



Country Fire Authority – Informing the
Future

Response to the Professor Joy
Report of the Independent
Investigation into the CFA
Facility at Fiskville

July 2012

“The investigation was extensive and what we know as a result is the best information we are likely to have about conditions at Fiskville over that period. We therefore accept that information and are taking action based upon it.”

– CFA Board

Contents

Foreword

Part 1 – Informing Our Future	6
CFA Welcomes the Independent Investigation Report	6
Conclusions	
The Facts	9
Exposure Levels	10
The Welfare of our People.....	10
CFA’s Response to the Recommendations	11
Governance and Further Management Initiatives	11
Part 2 –Recommendations	13
Recommendation 1	13
Recommendation 2	13
Recommendation 3	14
Recommendation 4	15
Recommendation 5	16
Recommendation 6	17
Recommendation 7	18
Recommendation 8	18
Recommendation 9	18
Recommendation 10	19

Foreword

After being made aware of health concerns related to historic practices for live fire fighting training at Fiskville from 1971 – 1999, CFA commissioned an Independent Investigation.

Professor Robert Joy, former Deputy Chairman of the Environment Protection Authority, has undertaken an exhaustive investigation over the past six months to establish the facts surrounding this complex setting that reaches back over three decades.

CFA has considered Professor Joy's report "Understanding the Past to Inform the Future" and provides this response.

CFA accepts the facts, conclusions and recommendations established in the report and will work to ensure the recommendations are addressed as a matter of priority.

CFA's response will be monitored and audited externally to ensure that the approach taken is consistent, thorough and transparent.

What took place at Fiskville, and to a lesser extent at our other RTGs, was not good enough and we regret what happened. While we cannot change what happened in the past, we can clearly demonstrate that we can learn from past mistakes and we are committed to making changes to assure the ongoing health and safety of our people, along with our care for the environment.



Kerry Murphy PSM AFSM
Chairman



Mick Bourke
Chief Executive Officer

Part 1 – Informing Our Future

Fiskville is CFA's primary training facility and has been in operation since 1971. It is where most of our people have been trained and where the majority of our operational staff commenced their careers. Other service agencies also regularly send their people to train there. CFA uses the facility for graduation ceremonies, to celebrate the achievements of our people and to honour those who have lost their lives in the course of duty. Over time Fiskville has come to play a symbolic role in CFA, reflecting the ethos and commitment of CFA members to emergency service.

In early December 2011 newspaper reports suggested there was a link between the materials used at Fiskville for hot fire training during the 1970s, 80s and 90s and some incidences of serious illness and death in CFA members. We took these reports seriously and by mid December 2011 Professor Robert Joy was tasked with establishing the facts surrounding the use of chemicals in hot fire training at Fiskville. A fully resourced, independent team began its investigations in January 2012.

Professor Joy was provided with the resources he needed to conduct the investigation and had unfettered access to information held by CFA. He was free to make whatever enquiries of our members past and present that he considered necessary. He also commissioned a number of environmental and pollution studies of the Fiskville property and other Regional Training Grounds (RTGs). In addition PriceWaterhouseCoopers (PwC) was retained to assess the level of independence of the investigation team and found evidence confirming CFA's commitment to protecting the independence of the investigation.

CFA Welcomes the Independent Investigation Report

The CFA Board and Management welcome the Report of the Independent Investigation into the CFA Facility at Fiskville between 1971 and 1999 (the Report). The Report by Professor Robert Joy was provided to CFA on 28 June 2012. It is titled "Understanding the Past to Inform the Future", which is a challenge that we accept.

The work of Professor Joy and his team is greatly appreciated and we thank them for their committed work over a six-month period to produce this Report. The Board particularly wants to put on record its appreciation of all those who contributed to the Report. Interviews were held with 324 people, including past and present CFA members, management and Board members as well as CFA customers, suppliers and our neighbours at Fiskville, all of whom gave their time willingly to assist the investigation.

We also acknowledge the extent of the technical and support work that needed to be done to ensure the Investigation was robust and independent. Four million documents were searched and a targeted review was undertaken of 30,000 documents with 8,000 documents deemed relevant to the task. A range of environmental studies were undertaken and individual interviews needed to be structured so that they were thorough and could be relied upon to clarify the issues presented to Professor Joy and his team.

Conclusions

We feel that it is important to include in our response the conclusions that Professor Joy came to in the Report. We accept Professor Joy's conclusions and they have helped to shape our governance and further management initiatives.

The conclusions of Professor Joy (pages 140 – 142 of the Report) are reproduced below.

CONCLUSIONS

The historical risks to staff and the environment at Fiskville associated with the use of a range of flammable materials in training will never be fully known.

Viewed from the perspective of modern day health, safety and environment standards and regulations, Fiskville's acceptance and use of donated fuels posed substantial risks which would be unacceptable today. It can be argued that, during the 1970s and much of the 1980s, the general level of industry standards and of regulatory requirements in relation to the management of hazardous materials waste was low. However, by the early 1990s, that situation had changed and the CFA's own staff responsible for assisting industry to comply with dangerous goods regulations could readily identify that Fiskville was not compliant with regulatory requirements.

