**SIMTARS SUBMISSION SIMTARS, METHANE EXPLOSION and SPONTANEOUS COMBUSTION RESEARCH AND TRAINING**

**FINDING**

**SIMTARS Research Station as expressly Recommended by a succession of Royal Commissions and Mining Warden Inquiries; has not fulfilled some/majority of the Functions and Research into Underground Coal Methane Explosions and Spontaneous Combustion.**

**RECOMMENDATIONS**

1. **A SIMTARS Advisory Committee formally be set up *under the chairmanship of an independent person and that representation on the committee should include nominees from:—***

***The Queensland Mining Unions***

 ***The Department of Mines***

 ***The Queensland Resource Council***

 ***The role of such an advisory committee would include advice to the Minister for Mines:— Priorities for research***

 ***Budget estimates***

1. **The SIMTARS Advisory Committee annually publish for the Public a Report including**
2. **Reports for Research Projects Concluded in that year.**
3. **Interim Reports and status of Research Projects Underway.**
4. **Research Projects Commenced During the Year and Reasons for funding.**
5. **Research Projects Declined and Reasons for.**
6. **Annual Research Projects into Spontaneous Combustion, Methane Explosion and Survivability of Mine Workers, and Ventilation Structures and Systems be funded Annually out of the Industry Levy.**
7. **Practical Outcomes for Hands on practical training for Underground Coal Statutory Positions be constructed and located at the Dysart Mines Rescue Facilities (or equivalent Bowen Basin Town) to gain experience in the correct methods of dealing with full scale underground mine fires and the hazards associated with the varying conditions that may occur.**

**This to be funded by Government Capital Outlay for construction and funds be Annually allocated from the Industry Levy for its on-going operation, improvement and maintenance.**

1. **Updated, comprehensive state-of-the-art Training and Assessment packages and facilities on the subjects of Ventilation, Methane and of Spontaneous Combustion in coal mines be available in the Central Highlands Towns.**

**Capital expenditure funded by Government and the Annual Levy to pay for ongoing Research, updating Training and Assessment and the running of Courses for Mine Workers**

1. **Independent Review into the Research Conducted by SIMTARS over the last 26 years that includes its compliance to the Moura No 2 Recommendations, its Charter/Duties and Obligations and Funding.**

**Royal Commission and Mining Warden Recommendations.**

**These Recommendation in particular relate to.**

1. **Methane Explosion Research**
2. **Spontaneous Combustion Research**
3. **Ventilation Structure Design to Maximise survival chances from a Methane Explosion, and allow Self Rescue, Aided Escape and Mines Rescue deployment in a timely and safe manner.**
4. **Hands on practical training for Underground Coal Statutory Positions to *gain experience in the correct methods of dealing with full scale underground mine fires and the hazards associated with the varying conditions that may occur***
5. **Collation of Information and Research into Spontaneous Combustion including Case Studies.**
6. **Keeping and making available to Mine Workers a Comprehensive and Up to Date Libraray.**

**SIMTARS has been in operation from 1986 and has had Tens, upon Tens, upon Tens of Millions of Dollars outlaid on its Buildings, Research Facilities and Equipment, its Full Time Researchers and of course the funding for actual Research Projects.**

**What did they have to show us for state-of-the-art research projects and gained insights into these areas?**

**There are numerous Research Papers that have been delivered at Ventilation and Mine Safety Conferences all over the world and include that annual Coal Operators Conferences run by the University of Wollongong in Wollongong NSW.**

**How many of these Research Papers are the Coal Mine Face Workers including Mine Deputies aware of?**

**I would say close to none.**

**If they were worthy of producing for the Grosvenor Inquiry they would have been.**

**SIMTARS besides Gas Chromatograph Analysis; produced absolutely NOTHING beyond Reports from ACARP Grants dating back to 1996 and the latest 2010.**

