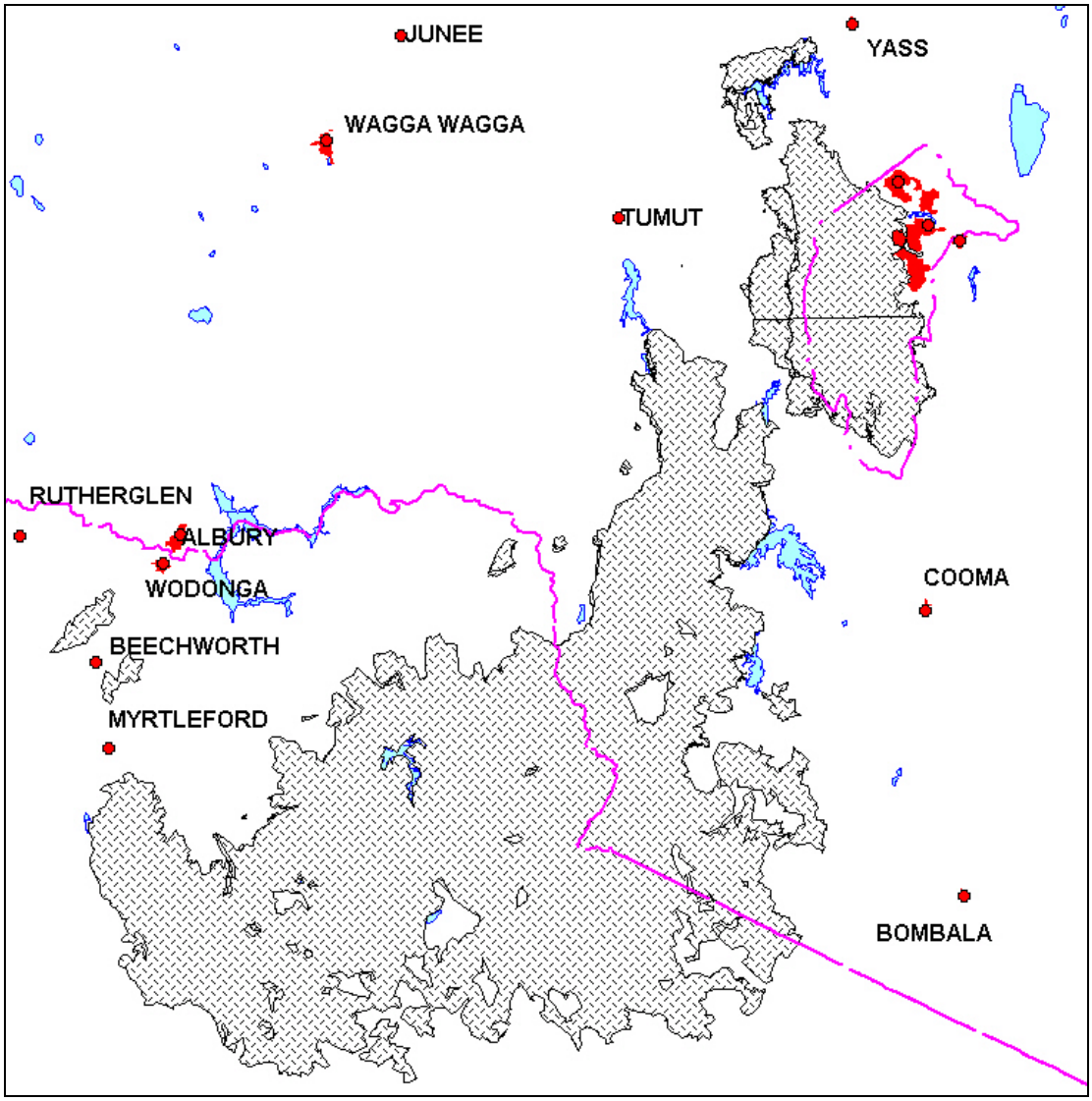
SUBMISSION
BY THE
EMERGENCY SERVICES BUREAU
TO
THE INQUIRY INTO THE OPERATIONAL RESPONSE TO THE JANUARY 2003 BUSHFIRES
BEING CONDUCTED BY
MR R MCLEOD

The areas of South East Australia burnt in the periods following 8 January 2003



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INTRODUCTION

This submission on behalf of the Emergency Services Bureau (ESB) is intended to outline in broad terms its role and responsibilities, the emergency management arrangements which prevail in the ACT, and the role of the Bureau in combating the January 2003 fires.

When reading this submission there are certain issues which need to be kept in mind.

This submission provides an outline of the firefighting activity in a chronology from the 8 January to the 18 January 2003. Details of individual units locations, support agencies and detailed description of the activities of many organizations involved in the event are not included. To include this level of detail seems unnecessary and would require access to the transcripts of communications activity during the weeks of the fire. The communications log is with the Coronial AFP Investigation Team who are preparing a transcript which is expected to be an extremely large document.

ESB would like to acknowledge formally and record its appreciation for the invaluable assistance provided to it by the many hundreds of volunteers, interstate services and staff from other ACT and Commonwealth Departments, and the significant spontaneous support from public members who all contributed over this period.

When considering the way the ACT prepares for and deals with emergencies and disasters, there are differences which distinguish it from the other States and Territories. The ACT is an urban area with an extensive urban/rural fringe, with a relatively small population of approximately 320 000 and with a resource base to match. The vast majority of land use in the Territory is rural in nature with a single principal urban area. Approximately 90% of the area of the Territory is comprised of forests (either native forested National Parks or pine plantations) and rural leases.

In relation to bushfire fighting a fundamental and paramount consideration is the safety of those tasked to fight the bushfire. Bushfire fighters, paid and volunteer, are all too regularly killed fighting bushfires, most recently in Kuringai Chase (in a hazard reduction exercise) in Sydney and at Linton in Victoria. Bushfires can be of such a size and ferocity that any impact upon the public, not just upon the urban fringe but also in rural areas, has the capacity for death and injury. In the 1967 Tasmanian fires 62 people died (9 as a result of natural causes). In the 1983 Ash Wednesday fires 75 people died, 47 in Victoria and 28 in South Australia.

With these tragedies in mind, tasking decisions made when fighting bushfires are based on an over riding concern for the personal safety of firefighters. On occasions, this over-riding concern will prevent the adoption by decision makers of fire fighting options which may otherwise be suited to the circumstances.

Despite the tragic outcomes of the January fires, the fire fighting efforts by the many personnel engaged directly at the fire front, or in support roles, was a significant achievement in cooperative effort. The Bureau's managers accept fully the need for a full accounting to the community for all the activities associated with preparation for, and attempts to suppress these fires. It is hoped that this submission, and the further information which may be sought by the Inquiry, will aid that accountability process and contribute to a complete and accurate record of the events of January 2003.

Finally the ESB wishes to acknowledge the tragic loss of life and devastation of property caused by the fires when it is the task of the ESB to prevent such impact occurring. Such profound loss is felt by all staff and volunteer members of the ESB and therefore these reviews are being viewed as an opportunity to improve all aspects of our Emergency Management activities.

GLOSSARY

Backing fire	Opposite of a head fire. Often the flames are leaning away from the unburnt fuel.
Bushfire Hazard Assessment	ACT has been undertaking formal bushfire hazard assessment since 1989, revised in 1990, 1994, 1997 and 2001. Involves the production of a standard series of six maps that show the components of bushfire hazard, the hazard and a guide on how best these might be changed. The maps are based on a grid laid across the whole ACT, and use computer technology to apply best practice for assessing hazard.
CFCO	Chief Fire Control Officer. The current CFCO is Mr Peter Lucas-Smith who is employed by ESB. The functions of the CFCO are established under the Bushfire Act.
Direct Attack	Direct application of fire suppression measures (water or manual tools) to a fire.
Diurnal cycle	Day/night variations
Fine Fuel	Debris, grass, sticks, leaves etc. Less than 6mm diameter. Generally fine fuel is what drives the spread of fire because it burns faster than large fuel such as logs.
Firestorm	Generally means an atmospheric phenomenon caused by a large fire in which a rising column of air above the fire draws in strong winds.
Head Fire	Is the fire front and generally makes a run with the wind or terrain, with the flames leaning over the unburnt fuel.
Indirect Attack	Use of measures such as containment lines and/or backburning to control a fire.
Meso-scale	Middle level scale between macro and micro levels.
Planning Function	There are four parts to the function: • Situation Unit, which assess what is occurring in the field; • Resources Unit, Track Resources; • Information Management Unit, which brings together available information and produces output products required; and • Administrative Unit, which provides the ability to run information flow lines.

Fire Behaviour Models	There are a number of recognised fire behaviour models (eg: McArthur Meter). They attempt to take into account the various fire behaviour drivers and come up with predictions concerning rate of spread, intensity and spotting distance for fires.
Fire Danger Index	A relative number denoting an evaluation of rate of spread, or suppression difficulty
Fire Suppression	Putting out a fire.
Fire Containment	Keeping a fire within pre-determined boundaries.
Fire Towers	Towers used to detect and report smoke sightings located at Mt Tennent, Mt Coree, Kowen Pines and One Tree Hill.
Haines Index	By observing the vertical structure of the atmosphere when the 'plume driven' fires occurred, Haines was able to note certain conditions that lead to explosive growth of fires, extreme spotting and frequent crowning. These were combined into an index that ranges from 2 to 6, which show the potential for large plume-driven fire growth o Index 2 or 3 - very low potential o Index 4 - low potential o Index 5 - moderate potential o Index 6 - high potential
McArthur Meter	Fire behaviour model, developed in the mid 1960's by Allan G McArthur (who worked for CSIRO forests). Generally used to predict bushfire danger, rate of spread and potential spotting distance. There are forests and grass versions. It is a circular slide rule.
Onion Ring Model	Aims to plot where the perimeter of the fire might be at certain periods, to allow for proactive firefighting (indirect attack).

'Extreme Fire Weather'	For the ACT, weather conditions become extreme when major pressure systems drive northwesterly air flow, with very high temperatures, low dew point, low humidity and high wind speeds.
Fire Behaviour	There are three main drivers of fire behaviour: • Terrain, in terms of slope, aspect, exposure, elevation, atmosphere. • Fuel, in terms of vegetation type, moisture content and prior history. • Weather. Day vs night variations affect fire behaviour, as do specific forecasts for temperature, wind, humidity and the like.
Situation Unit	Assesses and reports what is occurring in the field.
Containment Line	The line across which it is intended to stop a fire from crossing – generally a road, track or a bulldozed line cleared of debris, grass / forest material.
Lightning ignition	Fire started by lightning strike.
Vector Fire Modelling (VFM)	Fire behaviour model. Used for medium & larger fires. Uses a series of arrows laid over terrain, after considering background conditions (terrain, fuel and weather). Adjustments are made and applied – length and direction of arrows indicates field fire behaviour.
Hand tools	Rakes, chainsaws and other similar hand tools are used to construct fire lines to contain bushfires.

ACRONYMS

ABC	Australian Broadcasting Corporation
ACT	Australian Capital Territory
ACTAS	ACT Ambulance Service
ACTBS	ACT Bushfire Service
ACTES	ACT Emergency Service
ACTFB	ACT Fire Brigade
ADF	Australian Defence Force
AFAC	Australasian Fire Authorities Council
AFP	Australian Federal Police
AIIMS	Australian Inter-Service Incident Management System
ANU	Australian National University
ASNSW	Ambulance Service of NSW
AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
CFCO	Chief Fire Control Officer
CISM	Critical Incident Stress Management
COMCEN	Communications Centre
DOTARS	Department of Transport & Regional Services
DTS	Direct Turnout System
DUS	Department of Urban Services
EMA	Emergency Management Australia
EM Act	Emergency Management Act
ESB	Emergency Services Bureau
ESB HQ	ESB Headquarters
GIS	Geographic Information System
GPS	Global Positioning System
ICS	Incident Control System
IMT	Incident Management Team
IT	Information Technology
JESC	Joint Emergency Service Centres
KBDI	Keetch Byram Drought Index
MDS	Mobile Data System
MECC	Medical Emergency Coordination Centre
MOU	Memorandum of Understanding
NPWS	National Parks and Wildlife Service
PMR	Private Mobile Radio
QFRS	Queensland Fire & Rescue Service
RAAF	Royal Australian Air Force

RAFT	Remote Area Firefighting Team
RFT	Request for Tender
RMU	Risk Management Unit
SAMFS	South Australian Metropolitan Fire Service
SEWS	Standard Emergency Warning Signal
SMT	Service Management Team
SOP	Standard Operating System
TEOC	Territory Emergency Operations Centre
UHF	Ultra High Frequency
VHF	Very High Frequency

EMERGENCY SERVICES BUREAU STRUCTURE

ROLES AND OBJECTIVES

The ESB is the ACT government agency responsible for emergency management and other support arrangements in the Territory. The ESB serves the community's need to minimise the effects of fire, road accidents, medical and other emergencies and to mitigate the potential effects of disaster. The ESB also provides a range of other related services of a non-emergency nature.

HISTORY

The nucleus of the ESB was formed from the Emergency Management Group previously established within the Department of Urban Services (DUS). The Emergency Management Group initially provided the corporate infrastructure for three emergency service related agencies including the ACT Fire Brigade (ACTFB), Bushfire Service (ACTBS) and Emergency Service (ACTES).

On 17 March 1995, the Emergency Service Bureau came into being as an administrative unit still within the DUS with the transfer of the ACT Ambulance Service (ACTAS) from the Department of Health and Community Services. The newly established ESB, reported to the Minister for Emergency Services.

On 1 July 1996, the ESB was transferred to the Attorney General's Department under control of the same Minister whose title was changed to Minister for Police and Emergency Services. The name of the Attorney

General's Department was subsequently changed to the Department of Justice & Community Safety.

Amongst emergency response agencies the ESB is unique within Australia in that it brings each of the emergency services under the umbrella of a single agency. This is a model particularly suited to the needs of the ACT and it promotes a co-ordinated team response to managing emergencies.

In Australia's smallest (geographical) jurisdiction, the Bureau concept seeks to obtain maximum benefit from a single 'pool' of emergency management expertise, and an integrated approach to provision of services. It is considered that this model is best suited to the ACT's needs and the January fire experience provided further validation of the value of cooperative, well integrated activity by all emergency agencies.

Within the Bureau there are established protocols dealing with the interaction between and response by each emergency service which are supported by understandings of roles created by years of cooperative and effective team response to emergencies.

ORGANISATIONAL STRUCTURE

The ESB comprises four emergency service response organisations. Specifically, the:

1. ACT Ambulance Service;
2. ACT Bushfire Service;

3. ACT Emergency Service; and

4. ACT Fire Brigade

In addition to these operational Services, there is the Corporate Administration function comprising a number of units and four operational and administrative support units within the ESB that support all the Services.

These are:

a. Communications [including the Communications Centre (COMCEN)];

b. Staff Development and Training;

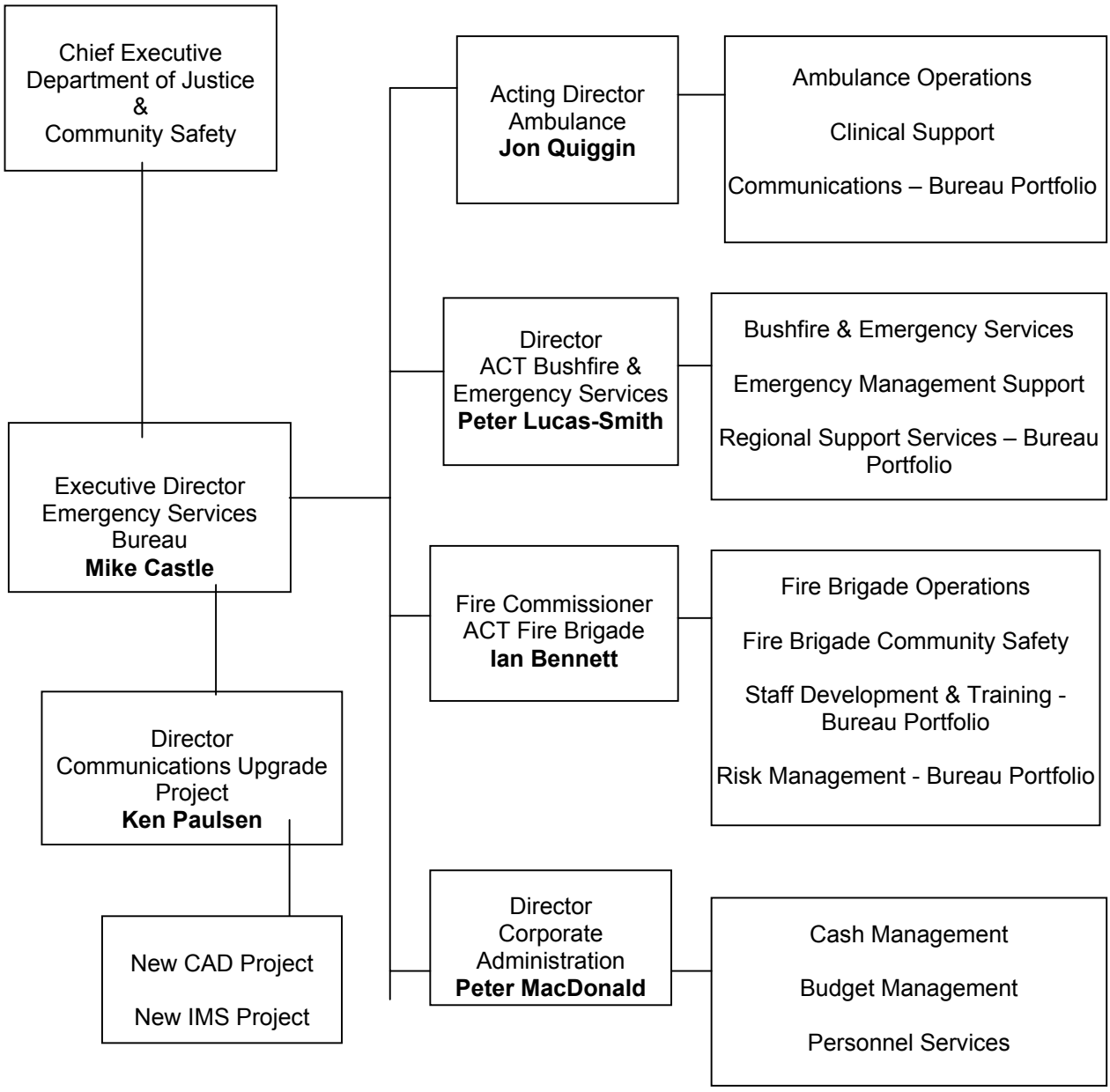
c. Regional Support Services; and

d. Risk Management.

The ESB Executive management team consists of the Executive Director of ESB, the Chief Officers of each emergency service, the Director of Corporate Administration and a temporary position of the Director Communications Upgrade Project.

A Chief Officer from each emergency service manages one or more of these support units on behalf of the ESB Executive.

The ESB organisational structure is outlined below.



ACTESB Organisational Structure

MISSION

The mission of the ACTESB is:

'To work with the community to preserve life, property and the environment.'

VALUES

The values established by the ESB are to:

- Provide quality services;
- Work with the community;
- Work as a team;
- Value and respect each other;
- Be innovative and progressive;
- Continually improve performance;
- Communicate performance;
- Communicate effectively; and
- Operate ethically and professionally.

SERVICES PROVIDED

GENERAL

The ESB provides a range of emergency services and related functions consistent with its obligation to the ACT Government.

These are:

a. Compliance;

b. Community Education, Awareness and Assistance;

c. Preparedness;

d. Response; and

e. Recovery.

COMPLIANCE

Legislative and community compliance with relevant public safety legislation, standards and guidelines:

- Hazard Management
- Legislation, Standards and Codes Application

COMMUNITY EDUCATION, AWARENESS AND ASSISTANCE

Public information, awareness, education and assistance to the community on the requirements of legislation, standards and guidelines relating to public safety and emergencies.

- Public Safety Education
- Public Safety Information
- Public Safety Programs
- Community Support

The ESB also is actively involved in a number of community support programs, including:

- Smoke detector installation;
- Fire Warden training and evacuation planning, testing and evaluation;
- First Aid Training;
- Ambulance attendances at sporting and other community events upon request;
- Emergency roadside telephones monitoring;
- Bushfire and Emergency Services volunteer attendance at appropriate community events throughout the year;
- Fire Brigade attendance at community events throughout the year; and
- School education programs, including pre-school visits to stations.

The Bureau has a large volunteer work force that is community based and community supported.

PREPAREDNESS

Readiness of resources to respond to emergencies, comprising aspects such as operational training, stand-by, resource deployment and disposition. Notifying the public about emergency situations and issuing warnings, collecting information about risks and hazards and developing and testing plans to meet likely disaster or emergency situations and evacuation procedures are all part of preparedness.

It also includes:

- Operational Readiness;
- Hazard and Risk Analysis;
- Pre-Incident Planning; and
- Disaster and Major Emergency Planning.

The nature of emergency service agencies is that currently a very large proportion of time is spent in the readiness phase. This reflects the capability of the service to respond when required and to escalate response, drawing on other agencies, depending on the nature of the incident.

It is not possible to simply activate a response if the capability is not maintained at an appropriate level. Currently response agencies spend on average about 85 – 95% of time in readiness to respond and 5 – 15% of time in response although this varies across agencies and in some cases seasonal impacts.

RESPONSE

Reaction to emergencies such as hazardous substance containment, fire suppression, road accident rescue, pre-hospital paramedic care and transport to hospital, and other emergency situations to reduce the effects on the community of hazardous conditions, actual, imminent or potential.

It includes:

- Ambulance Pre-hospital Care and Transport;
- Aero-medical Rescue Services;
- Fire Suppression;
- Hazardous Substance Emergencies;
- Road Accident Rescue and general rescue Services;
- Salvage Services; and
- Incident Management.

