

Turvallisuus- ja kemikaalivirasto (Tukes)

Tihinen Taimo | 9.10.2014

Senior Adviser



Finnish Safety and Chemicals Agency (Tukes)

SIGNIFICANT MINING INCIDENTS IN FINLAND

tukes

www.tukes.fi

Finnish Safety and Chemicals Agency (Tukes)

- Tukes is a Supervisory Authority, we are working under the Ministry of Employment and the Economy (TEM)
- Resources: more than 200 personnel in Tukes
- Tukes is the mining surveillance and permit consideration authority, nearly 20 persons in that group and Mining safety in Tukes demands 1 -2 persons work input
- Tukes maintains and promotes:
 - technical safety culture and reliability in order to protect people, property and the environment.
- Our tasks are divided into:
 - surveillance of the products on the market and the supervision of in-service plants, installations and technical services.
- Branches: Chemicals, Fireworks and Explosives, Electricity and lifts, Pressure equipment, Rescue service equipment, Construction products, Articles of precious metals, Measuring, Mines and Others



Turvallisuus- ja kemikaalivirasto

Mine supervision

- Nearly **fifty mines and quarries active** in Finland pursuant to **mining legislation**.
- In addition to **general safety**, mining safety also involves supervision of **hoisting installations** at Mines.
Tukes furthermore ensures that the **ore is extracted as efficiently as possible**.
All active mines are **inspected annually**.
- Tukes also supervises the using and storing of **dangerous chemicals (including explosives)**, Finland has implemented **the Seveso II Directive**.
- **Tukes supervises :**
 - **technical systems** and
 - the requirements of a **safety management system (SMS)**.
- Among others the following sides collaborate with Tukes in Mine Supervision:
 - The Ministry of Social Affairs and Health (safety at work, using of explosives, environmental permits),
 - The Ministry of the Environment (environmental evaluation, pads),
 - The Ministry of the Interior (Rescue Services, Policing)
 - Geological Survey of Finland (GTK) (works under the Ministry of Employment and the Economy).
 - STUK - Radiation and Nuclear Safety Authority (works under The Ministry of Social Affairs and Health)

