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Report on a Review of the Medical Monitoring Program at the Hazelwood Mine Fire Incident

A review of the Hazelwood Mine medical monitoring program was undertaken on 9th March by Robert Golec, Principal Occupational Hygienist AMCOSH Pty Ltd at the request of Craig Brownlie, Deputy Incident Controller (Technical) CFA.

The review consisted of observation of the Medical Monitoring process and review of some records and interview with Peter Langridge (CFA State Co-ordinator, Health Support Team) who is in charge of medical monitoring programme.

The review identified that the following protocol was in place for medical monitoring of personnel involved in the Hazelwood Mine fire incident:

- Medical monitoring was being undertaken in a tent in the Staging Area located in the power station car park;
- All personnel coming on site had to undergo medical monitoring immediately on entering the site. This meant thorough washing of hands with soap and water and the use of alcohol based hand sanitizer followed by presentation at the medical monitoring tent;
- Personnel involved in fire fighting activities are required to present to the medical monitoring tent immediately on re-entering the staging area after their rotation on the fire ground;
- Personnel leaving the site are required to undergo medical monitoring and obtain a yellow wrist tag from the medical monitoring tent. Wrist tags aree required to be worn for 24-hours after being issued. The presence of wrist tags is checked by security staff located at the exit point of the site and any personnel attempting to leave the site without a wrist tag are redirected to the medical monitoring tent;
- Medical monitoring includes CO-oximetry – measurement of SpCO (carbon monoxide haemoglobin saturation) by pulse CO-oximetry (using a Massimo Rad-57 Pulse CO-Oximeter) by placing sensor on finger as a proxy for the analysis of arterial carboxyheamoglobin (COHb) in blood;
- Rad-57 are cycled weekly for maintenance and there is an extra stock of CO sensors for these oximeters for changeover when required;
- All testing is undertaken by registered nursing staff;
- A representative of Massimo, the suppliers of the Rad-57 Pulse CO-Oximeters conducted a review of the use of their equipment during the initial phase of the incident and was satisfied that the use was in accordance with best-practice;

- A review of wounds and infections is undertaken by nursing staff and personnel are questioned about any cuts or abrasions;
- Personnel are questioned on their smoking status which can affect baseline COHb levels;
- If the measured SpCO is ≥ 5% (the target concentration stipulated by Safe Work Australia in their documentation of the Occupational Exposure Standard), personnel are questioned on whether they are experiencing symptoms (headache, vertigo, confusion etc) and if verified, the personnel are excluded from site for 24-hours. Personnel are not issued with a wrist band unless their SpCO is <5%
- Personnel with an SpCO ≥ 5% do not have an immediate retest but are assessed and retested after a rest period;
- If the SpCO measurement of an individual is >8%, the person is reviewed by paramedics. Breath CO is undertaken by Peter Langridge or a health monitoring team-leader to verify CO-oximetry result. Random breath CO is also undertaken or if nursing staff feel it is warranted based on observation and questioning for the presence of symptoms;
- If required, the person is transported to the Latrobe Valley Hospital for further assessment and treatment;
- The current rate of measurements with SpCO ≥ 5% - on 8th March was 0% out of 708 Pulse CO-Oximetry measurements. On 7 March, 2 individuals with SpCO ≥ 5% were detected, but were found to have SpCO levels of <5% on retest;
- All measurements are reviewed by Peter Langridge on a daily basis;
- All SpCO readings are inputted into a database which currently has approximately 47 ,000 individual datapoints (measurement results);
- This database will be correlated with AreaRae gas detector static measurements of carbon monoxide levels in the mine and with measurements of CO using the Drager Pac personal CO gas monitors. This will be done post-incident. Future monitoring data will be inputted into a Statewide database;
- Hazmat crews are responsible for supply, maintenance and calibration of CO gas monitoring equipment;
- Each agency is provided with a copy of the CO database for reference;

It is my opinion that the medical monitoring program currently in place is robust and professionally conducted. Many of the issues with the medical monitoring process which were experienced during the initial phases of the incident, when the staging area was located at the mine training centre, have been recified. These included:

- Iniially, issues were found with false SpCO readings which were identified as being due to stray artificial lighting used in the mine training centre. This was rectified by using a cover over the sensor and a towels over the hands to cut out stray light;
- Personnel were being given oxygen therapy which was potentially masking their true carboxyhaemoglobin (COHb) saturation status;
- Smokers had elevated baseline SpCO readings which were causing them to have reading above 5% COHb;

- Members were being deployed directly from other fires and were arriving on site with elevated SpCO levels and some had to be turned away;
- An initial lack of administrative support meant that input of monitoring data into the database was delayed and resulted in a large back-log which made the analysis of the data untimely;
- Breath CO analyser was not available for the first few weeks, therefore pulse CO-oximetry results could not be verified against another independent method;
- Long delays in the emergency department at the Latrobe Valley Hospital meant that persons who had pulse CO-oximetry results ≥ 5% (CoHb) did not have verification of readings against arterial CO-oximetry.

It is recommended that the medical monitoring program in place continue in its current form. Random testing of personnel with a breath CO monitor should be conducted at a higher frequency than is currently the case. This will provide useful correlation data between pulse CO-oximetry and breath CO measurements and also help identify the false negative and false positive rate (specificity and sensitivity analysis) which may be useful for planning medical monitoring of future potential incidents, particularly in setting decision/action levels and choice of monitoring method. Additionally, more timely comparison of the data from personal CO gas monitoring and medical CO monitoring results would assist with verification of COHb measurements and reduce potential issues associated with false positive and false negative results and give a higher level of confidence of the medical monitoring results.

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