NOTICE 2604 OF 2003

Safety in Mines Research Advisory Committee (SIMRAC) on behalf of Mine Health and Safety Council (Council)

Invitation to submit project proposals

SIMRAC, a permanent committee of the Mine Health and Safety Council, was established in terms of the Mine Health and Safety Act (29/1996) to conduct research and surveys regarding, and for the promotion of, health and safety in the South African mining industry. Suitably qualified agencies and/or persons are invited to submit proposals in response to the project specifications in this Notice. In soliciting research projects for the 2004/2005 research programme, the Council has the following goals:

- to indicate the current research interests and the areas prioritised for research to commence in the 2004/2005 cycle;
- to invite research ideas in response to these defined priority areas of research; and
- to invite applications for postgraduate funding[1] for research which will promote health and safety within the South African mining industry.

A consultative process has resulted in the Council formulating a co-ordinated, long-term health and safety research programme and identifying priority areas for research to commence in the 2004/2005 cycle. The intention is to conduct *fewer but more comprehensive and longer-term projects that may extend over several research cycles*. Researchers and agencies are invited to submit research proposals for the research projects indicated. Proposed research must be well-designed with a detailed methods section, be ethical *and* must have the potential to add to existing knowledge, practice or technology, involve the end users and implement/transfer outputs. Research teams must have the specified skills.

Submission of Proposals

1. Proposals must be submitted in accordance with the prescribed format. Contact Cheryl Jones at telephone 011 358 9180, fax 011 403 1821, e-mail cjones@simpross.co.za or visit the SIMRAC website http://www.SIMRAC.co.za to download the submission template.

2. Queries regarding the aims and objectives of the thrusts listed in this notice can contact the following persons:

Rock Engineering:	Duncan Adams at	dadams@simpross.co.za	(011 358 9184)
Machinery Engineering:	Alec Gumbie at	agumbie@simpross.co.za	(011 358 9186)
Occupational Health:	Mary Ross at	mross@simpross.co.za	(011 358 9183)
Organisational issues:	Paul vd Heever at	pvdheever@simpross.co.za	(011 358 9180)
SIMRAC Chairperson:	Piet Botha at	ptapbo@mepta.pwv.gov.za	(012 317 9303)

3. Proposers are requested to take note of past work in the different thrust areas. (Details are available on website http://www.SIMRAC.co.za)

[1] Guidelines for the Council postgraduate research and Ethics Guidelines are obtainable from nwoods@simpross.co.za

4. The closing time and date for the receipt of the proposals is **12:00 on Friday 7 November 2003.** Late entries will NOT be accepted.

5. A proposal in the correct format can be e-mailed to cjones@simpross.co.za prior to the closing time and date. Alternatively, two copies of each proposal, in a form suitable for photocopying **plus** a disk or CD with the proposal in MS Word or Rich Text Format, should be deposited in the repository labeled "*Proposals*" at the Council's offices[2].

6. The Council may at its sole discretion, decide to recommend the acceptance, rejection or amendment of any proposal and to commission the team to develop the proposal on the basis of which the contract is awarded. The Council shall not furnish any reasons for its decisions regarding proposals.

7. Every proposal accepted by the Council would be subject to a set of Terms and Conditions, which on acceptance of the final detailed proposal will form part of the contract applicable to the project. All prospective proposers should peruse a set of the standard terms and conditions prior to submitting a proposal. A copy of the draft standard terms and conditions is attached to this Notice. It should be noted that we are in the process of updating the standard terms and conditions but no substantial changes to the content are envisaged.

8. In compiling proposals, prospective proposers should provide details of methods, identifiable outputs and estimated costs as indicated.

9. The Council will endeavour to solicit the services of South African organisations to undertake projects, but will consider proposals from overseas-based organisations if expertise, cost considerations and local capacity building components compare favourably.

10. The Council requires full disclosure regarding all subcontracts included in the proposal.

11. Where an output includes a device, mechanism, procedure, or system capable of being applied in the mining environment, a prospective proposer shall include in the proposal an output which suggests how the outputs in question might best be applied in practice. In drafting proposals, all prospective proposers should bear in mind the potential for technology transfer and phasing the project as indicated.

12. Each successful proposer may, during the contract period or shortly after its completion, be required to provide:
    - A competent spokesperson with appropriate materials to make not more than two separate presentations, on an annual basis for the duration of the project, and
    - A technical paper on the project for publication and/or a poster presentation, without additional remuneration or reimbursement of costs.

    These activities must be detailed and costed within the project.

13. Where relevant, proposers may obtain copies of earlier project reports and other information from the website address or from contacts listed (See paragraph 1 and 2).

14. Proposers are advised that all Council projects should be submitted to language editing and may be subjected to technical and financial audits. Funding for editing and audits should be included in the proposal budget.

15. Proposers should substantiate and cost separately, all proposed travel outside the borders of South

[2], 2nd Floor, Braamfontein Centre, 23 Jorrisen Street, Cnr. Bertha Street, Braamfontein

Africa in connection with the project, and provide details of all expenses such as travelling and subsistence.

16. All proposed project costs must be expressed in South African Rands. Fluctuations in the exchange rate and purchase of forward cover should be considered when costing the proposal.

17. The Council will take all reasonable steps to ensure that confidentiality of proposals is maintained during the adjudication process. If a proposal is not accepted within the programme, the Council may invite additional proposals on the topic.

18. No unsolicited proposals will be included in the programme for 2004/5.

Objectives of the Council research programme

The **objectives** of the Council in commissioning health and safety research, for both general and commodity-based projects, are to:

- Obtain and evaluate information to establish evidence-based risk assessment, standard setting and health and safety performance measurement;
- Develop techniques or guidelines to prevent, reduce, control or eliminate risks;
- Develop and pilot innovative ideas and procedures, where appropriate, to eliminate, reduce or control risk;
- Obtain information on the extent of work-related ill health;
- Identify, develop and improve sampling and measurement techniques to detect environmental hazards and assess personal exposure;
- Understand the aetiology and identify and evaluate best-practice screening, diagnostic and treatment interventions to reduce the impact of occupational disease;
- Evaluate the effectiveness of control interventions;
- Understand risk perception, attitudes and behaviour related to health and safety and promote best practices in hazard recognition and procedural conformance;
- Empower its statutory committees to formulate policy, expedite research aimed at improving the health and safety in the South African mining industry; and
- Collaborate with national and international initiatives and research to promote health and safety in the mining industry.

The **criteria** by which proposals will be evaluated include:

- **Added value and impact** – the Council supports research which can contribute significantly to the improvement in the health and safety of South African miners;
- **Value for money** – the Council supports cost-effective research;
- **Innovation** – the Council welcomes new approaches or new areas of focus for research leading to technologies or best practices to improve health and safety;
- **Excellence** – the Council demands excellence, particularly in the methods employed to conduct research, be it quantitative or qualitative, and hence will consider the track record of the proposer/s for expertise and delivery (quality, time and to budget);
- **Use and development of research skills** – the Council requires research teams to possess the skills relevant to the success of the project and also favours projects which assist in developing research capacity, particularly in previously disadvantaged groups;
- **Collaboration** - the Council places a high priority on collaboration between researchers and the "teams of excellence" approach. Thus, the means of soliciting research proposals is intended to stimulate collaboration

between centres of excellence and individual experts in order to optimise the use of the Council funding and the research outcomes.

- **Development of key indicators** – the Council recognises the challenge in assessing performance and improvement in health, as opposed to safety, in the mining industry. There is a lack of suitable occupational health (OH) indicators and baseline data. Thus innovative and robust research to develop relevant OH indicators and baseline values will be favourably considered.

The Council's research and implementation programme consists of occupational health and safety, addresses occupational medicine and hygiene, rock engineering, engineering and machinery, behavioural issues and technology transfer processes.

Each proposal must:

- Address only the research topic advertised and this must be specified;
- Be in the format indicated and the template specified using Word or Rich Text format; and
- Be phased as indicated in the project scope.

