GOOD PRACTICES FOR DUST MONITORING

This sheet provides advice on how to implement dust monitoring in order to assess personal exposure levels to respirable crystalline silica dust.

ACCESS

Restrict access to the work area to authorised personnel only.

DESIGN AND EQUIPMENT

Both personal and static measurements can be used jointly as they are complementary. It is up to the experts designated by the employers and the employees' representatives to opt for the more adequate solutions, while respecting the national and European provisions.

The following general requirements (taken from the European Standards EN 689 and EN 1232) should be followed:

- Define a monitoring strategy: choose appropriate sampling equipment, define the job functions to be monitored, identify the appropriate personnel who will carry out the sampling and analysis, plan the dates of the measurement campaign.
- Use sampling equipment that conforms to European Standard EN 481. Use a recognised analytical technique to measure respirable crystalline silica: X-ray diffraction or infrared spectroscopy.
- The persons carrying out the sampling and analysis must be appropriately trained and experienced.
- In the case of crystalline silica, it is the respirable dust fraction that is of concern for its health effects. Therefore the respirable dust fraction should be collected.
- In the case of personal sampling, the sampling equipment must be worn by the worker and the sampling head must be positioned in the worker's breathing zone (less than 30cm from the mouth and nose area).
- Sampling duration should be as close as possible to a full working shift in order to ensure that samples are representative.
- Collect sufficient number of samples per campaign for each job function in order to get a follow up of each worker. Take into account variation of work activities on different days e.g. cleaning work is often done on Fridays.
- Inform the workers that dust monitoring will be undertaken and the reasons for it. This will help to ensure full co-operation. Inform them of the results of the dust monitoring.
- Record information during the sampling, including: date, job function, worker's name, shift length, sample flow rate and duration, work activities and working practices, weather conditions, personal protective equipment worn, comments on dust control measures, production process, tonnage rate etc.
- Check the correct operation of the sampling equipment (including the flow rate) at regular intervals during the shift and keep records of these checks.

Keep full documentation on the dust monitoring campaigns and adopt a quality system as described above.

ALL

MAINTENANCE

- Ensure dust sampling equipment is maintained and serviced/calibrated as advised by the supplier/installer in efficient working order and in good repair.
- Keep the sampling equipment clean to prevent contamination of future samples.
- It may be necessary to disassemble sampling heads in order to clean them properly.
- If cleaning sampling heads using wet cleaning methods, ensure that they are allowed to dry out fully before re-use.
- Replace consumables (batteries etc.) in accordance with the manufacturer's recommendations

EXAMINATION AND TESTING

- Visually check the sampling equipment before and after each use for signs of damage.
- Have the sampling equipment serviced regularly, in accordance with manufacturers' recommendations.
- Keep records of inspections for a suitable period of time which complies with national laws (minimum five years).
- Put in place measures to control the risk of bacterial growth within water sources used across site, focusing most on systems where water droplets will be generated.

TRAINING

- Give your employees information on the health effects associated with respirable crystalline silica dust.
- Provide employees with training on: dust exposure prevention; checking controls are working and using them; when and how to use any respiratory protective equipment provided and what to do if something goes wrong. Refer to task guidance sheet **2.3.4** and part 1 of the Good Practice Guide.

SUPERVISION

- Have a system to check that control measures are in place and that they are being followed. Refer to task guidance sheet **2.3.3**.
- Employers should make sure that employees have all the means to perform the checklist given below.

PERSONAL PROTECTIVE EQUIPMENT

- Refer to task guidance sheet **2.1.15** dedicated to Personal Protective Equipment.
- Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory protective equipment (with the appropriate protection factor) should be provided and worn.
- Personnel conducting sampling work should set a good example by wearing respiratory protective equipment in the required areas.
- Provide storage facilities to keep personal protective equipment clean when not in use.
- Replace respiratory protective equipment at intervals recommended by its suppliers.

EMPLOYEE CHECKLIST

- ☐ Look for signs of damage, wear or poor operation of any equipment used. If you find any problems, do not use the sampling equipment.
- ☐ Ensure that sampling pumps are fully re-charged prior to commencing each shift's sampling work.
- ☐ Regularly check the correct operation of the sampling equipment during the shift. Where possible, check that the sampling flow rate is still correct and adjust if necessary.