RECOVERY

Return of resources to the preparedness capacity level after emergency situations and the community to a 'safe' condition including:

- Post Incident Management;
- Community Recovery planning and support; and.
- Infrastructure Recovery planning and support.

PERFORMANCE STANDARDS

A number of performance standards have also been established as follows:

- The Fire Brigade's aim in suburban areas is for the first fire fighting appliance to arrive at the scene within 8 minutes of a call being received on 50% of occasions and within 10 minutes on 90% of occasions.

- The Fire Brigade also aims to confine structural fires to the room of origin.
- The Ambulance Service aim in suburban areas is that a paramedic ambulance response in life threatening situations be less than 7 minutes on 50% of occasions and less than 12 minutes on 90% of occasions.
- The ACT Bushfire Service (ACTBS) response parameters vary and are based on the weather conditions, the likely rate of the spread of the fire, the closeness to life and property and the likely damage and it aims to contain bush and grass fires to within 5 hectares in size 90% of the time.
- The Emergency Service volunteers aim to provide a timely response of emergency/rescue teams, support and appropriate equipment when required by other response services.

The ESB reports quarterly on these performance measures to the Legislative Assembly and annually in the Annual Report of the Department of Justice and Community Safety.

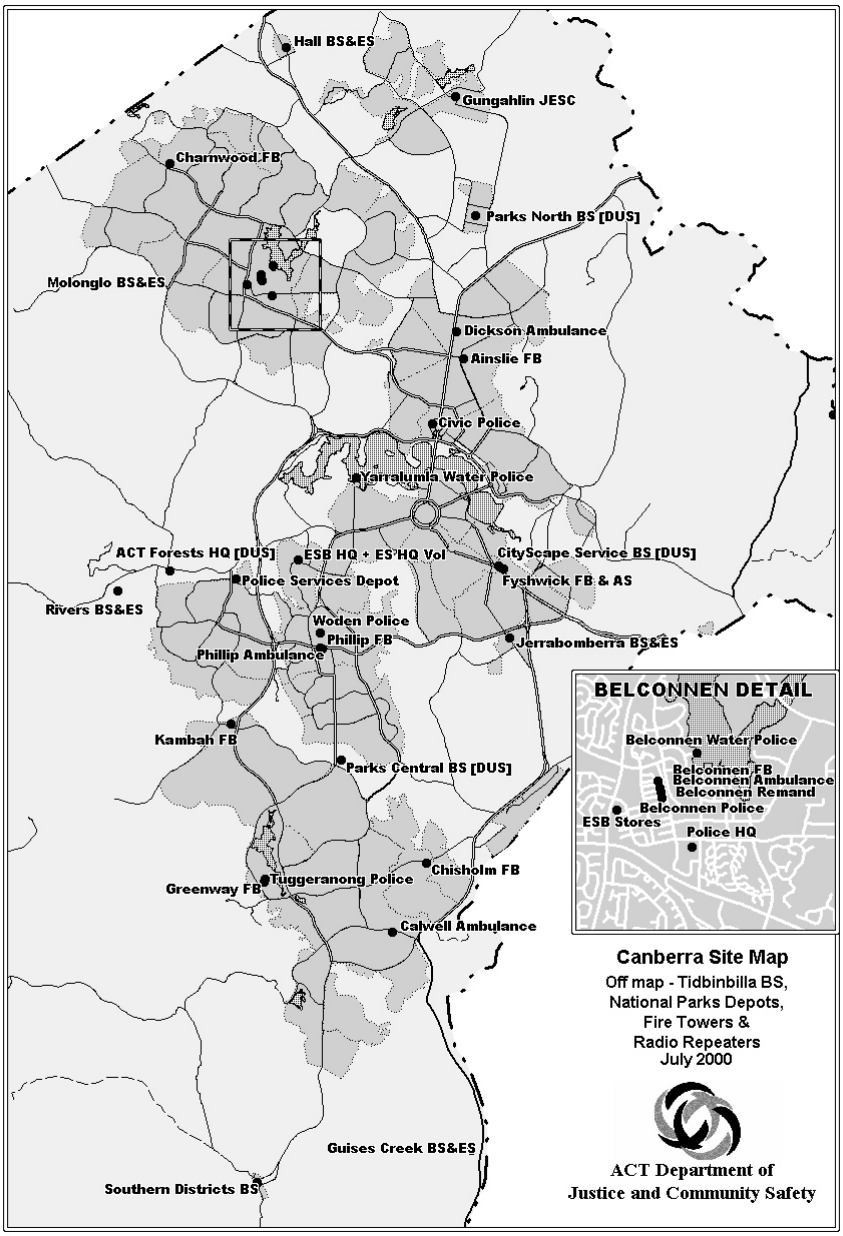


Figure 1: ESB Agencies Operational Stations (includes ACT Policing facilities for complete mixture of emergency facilities but Police are not part of ESB)

ACT AMBULANCE SERVICE

The Service is responsible for the provision of pre-hospital emergency care and transport for the citizens of the ACT which is achieved through the strategic deployment of crews from the various stations around the Territory.

STAFFING

There are approximately 83 paramedics/student paramedics employed under the *Public Sector Management Act (1994)* and 12 management and support staff in the ACTAS. The paramedics/student paramedics are rostered to four work groups who work a shift rota of 2 day 10 hours shift, followed by 2 night 14 hour shifts and then four days off over an 8 week cycle. This shift pattern is known as the 10/14. One crew of 2 paramedics are part of the Snowy Hydro SouthCare Aeromedical Rescue Service who work as a normal stretcher ambulance crew except when they are required for a helicopter mission. Extra crews can be brought in during a crisis by calling the crews on rostered days off into work on overtime. However to maintain such an intense level over an extended period is not sustainable due to fatigue and interstate assistance is generally sought to relieve the ACT staff after a period.

VEHICLES

There are 14 stretcher ambulances and 2 single officer Response Units. In addition there is 1 patient transport vehicle and 1 four-wheel drive stretcher ambulance. The ACTAS also operates the Snowy Hydro SouthCare Aeromedical Rescue helicopter as a joint venture with NSW SouthCare.

STATIONS

There are 4 ambulance stations and 3 joint stations (called JESC's for Joint Emergency Service Centres) housing other emergency services in addition to ambulances. There is also the Snowy Hydro SouthCare base at Symonston.

OPERATIONS

Every crew consists of at least one Intensive Care Paramedic ensuring the highest level of pre-hospital emergency care is available each time a crew responds to an incident. This is a nationally unique feature of the ACTAS and is achievable due to the relatively small geographic size of the ACT.

During 2002 the Service responded to a total of 24 565 incidents representing a 10.3% increase in caseload from the previous year. Response times continued to be the best nationally, as reported by the Productivity Commission in January 2003.

The ACTAS has evolved over many years from provision of basic first aid, through to a comprehensive treatment capability using a considerable number of advanced life support interventions and now the regional provider for aero-medical emergency medical support through the activation of Snowy Hydro SouthCare Aero-Medical Rescue Helicopter. The Helicopter is also shared for other ESB tasks such as aerial surveillance and water bombing during fire emergencies. In addition to the paramedics and student paramedics working from stretcher ambulances the service also operates 2 single officer response vehicles for emergency response to provide treatment but no transport capability and a Patient Transport Vehicle for lower priority transfers (inter-hospital and to/from a medical facility).

The structure of the ACTAS is difficult to place in a typical hierarchy format as the lines are somewhat blurred because of the extremely flat managerial pathways. The management team consists of the Director, three Operational

Managers, Manager Clinical Support, 2 Clinical Support Officers and an Operational Support Officer. Furthermore each member of the Management Team takes a role in overall Ambulance Management on a rotating 'Duty Manager' roster.

ACT FIRE BRIGADE

STAFFING

Currently there are 41 operational firefighters (across a variety of ranks) rostered on duty at any one time. They are rostered to 4 work groups (known as Platoons). The rostered firefighters work the same 10/14 shift rota as other fire and full-time emergency services around Australia. In a crisis extra crews can be called-in on their rostered days off but there is a limit if there are no appliances available for them to operate. Also for protracted events sufficient crews need to be rested to be fresh for subsequent rostered shifts. Again, like other jurisdictions the ACT looks to neighbouring jurisdictions for assistance in crisis to provide relief or additional capacity. Cross border assistance will depend on what level of activity is also occurring in the neighbouring jurisdiction at the time of request.

There are approximately 290 operational uniformed firefighters in ACTFB positions, including uniformed fire fighters in a number of Bureau support functions. Staff in the ACTFB are employed under the *Fire Brigade Administration Act (1974)*.

VEHICLES

The Fire Brigade's primary response vehicles are known as pumpers and provide for a fire fighting capability suited for structural fires and a road rescue capability. There are 9 front line pumpers and 3 spare pumpers all with a purpose built back on a Scania truck chassis. Two of the front line pumpers are designated as heavy rescue and carry heavier rescue/cutting equipment than other pumpers. There are also the following specialist or support vehicles:

Bronto	(Hydraulic Platform) for aerial fire fighting and high level rescue
BA Van	Breathing Apparatus support
Hazmat Vehicle	For hazardous materials response
ESV	Emergency Support Vehicle
2 x 4WD vehicles	For off-road rescue
3 x Tankers	For bulk water and bushfire fighting
2 x Tankers and 4 x Light Units	From the Bushfire Service for bushfire fighting capability

STATIONS

There are 9 fire stations (three co-located in joint emergency service centres (JESC) with other emergency services) located throughout the urban area. Each station has a pumper but in some cases also have one or more of the specialist/support vehicles located there and some are cross-crewed by the same single crew at the station.

OPERATIONS

The ACTFB is responsible for all structural fires within the ACT, various rescue functions including, road accident rescue, and vertical rescues from structures, confined space rescues, rescues of an industrial nature and animal rescues. Further, under the ACT hazardous materials spillage sub-plan, hazardous material spillages and incidents of chemical, biological and radiological incidents in the ACT are also the responsibility of the Brigade.

Most structures in the ACT are located in the built-up area, but there are scattered rural residences and a few remote villages (Hall, Tharwa) in that, whilst also being the responsibility of the ACTFB in the case of structural fire, are outside the recognised 'standards of response' catchment area.

The 'standards of response' are predicated on both time-to-intervention and weight of attack principles that see a minimum of 4 fully trained and equipped fire-fighters (per pumper) crew the 9 urban pumpers. The number of pumpers responded to an incident will depend on the nature of the incident and information provided by the caller but the normal initial response to a house fire is 2 pumpers. The number of appliances can then be increased according to on-scene reports and the number of pumpers and crews responded is generally referred to as 'weight of attack'. This weight of attack provides effective fire fighting operations and also provides for fire-fighter safety in an emergency. Other specialty functions are spread across the various stations (eg. hazardous materials, vertical rescue etc).

The ACTFB is recognised as a diverse fire service with its staff being multi-skilled and trained in many facets of emergency operations. A staffing arrangement within the ACT is that firefighters 'cross-crew' some bushfire tankers and other support vehicles, rather than crewing those appliances on a full time basis, which provides greater flexibility in the way crews are able to respond depending on the nature of the emergency.

To support the operations of the ACTBS, the ACTFB provides initial response to grass and bushfires outside of the prescribed bushfire period when the Bushfire Service does not have any crews 'stood-up' (i.e. available immediately to respond), and also maintains total responsibility for all grass and bushfires inside the *'Gazetted Built-Up Area'*. Response capability is managed through the Fire Brigade operations section and is maintained on a 24/7 (twenty four hours a day, seven days a week) basis by the rostered firefighting staff. Each shift is managed and supervised by a District Officer who is responsible for the day-to-day command and incident control functions of the 9 stations and crews. A number of Brigade personnel undertake administrative functions for the ACTFB at the HQ building at North Curtin. The roles are predominantly to support the Brigade Operations section and the Fire Safety Section where officers provide a consultation and inspectorial function. This is to ensure adequate fire and life safety provisions for both the public and fire fighters under the Building Code of Australia and to ensure that relevant Australian Standards are maintained within premises.

The ACTFB is subject to the *ACT Fire Brigade Act (1957)* which authorises the Fire Commissioner to deal with fires in the 'built up area', road accident rescues and other emergencies.

ACT BUSHFIRE SERVICE AND ACT EMERGENCY SERVICE MANAGEMENT STRUCTURE

The dual management role of the ACT Bushfire and Emergency Services developed from a recognition of the obvious synergy that could be achieved from the combination of what originally were two largely volunteer agencies. The Director of those two services has dual roles as the Chief Fire Control Officer (CFCO) of the Bushfire Service as defined by the *Bushfire Act*, and as the Director of the Territory Emergency Service under the *Emergency Management Act.*

The Headquarters (HQ) staff are the only full-time staff responsible for managing and supporting the Bushfire Service and the Emergency Service. HQ staff comprise the Director, an Operations Officer, Logistics Coordinator, Volunteer Support Officer, Logistics Support Officer and clerical support staff. The Operations Officer, and Logistics Coordinator perform the functions of Duty Coordinator for the two services on a rotating roster basis. The HQ operations staff form members of HQ Brigade.

This management structure is responsible for the management of the services, operation command, provision of facilities and acquisition and deployment of equipment for the two Services. It should be noted that all the equipment needs of the two services are met by funds provided by the ACT

Government. In most other jurisdictions, units are obliged to undertake fundraising to provide some of their equipment needs.

ACT BUSHFIRE SERVICE

STAFFING

There are approximately 600 bushfire volunteers comprising the Bushfire Service with approximately 450 of those actively available for operations. The volunteers are 'called in' when required but often during the designated bushfire season many volunteers make themselves immediately available for response by 'standing up' at the volunteer station locations. The volunteers are organised into nine volunteer brigades.

In addition to the volunteer bushfire fighters the Land Management Agencies in DUS have approximately 120 staff who, in addition to their primary employment functions as rangers, foresters etc, are trained in bushfire fighting. These 'departmental staff' from ACT Forests, Canberra Urban Parks and Places and Environment ACT are organised for Bushfire Service purposes into two Brigades (Forests and Parks Brigades).

VEHICLES

The Bushfire Service has a total of 22 tankers, 23 light units and 12 command and support vehicles. ACT Forests Brigade is provided with 2 tankers and 2 light unit backs by the Bushfire Service and has about 5 extra firefighting/command units of their own. Also Parks Brigade is provided with 4 tankers and 5 light units by the Bushfire Service and has about 6 extra firefighting/command units of their own. In addition 2 tankers and 4 light units are located at Fire Brigade stations and cross-crewed by ACTFB firefighters. The remainder of the vehicles are located with the volunteer brigades.

The Bushfire Service also contracts a light helicopter from Heli-Aust Pty Ltd for a twelve-week period each bushfire season. This helicopter is used for initial reconnaissance of remote fire, aerial observations and water bombing using a 400 litre bucket.

STATIONS

There are 7 volunteer joint stations (with the ACTES), 2 volunteer Bushfire Service only stations and a number of locations for the Forests and Parks Brigades. The volunteer stations are Headquarters, Hall, Molonglo (located at Higgins), Rivers (located on Cotter Road near Mt Stromlo), Jerrabomberra (located at Symonston), Gungahlin, Guises Creek, Southern Districts (located at Tharwa) and Tidbinbilla. The helicopter operates from the Weston Creek, Australian Federal Police complex during the contracted period.

In addition to stations there are 4 observation towers located at One Tree Hill (behind Hall), Mt Coree, Mt Tennent and Kowen. Contractors staff these towers during daylight hours for different periods depending on the forecast danger rating in the bushfire season. The role of these observers is to report any smoke/fire that occurs.

OPERATIONS

The *Bushfire Act* requires the compilation of the *Rural Fire Control Manual* which sets out in some detail the arrangements under which rural fire control will be carried out. The Territory is a single fire district for the purpose of the Bushfire Service.

It is important to understand that it is the responsibility of the CFCO to fight a bushfire once it has started. When a bushfire is occurring the CFCO has significant statutory powers to allow him to fight and suppress the bushfire regardless of land tenure.

It is the responsibility of land managers and owners to maintain their land so as to minimise the risk of a bushfire being sustained including taking the appropriate fuel management measures. The CFCO can and does provide advice to land managers and owners on the necessity for fuel management and suggested appropriate measures that could be adopted with bushfire prevention and mitigation in mind. However the challenge for the land managers is the need to consider bushfire hazard in the context of the whole biodiversity and timber production objectives of the land they are managing.

ACT EMERGENCY SERVICE

STAFFING

Apart from the management and support staff of the HQ of the Bushfire and Emergency Services, the ACTES is staffed totally by volunteers. There are approximately 250 members of the Emergency Service of whom approximately 150 are active and available for operations.

VEHICLES

The Emergency Service has 6 land cruiser troop carrier type vehicles and approximately 15 special purpose trailers. There are trailers for storm damage, catering, helicopter operations support, lighting, and mass casualty support. In addition there is a Forward Communications Unit and trailer.

STATIONS

There are 6 volunteer joint stations – Hall, Molonglo (located at Higgins), Gungahlin, Rivers (located on Cotter Road near Mt Stromlo), Jerrabomberra (located at Symonston) and Guises Creek. There is also a joint HQ volunteer brigade located at ESB HQ, Curtin.

OPERATIONS

The ACTES is predominately an emergency support agency and not generally a primary response service. In addition to supporting ESB agencies they undertake significant support operations for Police in such capacity as forensic and bush searches. A number of Emergency Service volunteers are also trained as air observers and are used by the Australian Search and Rescue organisation in assisting for searches of missing aircraft or missing bushwalkers. A significant role for Emergency Service volunteers is in callouts to assist the community in recovering from storm damage. With severe weather warnings the Emergency Service is often placed on 'stand by' at the stations to be available for response if damage occurs.

Logistics support to many types of operations is a key function of the Emergency Service. Also the joint HQ Brigade provides support to the operations centre at Curtin, assists in coordinating the logistics function in major operations and deploys the Forward Communications Unit into the field when required.

During 2002 many of the Emergency Service personnel received further training in the Incident Management System to allow them to undertake support functions during major operations.

EMERGENCY SERVICES BUREAU SUPPORT FUNCTIONS

COMMUNICATIONS UNIT

The ESB operates a single joint communications centre (COMCEN) for all four emergency services. The COMCEN receives all the '000' emergency calls except those for Police. Four ACTFB and two Ambulance Service operators staff the COMCEN on the same 10/14 rotating staff basis as the operational crews. This arrangement provides for the Fire Brigade staff to manage call-taking and then dispatch of response crews from ACTBS, ACTES and the ACTFB. The Ambulance COMCEN staff manage the call taking and then dispatch of ambulance crews. Depending on the bushfire danger ratings for each day in the bushfire season the staffing complement may be supplemented by up to two additional Fire Brigade operators.

The communications function includes substantial radio networks to allow the tasking of operational crews and field reporting from incident scenes and by Bushfire Service observation towers. Snowy Hydro SouthCare helicopter and the contracted Bushfire Service helicopters can communicate using the ESB radio system. The ESB radio systems are:

- Bushfire and Emergency Services on mid band Very High Frequency (VHF) (around 78 Mhz);
- Ambulance Service on Ultra High Frequency (UHF) low band (around 403 Mhz); and

- Fire Brigade – Ultra High mid band (around 468 Mhz).

The Bushfire and Emergency Services use VHF as this wavelength is considered better in rural/rough terrain. The Fire Brigade uses UHF as that wavelength is considered best for use in urban areas. Even so there are still communications "black spots" both within the urban area and in the rural areas to the west of Canberra. These "black spots" can move from day to day due to variables such as weather and atmospheric conditions. It needs to be understood that 'black spots' will continue to exist irrespective of the nature and modernity of the radio system employed.

The current system is beginning to "age" and a project exists to replace it (see page 152 of this Submission). The new radio system will have a division of voice and data traffic to reduce congestion caused by the volume of voice only traffic.

To improve cross agency communications, each Fire Brigade pumper has a VHF radio installed as well as the primary UHF Fire Brigade radio. This arrangement permits direct radio communication between ACT Bushfire units, and urban fire appliances. In addition command vehicles across the services have a UHF radio and a VHF radio.

Currently, there are differences in the call-taking and dispatch systems for the various services. To some extent, these reflect the different call out arrangements (e.g. full-time Fire Brigade staff, and bushfire volunteers) and either service characteristics. COMCEN technology has been under review for some time and preliminary funding to prepare to introduce the latest

generation computer aided dispatch system was provided in 2001/2002 Budget. A tender by Fujitsu for a new system was accepted on 14 January 2003 (cost: approx $3m). A separate project for a new radio communications system is also underway with preliminary funding provided in 2002/2003. An expert report and business case is close to completion. The cost of a complete radio upgrade will exceed $20m as it will also include the Land Management Agencies due to their involvement in the ACTBS.

The radio communications and operational Information Technology (IT) systems are supported by staff in a technical support section which reports to the Director, Ambulance who is responsible to the Executive Director for this Bureau operational support function.

RISK MANAGEMENT UNIT

Risk Management is a key element to prevention/mitigation, preparedness and response aspects of Emergency Management. 'All Hazards' analysis with risk assessments of likelihood and consequences of emergencies leading to pre-event preparation and mitigation are crucial requirements for contemporary emergency services to continually update their service delivery. It also leads to identification of community education measures and options for response strategies for different types of emergencies. During response operations the staff with risk management skills are ideally suited to provide the Planning function in the Incident Control System (ICS) adopted by all ESB agencies. Community Education and Awareness programs for emergency preparedness also provide a feedback mechanism to update risk assessments and refine emergency management processes.

Following similar organisational models of emergency services in other jurisdictions, ESB had formed a Risk Management Unit (RMU), but on an embryonic scale compared to other jurisdictions, due to competing staffing requirements.

Currently there are 3 staff in the RMU with the Acting Manager also having the technical spatial information skills and the overall planning functions responsibility. This unit reports to the ACTFB Fire Commissioner who is responsible to the Executive Director for this Bureau operational support function.

