List of references for PHMO F2F

Oakey Ground water contamination

Department of Defence website

http://www.defence.gov.au/id/Oakey/Default.asp

Senate inquiry website

http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/ADF_facilities/Report_part_A

Antibiotic Stewardship in primary care

National Prescribing Service website

http://www.nps.org.au/medicines/infections-and-infestations/antibiotics

University of Queensland General Practitioners Antimicrobial Stewardship Programme Study (GAPS)

http://gaps.uq.edu.au/

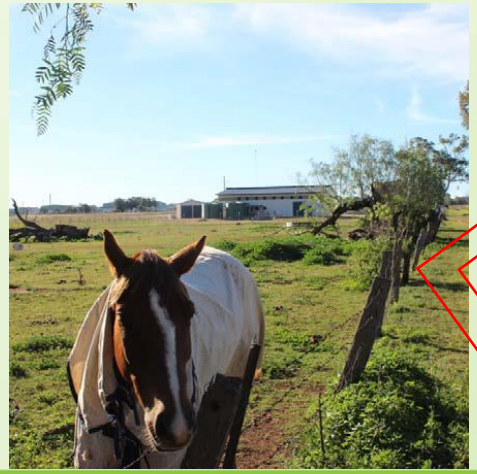
RCGP TARGET Antibiotics

www.RCGP.org.uk/TARGETantibiotics/

E-bug website

http://www.e-bug.eu/

Oakey Groundwater contamination incident



Dr Penny Hutchinson
Public health physician/ Director
Darling Downs Public Health Unit

Overview

- Background
- What are PFOS and PFOA?
- The Department of Defence (DoD) investigation
- DoD's response
- QG response
- Senate inquiries

Background

- Army Aviation centre Oakey
- Training centre for the Australian army's aviation services
- Has hosted fire fighting training activities from 1970s until 2005
- Aqueous Film Foams (AFFF) are used in fire fighting training
- Up until 2005 these foams contained PFCs

What are PFCs?

- perfluorinated chemicals (PFCs)
- PFCs are a group of chemicals used to make coatings and products that resist heat, oil stains, grease and water
- Used in a wide variety of common household and industrials products such as cleaning products, textiles and paper and packaging products, and are present at trace levels throughout the environment
- Found in very low levels in the blood of the general population all over the world.

What are PFCs?

There are many different PFCs, however,

- Perflurooctanoic Acid (PFOA)
- Perfluorooctane Sulfonate (PFOS)

are the ones we are concerned about.

Why are these chemicals a concern

- Persist in the environment (Stockholm Convention)
- “Emerging contaminants”
- Can accumulate in the food chain and in human tissue
- Limited research done in Australia or overseas on potential health impacts

Health effects

- PFCs can enter the body in a number of ways
- Drinking contaminated water
- Inhalation (mainly industrial settings)
- Consuming contaminated food
- Skin absorption (very poor)

Health effects

- PFCs naturally eliminated from the body
- Takes a significant amount of time (T1/2: 3 – 9 years depending on study).

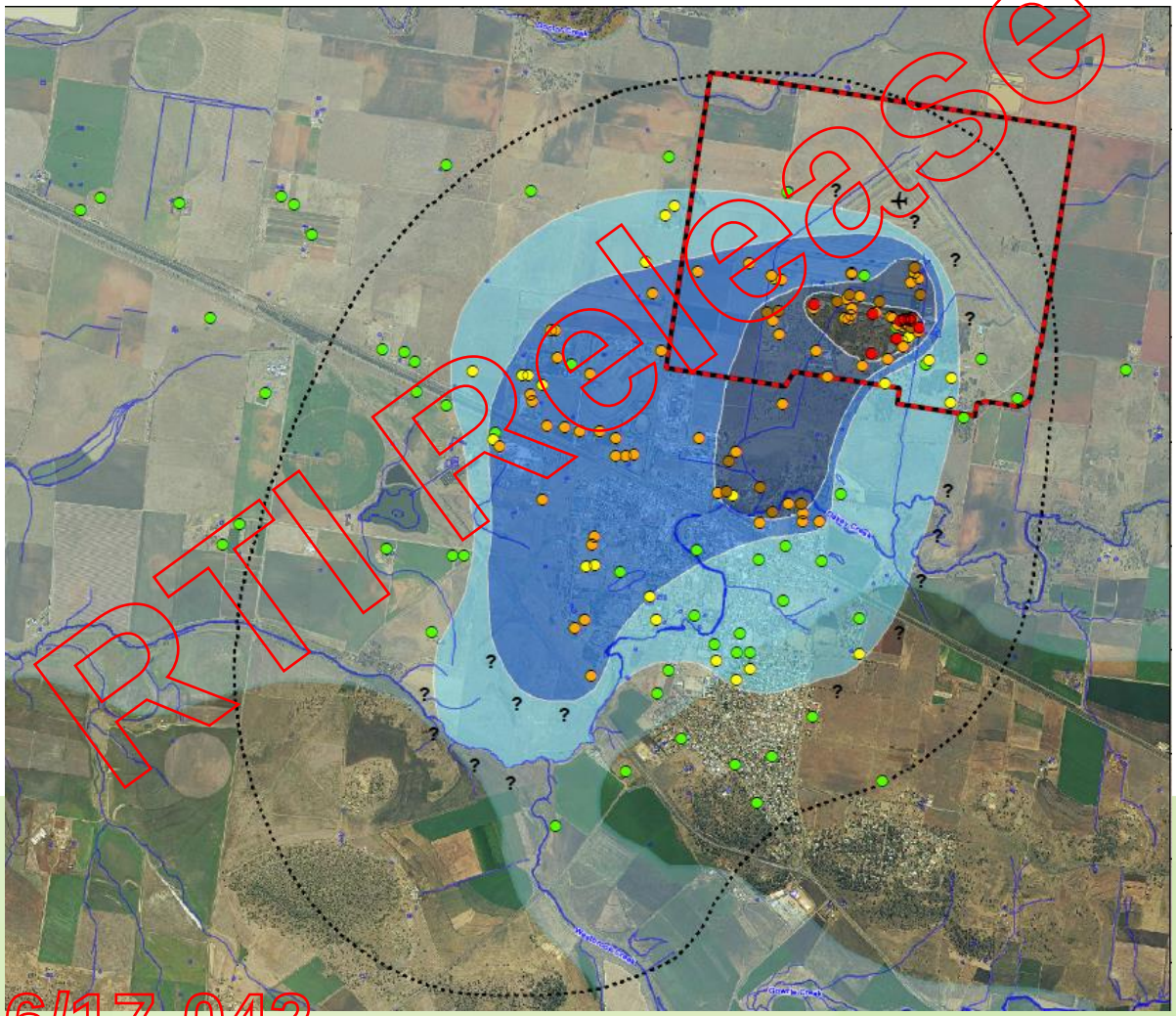
Health effects

- PFOA: probable links to a variety of conditions (thyroid, high chol., etc.)(C8 study)
- Minimal information about PFOS effects

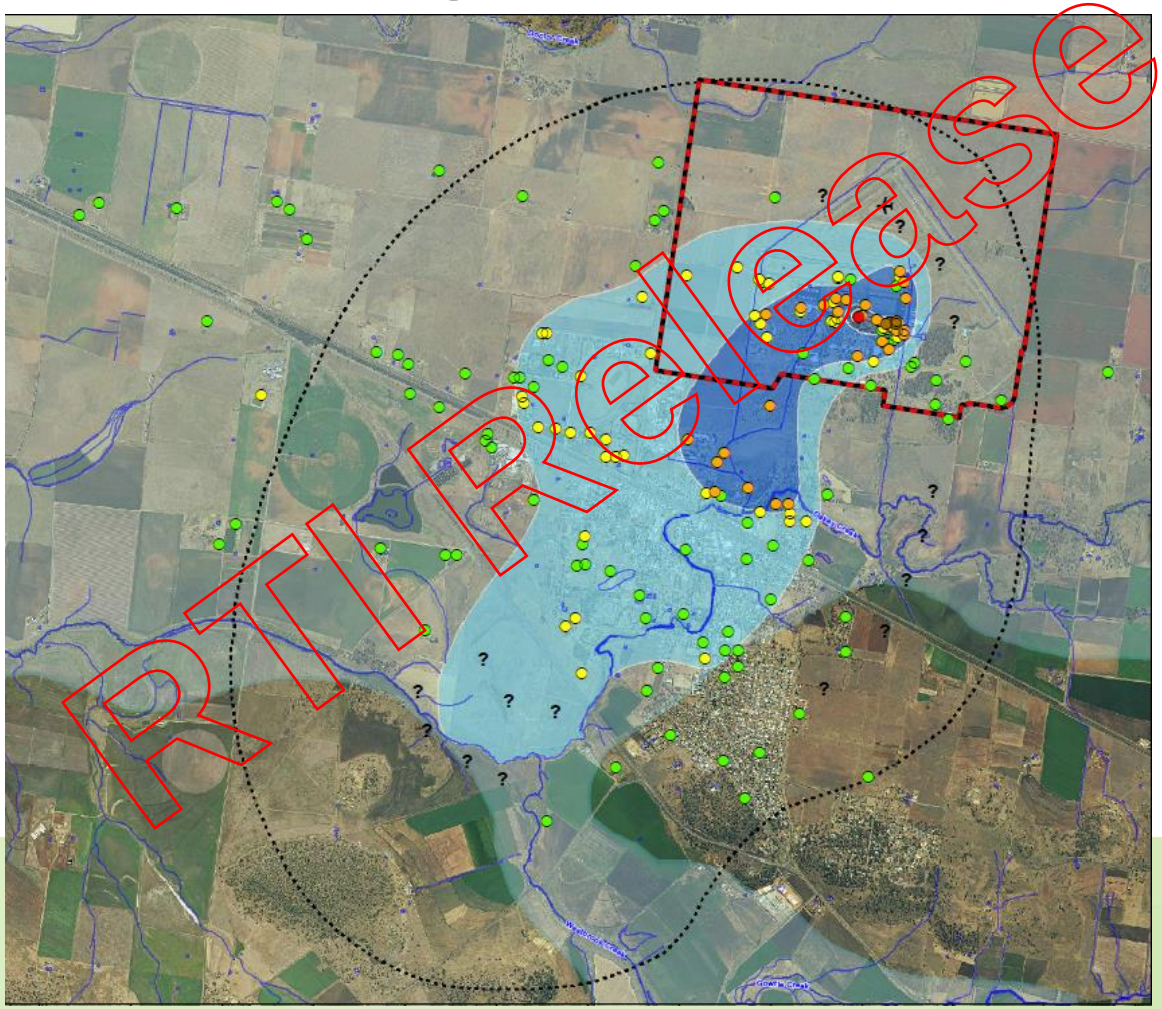
The DoD investigation

- Regularly undertakes groundwater assessment on bases
- 2010 PFOS was found on site at AACO
- 2011- 2013 further testing on base
- Results indicated possible spread beyond the base
- Early 2013 targeted off base testing
- 2014 – 2015: Wider scale sampling
- 97 bores off-site tested
- 32 elevated PFOS, 7 elevated PFOA

PFOS Detection and investigation areas



PFOA detection and investigation areas



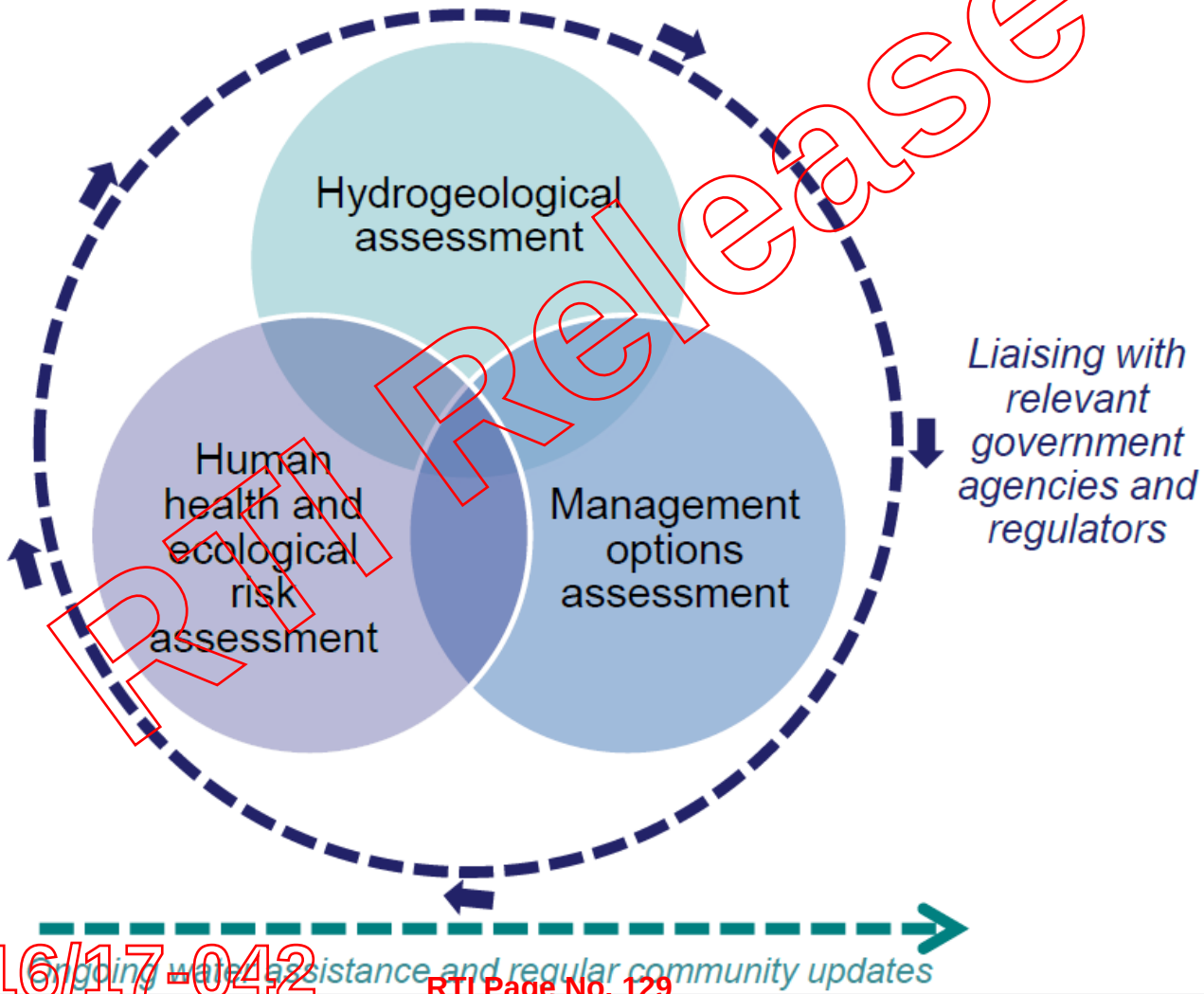
DoD's Reponse

- 6 Community information sessions. DDPHU staff attended July 14, August 2015, Dec 2015 and February 2016
- Advised landholders not to drink bore water on their property
- Providing potable water to landholders not on reticulated supply from Toowoomba
- Undertaking further site investigations and technical assessments to understand the extent of the contamination, it's potential impacts and how the impacts will be managed.

DoD response

- 2013 – mid 2015: Discovery and immediate risk response
- Mid to late 2015 Understanding the contamination and it's potential impacts
- 2015 – mid 2016: Assessing the contamination and it potential risks
- Mid 2015 – 2018: managing the contamination
- Post 2018 Longer term actions

Key activities mid 2015 – mid 2016



Hydrogeological Assessment

Task	Completion	Comments
Drainage line sampling	✓	Sediment + water
Creek sampling	✓	Off-site
Irrigated soil sampling	✓	
Monitoring well installation	✓	10 x well pairs
Aquifer gauging, sampling, testing	Dec 2015	New wells + target bores
Conceptual site model update	Mar 2016	
Hydrogeological flow model	Mar 2016	Model Plan in Nov-Dec with Technical Advisor
Solute transport and mass flux model	May 2016	
Hydrogeological Assessment Report	May 2016	

Human Health and Ecological Risk Assessment

Task	Completion	Comments
Biota (Crop & Fauna) sampling	Feb 2016	Preliminary HHERA Plan & Sampling Plan for Biota currently in review by Technical Advisor.
Fauna biokinetic modelling	March 2016	
Economic risk assessment	June 2016	
Tier 2 Human Health Risk Assessment	June 2016	
Risk Assessment Report	June 2016	

Health enquiries and blood testing

- ?mid 2014: concerned residents approached a retired GP for advice on health effects
- Conducted a screening program to reassure them
- Sought assistance from DoD to fund blood tests. Approved
- Contract with SNP to perform testing (Entox. Sub-contracted to perform analysis
- Several residents engaged services of Shine Lawyers (Erin Brockovitch made an appearance)

Health enquiries and blood testing

Criteria for testing

- Living in contamination zone
- Bores tested
- Drunk bore water within the last 3 years

- DoD agreed to fund up to 100 tests.
- Initially eleven residents tested
- No exposure information was obtained from those tested.

