



ASSAY

A NEWSLETTER ABOUT ACID SULFATE SOILS

No.12 January 1997

Lots of news from Queensland in this issue, reflecting the state's increasing interest in ASS. News items were provided by Col Ahern of Department of Natural Resources, newly appointed secretary of QASSMAC, the Queensland counterpart of ASSMAC.

Laboratory methods agreement

After the heated exchanges on methodology at the second national ASS conference in September, scientists met in October to agree on routine analytical methods for ASS environmental samples.

The meeting was chaired by ASSMAC technical committee chairman Ian White, with presidents of professional organisations G. Rayment (Australian Soil and Plant Analysis Committee) and Pam Hazelton (Australian Society of Soil Science) contributing. Also represented were CSIRO, universities, ANSTO, ACIAR, consultants and NSW and Queensland governments.

Two main approaches were approved.

Total oxidisable sulfur (TOS)

TOS = total sulfur - 4M HCl extractable sulfur. Preferred total S methods are LECO or X-ray fluorescence. Sulfur extracted in 4M HCl by overnight shake may be determined by ICP, gravimetry, turbidimetry or HPLC (after chloride removal).

Peroxide oxidisable sulfuric acidity combination (POSAC)

This method is essentially the one of Ahern et al. (1996) with a few modifications. The combined method follows both the sulfur trail and the acid trail to give multiple results that assist in greater understanding of the potential environmental risk.

Codings, to be included in an update of the Green Book of Rayment and Higginson (1992), have been developed to identify the methods, their components and instruments/end point procedures.

Bruce Blunden (NSW EPA) and Col Ahern are working on an update of the ASSMAC analytical methods to be published early 1997. However, a draft of the methods is expected to be ready early in the new year and can be obtained from Col Ahern, Angus McElnea or Dennis Baker of Qld Dept of Natural Resources. They are awaiting a shipment of pure pyrite from overseas to be used in some of the exchange soil samples they have prepared for the

quality assurance program. These samples will be ready for distribution in the new year to those who have already registered. Those wishing to register for sample exchange as part of the quality assurance program or a copy of the draft methods can email to: ahernc@dpi.qld.gov.au or fax (07) 3896 9782 bakerd@dpi.qld.gov.au or fax (07) 3896 9623

National working party on ASS

The national working party on acid sulfate soils held its fourth meeting at Maleny on Queensland's Sunshine Coast in November. New members include Grahame Colley of the Queensland Canegrowers' Association and Lionel Wood, Director of Sustainable Resource Use Strategies Section of the Department of Primary Industries and Energy. Stephen Tapsall from the Queensland Commercial Fishermen's Organisation has replaced Duncan Leadbitter as Australian Seafood Industry Council representative.

The group has agreed on the contents and format of the national ASS strategy. Major topics are

- social and economic issues requiring a national approach
- environmental and technical issues requiring a national approach
- roles and responsibilities of various levels of government and the community
- Australian acid sulfate soils research requirements.

The working party has also identified preliminary strategies and desirable outcomes for each of the five goals identified by SCARM. The final draft of the strategy will be distributed widely for comment mid-1997, and the completed document will be submitted to SCARM by the end of the year. The group's next meeting on 13-14 March will inspect significant ASS developments in the Tweed Valley, NSW. For more information contact chairman John Williams 066 261 340, fax 066 281 744.

QASSMAC inaugural meeting

Queensland has followed the highly successful NSW model in forming an Acid Sulfate Soils Management Advisory Committee (ASSMAC). The Queensland version will be known as QASSMAC. The inaugural meeting was held on 21 November and members were given an insight into the NSW operations and successes by ASSMAC chair John Williams. John is

also the chair of the SCARM national working party on ASS. Thanks John for setting the scene and issues needing to be addressed.