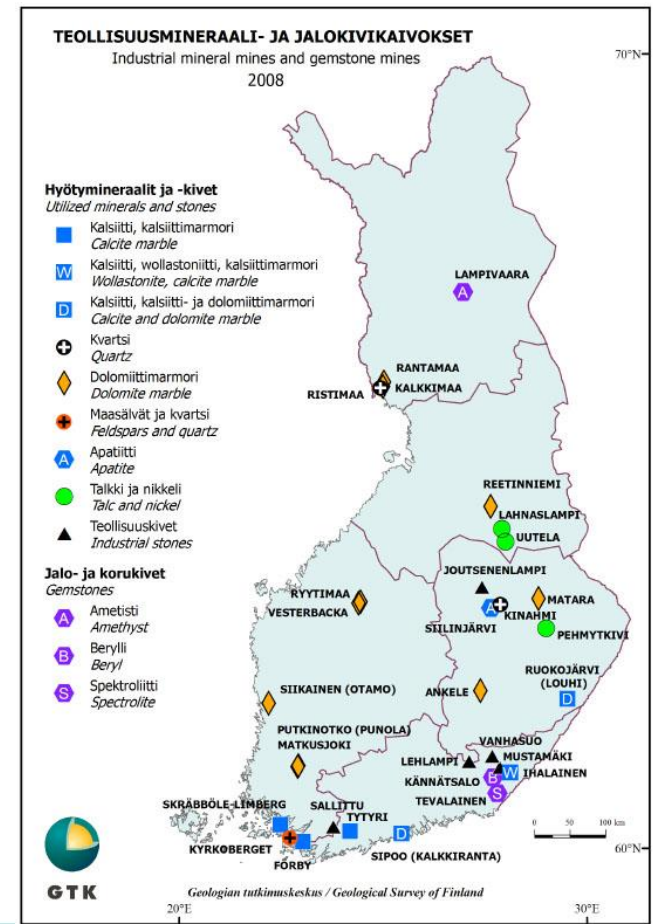
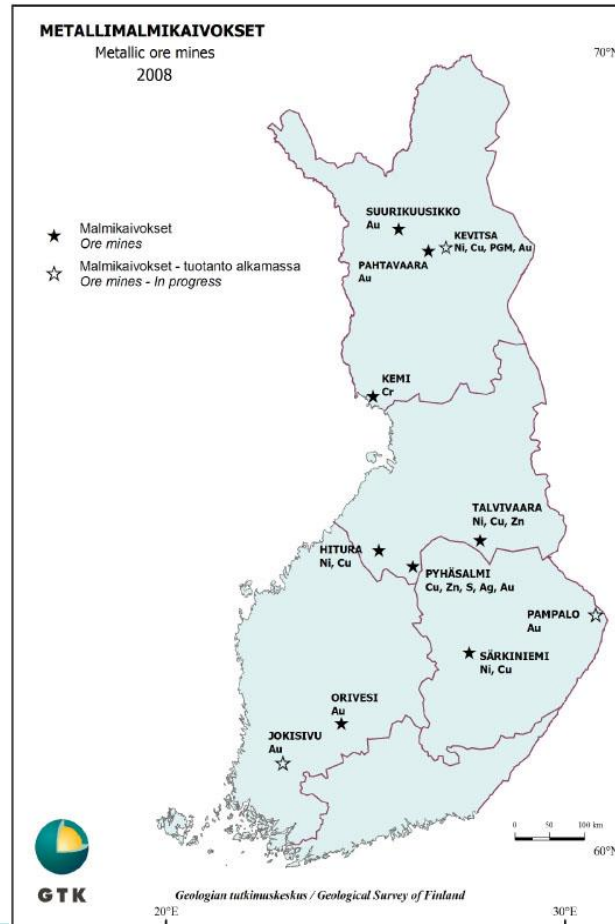
Finland`s Metallic Ore Mines and Industrial Mineral (like limestone) and Gemstone Mines

About 50 active
Mines
In Finland

Metallic ore Mines

Industrial mineral
Mines and

Gemstone mines



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9.10.2014 | MEETING OF EUROPEAN HEADS OF STATE MINING AUTHORITIES, DUBLIN, IRELAND, Tihinen Taino

50 operating Mines in Finland, both underground mines and open pit mines 1/2

GOLD MINES: 6, total mining of ore 3,8 Mt including companies from Sweden, Canada and Australia

Cu-Ni MINES: 2, total mining of ore 4 Mt including companies from Canada

Zn-Cu-Ni MINES: 3, total mining of ore 10,5 Mt including companies from Canada, Australia and Finland (Talvivaara, 8,7 Mt ore/a)

Cr-Mines: 1, total mining of ore 1,25 Mt

50 operating Mines in Finland... 2/2

LIMESTONE MINES: 18, total mining of ore 3,7 Mt including 4 companies from Finland, mainly Nordkalk Oy

