Introduction to Safety and Environmental protection
Outokumpu Tornio plant
2017
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Safety training

• Length 1.15 – 1.30 hours
• Includes an exam
• Training is compulsory to get a personal access pass to the Tornio plant area
• Training is valid for three years
• From ore to steel film or this
Outokumpu
Tornio site
Companies that have major accident prevention policies

• Five companies at Tornio plant area are obliged to prepare major accident prevention policy document:
  o Outokumpu Stainless Oy
  o Outokumpu Chrome Oy
  o Neste Oil Oy
  o Tornion Voima
  o AGA Oy

• In these companies dangerous substances are used or stored in large quantities
2. Safety first!
SAFETY STARTS WITH YOU!

Safety first - everyone, every time, everywhere

- Safety takes priority over all other activities. We are all responsible for our own safety, but also for the safety of our colleagues. We strongly believe that all injuries can be prevented.

"Take 2" – card; Short risk assessment before starting the work.

Work safety e.g. permits, adequate personal protective equipment, cleanliness and order
Safety first!

Outokumpu Tornio Safety Policy:
• Our target is **0 accidents**
• We believe that all accidents can be prevented
• We evaluate our operations and risks continuously and improve our performance to ensure and improve safety
• We require that our key suppliers and resident contractors comply with this policy.
• => All accidents and near-miss cases are investigated

• Our operations require permit from authorities. Authorities such as Finnish Safety and Chemicals Agency (TUKES), Regional state administrative agency (AVI) and Fire protection authorities audit us regularly.
3. Responsibilities
Responsibilities – Outokumpu/contractor (service provider)

Outokumpu:

- Is responsible for its own operations’ risk factors, their removal and limitation, and the instructions related to them.
- Is obligated to provide the service provider adequate information about safety aspects and requirements, as well as the risks caused to other parties by the Outokumpu’s own activities.

Contractor (service provider):

- Must obey Outokumpu’s safety instructions when moving or working in Outokumpu plant area.
- Is responsible for managing the work it is given and supervising its employees on the work site, unless otherwise agreed in written form.
Responsibilities of employees

• The employee must complete the work professionally following the given guidelines and regulations.

• The employee must keep their working environment clean and in good order every day.

• An employee may not change, on their own initiative, an approved plan of work or an accepted work permit.

• The employee's responsibility is to report any changes related to the work to the acting supervisors prior to the start of work or as soon as a change is detected. This includes changes in the work plan, the work or method of work, detecting a hazard, inadequacy or failure of a protection or other safety measure, and / or changes in the end result of the work compared to the planned result.
Responsibilities of supervisors

- Giving instructions, guidance and induction to their employees
- Supervision of employees
- Monitoring the working conditions, machines, tools and working methods
- Planning and coordinating of works
4. Access control and traffic
Access control

- Tornio plant area is fenced and it is electronically controlled: access control system and recording camera surveillance
- Access to the area is allowed only by personal access pass or visitor notice (separate form)
- It’s allowed for the area access control personnel to check belongings and vehicles’ loads
- Car parks are located outside Tornio plant area. To be able to enter the area by car requires an application for a special driving permit
  - Remember that that crossroads in the parking area are equal
Passenger traffic at Tornio plant

• There is a lot of heavy traffic at Tornio plant area. Use designated routes for pedestrians and cyclists when possible.

• When moving in and out from buildings use personnel doors instead of upward acting doors whenever possible.

• When walking in stairs pay attention to the slipperiness and how to carry load – hold the rails at least with one hand. Be careful especially at upper and lower end of the stairs.

• Pay attention to the hazards of the crossings: limited visibility and other traffic.
Vehicle traffic at Tornio plant

- Standard traffic regulations are complied at Tornio plant
- Only driver may enter Tornio plant area in a vehicle, all passengers must use a personnel gate.
- Passenger cars and vans enter the area using main gate (P01)
- Heavy traffic uses special gate for transport
- Driver is responsible for loading and safe transport of the load
- Driver must have a license for the vehicle he/she operates
- Driver is responsible for vehicle being in service. All work vehicles must use alarm light when moving or operating.
- Outokumpu forklifts are allowed to be used only by trained personnel who have a written permit
- Private motor vehicles (mopeds, scooters and motorcycles etc.) are not allowed to enter the plant area (exceptions are made during winter times on a special permit)
Vehicle traffic at Tornio plant

- General speed limit on the area (incl. parking places) is **30 km/h**
  - Other limits are shown using traffic signs
  - => Be extra careful!