The organisations represented at the QASSMAC meeting were:

- Dept of Natural Resources (DNR)
S Sturgess (adviser to the Minister), Bernie Powell, (chair), Col Ahern (secretary)
- Dept of Environment (DoE)
Peter Bek, John Bennett
- DPI Fisheries
John Beumer, Melissa White
- Dept Local Govt Planning (DLGP)
A Goodwin
- Universities
Paul Saffigna
- Qld Comm Fish Org (QCMO)
Stephen Tapsall
- Urban Devt Inst of Aust
Greg Long
- Canegrowers Assocn
M Everson
- Cane farmer
Grahame Colley
- Local Government
John Carleton (Gold Coast), D Aust (Redlands)
- Local Govt Association
S Greenwood
- Consultants
Neil Sutherland
- Qld Conservation Council
F Herbert

The extractive industries and Dept of Economic Development and Trade are expected to be invited to the next meeting on 30 January 1997. Industry consultation, representation and input to the process is regarded as essential and therefore reflected in the membership. The committee still has to be officially approved by the Minister but is expected to coordinate a whole of government statewide response on education, advice, policy and guidelines on ASS in Queensland.

NSW ASS meetings

The Acid Sulfate Soil Management Advisory Committee (ASSMAC) toured ASS-affected areas in the Shoalhaven catchment on the south coast during its October meeting. Landholders and government agency and local council representatives joined ASSMAC members for the tour. First stop was the Hall-Morris family dairy farm affected by ASS and subsequently rehabilitated, where NSW Agriculture soil scientist Roy Lawrie demonstrated his trailer-mounted soil corer. Honours student Andrew Porter talked about the hydrology of the area; and Buddhima Indraratna talked about the drainage research undertaken by the University of Wollongong. After lunch Ann Young of University of Wollongong talked about Shoalhaven's

sedimentation history which includes the possibility of tidal wave inundation; and NSW Agriculture researcher Martin Blumenthal spoke on pasture experiments in acid sulfate soils. The group then inspected an airfield with acid scalds, and Shoalhaven Starches' effluent irrigation which has changed a degraded landscape underlain by ASS into flourishing pasture.

ASSMAC next meets at Port Macquarie on 5-6 February; the meeting includes a boat trip on the Hastings River to inspect ASS impacts on the river and water quality.

ASSMAC's technical committee met at Port Macquarie on 9 December and next meets at Grafton in March.

QASSIT workshop in Mackay

Queensland Acid Sulfate Soil Investigation Team (QASSIT) members Bernie Powell, Dennis Baker and Col Ahern conducted a two day technical workshop in Mackay on 13-14 November 1996. The Bureau of Sugar Experimental Stations (BSES) sent along 30 of their technical/professional officers from Northern NSW to Mossman. In addition, 40 people ranging from local government and state department officers to consultants, environmentalists, canefarmers and aquaculturalists attended.

The workshop included a field component to teach attendees how to recognise and sample ASS in the field. One of the field sites was a small dam excavation in a creek line without an approved ASS management plan. There was plenty of jarosite, iron floc, actual ASS, potential ASS, gypsum and carbonate present. Soil pH in the white-yellow seepage areas was as low as 1.1 but the natural carbonate present prevented the water from going acid (pH 7). After the lectures presented in the morning, all participants recognised the tell-tale signs of pyrite and the potential for acid leaks after a significant rainfall event.

Less than two weeks after the workshop a fish kill of barramundi in the creek below the dam disturbance was associated with a significant storm. While there is no proof of the cause of the fish kill, those who attended the workshop and saw the poorly managed dam site will take a lot of convincing that acid leakage wasn't involved. In response to requests, the QASSIT team will probably be conducting another two day technical workshop in mid-February 1997 at Cairns. Contact Ann Clarke, DPI Fisheries, Cairns for further information (phone (070) 529844, e-mail clarkea@dpi.qld.gov.au, fax (070) 351401).

Well done Isis Shire Council

Some Queensland local authorities are getting the message about the environmental risks of digging drains in low lying coastal areas. Col Ahern from QASSIT has recommended a 'Well Done' award for

Isis Shire Council which commissioned a full ASS EIS before digging drains in a ASS area in the small coastal town of Woodgate south of Bundaberg. The proposed drain has now been designed not to intersect significant PASS. Also pleasing was the high standard ASS report produced for the EIS. It included clear, well-labelled cross-sectional diagrams and was a pleasure to assess.