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, by controlling exposure to respirable crystalline silica. Specifically, this sheet provides advice on good practice advice on personal dust exposure monitoring. It describes the key points you need to consider when establishing a dust monitoring programme.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimise exposure to respirable crystalline silica. i.e. to apply appropriate protection and prevention measures. This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures which are implemented.

This sheet forms part of the Good Practices Guide on silica dust prevention, which is aimed specifically at the control of personal exposure to respirable crystalline silica dust in the workplace.

GOOD PRACTICES FOR REAL TIME DUST MONITORING

This sheet provides advice/info on how to implement real time dust monitoring and Helmet-CAM in order to assess sources of (respirable) dust from installations and/or to the employees. This is not a routine monitoring tool. It is a helpful tool to be used for investigational purposes to identify sources of dust emissions and to help prioritise resources for dust control. This can encourage similar technologies to be developed, implemented and added to this good practice guide.

ACCESS

Restrict access to the work area to authorised personnel only.

DESIGN AND EQUIPMENT

A data logging Aerosol Monitor is used to provide real-time results and gravimetric validation of the aerosol in the air of the workplace and around the installations. It can be run in a fixed location, tripod mounted or hand-held, or on the belt of the employee. Fig 1.

An action CAM is used to make videos during the assessments of workplace. The camera is typically mounted on a hard hat. When making assessment of the exposure to the employee, the video provides visualisation of the worker's practices. Fig 2.

Software is used to compile/merge the real time measurement dust concentrations from the aerosol monitor with the video. Free software that can be used is EVADE, which is recognised/certified by OSHA. Fig 3.

Real time dust measurement concentrations (fixed location around dust source at installation) and real time measurements indicative of exposure to the employee, can be used to assess the sources of dust.

The following are some helpful suggestions for implementing the real-time data logging aerosol monitor for (respirable) dust sampling:

- Inform workers of the monitoring strategy to facilitate co-operation. Inform them on the results post monitoring.
- Record adequate description during measurement, including: date, job function, worker's name, work activities/task and working practices, protective equipment worn, control measures in place (or not), production process, (mineral) product produced, tonnage rate, dust extraction type, ventilation, etc. Record the weather and any misting, suppression systems in place.
- It may be helpful to make comparison of the measured airborne concentrations against occupational exposure limits. Remember that while the equipment is capable of measuring different dust fractions (including the respirable fraction) it does not analyse for the type of dust (e.g. crystalline silica), also consider the sensitivity of the equipment used, when making OEL comparisons.

Fig 1

Fig 2

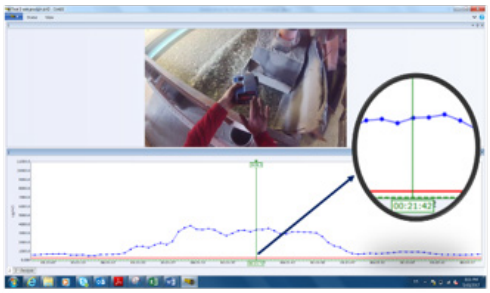

Fig 3

ALL

MAINTENANCE

- Ensure dust measuring equipment is maintained as advised by the supplier/installer in efficient working order and in good repair.
- Keep the measuring equipment clean to prevent contamination.
- It may be necessary to replace the filter in the aerosol monitor to ensure a correct flow.
- Replace consumables (batteries etc.) in accordance with the manufacturer's recommendations.

EXAMINATION AND TESTING

- Visually check the measuring equipment before and after each use for signs of damage.
- Zero the real-time data logging aerosol monitor prior to each use.
- Have measuring equipment serviced regularly, in accordance with manufacturers' recommendations.
- Put in place measures to control the risk of bacterial growth within water sources used across site, focusing most on systems where water droplets will be generated.

TRAINING

- Provide employees with training on:
  - using real time dust concentration measurements to investigate in detail personal dust monitoring results;
  - dust exposure prevention;
  - checking if control measures are working and how to use them;
  - when and how to use any respiratory protective equipment provided;
  - what to do if something goes wrong.
- Refer to task guidance sheet **2.3.4** and part 1 of the Good Practice Guide.

SUPERVISION

- Archive the data in a dedicated database.
- Share and comment on the results of the real time dust concentration measurements with the workforce.
- Form teams including workers from production, maintenance, engineering and HS for follow up and support of the program.
- Decisions should be taken on actions to improve the identified dust hot spots.
- Repeat measurements after improvements are implemented in order to check their effectiveness.