The Investigation believes for one group of staff (the PAD operators), the risks of exposure to flammable liquids were significant and considerably greater than to other groups. Instructors working full-time at Fiskville were the group most exposed to products of combustion, foam and fire water. Part-time instructors would have experienced the same types of acute exposures as the full-time instructors, but the frequency of such exposure would have been considerably less. Trainees' frequency of exposure would have been significantly less again. Exposure of other Fiskville staff and residents, including children, to chemicals, products of combustion, foam and firewater would have been negligible or very low and exposure of persons off-site would have been negligible. The key exposure of staff, residents, the primary school and neighbours would have been to occasional smoke and particulate fall out.

Exposure to chemicals during training needs to be seen in the context of the time and other risks firefighters would have been exposed to, particularly when responding to fires. The risks of exposure of firefighters to hazardous chemicals when responding to fires is likely to significantly outweigh any exposures as part of periodic training. Furthermore, exposures to chemicals as part of other occupational risks, particularly for volunteers, needs to be considered. For example, through the period considered by the Investigation, farmers often had significant exposures to agricultural and veterinary chemicals.

The risks associated with training need to be weighed against the benefits of hot firefighter training in saving the lives of firefighters and of community members. However, the risks inherent in training could have been recognised and managed earlier than 1996, without seriously compromising the realism of firefighter training exercises.

In view of the tens of thousands of people who trained on the flammable liquids PAD between its completion in 1974 and its closure in 1996, it is surprising that only three acute incidents involving exposure to chemicals have been identified. This is despite an exhaustive search of CFA's OHS records and over 300 interviews. No record of acute incidents involving exposure to chemicals has been found at the six RTGs.

Sampling and analysis of soil, surface water and sediments undertaken for the IFI by Golder Associates at Fiskville has shown that levels of a small number of residual contaminants, notably PFOA and PFOS, exceed human health or ecological guideline values. While the levels of contamination found are not judged to pose a significant risk either on or off-site, further work is needed: to characterise risks to groundwater; to better quantify the potential risks to human health downstream of Lake Fiskville (taking into account dilution, environmental fate and transport mechanisms); and to investigate and potentially reduce sources of PFOA and PFOS discharges into Lake Fiskville.

The full facts about drum burial at Fiskville remain unclear. However, the Investigation found documentary evidence that drums and contaminated soil from two mass burials in the 1980s were removed from Fiskville in 1991 and 2002. Drums are likely to remain buried at the former on-site landfills.

It is uncertain whether further drum burials remain or, where exhumations have taken place, whether all drums and contamination have been removed. Given the length of time for which any remaining drums will have been buried, it is likely that their integrity will have been breached and volatile components will have evaporated or migrated downwards. The Investigation believes that the risks associated with such drums are likely to be limited and to relate primarily to groundwater.

By 1996 the practice of Regional Training Grounds accepting undocumented, unknown fuels appears to have largely ceased with a shift to increased use of LPG. As a result, the four RTGs established in the 1990s were involved in accepting drums of donated fuel for only a relatively short period, so risks associated with exposure to chemicals, products of combustion and fire water were substantially less than at Fiskville. Unlike Fiskville, where PAD operators were mainly full-time employees, at the RTGs they were employed on a part-time basis. Even in the early days at Wangaratta and Gippsland, training numbers were much lower than at Fiskville, so the demand for large volumes of material, particularly drummed material, to be stored on site did not arise. Nevertheless the majority of each site's fire training area is unsealed and there is potential for contamination of soil and ground water.

In 1980 concerns over potential PCB contamination in donated fuels were transmitted from Fiskville to CFA senior management. However, the general approach of Fiskville management appears to have been that events that occurred at Fiskville (such as the 1982 drum fire and chemicals exposure incident) were dealt with at Fiskville without reference to head office.

In 1987, the Officer involved in the 1982 exposure incident sought information from the CFA Chairman about the nature of the chemicals in the buried drums. After some delay while head office staff inquired into the incident, CFA employed a consultant to temporarily exhume the drums and identify the chemicals. After a delay of more than two years, CFA provided the Officer with information about the chemicals identified in the consultant's report on the basis that the information would be treated as confidential.

The Investigation is aware of the problems in applying retrospectively current standards and community expectations in relation to corporate duty of care for health, safety and environment. Nevertheless, in the Investigation's view CFA managements' handling of concerns raised by the Officer is open to criticism on the following grounds. Firstly, the consultant's report clearly stated that the consultant was not qualified to comment on the possible health implications of exposure to the contents of the drums and advised that medical and/or legal advice should be sought. The Investigation saw no evidence that this was done and views this as a significant oversight. Secondly, the report included information on the acute and chronic toxicity of benzene, toluene and xylene that may have been present in the resins and solvents in the drums. In the case of benzene, the report noted that it was a recognised carcinogen of blood forming tissue.