REGIONAL SUPPORT SERVICES UNIT

This Bureau portfolio unit is responsible for managing the repair and maintenance function for all the response agencies. It has responsibility for the ESB Workshop which is located at the Kambah JESC (Fire Brigade and Ambulance Stations) and manages a variety of technical and mechanical support contracts. The mechanics from the workshop operate on an on-call roster system to provide technical and mechanical breakdown service during incidents if required. This unit has ACTFB staff undertaking the managerial functions with a total of 9 staff in the unit reporting to the Director, bushfire and emergency Services who is responsible to the Executive Director for this Bureau operational support function.

STAFF DEVELOPMENT AND TRAINING UNIT

This Bureau portfolio unit is responsible for managing the training and education functions of the ACTBS, ACTES and the ACTFB and for all the administrative and technical support staff in the Bureau.

In addition it is responsible for ensuring compliance with the ESB's obligations as a Registered Training Organisation are maintained for all four operational services and any other non-endorsed courses provided within the whole ESB. The major tasks are the introduction of competency based training and assessment framework across all agencies. Managerial responsibility is undertaken by ACTFB staff reporting to the ACTFB, Fire Commissioner who is responsible to the Executive Director for this Bureau support function.

COMMAND AND CONTROL

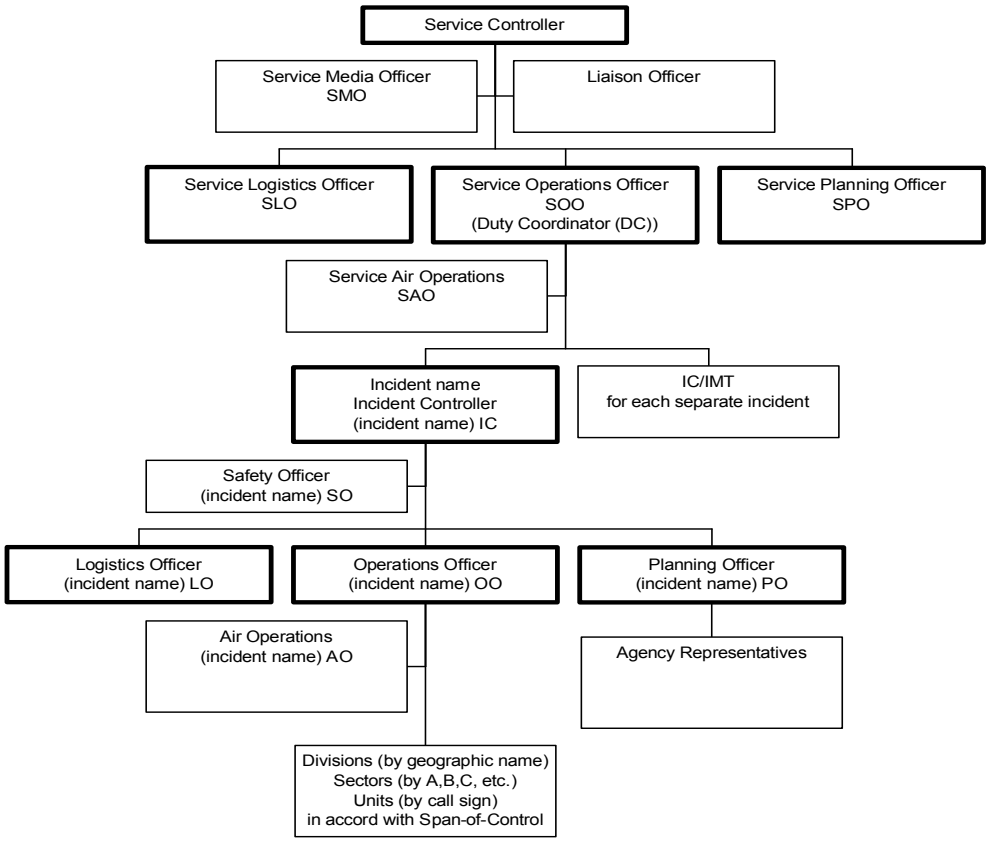
Command and control within an agency such as ESB is fundamental to the way it operates. Key responsibilities and powers are derived from various pieces of legislation under which services operate and are underpinned by Administrative Arrangement Orders which provide government accountability frameworks.

A fine balance needs to be maintained so that the administrative, legislative and governmental framework does not adversely affect the command and control arrangements which underpin effective emergency management arrangements. In brief the ESB does not control the day-to-day decisions on operational response. This is the responsibility of the respective response agencies and, in turn, of the individual officers who have decision making responsibility on the incident scene.

The Services within ESB use the Incident Control System (ICS) component of the Australian Inter-Service Incident Management System (AIIMS), as their basis for incident management.

The ICS is a structured system which is designed to ensure that all vital management and information functions are adequately performed. ICS is divided into four functional area:- Control, Operations, Planning and Logistics.

Operational Structure Chart



The diagram above shows the hierarchical implementation of the ICS principles used by the Services. The overall management is by the Chief Officer who operate through the Service Management Team (SMT). Each incident is allocated a separate Incident Management Team (IMT) which reports to the SMT. This affords both flexibility and accountability. Smaller events may have one person performing more than one role and hence not every incident will necessarily have separate personnel performing each of the four functions. The scale, complexity and priority of effort may dictate the allocation of staff to the various functions.

For bushfire suppression in the ACT, regardless of land tenure, the control, command and coordination functions are centralised into the Bushfire Service under the management of the Chief Fire Control Officer. This arrangement is unique to the ACT and has proven to be very effective in combating major incidents. This bushfire control arrangement have proven to be very successful due to the small geographic size of the ACT, the lack of defined land management boundaries, the separation of land management agencies and fire authorities across various government departments, and the efficiencies of a single detection system, communication system, training standard, equipment resource standard and incident management system.

During the January 2003 fires the Chief Fire Control Officer (CFCO) assumed control of all bushfire operations, and established an SMT which then assisted with the overall control of the various fires and all available resources. The CFCO and the SMT operated out of the Emergency Operations Centre, at Curtin, from where operational, planning and logistical support and direction was provided to the incident management teams in the field.

In the ACT, an officer from the ACTBS is appointed as the incident controller for each bushfire within its area of jurisdiction. The Incident Controller is responsible for developing the incident control objectives and for managing the resources assigned to their incident. They may request that additional resources be assigned to assist with managing the incident in the field. ACTBS officers were appointed as the Incident Controller for each of the lightning strike fires within the ACT except the Mt Gingera fire, which was managed as part of the Stockyard Spur fire.

In practice, the level of resourcing will alter throughout the incident and daily cycles. As with the management of any emergency, resources will be continually assigned early in the life of an incident until there are sufficient resources to control the event or available resources are depleted. Once a management structure has been successfully installed, resource allocation must reflect daily demands: peaks during shift changes and planning for shift changes, peaks during the maxima in forecast fire danger, reduced personnel for night shifts and changing priorities across the Territory depending on other fires or emergency incidents.

During the initial response phase of a bushfire incident, the Duty Coordinator appoints an Incident Controller who may perform all of the above functions. As the incident grows and the management functions become more demanding the functions of operations, planning and logistics are delegated and the SMT grows to support field operations.

The two main principles on which the ICS is based are:

- Management by objective, and
- Span of control.

Management by objectives in operations is a process of consultative management where the management team determines the desired outcomes of the incident and communicates those objectives to the personnel involved. Span of control is a concept that relates to the number of groups or individuals that one person can successfully and safely supervise. For ACT bushfire

operations this is 1:5 as a general principle, there is 1 officer for every 5 fire fighting units or one officer for every 5 people in a team.

The ACTBS uses the ICS as its Incident Management System (IMS) because it is designed to develop from the time an incident occurs until the requirement for management no longer exists. The structure of ICS is flexible and once established it can be expanded or varied in accordance with the changing conditions or complexity of the incident.

During the January 2003 fires each of the functional components of the SMT located at Curtin had numerous people assigned to them to assist with the various functions. For example, Planning Section included situation reporting, incident action planning, fire behaviour experts, mapping, and technical specialists (eg weather forecasting and Geographic Information Systems (GIS)), and information management. Logistics Section included supply coordination, people management, aircraft support, catering and servicing of resources. The Operations Section included air operations and resource deployment and other agency liaison officers. The Service Controller was responsible for the coordination of the SMT and its resources, and the control of all available resources to manage all the various bushfire events. The ICS formed the basic mechanism which allows personnel to be added effectively as the scale of events grew during the January fires. Skills strategies became evident in some specialists areas, but ICS proved durability and effective under extreme pressure.

EMERGENCY MANAGEMENT FUNCTION

THE EMERGENCY MANAGEMENT ACT 1999

The Emergency Management Act 1999 (the Act) provides the legislative basis for emergency management within the Australian Capital Territory (ACT). The Act outlines the provisions for ensuring effective emergency management arrangements, including prevention/mitigation, preparedness, response and recovery aspects. The Executive Director of ESB is also the Executive Director responsible for Emergency Management as mentioned in the Act. The Act also provides a legislative basis for the establishment, roles and responsibilities, and operations of the ACTAS and the ACT Emergency Service.

THE EMERGENCY MANAGEMENT COMMITTEE

The Emergency Management Committee comprises the Chief Police Officer for the ACT, Australian Federal Police (Chair); Executive Director, ACTESB; Chief Health Officer; agency heads from the ACTFB, ACTBS, ACTAS and ACTES; and other representatives appointed by the Minister from appropriate government and other agencies. The Director, ACT Bushfire and Emergency Services, is also the Executive Officer for the Committee and provides administrative assistance for the Executive Director to the Committee through the Emergency Management Support Officer.

The ACT Emergency Management Committee is responsible for enhancing emergency management capabilities, reducing community vulnerability to the effects of emergencies, and improving community awareness and training to deal with emergency management matters. The Committee is also

responsible for maintaining the ACT Emergency Plan, directing the activities of planning sub-committees, preparing and conducting exercises to test the ACT Emergency Plan and Sub-Plans, and advising the Minister on emergency management matters. The Committee has the function of supporting the Executive Director in his responsibility for Emergency Management. This Committee meets every six weeks and reviews plans, arrangements and coordination priorities.

THE ACT EMERGENCY PLAN

The ACT Emergency Plan formalises and explains the management arrangements for handling emergencies in the ACT through an 'all hazards and all agencies' approach to planning. The Plan also provides the framework for Civil Defence arrangements. The ACT Emergency Plan is supported by a number of sub-plans, including Community Recovery, Infrastructure Recovery, Health Emergency, Flood Management, Hazardous Materials, Major Systemic Technology Failure, Animal Disease Emergency, and the Canberra International Airport Emergency Plan.

The Act permits the Minister, if certain conditions are satisfied, to declare a State of Emergency. Once a declaration is made, the Territory Controller (Chief Police Officer for the ACT, Australian Federal Police) becomes responsible for controlling emergency operations and is assisted by a Management Executive. The Management Executive comprises the Territory Controller (Chairperson), members of the ACT Emergency Management Committee, and other advisers as appropriate.

Because of the unique nature of the ACT ('city state' and 'seat of Federal Government'), almost all major emergencies in the Territory are multi-agency and multi-jurisdictional. If the Chief Minister declares a state of emergency, the ACT Emergency Plan is automatically activated and the Territory Controller is assigned relevant functions and powers by the responsible Minister. The Territory Controller is then responsible for taking all action necessary to manage the emergency. There is provision for the appointment of an Alternate Controller, with the approval of the Minister.

Emergency response is coordinated from the Territory Emergency Operations Centre (TEOC), also referred to as the Territory Government Coordination Centre, which is designated as being in the Winchester Police Operations Centre. An alternative operations centre is located at ESB. Participants in the ACT Emergency Plan are grouped into Functional Services, each under the control of a Functional Services Coordinator, eg. Medical and Health Services, Community Recovery, Infrastructure Recovery. A Field Controller(s) is appointed by the Territory Controller to control the tasking of agencies and the coordination of resources assigned to their designated emergency area(s) if required.

COMMONWEALTH ASSISTANCE

The Executive Director, ESB is the ACT designated person authorised to request Commonwealth assistance through EMA arrangements. The first request by the Executive Director for Commonwealth assistance was made at 2030 hours on 12 January 2003 for four military helicopters to assist with aerial water bombing and reconnaissance tasks, and for four Army bulldozers

to assist in the constructing of firebreaks. The request was agreed to by the Federal Attorney General.

Over the following 22 days significant Defence Force resources provided substantial assistance in the fire fighting, preparedness for the ongoing bushfire threats and recovery efforts. The assistance included Navy helicopters, Army engineers with bulldozers, graders, water tankers, a RAAF fuel tanker and a number of logistics and operations experienced personnel. The request procedure was very efficient and effective and facilitation was even more streamlined with the deployment of an EMA Liaison Officer to ESB HQ.

CO-OPERATIVE ARRANGEMENTS FOR BUSHFIRE MANAGEMENT

ACT INTER-AGENCY ARRANGEMENTS

A number of information sharing and operational coordination forums exists covering bushfire arrangements between the Bushfire Service and other ACT agencies. These include:

- Fire Controllers Group (meet every 6 weeks)
- Land Managers Fire Liaison Group (meet every 6 weeks)
- Bushfire Fuel Management Committee (meet as required)
- Bush Fire Council (meet 12 times a year)
- Emergency Management Committee (meet every 6 weeks but bushfire matters as appropriate)
- Senior Officers Meetings (meet before and during the bushfire danger period)

- Pre-season workshop (addresses any specific new arrangements and reviews coordination aspects as well as briefing members of all agencies on the specific season outlook)
- Various specific purpose committees that consider matters such as:
    - Standard Operating Procedures reviews
    - Bushfire tanker design
    - Bushfire tanker tender evaluation as appropriate
- ACT Bushfire Service Training Officers meetings (meet 2 or 3 times a year)
- OH&S representatives meetings (meet 2 or 3 times a year)
- Bushfire Service meetings with local Bureau of Meteorology (pre and post bushfire season meetings)
- Ad hoc meetings with ACT Planning and Land Management (as required)
- Volunteer Brigade Annual General Meetings (9 Brigades meetings)
- Volunteer Brigades Association meetings (meet every 6 weeks)

In addition to the above forums there are two formal Memorandum of Understanding (MOU) between land management agencies and the Bushfire Service that detail specific interagency cooperation and service delivery arrangements. They are:

- Land Management Agency and Bushfire Service Cooperative Arrangements.
- Access by the Bushfire Service to Land Management Agency areas of management (still in draft form)

INTERSTATE AND NATIONAL ARRANGEMENTS

A number of information sharing and operational coordination forums also exists covering bushfire arrangements between the ACT Bushfire Service and interstate agencies. Some of these forums focus on the cross-border assistance arrangements in the immediate surrounding region and some have a broader information sharing function as they are national forums of like agencies. The various forums include:

- Yarrowlumla/Queanbeyan Bushfire Management Committee (meet every 3 months)
- Snowy River and District Bushfire Management Committee (meet every 3 months)
- Pre and post season Board of Management/fire agency meetings (meet 2 or 3 times a year)
- Meetings with NSW National Parks and Wildlife Service (meet as required)
- Australasian Fire Authorities Council (AFAC) (2 meetings per year) and the following sub-group meetings:
- Operations Services Strategy Group (2 meetings per year)
- Rural and Land Management Sub-Group (2 meeting per year)
- Urban Sub-Group (bushfire interface matters as appropriate)
- Community Safety Strategy Group (bushfire matters as appropriate)
- National Aerial Firefighting Working Group (meet as required)

In addition to the above forums there is a Cross-Border agreement with NSW National Parks and Wildlife Service for operational arrangements. This agreement is titled ‘NSW National Parks and Wildlife Service and ACT

Bushfire Service Operational Agreement'. There has been more recent discussion with the NSW Rural Fire Service to formalise some of the cross-border arrangements between the two bushfire agencies. Such an MOU is likely to cover such matters as access to NSW aerial firefighting resources, training opportunities and communications inter-operability.

BUSHFIRE MANAGEMENT: FIGHTING A TYPICAL BUSHFIRE

There is some degree of predictability about possible bushfire behaviour and the likely bushfire fighting capability requirements on any given day. This is due mainly to the relationship between fuel moisture content and the weather forecast for the day. These two factors can indicate the type of fire behaviour one could expect in certain bushfire fuel types, which in turn, can assist in determining the weight of the likely initial response needed.

A fire danger rating for each day is based on the fire weather forecast which is received at ESB twice daily. From that forecast an assessment is made about the level of readiness for a particular day, bush firefighting resources placed on stand-by and bushfire detection towers staffed. Different environments can have different bushfire behaviours and can therefore require a different response capability. For example, a pine plantation is different to a eucalypt forest, which is again different to a grassland area. Grassland types can also differ eg native grassland, improved pastoral grassland or irrigated paddock. Each different fuel type will have different fire behaviour characteristics which will affect the nature of response depending on the fuel moisture and weather conditions at the time. However, for the sake of simplicity, the Bushfire

Service maintains one level of readiness for the forecast day and has one standard weight of response for that level of readiness regardless of fuel type.

LEVELS OF READINESS

There are six levels of bushfire danger used in the ACT and each level has an associated colour code. The levels of readiness are:

Colour Code	Bushfire Danger
Nil:	Nil
Green:	Low
Blue:	Moderate
Yellow:	High
Orange:	Very High
Red:	Extreme

On any given day, the level of readiness is supported by a fire tower detection and reporting system. Before the start of each bushfire season a readiness chart is established, which shows what resources are on stand-by and available for immediate response. This chart will indicate such things as what resources staffed by ACT Forests, Parks and Conservation and Canberra Urban Parks and Places are on standby, for what duration and their location for the higher level of readiness. Other rostered people resources are also utilised through an On-Call Roster Chart, which includes the availability of the 9 key officers (who is on-duty, who is on second call and who is not on call) for any given week and who is absent from Canberra).

Remains of the Mount Coree Fire Tower after the January 2003 Bushfires.

Standard Operating Procedures (SOP) support the response and management arrangements and are used as a set of organisational directives to establish a standard course of action. SOP's are written, authorised, enforced and integrated into management practice.

LEVEL OF RESPONSE

For each level of readiness, there exists a 'weight of response'. If the level of readiness is Green, the normal response is 1 tanker and 1 light unit. If the level of readiness is red, three tankers and three light tankers respond to every new incident. These different response levels are determined by the bushfire's possible potential to grow, difficulty of control and its potential impact. Bushfires can spread very rapidly and in extreme fire weather conditions there is generally a very short period of time before the bushfire reaches a steady rate of growth after which control can become difficult. Therefore more resources are sent in the first instance to not only attempt to

keep the bushfire small but to also be on hand should the bushfire not be contained by the first arriving units. Standard Operating Procedure (SOP) No7, Weight of Response, describes the weight of response for each level of readiness.

Heavy Water Tanker

Light Unit conducting a direct attack from a road.

Within the ACT the manner in which bushfire response is approached is identical to just about every bushfire and land management agency in Australia, being that of:

- quick detection;
- quick response; and
- quick knock down

The small fires are the desired outcome. They are often not the subject of media attention because such bushfires are detected early, responded to and knocked down often before anybody has noticed that there is a bushfire apart from those who reported it.

Forward Communication Unit

DETECTION OF A BUSHFIRE

In the ACT, fire towers are the primary means of bushfire detection. The four towers are located at Kowen Pine Plantation, which is to the north east of the airport, Mount Tennent situated south of Tharwa, Mount Coree to the west and One Tree Hill which is to the north of Hall. Except for the tower on Mount Tennent, all the others are on the NSW/ACT border. All towers provide good 360-degree vision and triangulation can occur between towers.

Staffing the fire towers depends on the level of readiness for a particular day. For example, at a Green level of readiness, only 2 towers operate at One Tree Hill and Kowen. At Blue level of readiness, there are 3 towers operational and from Yellow through to Orange and Red, all 4 towers operate. Fire Tower Operators are trained observers who complete a Fire Observation Training Course. A significant number of Fire Tower Operators have been engaged in this capacity for a number of years and hence are very experienced and extremely accurate in reporting the location of smoke.

Other than fire detection duties the Fire Tower Operators are not required to perform other tasks whilst in the towers, aside from collecting weather information on the hour, every hour, and reporting those weather observations to ESB COMCEN.

Smoke from Stockyard Spur 10.00am 9 January 2003

The weather reports provided by the tower operators include the identification of their tower, visibility, dry bulb temperature, wet bulb temperature, humidity, wind direction and wind speed. These hourly reports are logged by ESB COMCEN in hard copy. This information is also reflected on the bushfire deployment board. This means that anyone entering the operation room can immediately observe the latest wind directions and strengths as reported from the towers.

If a Fire Tower is making a routine call, that call will be prefaced by the colour *yellow* (SOP No 29). If a Fire Tower is providing an update on a previous report such as the build up of smoke, it will be prefaced by the colour *blue*. A radio call prefaced by the colour *white* is the highest priority and it is usually an indication that there is a new incident.

RESPONSE TO FIRE REPORT

Scenario: Assume a theoretical lightning strike in the mountain ranges west of Canberra during the bushfire danger period and while stand-by arrangements are at Yellow (high bushfire danger) readiness. Events may then evolve as follows:

1. The fire tower operators report the storm and lightning activity to COMCEN giving bearing from the tower, number of lightning strikes observed and whether there was any rain activity associated with the storm.
2. There is no rain and one lightning strike has started a bushfire.
3. The fire tower operator would make a WHITE call (SOP No 29) to COMCEN and report a smoke sighting by transceiver radio giving compass bearing and the estimate of distance from the tower. Other relevant information, eg. whether the smoke was building, the colour of the smoke, the location of the bushfire and the type of fuel the bushfire was in, eg. pine, native forest, grassland.
4. Other fire tower operators would hear the report and try to find the smoke to give cross bearings from their location.
5. The COMCEN operator would use the bearings to plot the bushfire location on the deployment map. In this example we will assume that the fire reports place the fire, in a remote area of Namadgi National Park.
6. With a YELLOW readiness the COMCEN operator would deploy (as per SOP No 8) the nearest appropriate units (SOP No 4) for a YELLOW weight of response, which is 2 tankers and 2 light units (SOP No 7).