**Their own evidence demonstrates that “If there is not a Research Grant, no Research Occurs.”**

**The Reference Documents used in the SIMTARS REPORT, “Assessment of Gas Chromatographic Data; part of Inspectorate Investigation M20-0007 Grosvenor Explosion” are from 1999 to 2004**

***D.Cliff 1999***

***Cliff, David, David Rowlands, and Jon Sleeman. 2004. Spontaneous Combustion in Australian Coal Mines. Redbank: Safety in Mines Testing and Research Station.***

***D.Cliff, C.Hester, C.Bofinger. 1999. The Interpretation of Mine Atmospheres particularly for Spontaneous Combustion, Mine Fires and Explosions. Redbank, 4301, Queensland, Australia: Safety in Mines Testing and Research Station.***

**The Inquiry has heard that there are only Two Current Research Projects into Spontaneous Combustion, both funded by ACARP Grants.**

**Neither have any real application to spontaneous in Underground Coal Mines.**

**GREEN TIMBER should never be used for passive roof support due to shrinkage along making them ineffective and unsuitable.**

**SEAN MULLER**

***Q. Mr Hunter was referring you to timber, green timber, in particular, I think he referred to green timber underground. Are you aware of that work that's being done by Simtars at the moment in the development of what's ultimately to be an ACARP report?***

***A. Yes.***

**BEAMISH**

***TRA.500.022.0018***

***Q. And, for example, obviously the spontaneous combustion of coal is significant for the shipping industry?***

 ***A. That's correct.***

***Q. Is this methodology applied in that context as well?***

***A. No, it's not. They have their own devised test arrangement that has been signed off by the various countries. However, it is under severe review at this point in time.***

***There is an ACARP project reviewing the application of that test, primarily because it's creating a few issues for Australian coals.***

**The Inquiry has also heard that there is an urgent need to do more Research and has in effect asked the Inquiry to Recommend a number into Spontaneous Combustion, including from the effects of PUR, no doubt in large part funded by the Taxpayers of Queensland.**

**SIMTARS as historically has fallen well short of fulfilling any of its obligations to the Coal Mine Workers of Queensland for well over 20 years.**

**The Moura No 2 Wardens Inquiry made comprehensive Recommendations all accepted by Government and included in the SIMTARS obligations and duties.**

**MOURA NO 2 WARDENS INQUIRY (Windridge1995)**

***Evidence before the Inquiry indicated that there is a great deal of basic scientific and technical knowledge already available on the subject of spontaneous combustion of coal; on its causes, its detection and methods of dealing with it.***

***The regrettable fact is that much of this information is not widely known, and not readily available to mine operators.***

***It is recommended that funds be made immediately available to undertake an exhaustive international literature and data search, to critically review the literature and data and to prepare a comprehensive state-of-the-art report on the subject of spontaneous combustion in coal mines.***

***The investigation should include the collection and analysis of the available international information on field experiences with notable spontaneous combustion events in mines, on the circumstances of the occurrences and of the actions taken. This would establish a portfolio of case studies (against which the likely efficacy of different strategies could be assessed) for education and training purposes.***

***The Inquiry is not in a position to recommend who should be commissioned to undertake the project. SIMTARS might have the range of technical expertise required for the task but it may be profitable to have more than one organisation working on it conjointly. The project should have high priority and urgency as a necessary pre-requisite to the formulation of an Australian research strategy on spontaneous combustion.***

**All these Recommendations were accepted by the Government and the SIMTARS website boasts the areas of research and highly trained Research and Development Staff.**

**SIMTARS and the RSHQ have nor been able to demonstrate from any Report, Video, Witness or “Expert” that they do any of the relevant Research below.**

**The Literature Library does not work.**

**If you press the Link all that comes up is**

***This site can’t be reachedlibrary.dnrme.qld.gov.au took too long to respond.***

***Try:***

***https://www.rshq.qld.gov.au/simtars/about-us/about-simtars***

***Research themes***

***We conduct a broad range of commercially funded and non-profit research projects on themes such as***

***1. accident and incident investigation***

***2. large-scale and medium-scale spontaneous combustion testing***

***3. frictional ignition testing***

***4. mine explosion propagation and suppression testing***

***5. mine escape vehicle navigation systems***

***6. emergency response technology.***

***Simtars' highly trained R&D staff have a wealth of experience in mining safety technology and systems. We have specialist, purpose-built laboratory and testing facilities to deliver high-quality testing and research.***