- Area access control personnel monitor vehicles’ speed at the area regularly

- Restricted routes
  - If the height of vehicle is over 4,7 m
  - Temporary road blocks
Trains and cars

- Automatically operated trains and cars are used for transportation of coils and molten metal/slag. Also recycled steel is transported to the area using railroads.

- Trains and cars have right of way and their routes must be kept clear from objects and machines.

- Only trained personnel are allowed to operate the trains and cars.
5. Restrictions
Alcohol and narcotic substances

It is strictly **forbidden** to use alcohol or other narcotic substances or be under their influence at the workplace!

- **(0,00) Zero tolerance** at Tornio plant for alcohol and narcotic substances
  - Regular breath analyse tests
- In case of a traffic accident or workplace incident involving vehicle or machine at the plant
  - => Driver or operator will always be breath analysed with alcometer
Other restrictions

- **Smoking** is allowed only in marked places. This applies also for electrical cigarettes.
- **It is forbidden to bring own gas bottles** to Tornio plant. If special gases/bottles are needed, it must be informed before entering Tornio plant.
- **All radio phones need a permission.** If a permit-free, PMR-type radio phone, is used all users must always communicate their whole name and company name when using the phone.

**It is also to forbidden to:**

- Use knives, always use proper tools
- Use a radio hearing protection/ear plugs during working time (for listening to music etc.)
- Harass or bully
IT security

• Taking photographs or videos without authorization is prohibited. Permit can be applied from Communications department.

• Permission to connect computers to local network is required. For contractors and service providers it may be necessary to check their computer by Outokumpu Service Desk. Installing own software is forbidden. Connecting a USB stick is forbidden unless it is checked for viruses.

• Suppliers and other people in the industrial area are not allowed to disclose information related to the production process, economy or other confidential matter to third parties.
Acting against instructions

• Everyone is responsible to interfere to action that violates safety instructions

• The penalty depends on how severe, intentional and repetitive the violation is:
  o Notification
  o Written reminder
  o Written warning
  o Notice to remove a person from site if a person receives a second warning within 12 months or the violation is very serious

• Actions are always case-specific

• Actions are applied for Outokumpu personnel and contractor personnel
6. Safety at work
Personal protective equipment  

PPE’s

• Required PPE’s in all Tornio departments:
  o **Protective clothing** (anti-flame material)
  o **Safety shoes** (with penetration-resistant sole)
  o **Safety helmet, hearing protection and safety glasses** (not integrated to helmet)

• In addition special protection required by work
  o Safety goggles must be used at works with high risk of eye injuries, for example when using angle grinder or pneumatic drill
  o In areas where chemical are handled must wear a visor in addition

• There may be other extra requirements by departments depending the tasks and areas

• Due to the dust, it’s recommended to use eye protection all the time in the Tornio plant area

outokumpu
Check-in procedures

- Check-in procedures are applied for everyone who comes to the department/production unit; contractors and Outokumpu personnel from other units.

- Before going to the workplace in production unit:
  - Apply for work permit if it is needed
  - Check-in at the control room of the area
    - Use diary or notice board
    - When work is finished and when leaving the work place don’t forget to check-out at a control room and remove your information from the notice board.

- There are several fenced automated areas at the Tornio plant. Working in those areas when automation is on, is forbidden. Opening the gate to the automated area does not replace standard safety isolation procedures.

- If you are a visitor, check department’s visitor guidance!
Work permit

- **Written permit is required:**
  - 1. When work in production unit is supervised by a contractor
  - 2. Hot work, hot work on roofs
  - 3. Work in confined spaces e.g. containers or pipes
  - 4. When work is done in danger zone of crane or near electrical cables of crane
  - 5. Work related in chemical and gas pipes
  - 6. Work in EX-rooms
  - 7. Excavations at Tornio plant
  - 8. Work in automated lines
  - 9. Neutralization/Regeneration area
  - 10. CRM SZ – mill CO2 – danger zone
  - 11. All roof works
  - 12. Other hazardous works specified by the Outokumpu personnel (the process of testing circumstances, the introduction of new machinery, require lifting work and so.).