Despite being made aware of the range of potentially serious impacts on health of exposure to these compounds, and despite the Officer expressing concern that there were others apart for himself that should be advised of the results, there is no documentary evidence that this was ever done. Nor do interviews with the other officers indicate they were ever informed of the results of the consultancy. In the Investigation's view CFA should, as requested, have contacted all those involved in that incident and have made them aware of the findings.

Further, the Investigation concludes that, on the basis of the information available to the CFA Chairman and senior management by the second half of 1988, a thorough audit of Fiskville focusing on the nature and management of fuels should have been undertaken. This should have comprehensively assessed hazards to health and the environment associated with the acquisition, storage, handling, use and disposal of flammable liquids in training. A plan should have been developed to mitigate such hazards. A similar audit and plan should have been undertaken at the two RTGs in use at the time, West Sale and Wangaratta.

In addition, inquiries should have been made with past and then present staff at Fiskville with a view to determining whether other incidents involving significant exposure to chemicals had occurred.

Where such incidents were identified, all potentially exposed staff should have been provided with timely and relevant information on potential risks.

Against a background tightening regulatory requirements and increasing industry focus on environmental practice and health and safety, by the mid-1990s, there is evidence of concern amongst some CFA personnel about dangerous goods storage and handling practices at Fiskville. Prior to this, Fiskville staff did not appear to get substantial advice or support on health, safety and environment matters from head office. It is significant that staff pushing for change felt impelled to use regulatory requirements to ensure CFA management's attention to these matters.

Following CFA dangerous goods auditing in 1996, a CFA Instructor was asked to take a more holistic look at these issues, and the redevelopment of Fiskville in the late 1990s did take into account some health, safety and environment issues. However, even after the extensive studies and plans of 1996 and 1997, the response from Fiskville and corporate management appears limited, with no evidence of systematic follow up, review or auditing of recommendations. Only some of a large number of recommended actions appear to have been implemented. The Investigation did not identify a fundamental shift in focus on health, safety and environment in the period of the Investigation.

The Board through most of the period considered by the Investigation was a representative board and it is understandable that it did not adopt modern governance practice. However, it is notable that CFA did not adopt a more systematic approach to health, safety and environmental issues as other sectors did through the 1980s and 1990s. The fact that CFA hired its first occupational health and safety manager in 1994 is indicative of a late awakening by senior management and the Board.

The Investigation's Terms of Reference do not include considering current materials used in training or training practices. Rather they focus on legacy issues such as possible site contamination that may pose an on-going risk to human health or the environment. Consequently, these are the areas which the Investigation's recommendations address.

The Facts

Professor Joy has established the facts relating to the procurement, handling, storage, and exposure of people to hazardous chemicals at Fiskville, up until 1999, to the extent that it has been possible to so do. There are limitations arising from the passage of time and lack of detailed information about donated materials used at CFA fire training grounds, which means that a full account of events at Fiskville is not likely to be ever known. Nevertheless, the investigation was extensive and is based on the best available information we are likely to have about conditions at Fiskville over that period. We therefore accept this information and are taking action based upon it.

In the Report, Professor Joy has set out a chronology of events that describes the materials used at Fiskville for hot fire training. The materials of major concern were flammable materials and combustion products (such as solvents and paint thinners), extinguishing foams and waste firewater. These materials are considered to have contained chemicals that carry health risks. Liquid materials were stored in drums and the investigation shows that some drums were buried on the property. Most of these drums would have contained residual amounts of solidified materials. The use of these materials and extinguishing foams has resulted in contaminated firewater that was fed into dams on the property. A safe working standard is required to ensure personnel are not exposed to hazardous substances while working with Dams 1 and 2.

Professor Joy recommends that further work be done to minimise any risks from areas where buried drums possibly remain; to investigate possible contamination of dams on the property with a view to remediation if necessary; and to thoroughly investigate the quality of groundwater at Fiskville.

The series of four firewater retention dams eventually drain into Lake Fiskville, which is not a source of drinking water. Analysis completed for the investigation concluded that the risk posed to human health was considered to be low. Nevertheless, the Report recommends that further investigation is required to confirm that the waters and the discharge from Lake Fiskville pose no on-going threat to human health or to the environment.

Professor Joy also considered, in detail, three incidents related to acute exposures to chemicals by workers which have been documented. While noting that there may be other undocumented incidents, no additional incidents came to attention during the investigation period. He also comes to the conclusion that the “historical risks to staff and the environment at Fiskville, associated with the use of a range of flammable materials in training, will never be fully known”.