Research Contract

The Mine Health and Safety Council

Memorandum of agreement entered into by and between :

The Mine Health and Safety Council
(A body incorporated in terms of the Mine Health and Safety Act (No 29 of 1996)) hereinafter referred to as the MHSC

for the execution of a project through its permanent committee the Safety in Mines Research Advisory Committee (SIMRAC) herein represented by the Chief Inspector of Mines, duly authorised hereto

and

Name of contractor/organisation
(hereinafter referred to as the 'Contractor')

Identity or registration number:.....hereby represented by
.....
identity number: .....duly authorised hereto

Whereas the Contractor herewith submits to the MHSC the Project proposal ('the Proposal'), of which the original is initialled and attached marked Schedule A hereto, to be executed under the aegis of SIMRAC;

Now therefore the parties agree as follows:

1. The terms and conditions set out herein apply to the Proposal, dated..... and entitled .....form part of the agreement.

2. The persons signing the Proposal on behalf of their respective principals, warrant their authority. (Attach resolution of authorisation, if the contractor is not a natural person.)

3. Before the Contractor commences work on the project, he/she must inform SIMRAC in writing timeously of the date on which he/she proposes to start work and provide details of the Project Schedule, and (if applicable) provide details of any proposed changes in the initial Project Schedule submitted and must submit a clearance certificate from an ethics committee acceptable to SIMRAC, if required, to conduct the project.

4. Subject to Clause 11, the contract price shall be paid as follows:

4.1 Projects which extend over a period of up to three months
Payment for Projects which extend over a period of up to three months will be negotiable. All payments will be subject to acceptance by SIMRAC of progress reports. Thirty per cent of the total contract amount will be retained until acceptance by SIMRAC of all project deliverables.

4.2 Projects which extend over a period of up to one year

- Ten per cent of the total contract amount on the commencement date
- Fifteen per cent of the total contract amount upon receipt of a Final Report. The Final Report shall be in a form specified by SIMRAC and prior to payment, SIMRAC must be satisfied that the report is of acceptable quality in terms of its scope, accuracy and relevance. From time to time SIMRAC may specify certain other criteria that must be met in the Final Report
- Fifteen per cent of the total contract amount on acceptance by the Chief Inspector of all Project deliverables
- The remainder of moneys will be paid in equal amounts, at quarterly intervals of the Project duration, upon acceptance by SIMRAC as referred to in Clause 9 and Clause 10 hereof.

Payment schedule:
10% (start-up); 4 times 15% (quarterly progress); 15% +15% (final report)

4.3 Projects which extend over a period of longer than one year
The annual contract amount shall be paid over the duration of the Project as follows:

Year 1 and subsequent years

- Ten per cent of the total annual contract amount on approval (or continuation) of the project
- The remainder of the total annual contract amount will be paid in equal quarterly amounts upon acceptance by SIMRAC of progress reports as referred to in Clause 9 hereof.

Payment schedule
10% (acceptance or continuation); 4 times 22.5% (quarterly progress)

Final year:

- Ten per cent of the total annual contract amount on approval of continuation of the project
- Sixty per cent of the total annual contract amount will be paid in equal quarterly amounts, upon acceptance by SIMRAC of progress reports as referred to in Clause 9 hereof
- Fifteen per cent of the total annual contract amount on receipt of a Final Report of acceptable quality , scope, accuracy and relevance
- Fifteen per cent of the total annual contract amount on acceptance by SIMRAC of all Project deliverables

Payment schedule
10% (start-up); 4 times 15% (quarterly progress); 15% +15% (final report)

5. The MHSC shall effect payment in respect of invoices submitted in terms of Clause 4 within 14 days of approval by SIMRAC of the quarterly progress reports and financial statements referred to in Clause 4 hereof. SIMRAC shall inform the Contractor if payment has not been approved and shall supply reasons therefore. Payments will only be made by the MHSC against the submission to the MHSC of detailed invoices by the Contractor and on verification and approval thereof by SIMRAC. Where required by the Value Added Tax Act these shall be Tax invoices. No payment shall be effected by the Mine Health and Safety Council unless it has received valid VAT invoices where necessary in terms of the Value Added Tax Act.

6. The Contractor shall maintain a complete set of accounts relating to the contract, which shall include full details of all disbursements made in connection with the contract. All such documentation shall be made available for inspection on request during normal business hours to authorised representatives of the MHSC and/or SIMRAC, and shall be summarised in financial statements accompanying quarterly and final project reports, as well as each invoice

7. In the event of the total cost of the project exceeding the contract price, the Contractor shall be responsible for any additional costs.

8. Where project proposals are submitted by persons, agencies or sub-contractors domiciled outside the Southern Africa Common Monetary Area, all monetary amounts recorded in financial statements and progress reports must be expressed in both the foreign currency and its equivalent in South African Rand converted in terms of the South African Statement of Generally Accepted Accounting Practice number AC112 or International Accounting Standard IAS21. All payments shall be made in South African Rand and the MHSC will not be responsible for changes in costs attributable to changes in exchange rates.

9. Within 2 (two) weeks of the end of each successive quarter the Contractor shall submit to SIMRAC a quarterly progress report recording work completed and progress with the project in the preceding quarter, providing sufficient detail to allow a quantitative assessment by SIMRAC of actual progress made by the Contractor. Each such quarterly report must be accompanied by a financial statement detailing all expenditures and costs incurred in connection with the project in the preceding quarter. SIMRAC may specify the format of the reports, and the Contractor shall submit his reports in the specified form.

10. Within 6 (six) weeks of the completion of the project the Contractor shall submit a final project report, containing an overall review of the project and conclusions based on the entire project, for consideration by SIMRAC; such final report must be accompanied by a comprehensive and detailed financial statement covering the entire project, together with a copy of the project asset register referred to in Clause 22 hereof.

11. Reasons for delays in completion of projects and submission of final reports must be communicated to SIMRAC. Extensions will only be considered under exceptional circumstances, which must be fully justified in a timeous, formal application for extension, in writing, to the relevant committee. In the event of unsubstantiated delays and partial completion of projects, SIMRAC will undertake a contractual audit to determine the degree of completion and assess the value and currentness of the outputs and revise the payment schedule (Clause 4), accordingly. Each case will be assessed on merit but, if no further extensions are granted, the following actions will be initiated:

    11.1 A registered letter from SIMRAC, on behalf of the MHSC, will be forwarded to the project leader demanding that the contractual project deliverables be reported on within 30 days of receipt of the letter.

    11.2 The project leader will be given the opportunity to present the case to the committee.

    11.3 If no response is received, the MHSC will forward a Final Demand notification with a further 30-day extension period to the Contractor. If this demand is not met:

        11.3.1 Notification of Project Cancellation will be forwarded from the MHSC to the Contractor.

        11.3.2 Legal proceedings may be instituted against the Contractor for reimbursement of funds, based on the degree of contractual compliance of project deliverables and past payments.

    11.4 No further outstanding payments will be made until the project deliverables have been accepted by the responsible committee.

11.5 SIMRAC may elect not to award any new project to the Contractor and may elect not to award any new project in respect of which the person referred to in 11.1 is to act as project leader.

11.6 SIMRAC shall be entitled to impose, at its discretion, a penalty for late delivery of any part of the project in accordance with the following scale:

3 to 6 months delay: 5 percent; or
6 to 12 months delay: 15 per cent; or
more than 12 months delay: 25 per cent

of the amount that would have been payable for that part of the project had such part been delivered timeously in accordance with clause 4.

11.7 Decisions and actions and discussions concerning late delivery will be fully documented and forwarded to the project leader.

12. All reports, asset registers and invoices submitted to SIMRAC in terms of this contract shall where applicable comply as regards content and format with the requirements of SIMRAC as formulated from time to time.