Safety at work

All duties need permit!
Either verbal or written!
At Tornio plant all hot works are done according to Outokumpu manual for hot work, This requirement also applies to contractors.

- **Safety procedures:**
  - Written hot work permit and valid hot work card (only in temporary hot work places)
  - Adequate first-aid extinguishing equipment (never borrow extinguishers from marked places)
  - Non-flammable protective clothing and tools
  - Inflammable material must be removed and combustible structures protected. Prevent sparks spreading to adjacent space
  - Protect conveyors and cables
  - At least two hours post hot work guarding
Work on the roofs

- On the roofs of production units (Ferrochromium plant, Steel melting shop, Hot rolling mill and Cold rolling mill) can occur hazards due to:
  - Outlet of gases (carbon monoxide, liquified petroleum gas and chemicals)
  - Radiation (Hot rolling mill, area is marked on the roof)
  - Falling

- Work on the roof requires a written work permit
Prevention of unexpected energization or start-up of machines (KA3 film)

Before entering the danger zone:

1. Check-in at the control room. Identify all possible hazards of unexpected start-ups or energizations
2. Make safety isolation when you have a permit to do so
   - Electric energy
   - Flowing substances (chemicals and gases)
   - Hydraulics and pneumatics
   - Mechanical energy
3. Verification (trial start)
   - Pay attention other machines and equipments at the area
4. Lock-out and tag-out
5. Check from the supervisor that it is safe to start the work

Follow the procedure also after brakes!
Don’t assume that someone has taken care of lot-to (lock out – tag out)!
Lock-out tag-out procedures

• Always lock safety switches and valves with individual locks or borrow locks from the control room of the area.
• Use tags.
• Remember to return borrowed locks to control room.
Isolation of working area and working on top of the other

- Use barrier tape or bars to isolate the working area if work can cause danger to others: e.g. liftings, working in personnel lift, working in pipeline, constructing scaffolds.

- It is forbidden to work on top of the other. Always plan works so that there are no simultaneous tasks going on where employees are working on top of the other (possibility to get injured by falling objects).

- Traffick blocking in outdoor areas must be notified to area access control center.
Liftings and cranes

- Operating cranes requires a special training and permit.
- Use approved lifting accessories designed for that lift.
- Use loading tables when selecting the right lifting accessory.
- Always check visually lifting accessories.
- Ensure that load is in balance and that is properly fastened.
- **Going under the load is strictly forbidden**.
- Don’t leave the load hanging.
- Use rope or other aid to help to move the load.
- Make sure that load is firmly at place before removing the lifting accessory.
- Demanding liftings and special lifts must be planned in writing.
Prevention of falling

- Prevention of falling has to be taken care of in every work situation!

- Barrier tape is not a railing!

- Opening must be covered immediately or guarding must be arranged

- Best fall prevention system is such that prevents the person to enter to area where falling is possible (selection of rope and anchorage point where it is attached)

- Fall protection harness must be used in heights > 2 meters if fall protection can not be arranged in other way

- In personnel lifts the fall protection harness attached to the lifting basket must be used at all times
Scaffolding

- Scaffolds are ordered from a service provider (24/7)
- The scaffold must be constructed by a trained and competent person
- Check scaffold visually before working: green **inspection tag**, entry to scaffold, railings, toe board, cleanliness and order of working levels.
  - If you order a scaffold make sure that the surface and supporting is adequate
- The scaffold must not be used, if it does not have an inspection tag
- Building a scaffold to a danger zone of a crane requires a written permit
Electrical safety

• If a tool is defective, prevent its use, mark the defect and send the tool to service
• Pay attention to devices with high voltage for example conductor rails of cranes.
• Extension cords must not cause danger:
  o Pay attention to possibility of tripping
  o They must not prevent fire prevention door from closing or be broken under closed door
  o Extencion cords going through passages must be properly marked and protected
• Entry to electric rooms requires permission and special training
• Check safety instructions when working in moist and conductive surroundings such as metal containers
Measurement instruments

- Laser sensors, X-ray equipment, radioactive radiation sources etc. are used in various measuring devices at Tornio plant for example to measure thickness and quantity
  - Location of the instruments is marked using signs
  - Do not look at the Laser detectors beam
- Do not go to danger zone
- Secure always that measuring instrument is switched off before you go to danger zone
Cleanliness and order

- Everyone must keep their workplace in order every day.
- Walkways and stairs must be kept clean.
- Tools and equipment must be stored in a place where they cannot cause any hazard.
- Cleaning up is one part of the work.
- Remember that for different waste there is different collecting/recycling places.