7. The COMCEN operator would then notify the Duty Coordinator and advise them of the fire report and the action taken so far (SOP No 2).
8. Because the fire report is for a fire in a remote area and it could be some time before the units arrive at the fire the Duty Coordinator would direct COMCEN to dispatch the helicopter (Firebird 7) with an observer to locate and report on the fire's precise location and behaviour.
9. In this example because of the remoteness it is most likely that the helicopter would arrive at the fire first. The helicopter observer would report back to COMCEN the exact location by use of the helicopter's Global Positioning System (GPS), any information about the fire and give advice about best access for ground resources, etc. (SOP No 12).
10. If an appropriate near-by water resource was available the helicopter might then commence aerial water bombing to retard the fire's growth until ground resources arrive or, it may be tasked to patrol the area and report any other lightning strike fires. This is the Duty Coordinator's decision and depends on the amount of lightning activity experienced over the whole of the ACT at the time and any advice back from the helicopter.
11. Based on the advice from the helicopter observer, the Duty Coordinator would appoint an Incident Controller for the fire, give the fire a name and request the COMCEN operator to dispatch additional resources if required.
12. The Duty Coordinator would provide to the Incident Controller, usually by radio through the COMCEN operator, all known information about the fire and about the resources that have been deployed.

13. The Duty Coordinator would then bring together the Service Management Team to support and coordinate the on-going Bushfire Service response to the fire.
14. The Duty Coordinator would also contact the relevant Government Land Management Agency Representative (SOP No 22) and advise them of the fire's location, action taken so far and request any information that could assist in the response to the fire. The Agency Representative's role is defined in SOP No 17.
15. Once the Incident Controller has arrived at the fire and is able to give a situation report the Incident Controller assumes responsibility for the determination of containment objectives, incident management team structure, sectorising and resource tasking and all further resource requests. The Incident Management Team is established in accordance with SOP No 14.
16. The Service Management Team continues to operate by responding to requests, providing weather and planning advice and making recommendations to support the Incident Controller.
17. Should the incident escalate then so does the incident management and the service management teams as appropriate. Other considerations may then come into operation such as staging area management (SOP No 39), briefing arrangements (SOP No 40), Forward Communications Unit deployment (SOP No 20), Planning Section arrangements (SOP No 15), Liaison Officer arrangements (SOP No 18) and Changeover of personnel at the incident (SOP No 23).

TYPES OF ATTACK

There are three main methods of bushfire control: direct attack on the burning edge; parallel attack by constructing a fireline close by and parallel to the fire edge; and indirect attack by locating control lines a considerable distance from the fire edge and burning out all intervening fuel.

Direct attack, as the name implies, is the suppression of the actively burning fire edge. Direct attack involves suppressing flames by cooling the fuel with water or scraping a line down to mineral earth completely around the fire edge.

Parallel attack is used whenever rate of spread of the fire edge is slow but the fire is too intense for direct attack or when the fire edge is so irregular that direct attack would result in excessive length of mineral earth line. In parallel attack a fireline is constructed as near to the fire edge as possible while still allowing crew safety and ensuring that the line can be completed before the arrival of the fire.

Indirect attack is used when the fire is too intense for safe use of any other method. In indirect attack the firefighting force is withdrawn to roads, trails, fuelbreaks, or natural barriers some distance from the fire edge and all fuel within this connected network making up the containment line which is then burned out by backburning and other burning out methods.

PREPARATION AND PLANNING FOR THE 2003 BUSHFIRE SEASON

GENERAL

Following the significant bushfires that occurred in Canberra at Christmas 2001, debriefings occurred at a number of levels to fine tune response arrangements and preparedness measures. A strategic debrief was held by the Emergency Management Committee including other key parties. In addition the Bushfire Service conducted an operational level debriefing involving various response and supporting agencies/functions. Each of these debriefings identified aspects/improvements that were progressively addressed over the following 12 months to improve the ACT preparedness for large-scale emergencies and for specific bushfire events. Some of those aspects relevant to the bushfire emergency in January 2003 are outlined in this section.

In addition to aspects arising from the 2001 bushfires, the ACTES prepared for the 2002/2003 bushfire season in the same way it has prepared for each bushfire season. Additionally there was an understanding of the *El Nino* weather pattern and the related severe drought effects which resulted in increased dryness of the environment. Bearing in mind the unique and unpredictable climatic and weather events of January 2003, it would have been difficult to anticipate ahead of the event what additional preparation would have been necessary to manage or suppress such a firestorm that eventuated.

However, as the Bushfire Service did experience a major bushfire event in December 2001 a number of important and positive improvements were developed from experience with that fire event.

The lessons learnt from past bushfires assist response agencies to fight future bushfires but experience demonstrates that there will be some bushfires which, for reasons such as combinations of climatic, weather, topography and vegetative conditions, cannot be excluded from urban areas. Often such fires are associated with extreme climatic conditions (eg. drought, the *El Nino* effect) and extreme weather conditions (eg. excessive heat, high winds and humidity). The Ash Wednesday fires of 1983, the Tasmanian fires of 1967 and the ACT/NSW and Victoria fires of 2003 are examples of such extreme conditions.

When considering the January 2003 bushfires it should be remembered that in November and December 2002 there were 92 bushfire incidents in the ACT. Due to the effective responses by the fire services, all of these fires were successfully contained and suppressed with no significant impacts on assets.

Preparation and Planning for a bushfire season can be categorised as follows:

- Risk assessment and consideration of the projected bushfire season;
- Community Awareness/Education;
- Training of staff and volunteers;
- Maintenance and readiness of equipment and vehicles; and
- Liaison with other agencies.

RISK ASSESSMENT

The Risk Management Unit (RMU) at the ESB was formed to assist the 'all hazards all agencies' principle of Emergency Management. This involves applying 'Australian Standard AS/NZ 4360' to:

1. identify risks within data and technological constraints;
2. categorise risk; and
3. consider treatment options to improve community resilience to impacts from natural and man-made hazards.

The Manager, RMU acts as a technical advisor within ESB in a number of areas, including meteorology, mapping and associated electronic formats and GIS. The current Manager, RMU has also worked in a national context in terms of setting best practice in these areas. He has been involved within the Bureau in the introduction of GIS, and other related technologies.

A 1989 report, 'ACT Assessment of Rural fire Hazard' referred to as the 'Orange Report' was compiled by the Manager, RMU and widely circulated to all Territory bushfire stakeholders. That report was used to set the macro scale bushfire hazard which, whilst the hazard management is not the responsibility of the Bushfire Service, it is essential to the Service's ability to be able to identify the likely areas of highest bushfire risk across the Territory. The assessments were revised in 1990, 1997, 2001 and 2002.

This style of analysis takes into account, that geographically the Territory comprises approximately 60% bushland, 10% pine plantation, 10% urban and 20% rural land uses. This comprehensive examination included the relationships between the different natural and man-made environments that

create different fire management issues and attempted to identify the appropriate balances between them. A copy of the most recent Strategic Fire Threat Analysis is attached as ANNEXURE A. The resulting map is figure 8.1 in the Bushfire Fuel Management Plan 2002-2004. The land managers and users are responsible for micro-scale risk analysis taking into account such specific issues as land use, land management objectives, fuel breaks and fuel levels.

These assessments were revised again in 1997 and in 2001, and involve the production of a standard series of six maps that show the components of bushfire hazard. These maps are based on a grid laid across the entire ACT using computer technology. These are similar processes to those used in other parts of Australia and New Zealand.

In February 2002, the Manager, RMU prepared and circulated a paper entitled, '*The Phoenix Imperative*', which recommends a rigorous and immediate hazard reduction burning program and the establishment of a diversity of fire age across the Namadgi National Park, which would over time lessen the chance of large wildfires. However, as indicated earlier, such hazard reduction regimes need to be considered by the land managers in terms of biodiversity objectives and also the sometimes narrow windows of favourable weather conditions for hazard reduction burning. The hazard analysis was considered as part of the development of the Bushfire Fuel Management Plan 2002-2004.

COMMUNITY AWARENESS

The fires of Christmas 2001 provided Canberra residents with significant awareness of the bushfire hazard potential. It was clear from experience with these fires in that the urban/bushland interface management needs to be a partnership between the fire authorities, government land managers and residents to reduce the potential impacts of bushfire on built structures in the urban areas.

The release of the draft 2002-2004 Bushfire Fuel Management Plan for public comment in mid-August 2002 provided an opportunity for ESB, Environment ACT and the Conservation Council of the South-East Region and Canberra to emphasise the possible severity of the pending bushfire season.

Under a sponsored activity, the United Fire Fighters Union (Canberra Branch) distributed a Fire Prevention Handbook to primary school age children in the ACT. This was supported by the ACTFB and the ACTBS with the provision of fire safety material and included specific advice from the ACT Bushfire Council publication 'Will you Survive', about residents preparing houses in advance of fire threatening their property.

In a major two-page colour spread in the Canberra Times on 28 August 2002, agencies of the ESB provided advice on what the public could do to mitigate the potential effects of disasters. The Bushfire Service advice was specifically aimed at what people could do to prepare their homes for bushfires.

Further advice about the likely severity of the 2002-2003 bushfire season was given publicity in the Canberra Times and the Chronicle in mid-October 2002 at the time of the hazard reduction burns of debris from plantations around Lady Denman Drive and Orana School. Residents were asked to take precautions by clearing bushfire fuel away from their houses.

At the end of October/start of November 2002 the Director, ACTBS was quoted in the “Canberra Times” and on the ABC advising residents living on the fringe of bushland to take specific action to clear vegetation from around their houses. He indicated they should attempt to establish some type of defensive zone.

An article in the “Canberra Times” at the time of the launch of the 2002-2004 Bushfire Fuel Management Plan on 29 November 2002, gave specific advice to residents on approximately 12 measures to prepare houses for bushfires.

In addition to these newspaper advertisements/articles, on many occasions the Director, ACT Bushfire and Emergency Services and the Manager Operations, Bushfire and Emergency Services, provided radio and TV interviews concerning the potential severity of the 2002-2003 bushfire season, what people could do to prepare their houses, and actions to follow when total fire bans were in force.

In November 2002, the residents of Chauvel Circle Chapman, contacted the Bushfire Service seeking advice on bushfire preparedness measures that could be taken in the neighbourhood. Members from the Rivers Volunteer

Bushfire and Emergency Services Brigade provided an awareness session on Sunday 24 November 2002 at Chapman on measures the residents could undertake around their homes prior to the peak of the season, but also what to do if a bushfire threatened their homes. This advice has been acknowledged by some of these residents for saving their life.

TRAINING

Training, both initial and refresher, has a high priority in all services of the ESB. Training is done to national standards in each of the skills necessary including those required to operate each piece of equipment used to fight a bushfire. Training is conducted and provided by qualified fire fighters with significant experience in the practical aspects of fire fighting.

In December 1998, all fire agencies in Australia through the Australasian Fire Authorities Council (AFAC), commenced developing the competency based Fire Qualifications Training Framework. This framework sets national standards of training required for firefighters at all levels within Australia. Incident management roles performed under the Australian Inter-service Incident Management System (AIIMS) is another important component of the training system. A central component of AIIMS is the Incident Control System (ICS).

ESB has been working on linking all training requirements in the ACT to the national competency and assessment standards. Although the competency modules are part of a national framework, ESB, and other like agencies, have and are continuing to create training modules and assessment tools that

relate to structures, procedures and equipment configurations specific to the ACT.

There are four levels of bushfire fighters within the ACT firefighting training framework:

1. Basic Bushfire Fighter – This is the initial level of training provided to all firefighters. Once completed they are permitted onto the fire ground under supervision. Implementation of training is the responsibility of the Brigade (including in the case of DUS, being both Parks and Forests Brigades). However, ESB sets the modules and assessment tools for the training program. There are 8 Units of Competency to be completed to meet this level.
2. Advanced Bushfire Fighter – operates under orders but can do so without direct supervision if required. Implementation of training is the responsibility of the Brigade. ESB provides the training modules and assessment tools. There are a further 4 Units of Competency to be completed to meet his level.
3. Brigade Officer – supervises bushfire fighters. Training is the responsibility of ESB through the Bushfire Service. There are 3 Units of Competency to be completed to meet this level.
4. Group Officer – manages an incident where several Brigades are operating. Training is the responsibility of ESB through the Bushfire Service. There are 3 Units of Competency to be completed to meet this level.

Additional refresher training is conducted in Spring in each year before the start of the bushfire season.

A Training Guide and Information Booklet produced in 1999 sets out the modules of training required to train a bushfire fighter to basic and advanced levels. This booklet also sets out the Training modules necessary for those in higher positions. This Booklet is provided to each bushfire fighter and officer. Training is also conducted for those persons involved in specialised tasks such as Deputy CFCO, Duty Coordinator, Group Officers and Incident Management Specialists.

The Bushfire Service maintains an electronic log of the training competencies of each and every member of the Bushfire Service both paid and volunteer.

The table below sets out the training conducted by ESB specifically for bushfires and support and the dates on which that training was conducted. That training referred to as 'multiple and ongoing' occurred a number of times during the year on an ongoing basis. The number at the far right of the table indicates the number of attendees at each training session.

Training	Date	No
Incident Control Systems - Overview	06/09/2002	20
Incident Control Systems – Overview	08/09/2002	15
Incident Control Systems – Overview	18/09/2002	19
Incident Control Systems – Overview	24/09/2002	20
Incident Control Systems – Planning Officer	02/10/2002 - 04/10/2002	18
Incident Control Systems – Logistics Officer	08/10/2002 – 09/10/2002	14
Incident Control Systems – Operations Officer	14/10/2002 – 16/10/2002	16
Incident Control Systems – Incident Controller	21/10/2002	18
ESB – Fire Extinguisher Training	24/07/2002	20
ESB – Fire Extinguisher Training	11/09/2002	17
ESB – Fire Extinguisher Training	19/06/2002	14
FPIFGM069A – Trim & Cross Cut Felled Trees	05/03/2002	2

FPIFGM069A – Trim & Cross Cut Felled Trees	03/02/2002	1
FPIFGM069A – Trim & Cross Cut Felled Trees	01/12/2002	15
FPIFGM069A – Trim & Cross Cut Felled Trees	24/09/2002	1
PUAOPE002A – Operate Communications Systems & Equipment	28/02/2002	12
PUAOPE002A – Operate Communications Systems & Equipment	28/07/2002	22
PUAOPE002A – Operate Communications Systems & Equipment	06/11/2002	7
PUAOPE002A – Operate Communications Systems & Equipment	25/11/2002	10
PUAOPE002A – Operate Communications Systems & Equipment	27/11/2002	13
PUAOPE002A – Operate Communications Systems & Equipment	21/10/2002	13
Bureau of Meteorology – Fire weather Training	16/07/2002	12
Traffic Marshalling	11/03/2002	17
Traffic Marshalling	12/03/2002	17
Traffic Marshalling	29/07/2002	27
Traffic Marshalling	30/07/2002	24
Traffic Marshalling	31/07/2002	29
Traffic Marshalling	28/08/2002	21
Traffic Marshalling	17/12/2002	21
CIT – Electrical Inspection Course	04/05/2002	8
PUAEME001A – Provide Emergency Care	Completed during 2002	12
BSZ 404A Train Small Groups	04/09/2002	22
BSZ 401-403A Workplace Assessor Qualifications	Completed in 2002	28
Senior First Aid Certificate	Completed in 2002	11
Basic Bushfire Modules – Bushfire Service Members:		
Mod 1 – Basic Fire Ground Safety	Completed in 2002	155
Mod 2 – Bushfire Behaviour	Completed in 2002	155
Mod 4 – Bushfire Suppression	Completed in 2002	155
Mod 5 – Hand tools and Knapsack Sprays	Completed in 2002	155
Mod 6 – Fighting Fire With Water	Completed in 2002	155
Mod 8 – Basic First Aid	Completed in 2002	155
Basic Bushfire Modules – Emergency Services Members		
Mod 1	Completed in 2002	81
Mod 2	Completed in 2002	81
Mod 4	Completed in 2002	81
BSZ 401-403A Workplace Assessor Qualifications	2002 multiple & ongoing	28
Senior First Aid Certificate	2002 multiple & ongoing	11
Basic Bushfire Modules:	multiple & ongoing	
Mod 1 – Basic Fire Ground Safety	multiple & ongoing	
Mod 2 – Bushfire Behaviour	multiple & ongoing	
Mod 4 – Bushfire Suppression	multiple & ongoing	
Mod 5 – Hand tools and Knapsack Sprays	multiple & ongoing	
Mod 6 – Fighting Fire With Water	2002	155

In addition to the training conducted by ESB each Bushfire Station and Brigade conduct regular refresher and competency based training.

Every opportunity to provide practical training in a realistic environment is taken. The hazard reduction burns conducted in 2002 were used to provide volunteers and departmental bush firefighters with training opportunities, particularly in the practical management of fire and command and control measures. This training is difficult to coordinate as the 'Permit to Burn' gives a narrow 'window of opportunity' to complete the hazard reduction burn and the permit may only be granted a short time before the event. The table below shows those occasions where such opportunities were used for training.

Number	Area	Dates	Volunteers
1	Deeks Drive	22/03/2002 to 26/03/2002	Yes
2	Narrabundah Hill	25/03/2002 to 25/03/2002	Yes
3	Kowen escarpment	12/04/2002	Yes
5	Kowen escarpment	07/05/2002 to 10/05/2002	Yes
6	Kowen escarpment	13/05/2002 to 31/05/2002	Yes
7	Pierces Creek	07/05/2002 to 31/05/2002	
8	Boboyan Pines	07/05/2002 to 30/05/2002	
9	O'Connor Ridge	07/05/2002 to 30/05/2002	
10	Gilbraltar Creek	02/07/2002 to 31/07/2002	Yes
11	Pierces Creek	07/05/2002 to 31/05/2002	
12	Lady Denman Drive	02/09/2002 to 27/09/2002	Yes
13	Orana School	25/09/2002 to 31/10/2002	Yes
14	Stromlo Forest	13/11/2002 to 13/11/2002	Yes

Also following the Christmas 2001 fires, the ACTFB undertook a variety of training and familiarisation activities. It is important to understand that these activities occurred in a period of increased callouts to hazardous material incidents within the ACT following the September 11 tragedy.

Approximately 50 ACTFB staff predominantly from tanker and rescue stations completed chainsaw refresher training and approximately 80% of the Brigade completed ICS refresher training. In addition a number of operational commanders completed the operations component of ICS training arranged by the ACTBS.

Approximately 60% of ACTFB staff undertook pre-incident planning and risk analysis training aimed at giving staff the tools to undertake planning activities in their station catchment areas. Two crews from each of the 4 ACTFB Platoons undertook refresher training in Bushfire Service Communications Centre operations. Tanker stations undertook familiarisation inspections of interface areas in their station catchments designed to identify access points and any critical infrastructure.

In addition some Fire Brigade operational managers and senior officers participated in the pre-season workshop organised by the Bushfire Service. In the days leading up to 18 January 2003, ACTFB maps were produced and issued to all Fire Brigade tankers identifying rural properties, tracks and interface areas. A map was also produced that identified the responsible agency for areas relative to land use.

EQUIPMENT READINESS

The vehicles and equipment, including communications equipment, operated by the ESB are regularly monitored and kept to a high level of readiness.

The ESB operates a comprehensive maintenance facility located at the Kambah JES (Ambulance and Fire Brigade Stations). All vehicles, both urban and rural, are regularly serviced. All Bushfire Service vehicles and associated equipment (eg. pumps and chainsaws) are pre-season serviced in early Spring. Fire Brigade equipment is checked daily on each change of shift.
All communications equipment is checked and serviced by the brigades and appropriately trained technicians. Maintenance schedules indicating when and for what reason a vehicle or piece of equipment was serviced or repaired are maintained.

A light helicopter is contracted by the Bushfire Service to be on standby for the bushfire season and to undertake water bombing of fires and aerial observation where required throughout the period. For the 2003 season the helicopter was brought in earlier than usual having regard to the drought and the increased bushfire risk earlier than normal in the season due to those dry conditions.

All ACTFB staff were issued with bushfire fighting jackets. Along with their issue, ACTFB staff were instructed in the correct use and maintenance of all Personal Protective Equipment.

BUSHFIRE FUEL MANAGEMENT

In simple terms, fire involves the heating of a fuel to ignition temperature, followed by a combustion period during which energy is given off as generated heat. The heat emitted in the process promotes continued propagation of the fire in adjacent fuels. Where there is a continuous or near-continuous fuel bed, the combustion process will be self-sustaining, burning more and more fuel as the burning zone of the fire extends outwards from the ignition point. Once established a fire will continue to burn until a change of conditions contributing to combustion occurs, eg. lack of fuel, decreased wind speed, reduced oxygen supply or increased fuel moisture content.

Fuel will continue to burn at a particular rate, this rate being determined by the content of the volatised fuel constituents and inversely related to the moisture content. Sclerophyllous forests and woodlands are characterised by high levels of volatile oils and low mineral contents. This contrasts with low-fire prone vegetation, which has low volatile oil contents and high mineral levels in both live and dead fuels. In the ACT most vegetation types are prone to high intensity fire occurrence.

The low mineral content also contributes, to a degree, to the thermal energy content of the vegetation. This varies very little in sclerophyllous and coniferous vegetation, so the total energy released (intensity of a fire) is governed by the amount of fuel consumed in the fire.

This is the basis of fuel management programs, with the burning component variously called prescribed burning, hazard reduction burning, protection

burning and controlled burning. Prescribed burning is possibly the most contentious issue in fuel management and has polarised ideas and attitudes within the public, fire control authorities and land managers more than any other single management issue.