Exposure Levels

Professor Joy concludes that there were different levels of risk of chronic exposures for different groups of people to various sources of contamination while working at and using Fiskville. Supervisors and operators on the practice area for drills (PAD workers) are regarded as having high risk of exposure to flammable chemicals with other groups having low to negligible exposure to these chemicals. Full-time instructors were found to have much lower exposure to flammable chemicals than the PAD operators although they had high risk of exposure to combustion products and recycled firewater. PAD workers together with full-time instructors have been identified as having a high overall risk of exposure. Part-time instructors are regarded as being at medium risk with all other groups having low to negligible risk.

Professor Joy recommends that any further investigation of possible linkages between the risk of exposure and health effects evaluates the usefulness of the relative risk of exposure of different groups identified in his Investigation.

The Welfare of our People

CFA accepts the facts, conclusions and recommendations established in the Report. We will take the necessary action to demonstrate our ongoing commitment to the health, safety and welfare of our people and others affected by past practices at Fiskville; and our care for the environment, by fully implementing the recommendations and by improving governance and management capabilities and processes.

What took place at Fiskville, and to a lesser extent at our other RTG's, was not good enough and we regret what happened. While we cannot change what happened in the past, we can clearly demonstrate that we can learn from past mistakes and we are committed to making changes to assure the ongoing health and safety of our people, along with our care for the environment.

The welfare of our people remains our first priority. CFA has an existing Health and Welfare Service that provides access to health services and to a peer support program, chaplains, psychologists and counsellors. This Service has been expanded and now also includes the following support services that were developed especially for those who may be affected by the Fiskville matter:

- a Health and Welfare Hotline providing 24hour access for up-to-date information on services available as well as on-the-spot telephone counselling;
- medical reviews for members and their families who have registered with CFA because they believe they may be affected by Fiskville;
- case management based communication for identified past and current members (and their families) so that they will have a direct relationship with CFA including face-to-face meetings, telephone contact and written communication.

These services will be strengthened in the coming weeks as:

- CFA will offer health monitoring for those identified as being in a high or medium risk of exposure group;
- CFA will commission an independent health impact study to examine the linkages between the risk of exposure to hazardous materials at Fiskville and health effects;
- Information Packs will be available to CFA members and families outlining the support services available.

In addition, Information Packs will also be made available to the public and will incorporate details on accessing community based services. These packs are intended to target those in the community who feel they could be affected by their involvement with Fiskville or because they live or work close to the Fiskville training facility now or have done so in the past.

CFA's Response to the Recommendations

A detailed response to each of the ten recommendations is contained in Part 2 of this response. In summary:

- In response to Recommendations 1, 2, 3, 6, 7 and 10 about the nature, extent and significance of contamination of soils, sediments, groundwater and surface water, CFA will commission an independent examination of Lake Fiskville and the dams at Fiskville and any like arrangements at RTG's to assess these aspects of the contamination. Alternative firewater management systems and training water arrangements will be put in place at training grounds as required. Procedures to protect the health and safety of people working on Dams 1 and 2 at Fiskville will be put in place. As well, a site ground water monitoring system and appropriate soils testing will be implemented using an expert provider.
- Recommendation 4 that requires an inspection of electrical transformers at Fiskville has been implemented. All transformers either used as props or retained for that particular purpose have already been removed from CFA properties to an EPA approved disposal site.
- In March 2012 CFA undertook to proceed with a health impact study once the Professor Joy Report was available. This study will look at the possible linkages between the risk of exposure of persons during training at Fiskville to the hazardous materials identified in the Report and health impacts in accordance with Recommendation 5.
- Recommendations 8 and 9 require assessment of the need for rehabilitation of landfill areas at Fiskville after groundwater issues have been dealt with. Following geophysical examination of these areas and environmental assessments, management plans will be developed with a view to ensuring that any risks are mitigated and those areas are safe for use. This includes an appropriate cap for Landfill 1.

We accept accountability for the required implementation and the CFA Board will actively monitor the progress. We will ensure an independent and transparent scrutiny over this activity.

Governance and Further Management Initiatives

CFA is confident that the events and practices discovered by Professor Joy in respect to the use of hazardous substances in hot fire training are events and practices of another era. Attitudes, understandings and work practices have changed markedly for the better since 1999; but we do not underestimate how much further we have to go. Commencing after the Linton fires in 1998 CFA's focus became safety first for fire ground operations and equipment. Further advances are now required in the way we undertake our hot fire training so as to achieve the same emphasis on safety and environmental care.