Uncleanliness and unorder increase the risk of falling and slipping. It also increases the fire burden.
7. Environmental protection
We have principles for environmental protection. All our processes are operated so that emissions and effects to air, water and soil are as minimum as possible. We require our contractors to follow the same policy.

If there is an environmental accident at the Tornio plant for example oil leak from a vehicle or chemical leak, it requires immediate actions:

- To minimize the environmental effects
- Accidents must be reported to supervisor and in case of a major leak also to area access control personnel
Tornio plant and environment

• According to legislation manufacturing steel requires environmental permits:
  o Environmental permit
  o Waste water permit
  o Other permits and monitoring plans

• Permits require us to monitor our emissions and report them regularly to environmental authorities (also environmental accidents)
  o Limit values for air and water emissions
  o Processes and emission purification equipment must be handled adequately

• CO2-emissions are monitored as a part of emission trading in EU
  o Permit and monitoring plan for 2013-2020
8. Chemical safety
Warning signs

- There are several hundreds of different chemicals handled in Tornio plant e.g. raw materials, process chemicals, lubricants and chemicals for maintenance purposes
- More information can be found from their material safety data sheets
Some hazardous chemicals at Tornio plant

- **Corrosive substances:**
  - Hydrofluoric acid and Sulfur dioxide
  - Other corrosive substance: Sulfuric acid, Nitric acid, Sodium hydroxide, Ammonia solution

- **Toxic substances:**
  - Carbon monoxide
  - Hydrofluoric acid and Sulfur dioxide

- **Chronical health hazard:**
  - Carbon monoxide (May damage the unborn child)

- **Highly flammable substances:**
  - LPG
  - Carbon monoxide
  - Hydrogen

- **Oxidising substances:**
  - Oxygen

- Also nitrogen and argon gases are handled and stored at the plant

- **Always check the chemicals used and stored at the working place!**
9. Hazards of the production units
Ferrochromium plant
Ferrochromium plant – hazardous substances

- **Carbon monoxide, CO**
  - Byproduct of smelting, used as a fuel.
- **Oxygen, O2**
  - Used in furnace tapping level.
- **Nitrogen, N2**
  - Used for inertizing
- **Nitric acid**
  - Used at sintering plant 2 for cleaning ceramic filters.
  - Blue light alarm system to notify the start-up of automatic cleaning process.

Filters are located at the south end of sintering plant 2
Carbon monoxide, CO

Signal word: DANGER

H220: Extremely flammable gas.
H331: Toxic if inhaled.
H360D: May damage the unborn child.
H372: Causes damage to organs through prolonged or repeated Exposure

R12: Extremely flammable.
R23: Toxic by inhalation
R48/23: Danger of serious damage to health by prolonged exposure through inhalation
R61: May cause harm to the unborn child. (Repr. Cat. 1)

- **Occupational limit value for exposure in Finland**: HTP<sub>8h</sub> 30 ppm, HTP<sub>15min</sub> 75 ppm
- Deadly concentration: 1000-1200 ppm

- Colourless, odourless, tasteless ➔ **CAN NOT BE SEEN, SMELLED OR TASTED**
- Concentration is monitored using static and portable measuring devices

- Highly flammable gas, explosive limits 12-75 %
- Slightly lighter than air

10 000 ppm = 1 %
Asbestos at Ferrochromium plant

- Concentrate from Kemi mine contains small amount of asbestos
- Map updated 16.3.2016
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Signs

- Buildings that contain asbestos containing dust are marked using following signs

  ASBESTOS
  DANGER
  Inhaling the dust is dangerous
Protection against asbestos

• When working or moving in areas that may contain asbestos containing dust, one must use respiratory protection:
  ○ < 2 h => disposable face mask or half mask (P3 category particle filter)
  ○ > 2 h => filtering device with fan unit (minimum TH2 approved).