PHOSPHATE MINE: 1, total mining of ore 10 Mt, Yara, Norway

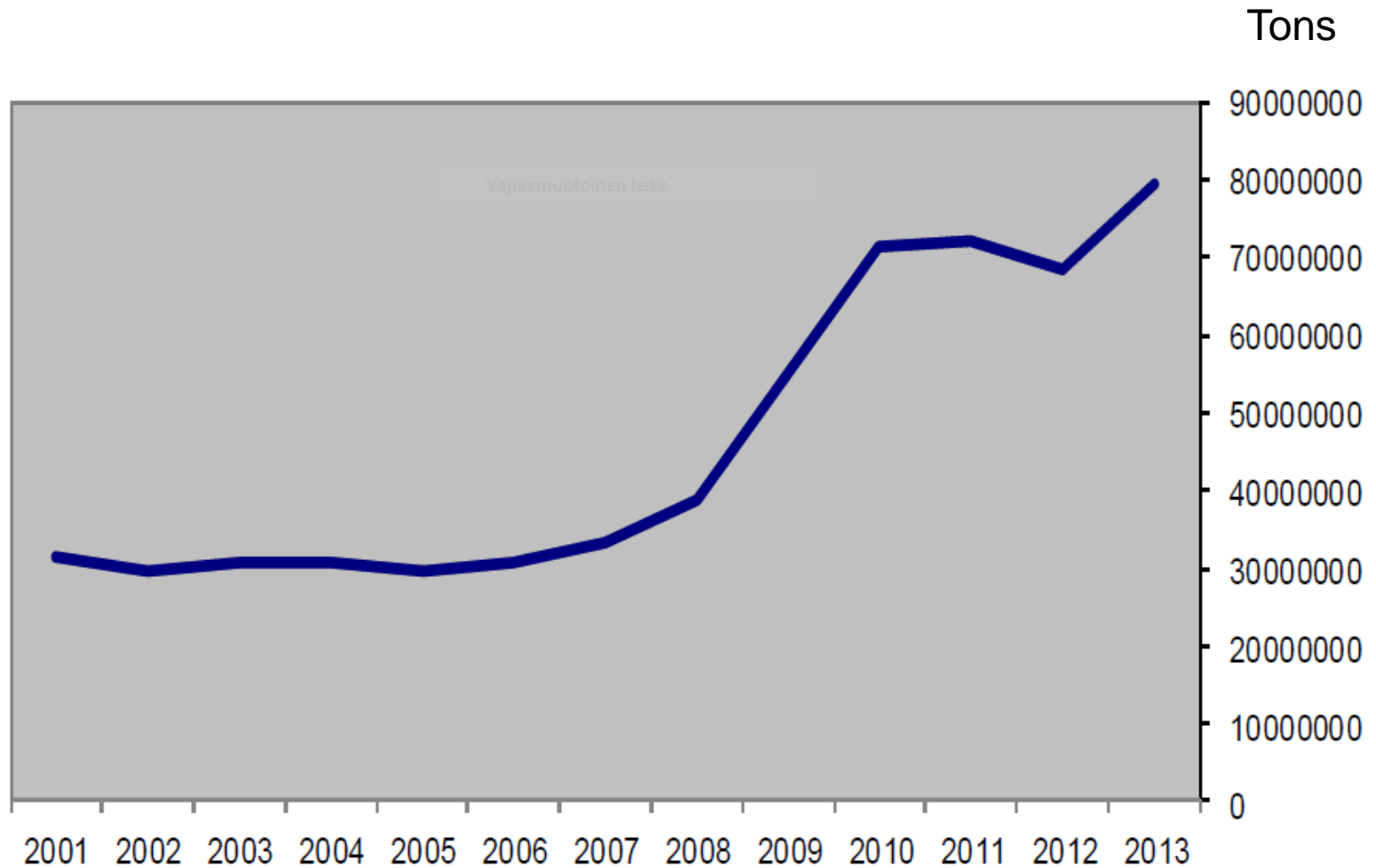
TALC MINES: 4, total mining of ore 1 Mt, Netherlands

SOAPSTONE MINES; 6, total mining of ore 0,12 Mt, 10 very small mines of quartz, aluminium, feldspar and amethyst, companies from Finland

Mine Legislation

- THE MINING ACT (621/2011, also available in English www.tukes.fi)
- As the Mining act **decrees** the safety rules for mines
 - Mine Decree (392/2012),
 - The Decree (1571/2011) on mining safety,
 - The Decree (1455/2011) on the Hoisting Installations at Mines
- **Targets for the Mining Act are** *To ensure with modern legislation the preconditions for exploration and mining in a **socially, economically and ecologically sustainable** manner*
- There has to be a **balance between different interests** in society, concerning
 - good operational business environment for exploration and mining companies
 - constitutional rights of various other stakeholders as well as private citizens
 - rights of private land and property owners
 - to secure the influence of local communities
 - to take into account **environmental protection** and competing land use issues