***https://www.rshq.qld.gov.au/simtars/resource-library***

***Simtars mining information and resource library***

***Simtars’ library and resource collections comprise a rich and diverse range of books, journals and magazines, maps, rare books, e-resources and more.***

***In addition to our history collection, you will find resources on underground mining health and safety subjects, and occupational health and safety.***

***The library can provide specialist advice and assistance in sourcing information from the following:***

***National and international databases containing journals***

***Scientific publications, articles and reference materials***

***Mining operations, health and safety***

***Occupation and environmental hygiene and monitoring related information***

***Government links and affiliated organisations and businesses***

***Links to mining industry reports, conferences and presentations.***

**During the Grosvenor Inquiry, we have had a number Former SIMTARS Employees and other non SIMTARS Mining Consultants, try and inform the Inquiry about,**

**1) Methane Explosions and the mechanisms and energy required for ignition at standard atmospheric conditions, and**

**2) Gases such as Carbon Monoxide, Hydrogen, and Ethylene as escalating indicators of an active coal heating, and (page 2)**

**3) GOAF GAS FLOW STUDIES (page 3)**

**4) Spontaneous combustion propensity of virgin coal that has not had its inherent moisture removed as happens with the gas drainage and mining activities. (page 4)**

**THE ONLY AREA SIMTARS EMPLOYEES WERE IN RELATION TO GAS READINGS FROM GAS CHROMATOGRAPH.**

**Gas chromatograph “Experts” employed by SIMTARS have almost UNIVERSALLY been University Chemistry Graduates.**

**Historically being a Chemistry Graduate and Gas Chromatograph Operator has led several people to positions of Safety and Health Authority and Stature within the Underground Coal Mining Industry totally unrelated to their Tertiary Academic Qualifications**

**They also Universally have no Coal Mining Practical Experience**

**Thus, they cannot and hold no.**

1. **Recognised Competencies prerequisites for Statutory Positions,**
2. **Ventilation and Gas Competencies.**

**Some though have delivered and deliver courses for Management Level Competencies for Positions such as Ventilation, Spontaneous Combustion and Risk Management for the last 2 decades.**

**I myself was exposed to this during my Ventilation Officer Training and G3 Risk Management Training.**

**SIMTARS or an Experimental Station was first recommended in the 1921 Royal Commission into the Mount Mulligan Disaster.**

**Likewise, it was recommended by the Mining Warden after 1972 Box Flat Disaster and the 1973 Kianga Disaster.**

**It was not until 1983 that SIMTARS was created as an Organisation, and the facilities were not opened till 1986.**

**I have collated all the relevant Recommendation from Mount Mulligan Disaster through to Moura No 2 Disaster. (Attachment)**

**Functions including**

* ***methane explosion research***
* ***the practical demonstration of matters related to safety in coal mines and in giving mining personnel the opportunity of gaining first hand experience in the correct methods of dealing with full scale underground mine fires and the hazards associated with the varying conditions that may occur***
* ***a concise, easily read manual covering the cardinal principles of dealing with mine fires be produced and circulated.***
* ***That senior personnel from all branches of the coal mining industry be brought together in groups to be advised by a fully competent person on the developments in techniques in fire fighting, of new equipment available, of explosive mixtures generated by a fire, of the production of water gas and on kindred matters.***
* ***It is recommended that funds be made immediately available to undertake an exhaustive international literature and data search, to critically review the literature and data and to prepare a comprehensive state-of-the-art report on the subject of spontaneous combustion in coal mines.***
* ***The investigation should include the collection and analysis of the available international information on field experiences with notable spontaneous combustion events in mines, on the circumstances of the occurrences and of the actions taken. This would establish a portfolio of case studies (against which the likely efficacy of different strategies could be assessed) for education and training purposes.***
* ***The Inquiry is not in a position to recommend who should be commissioned to undertake the project. SIMTARS might have the range of technical expertise required for the task but it may be profitable to have more than one organisation working on it conjointly. The project should have high priority and urgency as a necessary pre-requisite to the formulation of an Australian research strategy on spontaneous combustion.***