• In the areas where only respiratory protection is required, normal working clothes may be used in work situations that don’t contain dirty conditions. In the work situations that contain dirty conditions (e.g. maintenance) disposable overalls are required.

• In the areas that contain higher amounts of asbestos disposable overalls are required in all duties!

• When moving out from working places pay attention to minimizing the spreading of the dust: dispose overalls, clean of change other working clothes.
Ferrochromium plant, other hazards

• **Molten metal and slag, heat radiation**
  
  o Ferrochromium and slag, temperature as molten > 1500 °C.
  
  o Restrictions at areas with high risk of splashes of molten materials (tapping area, casting area, transport of molten metal).
    
    • In the tapping area only Ferrochromium plant employees are allowed to work, others need permission.
    
    • Trespassing the casting area forbidden (traffic and handling of molten metal)
    
    • Working near granulation pool during granulation and loading of slag is forbidden.
    
    • During tapping Winchester gun may be used to open the tap hole => risk for splashes and ricochettes. Use of the Winchester is notified with blue signal light.

• **Magnetic fields**
  
  o There are strong magnetic fields near the furnaces (VKU1-VKU3) health risk for people who have a pacemaker.
Steel melting shop

From Tornio

Main gate

SMS Office

Outokumpu
Steel melting shop – hazardous substances

- SMS uses large amount of different gases:
  - LPG – dryers and heaters in the area
  - Oxygen $O_2$ – converter process and burners
  - Nitrogen $N_2$, Argon $Ar$ – process gas, inertizing
- Portable measuring devices and static measurement and alarm system

**If you see or hear the alarm, remove from the area!**

Before starting the work check what gases are used at that area and what procedures you must follow to ensure the safety!
SMS - other hazards

- Production places
  - Risk of splashes and heat radiation.
  - Breakouts and explosions are possible.
  - Ladle cars and cranes
  - Strong magnetic fields near the furnaces - health risk for people with pacemaker.
  - Radiation (radioactive particle in melting furnace) is informed using crisis alarm system, light signals of safety board and warning signs attached to door. Follow instructions!
SMS – other hazards

- **Slag vehicles and slag handling**
- Remember to keep safety distance to moving slag vehicle.
- Slag vehicle are very heavy, they stop slowly
- They carry ladders filled with molten slag – risk for splashed.
- Remember to give way to slag vehicles at crossroads.
- Being in slag handling area is strictly forbidden (marked on the map) because of the risk of splashes and explosion.
Hot rolling mill
HRM – hazardous substances

• LPG, carbon monoxide, nitrogen, oxygen and hydrogen
  o At APU-area LPG, carbon monoxide and oxygen is used. Remember to check-in at control room of the area. Always wear multiple gas measuring device.
  o At KUPU-area hydrogen and nitrogen is used. Use multiple gas measuring device at the area.

• Static measuring devices for LPG, carbon monoxide and oxygen level
  o Portable measuring devices and multiple gas measuring devices

• If there is a leak, it is notified by alarm
  → Remove from the danger zone immediately
HRM – radiation sources

Strip mill measuring devices

- Radiation
- Lights in both sides show the status of the radiation source
- Danger zone also on the roof (fenced)
- When working close to these devices (< 5m) they must be switched off, personnel must have a radiometer with them and they must have a area specific safety training
Cold rolling mill

RAP 5 (v. 2003)
CRM 1 (v. 1975)
Personnel appr. 710

23 different production lines
→ Active transport of materials and personnel traffic
CRM – hazardous substances

- E.g. hydrofluoric acid, nitric acid and sulfuric acid
- Written work permit is required in the area where chemicals are handled.
- Additional PPEs: neck protector, visor and chemical resistant gloves.
CRM – other hazards

• Carbon dioxide, CO₂
  • Used in a fire extinguishing equipment.
  • Dangerous (replaces oxygen). Remove from the area, follow instructions.
  • Written work permit and portable safety equipment required when working in the area.
Technical Services

- Technical Services are responsible for energy and water supply, infrastructure and industrial construction.
- All energy plants are un-occupied. When working in these plants check-in is done in the TOVO power plant control room (phone number 2478).