Quarrying/Mining in total



Tukes maintains VARO-database

- Tukes collects information and also investigates accidents that occur in the sectors, which are under its supervision
- The information is inserted into the VARO-database
- The aim is to collect information concerning accidents for surveillance, training and communications
- With statistical information Tukes is able to keep track of the current status and the developments of safety.
- The statistics are also utilized in planning, actions and follow-up on the effectiveness of Tukes activities

Accident database VARO includes

1972

Mining accidents

1978

Accidents related to manufacturing, processing and storage of hazardous chemicals, pressure equipment and explosives

1980

Fatal electrical accidents

1996

All electrical accidents that are reported to Tukes
Elevator accidents

2006

Fatal electrical fires

2014

Database includes ca. 6000 cases, annual increase ca. 300.

Accidents

in sectors supervised by Tukes

Accident group	2009	2010	2011	2012*	2013*
Hazardous chemicals, sites supervised by Tukes	30	19	29	37	17
Hazardous chemicals, other sites	99	82	69	58	59
Liquefied petroleum gas (LPG)	18	14	9	18	18
Natural gas	-	3	-	-	1
Explosives	1	-	2	1	-
Fire works, self-made explosives	57	56	32	21	17
Pressure equipment	7	9	5	9	6
Aerosols	-	-	-	-	-
Fatal electrical fires	22	21	15	11	11
Electrical accidents	72	83	89	102	98
Elevators	4	5	6	9	9
Mining (occupational accidents)	17	27	22	42	32
Other mining accidents	2	1	7	5	2
Transportation of hazardous substances	3	8	9	4	8
Total	332	328	294	317	273