PERSONAL PROTECTIVE EQUIPMENT

- Refer to task guidance sheet **2.1.15**, of NEPSI Good Practice Guide, dedicated to Personal Protective Equipment.
- Risk assessment must be carried out to determine whether existing controls are adequate. If necessary, respiratory protective equipment (with the appropriate protection factor) should be provided and worn.
- Personnel taking measurements in the workplace should set a good example by wearing respiratory protective equipment in the required areas.
- Provide storage facilities to keep personal protective equipment clean when not in use.
- Replace respiratory protective equipment at intervals recommended by its suppliers.

EMPLOYEE CHECKLIST

- ☐ Undertake pre work inspection checks of all equipment for functionality, prior to and after use.
- ☐ Ensure that devices are fully re-charged prior to commencing each assessment.
- ☐ Regularly check the correct operation of the equipment during the measurement.
- ☐ Keep a detailed work activity log observed during the measurement assessment.
- ☐ Check and implement the measures to control the risk of bacterial growth within water sources used across site, focusing most on systems where water droplets will be generated.

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, by controlling exposure to respirable crystalline silica.

Following the key points of this task guidance sheet will help reduce exposure.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimise exposure to respirable crystalline silica. i.e. to apply appropriate protection and prevention measures. This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures which are implemented.

This sheet forms part of the Good Practices Guide on silica dust prevention, which is aimed specifically at the control of personal exposure to respirable crystalline silica in the workplace.

GOOD PRACTICES FOR SUPERVISION

This sheet provides advice on the competence, training and information needs of managers/supervisors at sites where there is potential exposure to silica dust.

It needs to be applied in a way that is relevant to the particular management arrangements at the site, ie some sites could have a detailed management structure, whereas others could have a single manager.

H&S MANAGEMENT SYSTEMS

- Employers should make sure that they are managing health and safety in line with a recognised H&S Management System (e.g. ISO 45000, OHSAS 18001:1999, ILO OSH 2001). In the absence of a formal system, employers should be able to display the presence of a system in line with Directive 89/391/EEC (Framework Directive), which is subject to formal auditing.
- Managers/Supervisors should understand their role within a H&S management system.

NEEDS OF MANAGERS/SUPERVISORS

- Knowledge of health hazards of silica dust.
- Understanding of processes likely to cause problems.
- Understanding of control measures and their application.
- Knowledge and understanding of the Good Practice Guide and the application of relevant task guidance sheets.

INFORMATION

- Employers must provide sufficient information to managers/supervisors to meet the needs identified above.

TRAINING

- Employers need to ensure that their managers/supervisors are trained in order to meet the requirements placed upon them by the task guidance sheets. In particular this is to enable them to:
  - be an effective part of a system that checks that control measures are in place and that they are being followed.
  - check that procedures for cleaning and maintenance are being followed.
  - ensure that the health surveillance programme is being carried out for everyone that needs it.
  - make sure that employees have all the means to perform the items included in the employee checklists for each relevant task guidance sheet.
- Training for managers/supervisors needs to include, specifically, knowledge and understanding of the "Good Practice Guide on Workers Health Protection through the Good Handling and Use of Crystalline Silica and Products containing it".
- Training should also include the development of communication skills for managers/supervisors.
- Training must stress the importance of managers/supervisors setting a good example in following safe working procedures.

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, by controlling exposure to respirable crystalline silica.

Specifically, this sheet provides good practice advice on the role of managers/supervisors in helping to minimise exposure to respirable crystalline silica. i.e. to apply appropriate protection and prevention measures.

This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they understand the roles and responsibilities of managers/supervisors.

This sheet forms part of the Good Practices Guide on silica dust prevention, which is aimed specifically at the control of personal exposure to respirable crystalline silica dust in the workplace.

ALL

GOOD PRACTICES FOR TRAINING

This activity covers the organisation and implementation of training or workers who are exposed to respirable crystalline silica dust.

ACCESS

Ensure personnel receive training in silica dust awareness before allowing them access to dusty areas.