Main hazards:
- Energy plants
  - CO gas, LPG (use CO measuring device or multiple gas measuring device!).
  - Hot surfaces and noise
- Water treatment plant
  - Hazardous chemicals: sodiumhypochlorite, sulfuric acid, sodium hydroxide, hydrochloric acid
  - Noise
10. Emergency management
Emergency management

• Work permits, check-in procedures, portable measuring devices
  o Given instructions must be followed!
• There are static measuring devices and alarm systems at the plant area and inside the buildings
  o In case of a leak there will be an alarm light and signal
  o Report all leaks to area’s control room
  o Evacuate from the danger zone!
Alarm number

ALARM NUMBER
Area surveillance center
+358 16 45 2300

Save the number to your phone !!!

1. Keep calm and state your name and explain what has happened
   • Accident or an acute illness?
   • How many people were injured?
2. Accident location?
3. Are there more people in danger?
4. Answer all questions logically and do not hang up until you are given the permission to do so
5. Guide the emergency staff to the accident site
6. Inform the supervisor and the personnel in the main gate

In emergency situations contractor employees can seek for first-aid at Outokumpu health care centre
Notifications

- **Immediate** notifications to foreman and Outokumpu contact person of all:
  - Work place injuries at Tornio plant (always when the injury is treated by a medical personnel)
  - Hazards and near-miss cases
  - Fires
  - Environmental damages and material damages
  - Chemical and gas leaks
General instructions

When arriving first to the accident scene always evaluate the situation.
Don’t risk your own safety.

1. Evaluate  
2. Rescue  
3. Emergency call  
4. Extinguish  
5. Guide  
6. Restrict  
7. First aid

- Fire alarm
- Portable fire extinguisher
- Fire plug

In evacuation situations move to evacuation point
Always use stairs – you may be trapped in to elevator.
Emergency situations

Notifications

- **Fires**: Fires are notified using fire alarm bells. More information will be given using speaker alarm system
  - => move to evacuation point

- **Chemical and gas accidents**: Accidents are notified using speaker alarm system and/or general emergency signal

- **Other accidents and emergency situations**: Other accidents and emergency situations (e.g. environmental accidents) are notified using speaker alarm system and/or general emergency signal and O’net (intranet)
If you are outside – move inside.

If you are inside – stay there

If you can’t go inside, move towards up wind from the gas cloud.

**General emergency signal** is one minute long up and down signal that will be repeated several times in case of an emergency.

**Emergency is over signal** is one minute long signal.

In Tornio plant also fires are notified using the same signal.
First aid - chemicals

Skin
- Remove immediately contaminated clothing. Wash skin with plenty of water and soap for at least 15 minutes.

Eyes
- Flush your eye with water for at least 15 minutes keeping eye lids open. Prevent the water from getting to the clean eye.

Breath
- Move person to fresh air, half-sitting position.

Mouth
- Help rinse the mouth. Give couple of glasses water. Do not induce vomiting.

Always contact medical personnel
First aid – hydro fluoric acid

Person giving first-aid must take care their own protection!

Skin
- Remove contaminated clothing. Flush skin with water quickly.
- Apply plenty of calcium gluconate gel to the skin (remember to protect your own hands). Gel can be applied to mouth and lips but not in the eyes.
- Give 6 chewing pills containing calcium.

Eye
- Flush immediately for at least 15 minutes.

Breath
- Move person to fresh air, give oxygen if needed.
- Give 6 chewing pills containing calcium.

Always seek medical help!
- Symptoms may appear hours after the exposure

Emergency management

Injury – small hole in a protective glove
When you enter to work place

• Ask for work place induction from the supervisor
  • Moving in/to the area
  • Personal protective equipment
  • Risk factors in the surroundings (chemical, physical)
  • Accident risks
  • Emergency exits and evacuation points
  • First-aid equipment, emergency showers, eye rinsing places /-bottles, fire-extinguishers
  • Safe places in gas leak situations
  • Waste collecting and recycling points
  • The number of the closest door
  • Contact person(s), closest control room
Exam

- 14 statements, answer either correct or wrong
- Approval requires at least 12 correct answers
- You have to always answer the 15th question and write at least 2 dangers of your work

- Exams are inspected immediately, wait for the results.

Safe working days at Outokumpu!