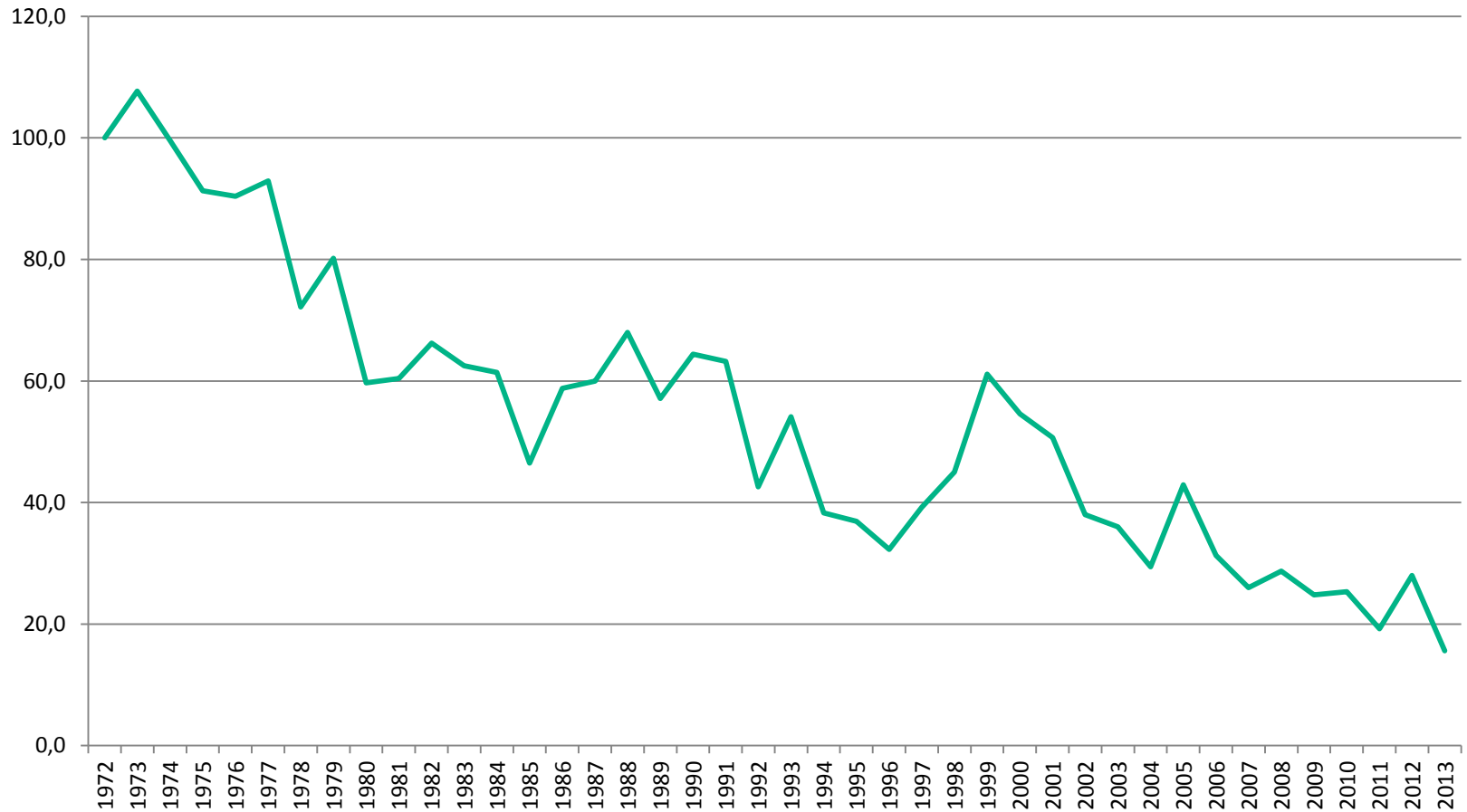
Mining accidents published in VARO

Accident information from 2005 to 2014

- 78* accident and near-miss case descriptions
 - 30 fires (of which many electricity- or sulphur-related)
 - 5 gas leakages + 4 liquid leakages
 - 2 explosions of explosives
 - 8 other accidents
- 8 summaries of annual injuries (days away from work)
 - 29 individual cases also described