13. At any time during, or within a reasonable period after, the execution of the project, the Contractor shall on request by SIMRAC, and without any payment in addition to the contract price, prepare a formal paper on the subject matter of the contract and provide a knowledgeable and competent speaker to present the paper, if appropriate, with audio-visual aids, to an invited audience of persons employed in or associated with the South African mining industry. If the contractor fails to comply with the request by SIMRAC in terms of this clause, SIMRAC at its sole discretion, may impose a penalty on the Contractor up to a maximum amount equal to 5% (five percent) of the total contract price.

14. At any time during the Contract period, authorised SIMRAC representatives shall be entitled, by prior arrangement with the Contractor, to inspect work in progress on the project, and to request up-to-date reports on the project or on specific aspects of the project.

15. The Contractor shall not use, disclose or in any other way use or disseminate the Confidential Information of the MHSC or SIMRAC save as may be necessary in the ordinary, normal and regular course of business or as is authorised by the MHSC or SIMRAC. The term "Confidential Information" shall include, but shall not be limited to, all secret knowledge, trade secrets, information (including any and all technical, financial and marketing information), written instructions, drawings, notes, memoranda, samples, devices, demonstrations, know-how, manufacturing specifications or techniques, research and development work together with results, analysis, interpretation, conclusions and the applicability thereof that may be conducted by or on behalf of the MHSC, and other materials of whatever description, in which the MHSC or SIMRAC has a proprietary, pecuniary or other interest in such information remaining confidential.

16. Unless authorised to the contrary in writing by the MHSC, the Contractor shall never use Confidential Information except for the benefit of the MHSC and the Contractor shall remain bound to keep such Confidential Information secret at all times after the termination of the Proposal. The Contractor will not divulge or permit to be divulged to any person any aspect of such Confidential Information otherwise than for the purposes of the Proposal.

17. All documentation furnished to the Contractor by the MHSC or SIMRAC pursuant to the Proposal will remain the property of the MHSC as the case may be, and upon termination of the Proposal will be returned to the MHSC or SIMRAC. The Contractor will not make copies of any such documentation without the prior written consent of the MHSC.

18. All intellectual property rights arising out of, or derived from, the project contemplated in the Proposal shall vest in the MHSC; provided that the MHSC may, upon written application by the Contractor and acting on the advice of SIMRAC, grant permission in writing for the said intellectual

property rights to be published, utilised or exploited commercially by the Contractor, or others, subject to such terms and conditions as the MHSC may in its sole discretion specify. In so far as may be necessary in law, the Contractor hereby assigns to the MHSC all such intellectual property rights to the MHSC, and the Contractor hereby waives in favour of the MHSC any so-called moral rights which may accrue to the Contractor in any such intellectual property. The Contractor undertakes to sign all documents and to do all things that may be necessary to record and perfect the transfer of the intellectual property rights into the name of the MHSC.

19. The contractor shall on request in writing by the MHSC or SIMRAC make available to the MHSC or SIMRAC, as the case may be, all information, including but not confined to, raw data, statistical analyses, formulae, plans, photographs, internal and external reports, and the like obtained, devised or developed by the Contractor or a sub-contractor in the course of performing the project in question, and shall furthermore assist the MHSC to the best of its ability, if the MHSC should, in its sole discretion, apply for the registration of a patent or design based on studies undertaken in terms of the contract, the registration being at the expense of the MHSC and wherever the MHSC may choose to obtain such protection.

20. All physical equipment, instrumentation, and the like purchased by the Contractor for use in connection with, or as part of the project, and/or charged to the MHSC, shall at all times remain the property of MHSC. The Contractor may make an offer to purchase such goods for his own use. MHSC, may sell or dispose of such goods to the Contractor, or others, subject to specific terms and conditions.

21 The provisions contained in Clause 20 above shall also apply, subject to the necessary changes having been made, to intellectual property, such as computer programs and software, patents, and designs purchased by the Contractor for use in connection with the project.

22 All assets with an initial value of more than R10 000 purchased by the Contractor in connection with or forming part of the contract, and/or charged to MHSC, shall be recorded in a project asset register which shall at all relevant times be available for inspection by SIMRAC or its representative. All such assets shall be kept secure, insured and maintained in good order and condition by the Contractor until such time as a decision is made by the MHSC concerning the disposal of such assets.

23. Full details of any contractual relationship between the Contractor and a sub-contractor shall be supplied to SIMRAC, and the sub-contractor shall be required to maintain, make available and submit financial statements to the Contractor for inclusion with the quarterly and final project reports and financial statements submitted to SIMRAC.

24. The Contractor shall not be entitled to cede nor transfer the rights in terms hereof without the written consent of MHSC, and the Contractor shall not replace strategic personnel nor strategic subcontractors as recorded in the Proposal without first consulting MHSC and amending the agreement and proposal in accordance with Clause 29 hereof.

25. The parties agree that on the default of either party, the other party may call upon the defaulting party in writing to remedy the default within a reasonable time, failing which the aggrieved party shall be entitled to terminate the contract or apply for specific contractual performance, without exercising such party's right to claim damages.

26. Disputes concerning the performance of the project shall be handled as specified in Addendum 1.

27. In the event of any party incurring legal costs to enforce its rights in terms hereof, the successful party to the resolution of the dispute, shall be entitled to recover all costs from the other party on an attorney and own client scale.

28. The Proposal, the MHSC's letter of acceptance, and the terms and conditions set out herein shall, for purposes of interpretation, constitute a single contract, and replaces any other agreement relating to this project.

29 On acceptance of this agreement and the Proposal, no changes or amendments shall have any force or effect unless recorded in writing and signed by, or on behalf of, the parties.

30. The contract shall remain in force until such time as both parties have performed their respective obligations under the contract; provided however that the MHSC's rights in respect of intellectual property rights, physical assets held by, or under the control of the Contractor and confidentiality rights as referred to in clauses 15 and 16 , shall continue after the termination of this agreement.

31. While engaged in the performance of the contract the Contractor shall comply with all relevant provisions of South African common law and statute law, including, but not confined to, measures prescribed in the Employment Equity Act, Act No. 55 of 1998.

32. Notwithstanding Clause 28 above (compliance with SA law), the Contractor shall endeavour to promote, to the best of its ability, the employment of previously disadvantaged persons, and, without being limited thereto, specifically by employing post graduate students to enhance the abilities of such persons at all levels while performing the contract.

33. The Contractor herewith guarantees to the MHSC that the execution of the Project will be of the highest professional standards and expertise, and that any strategic or key personnel or experts named in the proposal shall at all times be committed to the proposal and the project.

34 Any reference to a quarter in this agreement shall mean a period of three months commencing 1 April, 1 June, 1 September and 1 December each year

35. Any extension granted under this contract shall not set a precedent, nor shall it be construed as a waiver of the rights provided in terms of this contract.

36. The parties choose and herewith accept the following addresses for all purposes and notices in connection with the project and this agreement:

36.1 The MHSC:

of: 2nd Floor
Braamfontein Centre
23 Jorissen Street
Braamfontein
E-Mail: cjones@simpross.co.za

Private Bag X 63
Braamfontein
2017
Tel no: (011) 358 9180
Fax no.(011) 403 1821

36.2 The Contractor:

36.3 The parties agree that e-mail is an acceptable form of service. Proof of service will be constituted by a "confirmation of delivery" e-mail that is sent to the sender of the e-mail by the e-mail service provider.

36.4 Service by telefax is also an acceptable form of service in terms of this agreement. Confirmation of delivery will be constituted by the fax transmission slip.

36.5 Any mail that is sent by registered post shall be deemed to be received (3) three days after posting and proof of posting will be constituted by the registered post slip.