Bushfires involve an ignition phase, combustion (burning) phase, a mass transfer phase and a smouldering phase when nearly all fuel is consumed. During the combustion phase the fire's spread is determined by the flammability of the fuel complex (dead ground litter load and the live standing shrubs). Therefore, fires will continue to burn once established as long as a fuel bed/load is maintained adjacent to the burning zone (flame zone).

Even on the hottest of summer days the litter ground fuels do not reach ignition temperature, and hence for combustion (burning) to continue, the fuels ahead of a fire front have to be heated to the 'ignition temperature'. This is achieved in a fire by heat transfer from the flame front to the fuels ahead of the flame front. This heat transfer is in the form of radiation, convection and, to a minor degree, conduction. Radiation is the most effective means of transfer of heat, this energy release being that which contributes to the intensity of a fire. The significance and difference between fire temperature and intensity should be noted as it is intensity that determines the degree of impact of a fire.

This is important to consider in terms of fire suppression and prescribed burning. Convective heat transfer is very inefficient within the fuel complex and depends on the transfer of heat from one air particle to another, although

air is a very poor conductor of heat. Convective heat transfer above a fire is the main vertical heat transfer mechanism, but little forward or horizontal convective heat transfer occurs during a fire. Conduction, on the other hand, occurs between fuel particles within the fuel litter bed with heat being directly carried from one fuel particle to another. This is an efficient but slow form of heat transfer. The mass transfer phase is when ash from burning particles is falling forward to the ground amongst pre-heated unburnt fuel as the final, efficient mechanism of fire spread.

The rate of preheating of the fuel bed is a function of the four heat transfer mechanisms. The intensity and rate of spread of a fire as influenced by the factors above is commonly referred to as fire behaviour that human intervention can influence. Fuel management and planning requires the ability to estimate or predict this fire behaviour under any combination of fuel, vegetation and weather conditions and the terrain features of slope, aspect and elevation.

The type and amount of fuel in an area has the major influence upon fire behaviour particularly in terms of fire intensity, the latter being measured in terms of energy released per metre of fire front. Fuel available to a bushfire is also the only factor contributing to fire behaviour that human intervention can influence.

Fuel itself is measured in tonnes per hectare. The fuel complex is made up of all the combustible material including standing trees, large logs and branches of dead and fallen trees, small branches and litter on the forest floor in the

form of leaves, twigs and bark. The total fuel load may therefore be in the order of hundreds of tonnes per hectare in an old age forest. In non-forested areas, grassland fuel loads will be only in the order of less than ten tonnes per hectare, as large fuel components do not exist. In grassland areas fuel loads change seasonally and in the summer may in fact be quite low.

It is important though to recognise that grassland fuel loads can be the equal of a forest fuel in terms of that available to a fire. During the passage of a fire front, only the fine fuel components (litter and small live grass and shrub fuels) are consumed with the large components (logs etc.), burning slowly long after the passage of the fire front. The fine fuel which burns in the passage of a fire is referred to as the available fuel, which is generally less than even the total fine fuel weight and much less than the total fuel weight.

The above considers fuel basically in terms of the dead or cured components and in early fire prediction studies (1960s-1970s) these were the only components included in prediction calculations. It is now acknowledged that many past fire predictions using those early models may have been less accurate then first thought. This is because they may not have accurately predicted the upper levels of fire behaviour extremes due to the failure to account for the live fuel components particularly in heath and woodlands with a dense shrub understorey. As noted previously, Australian native plant species are sclerophyllous or xenomorphic in form, hence have low moisture contents providing for ready ignition in a bushfire. In some heath understorey fuels in the ACT for example, the live shrub component of the fuel complex may be up to 40% of the fuel load. To ignore the live shrub component would

lead to grossly inaccurate fire predictions. The live shrub (standing biomass) is also well aerated compared with the more compacted ground litter fuels and so burns more readily.

Surface fuels accumulate for as long as the amount of leaf and twig falling and bark shedding continue to exceed the rate of decomposition of the vegetative material. For example taking the situation following a major high intensity fire where the ground fuels and standing shrub fuels have been totally consumed by the fire, fuels begin to accumulate almost immediately post-fire. Any scorched leaves of trees are shed and shortly thereafter regrowth of grasses and shrubs occurs, the latter from the rootstock surviving below ground level or from the large soil borne seed reserves which generally accumulate between fire events.

As fuels accumulate and a dead vegetative ground cover builds up, conditions at the soil surface and within the fuel bed become more favourable for micro-organisms and soil invertebrates and the rate of decomposition of litter increases to a stage where decomposition is in equilibrium with litter fall. This is the equilibrium fuel load, each vegetation type having a characteristic equilibrium state. The increasing depth and compaction of the fuel load is significant in many situations as heavy fuels maintain a greater amount of moisture and hence are often less flammable than low fuel levels, in the early part of the fire season (November).

Note that generally the fuel accumulation in native forests is rapid in the early years (first 3-5 years) slowing in the period 7-15 years, and levelling off in the

later years (15-25+ years). Pine plantation fuels also accumulate in a similar way, with the early years producing low fuel loads mixed with grass and then increasing more rapidly as forest management strategies come into play with pruning and thinning operations in the 9 to 16 year old pines resulting in fuel loads around 40 tonne per hectare. In the case of pine trees over 16 years fuel loads in excess of 40 tonne per hectare are common with logging slash and needle litter contributing to the fuel bed.

The accumulation of fuel in native forests to maximum equilibrium level over time therefore provides us the first component of the fuel complex; the fuel load. The structure of these fuels as a fuel bed may vary considerably and cognisance must be taken of the structure of the fuels as fuels of similar weight but different structure, will burn differently in time and amount. The 'equilibrium fuel' will vary with weather conditions, soil moisture levels etc.

The fine fuel litter load (t/ha) is widely accepted as the indicator of fire hazard level. While the use of the term 'hazard' is somewhat ambiguous and ill-defined, it is accepted that fuel is the determinant of a fire's rate of spread and intensity, these two factors having a perceived hazard or pose some level of threat to identified values. An increase in fuel load provides for a proportionate increase in rate of spread and fire intensity. For example, if the quantity of available fuel increases from 10 to 20 tonnes per hectare the rate of spread may double. Similarly doubling of the fuel quantity may result in the intensity of a fire increasing four-fold, this being shown in the calculations below. However, care must be taken when using such general relationships

as it has been observed that even very low fuels can have a much faster rate of spread than heavy fuels under strong wind conditions.

Fire intensity can be calculated from the equation:

I = Hwr/600 = kW/m

I (fire intensity) = H (heat of combustion) x w (weight of fuel) x r (rate of spread) divided by a constant to account for units of measurement of kilowatts/metre.

Example 1	**Example 2**
H = 18 600 kilojoule/kilogram	H = 18 600
w = 7 T/ha	w = 14
r = 5 m/min	r = 10
I = 18 600 x 7 x 5 / 600	I = 18 600 x 14 x 10 / 600
= 1 085 kW/m	= 4 340 kW/m

Note: that by doubling available fuel, the intensity has increased four-fold. Or alternatively halving the available fuel decreases intensity by a factor of four.

While fuel as a weight or load in terms of tonnes per hectare, has been considered, seldom is the fuel evenly distributed. A fuel load of 20 t/ha, for example, may vary across an area of one vegetation type by as much as 5-8 t/ha and between adjacent vegetation types by similar or greater amounts. Fuels similarly are continually changing over time and space, as they are part

of a dynamic ecosystem; hence fuels must be considered in their right context.

Flame height and flame length are also functions of fuel weight and rate of spread of a fire, so they also have an implication of hazard in terms of the influence they have on the preheating of standing live fuels to ignition temperature.

The fire intensities calculated above are considered to be relatively low but in any one fire the intensities may vary greatly from 200-300 kilowatts per metre (kW/m) to around 100 000 kW/m. In the Ash Wednesday fires, fire intensities reached approximately the upper level of 100 000 kW/m and in the ACT January 2003 fire it is estimated that fire intensities reached well in excess of that figure, and in fact may have exceeded 500 000 kW/m. Such intensities have extreme effects and impacts on life and property, and natural environment features of value and hence are a major threat and hazard to any of these which lie in the path of such a fire. The important point here is, apart from the extraordinary circumstances of the January 2003 fires, such high intensity fires are only a hazard and threat if life and property or other features of value exist in the path of the fire.

At the other end of the intensity spectrum, fire intensities of 200 to 300 kW/m are considered to be a low hazard as such fires can generally be suppressed by direct fire suppression techniques. Intensities above 3 000 kW/m on the other hand pose problems for fire fighters. Flames from a fire of 4 000 kW/m,

for example could also be as high as 15m in forested areas and up to 4m in grasslands.

The above can be demonstrated in more dramatic terms by recognising that a fire of 20 000 kW/m intensity for every metre of fire front, is the equivalent of having 20 000 single bar electric radiators stacked one upon the other for every metre of equivalent fire front.

Fuel then is a contributing factor to hazard but is not the fire hazard. Hazard implies a potential impact and this impact may be on the natural environment also, even though fire is accepted as a natural environmental factor itself. The impact on native biota and systems can be both negative and positive depending on the fire regime and the condition of the vegetation at the time of a fire.

The term fuel management includes functions and activities which are often based on quite disparate philosophies, objectives and techniques of implementation. In many fuel management planning programs conflicts arise between the objectives of fuel management (such as prescribed burning for hazardous fuel reduction and life and property protection) and those of planned burning or no burning for habitat or species management objectives.

In the past, fire management has been based on fire control and suppression and/or fuel reduction burning. These are still very much a part of fire management but are now being more and more combined with other land use management objectives. Fire management is now considered a skill and

science in its own right, which increasingly draws upon an appreciation of land management objectives, ecological principles, and factors contributing to fire and fire behaviour.

All land management agencies have fire management responsibilities, which do sometimes conflict with the primary land management objective of the agency or have implications for management, which force compromises between what is desired and what is expected. This often results in ambiguous programs in many management plans but a balance must be struck between the desired objectives, community expectations and statutory requirements.

The best ways to minimise the damaging effects of wildfire are:

- Land use planning which distances life and property from potential fire impacts;
- Land management practices that mitigate by hazard reduction, the risk of high intensity fires near assets;
- Assessment of the changing hazard and risks prevailing;
- Management to avoid high fire risk;
- Personnel training; and
- Community awareness and compliance with standards and codes.

Fire mitigation has and is predominantly based on prescribed burning with the objective being to reduce hazardous level fuel loads and hence the potential fire intensity and high rates of spread. It is necessary to consider prescribed burning further as this management practice more than any other, divides and

polarises views and concepts of fire management by the general public, land managers and fire control personnel alike.

In the 1960's Alan McArthur developed the principles of prescribed burning which were initially called 'controlled burning'. McArthur defined controlled burning as 'the planned applications and confinement of fire to the vegetation of a pre-selected area'. The planned applications implied that fire would be used under a defined combination of weather and fuel to result in fire behaviour appropriate to land management objectives. Pre-selected area implies some strategic application to achieve the best results.

As already noted, rate of spread and intensity of a fire are related to the fuel load so any means of removing hazardous fuel loads will reduce the intensity of any subsequent wildfire. The real benefit of prescribed burning in this regard is usually limited to 1-8 years with decreasing benefit after the initial year.

Prescribed burning is carried out (or should be) under a defined weather scenario with defined objectives in terms of fuel reduction viz reduction by weight, percentage of an area, the limits of crown scorch, etc. These objectives usually demand a weather set which generally occurs in the cool, moist conditions of autumn in south eastern Australia.

A common reference to controlled burning is a ‘cool burn’. This concept is, in physics, a nonsense as the combustion of fuel occurs at about the same temperature (1,000 K) whether the fire is a low intensity autumn burn or the January 2003 bushfire.

The physical difference of course is energy, i.e. fire intensity. The differentiation is not scientific semantics. Unless fire managers understand the nature of fire intensity hazard, and what constitutes that hazard, then the fire management debate in Australia will continue to be unfocussed, confused and generate severe threats to lives and property as simple solutions are sought from complex situations.

While prescribed burning is implemented on the above basis usually the only prescription defined is that of reducing fuels to below 10 t/ha which as has been noted, is about the threshold level in terms of fire intensity. If fuel levels in excess of 10 t/ha are burnt during a wildfire, fire control is difficult due to intensity. A fuel load of 10 t/ha would yield a fire intensity of about 3,500 kW/m under a set of weather conditions that produce a high fire danger rating. This is the upper limit of intensity which fire fighting personnel can sustain for a reasonable period. Prescribed burning has itself now become variously known as hazard reduction burning as a response to this singular objective. This is a dangerous terminology precedent as firefighter safety or asset protection cannot be guaranteed during very high to extreme bushfire conditions based solely on previous prescribed burning.

It is to be recognised though that some benefits do accrue to fire fighting personnel and asset protection at the time of a wildfire if recent prescribed burns have been carried out in the area.

By the simple application of the principles of combustion physics a low intensity 'controlled burn' will reduce part of the available fuel. However, the coarser component of the fuel may still be available to wildfire, even in the same season, on extreme fire danger days.

After every fire season in which there are major fires, there is a call for more and more hazard reduction burning without an objective assessment of risks, assets under potential threat, hazards and a review of the range of objectives for which land is being managed. Fires such as occurred in January 2003 were fires that would have occurred under the extreme prevailing weather conditions and would have burned through the countryside irrespective of any previous hazard reduction burning. In some areas burnt over by the January 2003 fires, the fire intensities were certainly lower than would have been the case if some form of fuel management practice had not previously been carried out, but rates of spread were little changed and hence control lines were still breached and control problems still occurred. Therefore, having regard for all the relevant factors and limitations, it is accepted and recognised that strategic prescribed burning has aided fire suppression in many fire situations.

An unfortunate aspect of the debate on prescribed burning is the subsuming of all other fuel management options as part of an integrated fire protection

programme. Small area mechanical treatment of strategic fuels in fire hazardous locations can be far more reliable (not being subject to unpredictable seasonal windows of burning opportunities) than a prescribed burning programme.

Grazing can be used to reduce fuels. This however is obviously confined to fuels that are palatable to stock at sites where such fuels pose a potential fire intensity hazard. The fuel management debate however often proposes broad area grazing of nature conservation areas as a fire protection measure. This proposition often masks non-fire related desires to have access to areas of grazing potential. The reality is that palatable grasses do not form a major fuel component in natural forest – woodland areas. The history of fire in landscapes, which includes the reserves where grazing is proposed as a fire protection measure, is that major wildfire regularly occurs on grazing land. The proposition that grazing thus is an effective broad area fire protection measure in native vegetation has not been seen to stand up in practice.

The terminology associated with bushfires has always been imprecise and is particularly so when addressing hazards and risks. Luke and McArthur (1978) for example, defined hazard as ‘the condition of fuel and takes into account such factors as quantity, arrangement, current or potential flammability and the difficulty of suppression if the fuel should ignite’.

For any set of circumstances to be a 'hazard' then something of value has to be at risk. In the bushfire sense the 'value' could be:

- Production forests
- Property (houses etc)
- Urban / bushland interface
- Crops
- Access routes
- Areas of particular conservation significance
- Catchment values
- Isolated remnants of native vegetation
- Critical infrastructure

A 3,000 kW/m intensity fire could thus be a serious 'hazard' alongside a house but significantly less serious if it occurred remote from any valued asset.

It is thus essential for fire managers to address an actual identified 'hazard' as a start to a fuel management programme for a particular area. Applying broad area hazard mitigation programmes to tracts of bushland may be a waste of time and money if there is not a realistic hazard that can be treated with strategic application of fuel management practices. In defining the concept of hazard further it is to be recognised that any area of vegetation/fuel may or may not be a fire problem (hazard) at any point in time as the potential and process of burning will change continually.

Hazard assessment must therefore take account of all the natural factors, which contribute to fire behaviour, these being the many biophysical factors of bushland areas. Fire behaviour as has been noted earlier is measured as either the rate of spread of the fire front or as a mean fire intensity so 'wildfire hazard' can be considered as 'intensity hazard' or 'rate of spread hazard'.

The rate of spread hazard is the most significant for fire suppression personnel when a fire front is distant from urban developments but 'intensity hazard' assumes a greater significance as a fire approaches urban areas.

The rate of spread hazard and intensity hazard can be integrated, weighted and mapped for planning purposes as a combined fire potential hazard map. The hazards are calculated for areas by drawing upon detailed databases and linking them to an appropriate fire prediction model. Using geographical information systems (GIS) the bushfire hazard can be compared with existing residential areas or other assets. Once this is done an assessment of management constraints and/or impact potential posed by bushfire occurrence can be undertaken and the existing bushfire hazards actually quantified. Measures to ameliorate the higher hazard areas can then be planned.

Very few areas will exhibit high hazard levels continuously under all weather conditions but where these areas are identified, management action should be a high priority. In other areas where high hazard levels exist for lesser periods, be it during a fire season or over a number of fire seasons, land

managers should be seeking to determine the level of risk acceptable to them, the public and their neighbours (in land use terms).

CONCLUSION

From the above comments it can be recognised that type and amount of fuel in an area has the major influence upon fire behaviour, particularly intensity. Total fuel is different to available fuel and in extreme weather conditions, the live fuel components become part of the available fuel. A bushfire can range in intensity from 300 kW/m to in excess of 100 000 kW/m.

Although fuel is a contributing factor to the fire hazard it is not the fire hazard. Fuel is only a hazard if life and property or other features of value exist that will be directly affected by a fire burning through that fuel. The fire intensity potential can be dealt with by reducing the fuel load. However, this is best targeted to areas where intensity is a potential problem. The extent of the area so treated should be a function of the distance over which low intensity bushfire potential is strategically necessary.

All land management agencies have a hazard management responsibility, which sometimes can conflict with the primary objective of the agency or have implications for those objectives, and therefore force compromises between the management desired and the protection expectation. This is hazard and risk management at its most important and an essential requirement for decision makers responsible for land management and planning.

At present the *Bushfire Act* requires land managers to undertake fuel management planning. However, what is probably more accurately needed is for land managers to undertake hazard reduction through a process of hazard assessment and risk analysis, and then describe in a detailed plan what action will be taken, over a prescribed period, to ameliorate the hazard and reduce the risk to the particular asset under threat. This is even more of a dilemma where the hazard is also the potential asset under threat in the case of plantation forests.

Fuel management plans for areas managed by Government land management agencies have been a requirement since the amendments in 1996 to the *Bushfire Act*. A Bushfire Fuel Management Committee was established to coordinate the efforts of government land managers in preparing those plans. The first set of such plans were prepared for the period 1998 to 2000 and they are required to be revised every 2 years. Following the publication of the 2000-2002 series of plans and community feedback and some lessons from the 2001 bushfires the approach was substantially changed for the 2002-2004 plans. Greater understanding of the risk modelling and alternative approaches to hazard reduction have been incorporated into the plans. Each series of plans have been made available for public comment prior to final publication.

FIGHTING THE 2003 BUSHFIRES

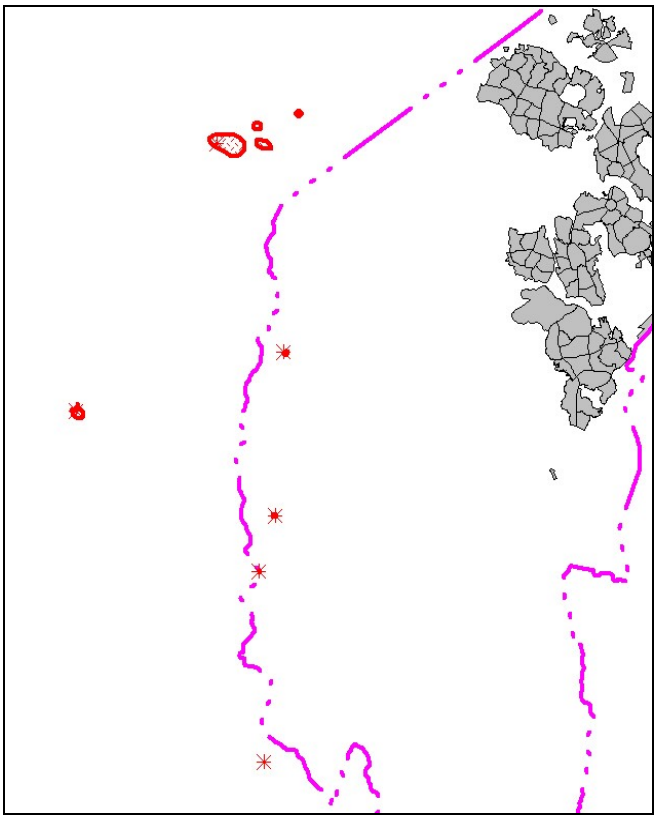
After the fires of December 2001, the region experienced one of the heaviest recorded February rainfalls. This was followed by an extended dry spell and from that point the Bushfire Service started monitoring the developing patterns of the El Nino effects in the Pacific, which suggested a dry summer in 2002-2003. The pattern continued with a dry winter and a dry spring, which resulted in grass fires in the ACT from early September, which is not uncommon for a dry winter as there is a lot of frost deadened grass that is easily ignited on windy days. There was also a reasonable size bushfire (approximately 20ha) on 22 September 2002 in Namadgi National Park. This was not normal for that time of year but is an indication of the dryness of the native forests fuels.

As the summer developed into the fire season, there had been little or no rain and the Keetch Byram Drought Index (KBDI) was increasing. The KBDI is roughly a two hundred point scale, which indicates how much moisture is required to saturate the soil. For example, if the KBDI is one hundred then at least one hundred millimetres of rain is needed to saturate the soils again. A zero KBDI is where the soil is fully saturated and everything on the ground is wet to the point that it is almost impossible to light a fire. At two hundred on the KBDI, fuels are almost at the point of spontaneous combustion given an iginition source. At the one hundred KBDI mark, there is a clear potential fire hazard for the ACT. The records indicate that on 18 January 2003, the KBDI was approximately one hundred and forty. KBDI readings of fifty and above indicate a worsening potential fire hazard.