Health enquiries and blood testing

- Late April 2015 local GP provided with test results by Entox
- GP contacted local resident with results
- According to GP 10 /11 tests significantly elevated levels.

Health enquiries and blood testing

- May 2015
- DoD met with DD HHS, DoH and other Govt. Departments.
- Outlined health issues and blood testing
- Advised that further blood tests were to be taken.
- SNP to contact residents and arrange for testing
- All testing to be completed before results provided
- Expected late June 2015

QLD Govt. Response

- DoD advised not experienced in health
- All Govt. departments concerned that DoD would not take responsibility for remediation of contamination.
- Interdisciplinary Committee convened
- Lead by DoH
- “matter for noting “ prepared for the Parliament
- List of questions provided for DoD to answer

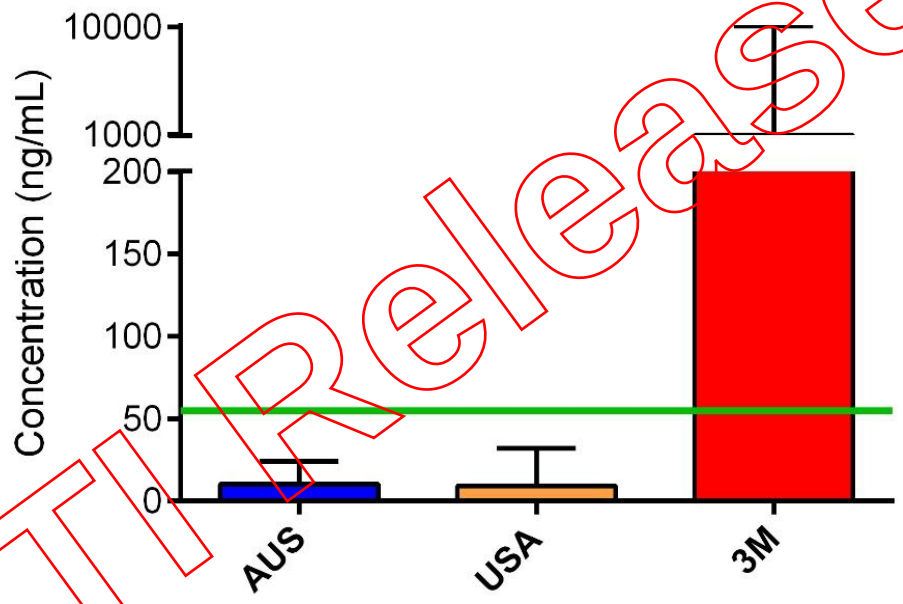
QLD Govt. Response

- Further meetings between DoD and IDC.
- DoD sought assistance from health as chief advisor had left department to brief the GPs
- Advised to seek medical expertise from within DoD to perform this.
- 13th August: Briefing to Oakey GPs and Departmental briefing.
- 25th August: Community meeting: Oakey

Further blood test results

- Mid July 2015: PHP from DDPHU sent Draft results letter for residents by DoD
- Advised DoD concerned about reading age of document.
- DoH offered to provide a more appropriate letter.
- 14th September 2015: SNP provided blood results to residents.
- Original letter template used
- NSW Health Fact sheet provided

Comparison to others in the Community



1. "Your level of PFOS" (green line)
2. The general Australian community in 2006-2007 (blue line)
3. The general US community in 2009-2010 (orange line)
4. A group of workers who were occupationally exposed to PFC at 3M manufacturing facility in USA in 2000 (in red)

Further blood test results

- QH fact sheets developed for Residents and GPs
- Residents advised to contact 13HEALTH (script prepared)
- GPs information disseminated via GP Connections and PHN.
- So far, four people have contacted 13HEALTH
- One very anxious, wanting children tested
- DoD to receive de-identified information on blood test results.

Blood test results

- 19/11/15 QH/ DDPHU received blood test results elevated blood levels of PFOS.
- PFOA generally WNL

Blood testing

- In Summary 75 people tested
- PFOS results: Range 2.35 – 381; Mean 69.4; Median 37
- PFOA results: Range 0.78 – 19.2; Mean 3.05; Median 2.58
- PFHxS results: Range 1.21 – 373; Mean 45.69; Median 24.7

Results of those residents who have been tested twice

Sample No	Date 1	PFOS	PFOA	PFHxS	Sample No	Date 2	PFOS	PFOA	PFHxS
1	12/03/15	54.8	3.00	110	72	21/08/15	73.7	3.41	115
2	13/03/15	360	4.44	215	59	3/07/15	194	3.20	137
3	3/03/15	134	3.19	60.6	61	3/07/15	125	2.31	48.6
4	11/03/15	113	9.50	89.2	58	22/06/15	70.9	6.64	48.1
5	11/03/15	55.4	4.88	38.5	63	22/06/15	53.7	4.21	39.6
57	26/06/15	67.2	1.40	35.3	68	30/08/15	80.0	1.48	30.7

QLD Govt. Response

- high level IDC convened
- Premiers and Cabinet leading
- Advice from premier DoD is responsible for managing incident.
- IDC advice: any QLD Govt. fact sheets to be withdrawn.
- Premier to write to Prime Minister

4 /12/15 Public Forum

- Assistant Minister for Defence: Hon. Darren Chester MP
- Member for Groom: Hon Ian McFarlane
- Community openly expressed their anger over management of incident
- Inaction by DoD

Public Forum concerns

- Human health impacts
- Ongoing exposure to PFCs
- Lack of ongoing human blood testing
- Poor treatment of ex DoD personnel
- Animal health (mainly horses)
- Land values including the inability to sell or develop land.
- Several people stated their blood results were above the national average
- Requesting an expansion of the blood testing

Political commitments

Ian McFarlane

- Human blood testing for anyone who requests such a test
- That any health survey (DoD human health assessment) include anyone within the plume, on the fringe of the plume or who requests inclusion
- Further testing of water, stock and fodder
- Someone from the DoD, based in Canberra, to come to Oakey every fortnight to meet the public and listen to their concerns.

Political commitments

- Darren Chester
- Mental health support for the community
- Support to address health concerns
- The need to review all types of testing to meet the community's expectations
- Provision of a point of contact for the community (including the possibility of a community consultative committee).

25/2/16 Drop in info session

- Health table
- Very anxious/ angry residents
- No blood testing, want to be tested
- Blood testing, want to know the risk , want further blood tests
- Shanghaied by Shine Lawyers

Senate Inquiry

- Part A:
- Part B: Oakey and other areas

Part A Report - recommendations

- Voluntary blood testing
- *6.37 "There appears to be an evolving Defence approach to blooding testing for PFOS/PFOA. While Defence funded blood tests for affected residents of Oakey, it now relies on NSW Health advice that blood tests are 'not recommended because they don't predict level of health risk'.[13] Witnesses from NSW Health were not available to be questioned regarding this position at the Newcastle public hearing"*

Part A Report - recommendations

- *6.38 "While there may not be a strictly medical reason to undertake blood testing of affected residents, in the view of the committee that should not be the only factor considered. Voluntary blood testing of affected residents, tracked over time, could provide other valuable information. For example, the results of testing could lead to evidence regarding pathways of exposure. It could also be important in determining subsequent entitlements to compensation for health outcomes in the future".*

Part A Report - recommendations

- *6.40 "The committee acknowledges that blood testing for levels of PFOS/PFOA, when medical knowledge regarding the impact of these contaminants is incomplete, could possibly cause additional anxiety for those persons tested. Nonetheless, the arguments put by Defence against blood testing were not convincing. Uncertainty regarding levels of exposure is also causing anxiety for affected residents. Furthermore, people interested in blood tests are likely to obtain them privately regardless. As a matter of fairness, when affected residents are interested in blood testing for PFOS/PFOA, they should not have to arrange and pay for it themselves."*

Part A Report – recommendation 7

“6.41 The committee recommends that Defence arrange and fund a program of blood tests for residents in the investigation area on an annual basis”.

9/3/16 -Part B Public hearing

- QLD Govt. did not look good
- Senators concerned about QLD Govt. in-action
- QH recommendation to undertake pooled bloods samples for the Oakey community.
- Awaiting final report and recommendations

We are not alone

s.73 - irrelevant

s.73 - irrelevant

Useful websites

- DoD website on Oakey
- http://www.defence.gov.au/id/Oakey/Default.asp
- Website for Senate inquiry
- http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/ADF_facilities/Report_part_A

Questions?

NSW GOVERNMENT Health

PFOS and PFOA
Williamtown RAAF site contamination

What is the issue?

The issue is that some related chemicals (perfluorinated compounds) have been used and remain in the environment around the Williamtown RAAF site. The Australian Defence Force (ADF) has informed the NSW government that the Williamtown site has been found to contain high concentrations of PFOS and other closely related chemicals. These chemicals are present on the site and over the past decades have slowly worked their way through the soil to the groundwater underneath the site. These substances have not only contaminated the RAAF site itself, but also land close to the site. Surface water samples from Dawsons Drain, Moors Drain, Upper Tilligerry Creek and Fourteen Foot Drain have been found to contain PFOS. Ground water and fish from the local creeks were tested for PFOS and were found to contain high levels. Tomago sands, a drinking water catchment site is close to the Williamtown site.

The NSW Government is investigating this issue. This fact sheet is interim advice by NSW Health and will be updated as further investigations are undertaken.

What areas are potentially affected?

See attached map for the area with potentially affected groundwater and for the location of fishery closures. Further testing will be undertaken to clearly identify areas of potential health risk.

What are PFOS and PFOA?

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) are man-made chemicals belonging to the group known as perfluorinated chemicals (PFCs). PFCs have been used by numerous industries and have been contained in products such as in textiles, leather products, metal plating, protective coating, cleaning products, pesticides and fire fighting foams.

PFOS and PFOA are both very stable chemicals that do not break down in the environment and can persist for a long time both in the environment and in humans.

What are the potential health effects of PFOS and PFOA?

Whether PFOS or PFOA causes adverse health effects in humans is currently unknown, but on current evidence, the potential for adverse health outcomes cannot be excluded. Studies of workers exposed to these chemicals have not consistently shown adverse health effects, though impact on blood cholesterol levels, thyroid function and liver size have been reported in some studies. Mothers exposed to high levels of PFOA in the drinking water did not have an increased risk of birth defects in their children. There are approximately 30 000 chemicals in use across Australia. For the vast majority of these, including PFOS and PFOA, very little is known about possible health effects in people.

Where there is not enough scientific evidence to assess health effects in humans, any effects in animals are then assessed. Certain laboratory experiments on rats have indicated some potential to promote cancer, but it is not clear if these results have implications for human health.

How are people exposed to PFOS and PFOA?

Studies in America have shown that almost everyone is exposed to low levels of PFOS and PFOA just by living in the modern world. People may be exposed to PFCs from the air, indoor dust, food, water, and various consumer products. Contaminated foods, particularly fish and eggs, are thought to be the main source of exposure.

September 2015

What can I do to reduce my exposure?

Don't eat fish, prawns or oysters from the following areas: Dawsons Drain, Moors Drain, Upper Tilligerry Creek , Fourteen Foot Drain and Fullerton Cove. See map for fishery closures.

If you live in the area with potentially affected groundwater indicated on the accompanying map additional precautions are advised:

- Don't drink or prepare food with bore water from this area. It is safe to drink water from the reticulated water supply (town water).
- Don't eat eggs from your own backyard
- Don't drink milk from cows or goats grazing in this area

Is there a test to determine likely health effects?

While blood tests can provide a measure of PFOS, they are not recommended because they don't predict level of health risk.

If you have any health concerns, please consult your general practitioner.

Further information
www.health.nsw.gov.au

Updated 11 September 2015

Suzanne Huxley

From: Penny Hutchinson
Sent: Friday, 4 March 2016 9:36 AM
To: Peta Mason; Sophie Dwyer; Suzanne Huxley; Peter Boland; Janet Cumming; Greg Jackson
Cc: Andrea Casasola
Subject: RE: Draft PFOS chronology
Attachments: PFOS timeline.doc

Good Morning
Please find attached Chronology with DDPHU additions (which I believe are relevant).

Happy to discuss if necessary.

Regards
Penny

Dr Penny Hutchinson
Public Health Physician and Director | Darling Downs Public Health Unit
Darling Downs Hospital and Health Service

Ground Floor Browne House
Baillie Henderson Hospital
Cnr Tor and Hogg St
Toowoomba QLD 4350

P: 07 46998240 | **F:** 07 46998262
E: Penny.Hutchinson@health.qld.gov.au

Web: http://www.health.qld.gov.au/darlingdowns/

From: Peta Mason
Sent: Thursday, 3 March 2016 3:14 PM
To: Sophie Dwyer; Suzanne Huxley; Peter Boland; Penny Hutchinson; Janet Cumming; Greg Jackson
Cc: Andrea Casasola
Subject: Draft PFOS chronology

Good afternoon,

Please find attached a draft chronology for the senate inquiry.

s.73 - irrelevant - relates to personal information

Kind regards,

Peta Mason
Senior Program Officer
Office of the Executive Director
Health Protection Branch | Prevention Division

Department of Health | Queensland Government
Level 3, 15 Butterfield Street, Herston QLD 4006

Postal address:
PO Box 2368, Fortitude Valley BC QLD 4006

t. (07) 3328 9205
e. peta.mason2@health.qld.gov.au | www.health.qld.gov.au

Oakey PFOS - Queensland Government chronology

Date	Activity
18 July 2014	Toowoomba Regional Council advise Darling Downs HHS that from 2008-2012, bores that had been contaminated were used to supply water to Oakey. Water was treated with reverse osmosis, mixed with uncontaminated bores and water from the Toowoomba water supply Darling Downs HHS contacts Oakey Army Aviation Base about PFOS and PFOA, and is advised that PFOS and PFOA have seeped into local aquifer as a result of the use of fire fighting foams
29 July 2014	Darling Downs HHS attend community information session convened by Defence
13 August 2014	AECOM advise Darling Downs HHS of numerous enquiries from Oakey residents expressing health concerns about contamination of the underground water, that residents in the area are being surveyed in the area of identified contamination to collect data on water usage and further testing of some bores from concerned residents is also occurring
11 September 2014	AECOM discuss water supply arrangements with households not connected to the town supply with Darling Downs HHS
1 October 2014	Darling Downs HHS receive advise of recent media about the incident and that media enquiries are to be referred to the Department of Health email, news@health.qld.gov.au
16 April 2015	Darling Downs HHS decides to disconnect bore water from all points at Oakey Hospital, including for gardening purposes
1 May 2015	QH is contacted by Defence about a situation in Oakey regarding chemical contamination in ground water and subsequent testing
8 May 2015	Defence meets with representatives from the Darling Downs HHS to brief them on the Oakey PFOS/PFOA Blood Testing Program
12 May 2015	Defence provides summary of initial Oakey blood test results to Darling Downs HHS
20 May 2015	Defence briefs Department of Health and Darling Downs HHS on Oakey PFOS/PFOA Blood Testing program
25 May 2015	Department of Health convenes a health working group with Darling Downs HHS, which has since met regularly
2 June 2015	Department of Health sends brief to Minister for Health and Ambulance Services on the investigation of PFOS contamination of groundwater at Army Aviation Centre Oakey (BR061473)
9 June 2015	QH meets with enTox representatives about research being conducted on PFOS/PFOA, including Oakey
17 June 2015	DPC receives phone call from QH, advising that there is an issue regarding blood testing at Oakey, and that Cabinet may need to be advised
18 June 2015	DPC is sent a copy of QH briefings regarding the contamination at Oakey
24 June 2015	Darling Downs HHS forwards Toowoomba Regional Council briefing notes detailing history of the water supplied to Oakey and the assessment of the PFOS and PFOA impact
26 June 2015	QH convenes QG interdepartmental committee (IDC) meeting to share contact various agencies have had with Defence. Meeting is attended by officers from Environment and Heritage Protection (EHP), Agriculture and Fisheries (DAF), Biosecurity Qld (BQ), Science, Information Technology and Innovation (DSITI), Justice and Attorney General – Workplace Health and Safety Qld (WHSQ), Natural Resources and Mines (NRM), Premier and Cabinet (DPC) and Safe Food Production Qld (SFPQ). Discussion is information sharing of contacts various agencies have had with Defence