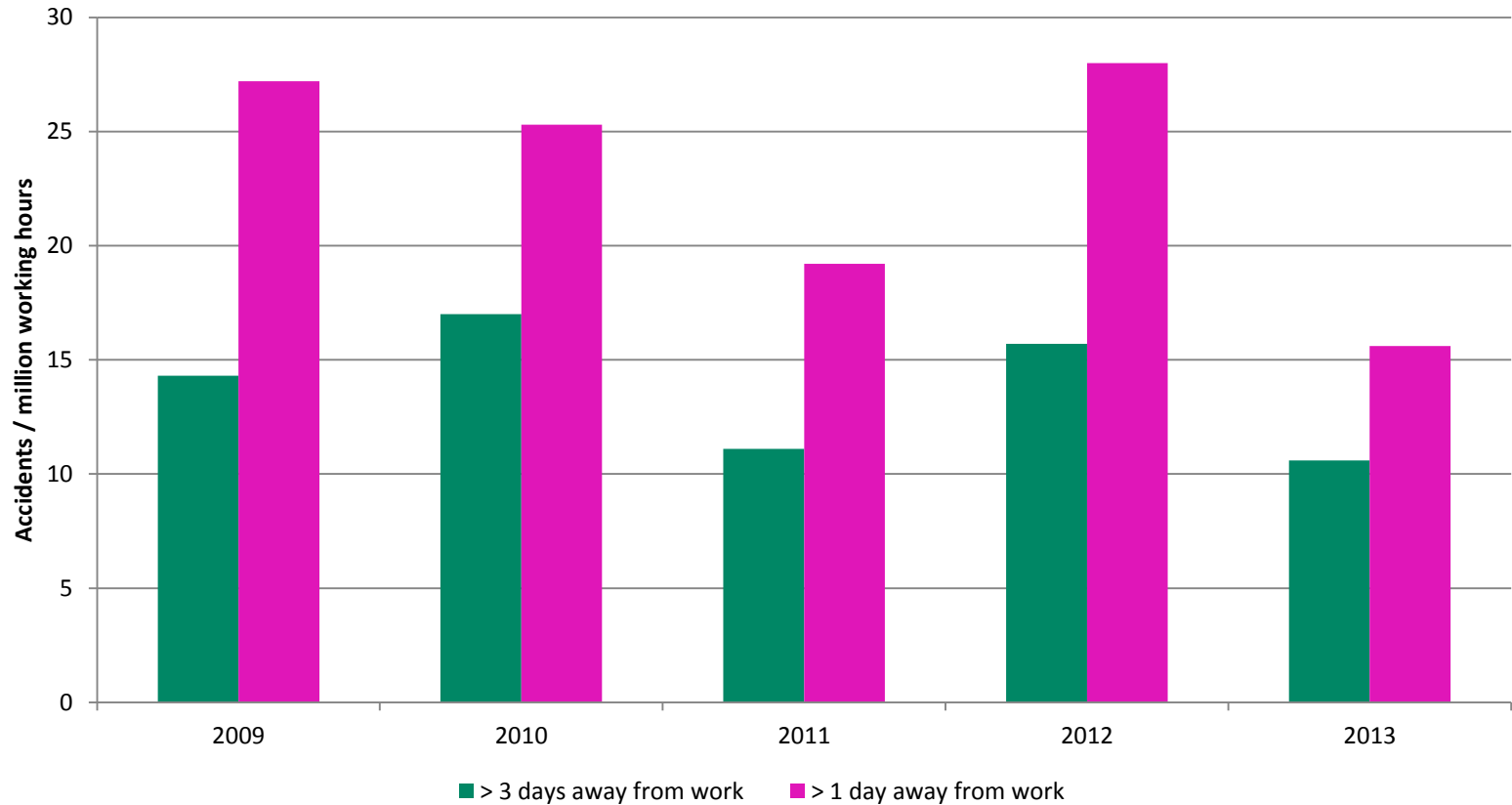
* Some cases may have been classified into several categories, only main category indicated here.

Accident frequency: mining accidents that resulted in more than one day away from work 1972 - 2013 (number of accidents per million working hours)