Around Christmas 2002 the KBDI was well above one hundred, with 95% of grasses in a cured state, meaning that 95% of the grass on the ground was dead and would burn. The drought factor of ten was indicating that one hundred percent of fine fuels were available. Fine fuel is any grass, stick or combustible material that is on the ground, generally less than 6 millimetres in diameter. Heavy fuels such as logs are not normally readily combustible as they retain more moisture than the finer fuels. However, in January 2003 logs were so dry they could be included in the combustible fuels available. This meant that the bush was in an extremely volatile state.

The following chronology attempts to outline the expansion of the fires in the ACT and immediate surrounds of NSW and the suppression activities undertaken. Significant resources or agency specific assistance is only briefly mentioned and this outline does not attempt to name all of the support agencies, private company assistance or the myriad of community organisations or spontaneous volunteers who contributed to the effort. For example, neither the significant efforts of AFP officers who staffed road blocks and warned residents of the impacts during the firestorm nor the efforts of the ACTES volunteers who provided a significant amount of logistics and operational support activities are specifically mentioned to name just two other emergency services. Understandably, since this was a major fire emergency most of the description focuses on the fire services and fire operational activities.

8 JANUARY 2003



8 January 2003; ignition points and extent of fires

A Total Fire Ban was in place for the day.

Late in the afternoon on 8 January 2003, a high-based storm cell formed over the ranges to the west of Canberra, which encompassed the Kosciuszko, Brindabella and Namadgi National Parks. This cell caused a wide range of lightning strikes in a single line stretching from the high country of Victoria, right up into NSW and the ACT. Reports indicated that in the vicinity of 140 fires were started by lightning in NSW and about 80 started by lightning in Victoria.

The Mt Coree fire tower operator reported lightning strikes initially to the west but then reported that they were virtually on top and all around him. Smoke was seen starting to rise from these lightning strikes somewhere between 1530 and 1600hrs. The McIntyres Fire in NSW, just north of the ACT border, was the first recorded, followed by the Bendora Fire.

The 4 fire towers were calling in range and bearing to the smoke columns, which were cross-referenced by the SMT to ensure the accuracy of the reports and to ensure that the sightings were not duplicated. The location of the fires to the west of the ACT were passed on by the SMT to the NSW authorities with jurisdictional responsibility for fire management in these areas.

Reported fires were Bendora, Stockyard Spur, and Mt Gingera in the ACT, and McIntyres Hut, Mt Morgan, Yarrangobilly, and Broken Cart in NSW. Even before the smoke reports were cross referenced, the COMCEN staff, acting under the direction of the Bushfire Service Duty Coordinator, responded fire fighting resources to these fires. The Parks Brigade Captain was appointed as Incident Controller and together with a number of firefighting resources were despatched to the Bendora Fire. A Parks Brigade Deputy Captain was appointed as Incident Controller and together with a number of resources were despatched to the fires in the vicinity of Stockyard Spur and Mt Gingera. The contracted helicopter (Firebird 7), with a Group Officer trained as an air observer, was dispatched to the west of the ACT for reconnaissance of all of the known fires in the ACT and surrounding region.

The SMT met to consider the situation, and to determine the control objectives for these fires. Firebird 7 was the first resource to arrive on scene at the fires. It provided the SMT with information about the exact locations of the fires, a description of their size and behaviour observed, and reported on access issues. This information was then relayed by COMCEN to the Incident Controllers. The SouthCare helicopter was tasked by the SMT for water bombing duties, initially on the Stockyard Spur Fire, and then later on the Bendora Fire. SouthCare was used for fire fighting duties for almost 3 ½ hours on the 8 January 2003 before sunset prohibited further operations.

On arrival at the Bendora Fire the crews found that access was relatively easy, though the fire was burning in the middle of a block and was about 50m from the fire trail. Direct attack was not initially undertaken due to the fire's location, and the crews waited on the fire trail for the fire to come to them. The Incident Controller at the Bendora Fire felt that due to the rugged terrain and access issues, together with the threat of falling trees and tree branches, keeping crews at the fire overnight posed significant safety issues.

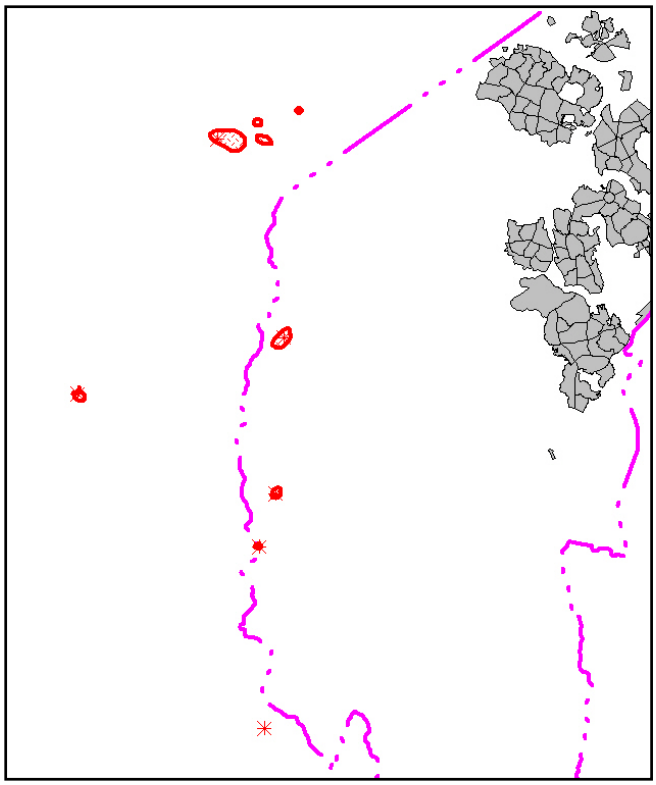
The Stockyard Spur fire was fairly inaccessible. There was no road or fire trail access and the ground crews had to walk a distance of approximately 4km to reach this fire. Firebird 7 water bombed some hot spots on the northwest edge of this fire in an attempt to slow its run. The Incident Controller felt that there was little to be gained by undertaking direct fire fighting by the ground crews on this fire and that with the access difficulties arising from the fire's remote location, there was no benefit in keeping the crews on this fire overnight.

There were no ground crews at the Gingera Fire on the 8 January 2003. Reports from Firebird 7 were that the fire was relatively small in size and that it was not posing any immediate risk. At about 2230hrs the Incident Controllers and crews from both the Bendora and the Stockyard Spur Fires returned to Canberra.

The SMT, following advice from the Bendora and Stockyard Spur Incident Controllers, organised crews for the following day, with an agreed 0600hrs start.

The ACT's CFCO, a Deputy CFCO, a Group Officer, and the SMT Planning Officer attended an evening Planning Meeting in Queanbeyan with the Yarrowlumla/Queanbeyan Fire Control staff and NSW Nature Parks and Wildlife Services (NPWS) officers to consider fire control options. At the meeting it was agreed that a Section 44 Declaration should be considered by NSW for the McIntyre's Fire, and that the ACT would support the McIntyres Fire operation with some ACT resources, as the threat to ACT pine plantations was evident. Section 44 of the *NSW Rural Fires Act* allows for the declaration of a bushfire emergency for that local government area (Yarrowlumla Shire). A Section 44 Declaration also provides access to state resources.

9 JANUARY 2003



At first light an aerial reconnaissance flight was conducted to provide information about the fire behaviour and fire growth overnight of the Bendora, Stockyard Spur, and Gingera fires. This information was passed onto the SMT, and the Incident Controllers appointed to the fires.

The objective for the ACT fires was to keep them contained to their smallest possible size using direct attack, and supplemented by aerial support and heavy plant. This was relayed to the Incident Controllers by the SMT.

At 0600hrs crews were deployed to the Bendora Fire, under the control of a Parks Brigade Deputy Captain, and the Stockyard Spur Fire, under the control of a Parks Brigade Deputy Captain. A small strike team was also deployed to the Gingera Fire.

On arrival at the Bendora Fire it was evident that there had been slow growth in fire size overnight. With no self-extinguishment of the fire overnight (a somewhat common feature of highland fire behaviour with cooler easterly winds), it was evident that there was some unusual fire behaviour patterns occurring. Fire fighting crews were deployed for direct attack on this fire in an attempt to keep it to the smallest possible size. As the day progressively warmed up and the fuels dried, out the fire began to increase in size fairly quickly. Following consultation between the SMT and the Incident Controller, the SMT once again sought and received the assistance of the SouthCare helicopter for water bombing duties. Firebird 7 was also being utilised for aerial reconnaissance and water bombing.

The agreed goal between the SMT and the Incident Controller was to keep the fire away from the Mt Franklin Road to the west as this provided the only access to the Stockyard Spur and the Gingera Fires.

Through the day the western flank was the most intense and caused the greatest control difficulty. The Incident Controller requested the SMT to provide heavy plant to improve the fire trail network around the fire. Heavy Plant was subsequently allocated. In the late afternoon an agreement was reached between the Bendora Fire Incident Controller and the SMT that due to safety concerns posed by access limitations, and the possible dangers of falling trees and branches, crews would not be used overnight.

The Stockyard Spur fire crews once again experienced difficulties in accessing this fire, though by mid morning they were on scene. Initially they

focussed on direct containment along the northern and western flanks. Both Firebird 7 and SouthCare provided reconnaissance support and water bombing.

The firefighting crews continued through the day with their containment efforts with limited success but had to commence their long walk out before dark. Agreement had been reached between the Stockyard Spur Fire Incident Controller and the SMT that due to safety concerns posed by access limitations, and the possible dangers of falling trees and branches, that crews would not be used overnight.

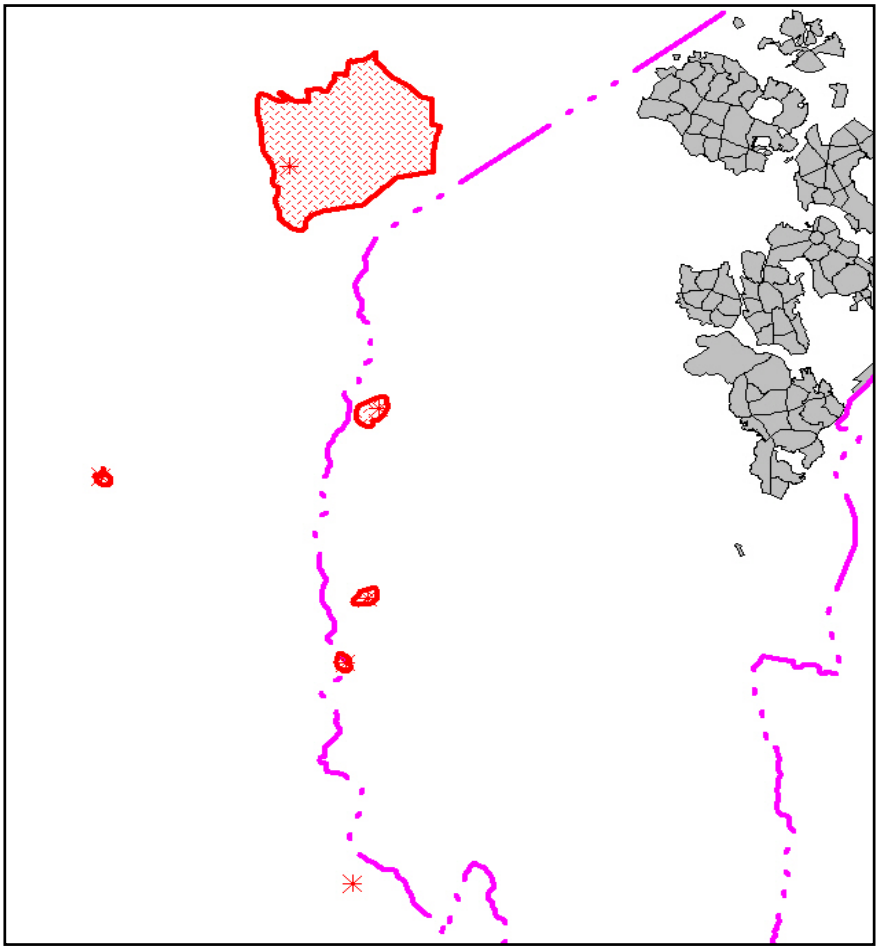
The Gingera Fire continued its slow but steady expansion throughout the day and was frequently monitored from the air. As the access road to this fire had the potential to be impacted by both the Bendora Fire and the Stockyard Spur Fire, the SMT decided that this fire would not be resourced overnight.

ACT crews were tasked with providing support to the NSW fire fighting operation at the McIntyres Fire. This fire was expanding rapidly and spotting. The containment strategy for this fire was based on indirect attack using a large burnout block.

The CFCO attended two Planning Meetings with the Yarrowlumla Shire S44 Controller and by mutual agreement an ACT Liaison Officer was located at the NSW Fire Control Centre. This arrangement continued until the end of January 2003.

The SMT discussed with the ACTFB the need to backfill bushfire stand-by in the urban area. This was likely to stretch the normal command and control arrangements of the ACTFB, and would require the stand up of 1 additional District Officer utilising overtime and acting-up of off-duty personnel. Also efforts were made to acquire additional helicopter support but due to the amount of bushfire activity in NSW and Victoria there were no additional helicopters available.

10 JANUARY 2003



The fires had continued to grow overnight.

Following discussions on the evening of the 9 January between the Executive Director ESB, the CFCO and the Fire Commissioner arrangements, were put into effect whereby cross crewing of tankers and light units in Fire Brigade stations would cease and during daylight hours they would be staffed by crews on overtime. This allowed the CFCO to concentrate Bushfire Service resources on the remote fires and leave any response to vegetation fires within the city boundaries to be covered by the Fire Brigade.

As a result of ongoing fire growth, the SMT changed objectives for the Bendora Fire to that of indirect attack on the southern flank with direct attack continuing to the north. This fire was initially under the control of the Parks Brigade Captain. Due to the changing objectives to indirect attack, a Group Officer assumed control of this fire in the early afternoon. Four heavy tankers and three Remote Area Fire fighting Team (RAFT) crew were operational, with support from heavy plant and air operations. With the decision to move to an indirect suppression strategy for the Bendora fire, a Planning meeting was held with representatives from Environment ACT as to where suitable containment lines could be constructed. Four firefighting units under the control of the Tidbinbilla Brigade Captain were assigned to this fire overnight.

The ACTBS provided 8 firefighting units and 2 command units to resource the southern flank of the McIntyres Fire throughout the day. These elements came under the control of the NSW Section 44 Controller who was responsible for the coordination of all firefighting activity within Yarrowlumla Shire. The CFCO attended a morning Planning Meeting with the Yarrowlumla/Queanbeyan Fire Control staff, to provide input to their control objectives for the McIntyres Fire.

The SMT agreed to the deployment of the Forestry D9 dozer to construct a firebreak on the northwest edge of the Uriarra Pine Plantation area to create a fall back option existed should the McIntyre's fire not be contained within the proposed lines.

An afternoon Planning Meeting was held at Queanbeyan at which the ACT was represented by the Executive Director, ESB, a Deputy CFCO, and a Group Officer.

The Gingera Fire remained west of the Mt Franklin Road. The Incident Controller, Hall Brigade Captain, and the SMT agreed that there was no need to change objectives. Two heavy tankers were assigned to this fire throughout the day.

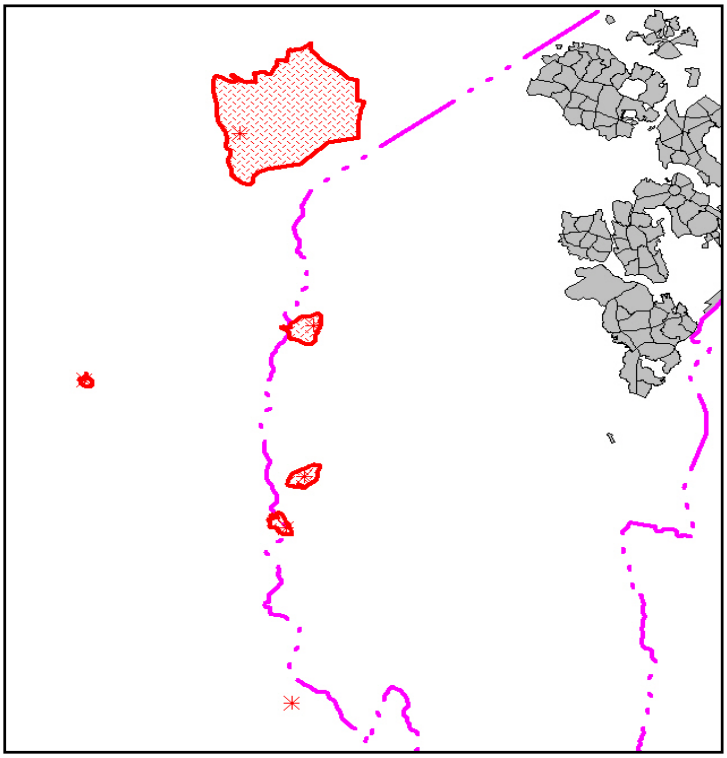
The Stockyard Spur Fire remained south of Stockyard Creek. The SMT decided that this fire was a lower priority than the Bendora Fire, and therefore no ground crews were tasked. Aerial monitoring, and hotspot water bombing of the Stockyard Spur Fire continued throughout the day. A small planning team, under the direction of a Deputy CFCO, was put in place to commence detailed planning for the management of the Stockyard Spur Fire.

Discussions throughout the afternoon between the IMT and the SMT determined the overnight resource requirements. Night resources were arranged and put in place for the Bendora Fire, while day shift resources continued working into the night at the McIntyres Fire to allow completion of tactics.

As a standard practice, the ACT routinely monitors any NSW fires within an 8km buffer of the border. Thus the ACT was monitoring another fire further to the south on Mt Morgan, but no ACT resources were allocated to that fire as it was well inside Kosciuszko National Park.

Close contact with the NSW NPWS was maintained regarding this fire and a NPWS officer was located at ESB Curtin for liaison with all NSW operations. This cross border liaison arrangement continued until the end of January 2003.

11 JANUARY 2003



The fires continued to expand overnight.

The establishment of direct and indirect containment lines on the Bendora Fire continued throughout the day. A Deputy CFCO was appointed as Incident Controller of this fire and agreement was reached with the SMT on the objectives and details of the containment lines. Resourcing on this day was unchanged, based on planning late the previous day. The fire expanded to the south west, approaching Little Collins Creek. Direct attack was undertaken on those runs of fire that threatened to breach proposed containment lines. SMT staff met with fire control staff on scene to coordinate incident management. Replacement firefighting crews were brought in for the overnight shift on the Bendora Fire, these crews were under the control of a Group Officer.

Under the control of the Forests Brigade Captain the ACT continued to resource the southern flank of the McIntyres Fire, working closely with NSW to construct containment lines. Lighting up of backburning operations was commenced in key areas during the day. The ACT crews were relieved from this fire during the night.

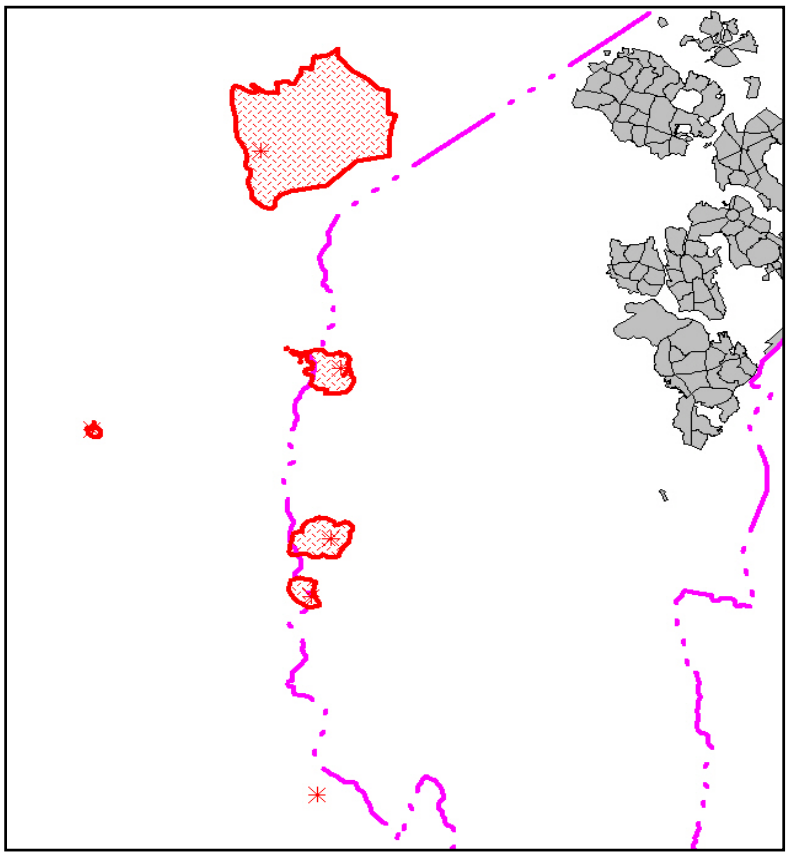
Heavy plant resources were sent to the Stockyard Spur Fire to improve access into the area and provide firebreaks around assets. These resources were under the control of a Forests Brigade Deputy Captain. Aerial monitoring and hotspot water bombing of the Stockyard Spur Fire continued throughout the day. Fire situation analysis for this fire continued. Due to safety concerns, the fire was unattended overnight.

A Southern Districts Brigade Deputy Captain was appointed by the SMT as Incident Controller of the Gingera Fire. He was assigned resources who were tasked to prevent the fire crossing the Mt Franklin Road. The fire made a significant run to the north west, over the top of Mt Gingera, and was held to the west of Mt Franklin Road. As the fire behaviour tended to abate overnight, the SMT, in consultation with the Incident Controller, agreed that there wasn't any need to resource this fire through the night.