ORGANISATION

- New employees should attend a training session on all aspects of health and safety, including the employer's safe working procedures for dealing with hazardous substances such as respirable crystalline silica. A comprehensive list of suggested training topics is given overleaf.
- Training sessions should be lively and informative, with the possibility of a two-way dialogue between the trainer and the workers during or after the training.
- Training should be provided by the employer and tailored to all those at risk and should draw examples from their workplace and work activities.
- Limit the number of participants so that everyone has an opportunity to discuss issues of concern and to ask questions.
- Limit the duration of training sessions and take regular breaks.
- Prohibit the use of mobile telephones and two-way radios during training sessions.
- Use a variety of training methods, incorporating visual aids, videos, group discussion and handouts.
- As an alternative to formal training sessions, toolbox talks are a useful means of communicating individual health and safety messages within a short period of time. Toolbox talks should be of maximum 15 minutes duration.
- Workers' knowledge should be assessed at the end of each training session in order to verify that they have understood the training material.
- Refresher training sessions should be organised to keep workers up to date on the health and safety aspects associated with work with products containing crystalline silica.
- Workers should be given access to this Good Practices Guide and its task guidance sheets, along with any other additional information, including copies of risk assessments, safety data sheets and safe working procedures.

IMPLEMENTATION

- Training sessions should be organised during employees' normal working time.
- Refresher training sessions should be conducted at least once every two years, or more often in the event of changes in working practices etc.
- Attendance at training sessions should be made compulsory. Attendance should be documented and records maintained as long as reasonably possible.
- Workers should be asked to provide feedback on each training session, which might help in the organisation of future training sessions.

ALL

TRAINING

- Give your workers information on employer's and employee's duties under Health and Safety law.
- Give your workers information on the health effects associated with respirable crystalline silica dust.
- Provide them with training on factors affecting dust exposure and on dust exposure prevention.
- Provide them with training on good practices to use in the workplace and on safe working procedures.
- Provide them with training on protective measures and how to check that those controls are working.
- Provide them with training on when and how to use any respiratory protective equipment (RPE) or other personal protective equipment (PPE) provided.
- Provide them with training on how to maintain RPE/PPE, where to store it when not in use, how to obtain replacements and how to report defects.
- Provide them with training on what to do if something goes wrong.
- Give your workers information on dust monitoring programmes and the importance of their co-operation.
- Employees should also be informed of the conclusions of any personal exposure monitoring campaign.
- In the event that an employee's measured personal exposure to respirable crystalline silica exceeds the relevant occupational exposure limit value, that employee must be provided with details of his own personal exposure monitoring result.
- Employees should be informed about health surveillance procedures.

SUPERVISION

- Have a system to check that training sessions are planned, that they are well-attended, that their effectiveness is demonstrated by suitable methods and that the entire workforce is covered by them. Refer to task guidance sheet **2.3.3**.
- Employers should be in line with Directive 89/391/EEC (Framework Directive) and NEPSI risk management principles and make sure that employees have all the means to perform the checklist given below.

EMPLOYEE CHECKLIST

- ☐ Ensure that you attend all health and training sessions that are organised for you.
- ☐ Don't hesitate to ask questions during training sessions. You may be aware of problem areas, or solutions to problems, that have not previously been identified.
- ☐ Follow the Good Practices document and its task guidance sheets.
- ☐ Make sure you use the correct sheet for the task.
- ☐ Co-operate with your employer and other workers with specific responsibilities for the safety and health of workers, to enable your employer to ensure that your working environment and working conditions are as safe as possible.
- ☐ Immediately inform your employer, or other workers with specific responsibilities for the safety and health of workers, of any work situation that you think may represent a serious and immediate danger to safety and health.
- ☐ Make correct use of your work equipment and use all hazardous substances as directed.
- ☐ Use personal protective equipment, including respiratory protective equipment, as directed by your employer.

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, by controlling exposure to respirable crystalline silica. Specifically, this sheet provides advice on organising and implementing training for workers who are exposed to crystalline silica dust.

Following the key points of this task guidance sheet will help reduce exposure. Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimise exposure to respirable crystalline silica. i.e. to apply appropriate protection and prevention measures.

This document should also be made available to persons who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures which are implemented.

This sheet forms part of the Good Practices Guide on silica dust prevention, which is aimed specifically at the control of personal exposure to respirable crystalline silica dust in the workplace.

GOOD PRACTICES FOR WORKING WITH CONTRACTORS

This task guidance sheet relates to the employment of external contractors in plants where airborne respirable crystalline silica dust may be generated.

ACCESS

Restrict access to the work area to authorised personnel only.

NATURE OF CONTRACTORS' WORK

It is typical for contractors to be employed in the following types of work (non exhaustive list):

- Design work
- Construction work
- Installation of plant and equipment
- Maintenance and servicing of equipment
- Equipment testing and calibration
- Specialist inspection services (e.g. asbestos, structural)
- Packaging (e.g. bagging)
- Mineral extraction and on-site haulage
- Road haulage
- Cleaning

CONTRACTOR SELECTION CRITERIA

When choosing contractors, the client's selection criteria must include an assessment of the contractor's health and safety performance.