Oakey PFOS - Queensland Government chronology

16 July 2015	QH convenes a scientific meeting, with DPC and technical experts from DAF, NRM, WHSQ, DSITI and enTox
17 July 2015	Defence forwards copy of letters to accompany blood testing results to Darling Downs HHS
20 July 2015	Information brief on Oakey provided to Premier's Office (TF/15/13218)
22 July	QH convenes QG IDC meeting, with officers from EHP, DAF, BQ, DSITI, WHSQ, NRM, DPC and SFPQ to discuss issues regarding the reading level of letters that Defence has prepared to send to patients
30 July 2015	QH convenes QG IDC meeting, with officers from Defence, EHP, DAF, BQ, DSITI, WHSQ, NRM, DPC and SFPQ
30 July 2015	**QH sends 'Scope of Work' to Defence on behalf of QG agencies, requesting further information on work being undertaken to investigate impacts of contamination at Oakey and contain any further contamination** Copy at DOC/16/30275 Response received 12 November 2015 – refer below
31 July 2015	QH develops draft letter and information sheet to accompany blood test results
6 August 2015	Darling Downs HHS provides advice to Defence that it would be useful to brief doctors in Toowoomba as well as Oakey
10 August 2015	**Minister for Health and Ambulance Services takes Matter to Note to Cabinet**
11 August 2015	QH convenes QG IDC meeting with officers from Defence, EHP, DAF, BQ, DSITI, WHSQ, NRM, DPC and SFPQ
11 August 2015	Department of Health sends brief to Minister for Health and Ambulance Services on briefing for Premier on the contamination of groundwater at Oakey with perfluorinated chemicals (BR061942)
13 August 2015	Defence convenes stakeholder information meeting for the ongoing environmental investigations being conducted at and around the Army Aviation Centre Oakey. Meeting is attended by officers from Defence, EHP, DAF, NRM, QH, DPC and SFPQ. Defence and Golder and AECOM (consultants engaged by Defence) present on the status of current activities, as well as planned activities for the next stage of the investigation.
25 August 2015	Darling Downs HHS attend community information session at Oakey convened by Defence
28 August 2015	QH representative briefs Queensland Government Consultative Forum Working Group South convened by Defence
2 September 2015	QH convenes IDC meeting, with officers from EHP, DAF, BQ, DSITI, WHSQ, NRM, DPC and SFPQ
4 September 2015	DPC writes to Defence to request that they provide a briefing on their management of the Oakey contamination to the DG, DPC and the DG, QH
15 September 2015	QH convenes IDC meeting, with officers from EHP, DAF, BQ, DSITI, WHSQ, NRM, DPC and SFPQ. Communication officers are also invited to this meeting.
16 September 2015	Defence advise Darling Downs HHS and Department of Health that Sullivan and Nicolaides Pathology would be sending out blood results to residents, and that no further community information sessions are planned
18 September 2015	Department of Health advises Darling Downs HHS that Defence posted blood test results on 16 September 2015, and that the covering letter contained a reference to recently released NSW Health fact sheet on PFCs. Department of Health makes decision to distribute fact sheets for

Oakey PFOS - Queensland Government chronology

	GPs in Oakey and Toowoomba, and a 13 Health Script is developed. Department of Health sends urgent brief to DG (DG062309) – advising of blood results release relating to Oakey ground water contamination
21September 2015	Oakey Army Aviation Centre contamination incident: Information for Medical Practitioners distributed to local doctors by the Primary Health Network
23 September 2015	Department of Health briefs DG, QH about a meeting with the Defence on the Oakey groundwater conatimation (BR062332)
25 September 2015	**Defence provides briefing to DG, DPC; DG, QH and representatives from DAF and EHP** Agenda at DOC/15/168699 No minutes DG, DPC states that DPC will chair IDC with Defence
28 September 2015	**Minister for Agricultures writes to Minister for Defence expressing concern about management of Oakey contamination**
9 October 2015	DPC convenes IDC (QG reps only, including QH) Agenda: DOC/15/169180 Minutes: DOC/15/173471
21 October 2015	Update provided to Premier's Office by way of PBN TF/15/13552 (which was later updated again)
5 November 2015	DPC convenes IDC (QG reps only, including QH) Agenda: DOC/15/186761 Minutes: DOC/15/189424
12 November 2015	**Defence responds to the 'Scope of Work' sent by QH on behalf of QG agencies** DOC/16/30276
13 November 2015	**DPC convenes IDC (QG reps, including QH and Defence)** Agenda: DOC/15/191170 Minutes: DOC/15/193911
16 November 2015	QH attends Australian Land and Groundwater Association national workshop on PFCs (Perfluorinated Chemicals)
18 November 2015	QH replies to Defence correspondence dated 12 November 2015, advising that the role of coordinating the committee has moved from the Department of Health to DPC, and that the correspondence has been forwarded to DPC for dissemination to IDC members.
25 November 2015	Darling Downs HHS receives blood test results – comparison of results for those patients who presented twice
30 November 2015	Defence provides briefing on testing and sampling process to QG agencies QG agency questions for Defence: DOC/15/201434 Defence indicates 'sampling plans' will be available 'in a few weeks'
30 November 2015	Senate Inquiry announced
4 December 2015	Darling Downs HHS attends a community forum where Defence and Federal Member provide an update to the community on the PFC contamination at Oakey
11 December 2016	Queensland Health technical experts attend national PFC (Perfluorinated Chemicals) Summit convened by enHealth (national meeting of environmental health, reporting to the Australian Health Protection Principal Committee)
15 December 2015	Update of PBN TF/15/13552 provided to PO

Oakey PFOS - Queensland Government chronology

21 December 2015 – 7 January 2016	DPC coordinates the preparation of the QG submission to the Senate Inquiry and prepares draft Cabinet submission
23 December 2015	**EHP commences the process of listing the AACO on the EMR by notifying Defence of its intention to list the AACO**
8 January 2016	DPC provides draft Cabinet submission and draft QG submission to EHP for finalisation
25 January 2016	**Cabinet approves QG submission**
29 January 2016	DPC requests information on ports from TMR
5 February 2016	**Minister for Environment and Heritage Protection conveys QG submission to Senate Committee**
9 February 2016	Defence provides biota sample plans for review DOC/16/27991
23 February 2016	DPC provides QG agencies' comments to Defence DOC/16/28020
25 February 2015	Defence convene a community information session, which is attended by Darling Downs HHS

Myra Thompson

From: Penny Hutchinson
Sent: Thursday, 18 February 2016 8:52 AM
To: Kevin Phillips; Christine Castley; CHO ESO; Jeannette Young; 'Richard.Routley@daf.qld.gov.au'; 'Andrew.connor@ehp.qld.gov.au'; 'Chris.Hill@ehp.qld.gov.au'; 'paul.sanders@dnrm.qld.gov.au'; Sophie Dwyer; Elton.miller@daf.qld.gov.au; CCS Online; Greg Jackson; 'SLIZANKIEWICZ Veronica'
Cc: Adrian Jeffreys; Jessica Martin; Rebecca McGarrity; Virginia Berry
Subject: RE: ACTION REQUIRED - Defence Community Session OAKEY - 25 FEB 2016 - QLD Govt Support [SEC=UNCLASSIFIED]

Hi Kevin
Apologies for the late notice.
I have been in contact with the Chief executive of the Darling Downs Hospital and Health Service who has agreed to arrange for mental health personnel to attend this information session. Will there be some defence medical people at the session? I am prepared to come on the proviso that defence also send medical staff (this will provide mutual support and ensure that we have consistent messaging, it is also important given the recommendations from the senate inquiry about blood testing).

Regards
Penny

Dr Penny Hutchinson
Public Health Physician and Director | Darling Downs Public Health Unit
Darling Downs Hospital and Health Service

Ground Floor Browne House
Baillie Henderson Hospital
Cnr Tor and Hogg St
Toowoomba QLD 4350

P: 07 46998240 | **F:** 07 46998262
E: Penny.Hutchinson@health.qld.gov.au

Web: http://www.health.qld.gov.au/darlingdowns/

From: Kevin Phillips [mailto:Kevin.Phillips@premiers.qld.gov.au]
Sent: Tuesday, 16 February 2016 3:47 PM
To: Christine Castley; CHO ESO; Jeannette Young; 'Richard.Routley@daf.qld.gov.au'; 'Andrew.connor@ehp.qld.gov.au'; 'Chris.Hill@ehp.qld.gov.au'; 'paul.sanders@dnrm.qld.gov.au'; Sophie Dwyer; Penny Hutchinson; Elton.miller@daf.qld.gov.au; CCS Online; Greg Jackson; 'SLIZANKIEWICZ Veronica'
Cc: Adrian Jeffreys; Jessica Martin; Rebecca McGarrity; Virginia Berry
Subject: ACTION REQUIRED - Defence Community Session OAKEY - 25 FEB 2016 - QLD Govt Support [SEC=UNCLASSIFIED]

Good Afternoon

I am writing to you regarding the email (below) from Stacey Hannon, Defence, regarding the upcoming **Community Drop-In Information Session : Oakey, Thursday afternoon, 25 February 2016**, and to ascertain your agency's involvement in this event.

Defence have requested representation at the event from public health and environment agencies and mental health personnel if possible.

Defence have also requested to meet with DPC/Qld Government agency reps this **Friday 19 February (late morning)** to ascertain the level of Qld Government involvement in the upcoming event.

Defence have also advised they wish to re-convene the **Inter-governmental Committee** meeting with Qld Government agencies re: PFOS/PFOA, **Thursday morning, 25 February 2016, Brisbane,** as a follow up to the last meeting of 30 Nov 2015.

Defence is also meeting with Qld Government agency technical officers to discuss sampling plan issues on Friday 19 February at 10:30.

Would you please advise by COB tomorrow, Wednesday 17 February 2016 if possible what your agency's involvement in the community event will be, and provide contact details that can be provided to Defence.

As noted below, this is not an event based on presentations but will be an informal 'drop in' centre type activity.

Health – please note the request for mental health personnel.

Please contact me with any questions.

Thanks

Kevin Phillips
a/Principal Policy Officer
Social Policy
Department of the Premier and Cabinet
Ph 07 300 39360 /
Kevin.Phillips@premiers.qld.gov.au

From: Louise Mahoney
Sent: Tuesday, 16 February 2016 6:36 AM
To: Christine Castley <Christine.Castley@premiers.qld.gov.au>; Kevin Phillips <Kevin.Phillips@premiers.qld.gov.au>; Jessica Martin <jessica.martin@premiers.qld.gov.au>
Subject: Fw: Community Drop In Information Session Oakey 25FEB16 - QLD Govt Support Requested Please [SEC=UNCLASSIFIED]

From: Hannon, Stacey MS <stacey.hannon@defence.gov.au>
Sent: Monday, 15 February 2016 3:19 PM
To: Louise Mahoney; 'dave.stewart@premiers.qld.gov.au'; Boyd, Adam MR 3
Cc: Mobbs, Tristan MR; Pearce, Vicki MS 1; Clifton, Alison MS; 'Mitchell, Fran'; Evans, Greg AVM; O'Connell, Mark MR 2; Gray, Lauren MS; Klein, Mathew DR; Lysewycz, Michael MR; DL Special Counsel; Lavers, Dave MR; Matias, Keifer MR; Nakhla, Sherif MR; Lun, Patrick MR 3; Benbow, Scott COL; Horn, Helen MRS; Cox, Brett MR 1

Subject: Community Drop In Information Session Oakey 25FEB16 - QLD Govt Support Requested Please [SEC=UNCLASSIFIED]

UNCLASSIFIED
Hello Dave and Louise,

I am writing to request your support to hold a Community Drop In Information Session in Oakey on Thursday 25 February, 2016.

As you will be aware, Defence is eager to ensure that local community representatives have opportunities to engage with all of the authorities that have a role in guiding the management of perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

Following your advice Dave, in your letter of 27 January, 2016 Defence will lead on arranging the next engagement session, as we are very keen to continue our relationship with the community. Defence notes however, that in the broader Queensland context, this issue is unlikely to be limited to Defence bases in isolation. As you may be aware the Standing Committee on Foreign Affairs, Defence and Trade has initiated a Senate Inquiry into PFOS and PFOA contamination.

The second part of this Inquiry expands its scope beyond Defence and is focussed on other Commonwealth, State and Territory facilities that may also have PFOS and PFOA contamination. Defence understands it is highly likely that the old formulations of aqueous film-forming foams may also have been used for fire-fighting of liquid fuel fires by many industry and civilian fire authorities. Further, Defence understands that PFOS and PFOA have been used across Australia and internationally in a wide range of household and industrial applications.

As the Queensland Government starts to work with other Commonwealth, State and Local authorities to understand their use of PFOS and PFOA, it may be necessary to review the arrangements surrounding community engagement and who should lead it. In the interim however, Defence would like to initiate a number of engagement sessions, with the first one on the afternoon of Thursday 25 February 2016, 16:00 - 18:00hrs. (Venue to be determined).

Defence considers it is critical to have representatives from all relevant Queensland Government agencies, as well as the local Oakey community, attend these sessions. In this regard, Defence would appreciate your suggestions regarding suitable participants from the Queensland Government agencies, particularly those responsible for public health and environment. If we could get some representation from the mental health and well being area in particular, this would be extremely beneficial.

The approach for this session will be to have an informal 'drop in' centre type of activity. Defence has taken feed back from the community, that standing out the front and presenting information, is not necessarily what is needed now. Consequently, Defence is styling this activity from sessions the NSW Government has facilitated in Williamtown that Defence has participated in. NSW Government has groups of agencies, and interested parties attend and have booths or stands set up, so the community members can speak to their area of interest in a more individualised manner.

Defence also gratefully accepts your offer to provide advice on suitable independent experts to participate in local engagement activities. As we establish this cohort we may look to establish a Community Reference Group, similar to that established at Williamtown should the community think it relevant.

My point of contact for this activity will be Mr Adam Boyd, available on adam.boyd3@defence.gov.au. Your earliest guidance on attendees would be appreciated so we can work out their requirements for the afternoon.

Please also feel free to call me directly, should you have any further questions.

Kind regards,

Stacey

STACEY HANNON
Director
Strategic Contamination Management
Environment & Engineering Branch

Infrastructure Division
Estate & Infrastructure Group
Department of Defence
BP26-2-B009
Brindabella Park
CANBERRA ACT 2600

PH: 02 6266 8060
MOB:

PO Box 7925 CANBERRA BC ACT 2610

Suzanne Huxley

From: BRADSHAW Tony <Tony.Bradshaw@ehp.qld.gov.au>
Sent: Friday, 19 May 2017 5:28 PM
To: Darcy Garlick-Kelly; Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet Cumming; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan; CHAVASSE Jason
Subject: RE: Army Aviation Centre Oakey (AACO) Fortnightly Environmental Investigation Sampling Data [SEC=UNCLASSIFIED]

Hi Darcy,

It is a bit meaningless unless they explain where the samples were taken from and what the purpose was. Cheers Tony

---

From: Darcy Garlick-Kelly [mailto:darcy.garlick-kelly@premiers.qld.gov.au]
Sent: Thursday, 18 May 2017 2:08 PM
To: Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet.Cumming@health.qld.gov.au; BRADSHAW Tony; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan; CHAVASSE Jason
Subject: FW: Army Aviation Centre Oakey (AACO) Fortnightly Environmental Investigation Sampling Data [SEC=UNCLASSIFIED]

HI all,

Please see the latest round of sampling data from Oakey.