From the 11 January the ACTAS deployed resources to the Namadgi National Park in support of task forces undertaking firefighting and backburning operations in the area. This commitment continued until the 17 January.

The ACT continued to be involved with NSW/ACT regional planning meetings.

12 JANUARY 2003



A Deputy CFCO continued as the Incident Controller for the Bendora Fire and resourcing was unchanged from the previous day. Following discussions with the SMT, the objectives for the day were agreed and implemented. SMT staff met with the Incident Controller and his key staff on scene to coordinate incident management. Due to hot windy conditions during the day the fire made significant runs upslope towards the Mt Franklin Road to the west. This made containment difficult for ground and aerial crews. These runs crossed initial containment lines and into NSW, and could not be contained. With the Mt Franklin Road now straddled by fire, there were significant safety issues for the fire crews, including concerns about safe access and egress, and an increased likelihood of falling trees across the road. Once again resources were sent to this fire overnight under the control of a Group Officer.

ACT was once again supporting the NSW operations at the McIntyres Fire under the control of a Forests Brigade Deputy Captain. They continued to focus their efforts on the southern flank. On the evening of the 12 January the CFCO advised the Yarrowlumla S44 Controller that the ACT would only be able to provide limited support to the McIntyres Fire due to the need to attend to the fires in the ACT.

Dozer trail work continued on the Stockyard Spur Fire, as did water bombing of hotspots. Given this and the prioritising of the Bendora Fire, the SMT decided that there would be no fire fighting ground crews assigned to this fire on this day. During the afternoon the fire expanded to the west and the north significantly. Late in the day it crossed the Mt Franklin Road north of Pryors Hut. As the fire spread north through significant peatland, the SMT liaised with ACTEW hydrologists on ways to mitigate the fire impact on water catchments. Again, crossing of the Mt Franklin Road created safety issues for the fire fighters.

One of the vehicles proceeding to the Gingera Fire had an accident on Mt Franklin Road thereby cutting the road to through traffic. The resources assigned to this fire were prevented from reaching it with the result that no ground fire fighting crews were on the Gingera Fire which remained to the west of the Mt Franklin Road.

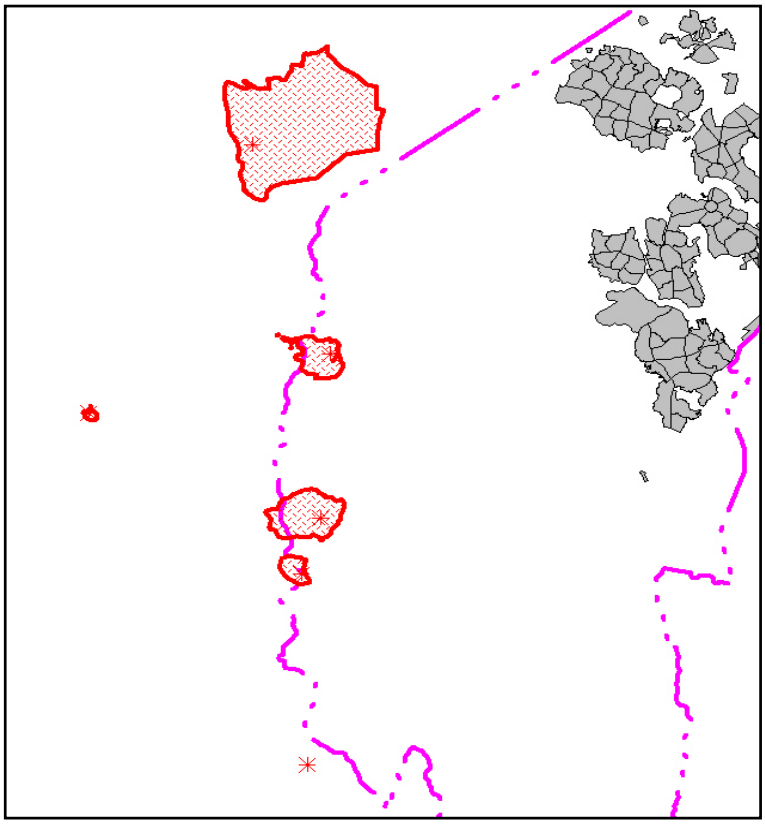
Given the developments of the fires in our immediate region the CFCO contacted NSW Rural Fire Service HQ at Rosehill and inquired about the timeframes for ground resources if needed. The CFCO also requested

access to the local aerial support under control of NSW. The NSW Rural Fire Service duty officer indicated they would have the relevant Air Operations Officer make contact to discuss options.

The SMT reached the conclusion that the objectives it was seeking to achieve required capabilities that were not available locally. The additional resources required were heavy plant to establish containment lines, and aircraft for aerial observation and water bombing. Utilising standard Commonwealth arrangements for seeking the use of military resources, Executive Director ESB formally requested Emergency Management Australia (EMA) to provide 4 aircraft and 4 dozers to ACT fire fighting operations. It was discussed with EMA that their military aircraft would preferably have water bucketing capability EMA subsequently advised that two Seahawk helicopters with water bucketing capability and two Squirrel helicopters for aerial observations would be provided from the Naval Air Station at Nowra.

These helicopters arrived the next day, originally being based at RAAF Fairbairn and later using the Bulls Head staging area and the heliport at Uriarra Settlement.

13 JANUARY 2003



The objectives for the Bendora Fire were agreed between the SMT and the Group Officer appointed as the Incident Controller and were based on the treating of the ACT part of the burnout block. The ACT resources were not involved with any action in the NSW part of this fire due to the extremely rugged terrain and no access trails. Operations were complicated by the crash of a water bombing helicopter into Bendora Dam.

In the afternoon of 13 January 2003 the Executive Director, ESB requested the Fire Commissioner to coordinate the recovery of the sunken helicopter which was categorised as a potential hazardous materials incident. The Fire Commissioner formed a separate incident management team to coordinate that operation so the Bushfire Service management team could concentrate

on the fires. The Fire Brigade coordinated this recovery operation and the helicopter was retrieved from the dam on 15 January 2003.

The ACTFB crews involved with the recovery of the helicopter from Bendora Dam found they could not communicate with COMCEN via UHF radio. Contact was made using the VHF radio installed in Fire Brigade appliances, but reception was poor.

Resources assigned to the Bendora Fire overnight were under the control of a Parks Brigade Deputy Captain.

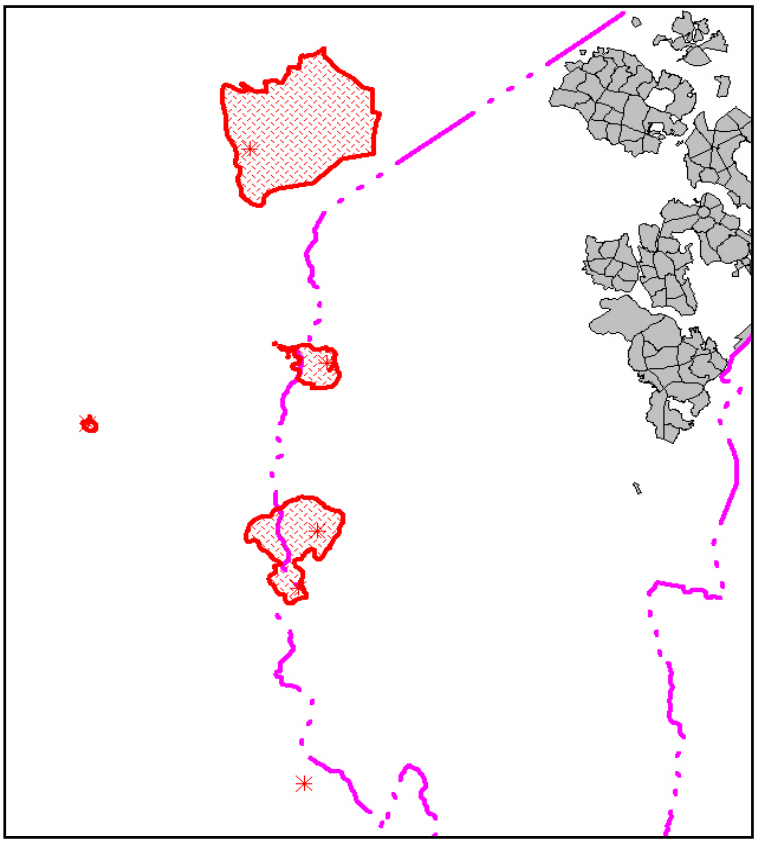
Overnight the Stockyard Spur Fire continued to expand to the west. Under the coordination of a Deputy CFCO, planning for the containment and suppression of the Stockyard Spur Fire continued. The fire reached Mt Ginini without causing damage to the aviation communications site, but did cross an old trail down to the Goodradigbee River which was the last available containment line in that area. Beyond this, containment lines were well within the Kosciuzsko National Park.

The ACT provided only a minor tactical resource commitment to the McIntyres Fire due to its own fire commitments.

While the Gingera Fire continued to expand it did not cross the Mt Franklin Road to the east. The northern edge of this fire was now just over 1 km from the Stockyard Spur Fire.

With the growth of the fires' perimeters over the previous few days, and the expectation that these would continue to expand, EMA was requested to arrange for some additional military resources in the form of aviation refuelling capacity to assist the ACT fire fighting effort. This was subsequently provided by the RAAF from Richmond. In addition, with the deployment now of Australian Defence Force (ADF) resources the Defence Liaison Officer to the Emergency Management Committee was deployed from Sydney and apart from changeover of personnel provided that continuous liaison through until the end of January 2003.

14 JANUARY 2003



Formal Planning (information and strategic decision-working) meetings chaired by the CFCO under the ICS commenced and were set for 0930hrs and 1600hrs daily.

Under the direction of the Parks Brigade Senior Deputy Captain, work continued on the burnout block at Bendora. Aerial support was provided, though thick smoke and cloud hampered operations.

At approximately 0200hrs the Gingera and Stockyard Spur fires combine and from there on were referred to as the Stockyard Fire.

The Stockyard Fire expanded significantly to the west towards the Goodradigbee River, with no obvious containment lines due to the

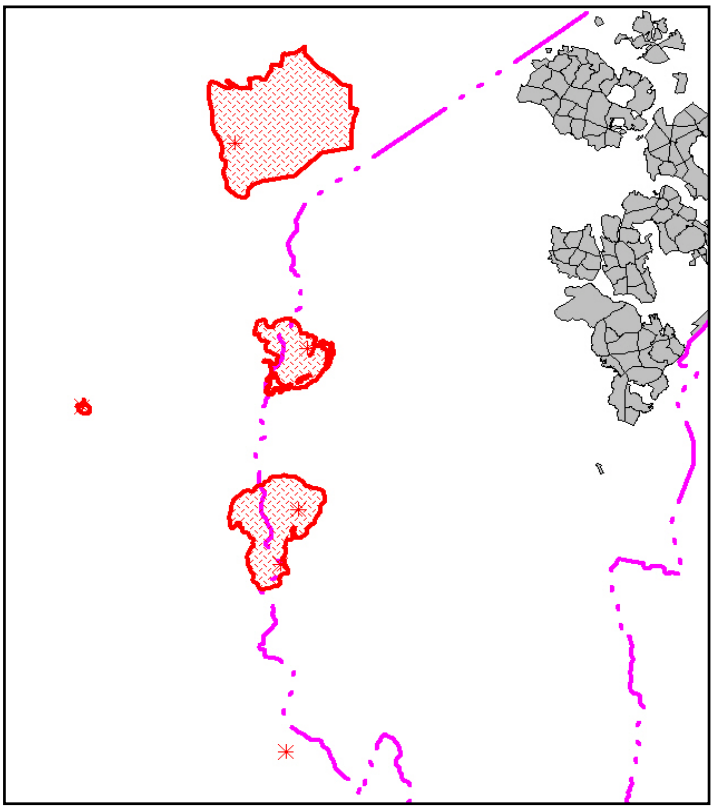
inaccessibility of the terrain. There was no suppression action being undertaken by ground crews throughout the day.

NSW continued to achieve burnout of the McIntyres Fire within containment lines with no ACT assistance.

Resources requested through EMA arrived. These consisted of the water bombing military aircraft and observation military helicopters and the 4 Army dozers.

The SMT put in place via Canberra Connect efficient channels to inform the ACT public on progress of the ACT bushfires.

15 JANUARY 2003



A meteorologist from the Bureau Of Meteorology commenced attending the routine Planning Meetings, providing specialist weather services. Forecast for the weekend and Monday indicated to the SMT the likelihood of severe fire weather and the need to complete containment operations before this forecast severe weather eventuated. From Wednesday 15 January, the ACTFB attached a number of staff to the planning cell of the SMT to enhance the liaison link between the two services.

The Bendora Incident Controller for the day was a Group Officer. With strong containment lines now established, ignition of the perimeter of the burnout blocks was achieved by the ACT ground crews. The fire continued to expand towards the west and threatened Brindabella Valley (NSW), this part of the fire

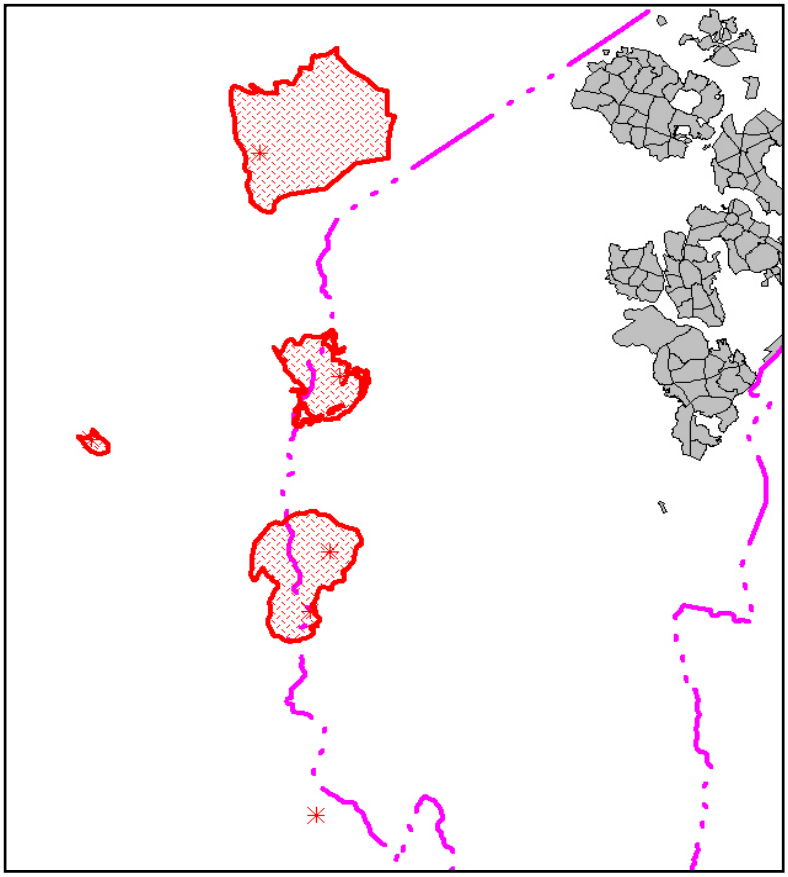
was being managed by NSW resources. NSW commenced a back burn along the top of Honeysuckle Track linking into the ACT containment line.

The Stockyard Fire expanded slightly. The SMT did not resource this fire with ground crews due to safety concerns and the need to task all available resources to complete the objectives for the Bendora Fire. Heavy plant continued to establish new containment lines to the north. The SMT addressed the need for long distance containment lines and in consultation with the Deputy CFCO appointed as the Incident Controller, tasked dozers to upgrade the Leura Gap Trail and the Lickhole Road.

A meeting between the CFCO and NSW Rural Fire Service Commissioner and the Director General NPWS discussed the ACT situation and the need of the ACT for NSW assistance. NSW agreed to provide four taskforces and IMT resources as requested by the CFCO. These four taskforces each of 5 units with command vehicles would be capable of 24 hour operations and expected to arrive in ACT for operational shifts commencing 1800hrs on 16 January 2003.

Requested through EMA one 30 000 litre water tanker to fill portable reservoirs.

16 JANUARY 2003



The Bureau Of Meteorology continued to forecast severe fire weather. On this basis the CFCO declared a Total Fire Ban for five days (16/01/2003 until 21/01/2003). This unprecedented imposition of a Total Fire Ban for such a lengthy period was given prominence in media interviews to emphasis the severity of the conditions likely to be experienced.

On the morning of the 16 January the Executive Director, ESB and CFCO, along with the Chief Executive, Department of Justice and Community Safety briefed Cabinet on the fire situations and possible developments. In the afternoon of 16 January the Executive Director provided the same briefing for the Chief Police Officer for the ACT and Commander Operations, AFP.

The smoke produced by the fires significantly hampered efforts to accurately determine the fire front. In order to obtain an accurate picture of the progress of the fire line scans were performed periodically during this time. A line scan utilises remote scanning technology including the use of infra-red cameras carried by fixed wing aircraft.

In the afternoon of 16 January the CFCO provided a comprehensive briefing on the fires for the Fire Commissioner and senior operations staff of the ACT Fire Brigade. As conditions deteriorated, and on advice that Monday 20 January would see extreme weather conditions, the ACTFB formed their own internal IMT to supplement the SMT.

A number of activities were commenced by the Fire Brigade in preparation for a prolonged fire danger period and included vehicle and inventory checks, the allocation of command and control responsibilities to staff (which was notified to the SMT), the preparation of contingency plans for interface protection, and the purchase of satellite phones for operations in areas outside those areas covered by the ESB radio network.

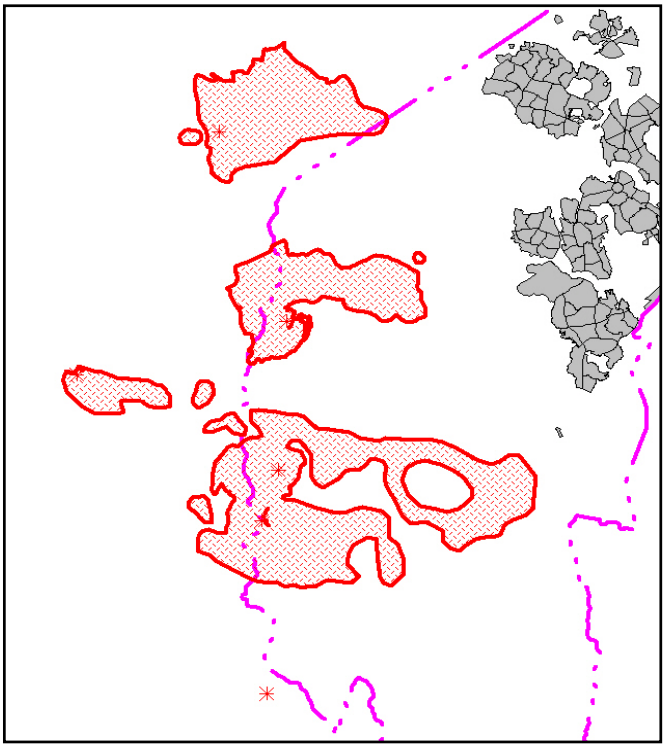
Given the conditions under which these fires were burning, suppression or control of the fires before the extreme fire weather days occurred was recognised as being difficult. Bendora Fire continued to expand in the Brindabella Valley in NSW. In the ACT it jumped containment lines in the northern corner. The Incident Controller, a Group Officer, put in place new containment lines, which held.

The first shift of 4 taskforces from NSWRFS arrived in the ACT late afternoon and were deployed to the south of the Stockyard fire to undertake the intended backburning operation inside the constructed containment lines.

The Stockyard Fire continued to expand slowly in all directions, but moving also toward Corin Dam. Dozer work to the south continued under the control of a Deputy CFCO. The SMT and Incident Controller felt that this work had progressed sufficiently to permit backburning from the dozer line that night. However, a vehicle accident blocked access along the dozer line preventing any backburning operations from taking place overnight due to concerns about firefighters safety and entrapment if the burn proceeded.

ACTAS formally requested assistance from Ambulance Service of NSW (ASNSW) by way of ambulances and crews.

17 JANUARY 2003



The Bureau Of Meteorology weather forecasts indicated this was the start of a run of severe fire weather. The SMT reviewed objectives on this basis and worked with Incident Controllers to ensure crew safety and achievability of objectives.

ASNSW resources arrived and were tasked to support bushfire operations in remote areas.

The ACTFB was updated on the likely fire developments to ensure their preparedness. Friday 17 January became a day of major preparedness and planning activities by the ACTFB IMT that included backburning operations at Tharwa and Tidbinbilla on behalf of the ACTBS.

The following activities were undertaken by members of the ACTFB on Friday 17 January, all on the basis of advice from the ACTBS that Monday 20 January was expected to be the worst day of extreme fire danger and adverse weather conditions.

Recall	A number of off-duty staff were contacted and placed on alert for recall duties for the period 18, 19 & 20 January should they be required. Off-going crews were also advised to take their firefighting gear home with them.
Access Points	Operational crews were requested to undertake familiarisation activities in interface areas to identify access points/tracks and safe zones for fallback.
Vehicle Readiness	All front line and reserve pumping appliances were readied for deployment, ensuring appropriate firefighting equipment was available.
Back-up Supplies	Stocks of firefighting supplies were assessed and a number of equipment suppliers were identified should additional supplies be required at short notice.
COMCEN Staffing	Additional COMCEN operators were assigned to deal with the additional workload in compliance to COMCEN operating protocols for increased fire danger indices.
Field Command	An additional operational District Officer was activated to enhance ACTFB incident command and control capabilities taking the number of DO's to 3.
Portable Radios	A number of additional portable radios were placed into service to complement the additional staffing.
Interface Hydrants	Operational staff were tasked with checking hydrants on the interface areas between Duffy and Bonython.
Inter-State Assistance	Calls were made by the ACT Fire Commissioner to the NSWFB to seek resources on stand-by for dispatch to the ACT should conditions worsen for Monday (the day of the forecast worst day).