EIS improving in Queensland

QASSIT has reported substantial improvement in the sampling intensity and presentation of data for some EIS in Queensland. Bouquets go to the consultants responsible for Isis Shire drain (R McMahon) and Yandina sand extraction (N Covey/P Saffigna). Good on you, those owners, developers and consultants who are trying to meet today's higher standards and cooperate to minimise risk to the environment. We know it costs more initially, but a well planned job is cheaper in the long run for all concerned.

Clean Up Cudgen Lake project

A coastal lake acidified by drainage from disturbed ASS land is the focus for a community campaign in NSW's Tweed catchment. The Clean Up Cudgen Lake project aims to make the 260 ha lake a viable prawn and fish breeding area again. The lake was once a renowned prawn nursery and fishing area, but in 1991 heavy rain released large volumes of acid drainage from disturbed ASS soils in the catchment, acidifying the lake and Cudgen Creek, its outlet to the ocean. Extensive prawn and fish kills resulted and dead prawns covered the entire lakebed.

Prawns and most fish are extremely sensitive to low pH and problems occur below pH6. For prawns these problems can be slow or zero growth, diseases and mass mortalities. Fish below pH5.5 show outbreaks of red spot disease (epizootic ulcerative syndrome) and extensive fish deaths. Where possible, prawns and fish avoid acidified waters.

Monitoring by Tweed Shire Council at the time revealed highly acidic waters in major drains feeding the lake with pH as low as 2.5 and with toxic aluminium concentrations. The pH of the lake has remained below pH 5 for extended periods and the western half of the lake is often below pH4.

The acid waters have also produced dramatic changes in aquatic plants; exotic acid-tolerant species have replaced non-acid-tolerant indigenous species. Major areas of the main water body have been colonised by acid-tolerant *Juncus* sedge growth to an extent not observed in the past 30 years. These dramatic changes further erode the lake's ability to sustain a prawn nursery.

The Clean Up Cudgen Lake project is a joint venture of the Richmond-Tweed Acid Sulfate Soils Local

Action Committee (RTASSLAC), Clean Up Australia 2001, the Australian National University, the University of NSW, Tweed Shire Council and Tweed Catchment Management committee. The project hopes to provide many educational opportunities for local schools. Tweed CMC has provided money for two initial subprojects on the distribution of the problem soils in the catchment, and their hydrology. For more information, contact Don Buckley, Tweed Shire Council 066 720 430, fax 066 720 429.

ASS and oysters

Are oysters affected by acid water? The Fisheries Research & Development Corporation has given a research team \$186,300 to find out. The oyster industry has been affected by mass mortalities of oysters, disease and reduced growth rates which appear to be related to poor water quality. The FRDC project will identify risk factors in poor oyster production and oyster health issues, including the effect of acid water. The study will focus on the Hastings and Tweed rivers, and has the support and involvement of NSW and Qld oyster growers and commercial fishers. Project leader is Jes Sammut, University of NSW School of Geography. Also involved are Dick Callinan, NSW Fisheries, Mike Melville, UNSW, and Ian White, the Australian National University's Centre for Resource and Environmental Studies. For more information on the project, contact Jes Sammut on email j.sammut@unsw.edu.au or phone 02 9385 6211.

ASS monograph

A new publication on acid sulfate soils is available from Earth Foundation Australia. *Acid sulfate soils: facing the challenges*, is written by Ian White and Mike Melville, with contributions from Jes Sammut, Pam Van Oploo, Ben Wilson and X Yang. The 50 page monograph is a practical guide to understanding, addressing and preventing the problems of ASS. Topics include

- formation - the oxidation process and production of toxic drainage waters
- ASS locations in Australia (including maps)
- effects of hydrology, climate vegetation and drainage design on oxidation
- environmental impacts
- management options, including neutralisation and avoidance.

A key feature is the discussion of government and community initiatives for managing ASS, including the use of economic tools.