Cheers,
Darcy

Darcy Garlick-Kelly
Policy Officer
Environment Policy
Department of the Premier and Cabinet

Phone: (07) 3003 9487
Level 30, 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

Queensland Government

From: Kenna, Sharon MS [mailto:sharon.kenna@defence.gov.au]
Sent: Wednesday, 17 May 2017 11:02 AM
To: Darcy Garlick-Kelly <darcy.garlick-kelly@premiers.qld.gov.au>
Cc: Justin Carpenter <justin.carpenter@premiers.qld.gov.au>; Pearce, Vicki MS 1 <vicki.pearce1@defence.gov.au>; Harvey, Renee MS <renee.harvey@defence.gov.au>; Sarafov, Belinda MS 1 <belinda.sarafov1@defence.gov.au>; PFAS Investigations.Engagement <pfas.investigationsengage@defence.gov.au>
Subject: Army Aviation Centre Oakey (AACO) Fortnightly Environmental Investigation Sampling Data [SEC=UNCLASSIFIED]

UNCLASSIFIED

Good morning Darcy

Please find attached the fortnightly Environmental Investigation sampling data from AACO.

This data is unverified and has not yet been interpreted by AECOM.

Regards
Sharon

Sharon Kenna
PFAS Investigations Engagement
PFAS Investigations and Management Branch
Infrastructure Division
Estate and Infrastructure Group
Department of Defence

M:
sharon.kenna@defence.gov.au

AECOM Australia Pty Ltd
Level 8
540 Wickham Street
PO Box 1307
Fortitude Valley QLD 4006
Australia
www.aecom.com

+61 7 3553 2000 tel
+61 7 3553 2050 fax
ABN 20 093 846 925

15 May 2017

Vicki Pearce
Acting Director
PFAS Strategic Environmental Management and Infrastructure
Department of Defence

Dear Vicki,

AACO Stage 2C Environmental Investigation 2017: Preliminary sampling results (processed by 12 May 2017)

1.0 Introduction

AECOM Australia Pty Ltd (AECOM), on behalf of the Department of Defence (Defence), is undertaking the 2017 Environmental Investigations in and around the Army Aviation Centre Oakey (AACO, the Site).

This report includes preliminary, unvalidated data that have been collected and processed as at 12 May 2017.

AECOM will continue to provide results from further sampling, following the processing of the data.

2.0 Purpose

The purpose of the provision of preliminary data is to allow Defence and other stakeholders, including QLD government to view the data prior to its use in the technical reports for the 2017 Environmental Investigations.

3.0 Laboratory Analysis

Upon collection, the samples were sent under Chain of Custody (CoC) conditions to the following National Association of Testing Authorities (NATA) accredited laboratories:

- ALS Environmental, 2 Byth Street Stafford QLD Australia 4053
- National Measurement Institute (NMI): 105 Delhi Rd, North Ryde NSW 2113.

4.0 Preliminary Results Tables

The preliminary results are provided in the attached tables.

AECOM notes that the data provided in the tables are preliminary only. The data have not been validated and are subject to change following the data validation process.

The data are not for public distribution.

Yours faithfully

Julian Buttigieg
Professional Environmental Scientist
julian.buttigieg@aecom.com

Direct Dial: +61 7 3553 3090
Direct Fax: +61 7 3553 2050

Richard Somerville
Principal Environmental Engineer
richard.somerville@aecom.com

Mobile: +
Direct Dial: +61 3 9653 8040
Direct Fax: +61 3 9654 7117

encl: Table 1: Soil Results - PFAS
Table 2: Water Results - PFAS and Major Ions
Table 3: Water Results - other

cc: Renee Harvey (Defence)
Belinda Sarafov (Defence)
Frances Lee (AECOM)
Paul McCabe (AECOM)

Table 1 - Soil Results - PFAS
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

NOTE: The results are Preliminary only. The data has not been validated and are subject to change following the data validation process. NOT FOR PUBLIC DISTRIBUTION

Legend:
- Not analysed / not calculated
LOR – Limit of Recording
Sample Type: N - Primary, FD - Duplicate, FT - Triplicate
% = Percent
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
µg/l = micrograms per litre (ppb)
Lab Qualifiers:
J - Estimated value.

Field_ID	AACO-BH-O-Ya-AL-0.5-170418	AACO-BH-O-Ya-AL-3.0-170418	AACO-BH-O-Ya-AL-8.0-170418	AACO-BH-O-Ya-AL-12.0-170418	AACO-BH-O-R-AL-0.5-170419	AACO-BH-O-R-AL-3.0-170419	AACO-BH-O-R-AL-8.0-170419	AACO-BH-O-R-AL-13.0-170419	AACO-SSL8-0.0-170420	AACO-BH-O-U-MRV-1.0-170420
Sample Depth	0.5	3.0	8.0	12.0	0.5	3.0	8.0	13.0	0.0	1.0
Lab Report	EB1708129	EB1708129	EB1708129	EB1708129	EB1708130	EB1708130	EB1708130	EB1708130	EB1708131	EB1708131
Sample Type	N	N	N	N	N	N	N	N	N	N
Matrix Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
LocCode	AACO-BH-O-Ya-AL	AACO-BH-O-Ya-AL	AACO-BH-O-Ya-AL	AACO-BH-O-Ya-AL	AACO-BH-O-R-AL	AACO-BH-O-R-AL	AACO-BH-O-R-AL	AACO-BH-O-R-AL	AACO-SSL8	AACO-BH-O-U-MRV

Group	**Analyte**	**Units**	**EQL**									
PFAS	Sum of PFAS	mg/kg	0.0002	0.0045	<0.0002	0.0033	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	4:2 Fluorotelomer sulfonate (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	8:2 Fluorotelomer Sulfonic Acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-heptadecafluorooctane sulfonamide (N-Et-FOSA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-heptadecafluorooctane sulfonamidoethanol (N-ET-FOSE)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-Perfluoroctane Sulfonamidoacetic Acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	N-Methyl-heptadecafluorooctane sulfonamide (N-Me-FOSA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl-heptadecafluorooctane sulfonamidoethanol (N-Me-FOSE)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl Perfluoroctane Sulfonamide Acid (MeFoSAA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	6:2 Fluorotelomer sulfonate (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoroheptane Sulfonic Acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoro-n-Pentanoic Acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorooctanoic Acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorobutane Sulfonic Acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorodecanoic Acid (PFDcA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorododecanoic Acid (PFDoA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoroheptanoic Acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorohexanoic Acid (PFHxA)	mg/kg	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorohexane Sulfonic Acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorononanoic Acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorooctane Sulfonate (PFOS)	mg/kg	0.0002	0.0043	<0.0002	0.0033	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorooctane sulfonamide (PFOSA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorotetradecanoic Acid (PFTeA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	Perfluorotridecanoic Acid (PFTriA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoroundecanoic Acid (PFUnA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Inorganics	Moisture	%	1	24.4	15.4	10.2	21.5	26	22.8	22.3	29.1	22.9	31.5

Table 1 - Soil Results - PFAS
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

NOTE: The results are Preliminary only. The data has not been validated and are subject to chaNOTE: The results are Preliminary only. The data has not been validated and are subject to change following the data validation process. NOT FOR PUBLIC DISTRIBUTION

Legend:
- Not analysed / not calculated
LOR – Limit of Recording
Sample Type: N - Primary, FD - Duplicate, FT - Triplicate
% = Percent
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
µg/l = micrograms per litre (ppb)
Lab Qualifiers:
J - Estimated value.

Field_ID	AACO-BH-O-U-MRV-16.0-170420	AACO-BH-O-U-MRV-3.0-170420	AACO-QC230-170420	AACO-BH-O-U-MRV-6.0-170420	AACO-BH229-170427	AACO-QC01-170427	AACO-SSL17-170426	AACO-SSL18-170426	AACO-SSL19-170426	AACO-SSL20-170426	AACO-SSL31-170427	AACO-SSL33-170427
Sample Depth	16	3.0	3.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lab Report	EB1708131	EB1708131	EB1708131	EB1708131	EB1708630	EB1708630	EB1708632	EB1708632	EB1708632	EB1708632	EB1708633	EB1708633
Sample Type	N	N	FD	N	N	FD	N	N	N	N	N	N
Matrix Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
LocCode	AACO-BH-O-U-MRV	AACO-BH-O-U-MRV	AACO-BH-U-3.0-170420	AACO-BH-O-U-MRV	AACO-BH229	AACO-BH229	AACO-SSL17	AACO-SSL18	AACO-SSL19	AACO-SSL20	AACO-SSL31	AACO-SSL33

Group	Analyte	Units	EQL											
PFAS	Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0117	0.0107	<0.0002	0.387	0.0004	0.0003	0.0344	0.0024
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	4:2 Fluorotelomer sulfonate (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	8:2 Fluorotelomer Sulfonic Acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-heptadecafluorooctane sulfonamide (N-Et-FOSA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-heptadecafluorooctane sulfonamidoethanol (N-ET-FOSE)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Ethyl-Perfluoroctane Sulfonamidoacetic Acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	N-Methyl-heptadecafluorooctane sulfonamide (N-Me-FOSA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl-heptadecafluorooctane sulfonamidoethanol (N-Me-FOSE)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	N-Methyl Perfluoroctane Sulfonamide Acid (MeFoSAA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	6:2 Fluorotelomer sulfonate (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	-	-
	Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	0.0024	<0.0002
	Perfluoroheptane Sulfonic Acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0027	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoro-n-Pentanoic Acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0081	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0128	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorooctanoic Acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	0.0007	<0.0002	0.0004	<0.0002	<0.0002	0.0003	<0.0002
	Perfluorobutane Sulfonic Acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0295	<0.0002	<0.0002	0.0002	<0.0002
	Perfluorodecanoic Acid (PFDcA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	0.0014	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorododecanoic Acid (PFDoA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoroheptanoic Acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorohexanoic Acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0125	<0.0002	<0.0002	0.0006	<0.0002
	Perfluorohexane Sulfonic Acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0396	<0.0002	<0.0002	-	-
	Perfluorononanoic Acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorooctane Sulfonate (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0094	0.0083	<0.0002	0.276	0.0004	0.0003	-	-
	Perfluorooctane sulfonamide (PFOSA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluorotetradecanoic Acid (PFTeA)	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	Perfluorotridecanoic Acid (PFTriA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Perfluoroundecanoic Acid (PFUnA)	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Inorganics	Moisture	%	1	6.8	24.9	22.3	2.3	43.3	41.5	9.5	19.2	9.3	11.4	16.4	24.9

Table 2 - Water Results - PFAS and Major Ions
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

NOTE: The results are Preliminary only. The data has not been validated and are subject to change following the data validation process. NOT FOR PUBLIC DISTRIBUTION

Field ID	AACO-GW31-170428	AACO-QC08-170428	AACO-MWB5-A-170428	AACO-QC13-170428	AACO-MWB5-B-170428	AACO-MWB5-C-170505	AACO-QC02-170404	AACO-QC11-170406
Lab Report	EB1708621	EB1708621	EB1708629	EB1708629	EB1708629	EB1709193	AECO06_170410	AECO06_170410
Sample Type	N	FD	N	FD	N	N	FT	FT
SDG	EB1708621	EB1708621	EB1708629	EB1708629	EB1708629	EB1709193	AECO06_170410	AECO06_170410
LocCode	AACO-GW31	AACO-GW31	AACO-MWB5-A	AACO-MWB5-A	AACO-MWB5-B	AACO-MWB5-C	AACO-GW70	AACO-GW13
Sample Date	28/04/2017	28/04/2017	28/04/2017	28/04/2017	28/04/2017	5/05/2017	20/04/2017	20/04/2017

Group	Analyte	Units	EQL							
PFAS	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	4:2 Fluorotelomer sulfonate (4:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	8:2 Fluorotelomer Sulfonic Acid (8:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	6:2 Fluorotelomer sulfonate (6:2 FTS)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05
	N-Ethyl-heptadecafluorooctane sulfonamide (N-Et-FOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	N-Ethyl-heptadecafluorooctane sulfonamidoethanol (N-ET-FOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	N-Ethyl-Perfluoroctane Sulfonamidoacetic Acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	N-Methyl-heptadecafluorooctane sulfonamide (N-Me-FOSA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	N-Methyl-heptadecafluorooctane sulfonamidoethanol (N-Me-FOSE)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	N-Methyl Perfluoroctane Sulfonamide Acid (MeFoSAA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluorobutanoic acid (PFBA)	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-
	Perfluorodecane sulfonic acid (PFDS)	mg/L	0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	-	-	-
	Perfluoroheptane Sulfonic Acid (PFHpS)	µg/L	0.02	0.4	0.4	0.05	0.06	<0.02	-	-	-
	Perfluoro-n-Pentanoic Acid (PFPeA)	µg/L	0.02	0.1	0.11	<0.02	<0.02	<0.02	-	-	-
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	0.56	0.54	0.21	0.19	<0.02	-	-	-
	Perfluorooctanoic Acid (PFOA)	µg/L	0.01	0.32	0.32	0.04	0.03	<0.01	-	0.033	<0.02
	Perfluorobutane Sulfonic Acid (PFBS)	µg/L	0.02	0.88	0.92	0.18	0.2	0.02	-	-	-
	Perfluorodecanoic Acid (PFDcA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluorododecanoic Acid (PFDoA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluoroheptanoic Acid (PFHpA)	µg/L	0.02	0.03	0.04	<0.02	<0.02	<0.02	-	-	-
	Perfluorohexanoic Acid (PFHxA)	µg/L	0.02	0.16	0.15	0.11	0.07	<0.02	-	-	-
	Perfluorohexane Sulfonic Acid (PFHxS)	µg/L	0.02	7.2	6.76	1.62	1.94	0.22	-	0.44	0.29
	Perfluorononanoic Acid (PFNA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluorooctane Sulfonate (PFOS)	µg/L	0.01	7.24	7.69	0.9	1.27	0.44	-	0.36	0.13
	Perfluorooctane sulfonamide (PFOSA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluorotetradecanoic Acid (PFTeA)	µg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-
	Perfluorotridecanoic Acid (PFTriA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
	Perfluoroundecanoic Acid (PFUnA)	µg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-
Inorganics	Alkalinity (Hydroxide) as CaCO3	mg/L	1	-	-	<1	-	<1	-	-	-
	Alkalinity (total) as CaCO3	mg/L	1	-	-	444	-	368	-	-	-
	Anions Total	meq/L	0.01	-	-	38.4	-	41	-	-	-
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	-	-	444	-	368	-	-	-
	Alkalinity (Carbonate as CaCO3)	mg/L	1	-	-	<1	-	<1	-	-	-
	Calcium (Filtered)	mg/L	1	-	-	139	-	149	-	-	-
	Cations Total	meq/L	0.01	-	-	35.6	-	38.6	-	-	-
	Chloride	mg/L	1	-	-	1030	-	1180	-	-	-
	Fluoride	mg/L	0.1	-	-	0.3	-	0.3	-	-	-
	Ionic Balance	%	0.01	-	-	3.86	-	3.03	-	-	-
	Magnesium (Filtered)	mg/L	1	-	-	138	-	150	-	-	-
	Potassium (Filtered)	mg/L	1	-	-	2	-	2	-	-	-
	Sodium (Filtered)	mg/L	1	-	-	396	-	432	-	-	-
	Hardness as CaCO3 (Filtered)	mg/L	1	-	-	915	-	990	-	-	-
	TOC	mg/L	1	-	-	4	-	3	16	-	-
	TSS	mg/L	5	-	-	3300	-	1520	51	-	-
	Sulfate as SO4 - Turbidimetric (Filtered)	mg/L	1	-	-	24	-	19	-	-	-

Legend:
- Not analysed / not calculated
LOR – Limit of Recording
Sample Type: N - Primary, FD - Duplicate,
FT - Triplicate
% = Percent
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
µg/l = micrograms per litre (ppb)
meq/L = milliequivalents per litre
Lab Qualifiers:
J - Estimated value.

Table 3 - Water Results - other
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

NOTE: The results are Preliminary only. The data has not been validated and are subject to change following the data validation process.
NOT FOR PUBLIC DISTRIBUTION

Legend:
- Not analysed / not calculated
LOR – Limit of Recording
Sample Type: N - Primary, FD - Duplicate, FT - Triplicate
% = Percent
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
µg/l = micrograms per litre (ppb)
cells/mL = algal cells per millilitre
Lab Qualifiers:
J - Estimated value.