One of the themes of the Report is past poor management practices concerning the use of potential hazardous materials that reflected a culture that did not give health, safety and the environment a

high priority. To ensure that our people and the community can have confidence in CFA's ability to respond effectively to this Report and to any future issues, the CFA Board is:

- establishing a Board Committee for OHS&E that will also have independent membership with relevant expertise;
- implementing ISO 14001 Environmental Management and along with AS4801 Occupational Health and Safety strive to gain accreditation in these business processes;
- including a Standing Item on Board agenda's relating to progress reports on implementation of the Report;
- arranging for external independent audit of our actions to implement the Professor Joy Report and making the audit results publically available;
- acquiring specialist personnel around environmental management to support personnel who are already working on health and safety, and increase the presence across the State around OHS&E;
- allocating the executive responsibility and management and control for all Training Grounds with the Executive Director Operational Training and Volunteerism. The Regional Site Review issues and recommendations will be considered, assessed and implemented by OT&V in a manner that is complimentary to the Professor Joy Report and recommendations;
- providing project management capability for the implementation of recommendations;
- extending our Health and Welfare Services for those who may be affected by the Fiskville matter, including:
 - health monitoring for those identified as being in a high or medium risk of exposure group.
 - commissioning a health impact study to examine the linkages between the risk of exposure to hazardous materials at Fiskville and health effects.
 - providing Information Packs to CFA members and families outlining the support services available.
 - making Information Packs available for the public which will incorporate details on accessing community based services. These packs are intended to target those in the community who feel they could be affected by their involvement with Fiskville or because they live or work close to Fiskville training facility.

While training in realistic conditions helps save firefighters lives, CFA acknowledges that hot fire training carries inherent risks, especially to workers at fire training grounds, but also to trainees. To better manage these risks, CFA will take steps to ensure that its training facilities are accredited as meeting recognised International and Australian Standards including AS4801 in relation to health and safety and ISO14001 for environmental management. Together, these standards should ensure that our people and the community can have a high level of confidence in our training management practices.

CFA will also arrange for external audit of our response to the Professor Joy Report. An independent audit will maximise the confidence of the CFA Board and Management that the identified issues have been addressed effectively. More importantly, such an audit will give our people, stakeholders, local land owners and the community information and assurance about the steps we have taken to rectify the problems found by Professor Joy.

Part 2 – Recommendations

The Report's conclusions relate largely to the activities, practices, exposures and management at Fiskville and in Headquarters prior to 1999 but some conclusions have implications for the future. The Recommendations of the Report focus on work that needs to be done to ensure that the Fiskville training facility and RTGs are safe facilities for our members, trainees, nearby residents and the local community. The following discussion sets out the recommendations of the Report, some background to those recommendations and how the CFA will respond to them.

Recommendation 1

That soil and groundwater quality be assessed in areas where fuel storage tanks are currently located or have been located in the past both above and below ground.

What the Professor Joy Report says

Contamination at Fiskville is likely to have arisen from a number of activities including fire training, storage of fuels and materials used in training, capture and disposal of waste water from training, burial of used drums and potential leakage from underground fuel tanks. While targeted sampling has been done for the Report, groundwater was not found in any of the bores used for sampling. While it was considered unlikely that there was an adverse risk to human health or the ecosystem, specific testing of groundwater is recommended.

What will be done

A soil and ground water quality assessment will be undertaken in the areas where fuel storage tanks are currently located or were located in the past both above and below ground. The assessment will test for a wide range of organic chemicals and metals associated with materials that have been identified in the Report.

The work will be part of a property-wide investigation of groundwater occurrence, flow and chemistry. Soil will be assessed at each storage area. The property-wide groundwater investigation will commence following consultation with EPA and will be done by specialist environmental practitioners with capability in investigation of similar situations.

Recommendation 2

That groundwater investigations be undertaken in the vicinity of: the historical flammable liquids PAD, the fuel mixing area, the historical foam training pits, the prop storage area and the area used to rehabilitate contaminated soils in 1998

What the Professor Joy Report says

In 1998 a two-stage remediation plan was implemented at Fiskville to address possible contamination of the PAD. Soil was excavated from the flammable liquids PAD and old fire training pits (i.e. foam pits) and remediated by soil composting. Six months after the completion of bioremediation, the quality of the soil met the Victorian EPA clean fill criteria. Groundwater quality in the vicinity of these historic areas needs to be checked.

What will be done

A groundwater study will be undertaken for the whole property to delineate the groundwater movements beneath the property and whether or not the groundwater has been affected by activities carried on at the property. It will include the areas specifically addressed in the recommendations.

A strategy will be adopted whereby the groundwater environment will be investigated initially in areas with no contamination sources to confirm the occurrence, chemistry and flow of groundwater in its regional setting. Following the confirmation of the hydrogeology of the property, bores will be installed down-gradient of each key suspected source of contamination to test the water and enable ongoing monitoring for potential contamination.

The work will ensure CFA has an understanding of the contamination status of the groundwater and any current or future risks to groundwater. CFA will then be able to take action to protect groundwater quality.

The work will be undertaken by specialist environmental practitioners with expertise in investigation of similar situations.

