risk assessment tools was to enforce safe work, safe tools, as well as safe behaviour of workers.



3.3. *What was done, and how?*

The comprehensive risk assessment set up by the company was a continuous process, which was supported by a large number of tools. In addition to the work place evaluations required by law, the following tools for minimising risk were implemented and taught at Rio Tinto Minerals' Austrian Operations.

The "Qualitative Risk Analysis of Activities"

The "Qualitative Risk Analysis of Activities" was made use of for routine activities. At first all employees were grouped into so-called "Similar Exposure Groups" (SEGs). Then routine activities were listed for every SEG and the associated risks were recorded and evaluated for probability and consequences. The five-point scales were used for both kinds of evaluations by the work groups. With the help of a matrix the risk could be determined (low risk, medium risk, high risk, and critical risk). If the total risk was greater than 3, measures had to be defined. At least once a year, and whenever there were technical or organisational changes (which were entered into the "Change Management" module of the Safety, Environmental Protection and Health database), the work team in charge had to adjust the risk analyses to the current conditions. The "Change Management" module could be found in the database. It had to be filled in and ensured that no relevant information regarding safety, health and environmental issues were forgotten.

The "SAFER" Risk Analysis

The "SAFER" Risk Analysis was made use of with regard to non-routine activities. The risk analysis tool "SAFER" was designed and introduced, since changes and non-routine activities posed a potential hazard risk. Before starting non-routine activities, the employees had to complete the "SAFER" working document. It is a checklist in brochure form, which gives a precise guide to risk analysis. Therefore, changes to equipment, instructions, processes, the environment and personnel were identified, analysed and assessed for risks. In particular, the employees should think about the following:

- if safety information exists,
- whether they are using the right tool, the right equipment, the right personal protective equipment (PPE),
- whether they have the adequate amount of time,
- whether the working environment is secure, and whether special work instructions must be observed;
- whether they have the relevant work permit and whether the access is secure and there is a lock-out system securing of hazardous potential energy sources against unauthorised operation on site.

Moreover, the workplace was evaluated for hazards such as banging and / or jamming one's body at / between objects, falls, extreme temperatures, risks associated with electrical power, exposure to dangerous substances, overstrain / repetitive movements, difficult positions / static positions, risks from others, inadequate light, movement of vehicles, weather, noise, and vibration.

The safety relevant information had to be communicated to all persons potentially affected. In addition, in order to ensure that third-party firms also work safely, this risk analysis tool was used to analyse their work before the activity began. Thus, the "SICHER" Risk Analysis jointly had to be carried out by the responsible persons and workers of the external company and the external employees might not begin work until the situation had been declared safe.

CASE STUDIES

The “Take 5” Risk Analysis

The “Take 5” Risk Analysis was made use of with regard to personal risk assessment. The “Take 5 – 5 Steps to Safety” is a thought process and a system for self-appraisal. Before beginning each activity all employees were required to think through the task, so that they had a clear plan. Subsequently, they should look for risks by asking them how and where the work would be done. In order to assess the risk, they should think about what could happen, if the situation would get out of control. If they find potential risks associated with their activity, they were asked to take precautionary measures. Obstacles to safety should be cleared away. Last but not least, they were asked to carry out the work safely, watching out for changing conditions and risks.

Figure 1: Poster Stopp



Source: Rio Tinto Minerals Austria

This tool was a campaign to raise awareness among the employees. It was taught through PowerPoint presentations, brochures, posters, and reminder cards. Thereby, it was made clear that no work is so important or urgent that time cannot be taken to carry it out safely. The active implementation of “Take 5” was reviewed as part of the database-supported safety appraisals carried out by each employee several times a year. When carrying out the “Take 5” Risk Analysis, the probability of a risk is assessed by using a five-point scale. Thereby, risks are evaluated as rare, improbable, possible, probable, and almost certain. The consequences are also assessed on a five-point scale. Thereby, the consequences are interpreted as rare, medium, serious, considerable, and catastrophic.