Field ID	AACO-MWB5-A-170428	AACO-MWB5-B-170428
Lab Report	EB1708629	EB1708629
Sample Type	N	N
SDG	EB1708629	EB1708629
LocCode	AACO-MWB5-A	AACO-MWB5-B
Sample Date	28/04/2017	28/04/2017

Group	**Analyte**	**Units**	**EQL**		
Total Algae Count	Amphora spp.	cells/ml	5	<5	<5
	Anabaena spp. (straight)	cells/ml	5	<5	<5
	Anabaenopsis spp. (cylinder)	cells/ml	5	<5	<5
	Anabaenopsis spp. (sphere)	cells/ml	5	<5	<5
	Ankistrodesmus spp.	cells/ml	5	<5	<5
	Ankyra spp.	cells/ml	5	<5	<5
	Aphanocapsa spp. < 2µm	cells/ml	5	<5	<5
	Aphanocapsa spp. > 2µm	cells/ml	5	<5	<5
	Aphanothece spp. >2 µm	cells/ml	5	<5	<5
	Asterionella spp.	cells/ml	5	<5	<5
	Aulacoseira spp.	cells/ml	5	<5	<5
	Bacillaria spp.	cells/ml	5	<5	<5
	Bacillariophytes	cells/ml	5	<5	<5
	Botryococcus spp.	cells/ml	5	<5	<5
	Chaetoceros spp.	cells/ml	5	<5	<5
	Chlamydomonas spp.	cells/ml	5	<5	<5
	Chlorella spp.	cells/ml	5	<5	<5
	Chlorogonium spp.	cells/ml	5	<5	<5
	Chrysochromulina spp.	cells/ml	5	<5	<5
	Chrysosporum bergii	cells/ml	5	<5	<5
	Chrysosporum cf. ovalisporum (PTP)	cells/ml	5	<5	<5
	Chrysosporum ovalisporum (PTP)	cells/ml	5	<5	<5
	Cocconeis spp.	cells/ml	5	<5	<5
	Coscinodiscus spp.	cells/ml	5	<5	<5
	Cosmarium spp.	cells/ml	5	<5	<5
	Cosmocladium spp.	cells/ml	5	<5	<5
	Crucigeniella spp.	cells/ml	5	<5	<5
	Cryptomonas spp.	cells/ml	5	<5	<5
	Cyclotella spp.	cells/ml	5	<5	<5
	Cylindrotheca closterium	cells/ml	5	<5	<5
	Desmidium spp.	cells/ml	5	<5	<5
	Diceras spp.	cells/ml	5	<5	<5
	Dichotomochoccus spp.	cells/ml	5	<5	<5
	Dinobryon spp.	cells/ml	5	<5	<5
	Dolichospermum cf. circinale (PTP)	cells/ml	5	<5	<5
	Dolichospermum circinale (PTP)	cells/ml	5	<5	<5
	Dolichospermum planctonicum	cells/ml	5	<5	<5
	Dolichospermum smithii	cells/ml	5	<5	<5
	Dolichospermum spp. (coiled)	cells/ml	5	<5	<5
	Dolichospermum spp. (straight)	cells/ml	5	<5	<5
	Epipyxis spp.	cells/ml	5	<5	<5
	Euastrum spp.	cells/ml	5	<5	<5
	Eudorina spp.	cells/ml	5	<5	<5
	Eutreptia spp.	cells/ml	5	<5	<5
	Fischerella sp. (PTP)	cells/ml	5	<5	<5
	Geitlerinema splendidum	cells/ml	5	<5	<5
	Geitlerinema spp.	cells/ml	5	<5	<5
	Glaucospira spp.	cells/ml	5	<5	<5
	Glenodinium spp.	cells/ml	5	<5	<5
	Gloeothece spp.	cells/ml	5	<5	<5
	Gloeotrichia spp.	cells/ml	5	<5	<5
	Gomphosphaeria spp.	cells/ml	5	<5	<5
	Gonium spp.	cells/ml	5	<5	<5
	Gonyaulax spp.	cells/ml	5	<5	<5
	Gymnodinium spp.	cells/ml	5	<5	<5
	Gyrodinium spp.	cells/ml	5	<5	<5
	Haplotaenium spp.	cells/ml	5	<5	<5
	Heterosigma spp.	cells/ml	5	<5	<5
	Isthmochloron spp.	cells/ml	5	<5	<5
	Katodinium spp.	cells/ml	5	<5	<5
	Koliella spp.	cells/ml	5	<5	<5
	Komvophoron spp.	cells/ml	5	<5	<5
	Large Chroococcales	cells/ml	5	<5	<5
	Lepocinclis spp.	cells/ml	5	<5	<5
	Leptolyngbya spp.	cells/ml	5	<5	<5
	Limnococcus spp.	cells/ml	5	<5	<5
	Limnothrix spp.	cells/ml	5	<5	<5
	Limnothrix spp. (possible PTP)	cells/ml	5	<5	<5
	Melosira spp.	cells/ml	5	<5	<5
	Merismopedia danubiana	cells/ml	5	<5	<5
	Merismopedia marsonii	cells/ml	5	<5	<5
	Merismopedia punctata	cells/ml	5	<5	<5
	Merismopedia spp.	cells/ml	5	<5	<5
	Merismopedia tenuissima	cells/ml	5	<5	<5
	Micractinium spp.	cells/ml	5	<5	<5
	Microcystis aeruginosa (PTP)	cells/ml	5	<5	<5
	Microcystis botrys	cells/ml	5	<5	<5
	Microcystis cf. aeruginosa (PTP)	cells/ml	5	<5	<5
	Microcystis flos aquae	cells/ml	5	<5	<5
	Microcystis spp.	cells/ml	5	<5	<5
	Microcystis wesenbergii	cells/ml	5	<5	<5
	Microseira wollei (PTP)	cells/ml	5	<5	<5
	Microspora spp.	cells/ml	5	<5	<5
	Monoraphidium spp.	cells/ml	5	<5	<5
	Myxobaktron cf. spp.	cells/ml	5	<5	<5
	Myxobaktron spp.	cells/ml	5	<5	<5
	Nephrocytium spp.	cells/ml	5	<5	<5
	Nodularia cf. spumigena (PTP)	cells/ml	5	<5	<5
	Nodularia spumigena (PTP)	cells/ml	5	<5	<5
	Nostoc cf. linckia (PTP)	cells/ml	5	<5	<5
	Nostoc linckia (PTP)	cells/ml	5	<5	<5
	Nostoc spp.	cells/ml	5	<5	<5
	Oedogonium spp.	cells/ml	5	<5	<5
	Oocystis spp.	cells/ml	5	<5	<5
	Other Bacillariophytes	cells/ml	5	<5	<5
	Other Chroococcales	cells/ml	5	<5	<5
	Other Cryptophytes	cells/ml	5	<5	<5
	Other Cyanophytes	cells/ml	5	<5	<5
	Other green filaments	cells/ml	5	<5	<5
	Other Nostocales	cells/ml	5	<5	<5
	Other Nostocales (possible PTP)	cells/ml	5	<5	<5
	Other Oscillatoriales (possible PTP)	cells/ml	5	<5	<5
	Other pennates	cells/ml	5	<5	20
	Other Raphidophytes	cells/ml	5	<5	<5
	Other Stigonmetales	cells/ml	5	<5	<5
	Palmella spp.	cells/ml	5	<5	<5
	Pannus punctiferus	cells/ml	5	<5	<5
	Pediastrum spp.	cells/ml	5	<5	<5
	Peridinium spp.	cells/ml	5	<5	<5
	Phacus spp.	cells/ml	5	<5	<5
	Phormidium aff. amoenum (PTP)	cells/ml	5	<5	<5
	Phormidium aff. formosum (PTP)	cells/ml	5	<5	<5
	Phormidium spp. <5 (possible PTP)	cells/ml	5	<5	<5
	Phormidium spp. <5 µm	cells/ml	5	<5	<5
	Phormidium spp. >5 (possible PTP)	cells/ml	5	<5	<5
	Phormidium spp. >5 µm	cells/ml	5	<5	<5
	Picoplanktic Chroococcales (<2µm)	cells/ml	5	<5	<5
	Planctonema spp.	cells/ml	5	<5	<5
	Planktolyngbya spp.	cells/ml	5	<5	<5
	Planktothrix spp. <5 µm	cells/ml	5	<5	<5
	Planktothrix spp. >5 µm	cells/ml	5	<5	<5
	Plectonema spp.	cells/ml	5	<5	<5
	Prorocentrum minimum	cells/ml	5	<5	<5
	Prorocentrum spp.	cells/ml	5	<5	<5
	Pseudanabaena limnetica	cells/ml	5	<5	<5
	Pseudanabaena mucicola	cells/ml	5	<5	<5
	Quadrigula spp.	cells/ml	5	<5	<5
	Radiocystis spp.	cells/ml	5	<5	<5
	Raphidiopsis cf. mediterranea (PTP)	cells/ml	5	<5	<5
	Raphidiopsis mediterranea (PTP)	cells/ml	5	<5	<5
	Rhabdoderma spp.	cells/ml	5	<5	<5
	Rhabdogloea spp.	cells/ml	5	<5	<5
	Rhizoclonium spp.	cells/ml	5	<5	<5
	Rhodomonas spp.	cells/ml	5	<5	<5
	Rhopalodia spp.	cells/ml	5	<5	<5
	Rivularia spp.	cells/ml	5	<5	<5
	Romeria spp.	cells/ml	5	<5	<5
	Scenedesmus spp.	cells/ml	5	<5	<5

Table 3 - Water Results - other
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

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cells/mL = algal cells per millilitre
Lab Qualifiers:
J - Estimated value.

Field ID	AACO-MWB5-A-170428	AACO-MWB5-B-170428
Lab Report	EB1708629	EB1708629
Sample Type	N	N
SDG	EB1708629	EB1708629
LocCode	AACO-MWB5-A	AACO-MWB5-B
Sample Date	28/04/2017	28/04/2017

Group	**Analyte**	**Units**	**EQL**		
	Schroederia spp.	cells/ml	5	<5	<5
	Selenastrum spp.	cells/ml	5	<5	<5
	Selenodictyum spp.	cells/ml	5	<5	<5
	Snowella spp.	cells/ml	5	<5	<5
	Sphaerocystis spp.	cells/ml	5	<5	<5
	Sphaerospermopsis aphanizomenoides	cells/ml	5	<5	<5
	Spirulina spp.	cells/ml	5	<5	<5
	Stichococcus spp.	cells/ml	5	<5	<5
	Stigeoclonium spp.	cells/ml	5	<5	<5
	Straurodesmus spp.	cells/ml	5	<5	<5
	Strombomonas spp.	cells/ml	5	<5	<5
	Surirella spp.	cells/ml	5	<5	<5
	Synechococcus spp.	cells/ml	5	<5	<5
	Synechocystis spp.	cells/ml	5	<5	<5
	Synedra spp.	cells/ml	5	<5	<5
	Tabellaria spp.	cells/ml	5	<5	<5
	Tellingia spp.	cells/ml	5	<5	<5
	Tetradesmus spp.	cells/ml	5	<5	<5
	Tetraedron spp.	cells/ml	5	<5	<5
	Tetraspora spp.	cells/ml	5	<5	<5
	Tetrastrum spp.	cells/ml	5	<5	<5
	Total Bacillariophytes	cells/ml	5	<5	20
	Total Chroococcales	cells/ml	5	<5	<5
	Total Nostocales	cells/ml	5	<5	<5
	Total Oscillatoriales	cells/ml	5	<5	<5
	Total Stigonematales	cells/ml	5	<5	<5
	Treubaria spp.	cells/ml	5	<5	<5
	Trichodesmium spp.	cells/ml	5	<5	<5
	Triploceras spp.	cells/ml	5	<5	<5
	Tychonema spp.	cells/ml	5	<5	<5
	Ulothrix spp.	cells/ml	5	<5	<5
	Unidentified Chroococcales	cells/ml	5	<5	<5
	Unidentified Cyanophytes	cells/ml	5	<5	<5
	Unidentified Flagellates	cells/ml	5	<5	<5
	Unidentified Nostocales	cells/ml	5	<5	<5
	Unidentified Oscillatoriales	cells/ml	5	<5	<5
	Westella spp.	cells/ml	5	<5	<5
	Woronichinia spp.	cells/ml	5	<5	<5
	Xanthidium spp.	cells/ml	5	<5	<5
	Zygnema spp.	cells/ml	5	<5	<5
	Carteria spp.	cells/ml	5	<5	<5
	Spondylosium spp.	cells/ml	5	<5	<5
	Flagellates	cells/ml	5	<5	<5
	Acanthoceras spp.	cells/ml	5	<5	<5
	Achnanthidium spp.	cells/ml	5	<5	<5
	Actinastrum spp.	cells/ml	5	<5	<5
	Actinotaenium spp.	cells/ml	5	<5	<5
	Anabaena spp. (coiled)	cells/ml	5	<5	<5
	Anabaena torulosa	cells/ml	5	<5	<5
	Arthrospira spp.	cells/ml	5	<5	<5
	Bulbochaete spp.	cells/ml	5	<5	<5
	Aphanizomenon gracile	cells/ml	5	<5	<5
	Aphanizomenon spp.	cells/ml	5	<5	<5
	Aphanothece spp. <2 µm	cells/ml	5	<5	<5
	Centritractus spp.	cells/ml	5	<5	<5
	Ceratium spp.	cells/ml	5	<5	<5
	Chlorophytes	cells/ml	5	<5	<5
	Chrysophytes	cells/ml	5	<5	<5
	Closteridium spp.	cells/ml	5	<5	<5
	Closteriopsis spp.	cells/ml	5	<5	<5
	Closterium spp.	cells/ml	5	<5	<5
	Coelastrum spp.	cells/ml	5	<5	<5
	Coelomoron spp.	cells/ml	5	<5	<5
	Coelosphaerium spp.	cells/ml	5	<5	<5
	Cuspidothrix issatschenkoi	cells/ml	5	<5	<5
	Cyanocatena imperfecta	cells/ml	5	<5	<5
	Cyanocatena planctonica	cells/ml	5	<5	<5
	Cyanocatena spp.	cells/ml	5	<5	<5
	Cyanodictyon spp.	cells/ml	5	<5	<5
	Cyanogranis libera	cells/ml	5	<5	<5
	Cyanonephron spp.	cells/ml	5	<5	<5
	Cyanothece spp.	cells/ml	5	<5	<5
	Cylindrocapsa spp.	cells/ml	5	<5	<5
	Cylindrospermopsis cf. raciborskii (PTP)	cells/ml	5	<5	<5
	Cylindrospermopsis raciborskii (PTP)	cells/ml	5	<5	<5
	Cylindrospermum spp.	cells/ml	5	<5	<5
	Cymbella spp.	cells/ml	5	<5	<5
	Cladophora spp.	cells/ml	5	<5	<5
	Diatoma spp.	cells/ml	5	<5	<5
	cf. Synechococcus spp.	cells/ml	5	<5	<5
	cf. Synechocystis spp.	cells/ml	5	<5	<5
	Chaetophora spp.	cells/ml	5	<5	<5
	Crucigenia spp.	cells/ml	5	<5	<5
	Dictyosphaerium spp.	cells/ml	5	<5	<5
	Dimorphococcus spp.	cells/ml	5	<5	<5
	Chroococcus minimus	cells/ml	5	<5	<5
	Chroococcus minutus	cells/ml	5	<5	<5
	Chroococcus spp.	cells/ml	5	<5	<5
	Chroomonas spp.	cells/ml	5	<5	<5
	Dolichospermum crassum	cells/ml	5	<5	<5
	Encysted Dinium	cells/ml	5	<5	<5
	Encysted Euglenophytes	cells/ml	5	<5	<5
	Entomoneis spp.	cells/ml	5	<5	<5
	Fragilaria spp.	cells/ml	5	<5	<5
	Gloeocapsa spp.	cells/ml	5	<5	<5
	Gloeocystis spp.	cells/ml	5	<5	<5
	Hantzschia spp.	cells/ml	5	<5	<5
	Eucapsis spp.	cells/ml	5	<5	<5
	Euglena spp.	cells/ml	5	<5	<5
	Eunotia spp.	cells/ml	5	<5	<5
	Didymocystis spp.	cells/ml	5	<5	<5
	Kirchneriella spp.	cells/ml	5	<5	<5
	Lagerheimia spp.	cells/ml	5	<5	<5
	Lyngbya cf. wollei (PTP)	cells/ml	5	<5	<5
	Lyngbya spp.	cells/ml	5	<5	<5
	Lyngbya wollei (PTP)	cells/ml	5	<5	<5
	Mallomonas akrokomos	cells/ml	5	<5	<5
	Mallomonas splendidum	cells/ml	5	<5	<5
	Gyrosigma spp.	cells/ml	5	<5	<5
	Mallomonas spp.	cells/ml	5	<5	<5
	Haematococcus spp.	cells/ml	5	<5	<5
	Elakatothrix spp.	cells/ml	5	<5	<5
	Navicula spp.	cells/ml	5	<5	<5
	Netrium spp.	cells/ml	5	<5	<5
	Nitzschia spp.	cells/ml	5	<5	<5
	Nostochopsis spp.	cells/ml	5	<5	<5
	Golenkenia spp.	cells/ml	5	<5	<5
	Gomphonema spp.	cells/ml	5	<5	<5
	Gonatozygon spp.	cells/ml	5	<5	<5
	Gonyostomum spp.	cells/ml	5	<5	<5
	Oscillatoria spp.	cells/ml	5	<5	<5
	Other centrics	cells/ml	5	<5	<5
	Other Chrysophytes	cells/ml	5	<5	<5
	Other Dinoflagellates	cells/ml	5	<5	<5
	Other green cells	cells/ml	5	<5	<5
	Other Stigonematales	cells/ml	5	<5	<5
	Micrasterias spp.	cells/ml	5	<5	<5
	Penium spp.	cells/ml	5	<5	<5
	Mougeotia spp.	cells/ml	5	<5	<5
	Hyalotheca spp.	cells/ml	5	<5	<5
	Hydrodictyon spp.	cells/ml	5	<5	<5
	Pinnularia spp.	cells/ml	5	<5	<5
	Planktolyngbya limnetica	cells/ml	5	<5	<5
	Planktolyngbya microspira	cells/ml	5	<5	<5
	Planktolyngbya minor	cells/ml	5	<5	<5
	Planktonema spp.	cells/ml	5	<5	<5
	Pseudanabaena galeata	cells/ml	5	<5	<5
	Pseudanabaena spp.	cells/ml	5	<5	<5