Recommendation 3

That further investigation be undertaken into surface waters in and discharging from Lake Fiskville to:

- *better quantify the risk to downstream human health receptors, taking into account downstream dilution and environmental fate and transport mechanisms;*
- *investigate potential sources of PFOA and PFOS [flurosurfactants perfluorooctanic acid and perfluorooctanesulfonic acid] discharges to Lake Fiskville and discharging offsite, if the potential risk of adverse impact on downstream human health receptors is found to be unacceptable;*
- *collect surface water samples at a representative location to assess whether the reported copper and zinc concentrations are consistent with background levels; and*
- *assess the ecological condition of Lake Fiskville.*

What the Professor Joy Report says

Fiskville Lake is not used as a source of drinking water. Rather, it is part of the system for treating water used on the fire training ground. Water used for fire fighting at Fiskville circulates through a treatment system of four dams to remove contaminants and finally flows into Lake Fiskville, an artificial lake (dam) built on the adjacent Beremboke Creek. Lake Fiskville overflows to the creek environment away from the Fiskville property.

The Professor Joy Report identifies that water and/or sediment in the dams (and to a minor degree Lake Fiskville) are contaminated with PFOA and PFOS, copper and zinc, petroleum hydrocarbons and bacteria but also concludes that these concentrations may not be of significance for worker health and safety and public health. The Report is less definitive about ecological impacts on the lake and creek and recommends further assessment of these risks including downstream water users. The Report also considered it necessary to further investigate the sources of PFOA and PFOS in Lake Fiskville.

What will be done

Lake Fiskville surface waters and discharge will be investigated to assess the distribution of dissolved and sediment-adsorbed PFOA and PFOS in the water system. The potential sources of any contaminants will be investigated, including dams 1-4, to understand the distribution and persistence of any chemicals found in the lake.

The presence of copper and zinc in Lake Fiskville will be assessed in comparison with the quality of uncontaminated water in the local catchment to assess whether the Lake Fiskville levels of copper and zinc are a reflection of the background levels in the local environment or if they are indicative of contamination.

Following the assessment of Lake Fiskville waters, and if those results suggest it, we will undertake an assessment of the health risk to downstream users of water from creeks and dams fed by surface waters receiving discharge from Lake Fiskville.

Finally, the ecology of Lake Fiskville will be assessed in accordance with the State Environment Protection Policy (Waters of Victoria) to arrive at a measure of the health of the water body. An Ecological Risk Assessment report will be prepared in consultation with EPA.

See also information related to Recommendation 6.

Recommendation 4

That any electrical transformers located at any CFA training site be inspected by an independent hygienist and, if not able to be certified and PCB-free under the National Polychlorinated Biphenyls Management Plan 2003, that it be treated as a scheduled waste and disposed of in accordance with the provisions of the Plan

What the Professor Joy Report says

At Fiskville two disused electrical transformers were being used as props for training purposes at the beginning of the Investigation but they were not certified as PCB-free (polychlorinated biphenyls (PCBs)) are known to produce a range of adverse health and environmental effects.) Similar props were stored at Bangholme training centre. It appears unlikely that any action was taken to ensure that these props were PCB-free.

What has been done

In March of 2012 both transformers at Fiskville were tested for PCBs by ALS Global, an environmental auditing company. Testing revealed that both electrical transformers contained traces of PCBs above the acceptable safe levels as per the relevant EPA guidelines. Arrangements were subsequently made with MRI Pty Ltd, an accredited and EPA approved transporter of contaminated materials, to remove both electrical transformers to an approved disposal site at Campbellfield. The removal occurred on 30 May 2012. The appropriate EPA Waste Transport Certificate was provided at the time of disposal.

At Bangholme there were five electrical transformers that have not been used for many years. The transformers were used as static props, not incorporating hot fire, for a two-year period following their arrival and then remained unused. In June 2012 the five transformers were tested for PCBs by MRI Pty Ltd. The testing found no oil samples were present or obtainable, with all units identified as having been previously drained and stripped leaving the metal casings only. This was the condition in which the electrical transformers were when they arrived at Bangholme some 15 years previously. Given these transformers were no longer required, arrangements were made with MRI

Pty. Ltd. to remove the electrical transformers, which occurred on 4 July. The appropriate EPA Waste Transport Certificate was provided at the time of disposal.

No dormant electrical transformers now exist on any CFA property.

Recommendation 5

That any subsequent study of possible linkages between exposure of persons during training at Fiskville to materials such as flammable liquids and health effects evaluate the usefulness of the qualitative assessment of relative risk of exposure of different groups developed in Chapter 7

What the Professor Joy Report says

The Report concluded that the risk of exposure of PAD workers to flammable liquids was high and considerably greater than other groups. Full-time instructors had high levels of exposure to products of combustion, foam and firewater but low exposure to flammable materials. Part-time instructors would have experienced the same types of exposures as the full-time instructors, but the frequency of exposure would have been considerably less. Exposure of trainees would have been significantly less again. Other Fiskville staff, visitors and residents would have experienced considerably lower levels of exposure than trainees. The key exposure to staff, residents, the primary school in the grounds of Fiskville and neighbours would have been to occasional smoke and particulate fall-out.

What will be done

CFA has previously committed to undertake a study of possible linkages between exposures of persons during training at Fiskville to materials such as flammable liquids and health effects.