**REASON 1**

**WHERE IS THE EVIDENCE THAT SIMTARS HAS DONE ANY RESEARCH INTO METHANE EXPLOSIONS?**

**NO ONE FROM SIMTARS produced a REPORT for the INQUIRY of gave EVIDENCE.**

**NOT ONE SECOND OF VIDEO FOOTAGE INTO EVEN ONE TEST FROM SIMTARS**

**Forensic Fire Investigators for residential and commercial structures gave evidence.**

**REASON 2**

**No matter what excuse is given about the events at Grosvenor and North Goonyella before it, the fact that the Confirmed Presence of Ethylene is not immediately recognised by any of the Management as an issue of immediate unacceptable risk and a grave danger cannot be creditable believed, let alone accepted.**

**With due respect we have known that for decades, that the presence of Ethylene is BAD.**

**Very, very, BAD.**

**3) GOAF GAS FLOW STUDIES**

**AGAIN, NO CURRENT SIMTARS RESEARCHER PROVIDED A REPORT OR EVIDENCE AT THE GROSVENOR INQUIRY.**

**Extensive Reference as made to the original studies conducted by SIMTARS as part of a Study into the Inertisation of a “Sealed Goaf” from 1996**

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**NOT ONE SECOND OF VIDEO FOOTAGE INTO EVEN ONE TEST FROM SIMTARS**

**Forensic Fire Investigators for residential and commercial structures gave evidence.**

**Grainy footage of simple methane ignitions from Britain and the US dating from the 1980’s were shown.**

**Videos of a PROPANE gas explosions in a small industrial building.**

**REASON 2**

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**With due respect we have known that for decades, that the presence of Ethylene is BAD.**

**Very, very, BAD.**

**North Goonyella Mines periodic spontaneous combustion events since 1998, have now resulted in**

1. **The loss of Four Different Sets of Longwall Face Equipment at North Goonyella, which all remain in abandoned and forever sealed areas of the Mine.**
2. **Numerous Mine Evacuation for TARP exceedances.**
3. **All involved the confirmed presence of Ethylene.**

**In 2018 the Management at North Goonyella did not take decisive action and make the decision to withdraw the workforce from Underground and seal the Section.**

**Prep seals have been successfully used since the year 2000, and last successfully for 7 North panel, Management made the conscious decision to not even erect Prep Seals in 2018 at any stage prior to the final Mine Evacuation.**

**Despite all the attempts at active goaf inertisation. the result was predictable and Reasonably Foreseeable. The result was.**

1. **Out of Control Heating.**
2. **Multiple Mine Evacuations from Spontaneous Combustion Evacuation TARPS being exceeded.**
3. **Final Mine Evacuation and the Nugent Section 167 Directive preventing workers returning Underground.**
4. **Activation for months of the full resources available from Qld Mines Rescue Service, including the GAG jet engine and Mutual Assistance**
5. **Mine Surface Offices, Control Room, Gas Monitoring Equipment, Workshops being abandoned due to being in the surface exclusion zone because they were directly adjacent to the Drift tunnel mouths.**
6. **Emergency Sealing of the drifts at the tunnel mouths using specially sourced Remote Control Earth Moving Equipment such as Dozers.**
7. **Attempts at remote sealing of the 9 Nth Panel via surface to seam boreholes.**
8. **Methane Explosion in 9 North Panel once the heating reached the ignition temperature of Methane.**
9. **Mine was lost, though pit bottom and part of the mains were eventually recovered.**
10. **Retrenchment of 95% of the Workforce.**
11. **Mine on Care and Maintenance.**
12. **Mine put on the Market and still on Market with NO declared interested buyers after more than 12 Months.**