Settlement of Disputes

1. Disputes
   1.1. Should any disputes or differences whatsoever arise at any time between the parties concerning this Agreement, or its constructions or effect or as to the rights, duties and/or liabilities of the parties or either of them under or by virtue of this Agreement or otherwise, or as to any matter in any way arising out of the subject matter of this Agreement, then either party:
      1.1.1. may declare a dispute by delivery of the details of the dispute to the other party; and
      1.1.2. request that the dispute be referred by the parties, without legal representation, to mediation by a single mediator at a place and time to be determined by the mediator.
2. Mediation
   2.1. If, within 30 days of the delivery of the declaration of a dispute, the parties have not agreed to accept mediation then the dispute shall be determined by arbitration as prescribed below.
   2.2. If the parties agree to mediation then the mediator shall be
      2.2.1. selected by agreement between the parties;
      2.2.2. or failing agreement, nominated on application by either party to the president, for the time being, of the Law Society of the Northern Provinces.
   2.3. The mediator shall, at his entire discretion, determine whether the representations to him shall be made in the form of written and/oral representations and in which manner the mediation will take place, providing that, in making these determinations, he shall consult the disputing parties and be guided by their desires.
   2.4. The costs of the mediation shall be determined by the mediator and shall comprise:
      2.4.1. the mediator's expenses; and
      2.4.2. a fee which shall have been previously agreed by the parties or in the absence of agreement, a reasonable charge determined by the mediator.
   2.5. The costs shall be borne equally by the parties and shall be due and payable to the mediator on presentation to them of his written account.
   2.6. Each party shall bear the costs of any legal advise that party may have obtained in connection with the mediation.
   2.7. If either party to this Agreement is unwilling to accept mediation or should the mediator declare the parties unable to resolve their dispute by mediation, then either party may, by written notice delivered to the other (within 30 days of the declaration of the dispute if there be no mediation, or within 30 days of the mediator declaring the parties unable to resolve their dispute by mediation), require that the dispute be referred to arbitration.
3. Arbitration
   3.1. The parties hereby record that should any dispute or difference which may arise at any time between them not be resolved by mediation in terms of this clause the parties shall, unless otherwise herein expressly provided, refer the matter to arbitration before a Johannesburg attorney or advocate having not less than ten years standing, subject to the following conditions:
      3.1.1. The arbitration shall be held on an informal basis and shall not be subject to the Arbitration Act.
      3.1.2. The arbitration shall be held as soon as practicable within the city of Johannesburg.
      3.1.3. The arbitrator shall be entitled to dispense with such rules of evidence as he deems reasonable.
      3.1.4. The decision of the arbitrator shall be final and binding on both parties.
      3.1.5. the costs of the arbitration shall be awarded against the losing party, alternatively the arbitrator shall have the right to award costs on such basis as he deems fit having regard to the circumstances of the arbitration.
4. Legal proceedings
   4.1. If for any reason the arbitration proceedings have not commenced within 90 days of the one party advising the other in writing that a dispute as arisen, either party may elect to dispense with the provisions of this Agreement relating to mediation and arbitration and may institute proceedings in the Witwatersrand Local Division of the High Court of South Africa.

Details of Proposals

SIM 04-02-01

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
Evaluation of Rock Engineering implementation on South African mines

MOTIVATION
The scope and depth of SIMRAC research in rock engineering is impressive. However, the application of the findings of research is less impressive. Whether it is that the findings are not true, not relevant or not implemented needs to be clarified. A project that evaluates mining in terms of best rock engineering practice and gaps that exist in the knowledge will be useful for setting future research directions and documenting what works best in different mining conditions.

PRIMARY OUTPUT/S OF RESEARCH:
Comprehensive report of rock engineering implementation on mines backed up by measurement and observation.
Rock Engineering input to rock mechanics departments on mines.
Identification of gaps in knowledge for further research
Current practice in rock engineering

POTENTIAL IMPACT OF RESEARCH
The rock engineering knowledge and understanding of the important rock related issues is fairly comprehensive in South Africa. However, statistics suggest that much of the knowledge is not applied. A survey of industry will identify impediments to implementation as well as best practices. The team will be in a position to share best practice with mining personnel during their survey and provide much needed monitoring and measuring know-how. Gaps will emerge in RE knowledge that will help to direct further research

SCOPE OF RESEARCH
Focus areas:
Gold and platinum underground mining sectors
Facebursts and rockfalls
Stopes and tunnels
The research will be conducted in phases as shown:

Phase 1
VCR and Merensky Reef
The following will be considered in assessing implementation:
Reference to and use of SIMRAC and other rock engineering knowledge/practices
Effectiveness of support, including measurements of their performance against stope closures
All incidents of rockfalls and/or rockbursts
All rock related losses associated with the monitoring site
Analysis of the rock engineering aspects of the stope with reference to the geotechnical conditions
Identify gaps in rock engineering knowledge/practices
Identify positive rock engineering practice that benefits safety and production
The mining layout including the influence of leads and lags between mining faces
The impact of human factors on rock engineering aspects

Phase 2

Carbon Leader and UG2
The following will be considered in assessing implementation:
Reference to and use of SIMRAC and other rock engineering knowledge/practices
Effectiveness of support, including measurements of their performance against stope closures
All incidents of rockfalls and/or rockbursts
All rock related losses associated with the monitoring site
Analysis of the rock engineering aspects of the stope with reference to the geotechnical conditions
Identify gaps in rock engineering knowledge/ practices
Identify positive rock engineering practice that benefits safety and production
The mining layout including the influence of leads and lags between mining faces
The impact of human factors on rock engineering aspects

Phase 3
Vaal Reef & Basal Reef
The following will be considered in assessing implementation:
Reference to and use of SIMRAC and other rock engineering knowledge/ practices
Effectiveness of support, including measurements of their performance against stope closures
All incidents of rockfalls and/or rockbursts
All rock related losses associated with the monitoring site
Analysis of the rock engineering aspects of the stope with reference to the geotechnical conditions
Identify gaps in rock engineering knowledge/ practices
Identify positive rock engineering practice that benefits safety and production
The mining layout including the influence of leads and lags between mining faces
The impact of human factors on rock engineering aspects

Phase 4
Tunnels in gold and platinum mines
The following will be considered in assessing implementation:
Reference to and use of SIMRAC and other rock engineering knowledge/ practices
Effectiveness of support, including measurements of their performance against deformation
All incidents of rockfalls and/or rockbursts
All rock related losses associated with the monitoring site
Analysis of the rock engineering aspects of the tunnel with reference to the geotechnical conditions
Identify gaps in rock engineering knowledge/practices
Identify positive rock engineering practice that benefits safety and production
The mining layout
The impact of human factors on rock engineering aspects

Duration:

Phase 1	12 months
Phase 2	12 months
Phase 3	12 months
Phase 4	12 months

Potential for application:
The collective rock engineering experience of the mines has been reduced over the past few years. There is a need for experience to be shared widely in the industry. This project would allow greater exposure of researchers to underground production situations while creating opportunities for the mine staff to have access to experts. On the job transfer of technology would occur on the mines where the work is conducted and to the wider mining fraternity through good documentation and communication.

REQUIREMENTS FOR TECHNOLOGY TRANSFER:
Sufficient time spent with mining personnel on the mines and underground.
Collection and presentation of excellent measured underground data

Special skills required from project team:
Rock engineering skills, underground experience, and technology transfer skills.
Monitoring expertise and experience

SIM 04-02-02

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
Feasibility study of thermal imaging equipment to identify potential rockfalls

PRIMARY OUTPUT/S OF RESEARCH:
Full documented initial assessment of the use of night vision equipment in identifying rockfalls underground indicating potential of such equipment to identify rockfalls prematurely.

MOTIVATION
Barring accidents and unexpected falls of hangingwall are one of the chief causes of fatalities and injuries in the mining industry. Any tools that will aid in identifying potential rocks that could detach themselves from the rock mass under gravity or shaking would be of benefit to the mines. This technology is untried in the mining industry but has proved itself in other arenas. An initial trial will determine if there is any potential in pursuing the technology further.

POTENTIAL IMPACT OF RESEARCH
Night vision relies on infra-red radiation to obtain images. This technique has been used in warfare with great success. Previous SIMRAC work has demonstrated that it is possible to differentiate loose blocks of rock using a hand-held instrument that measures temperature of the rock remotely. That technology gave spot readings. Night vision gives an integrated image of multiple temperatures. It may be possible using this technique to identify areas of rock instability.