Consider each of the following (non exhaustive list) and ensure that the contractor's performance against each of the criteria is adequate for the risks associated with the job and the area(s) in which it will be conducted.

- Health and safety policy document
- Certificates of training/competence
- Arrangements for health and safety advice and support
- Risk assessment and safe working procedures
- Availability of necessary work equipment
- Measures for control of hazardous substances
- Personal protective equipment arrangements
- Health surveillance arrangements
- Previous accident record
- Employer's Liability and Public Liability insurance arrangements

DO NOT allow a contractor to work on your site unless you are satisfied that he has given due consideration to all health and safety issues.

ALL

EXCHANGE OF COMMUNICATION

- It is the client's responsibility to inform external contractors of reasonably foreseeable risks (including those relating to respirable crystalline silica dust) that may be encountered on their site. This information must be provided in the form of written documentation at the pre-tender stage.
- Relevant sections of the Good Practices Guide and Fact Sheets should be sent to the Contractor as part of the pre-tender documentation.
- All contractors must be provided with induction training, prior to commencing work on the client's site, as a condition of them being authorised to enter the working area. If for some reason it is not practicable to provide induction training, then close personal supervision of the contractors must be provided by the client at all times.
- Induction training must include details of site rules and procedures, including any specific dust control measures that are relevant to the contract. Details should be provided of areas and activities for which personal protective equipment must be worn.
- During the induction session, contractors should be tested on their knowledge of their own safe working procedures. Do not allow work to commence until you are satisfied that all individual contractors are fully conversant with the requirements of their employer's safety documentation.
- It may be necessary under national regulations to appoint a central co-ordinator of specific contract works.

WRITTEN AGREEMENT WITH CONTRACTORS

- Outsourcing agreements for jobs entailing potential exposure to respirable crystalline silica should contain a provision regarding health protection.
- The Good Practices Guide together with its Facts Sheets constitutes an integral part of the contract. This means that the Contractor will not only have to respect all general legal provisions regarding Health and Safety but also the recommendations of the Good Practices Document.

SUPERVISION OF CONTRACTORS

The client must provide an appropriate level of supervision of all contractors who are working on their sites. The extent of this supervision will depend upon the complexity of the job and should, as a minimum, involve documented spot checks on the contractor's working practices. However, if it has not been practicable to provide full induction training, then contractors must be provided with close personal supervision at all times.

The client should have in place documented procedures for managing any situation in which a contractor fails to adhere to safe working procedures. Records should be maintained of all actions taken by both the client and the contract firm involved in addressing unsafe working practices.

CLIENT CHECKLIST

- [ ] When selecting contractors, make an assessment of the adequacy of their systems for managing personal exposure to respirable crystalline silica dust.
- [ ] Ensure that contractors are provided with information on the health and safety risks present on your site that are relevant to their work.
- [ ] Provide contractors with induction training before allowing them to start work on your site.
- [ ] Ensure that you adequately supervise contractors in order to satisfy yourself that they are following safe working practices.
- [ ] Do not hesitate to stop the job if contractors are not working safely.

CONTRACTOR CHECKLIST

- [ ] Conduct risk assessments for all of your work activities and document them. You will be required to provide copies to your clients.
- [ ] Ensure that individual contractors are provided with training on the requirements of your risk assessments.
- [ ] Ensure that you maintain communication on health and safety issues with the client at all times.

This guidance sheet is aimed at employers to help them comply with the requirements of workplace health and safety legislation, requiring the same protection standards for external contractors as those applicable to their own employees.

Specifically, the advice given in this sheet is good practice for the management of all contract works, but the wording has been tailored to make it most relevant to circumstances where there is risk of exposure to respirable crystalline silica.

Depending on the specific circumstances of each case, it may not be necessary to apply all of the control measures identified in this sheet in order to minimise exposure to respirable crystalline silica. i.e. to apply appropriate protection and prevention measures.

This document should also be made available to contract firms and their employees who may be exposed to respirable crystalline silica in the workplace, in order that they may make the best use of the control measures which are implemented.

This sheet forms part of the Good Practices Guide on silica dust prevention, which is aimed specifically at the control of personal exposure to respirable crystalline silica dust in the workplace. Existing national provisions must always be applied.