**For reasons known only by the Mines Inspectorate and RSHQ, the Mines Inspectorate has not published any sort of Investigation Report and Findings, Recommendations, or distributed this information to the Industry so they can look at their own SHMS and take action to ensure they do not make the same mistakes as North Goonyella**

**The major historical problems were.**

1. **Having the Gas Detection Equipment (Gas Chromatographs) on the Mine Site.**
2. **Second was confirming the presence of Ethylene present in single parts per million.**

**Gas Chromatographs have been standard equipment on Queensland Mine Sites for nearly 30 years.**

**All the Expert Witnesses including Sean Muller and Andrew Self stated that the confirmed presence of Ethylene is a sign of an advanced ongoing heating that will not just disappear abate of its own accord.**

**(ATTACHMENT 2. Self and Muller Ethylene Comments)**

**The evidence given that the presence of Self in particular that it should be a Stand-Alone Trigger; with no “and” for CO make and should be included in a stand alone TARP for the Goafstream.**

**The confirmed presence of Ethylene means and demands Management must make firm concrete decisions and carry out actions that will LOWER the risk.**

**For example, Level 3 TARP of evacuating the Mine.**

1. **Gases such as Carbon Monoxide, Hydrogen, and Ethylene as escalating indicators of an active coal heating, and**

**The most relevant parts for the Spontaneous Combustion evidence is that the confirmed presence of ETHYLENE is produced at Coal Temperatures of not much over 100 Degrees C.**

**It is a sign of an Advanced Heating that has an extremely high probability of progressing to a point of being able to ignite Methane and cause a Methane Explosion**

**With due respect we have known that for decades, that Ethylene is BAD; Very, Very BAD**

**All the Expert Witnesses including Sean Muller and Andrew Self stated that the confirmed presence of Ethylene is a sign of an advanced ongoing heating that will not just disappear abate of its own accord.**

***Q. What about the presence of ethylene? That wasn't one of the four that you listed a moment ago. How significant is the detection of ethylene in gas samples that have come from the goaf?***

***A. This is a very wide subject, as I think you know. Going back, early stages of my career, if we identified ethylene, we knew we had a major problem and we moved quickly.***

***It was absolutely acknowledged that if ethylene was detected at all, then we had a serious problem.***

***Modern era, better gas chromatographs, et cetera, we can detect ethylene down to lower concentrations, so the fact that you've detected ethylene is not as probably obvious now as it was in 1980.***

***However, ethylene does not come off at low temperatures. You don't get ethylene, generally speaking, at much less than 100 degrees Centigrade. I said earlier on that at 100 degrees Centigrade, I think it's all over, we've lost this battle, so we're really into damage control.***

**ANDREW SELF**

**As well as that, we have also known that CO and then Hydrogen are detected at lower temperatures.**

**The main problem was being able to detect Ethylene.**

**The Moura No 4 Wardens Inquiry from 1986 mentions Ethylene being detected by the SIMTARS gas chromatograph when it arrived and was deployed on site, after being flown up from Brisbane/Amberley.**

**No mines had their own gas chromatographs in 1986. They all do now.**

**The Moura Wardens Inquiry also recommended.**

***Various opinions were expressed at the Inquiry as to the availability of a suitable alternative to the chromatograph for the determination of hydrogen content.***

1. **GOAF GAS FLOW STUDIES**

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***Q. Dr Ren, you're an associate professor at the University of Wollongong where you're situated today; is that right?***

***A. Correct.***

***Q. And you're attached to the School of Civil, Mining and Environmental Engineering?***

***A. Yes.***

***Q. Have you had that position since 2009?***

***A. That's correct.***

***Q. Relevant to today's topic, you've participated, I think some years ago, in a number of ACARP projects that considered the application of inertisation to active goafs and, in particular, the two projects in 2005 and 2010; correct?***