SCOPE OF RESEARCH
Focus areas:
This is a short exploratory project in which the feasibility of night vision concept will be tested.
Phase 1
The gold sector with the greatest potential for rockfalls should be used to test the concept first.
Phase 2
If the technology works in that sector a second phase of the project can investigate the other major mining sectors i.e. coal, platinum and other mines.

The technology should focus on rockfall potential and rock instability, although the technique should also be assessed in highly stressed rock.
Tunnels, stopes and large excavations should be considered for application of the technique.

Duration:

Phase 1	3 months
Phase 2	3months

Potential for application:
If it can be shown that underground personnel are able to identify loose rocks that have the potential to dislodge, this will address a hazard in the industry. If such a system prevented rockfalls through early identification of the hazard then it would be embraced by the industry as a useful technology.

REQUIREMENTS FOR TECHNOLOGY TRANSFER:
If sufficient documented success with such equipment is demonstrated undergound then this would open the way to develop an cost effective instrument for the mining industry with its unique conditions and needs. A commercial partner would have to be found to refine and adapt the current equipment to be mine-worthy and to market such equipment into the industry.

Special skills required from project team:
Rock engineering skills, Underground experience, and technology transfer skills.

SIM 04-02-03

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
New approaches to tabular stope support design.

PRIMARY OUTPUT/S OF RESEARCH:
Inputs into support design for tabular stope faces that considers area coverage.

MOTIVATION
The SDA software developed by CSIR Miningtek with SIMRAC funding has been useful in helping to gain a better understanding regarding support requirements and shortcomings in the face area. In some cases however, any attempt to apply the software for support design has been shown to be inappropriate. A new approach to support design based on engineering principles rather than empirical design for the stope area that will compliment or supercede the SDA approach is deemed necessary.

POTENTIAL IMPACT OF RESEARCH
The high risk at the faces of tabular stopes will be addressed if the support design is based on an engineering basis.

SCOPE OF RESEARCH
Focus areas:
Facebursts androckfalls
Gold and platinum tabular stopes
All depths
Phase 1
Identify the conditions in which current design approaches do not work
Phase 2
Explore new and existing theoretical approaches to addressing the gaps
Phase 3
Demonstrate the applicability of the new approaches to address design of face support for the majority of geotechnical conditions

Duration:
Phase 1: 2 months
Phase 2: 6 months
Phase 3: 4 months

Potential for application:
Often individual support units work underground but as a system the support is unsuccessful. Also empirical data may not be adequate for the design to occasionally to be under-designed and result is major failure. These issues need to be addressed.

REQUIREMENTS FOR TECHNOLOGY TRANSFER:
Computer based program that will allow rock engineers to input data from their mine and arrive at a generic support system design

Special skills required from project team:
Rock engineering skills, Underground experience and modeling skills.

SIM 04-02-04

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
Evaluation of the performance of shotcrete.

PRIMARY OUTPUT/S OF RESEARCH
Quantification of in situ performance of shotcrete under high stress and dynamic loading.
Determine and calibrate relationships between common laboratory tests (UCS and Energy absorption etc) and the actual performance underground (ie What does a UCS of 40 MPa and an EA of 700J mean underground for a 25mm, 50mm, 100mm etc. thickness of shotcrete under different loading conditions.
Determine the interaction of the shotcrete with the rock mass.

MOTIVATION

Recently there have been a number of major rockbursts in tunnels resulting in several fatalities. Investigations of these incidents resulted in the following question being posed "Do we know and understand what we are design for?" This is especially relevant to the use of shotcrete in high stress tunnels that may be subject to dynamic loading.

Previous SIMRAC work on shotcrete has been carried out and reference to this work should form the basis for further work. Use should be made of the numerous underground shotcrete sites for collection of data rather than setting up special project sites.

POTENTIAL IMPACT OF RESEARCH
Improved understanding and design resulting in improved safety.

SCOPE OF RESEARCH
Focus areas:
Phase 1
Review previous SIMRAC and shotcrete working groups work
Identify gaps
Perform necessary laboratory testing of different shotcrete mixes (UCS, shear tests, energy absorption etc).
Phase 2
Identify mines and mine champions for underground evaluation of different shotcrete mixes and tendons under different loading conditions. This would be done by installing instrumentation (extensometers, strain gauges, stress measurements, ground motion monitors etc) underground on mines that are using shotcreting.
Rock mass classification prior to installing support.
Phase 3
Numerical modeling based on calibration from measured performance.

Duration:

Phase 1	6 months
Phase 2	24 months
Phase 3	6 months

Potential for application:
Improved design and understanding wrt to shotcrete application in deep mines.

Requirements for technology transfer:

Clear indications of the appropriate thickness of shotcrete that should be used in different underground

conditions. A methodology for shotcrete design should be presented in the form of design charts, computer software or both.

Special skills required from project team:
Instrumentation
Laboratory testing of shotcrete
Numerical modeling
Seismology (strong ground motion analysis)

SIM 04-02-05

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
Development of a practical guideline for support quality assurance for different support systems used in tunnels and stopes.

PRIMARY OUTPUT/S OF RESEARCH
A guidebook that will indicate support assurance requirements for the entire range of support classes.
Sampling criteria, frequency of tests, levels of confidence etc.
Outline laboratory and underground test requirements for different support classes.

MOTIVATION
In January 2003 a new mining regulation (14.1) came into effect which states that: "*At every underground mine where a risk of rockbursts, rock falls or roof falls exists, the employer must ensure that a quality assurance system is in place which ensures that the support units used on the mine provide the required performance characteristics for the loading conditions expected.*" Previous SIMRAC work in this area should be referred to.

POTENTIAL IMPACT OF RESEARCH
Improved support performance that will contribute towards improved safety.
Compliance with legal requirements.

SCOPE OF RESEARCH
Focus areas:
Phase 1
Statistical methods used in quality assurance for stope and gully support.
Testing procedures and requirements (laboratory and in situ)
Phase 2
Appropriate test methods
QA management systems
QA in production phase
Phase 3
On site QA piloting and testing

Duration:

Phase 1	3 months
Phase 2	6 months
Phase 3	3 months

Potential for application:

All mines will benefit from a standardized and systematic method of determining the support. The DME will also derive benefit for evaluating one mine against another and for assessing the support following an accident

Requirements for technology transfer:
Guideline on quality assurance for support.
Training courses

Special skills required from project team:
Quality assurance experience
Statistical methods
Product testing

SIM 04-02-06

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
A holistic assessment of SIMRAC rock related research to date

PRIMARY OUTPUT/S OF RESEARCH
A succinct overview of the research themes pursued by SIMRAC in the rock related areas with the relationship between projects indicated and the gaps in research identified.

MOTIVATION

The volume of research conducted by SIMRAC in the rock engineering and rock mechanics fields is substantial. There is a need to take stock of all the projects and how they relate to particular themes and to one another. Duplication of research may occur and gaps in the research effort may continue if such an initiative is not carried out.

POTENTIAL IMPACT OF RESEARCH
Focus the rock related research effort so that gaps are addressed. A holistic view of the past SIMRAC research will be gleaned and the future direction will be able to be determined.

SCOPE OF RESEARCH
Focus areas:
Phase 1
Review all rock related projects, grouping them into themes and indicating their inter-relationship
Identify gaps in the research
Phase 2
Design mind-map/roadmap or other graphic to represent the rock related research effort
Review by international rock engineering expert

Duration:
Phase 1 4 months
Phase 2 1 month

Potential for application:

The decision-makers in SIMRAC and the research providers to SIMRAC in the rock related area will use this as a reference to shape the future research programme

Requirements for technology transfer:
Succinct summary of the past research and graphic presentation of that research with gaps indicated

Special skills required from project team:
Wide rock engineering knowledge
Graphic design

SIM 04-02-07

DESCRIPTION OF RISK
Rockfalls

TITLE OF RESEARCH TOPIC
Closure profiles of the UG2 and Merensky reef horizons at various depths, using different pillar types, in the Bushveld Complex.