The monograph is available from Earth Foundation Australia, PO Box 31, Millers Point 2000. The price is \$12 plus an extra \$3 for postage and handling. For orders of five or more, price is \$10 each plus an extra \$2 per book for postage and handling.

Floodgates research proposal

Australian and Vietnamese research organisations have submitted a joint proposal to look at the impacts and management of saline water intrusion floodgates in Vietnamese coastal areas with acid sulfate soils.

The floodgates have been installed or are planned for much of the lower Mekong River as part of foreign aid schemes. Floodgate design has been based on purely engineering criteria to reduce incursions of seawater into 2 Mha of agricultural land. Impacts on soil acidification, the transport and storage of acid, and the impacts of stored acid on agricultural and aquatic productivity have been ignored.

Work in eastern Australia has shown that floodgates on estuarine, acid sulfate floodplains promote soil acidification, lower plant production, act as large acid reservoirs, form barriers to fish migration, decrease recruitment and feeding areas, diminish tidally-driven acid neutralisation and release hundreds of tonnes of acidity into estuarine reaches. The impacts on aquatic communities are significant.

Seawater intrusion and acid production from acid sulfate soils during dry seasons, and the export of acid through drainage systems during the wet season, are major constraints to agricultural and aquatic production in Vietnam's lower Mekong Delta and in coastal floodplains in eastern Australia. These problems are seen as high priorities by the Vietnamese government.

A collaborative research proposal between the Australian National University, the University of NSW, NSW Fisheries, CSIRO, ACTEW, Cantho University and the Vietnamese Ministry of Agriculture and Water Resources has passed Phase 1 of ACIAR's project evaluation procedure.

The research group's hypotheses, based on Australian experience, are

- installation of floodgates in Vietnam will result in extremely poor upstream water quality during the dry season
- resulting water quality will cause major decreases in upstream, dry-season, irrigated crop production and fish and aquatic production.

This project proposes to

- quantify the impacts of salinewater intrusion floodgates on hydrology, acid production, storage, neutralisation and export
- determine the influence of those impacts on crop production and aquatic communities
- improve floodgate and floodplain management
- produce policy options for floodgate and floodplain management which optimise agricultural production and minimise downstream impacts.

For information, contact Ian White 06 249 0660, fax 06 249 0757, or ian.white@cres.anu.edu.au.

Conference proceedings

Limited copies of the proceedings of the second national acid sulfate soils conference are still available for \$50 (\$45 plus \$5 postage). To order a copy please fax your order to Jennifer Grant on 066 281 744 or post it to her at Wollongbar Agricultural Institute, Bruxner Highway, Wollongbar 2477. We cannot take orders over the phone.

Acid sulfate soils information officer

The position of acid sulfate soils information officer, vacant due to the resignation of Rebecca Lines-Kelly will be advertised this month. ASSMAC hopes the position will be filled by February. If you would like to know more about the position, contact John Williams on 066 261 340 or fax 066 281 744.

ASSIST database

If you would like a copy, email or paper, of the ASSIST database on acid sulfate soils, contact the acid sulfate soils information officer on 066 261 319. If you would like to be in the next edition (March 1996) fax your details (name, address, phone, fax, email, ASS classification, eg landowner, consultant, and area of ASS interest) to the acid sulfate soils information officer on 066 281 744.

Pimpama River research

Fresh from his work on the Shoalhaven River in NSW, Andrew Porter is now looking at the processes and impacts of acidification on the Pimpama River in Queensland. The river has recurrent fish kills, fish disease outbreaks, and degraded habitat, and the North East Albert Landcare Group wants to improve it.

Andrew is funded by a three year Coastcare grant awarded to the Landcare Group and Gold Coast City Council. He will be based with council, and will work towards a Masters degree by research, supervised by Jes Sammut of University of NSW.

To find out more about the project, contact Jes Sammut on email j.sammut@unsw.edu.au or phone 02 9385 6211.

ASSAY is published quarterly for the acid sulfate soils information and awareness program, and funded by the National Landcare Program.

For more information contact the acid sulfate soils information officer.

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