***A. Yes.***

***Q. And have you retained since then a professional interest in that subject?***

 ***Yes, I do.***

***Q. There was quite a lot of time and money spent on that 2005 project; am I right?***

***A. Yes, that's true.***

***Q. It spanned over a two-year period?***

***A. Yes.***

***Q. According to the abstract from the report, the program was one to develop and demonstrate effective proactive inertisation strategies. Can I ask you, what was the impetus behind a project of that expense and magnitude?***

***A. I think at that time in Australia we had done quite a lot of goaf inertisation already. It was coming to the point that we need to further optimise the inertisation strategy, and, as a result, I think ACARP supported that project. I can't remember the exact amount of the money, but it's quite substantial, say something like $450,000.***

***Q. To that point, had there been use made of inertisation beyond its more established use in sealing operations?***

***A. Prior to this project, there was another ACARP project with the aim of optimising the process of seal-off***

***Q. This report was published in 2005, and I think since then you and Dr Balusu have also published a conference paper in 2009 on a similar subject, or at least derived from the ACARP project?***

***A. Yes.***

***Q. Could you perhaps bring us up to date, then, since the 2005 project, since your conference presentation in 2009, as to the take-up of proactive inertisation in the industry?*** ***TRA.500.023.0015***

***A. I think since the last project we mentioned and this hearing, quite many of the outcomes from that project have been adopted or at least considered to a certain extent by people on site when they are designing their inertisation system. Obviously it has been quite some years and there are changes in the mining conditions.***

***For example, I believe in Queensland there's lots of high-production mines, they are operating not only a spon com pit but also high gas emissions.***

***So in facing the challenge of spon com, you deal with spon com on one hand, and on the other hand you have to deal with very high gas emissions. So there are studies, field trials still going on, for example, at the University of Wollongong we continue to do some modelling studies trying to better understand other parameters in the equation, for example, high gas emissions or larger longwalls, what sort of inertisation strategies you could perhaps adopt on the basis of previous studies and things like that.***

**DR TING REN (University of Wollongong).**

1. **Spontaneous combustion propensity of Coal that has had inherent moisture removed as happens with the gas drainage and mining activities.**

**This in a lot of ways was some of the most disappointing evidence at the Inquiry.**

**After nearly 30 years of Government and Company funded Research, we get told by Dr Beamish that they are still using the same basic R 70 small scale tests that were done 20 to 30 years ago.**

***the low ash roof coal is unable to reach thermal runaway, and so under a normal mine ambient temperature condition, without an external heat source, it can't reach that thermal runaway point.***

***TRA.500.022.0036***

**I do not pretend to have great knowledge of the tests done, but surely Dr. Beamish is comparing apples and oranges.**

**The coal in LW 104 has allegedly had extensive gas drainage of the Goonyella Middle Seam done.**

**Gas does not release from the coal until the water (inherent moisture) has been drained from the coal.**

**Therefore, the direct relationship Dr. Beamish is basing his whole hypothesis on needs examination.**

**The coal in the goaf as it is self-heating, does not have to remove much, if any inherent moisture.**

**Therefore, the energy is retained in the coal and any cooling effect from inherent moisture does not exist.**

***Q. I'm not suggesting that you have had an opportunity to digest it in any great detail. In your view, should there be more testing of this product, preferably on a larger scale than has been done so far?***

***A. Most definitely. That was one of the conclusions or recommendations I really came to in my report, that there is a serious need to actually look at more bulk-scale testing. And that was a follow-on from the review I had done of the ACIRL report. They had started to do that sort of bulk-scale testing, but they hadn't pursued it beyond those initial trials that they did.***

***Q. When you say "bulk scale testing", does Simtars have the capacity to do that sort of testing?***

***A. Well, they do at the really bulk scale, yes. They have a 16 cubic metre chamber that has been used for ACARP spon com projects in the past to look at heating development and what takes place with the gas evolution associated with heating development.***