PRIMARY OUTPUT/S OF RESEARCH:
Closure profiles at different depths with different pillar types. This should hopefully enable a database to be produced as to how the hangingwall/footwall responds to various pillar types at various depths on the different reef horizons.

MOTIVATION
There is a general lack of understanding as to how the rockmass is behaving at various depths with different pillar types. A comprehensive closure measuring programme will add much to the understanding of the various underground stopes and provide input to the design of pillars and stopes.

POTENTIAL IMPACT OF RESEARCH
Assist the Rock Engineering Practitioner in choosing the pillar support method and internal stope support types for stoping operations at various depths on different reef horizons.

SCOPE OF RESEARCH

Focus areas:
Pillar types used on different reef horizons
Pillar design criteria
Mining methods
Geological domain
Panel spans
Behavour of hanging and footwall

Duration:
24 Months

Potential for application:
Assist the Rock Engineering Practitioner in choosing the pillar support method and internal stope support types for stoping operations at various depths on different reef horizons.

REQUIREMENTS FOR TECHNOLOGY TRANSFER:

Special skills required from project team:
Rock Engineering practical experience, particularly in the Bushveld Complex.
Rock Engineering instrumentation experience
Geological knowledge of the Bushveld Complex
Numerical modeling experience

SIM 04-03-01

DESCRIPTION OF RISK
Rockbursts

TITLE OF RESEARCH TOPIC
Evaluation of the design criteria of closely spaced dip pillars based on their in situ performance

MOTIVATION
The future of deep and ultra deep mining in tabular reefs is dependent on regional support to control seismicity. Many of the deep working have moved to the use of dip pillars in some form as their regional support. The layouts vary in span and dip dimensions from one operation to another. The long-term stability of the layouts has been theoretically appraised during Deepmine projects but the implications of applying these layouts needs to be carried out. Monitoring and measurement of underground sites together with theoretical modeling still needs to be pursued.

PRIMARY OUTPUT/S OF RESEARCH:
Full record of seismic, closure, stress and other rock stability measures as mining proceeds from ledging to stopping for different pillar spacings.

POTENTIAL IMPACT OF RESEARCH
The information from this project will demonstrate the stability of dip pillar layouts and help to determine the usefulness of backfill in such mine layouts.

SCOPE OF RESEARCH
Focus areas:
Facebursts and rockfalls
Deep gold tabular stopes
Multiple raise lines

Phase 1
Monitoring and measuring underground
Modeling
Phase 2
Interpretation of findings

Duration:

Phase 1	24 Months
Phase 2	12 Months

Potential for application:
The output will determine the layouts for ultra-deep mining and the regional support that is required.

REQUIREMENTS FOR TECHNOLOGY TRANSFER:
Support and participation from the mine, significant time to monitor and mining according to plan

Special skills required from project team:
Rock engineering skills, Underground experience, Monitoring and Instrumentation expertise.

SIM 04-03-02

DESCRIPTION OF RISK
Rockbursts

TITLE OF RESEARCH TOPIC

The determination of loading conditions for crush pillars and the performance of crush pillars under dynamic loading.

PRIMARY OUTPUT/S OF RESEARCH
Quantification of the transition depth from geological controlled to stress fracturing controlled hangingwall instability /stability.

Performance of crush pillars under static and dynamic conditions at depth in virgin and secondary mining conditions.

Methodology for determining transition from crush pillars to pack / backfill support.

MOTIVATION
Crush pillars are used in shallow and intermediate depth mines to control backbreaks and large geologically defined hangingwall instabilities. A substantial amount of work has been on the design of crush pillars and at what stage (depth and or loading conditions) crush pillars can start being used. There appears to have been no work done to determine the conditions when mines should stop using crush pillars and move onto conventional support such as packs or elongates and backfill.

Crush pillars are used as the major form of support on several gold and platinum down to depths of 1700m below surface. Some of these mines have a possibility of mining down to 2500m below surface. The question that needs to be researched is at what stage does stress induced fracturing start driving hangingwall instability / stability instead of geological structures.

It may be possible to use crush pillars down to a substantial depth, however at this stage we do not know how crush pillars will behave if exposed to dynamic loading from seismic events related to structures or failure of pillars. Possibly, crush pillars may actually damage the hangingwall.

POTENTIAL IMPACT OF RESEARCH

Improved understanding and design resulting in improved safety.

SCOPE OF RESEARCH
Focus areas:
Phase 1

Instrumentation to determine crush pillar behaviour under different loading conditions.

Hangingwall behaviour – geological discontinuity and fracture mapping

Phase 2
Numerical modelling

Phase 3
Pillar seismicity and behaviour

Duration:

Phase 1	12 months
Phase 2	6 months
Phase 3	6 months

Potential for application:
Can be applied at mines currently using crush pillar layouts that may want to mine at greater depths.

Requirements for technology transfer:

A systematic and simple approach to determining the correct size of crush pillars at particular depths and with certain geotechnical conditions. This should be in the form of a methodology with design charts, computer software or both.

Special skills required from project team:
Instrumentation
Numerical modeling
Analysis of seismicity

SIM 04-03-03

DESCRIPTION OF RISK
Rockbursts

TITLE OF RESEARCH TOPIC
Quantification of optimum lead / lag distances between adjacent panels in longwall, scattered and sequential grid layouts with respect to seismicity patterns related to abutment shear events.

PRIMARY OUTPUTS OF RESEARCH
Quantification of the effects of various inter-panel lead / lags considering the rockfall and rockburst risks of the various configurations.
Strategies / guidelines to manage the risks associated with different lead / lag situations. This would also apply to support requirements.

Identification of different circumstances to which different lead / lag criteria may be more appropriate.

MOTIVATION
Longwall mines have generally adopted layouts where optimum lead / lags between adjacent panels are deemed to be between 5 and 10m. Guidelines of minimum lead / lags of 40m, where the 5 to 10m "rule" is exceeded, have also been suggested. These guidelines are intuitive, and have not been quantified and are restrictive with respect to production flexibility. Excessive lead / lags can also result in seismicity being generated on the abutment. When exactly this can be expected to occur is unclear and may vary for different types of reefs.

A similar question arises with regard to the lead / lag between adjacent panels in a scattered or sequential grid mining layout.

POTENTIAL IMPACT OF RESEARCH
Improved understanding of lead / lags in terms of their influence on contributing to seismicity, ground conditions and rock mass response to seismic loading.

Understanding of the lead / lags with respect to seismicity being generated on abutments in different geotechnical environments using different layouts. This would mainly be applicable to intermediate to deep gold mines. However, this issue may also have a bearing on shallower platinum mines, which may mine at greater depths in the future.

SCOPE OF RESEARCH

Focus areas:

1. Succinct review of current practices within the gold and platinum mining sectors. Identification of alternative practices that may be appropriate.
2. Review / back analysis of a statistically significant number of rock related incidents where lead / lags were identified as a major contributing factor, to determine conditions at the time of the incident.
3. Review / back analysis of previous rock related incidents (selected) where lead / lags were identified as a major contributing factor to determine conditions at the time of the incident.
4. Evaluation of statistically significant number of lead / lag situations in different environments, this would include:
    - Analysis of occurrence of seismicity and seismicity patterns for large lead /lags.
    - Instrumentation (stress, closure, ground velocities, seismicity)
    - Seismic history analysis and evaluation of rock mass response

- Fracture mapping / quantification of ground conditions over time.
- Numerical modelling.
- Analysis of FOG and rockburst incidents.

5. Longwall, scattered and sequential grid layouts should be considered in several geotechnical environments (VCR, CL, VR and Merensky reefs).
6. Review of risk management strategies for lead / lags and the compilation of recommendations (strategies) for managing the associated risks.

Duration:
1-2 years

Potential for application:

All mines that have problems associated with lead / lags. This would include the majority of intermediate to deep gold mines and possibly platinum mines.

Requirements for technology transfer:

Guide on lead / lags which includes a review of current practices, design criteria, alternatives and risk management strategies.