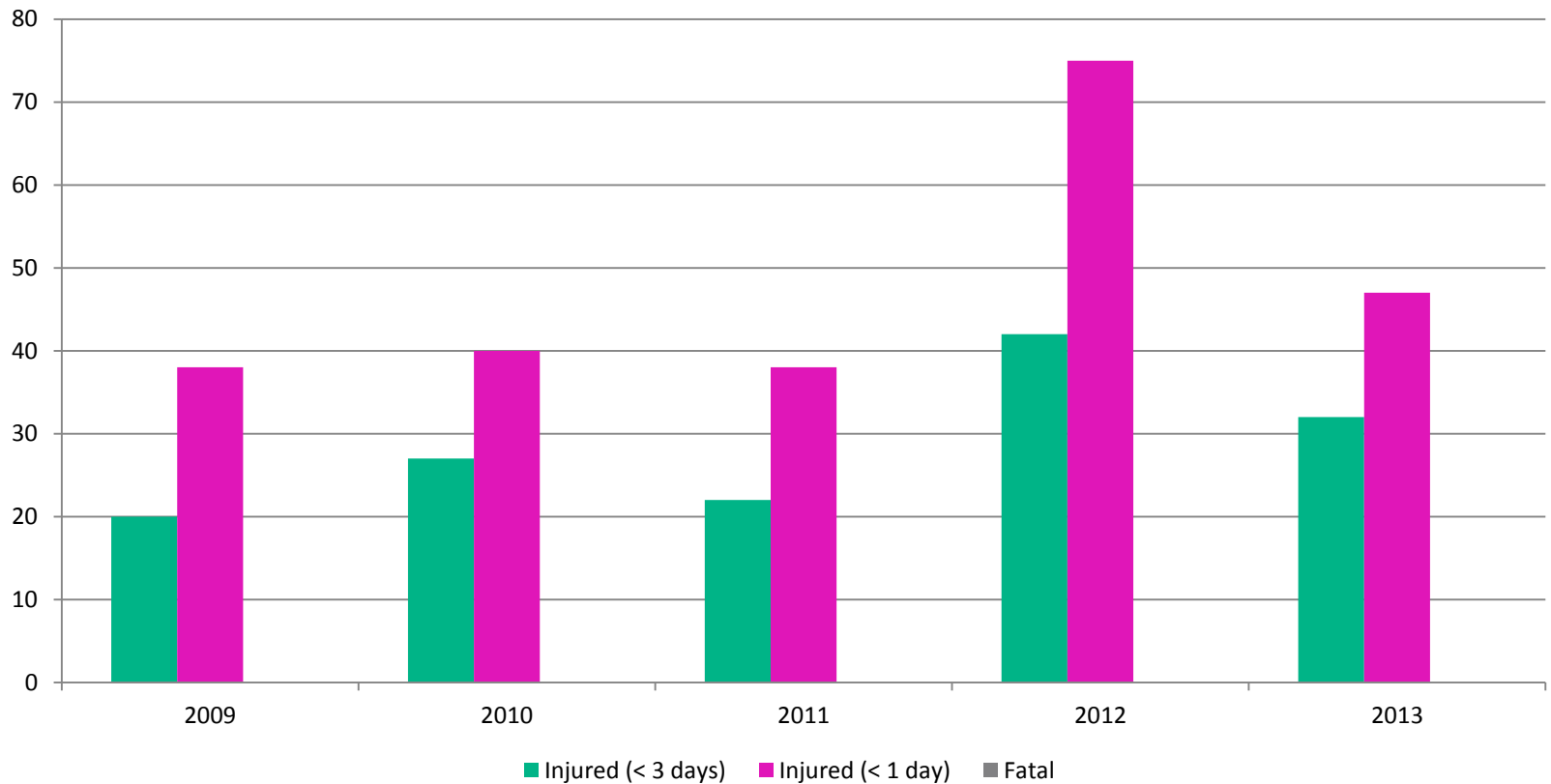
Mining accident frequency

according to seriousness



Number of mining accidents

according to seriousness



INCIDENTS AND NEAR-MISSES...

- The last deadly accident happened in 2003, when a mine vehicle dropped and slid into a mine
- A serious accident happened in 2005, when a stone struck a man after explosion, when three men went to the area without cleaning the tunnel roof
- Most small accidents happen because people slip, get a cut with knives and so on
- There have been very many dramatic near-misses, where men could have died; I`ll tell a bit about them later as risks

GENERAL RISK AREAS IN MINING

- 1. TRAFFIC: COLLISIONS, MACHINE FALL
- 2. ROCK FALL
- 3. FIRES
- 4. EXPLOSIVES HANDLING
- 5. TRANSPORTATION AND USE OF CHEMICALS
- 6. DAM LEAKS
- 7. GASES AND DUSTS
- 8. COMMUNICATION
- 9. COMPETENCE, TRAINING
- 10. ELECTRICITY



THE MINE AREA IS
CHANGING
CONTINUALLY

ROCK OR STONE FALL

- GEOLOGICAL STABILITY OF THE ROCK
- LOOSE STONES
- WALL SLOPES
- EXPLOSIONS
- WATER FLOW
- DIFFERENT CHARACTER
- ROCK CONTACT