CASE STUDIES

Figure 2: Work group filling in Take 5 to identify personal risks



Source: Rio Tinto Minerals Austria

The “Semi-Quantitative Risk Analysis “SQRA””

The “Semi-Quantitative Risk Analysis “SQRA”” was made for risks with catastrophic effects. These effects include events that end in fatality or have critical consequences. “SQRA” was conducted as a workshop involving employees who were familiar with the specific risks. The team was led by a moderator, who was trained in the “SQRA” process. Typical “SQRA” teams comprised production personnel, mechanics, electricians, and foremen. First of all, the risks were recorded in a “bow tie” diagram. The diagram consisted of pre events and the initiating event. The steps to fatality after the initiating event were broken down and probabilities were assigned to these steps. Then the probability of occurrence was calculated and the risk was assessed in a risk matrix. Subsequently, control measures were defined, the effectiveness of existing control measures was assessed and additional measures were defined where necessary. The assessment was held in the “Critical Risk Register” of a Rio Tinto Minerals - wide database. The scenarios with potentially catastrophic effects and the relevant preventive / crisis management measures formed part of the company’s crisis management process.

The Incident Analysis “TapRoot”

All reported incidents including hazardous activities and situations had to be investigated and analysed and were entered into an internal database which was used across the group for this purpose. The tool “TapRoot” was used for incidents with increased potential risk and for accidents. A superior who was in charge of the activity or the area in which the accident / incident had taken place, carried out the investigation together with all those who were responsible and involved. First of all, the team listed the actions that had led to the accident, stating accompanying circumstances (e.g.



required training, evaluations, risk analyses, failures etc.) for each. Then the causal factor of the accident was defined, the causes of the causal factor were sought and corrective measures were suggested. The completed analyses were published on the intranet of the Group. All companies were requested to communicate accidents that could also occur within their own operations and to take countermeasures. Rio Tinto Minerals Austria disseminated this information in so-called “Accident Newsletters”.

3.4. *What was achieved?*

- The “Comprehensive Risk Analysis” can be regarded as a risk assessment concept that allows for different reactions to various problems.
- The accident figures of Rio Tinto Minerals Naintsch speak for themselves. At the end of July 2008, the lost time injury rate (lost time injury rate = (accident x 200,000)/man hours) for the entire enterprise has stood at zero for over four years. The underground mine in Kleinfeldstritz has even been accident-free for seven years and the Weisskirchen Mill had been accident-free for nine years until the second half of 2008 also taking into account the accidents caused by outside companies.
- The “Take 5” and “SAFER” tools went far beyond the evaluation required by law, as the employees were called upon to keep in mind the specific hazards of the activity they were engaged in at all times. Making employees risk-aware means that they identified personally with the “zero accidents” target. The tool “SQRA” for serious risks and the use of “TapRoot” which was also used for near-misses with a high potential for an accident ensure that potentially serious hazards were identified and removed. By involving all responsible employees, risk-awareness was also taught.
- The measures described an increase in risk-awareness amongst employees which was displayed by low numbers of unsafe and high number of safe acts during observations as well as a decrease in accidents.
- On average, every work-related accident costs EUR 400 a day. Accidents with catastrophic effects kill people and destroy property. Diseases related to work are difficult to define in terms of cost, but the cost burden on society is high. Avoiding accidents, diseases and damage to property as far as possible reinforces the economic strength both of the company, and of society.

3.5. *Success factors*

One success factor of the “Comprehensive Risk Analysis” was certainly the fact that the comprehensive risk analysis programme was part of the Sustainable Safety Culture (SSC). With the concept of the SSC people working for the company were trained to consider safety as a personal value. An essential point here was the strong commitment of the entire management which made it possible to live your values on a daily basis. Another important factor was the integration of third-party firms into the risk assessment concept.

3.6. *Further information*

Ms Sonja Kainz

Rio Tinto Minerals Austria – Naintsch Mineralwerke GmbH

Andritzer Reichsstraße 26

8045 Graz

Tel: +43-316693650-1184



Fax: +43-316693655

E-Mail: sonja.kainz@riotinto.com

Web: <http://www.riotinto.com>

3.7. *Transferability*

The “Comprehensive Risk Analysis” for minimising risks can easily be transferred to all firms which are ready to go beyond the minimum requirements set in the legislation and examine in a thorough way non-routine activities or day-to-day activities not considered as hazardous per se. The concept is suitable for use in businesses of any size, can be applied internationally and on a modular basis.

4. References, resources:

Information provided by the company/organisation in the framework of the Good Practice Award Competition 2008/2009.