Special skills required from project team:
Practical rock engineering experience in several different mining layouts and geotechnical areas.
Underground mapping
Risk assessment
Numerical modelling
Analysis of seismicity

SIM 04-04-01

Project title

Technology transfer of flammable gas hazards reduction techniques in fiery mines

Motivation

The SAMRASS data (1998 to 2001) indicates that flammable gas (methane) accidents account for 7,3% fatalities in the mining industry as a whole. Nearly 97% of these happen in mines other than collieries. SIMRAC completed COL030, COL205 and GAP504, which generated practical ways and techniques to address flammable gas hazards in fiery mines. The information, although available in reports, has not reached a wider audience. There is a need to transfer it to the mines. Hard rock fiery mines should also benefit from some of the techniques discussed in the above research, which was originally aimed at collieries. The aim of this study is to investigate and delineate the content to be transferred and the appropriate mechanism for transfer. Once the transfer mechanism has been agreed upon by SIMRAC, it should be used to disseminate the information.

Primary outputs

Phase 1

1. An appropriately packaged information pack to transfer technology from COL030, COL205, GAP 504, SIM 02 04 01 and SIM 03 04 01to collieries and hard rock fiery mines
2. A practicable method for the transfer

Phase 2

Practical dissemination of output 1 using output 2.

Scope

Phase 1:

Phase 1 addresses the outcomes and recommendations from COL030, COL205 and GAP504, (and any other SIMRAC research), analyse them critically and repackage them appropriately for each sector, then proposes a practical method for communication the information to the relevant sector. Can mapping, as applied in the collieries, be applicable to hard rock mines? The preferred route should involve direct contact with end users.

Phase 2:

Dependant on phase 1, this phase must carry out the transfer process, using the method agreed upon in phase 1, output 2.

Estimated duration

Phase 1: 6 months
Phase 2: 6 months

Potential impact on significant health and safety risks

Minimize the risk of an underground flammable gas ignition from occurring and effective containment of such an ignition if it is required, or possible, hence saving lives.

Requirement for technology transfer

Entire project is involved with establishing relevant information to transfer, and the appropriate method to do so, as well as the transfer of the product.

Special skills and facilities required by project team

- Occupational /environmental engineering with strong experience in flammable gas in hard rock and coal mines

SIM 04-04-02

Project title

Prevalence of flammable gas pockets in unmined ground ahead of mining operations

Motivation

The SAMRASS data (1998 to 2001) indicates that flammable gas (methane) accidents account for 7,3% fatalities in the mining industry as a whole. One of the causes is the sudden intersection with a gas pocket whose existence was not foreseen. Because of the high pressure (normally associated with the pockets), the gas is liberated into the working environment quicker than it can be cleared by the ventilation regime in use. Such accumulation of gas might result in levels beyond LEL for the mixture, thereby rendering the possibility of an explosion in the area concerned. There is a need to establish the extent and prevalence of such pockets in SA fiery mines so that adequate precautions may be taken to ameliorate this risk. The aim of this study is to investigate the extent of this problem throughout sectors that experience flammable gas, and establish the existence and viability of detection technologies (phase 1). A decision on a way forward will be made based on the findings.

Primary outputs

1. A HIRA based risk assessment document giving guidance on the size and prevalence of gas pockets through out the SA fiery mines

2. An analytical and critical literature survey to determine the existence of technology to detect gas pockets remotely

Scope

The aim is to establish how widespread the problem is, and to guide on the size and significance of the risk the problem causes. A survey based on site interviews and statistics data base interrogation must be made to get a handle on the size and significance of the risk estimated. The study must cover a representative sample of fiery mines in the coal and gold sectors.

A literature review must be carried out to determine the availability of cost effective detection systems to meet this need. Where such technology is in existence, a critical analysis must be made of its applicability in the each of the sectors involved in South Africa. Can such a system be used to detect gas in sealed-off areas? A recommendation to continue to phase 3, or to terminate is expected in this phase. The recommendation should be based on the availability and practicability of the system.

Estimated duration

Duration: 6 months

Potential impact on significant health and safety risks

Minimize the risk of an underground flammable gas ignition from occurring, thereby saving lives.

Requirement for technology transfer

Regional workshops to be done to communicate the outcomes

Special skills and facilities required by project team

- Occupational /environmental engineering with strong experience in flammable gas in hard rock and coal mines
- Electronics expertise essential

SIM 04-04-04

Project title

Review of organic materials used U/G and the risks associated with them

Motivation

There have been a few but significant occurrences of U/G fires propagated by the presence and ignition of organic materials used in the mines. The risk of U/G fires is real and significant. The purpose of this study is to review the different types of organic materials that are used in mines, their volumes and the extent of their use, and recommend replacements with inorganic or flame retarding materials.

Primary outputs

1. Determine the extent and volume of use of organic materials
2. Recommend, where possible, suitable replacements

Scope

Conduct a survey at Commercial departments, Standard Committee members and Occupational Hygienists/Environmental staff at selected mines to determine the extent of use, and therefore the problem. Determine appropriate interventions, prioritising the order of replacement according to the risk pertaining to individual materials.

Estimated duration

12 months

Potential impact on significant health and safety risks

Minimize the risk of possible underground fires that could lead to the loss of life and loss of business.

Special skills and facilities required by project team

- Occupational/Environmental engineering with strong experience in fire causes and prevention in hard rock and coal mines

SIM 04-05-01

Project title
Protection systems for decline shaft systems

Motivation
So far SIMRAC research has focussed on protection systems for vertical winders, as accident statistics has previously guided in this direction. There have been a couple of accidents lately, where fatalities have resulted from run-away situations (for a variety of reasons), on inclined shaft installations. It is not clear whether or not, there is a generic significant risk in the industry, due to such installations. This study aims to assess the prevalence and significance of them risk, thereafter determine further need for the development of protection systems.

Primary outputs
Phase 1
Document assessing size and significance of the risk
Phase 2
Prototype system for the underwind protection system for Decline winders

Scope
Phase 1:
The study should start off by reviewing the SAMRASS data to determine the extent and size of risk. It should then review the protection systems currently being employed and determine what could be improved, and how? Areas of focus to include protection against run-away cages and protection for people working at shaft bottom. If risk is significant and generic, prototype or best practice protection system should be developed/proposed.
Phase 2:
Contingent upon the result and recommendations from Phase 1.

Estimated duration
Phase1 12 months

Potential impact on significant health and safety risks
Minimise the risk of injury or death to cage occupants, and those within the system in the event of a system failure

Requirement for technology transfer
Product will be launched/demonstrated and workshops will be conducted with end users.

Special skills and facilities required by project team
- Mechanical and Control Engineering experience
- Hands-on experience with winder installations in decline shafts

SIM 04-05-02

Project title

Brake testing of Trackless Mobile Mining Machinery

Motivation

No definitive procedure and supporting equipment exist in the South African mining industry to evaluate the efficiency of braking systems on TM3 equipment. The requirements, as required by law are vague, and, in not being prescriptive, are open for interpretation. Research into the requirements for adequate braking, as well as the specifying, testing and in-service verification as an input to maintenance is required. Equipment for testing and verifying the effectiveness of retardation needs to be researched, and in the absence of anything suitable, be developed.

Primary outputs

Phase 1

Status document of the current status in the South African mining industry, as well as an investigation into what exists world-wide, and a specification for a brake testing facility.

Phase 2

The development and testing of a brake test device to be adopted throughout industry.

Scope

Phase 1: To establish how widespread the problem and need is, and to guide the size and significance of the risk that the braking system causes. The study is of a theoretical nature, and must cover the full spectrum of trackless vehicles used in mechanised mining, cover all braking systems from all suppliers, and take cognisance of all mining conditions under which these vehicles operate.

Phase 2: This phase must, based on the requirements as identified in phase 1, review all existing means of brake testing, and in the absence of anything found suitable, develop such an apparatus, procedure or otherwise. The findings must be in such a format that it can be adopted throughout industry.