Discussions have been held with the Head of the Monash University Department of Epidemiology and Preventative Medicine with a view to conducting a study to determine possible linkages between exposure to hazardous materials and any possible health effects taking into account that some groups of people as identified in the Professor Joy Report had higher levels of risk of exposure than others. This approach will ensure that the usefulness of the qualitative assessment of relative risk referred to in the Report is assessed.

Preliminary steps have been taken so that the feasibility of a retrospective cohort study can be assessed. The feasibility of the study will determine if records exist that can identify the individuals who comprise each of the exposed groups, determine their level of exposure and take account of other demographic information such as age. Monash University Ethics Committee approval will be required and will ensure the validity and reliability of the research methodology.

The results of the feasibility study and the health study will be made publicly available.

Recommendation 6

That procedures be put in place to protect the health of personnel potentially exposed to waters and sediments in Dams 1 and 2 of the firewater treatment system and, in particular, to manage the risks to individuals who have the potential to come into contact with sediments in the dams during routine maintenance

What the Professor Joy Report says

Golder Associates undertook a series of technical investigations at the Fiskville property on behalf of the Investigation. Sampling and analysis of soil, surface water and sediments included testing of the water and sediment in the four dams at Fiskville. As indicated above, this testing indicated contamination in the water and sediment in the dams by a number of chemicals including hydrocarbons, PFOS and PFOA (derived from discontinued fire-fighting foams). While there are no specific criteria for these contaminants for firefighting training water, they exceeded drinking water criteria. The level of contaminants was judged to pose an insignificant risk to workers at Fiskville or in surrounding or downstream areas. The Report recommends implementation of procedures to protect workers who are potentially exposed to water and sediment in Dams 1 and 2.

What will be done

While the fire fighting water system at Fiskville is supplied by potable town mains water source, it is apparent that chemicals such as PFOA and PFOS and bacteria are circulating in the water recycling system dissolved in the water and adhering to the fine sediment particles. The risks arising from current operational exposure of PAD workers to water and sediment in Dams 1 and 2 will be assessed. Similarly, the risks arising from current operational exposure of instructors and trainees to fire fighting water recirculated from Dam 2 will be assessed.

Standard Operating Procedures (SOPs) for fire fighting water system operation and maintenance will be reviewed and revised to assure the safety of personnel exposed to this water. The SOP will include an updated water quality monitoring program and an audit process.

OHS procedures and compliance systems will be revised. OHS will be managed in conformance with AS4801 and accreditation will be pursued. Once these procedures are in place normal OHS precautions will provide adequate protection.

In addition to resolving issues related to the presence of hazardous materials in Dams 1 and 2 we will also develop a set of criteria for water quality to assure suitability for current fire fighting training purposes. This water quality does not need to be of a potable standard. A specific risk-based criterion for PFOS and PFOA may need to be derived.

A comprehensive study into the options for re-engineering the firewater supply, treatment and recirculation system at Fiskville will be undertaken to achieve fit-for-purpose water quality at Fiskville. Options with and without recirculation of firewater will be developed for upgrading and refurbishing the fire water supply system at Fiskville with a view to eliminating PFOA and PFOS to the greatest extent practicable and to meet the risk-based criterion.

Options will be explored that could include provision of large storage tanks to contain the additional town water needed to allow the majority of training exercises to be conducted. Other options such as upgraded treatment systems or using groundwater supply will also be investigated as the local groundwater may be a suitable non-potable quality for fire fighting purposes.

No water from Dam 1 or 2 will be used in training until the assessment of OHS risk is completed.

Recommendation 7

That soil and groundwater quality be assessed in the following areas that were not examined during the site investigation stage of the Preliminary Site Assessment of Fiskville: (Figure 8.1)

- *Part of Drum Burial Area 1 (south of the airstrip and south of Deep Creek Road)*
- *Drum Burial Area 2 (north of Administration Building);*
- *Drum Burial Area 3 (east of the Administration Building)*
- *Historical landfills 1 and 2.*

What the Professor Joy Report says

Up until 1996 drums that had contained flammable materials were frequently buried at Fiskville in landfill areas or by way of mass burials. The Investigation leading to the Professor Joy Report included a search for prospective drum burial areas using ground penetrating radar, however no drums were found. The Report concludes that should any drums remain, their integrity would have been breached by now and any volatile components will have evaporated or migrated downwards and any remaining risk will relate to possible groundwater contamination.

What will be done

The five areas where buried drums have been found or have been suspected will be investigated in more detail using geophysical methods including but not limited to electromagnetic and magnetic methods to identify the location of any remaining drums.

A soil and ground water quality assessment will be undertaken in the areas where drums are believed to have been buried. The testing program will include a wide range of organic chemicals and metals associated with materials that were known to have been stored in drums.

In the event that drums are found, they will be removed if it is assessed that that is the best way of addressing any risks associated with the drums. Otherwise the area will be capped.

This work will be undertaken in association with work to address Recommendations 1 and 2 (Soil and groundwater investigation).