TRAFFIC: ACCIDENTS AND NEAR MISSES, COLLISIONS, **STONE TRANSPORTING DUMPER TRUCK FALLS FROM BANK...**

- RIDGE OF OPEN PIT OR EDGE OF ROAD SLOPE HAVE GIVEN AWAY UNDER MINE VEHICLES
- OVERSPEED
- DEFECTIVE CONDITION OF ROAD
- DEFECTIVE CONDITION OF VEHICLE
- INADEQUATE: WORK INSTRUCTIONS, SUPERVISION, DRIVER EXPERIENCE, MARKING OF WORKING AREA, SAFETY BANK



FIRES

- FIRES IN MINES ARE ALWAYS DRAMATIC
- SMOKE HINDERS EXITING THE MINE
- YOU SHOULD BECOME AWARE OF EVERY POSSIBLE SOURCE OF FIRE



ENVIRONMENTAL ACCIDENT AT THE TALVIVAARA MINE IN NOVEMBER 2012

- A leak in gypsum pond No. 1 was noticed on 4 November 2012. At the time of the incident, the pond contained a total of some five million m³ of water with metal content and gypsum sediment.
- As a consequence of the accident, approximately 1.2 million m³ of environmentally hazardous water bearing metal content and sediment leaked out of the pond, around 240,000 m³ of which ended up outside the mine area.
- The causes of the accident are the structure used in the gypsum pond and the use of the pond as water storage contrary to its proper purpose of use.
- The Finnish Safety Investigation Authority's accident investigation report (with English and Swedish summary)
<http://turvallisuustutkinta.fi/en/index/tutkintaselostukset/muutonnettomuudet/tutkintaselostuksetvuosittain/muutonnettomuudet2012/y2012-03ymparistoonnettomuustalvivaarassamarraskuussa2012tutkintaonkesken.html>

MINES ARE CHANGING CONTINUALLY, WHICH CAUSES POSSIBILITIES FOR INCIDENTS



TO MINE OR NOT TO MINE, IS IT AN ENVIRONMENTAL INCIDENT TO MINE IN PROTECTED AREAS?

THE MINING ALWAYS POLLUTES AND RUINS THE SURROUNDINGS LIKE
WATERS, FORESTS AND WILDERNESS, SAFETY BEGINS FROM PLANNING!

ONE EXAMPLE!

LARGE GYPSUM RESIDUE
SPILLOVER DUE TO E.G. HEAVY
RAIN PERIOD AND WRONG
WATER BALANCE AND SPOILED
THE NEAR NATURE

TOURISM
URANIUM
REINDEER OWNERS
LAKES AND RIVERS



WHAT DO WE MEAN WITH MINE SAFETY ?

YOU MUST KNOW YOUR **INCIDENT HISTORY**
- BUT YOUR PLANNING AND OPERATION
MUST BE IN **MODERN** SOCIETY!

WHAT ARE YOUR VALUES?

WHAT BENEFITS DO YOU WANT?

**MINE SAFETY MEANS TO KNOW ALL KIND
OF RISKS, TO KEEP THEM AT ACCEPTABLE
LEVELS, TO UNDERSTAND WHAT TO DO!
YOU CAN PREVENT AND CONTROL ONLY
THOSE RISKS WHICH YOU HAVE
RECOGNIZED.**

**THE MAIN OBSERVATION IS IN THE STRUCTURAL
AND TECHNICAL SAFETY OF THE MINE**

**ACCIDENT PREVENTION POLICY MUST BE
DOCUMENTED**

- **PLANNED INFLUENCE ON BETTER SAFETY**
- **COMPREHENSIVE SOLUTION**
- **INTEREST GROUPS**
- **NETWORKING**
- **OUTSOURCING, SUBCONTRACTOR**



The mining operator is obliged to ensure mining safety.

The operator shall pay particular attention to the structural and technical safety of the mine and to prevention of dangerous situations and accidents in the mine, alongside limitation of detrimental consequences caused by them.

Thank you for your attention!

More information www.tukes.fi

WELCOME TO HELSINKI IN FINLAND 2015!