Estimated duration

Phase 1: 6 months
Phase 2: 9 months

Potential impact on significant health and safety risks

Minimize the risk of brake system related accidents, preventing runaways of vehicles, thereby saving lives.

Requirement for technology transfer

Roll-out to manufacturers and industry – DME involvement and possible inclusion in SANS standard.

Special skills and facilities required by project team

Mechanical engineering expertise, with brake testing expertise and experience

SIM 04-07-01

Project title
Review of illumination systems and occupational medical surveillance in underground mines and a handbook/CD of best practice

Motivation
Previous SIMRAC research has investigated illumination in collieries and gold and platinum mines (Col 541 and GAP 804). Lighting levels required for different tasks and standards have been suggested. Mines have also implemented innovative lighting systems, which have apparently greatly improved safety and productivity. There is however, no overview of the lighting systems in place, what levels of illumination prevail and the best means of enhancing illumination is available. While medical surveillance should include testing of vision, the application of results to the work situation and corrective action for impaired vision, including nutritional intervention, is not documented. Research is therefore necessary to review the current status of illumination and occupational medical surveillance systems to identify best practice/s for enhancement of illumination, working safely and clinical surveillance for different operations.

Primary outputs
1. Report and video on the lighting systems used and the levels of illumination currently prevailing in the S A mining industry underground operations;
2. Report on the occupational medical surveillance systems currently implemented for fulltime and contractor workers in underground operations;
3. Develop a handbook & training CD of best practice for illumination, working safely and medical surveillance in different underground operations.
4. Technology transfer regional workshops.

Scope
The project should include all underground operations. Medical surveillance should include both levels of vision and nutrition, particularly Vitamin A and adaptation to levels of light prevailing in underground mining. The PIMEX system can be used to video tasks and levels of illumination representative of important underground mining activities. This mode of technology transfer can be incorporated into training materials for working safely. The research process and technology transfer should involve all stakeholders, including professional organisations and take cognisance of the current SIMRAC postgraduate optometry project on vision, health and safety.

Estimated duration
18 months

Potential impact on significant health and safety risks
High potential impact for improving safety and health

Requirement for technology transfer
Recommendations on potential application of best practice

Special skills and facilities required by project team
- Environmental and electrical engineering
- Occupational medicine
- Physiology and nutrition

SIM 04-09-01

Project title
Ergonomics programme and standards for functional work capacity

Motivation
Previous SIMRAC research and the changing demography in the mining industry have highlighted the need for a comprehensive ergonomics programme to be implemented in the mining industry. The issues of anthropometry, workstation design, gender, functional work capacity, worker fatigue, shift cycles, chronic occupational and other diseases, and nutrition have emerged as some of the important factors affecting the health and safety of miners. SIMRAC research has produced recommendations addressing some of these factors but there is a need to do further research in some areas in order to develop and pilot a comprehensive ergonomic programme for the industry.

Primary outputs
5. A limited anthropometrical survey to obtain current data appropriate to the present and future mining workforce;
6. Matrix of work/functional work capacity criteria required for optimal worker placement;
7. Development of a comprehensive ergonomic programme to implement best practice;
8. Pilot ergonomics programme in 3 mines and develop criteria to evaluate success;
9. Handbook/s & training CD for ergonomic programmes in different operations; and
10. Technology transfer regional workshops.

Scope
The project should include all recommendations from previous SIMRAC research and similar working populations and should address the restricted tabular height and stope width. The anthropometric study should be conducted to assess the representivity of national data from the SANDF. The matrix of work/ functional work capacity must be workshopped with stakeholders to ensure that recommendations are practical and affordable and that representative mines are selected for the pilot, which includes implementing and evaluating the programme. The handbook/s and CD must contain the generic components of best practice programmes and the areas/methods that are necessary for adapting the programme to be mine specific. There must be different but integrated components e.g. guidelines on WMSDs for health personnel, guidelines on operators and machinery for engineers, guidelines on shift rotation for managers.

Estimated duration
30 months

Potential impact on significant health and safety risks
High potential impact for improving safety and health

Requirement for technology transfer
Implementation of successful ergonomics

Special skills and facilities required by project team
- Ergonomics
- Occupational medicine
- Adult education

SIM 04-09-02

Project title
National occupational health survey of the SA Mining industry

Motivation
This research will provide detailed information on occupational hazards in the SA mining industry and will assist in setting priorities for further mine-related occupational health research and guidelines. It will help to answer the questions on the numbers of workers exposed to occupational health hazards by mining commodities and by gender. The work is to be based on *The National Occupational Health Survey of Mining (NOHSM)* conducted by the U.S. National Institute for Occupational Safety and Health (NIOSH).

Primary outputs
Phase 1
1. Identification of occupational hazards in the mining industry; the identification of the mining commodities where these occupational hazards occur; and the identification of the occupations and the number of workers, by gender, potentially exposed to these occupational health hazards.
2. Inventory data identifying all chemical substances and trade name products found on SA mines and the annual usage rate of each chemical substance.
3. Estimates of the potential number of workers exposed to various chemical, physical, biological and ergonomic hazards.
4. Observations on potential occupational exposures at the worksite.
5. Mine services in place to address occupational health hazards.
6. Establishment of a database to estimate the number of mine workers potentially exposed to occupational health hazards.

Phase 2
1. To be based on recommendations from Phase 1 work but should include exposure assessments and investigations of multiple exposures to chemical and physical stressors.

Scope
The project will based on the NIOSH NOHSM, previous SIMRAC research e.g. Health 804, Health 702, SIM 02-09-01 and SIM 02-09-04 and will involve collaboration with NIOSH.

Estimated duration
Phase 1 2 years

Potential impact on health and safety risks
The study will define potential exposures by commodity and gender, and contribute to the development of further research, regulatory guidelines and control measures for the protection of workers in the mining industry.

Required technology transfer
The study will lead to an improved understanding of the occupational exposures occurring in the SA mining industry and provide evidence for revision of occupational exposure guidelines, taking into account also gender issues.

Special skill and facilities required by project
- Occupational hygiene
- Ergonomics
- Chemistry

SIM 04-09-03

Project title
Handbook – Measurements in Mine Occupational Hygiene

Motivation
It is envisaged that the handbook will represent an authoritative reference manual for occupational health and safety practitioners. Present handbooks in mine environmental control do not encompass the broad aspects of occupational hygiene and also need updating. Extensive legislation pertaining to occupational hygiene has recently been promulgated, which includes an extensive list of airborne pollutants. Occupational hygienists operating on mines are in dire need of guidance in assessing compliance with the occupational hygiene exposure limits. The handbook will give guidance for acquiring the most appropriate instruments and the correct operational procedures necessary for accurate sampling and measurement.

This handbook should be suitable for a broad range of health and safety personnel. It would also be a natural progression and extension to chapters in the occupational health handbook issued by SIMRAC.

Primary outputs
- Overview of current occupational hygiene techniques for assessing the mine environment and worker exposures;
- Analysis of factors that affect employee exposures (eg pump flow rates);
- Development of chapters to address the measurement of chemical, physical (ionising and non-ionising radiation) and biological agents relevant to the mine environment;
- Guidance for the acquiring of the appropriate instrumentation;
- Guidance on the correct operational procedures for sampling and measurement; and
- Guidance on calibration of instrumentation.

Impact of health and safety
High-comprehensive information to assist occupational health practitioners to assess and control exposure of workers to contaminants in the mining industry.

Scope
This project will cover the measurement and assessment of a broad range of chemical, physical and biological agents present in the mining industry. The handbook and CD will also cover control banding and include discussion on measurement range and limits of detection. The project includes publication of 10 000 copies of the handbook.

Estimated duration
24 months

Typical recipients
Occupational health and safety representatives, occupational health practitioners, management and workers.

Potential impact on significant health and safety risks
High potential impact for the identification and controlling of occupational diseases.

Requirement for technology transfer
Handbook to be developed for issue to the mining industry.

Special skills and facilities required by project team
Environmental engineering and occupational hygiene knowledge.