Table 3 - Water Results - other
AACO Stage 2C Environmental Investigation 2017
Data Processed: as at 12 May 2017
AECOM Project number: 60533675

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Legend:
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µg/kg = micrograms per kilogram
µg/l = micrograms per litre (ppb)
cells/mL = algal cells per millilitre
Lab Qualifiers:
J - Estimated value.

Field ID	AACO-MWB5-A-170428	AACO-MWB5-B-170428
Lab Report	EB1708629	EB1708629
Sample Type	N	N
SDG	EB1708629	EB1708629
LocCode	AACO-MWB5-A	AACO-MWB5-B
Sample Date	28/04/2017	28/04/2017

Group	**Analyte**	**Units**	**EQL**		
	Pseudonitzschia spp.	cells/ml	5	<5	<5
	Pteromonas spp.	cells/ml	5	<5	<5
	Pyramimonas spp.	cells/ml	5	<5	<5
	Sirogonium spp.	cells/ml	5	<5	<5
	Skeletonema spp.	cells/ml	5	<5	<5
	Synura spp.	cells/ml	5	<5	<5
	Spermatozoopsis spp.	cells/ml	5	<5	<5
	Sphaerellopsis spp.	cells/ml	5	<5	<5
	Sphaerozosma spp.	cells/ml	5	<5	<5
	Spirogyra spp.	cells/ml	5	<5	<5
	Staurastrum spp.	cells/ml	5	<5	<5
	Pleodorina spp.	cells/ml	5	<5	<5
	Pleurotaenium spp.	cells/ml	5	<5	<5
	Total Algae Count	cells/ml	5	25	20
	Total Chlorophytes	cells/ml	5	<5	<5
	Total Chrysophytes	cells/ml	5	<5	<5
	Total Cyanophytes	cells/ml	5	<5	<5
	Rhizosolenia spp.	cells/ml	5	<5	<5
	Total Flagellates	cells/ml	5	25	<5
	Total Potentially Toxic Cyanophytes	cells/ml	5	<5	<5
	Trachelomonas spp.	cells/ml	5	<5	<5
	Scerpsiella spp.	cells/ml	5	<5	<5
	Scrippsiella spp.	cells/ml	5	<5	<5
	Pandorina spp.	cells/ml	5	<5	<5
	Uroglena spp.	cells/ml	5	<5	<5
	Urosolenia spp.	cells/ml	5	<5	<5
	Tetraselmis spp.	cells/ml	5	<5	<5
	Thalassioseira spp.	cells/ml	5	<5	<5
	Thalassiosira spp.	cells/ml	5	<5	<5
	Phacotus spp.	cells/ml	5	<5	<5
	Tribonema spp.	cells/ml	5	<5	<5
	Rhoicosphenia spp.	cells/ml	5	<5	<5
	Total Raphidophytes	cells/ml	5	<5	<5
	Unidentified Dinoflagellates	cells/ml	5	25	<5
	Unidentified Golden algae	cells/ml	5	<5	<5
	Unidentified Green algae	cells/ml	5	<5	<5
	Volvox spp.	cells/ml	5	<5	<5
Total Petroleum Hydrocarbons	C6-C9 fraction	µg/L	20	<20	<20
	C10-C14 fraction	µg/L	50	<50	<50
	C15-C28 fraction	µg/L	100	<100	<100
	C29-C36 fraction	µg/L	50	<50	<50
	C10-C36 fraction (sum)	µg/L	50	<50	<50
Total Recoverable Hydrocarbons	>C10-C16 fraction	µg/L	100	<100	<100
	>C10-C16 (Less Naphthalene)(F2)	mg/L	0.1	<0.1	<0.1
	>C16-C34 fraction	µg/L	100	<100	<100
	>C34-C40 fraction	µg/L	100	<100	<100
	>C10-C40 fraction (sum)	µg/L	100	<100	<100
	C6-C10 fraction	µg/L	20	<20	<20
	C6-C10 fraction (Less BTEX)(F1)	µg/L	20	<20	<20
Amino Aliphatics	N-nitrosodiethylamine	µg/L	2	<2	<2
	N-nitrosodi-n-butylamine	µg/L	2	<2	<2
	N-nitrosodi-n-propylamine	µg/L	2	<2	<2
	N-Nitrosodiphenyl & Diphenylamine	µg/L	4	<4	<4
	N-Nitrosomethylethylamine	µg/L	2	<2	<2
Amino Aromatics	1-naphthylamine	µg/L	2	<2	<2
Anilines	2-nitroaniline	µg/L	4	<4	<4
	3-nitroaniline	µg/L	4	<4	<4
	4-chloroaniline	µg/L	2	<2	<2
	4-nitroaniline	µg/L	2	<2	<2
	2-methyl-5-nitroaniline	µg/L	2	<2	<2
	Aniline	µg/L	2	<2	<2
BTEX	Benzene	µg/L	1	<1	<1
	Ethylbenzene	µg/L	2	<2	<2
	Toluene	µg/L	2	<2	<2
	Total BTEX	µg/L	1	<1	<1
	Xylene (m & p)	µg/L	2	<2	<2
	Xylene (o)	µg/L	2	<2	<2
	Xylene Total	µg/L	2	<2	<2
Chlorinated Hydrocarbons	1,1,1,2-tetrachloroethane	µg/L	5	<5	<5
	1,1,1-trichloroethane	µg/L	5	<5	<5
	1,1,2,2-tetrachloroethane	µg/L	5	<5	<5
	1,1,2-trichloroethane	µg/L	5	<5	<5
	1,1-dichloroethane	µg/L	5	<5	<5
	1,1-dichloroethene	µg/L	5	<5	<5
	1,1-dichloropropene	µg/L	5	<5	<5
	1,2,3-trichloropropane	µg/L	5	<5	<5
	1,2-dibromo-3-chloropropane	µg/L	5	<5	<5
	1,2-dichloroethane	µg/L	5	<5	<5
	1,2-dichloropropane	µg/L	5	<5	<5
	1,3-dichloropropane	µg/L	5	<5	<5
	2,2-dichloropropane	µg/L	5	<5	<5
	Bromodichloromethane	µg/L	5	<5	<5
	Bromoform	µg/L	5	<5	<5
	Carbon tetrachloride	µg/L	5	<5	<5
	Chlorodibromomethane	µg/L	5	<5	<5
	Chloroethane	µg/L	50	<50	<50
	Chloroform	µg/L	5	<5	<5
	cis-1,2-dichloroethene	µg/L	5	<5	<5
	cis-1,3-dichloropropene	µg/L	5	<5	<5
	Dibromomethane	µg/L	5	<5	<5
	Hexachlorobutadiene	µg/L	2	<2	<2
	Hexachlorocyclopentadiene	µg/L	10	<10	<10
	Hexachloroethane	µg/L	2	<2	<2
	Trichloroethene	µg/L	5	<5	<5
	Tetrachloroethene	µg/L	5	<5	<5
	trans-1,2-dichloroethene	µg/L	5	<5	<5
	trans-1,3-dichloropropene	µg/L	5	<5	<5
	Vinyl chloride	µg/L	50	<50	<50
Explosives	1,3,5-Trinitrobenzene	mg/L	0.002	<0.002	<0.002
	2,4-Dinitrotoluene	µg/L	4	<4	<4
	2,6-dinitrotoluene	µg/L	4	<4	<4
	Nitrobenzene	µg/L	2	<2	<2
Halogenated Benzenes	1,2,3-trichlorobenzene	µg/L	5	<5	<5
	1,2,4-trichlorobenzene	µg/L	2	<2	<2
	1,2-dichlorobenzene	µg/L	2	<2	<2
	1,3-dichlorobenzene	µg/L	2	<2	<2
	1,4-dichlorobenzene	µg/L	2	<2	<2
	2-chlorotoluene	µg/L	5	<5	<5
	4-chlorotoluene	µg/L	5	<5	<5
	Bromobenzene	µg/L	5	<5	<5
	Chlorobenzene	µg/L	5	<5	<5
	Hexachlorobenzene	µg/L	4	<4	<4
	Pentachlorobenzene	µg/L	2	<2	<2
Halogenated Hydrocarbons	1,2-dibromoethane	µg/L	5	<5	<5
	Bromomethane	µg/L	50	<50	<50
	Chloromethane	µg/L	50	<50	<50
	Dichlorodifluoromethane	µg/L	50	<50	<50
	Iodomethane	µg/L	5	<5	<5
	Trichlorofluoromethane	µg/L	50	<50	<50
Halogenated Phenols	2,4,5-trichlorophenol	µg/L	2	<2	<2
	2,4,6-trichlorophenol	µg/L	2	<2	<2
	2,4-dichlorophenol	µg/L	2	<2	<2
	2,6-dichlorophenol	µg/L	2	<2	<2
	2-chlorophenol	µg/L	2	<2	<2
	Pentachlorophenol	µg/L	4	<4	<4
Herbicides	Pronamide	µg/L	2	<2	<2
MAH	1,2,4-trimethylbenzene	µg/L	5	<5	<5
	1,3,5-trimethylbenzene	µg/L	5	<5	<5
	Isopropylbenzene	µg/L	5	<5	<5
	n-butylbenzene	µg/L	5	<5	<5
	n-propylbenzene	µg/L	5	<5	<5
	p-isopropyltoluene	µg/L	5	<5	<5
	sec-butylbenzene	µg/L	5	<5	<5
	Styrene	µg/L	5	<5	<5
	tert-butylbenzene	µg/L	5	<5	<5

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AECOM Project number: 60533675

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Lab Report	EB1708629	EB1708629
Sample Type	N	N
SDG	EB1708629	EB1708629
LocCode	AACO-MWB5-A	AACO-MWB5-B
Sample Date	28/04/2017	28/04/2017

Group	**Analyte**	**Units**	**EQL**		
Metals	Aluminium (Filtered)	mg/L	0.01	<0.01	<0.01
	Arsenic (Filtered)	mg/L	0.001	<0.001	<0.001
	Cadmium (Filtered)	mg/L	0.0001	<0.0001	<0.0001
	Chromium (III+VI) (Filtered)	mg/L	0.001	0.001	<0.001
	Copper (Filtered)	mg/L	0.001	<0.001	0.001
	Iron (Filtered)	mg/L	0.05	<0.05	<0.05
	Lead (Filtered)	mg/L	0.001	<0.001	<0.001
	Mercury (Filtered)	mg/L	0.0001	<0.0001	<0.0001
	Nickel (Filtered)	mg/L	0.001	0.002	0.002
	Selenium (Filtered)	mg/L	0.01	<0.01	<0.01
	Zinc (Filtered)	mg/L	0.005	0.005	0.011
Nitroaromatics	4-aminobiphenyl	µg/L	2	<2	<2
	Pentachloronitrobenzene	µg/L	2	<2	<2
Organochlorine Pesticides	4,4-DDE	µg/L	2	<2	<2
	a-BHC	µg/L	2	<2	<2
	Aldrin	µg/L	2	<2	<2
	Aldrin + Dieldrin	µg/L	4	<4	<4
	b-BHC	µg/L	2	<2	<2
	d-BHC	µg/L	2	<2	<2
	DDD	µg/L	2	<2	<2
	DDT	µg/L	4	<4	<4
	DDT+DDE+DDD	µg/L	4	<4	<4
	Dieldrin	µg/L	2	<2	<2
	Endosulfan I	µg/L	2	<2	<2
	Endosulfan II	µg/L	2	<2	<2
	Endosulfan sulphate	µg/L	2	<2	<2
	Endrin	µg/L	2	<2	<2
	g-BHC (Lindane)	µg/L	2	<2	<2
	Heptachlor	µg/L	2	<2	<2
	Heptachlor epoxide	µg/L	2	<2	<2
Organophosphorous Pesticides	Chlorfenvinphos	µg/L	2	<2	<2
	Chlorpyrifos	µg/L	2	<2	<2
	Chlorpyrifos-methyl	mg/L	0.002	<0.002	<0.002
	Diazinon	µg/L	2	<2	<2
	Dichlorvos	µg/L	2	<2	<2
	Dimethoate	µg/L	2	<2	<2
	Ethion	µg/L	2	<2	<2
	Fenthion	µg/L	2	<2	<2
	Malathion	µg/L	2	<2	<2
	Prothiofos	µg/L	2	<2	<2
PAH/Phenols	2,4-dimethylphenol	µg/L	2	<2	<2
	2-chloronaphthalene	µg/L	2	<2	<2
	2-methylnaphthalene	µg/L	2	<2	<2
	2-methylphenol	µg/L	2	<2	<2
	2-nitrophenol	µg/L	2	<2	<2
	3-&4-methylphenol	µg/L	4	<4	<4
	3-methylcholanthrene	µg/L	2	<2	<2
	4-chloro-3-methylphenol	µg/L	2	<2	<2
	7,12-dimethylbenz(a)anthracene	µg/L	2	<2	<2
	Acenaphthene	µg/L	2	<2	<2
	Acenaphthylene	µg/L	2	<2	<2
	Acetophenone	µg/L	2	<2	<2
	Anthracene	µg/L	2	<2	<2
	Benz(a)anthracene	µg/L	2	<2	<2
	Benzo(a) pyrene	µg/L	2	<2	<2
	Benzo(g,h,i)perylene	µg/L	2	<2	<2
	Chrysene	µg/L	2	<2	<2
	Dibenz(a,h)anthracene	µg/L	2	<2	<2
	Fluoranthene	µg/L	2	<2	<2
	Fluorene	µg/L	2	<2	<2
	Indeno(1,2,3-c,d)pyrene	µg/L	2	<2	<2
	Naphthalene	µg/L	2	<2	<2
	PAHs (Sum of total)	µg/L	2	<2	<2
	Phenanthrene	µg/L	2	<2	<2
	Phenol	µg/L	2	<2	<2
	Pyrene	µg/L	2	<2	<2
Pesticides	Chlorobenzilate	µg/L	2	<2	<2
	Pirimphos-ethyl	µg/L	2	<2	<2
Phthalates	Bis(2-ethylhexyl) phthalate	µg/L	10	<10	<10
	Butyl benzyl phthalate	µg/L	2	<2	<2
	Diethylphthalate	µg/L	2	<2	<2
	Dimethyl phthalate	µg/L	2	<2	<2
	Di-n-butyl phthalate	µg/L	2	<2	<2
	Di-n-octyl phthalate	µg/L	2	<2	<2
Solvents	1,4-Dioxane	µg/L	0.5	<0.5	<0.5
	2-hexanone (MBK)	µg/L	50	<50	<50
	4-Methyl-2-pentanone	µg/L	50	<50	<50
	Methyl Ethyl Ketone	µg/L	50	<50	<50
	Carbon disulfide	µg/L	5	<5	<5
	Isophorone	µg/L	2	<2	<2
	Vinyl acetate	µg/L	50	<50	<50
Semivolatile Organic Compounds	Benzo(a)pyrene TEQ (zero)	µg/L	2	<2	<2
	Benzo(b+j) & Benzo(k)fluoranthene	µg/L	4	<4	<4
SVOCs	2-(acetylamino) fluorene	µg/L	2	<2	<2
	3,3-Dichlorobenzidine	µg/L	2	<2	<2
	4-(dimethylamino) azobenzene	µg/L	2	<2	<2
	4-bromophenyl phenyl ether	µg/L	2	<2	<2
	4-chlorophenyl phenyl ether	µg/L	2	<2	<2
	4-Nitroquinoline-N-oxide	µg/L	2	<2	<2
	Azobenzene	µg/L	2	<2	<2
	Bis(2-chloroethoxy) methane	µg/L	2	<2	<2
	Bis(2-chloroethyl)ether	µg/L	2	<2	<2
	Carbazole	µg/L	2	<2	<2
	Dibenzofuran	µg/L	2	<2	<2
	Hexachloropropene	µg/L	2	<2	<2
	N-nitrosomorpholine	µg/L	2	<2	<2
	N-nitrosopiperidine	µg/L	2	<2	<2
	N-nitrosopyrrolidine	µg/L	4	<4	<4
	Phenacetin	µg/L	2	<2	<2
VOCs	cis-1,4-Dichloro-2-butene	µg/L	5	<5	<5
	Pentachloroethane	µg/L	5	<5	<5
	trans-1,4-Dichloro-2-butene	µg/L	5	<5	<5