Recommendation 8

That historical landfill 1 which has been disturbed by the construction of a walking track needs to have its extent clearly identified, have an appropriate impermeable and properly drained cap constructed and be revegetated with shallow rooting species that will not compromise the integrity of the cap. This should ensure the safety of any people using the walking track

Recommendation 9

That any decision on the future management of historical landfill 2, including possible exhumation of buried drums and further site rehabilitation, await the results of soil and groundwater quality assessment at the site (Recommendation 7)

What the Professor Joy Report says

Drums, sludge and other material were routinely buried at Fiskville in one of two areas near the south-western corner of the property. One of those landfills (Landfill 1) dates back to and was used by previous owners of the property, AWA, as well as by CFA. While the drums were reported to be empty, in practice any are likely to have contained solidified residues. The AWA landfill also

contains other materials, such as old ceramic insulators that were brought to the surface during construction of a public walking track. Further work is needed both to determine if there is any residual contamination of these areas and to ensure that the areas are properly drained and covered.

What will be done

The environmental condition of both landfills will be investigated. The type, thickness and condition of landfill capping will be determined by geotechnical drilling and inspection.

A qualitative risk assessment based on the landfill history, soil and groundwater assessment, geophysical investigation and current property usage will be completed. In particular, the risks to people using the walking track traversing Landfill 1 will be assessed.

Any decision to remove drums from either landfill will depend on the outcomes of the risk assessment, including the risks associated with removal of the drums.

Upon completion of the assessment and works required to be done under Recommendation 7, a management plan will be developed and implemented to ensure that all environmental and health and safety risks are adequately managed at the two former landfills.

Recommendation 10

That the site specific recommendations of the Golder Associates' Preliminary Site Assessment - CFA Regional Training Grounds (RTGs) be adopted including recommendations to:

- *undertake targeted soil and groundwater investigation at sites where possible sources of contamination have been identified;*
- *assess fire fighting water quality for contaminants associated with flammable liquids and extinguisher foams;*
- *assess water quality where discharges occur to the environment.*

What the Professor Joy Report says

Golder Associates completed a Preliminary Site Assessment of RTGs for the Investigation. Four RTGs have unsealed fire training areas and visual inspection shows evidence of hydrocarbon staining, probably arising from poor fuel storage and management practices. The Professor Joy Report found that the types of exposure on the RTGs would be similar to those at Fiskville, but the levels of exposure would be significantly less. Further examination of these grounds is warranted to assure health and safety.

What will be done

CFA has commissioned a range of work that is informed by and will achieve the outcomes sought in the report of assessments completed by Golder and Associates (see below). This recommendation is complex and covers six properties where we have RTGs.

The work will include targeted soil assessments in the vicinity of:

- flammable liquids pads;
- current and former above ground and underground storage tanks;
- extinguisher pads;
- fuel mixing areas;
- prop storage areas including former transformer prop areas;
- soil remediation areas;

- water recirculation dams.

A laboratory testing program will test for a wide range of organic chemicals and metals associated with materials that have been used on the RTGs. The results of these assessments will inform the investigation of groundwater quality.

In accordance with the approach taken at Fiskville, the hydrogeology of each property will be examined in its regional setting. At least three monitoring bores will be installed at each training ground, including down-gradient from the potential source area of contamination. Procedures will be put in place to protect groundwater quality.

We will sample and test water in the fire-fighting systems at key points at each training ground plus the point of water discharge from each property. Testing would be for the same chemical and biological parameters evaluated at Fiskville in order to assess the potential for adverse human health or environmental impact.

Supporting technical assessments

In the course of the Independent Fiskville Investigation, Professor Joy commissioned a number of technical assessments from Golder and Associates. CFA has used these reports to ensure that the response to the recommendations of the Professor Joy Report is comprehensive. The reports include:

- a Health Hazard Report, which provided factual information on substances potentially present at Fiskville;
- a Preliminary Site Assessment of Fiskville designed to identify the location of buried contaminants and make recommendations about clean-up or remediation. Three recommendations are included in the Assessment Report which are reflected in Recommendations 1, 2, 3, 6 and 7 of the Professor Joy Report;
- a Preliminary Site Assessment of Regional Training Grounds to assess potential sources of contamination and undertake a preliminary assessment of the risks of potential contamination. Thirteen recommendations (being between one and three recommendations for each of the RTGs) are included in the report which is reflected in Recommendation 10 of the Professor Joy Report.

A Review of CFA Regional Training Grounds was undertaken for Professor Joy by Brian Lawrence which addressed governance, systems, training, best practice and asset management of the RTGs. Eighteen recommendations are included in the review. These recommendations require a new focus on the management and operation of the RTGs in order to achieve consistency of practice, common systems, standards and processes, clear responsibilities and accountabilities and a strong and focussed management. Responsibility for assessing and implementing these recommendations rests with the Executive Director Operational Training and Volunteerism.