**Unit:** Department of biotechnology and food science **Date: 2019-02-17**

**Line manager: Kjetil Rasmussen**

**Participants in the identification process** (including their function)**: Kåre A. Kristiansen (senior eng.), Susana Gonzalez (senior eng.)**

**Short description of the main activity/main process: Analysis** .

**Is the project work purely theoretical?** (YES/NO): NO *Answer "YES" implies that supervisor is assured that no activities*

*requiring risk assessment are involved in the work. If YES, briefly describe the activities below. The risk assessment form need not be filled out.*

**Signatures:**   *Employee:*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ID nr.** | **Activity/process** | **Responsible person** | **Existing documentation** | **Existing safety measures** | **Laws, regulations etc.** | Comment |
| 1 | GC-MS. Event 1. Burns from hot zones (inlet, oven, transfer line). |  | Instrument manual. | Let instrument cool before starting maintenance work. |  |  |
| 2 | GC-MS. Event 2. Damage on column because of air or high temperature in/on column. |  | Column manuals. | Inlet pressure is on for 10min before increasing temperatures. Column is capped when not in use. |  |  |
| 3 | GC-MS. Event 3. Mass spectrometer damage because of air leak into MS. |  | Instrument manual | MS should not have vacuum if the inlet pressure is to be turned off or expected to be turned off automatically. |  |  |
| 4 | GC-MS. Event 4. Electric shock from MSor connected apparatus. |  | Instrument manual | Turn off the instrument and pull the plug before opening up the instrument. |  |  |
| 5 | GC-MS. Event 5. Accident when changing gas flask. Gas flask fall over/or leak gas. |  | IBT instructions/routines for handeling gas. | Bottle is secured during transport. Gas bottles must be handeled by a trained person. Two people are needed for transport. |  |  |
| 6 | LC-MS. Event 1. Leakage of mobile phase. |  |  | Check for leaks before starting the analysis. During purge/prime and at the column. Use safety googles and gloves when searching for leaks. |  |  |
| 7 | LC-MS. Event 2. Change ion source or clean cone. Exposure of hot surfaces. |  | Instrument manual. | Use gloves intended for this use. Cotton, from Agilent. |  |  |
| 8 | LC-MS. Event 3. Noise. |  | «Kartlegging av lydnivå i laboratorie/kontor». HSE department. | Use noise protection if needed. Generally the noise is below the limit for mandatory use of noise protection, but if more/other equipment is introduced noise protection may be needed, also when sitting close to the vacuum pumps. |  |  |
| 9 | Handling organic solvents. When making mobile phase for LC-system (e.g metOH, ACN or dichloromethane). |  | Chemical data sheet-SDS | Use gloves/googles and work in the fumehood with volatile solvents (e.g. metOH, ACN, dichloromethane). |  |  |
| 10 | Sonication |  |  | Use noise protection when operating the sonicator. |  |  |

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Activity from the identification process form** | **Potential undesirable incident/strain**  | **Likelihood:** | **Consequence:** | **Risk****Value (human)** | **Comments/status****Suggested measures** |
| Likelihood(1-5) | Human(A-E) | Environment (A-E) | Economy/material(A-E) |
| ID 1 | Burns | 1 | A | A | A | 1A |  |
| ID 2 | Instrument damage | 2 | A | A | B | 2A |  |
| ID 3 | MS damage | 2 | A | A | B | 2A |  |
| ID 4 | Electric shock | 1 | B | A | A | 1B |  |
| ID 5 | Fall | 2 | B | B | A | 2B |  |
| ID 6 | Chemical exposure | 4 | A | A | C | 4A |  |
| ID 7 | Burns | 3 | B | A | A | 3B |  |
| ID 8 | Noise | 5 | B | A | A | 5B |  |
| ID 9 | Chemical exposure | 1 | B | A | C | 1B |  |
| ID 10 | Noise | 3 | B | A | A | 3B |  |

|  |  |  |
| --- | --- | --- |
| ***Likelihood, e.g.:*** | ***Consequence, e.g.:*** | ***Risk value (each one to be estimated separately):*** |
| 1. *Minimal*
2. *Low*
3. *Medium*
4. *High*
5. *Very high*
 | *A. Safe**B. Relatively safe* *C. Dangerous* *D. Critical* *E. Very critical* | ***Human = Likelihood x Human Consequence*** ***Environmental = Likelihood x Environmental consequence******Financial/material = Likelihood x Consequence for Economy/materiel*** |

**Potential undesirable incident/strain**

Identify possible incidents and conditions that may lead to situations that pose a hazard to people, the environment and any materiel/equipment involved.

**Criteria for the assessment of likelihood and consequence in relation to fieldwork**

Each activity is assessed according to a worst-case scenario. Likelihood and consequence are to be assessed separately for each potential undesirable incident. Before starting on the quantification, the participants should agree what they understand by the assessment criteria:

**Likelihood**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Minimal****1** | **Low****2** | **Medium****3** | **High****4** | **Very high****5** |
| Once every 50 years or less | Once every 10 years or less | Once a year or less | Once a month or less | Once a week |

**Consequence**

|  |  |  |  |
| --- | --- | --- | --- |
| **Grading** | **Human** | **Environment** | **Financial/material** |
| **E****Very critical** | May produce fatality/ies | Very prolonged, non-reversible damage | Shutdown of work >1 year. |
| **D****Critical** | Permanent injury, may produce serious serious health damage/sickness | Prolonged damage. Long recovery time. | Shutdown of work 0.5-1 year. |
| **C****Dangerous** | Serious personal injury | Minor damage. Long recovery time | Shutdown of work < 1 month |
| **B****Relatively safe** | Injury that requires medical treatment | Minor damage. Short recovery time | Shutdown of work < 1week |
| **A****Safe** | Injury that requires first aid | Insignificant damage. Short recovery time | Shutdown of work < 1day |

The unit makes its own decision as to whether opting to fill in or not consequences for economy/materiel, for example if the unit is going to use particularly valuable equipment. It is up to the individual unit to choose the assessment criteria for this column.

**Risk = Likelihood x Consequence**

Please calculate the risk value for “Human”, “Environment” and, if chosen, “Economy/materiel”, separately.

**About the column ”Comments/status, suggested preventative and corrective measures”:**

Measures can impact on both likelihood and consequences. Prioritise measures that can prevent the incident from occurring; in other words, likelihood-reducing measures are to be prioritised above greater emergency preparedness, i.e. consequence-reducing measures.

**MATRIX FOR RISK ASSESSMENTS at NTNU**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CONSEQUENCE** | **Extremely serious** | **E1** | **E2** | **E3** | **E4** | **E5** |
| **Serious** | **D1** | **D2** | **D3** | **D4** | **D5** |
| **Moderate** | **C1** | **C2** | **C3** | **C4** | **C5** |
| **Minor**  | **B1** | **B2** | **B3** | **B4** | **B5** |
| **Not significant**  | **A1** | **A2** | **A3** | **A4** | **A5** |
|  |  | **Very low** | **Low**  | **Medium** | **High** | **Very high** |
|  |  | **LIKELIHOOD**  |

**Principle for acceptance criteria. Explanation of the colours used in the risk matrix.**

|  |  |
| --- | --- |
| **Colour** | **Description** |
| Red |  | Unacceptable risk. Measures must be taken to reduce the risk. |
| Yellow |  | Assessment range. Measures must be considered. |
| Green |  | Acceptable risk Measures can be considered based on other considerations.  |