Suzanne Huxley

From: Penny Hutchinson
Sent: Wednesday, 29 March 2017 12:37 PM
To: Suzanne Huxley
Subject: RE: Information re Oakey and PFAS

Hi Suzanne
Thanks for this.
Yes, you will need to go through my CE.
Regards
Penny

From: Suzanne Huxley
Sent: Wednesday, 29 March 2017 10:21 AM
To: Penny Hutchinson
Subject: Information re Oakey and PFAS

Hi Penny

As discussed this is still all confidential until the expected public release next week. I believe all of what I have attached is in draft, we do not have any final versions.

Defence is doing ongoing work around Oakey with further testing to inform the HHRA and the ERA as well as further ground water modelling.

The program from the Australian Department of Prime minister and Cabinet is:

Date	Task
Mon 27 March	Defence commence activities to publicise walk-in sessions on FSANZ report for Oakey & s.73
Monday 3 April	Soft release of FSANZ reports and Chief Medical Officer media release on Health website
Week of 3 April	Letterbox drop (time permitting), media engagement
Wednesday 5 April	Community walk-in session – Oakey
Thursday 6 April	s.73

The HHRA sensitivity analysis is 276 pages and still draft. The most useful bit of the document is pages 20 to 23 which show in table form the previous advice and what has changed based on the new FSANZ health based guideline values.

Att A Plain English summary is a 2 page summary of the new health based guideline values and Att B is the hazard assessment report relating to the development of the HBGVs

Item 3.2 Dept of Health Supporting Information is not intended for public release but may be useful information to explain some of the background.

I will let you know when I know more about the Oakey meeting next week. As I said, Sophie has asked me to attend and it would be great if there was also representation from the HHS. Let me know if we need to go through your CE.

Thanks

Suzanne

Dr Suzanne Huxley
Senior Medical Officer
Health Protection Branch
Prevention Division
Ph: 3328 9606

Suzanne Huxley

From: BRADSHAW Tony <Tony.Bradshaw@ehp.qld.gov.au>
Sent: Monday, 20 March 2017 1:34 PM
To: Darcy Garlick-Kelly; Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet Cumming; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan; CHAVASSE Jason; COOK David
Subject: RE: Oakey HHRA Methodology and general updates
Attachments: Comments Addendum Preliminary Oakey HHRA Methodolgy Report MArch 2017.docx

Hi Darcy, please find attached comments as requested,

cheers Tony

From: Darcy Garlick-Kelly [mailto:darcy.garlick-kelly@premiers.qld.gov.au]
Sent: Monday, 20 March 2017 8:46 AM
To: Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet_Cumming@health.qld.gov.au; BRADSHAW Tony; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan; CHAVASSE Jason
Subject: RE: Oakey HHRA Methodology and general updates

Hi all,

Just a gentle reminder to please pass on any comments on the HHRA Methodology Addendum by 12pm today.

Cheers,
Darcy

From: Darcy Garlick-Kelly
Sent: Monday, 13 March 2017 12:16 PM
To: 'Sophie Dwyer' <Sophie.Dwyer@health.qld.gov.au>; 'VENTURA Simone' <simone.ventura@ehp.qld.gov.au>; 'Suzanne Huxley' <Suzanne.Huxley@health.qld.gov.au>; 'David Larkings' <David.Larkings@health.qld.gov.au>; 'Janet_Cumming@health.qld.gov.au' <Janet_Cumming@health.qld.gov.au>; 'BRADSHAW Tony' <Tony.Bradshaw@ehp.qld.gov.au>; 'WATTS Richard J' <Richard.Watts@daf.qld.gov.au>; 'KIND Peter K' <Peter.Kind@daf.qld.gov.au>; 'MCKAY Adrian' <Adrian.Mckay@dnrm.qld.gov.au>; 'Michael Logan' <Michael.Logan@qfes.qld.gov.au>; 'Jason.Chavasse@dnrm.qld.gov.au' <Jason.Chavasse@dnrm.qld.gov.au>
Subject: Oakey HHRA Methodology and general updates
Importance: High

Hi all

See the below email from Defence and the attached HHRA Methodology Addendum.

I'm inclined to send our feedback next Monday 20th, given the workload over the past few weeks. In that case, please send through any agency comments by 12pm Monday 20th (at the latest).

s.73

Cheers,
Darcy
Darcy Garlick-Kelly
Policy Officer
Environment Policy

Queensland Government

Department of the Premier and Cabinet

Phone: (07) 3003 9487
Level 30, 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

From: Pearce, Vicki MS 1 [mailto:vicki.pearce1@defence.gov.au]
Sent: Monday, 13 March 2017 11:33 AM
To: Darcy Garlick-Kelly <darcy.garlick-kelly@premiers.qld.gov.au>
Cc: Harvey, Renee MS <renee.harvey@defence.gov.au>; Mitchell, Andrew MR 6 <andrew.mitchell6@defence.gov.au>; Sarafov, Belinda MS 1 <belinda.sarafov1@defence.gov.au>
Subject: HHRA Methodology [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi Darcy,

In response to your email below, just to clarify, the Sensitivity Assessment for Oakey will not be revised based on the comments provided by the IDC on 27 February. This is because the purpose of the Sensitivity Assessment was to change the toxicity reference value to the impending value from FSANZ and calculate its effect on the 2016 risk assessment. A sensitivity assessment is a process whereby a single variable is adjusted and then everything is recalculated. Many of the comments provided by the IDC on the sensitivity assessment relate to underlying assumptions applied to the 2016 HHRA. Comments of this nature have been considered as part of the HHRA update to be completed later in 2017.

Therefore, please find attached an addendum to the HHRA methodology report for review by the IDC. In this document, you will see that the comments provided by the IDC on the sensitivity assessment have been considered in the overall update to the HHRA due for delivery later in 2017.

We would appreciate the IDCs feedback on the attached document by COB 17 March.

regards

Vicki Pearce
Director
PFAS Environmental Management & Integration

Mobile:
Email: vicki.pearce1@defence.gov.au

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Comments on Draft "Addendum to Preliminary HHRA Methodology Report dated 18 May 2016 - Army Aviation Centre Oakey - Stage 2C (Rev D)"

Data Gap – Precursors

Background

Queensland has previously indicated that the lack of analytical data on TOPA means that potential PFAS exposures may be underestimated due to uncertainty as to the degree to which PFAS precursors are present. Queensland has requested that this issue be incorporated into the revised HHRA.

For example, direct measurement by LC-MS/MS was found to only indicate significantly less than observed perfluorinated carboxylate products in the corresponding TOPA oxidized sample (Houtz et al. 2013). This demonstrates the importance of understanding the extent of any hidden PFAS present in carrying of risk assessments.

e.g. Houtz, E.F., Higgins, C.P., Field, J.A. and Sedlak, D.L. (2013) Persistence of Perfluoroalkyl Acid Precursors in AFFF-Impacted Groundwater and Soil. Environ. Sci. Technol. 2013, 47, 8187–8195.

Defence has advised that TOPA analysis will be conducted in key source areas and key identified pathways of offsite migration to gauge potential presence of precursors. Queensland agreed that this was a reasonable approach to obtain a representative picture (refer joint meeting 20 February) e.g. rather than analysing every single sample for TOPA.

The draft addendum states:

> Select environmental samples have also been proposed to be submitted for Total Oxidisable Precursor Assay (TOP Assay). Data from the TOP Assay will not be included in the HHRA as it is an empirical test that employs an aggressive oxidant that is not considered relevant to bioavailability of PFAS in the human body.

Comment

The relevance of the TOP Assay is not whether it indicates bioavailability of PFAS in the human body. Its relevance is to find out whether, as has been discovered for contaminated defence bases in the USA, there are material quantities of PFAS present that are not included in the current LC/MS/MS library (represented by the extended PFAS suite).

Research has shown that these PFAS are generally transformed in the environment to more persistent forms e.g. PFCA under oxidative conditions that can exist in the environment.

Therefore, TOPA results should be used in the HHRA as part of a sensitivity analysis to determine whether HHRA conclusions would materially change if any untransformed PFAS found to be present were transformed to potential daughter PFAS products.

They can also be used outside the HHRA in evaluating risks of various contaminant remediation options, particularly those that may involve oxidation of co-occurring organic contaminants e.g. hydrocarbons.

Data gap – Aquaculture

Background

Under the *Environmental Protection Act 1994,* environmental values including potential uses of abstracted water are protected. This also aligns with schedule B6 of the *National Environmental Assessment of Site Contamination Measure 1999* which protects future potential uses of groundwater.

The revised HHRA will thus need to assess suitability for aquaculture. Aquaculture can be undertaken for home consumption as well as commercial purposes.

The planned approach is as follows:

> The potential consumption of fish raised in future aquaculture systems will be assessed via an assumption that the maximum PFAS concentrations identified in fish from Oakey Creek could be present in fish raised in aquaculture systems. Water sample data will not be used to calculate PFAS uptake from fish, based on guidance from the NSW EPA (2017) guidance document Designing Sampling Programs for Sites Potentially Contaminated by PFAS, which states "*the use of calculated estimates of concentrations of PFAS in edible aquatic biota from water samples is not considered appropriate for assessing human consumption for seafood, even if it may be a conservative calculation*" because "*there are site-specific conditions that will affect how aquatic biota will take up these chemicals, and differences between different species*".

Comment

The concentration of PFAS of fish in Oaky Creek will be the net result of a wide ranges of influences including biomagnification due to the trophic level of the fish, sediment-water column chemical disequilibrium, the diet of the fish and its underlying food web, the fish's foraging range and chemical metabolism within the fish and its food web (Burkhard et al., 2003).

[Reference: Burkhard, L.P., P.M. Cook and D.R. Mount. 2003. The relationship of bio-accumulative chemicals in water and sediment to residues in fish: A visualization approach. Environ. Toxicol. Chem. 22(11):2822–2830.]

It is inappropriate to assume that all these same factors would apply to fish or crustaceans raised in a closed aquaculture system, for example a series of ponds or tanks with water abstracted from groundwater or collecting surface water which runs off contaminated land.

Whilst analysis of biota samples is a preferred way of investigating potential bioaccumulation where exposures are currently occurring, this cannot be utilised for evaluating future potential suitability for a beneficial use.

Thus the approach of not taking into consideration quality of water potentially used for aquaculture production and relying on what is found in fish in the local creek is not supported. For example, if fish in Oaky Creek are found to have tissue concentrations of PFAS in excess allowable levels due in large part to consuming PFAS contaminated prey, this would lead to a conclusion that aquaculture should be excluded as a local land use. However, this would be unreasonable as aquaculture species are typically feed prepared food that would likely be PFAS free.

The recommended approach is:

Determine water PFAS concentrations aquaculture species would be likely be exposed to under realistic benefical use scenarios e.g. ponds filled from groundwater, ponds filled with stormwater runoff water, ponds filled from Oakey Creek.

Using available bio concentration data for fish or crustaceans, determine predicted PFAS concentration in organisms

Compare predicted PFAS concentration in fish with PFAS tissue concentration determined suitable for human consumption e.g. either value published by FSANZ or if none available, a value derived from the applicable TDI and fish consumption rates advised by Queensland Health.

If there were higher seafood consumption rates predicted for a domestic aquaculture scenario, then these rates would need to be factored into the calculations.

OR

Grow potential aquaculture species e.g. crustaceans, fish in water of PFAS concentration representative of predicted exposure concentration and determine PFAS concentration at end of typical grow out period

PLUS

Compare predicted PFAS exposure concentrations with available data on chronic and acute toxicity for taxonomic groups and environmental conditions representative what a potential aquaculture operation would entail e.g. freshwater fish and crustaceans. The objective would be to ascertain whether any adverse effects on production were likely as opposed to effects on suitability for human consumption.

Background Statement

The background statement is misleading as it infers that Ansulite AFFF, used as the replacement foam to 3M light water AFFF has little risk of creating PFOA problems as "it has significantly lower concentration of PFOS and PFOA."

It is well known that ansulite AFFF contains fluorotelomers e.g. 8:2 FtS that readily transform into PFOA when released in that environment.

This section should be rewritten so that it is not misleading and recognises that Anulsite contains PFAS that can transform into more persistent forms, including PFOA.

Chicken egg sampling studu

The chicken egg sampling study needs to mimic likely PFAS exposure to chickens at Oakey. Thus it needs to be ascertained whether chickens at Oakey are kept in clean pens or whether they range over soil/land irrigated with PFAs contaminated water or consume produce irrigated with PFAS contaminated water. Pecking behaviour of chickens can create another source of PFAS exposure where soil is contaminated.

Toxicity Assessment

The new study will entail analysis of a wider range of PFAS, as indicted by inclusion of the extended analysis suite for many included samples. This raises the question as to how results will be evaluated if it is found that material concentrations of other PFAS are detected.

It is suggested that this section could include mention of using read across approaches to PFOS, PFOA, PFHxA and/or PFHxS where studies/other reputable agencies indicate there is sufficient evidence to conclude that substances whose physicochemical, toxicological and ecotoxicological properties are likely to be similar or follow a regular pattern as a result of structural similarity can be considered as a group, or category of substances.

Suzanne Huxley

From: BRADSHAW Tony <Tony.Bradshaw@ehp.qld.gov.au>
Sent: Monday, 27 February 2017 12:22 PM
To: Darcy Garlick-Kelly; Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet Cumming; WATTS Richard J; KIND Peter K; Michael Logan
Subject: RE: FYI Defence Oakey | Proposed groundwater monitoring well locations [SEC=UNCLASSIFIED]

Hi All,

Defence should provide a conceptual model showing the groundwater system in relation to where extraction, treatment and discharge will occur to aid interpretation of this information.

Also, monitoring and assessment must include TOPA for materials extracted and discharged back into the groundwater system as well as common anions and cations to aid understanding of subsequent dispersal (on the understanding that treatment may affect the anion/cation ratios) plus any other contaminants of potential concern e.g. BTEXN, TRH, chlorinated solvents ,

cheers Tony

From: Darcy Garlick-Kelly [mailto:darcy.garlick-kelly@premiers.qld.gov.au]
Sent: Friday, 24 February 2017 2:00 PM
To: Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet_Cumming@health.qld.gov.au; BRADSHAW Tony; WATTS Richard J; KIND Peter K; Michael Logan
Subject: FYI Defence Oakey | Proposed groundwater monitoring well locations [SEC=UNCLASSIFIED]

FYI only,

Attached is further information from Defence regarding monitoring well locations for Oakey.

Cheers,
Darcy

Darcy Garlick-Kelly
Policy Officer
Environment Policy
Department of the Premier and Cabinet

Phone: (07) 3003 9487
Level 30, 1 William Street, Brisbane QLD 4000
PO Box 15185, City East, QLD 4002

Queensland Government

From: Harvey, Renee MS [mailto:renee.harvey@defence.gov.au]
Sent: Friday, 24 February 2017 12:04 PM
To: Darcy Garlick-Kelly <darcy.garlick-kelly@premiers.qld.gov.au>; Justin Carpenter <justin.carpenter@premiers.qld.gov.au>
Cc: Pearce, Vicki MS 1 <vicki.pearce1@defence.gov.au>; Sarafov, Belinda MS 1 <belinda.sarafov1@defence.gov.au>
Subject: Defence Oakey | Proposed groundwater monitoring well locations [SEC=UNCLASSIFIED]

UNCLASSIFIED

UNCLASSIFIED

UNCLASSIFIED

Hi Darcy,

Following on from our meeting on Monday, please find attached a memo detailing the monitoring well locations proposed for the Oakey environmental investigation.

The memo also contains information on the data to be collected, and how it will be used to refine the groundwater model etc.

Can you please pass this on, particularly to the DNRM reps in the TWG?

Ideally, it would be good to discuss this with DNRM on Tuesday after the meeting already planned at 11:30am.

Please let me know if this is possible. If not, we'll need to arrange a separate meeting early next week.

Thanks
Renee

Renee Harvey
Contractor to Defence
Environmental Remediation Programs
Department of Defence
M:

BP3-2-B021
Brindabella Circuit
Brindabella Business Park
PO Box 7925 Canberra BC 2610

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Suzanne Huxley

From: BRADSHAW Tony <Tony.Bradshaw@ehp.qld.gov.au>
Sent: Wednesday, 8 February 2017 7:21 PM
To: Darcy Garlick-Kelly; Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet Cumming; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan
Cc: COOK David; HILL Chris; CONNOR Andrew; GLEESON Kelly
Subject: RE: Summary of AECOM's Proposal for Data Gap
Attachments: Comments Aecom Data Gap Proposal Jan 2017.docx

Hi Darcy, please find attached final comments on the AECOM Data Gap document for Oakey PFAS contamination.

Cheers Tony

From: Darcy Garlick-Kelly [mailto:darcy.garlick-kelly@premiers.qld.gov.au]
Sent: Monday, 6 February 2017 12:26 PM
To: Sophie Dwyer; VENTURA Simone; Suzanne Huxley; David Larkings; Janet_Cumming@health.qld.gov.au; BRADSHAW Tony; WATTS Richard J; KIND Peter K; MCKAY Adrian; Michael Logan
Subject: FW: Summary of AECOM's Proposal for Data Gap

Hi all,

Please see the below comments on the AECOM Data Gap document.

If all final comments could be sent to me by COB Thursday 9th for collation, I'll pass them on to Defence prior to our meeting on the 20th.

Cheers,
Darcy

From: David Larkings
Sent: Thursday, 2 February 2017 5:39 PM
To: Suzanne Huxley
Cc: Tenille Fort
Subject: FW: Summary of AECOM's Proposal for Data Gap

Hi Suzanne

If it is not too late, consideration could be given to providing the following comments on the AECOM Proposal for Data Gap Analysis Reporting document.

- Generally agree with the comments provided by Dick and Peter.
- Chicken meat does not appear to have been considered. If chickens raised in the Oakey contamination area are non-egg laying (e.g. roosters, meat varieties and older hens), they may not achieve the same reduction in PFAS in their bodies productive egg layers when placed on non-contaminated water and feed.
- AECOM could confirm whether any chickens raised within the Oakey contamination area that may have been exposed to PFAS (e.g. via water) may be eaten. If this is the case, consideration be given to obtaining more information on their use and issues affecting their exposure to PFAS, that may guide the provision of suitable information to residents.
- As part of the community survey, consideration be given to establishing if residents have changed practices to limit exposure of the chickens to PFAS, any factors preventing them from reducing their chickens exposure to PFAS, and whether residents may be at risk of exposing themselves to PFAS via chickens in the Oakey contamination area.

- Aquatic biota sampling should note if the samples are species consumed by people (as opposed to environmental indicators). The sampling should include if possible species that may reasonably eaten by people to help guide assessing human health risks and advice to the public.

I'm not sure if it is appropriate, but it would be nice if AECOM were to provide recommendations/ observations on how human exposure to PFAS may be reduced and prevented in the Oakey area.

Regards,
David

Queensland Government

David Larkings
Advanced Environmental Health Officer
Food Safety Standards and Regulation, Health Protection Branch, **Department of Health**
p: 07 3328 9328 | After hours oncall **m:**
a: PO Box 2368 Fortitude Valley BC QLD 4006
w: Queensland Health | **e:** david.larkings@health.qld.gov.au

Queensland's health vision | *By 2026 Queenslanders will be among the healthiest people in the world.*

Queensland Health acknowledges the Traditional Owners of the land, and pays respect to Elders past, present and future.

From: KIND Peter K [mailto:Peter.Kind@daf.qld.gov.au]
Sent: Tuesday, 24 January 2017 1:25 PM
To: WATTS Richard J; Virginia Berry
Cc: BAUER Bartley; Sophie Dwyer; Suzanne Huxley; VENTURA Simone; David Larkings; Janet Cumming; BRADSHAW Tony; MCKAY Adrian; Justin Carpenter; Darcy Garlick-Kelly
Subject: RE: Summary of AECOM's Proposal for Data Gap

Darcy et al. - just brief comments from the fisheries perspective.

Gap B1 – Biota Sampling
Support the proposal to establish data describing human consumption of local aquatic invertebrates, particularly freshwater crayfish (page 23).
Support proposed additional sampling to include freshwater crayfish and mussels plus sediment and water samples associated with these species
DAF would like the opportunity to review the sampling methodology report for aquatic biota (as described on page 24)

Gap C ERA Ecological Survey and Biota Sampling
Support the proposal to establish broader ecological values of Oakey Creek and surrounding waterways as described on page 31, particularly the potential for the drainage channels to support aquatic communities.

From: WATTS Richard J
Sent: Tuesday, 24 January 2017 10:49 AM
To: Virginia Berry <Virginia.Berry@premiers.qld.gov.au>
Cc: BAUER Bartley <Bartley.Bauer@daf.qld.gov.au>; Sophie Dwyer <sophie.dwyer@health.qld.gov.au>; Suzanne Huxley <suzanne.huxley@health.qld.gov.au>; VENTURA Simone <simone.ventura@ehp.qld.gov.au>; David Larkings <david.larkings@health.qld.gov.au>; Janet Cumming <Janet_Cumming@health.qld.gov.au>; BRADSHAW Tony <Tony.Bradshaw@ehp.qld.gov.au>; WATTS Richard J <Richard.Watts@daf.qld.gov.au>; KIND Peter K <Peter.Kind@daf.qld.gov.au>; MCKAY Adrian <Adrian.Mckay@dnrm.qld.gov.au>; Justin Carpenter <justin.carpenter@premiers.qld.gov.au>; Darcy Garlick-Kelly <darcy.garlick-kelly@premiers.qld.gov.au>
Subject: Summary of AECOM's Proposal for Data Gap

Virginia

I enclose my comments on the Summary of AECOM's Proposal for Data Gap Analysis Reporting, Updates to the ESA, HHRA and ERA, and Development of an Ongoing Monitoring Plan

P23

Fruit and vegetable consumption:

Also need to know how a plant is irrigated (foliar, drip etc) and the use of contaminated water for foliar pesticide or fertiliser application.

Mammalian Livestock consumption:

With regard to the number of livestock sent to sale yards or direct to slaughter annual. Note properties that produce livestock must be a registered biosecurity entity (RBE) and have a Property Identification Code (PIC no). The data on livestock movements (cattle each animal, sheep mob movement) for each PIC are available from the National Livestock Identification System Database. But DAF would need to have the person's authority to release this data to Defence. In theory, DAF knows the lifetime history of the location for every cow and sheep in Australia.

With regard to whether livestock are sold commercially or only used for domestic consumption. This should not be seen as mutually exclusive as both can occur from the one property. Animals can be sent as 'Service kills' from the local butcher or a small abattoir which can mean that meat and offal is returned to the property and is distributed to friends and relatives. This can happened independently of their main business.

Data on the business model for each property is required. For instance, are they producing breeders, backgrounders, stud animals, finishers etc. What market are they aiming for as it will dictate at what age they turn off (slaughter) the animals, move them into a feedlot or sell them for their genetics etc? This will provide the data If the animals were born and raised on in the IA or if they have been brought in at a later age for finishing prior to slaughter. Note sometimes the animals may be sold at a young age to be raised elsewhere in some business models. Such a business model would be comparatively low risk of contamination. DAF would be happy to discuss animal production business models with AECOM so those doing the survey have an understanding of the kinds of questions to ask producers.

DAF envisages this process as identifying properties with business models that are at higher risk of contamination rather than a survey to manage risk at the community level. For this reason, we don't necessarily regard the process as requiring a standard set of question to produce a statistically valid conclusion. Nor do we think it is necessary to have a statistical approach to the sampling. DAF envisages the process more as a traceback investigation that occurs when contamination is detected. Traceback investigations identify property specific risk factors and seek to mitigate any risks identified via minimisation of contamination. The ultimate goal is to link the exposures to the resultant tissue concentrations and mitigate them. When a small number of producers is involved, it may be better to deal with the issues at the producer level than a statistical approach.

Presumably, blood sampling is being proposed from live animals. However, DAF disagrees with Toxconsult on the Transfer factors for blood to offal, so ideally we would like that resolved. In order to resolve that issue, concurrent blood and tissue samples are required. This can really only happen at slaughter. [note Qhealth may have a different view of taking samples at slaughter]

Chicken Eggs Study

This seems like a 'nice to do' study in that the risk have been managed by advice to not consume eggs and that replacement pullets that have only been on clean water would negate any ongoing risk. I am aware that resident's lifestyles are impacted by not eating their eggs and they would not necessarily want to replace their chickens. However, given that we need Defence to actively manage some risks and they have not adequately done so, I pose the question to the Technical Working Group whether this is something we consider important.

Regards

Dick Watts
Principal Scientific Advisor and Qld AgVet Chemical Coordinator
Biosecurity Queensland
Department of Agriculture and Fisheries

T 07 3708 8479 **M** [redacted] **E** richard.watts@daf.qld.gov.au **W** www.daf.qld.gov.au
Ecosciencies Precinct, Office 1.B.552 1B East,41 Boggo Rd, Dutton Park, Qld, 4102
Postal B3 Store, ESP, GPO BOX 267 Brisbane Qld 4001
Delivery DAFF, Joe Baker St, B3 Loading Dock, Dutton Park, Qld, 4102

consideration of further steps to mitigate potential public health and environmental impacts of the contamination.

- This could include investigation of exposure pathways other than drinking groundwater, and measures that could be taken to prevent further movement of the chemicals off base.

Agricultural Impacts

- Advice from the DoD is that bore water used by the Oakey Beef Exports abattoir, which is within the investigation area, is treated with reverse osmosis before use.
- DAF, can you please provide any update from your perspective, and also summarise any further actions DAF believes DoD should be undertaking, but is not.

Health Impacts

- A local general practitioner arranged blood testing of some Oakey community members, which when released in April 2015, revealed significantly elevated PFOS levels in 10 out of 11 subjects. The DoD has subsequently arranged testing of other concerned residents and results are expected to be released later in 2015.
- Possible health impacts from long-term exposure to PFOS or PFOA are not fully understood. They are what are known as 'emerging contaminants' and limited research has been undertaken into possible health impacts. There is no Australian guideline value for PFOS or PFOA in drinking water.
- The United States EPA information on PFOS and PFOA states that the toxicity, mobility and bioaccumulation potential of PFOS and PFOA pose potential adverse effects for the environment and human health.
- While QH has a particular interest in ensuring future exposure of residents is limited, it is unlikely that the provisions of the *Public Health Act 2005* (the Act) could be utilised to compel DoD to take further corrective action(s).
- The Act's public health risk provisions are typically employed to direct a person to remove, reduce or prevent a public health risk from occurring and must be appropriate in the circumstances having regard to the risk posed.
- Residents in the affected area have already been advised to limit their exposure to the contaminated water and remediation of the aquifer is not a realistic option.
- The State can, however, establish an environmental health event register under sections 47-57 of the PH Act.
    - The purpose of the event register for the Oakey community would be to provide the community with confidence that the Department of Health was providing ongoing monitoring of possible health effects in the impacted local population.
    - The use of the environmental health event register would require consultation with a human research ethics committee.
    - Participation of people affected by the event would be voluntary.
- Queensland Health is concerned that the following items, included in the Scope of

Comment [GJ2]: This is not quite accurate. We have recently learned that only a small proportion of the groundwater they use is treated by RO. But I will leave it to DAF/SFPQ to correct this.

Work provided to Department of Defence for response, are not adequately being addressed.

- DoD should conduct a full exposure assessment of the Oakey community (both historical and current), including secondary exposures like food, air and soil. Consideration should be given to the inclusion of residents living outside the estimated contamination plume area in order to provide a control population.
- On the basis of this assessment, DoD should provide updated advice to the community on management of risk from contaminated groundwater on their property, as well as indirect exposures.
- DoD should consider commissioning a health cohort study to compare blood serum levels and health outcomes of impacted community members with pooled blood serum for the rest of the Oakey community.
- DoD should consider establishment of a reference group with members from Commonwealth and Queensland Government agencies and the local community.
- Defence should identify the chemical makeup of fire-fighting foams currently stored or used by DoD in Oakey and ensure future environmental monitoring includes these other PFCs (e.g. perfluorohexane sulfonate, which has been found in blood samples from the local community).

Environmental Impacts and Queensland Government regulatory response

- EFP can you please add an overview of your powers in respect of contamination under the EPA 1994 and rationale for EHP's current position in respect of the Oakey site.
- EHP, can you please summarise any further actions EHP believes DoD should be undertaking, but is not.

Community response

- Shine Lawyers is representing interests of community members concerned about potential loss of property values and health issues, commenced in approximately August 2014.
- DoD held a community meeting on 25 August 2015. Dr Chris Hill from EHP attended. Dr Hill commented that community anxiety levels were higher than in previous meetings. Particular concern regarding inconsistency of DoD messages. At first meeting Defence described Oakey contamination as "the new asbestos" but now appears to be downplaying health risk. There was also concern that some community members with elevated levels claim to not have consumed bore water.

Precedent

- It is known that there are other instances of PFOS/PFOA contamination where these fire-fighting foams have been used for training. For example, DoD has advised that they have 10 "priority sites" that have been subject to PFC contamination nationwide.

~~The number and scale of likely instances is unknown at this time, although the primary use and storage of these kinds of firefighting foams will have been in an aviation context.~~ The action taken for this event ~~may~~ is likely to set a precedent for other instances of contamination

- **CONSULTATION**

– QH, DAF, DEHP, QFES

- **BACKGROUND**

– Fire-fighting foam containing the chemicals PFOS and PFOA was used in fire-fighting training between 1970 and 2005 at the AACO on the Darling Downs.

– PFOS and PFOA have been used in a wide variety of common household and industrial products, such as cleaning products, textiles and paper and packaging products, and are present at trace levels throughout the environment.

– PFOS and PFOA are known to persist and do not readily break down in the environment.

– An information brief on the Oakey contamination was provided to your office on 20 July 2015 (TF/15/13218).