Community Alerts	In conjunction with the SMT rural lessees (47 in total) in outlying areas were contacted and advised of potential fire danger and to prepare their properties for possible impact. These alerts were also provided to ACT Housing for the settlements at Stromlo, Pierces Creek and Uriarra to ensure evacuation procedures were in place and that firefighting systems were serviceable.
Institution Notifications	Institutions on urban fringe areas were identified and advised by the Fire Safety Unit to ensure emergency procedures were in place. These included; CSIRO, Ainslie Village, and Mt Stromlo Observatory Australian National University (ANU). Restaurant bookings at Mt Stromlo were ascertained in the event that evacuations may be required.
Smoke Detection Systems	All ACT Fire Protection companies were notified by the Fire Safety Unit and advised to consider the isolation of sensitive smoke detection equipment in buildings to ensure the ACTFB was not overwhelmed by false alarms.
Tharwa Water Supplies	The Captain, Southern Districts Volunteer Bushfire Brigade was contacted to seek information on the availability of water supplies at the village of Tharwa.
Mapping	Topographic maps of ACT rural areas and interface areas were prepared and distributed to each Station.
Evacuation Centres	Liaison occurred with the Recovery Coordinators under the Emergency Plan to identify likely evacuation centres.
Water Supplies	ActewAGL was contacted and requested to increase water pressures on western interface areas. ActewAGL advised this was not possible. ActewAGL were also advised of possible threats to Cotter pumping Station, Stromlo treatment plant and Lower Molonglo treatment plant.
Structure Protection	The ACTFB was tasked by the ACTBS to undertake back-burning operations and provide structure protection in the Tidbinbilla-Tharwa area.

The McIntyres Fire broke its eastern containment line and made a run towards the ACT in the vicinity of Blue Range. This fire continued to be managed by the Yarrowlumla S44 Controller, with whom the SMT was in frequent liaison. The SMT emphasised assessment of risks to ACT assets.

Under the control of a Deputy Captain from the Parks Brigade, firefighting crews consolidated containment lines around the Bendora Fire in the ACT. The Incident Controller sought to augment these containment lines with a back burn to the north along Mt Franklin Road. This was based on an assessment of the risk of the fire coming out of NSW. Early in the afternoon the fire jumped containment lines in the north east corner and headed for Bendora Trig.

After failure of initial attempt to control this breakout, the Incident Controller evacuated the ground crews from this part of the fire. During the afternoon the fire near Brindabella Valley made a run towards Bulls Head. When this happened the Bulls Head Staging Area was evacuated, leaving the entire Bendora Fire unattended due to concerns about fire fighter safety.

The Bulls Head Staging area was a forward logistics base under the command of an ES Brigade Commander reporting to the logistics officer in the SMT. The services provided by this logistics base included:

- Aircraft refuelling;
- Crew change over co-ordination;
- Briefing point; and
- Meals.

The fire crossed Mt Franklin Road in the evening and headed towards the Cotter River, which it crossed and then burnt over the Tidbinbilla Ranges.

Early in the night the SMT was advised of the fire threatening assets and property in the Paddy's River Valley. In response to this threat the SMT appointed a Group Officer to control resources evacuating from the Stockyard Fire, and other resources despatched from the city to protect property in the valley.

Under the control of a Group Officer who had been appointed Incident Controller, effort at the Stockyard Fire focussed on building a northern containment line, and progressing previous efforts to the south. Fire weather conditions deteriorated rapidly through the morning and the Incident Controller and SMT agreed that to ensure firefighter safety the firefighters and heavy plant operators had to be withdrawn to the Orroral Valley Staging Area.

Field reports in the early afternoon indicated that the fire had spotted over Corin Dam and was moving rapidly to the east. The SMT response to this was to divert aircraft for water bombing operations, and to assess risks to property to the east. Some crews were sent to the Corin Forest Ski and Recreation area for property protection under the control of a Parks Brigade Deputy Captain.

Out of sight of any observers, the southern flank of the Stockyard Fire had spotted over the Orroral Valley. The northern flank of the Stockyard Fire moved rapidly to the east over Corin Forest and reached Mt Tennent early in the night. The SMT worked with the Incident Controller and officers from

NSW to ensure property protection was being provided in response to these developments. At about this time additional NSW resources arrived in Canberra, and they were immediately deployed by the SMT. The SMT organised a shift change to allow operations to continue overnight.

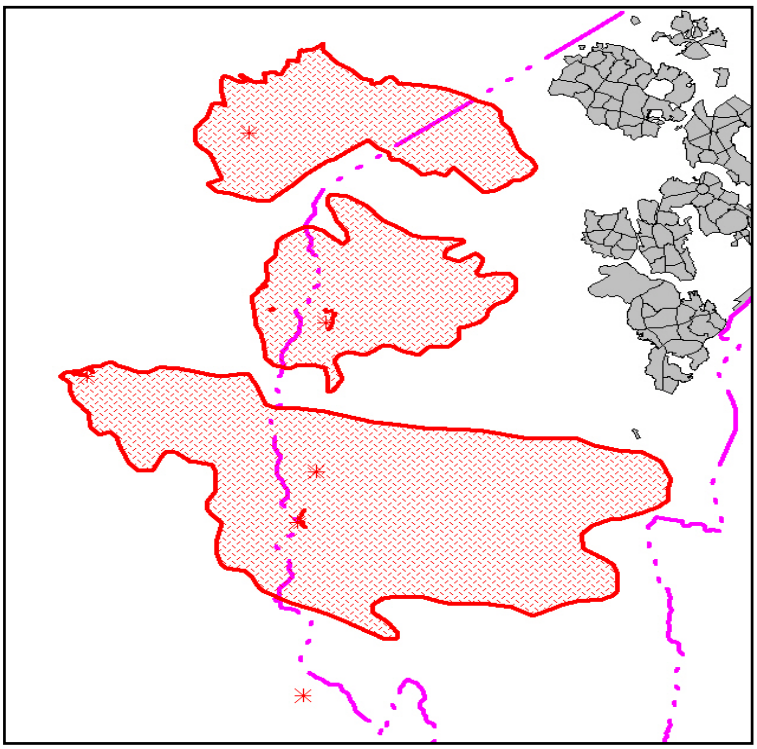
A strategic focus in the Tharwa area was a protection burn to reduce risk to the village and this protection burn was undertaken overnight.

Fire fighters in those rural areas then responded to threats to individual rural properties and to the threat to the Tidbinbilla Nature Reserve and properties.

Warnings were immediately issued to rural properties felt to be under immediate threat by the IMT. Further warnings were provided through the media by the SMT.

On 17 January a coordination meeting between ACT representatives and the NSW Rural Fire Service Commissioner took place to discuss the worsening situation in the region.

18 JANUARY 2003



Midday 18 January 2003

At 0800hrs a meeting was convened with Canberra Connect to arrange close liaison between the ESB and the Canberra Connect Call Centre.

At the morning Planning Meeting, at approximately 0930hours, the Bureau Of Meteorology advice was that today would bring extreme fire dangers, with perhaps worse to follow. All agencies involved in the incident were briefed on the implications of this. A Total Fire Ban was in force. At this meeting, the SMT agreed to a request to EMA for the provision of additional plant from the military.

ACTAS advanced its capability through recall of staff. This was supplemented by further ASNSW resources and later in the day ASNSW provided a dedicated liaison officer at ESB Headquarters. A Medical Emergency Coordination Centre (MECC) was established at ESB Headquarters, and staffed continuously by ACTAS managers and by representatives of various

support agencies. The ASNSW presence was maintained until the 29 January, and the MECC was maintained until the 30 January.

A number of ACTFB activities were also undertaken by the ACTFB in light of the extreme fire danger and predicted weather conditions. Those activities were implemented in the event that the containment lines may not hold. These were as follows;

Planning	A planning meeting was conducted by the IMT and was followed by a briefing from the SMT. The SMT advised that weather conditions over the next few days would remain extreme until after Monday 20.
Risk Management	A District Officer and pumper crew attended Mt Stromlo water treatment plant (Chlorine facility) with ActewAGL staff to review plant shut-down and staff evacuation procedures. Following this assessment the DO went to the Stromlo Café and checked with reservations for that day. The emergency plan for Mt Stromlo observatory was implemented by ANU staff on advice from the ACTFB. A site evaluation was undertaken by Brigade crews at the RSPCA facility in Weston
Liaison	A liaison officer was assigned to the Police Operations Centre at the Winchester building.
Inter-State assistance	NSW Fire Brigades assistance was requested and a task force was subsequently despatched from Sydney.

Overnight and I the early morning of 18 January the major fires runs in the Tidbinbilla and Paddy's River Valleys had died down with the abating conditions, allowing the Incident Controller to assess the damage so far, and likely future risks. On the basis of this the SMT and the oncoming Incident Controller, a Deputy Chief Fire Control Officer adopted an objective which emphasised protection of people and property. The strategy had changed with the deteriorating conditions from fire fighting to protection.

All resources were tasked.

The eastern flank of the McIntyres Fire continued to expand and move into the ACT, crossing Mountain Creek Road late in the morning. The south western flank of the McIntyres Fire broke its containment lines in the early morning and burnt through Flea Creek and onto the Brindabella Range between Mt Coree and Picadilly Circus. The north flank of the Bendora Fire expanded and joined the McIntyres Fire at Picadilly Circus. The Bendora Fire jumped containment lines on Flat Rock Spur and burnt over Bendora Dam. The Broken Cart Fire in Koscuizsko National Park burnt over Mt Franklin and joined with the Bendora and Stockyard Fires. The Stockyard Fire continued to make major runs to the east, towards Ingledene, Naas, and Glendale. The now combined fire burnt into rural grasslands along a 50km front. The Incident Controller allocated resources to assist the residents in structure protection.

The SMT utilised all available sources of information, including the Incident Controllers and the public, to assess the situation and likely risks, especially to the urban interface. Once again the dense smoke continued to make it very difficult to track the fire front. Attempts using line scans, NSW aircraft, helicopters, remote sensing devices from ATI Ltd and satellite photographs were used.

In response to this the SMT advised the Incident Controllers of threats east of the Murrumbidgee, enhanced urban readiness in cooperation with the ACT Fire Brigade, upgraded public information channels, and participated in making recommendations for a proposed declaration of a state of Emergency by the Chief Minister.

At this point it was felt that all rural properties south and west of the city were under immediate threat. It was also recognised that any major fire runs from this point on could impact on the urban edge from Dunlop through to Gordon.

In preparation for the possible impact of the fire into suburban Canberra, the SMT liaised with the ACTFB management to ensure that all practicable preparations were undertaken. Issues discussed included strategic deployment of resources, defensive structural support by ACTBS and NSWRFS resources, command, control and communication arrangements, and the areas most likely to be under threat.

The Media Unit attached to the Planning Section of the SMT was tasked with preparing, having approved, and disseminating advisory notices to the community about the threatened areas. The nationally agreed Standard Emergency Warning System (SEWS) was broadcast by the media to alert the public of the impending threat.

At approximately 1400hrs a discussion occurred about the vulnerability of the urban area and the desirability of declaring a State of Emergency pursuant to the Emergency Management Act. Participants in this discussion included the Chief Minister, Chief Police Officer, Chief Executives of the Chief Ministers Department and the Department of Justice and Community Safety, the Chief Fire Control Officer, the Fire Commissioner and the Executive Director, ESB.
The Chief Minister was advised unanimously that the circumstances then existing met the Statutory test for the declaration of an emergency and that an emergency could be declared. There were considerable discussions surrounding the range of powers of the Territory Controller and the Chief

Police Officer indicated that Police did not have the power normally for forcible evacuations except that power was available to the Territory Controller under a Declared Emergency. A concern at the time was that control and direction of the fire fighting effort by the CFCO and the structure which had developed under him, should not be compromised. This concern centred on the ambiguity that might occur in relation to the respective roles and authority of the CFCO and the Territory Controller once the declaration was made.

It was agreed that the Chief Minister would declare a State of Emergency and that the Territory Controller would then, with the Chief Minister's approval, appoint the CFCO as Alternate Controller, pursuant to Section 23, Emergency Management Act. In this way it was intended that the fire fighting effort would continue to be directed by the CFCO/ Alternate Controller and the Territory Controller would be responsible for managing other impacts of the emergency. The declaration of the emergency was made at 1445hrs and subsequently issued to the media for public dissemination using the SEWS.

Fire penetrated into the urban edge for up to 1 km, due to the combined action of three processes: scale effects; embers; and house-to-house spread.

The urban edge was also affected by a tornado that arrived at Weston Creek from the west just as the ground fire arrived. The tornado was generated by a pyro-cumulonimbus cloud on the fire's convection column, and steered by upper westerly winds. There may have been more tornado type events in remote locations. ACTES volunteers were activated also to respond to wind damaged houses also in the Weston Creek area.

The fire runs to the southeast on the 18 January caused massive damage in rural areas, and claimed 4 lives and caused enormous damage on the urban edge. The scale of the event was well beyond anything seen before in the ACT and surpassed, by many orders-of-magnitude, the capability of the local and interstate resources gathered to protect the community. Nevertheless, it is likely that a ratio of two urban houses were saved for every one lost, due to the combined efforts of the community and fire crews.

The ACTFB was advised that the fires were continually breaking containment lines, and that the SMT was not able to predict exactly where along the western interface the fires were most likely to impact. After taking into account the pine plantations on the western interface of the Weston Creek area, it was decided to deploy resources into this relatively high-risk area. Listed below are the ACTFB activities undertaken on the afternoon of 18 January and immediately prior to and during the fire impact.

Reconnaissance	Due to the uncertainty about the fire situation, 2 senior Brigade officers drove to the Cotter and then Uriarra homestead areas to undertake reconnaissance and then return.
Deployment	A strike team consisting of 2 urban pumpers, tankers, support vehicle and operational command was despatched to Duffy to implement an interface defence line along Eucumbene Drive. In addition a support vehicle with extra standpipes and hoses was sent to support the strike team. A strike team was deployed to the Lower Molonglo Treatment Plant in light of its significance as a major Territory resource, and information that it may be under possible threat. This initial task force consisted of 1 urban pumper, 2 tankers and a District Officer, but was supplemented by a second pumper when crews advised that they were being overwhelmed by a fire front. 2 urban pumpers were responded to a number of houses alight in Giralang. As information was received that a major firestorm

	had struck, all remaining pumpers were despatched to the Duffy, Chapman and Kambah areas.
Re-call	As the two strike teams were deployed, the pre-planned re-call arrangements were initiated to staff all spare appliances. Additional District Officers were re-called to undertake incident command functions. Senior Officers were compelled to coordinate ACTFB activities from within the CCOMCEN back room of the HQ building, as the Bureau's operations centre was fully occupied by the ACTBS operations.
Inter-State assistance	The NSWFB resources arrived at approximately 1900hrs and after being briefed were tasked to assist under ACTFB control.

Firefighting activities continued throughout the night in the Weston Creek area however difficulties were experienced in coordinating crew change-overs as this meant the systematic removal of working crews from the scene. Change-overs for the ACTFB were also hampered by the fact that a number of ACTFB pumpers had been rendered inoperable resulting in some crews had reported for rostered duty, but with no vehicles to utilise.

Critical Incident Stress Management (CISM) peer support arrangements were in place to greet all off going crews to provide peer support. A major crew consideration was for the sustainability of many crew members who had been working in the vicinity of 24hrs continuously.

The impacts at the end of 18 January 2003 are outlined below.

Despite firefighting efforts, virtually all forest west of the Murrumbidgee River was burnt. This included Tidbinbilla Nature Reserve, Namadgi National Park and the pine plantations. Also, Stromlo Pine Plantation, east of the river, was destroyed.

Large areas of grazing land and associated infrastructure were burnt, with 89 rural residence destroyed and 14 more affected. Firefighting efforts by fire crews and locals saved many structures and assets.

In the urban area, 414 houses were lost, but the efforts of residents and firefighters saved more than twice that number. A further 161 residences were affected by the fire.

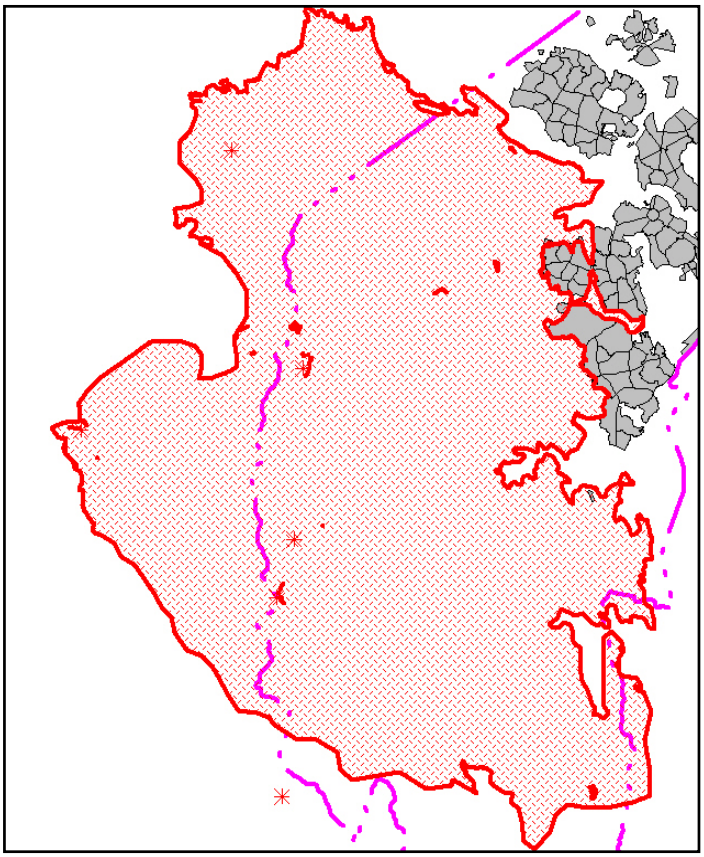
Numerous infrastructure impacts occurred, although the efforts of their managers staff and fire agencies prevented much more.

- Roads and bridges were damaged.
- Electricity supply lines of a range of voltages were damaged.
- Electricity substations were damaged.
- Telecommunications sites and cables were damaged.
- Gas supply was interrupted when houses burnt and breached the lines.
- Water supply was also disrupted locally.
- The Lower Molonglo Water Quality Supply Centre was burnt, but was brought back on-line before the holding ponds reached overflow capacity.

A number of significant sites were impacted to varying degrees:

- The RSPCA site was burnt.
- The Weston Police Depot was damaged.
- The Australian National University lost structures at Weston and Mount Stromlo.
- CIT lost buildings at its Weston Campus.
- ACT Forests Headquarters was destroyed.
- Various government depots were damaged or destroyed across the ACT.
- Fire stations were damaged.
- A petrol station was destroyed.
- A school was damaged.
- A government health laboratory was destroyed.
- A veterinary hospital was destroyed.
- The fires burnt a total of 260 000ha, with 160 000ha within the ACT and the rest in NSW.

19 TO 30 JANUARY 2003



January Firestorm final impact

The focus of operations changed from the previous day in that the main fire storm had passed and a major effort was needed to begin recovery operations. These recovery operations also had to be balanced against the ongoing extreme fire conditions predicted for several days during this period, and the possible further impact on the ACT from fires in NSW to the northwest (McIntyres Fire).

NSWFB taskforces were employed, under the direction of an ACTFB District Officer, to begin the systematic task of searching fire damaged houses for possible victims and to ensure the stability of structures. An offer of assistance was received from the Queensland Fire and Rescue Service, and was accepted, to assist with ongoing interface protection on the northside in the coming days.

The ACT's Aviation Rescue and Fire Fighting organisation was also utilised throughout this aftermath period, providing large capacity fire fighting tenders to support the ACT fire fighters.

Heavy plant was used extensively around the northwestern through to the southern urban/rural interface areas establishing continuous, wide containment lines. These were constructed to stop any run of fire that may flare up following the 18 January fire events, and any new fires that may have started after the 18 January.

Between the 19 January and 26 January significant resources from the ACTBS were deployed along the western edge of Clear Range in the south to establish containment lines. These resources were supported by aerial support from Firebird 7.

Between the 21 January and 31 January the ACT responded officers and firefighters to the southern part of Namadgi National Park for fire suppression of the southern flank of the fire, asset protection around the Gudgenby Homestead and containment line construction on Booth Range.

On the evening of the 29 January fire threatened to break the containment line to the west of the NSW township of Michelago. The ACT was requested by the Yarrowlumla Shire S44 delegate to provide fire fighting assistance in this area. The SMT agreed to this request and 6 ACT appliances, under the control of an ACTFB District Officer, were immediately responded to this area. These units were progressively released overnight as the fire situation abated.

Significant effort went into providing advice about the current and potential fire situation to the public through the media, through Canberra Connect, and with additional information being made available on the ESB website being managed by Canberra Connect. Additional firefighting crews and other emergency service organisations on the ground provided advice and assistance to the public.

A daily teleconference was set up between the NSW Fire Control Centres at Tumut, Cooma, Yass, and Queanbeyan, and the ACT to discuss incident management issues as some of the fires in those regions had various potential to still threaten the ACT or the immediate surrounding rural areas of NSW.

Between the 19 January and 31 January, 11 of the 13 days were declared as days of Total Fire Ban.

The declaration of the State of Emergency was revoked by the Chief Minister on the Tuesday 28 January 2003.

RECOMMENDATIONS AND THE FUTURE

ESB RISK MANAGEMENT CAPACITY

The January bushfires demonstrated that various components of the RMU need additional resources to increase its capacity to prepare for and cope with the increasing complexity of emergencies. Elements that need additional capacity are in Spatial Analysis (outlined below) and Community Awareness (mentioned elsewhere in this submission).

GIS AND SPATIAL ANALYSIS CAPACITY

The January fires demonstrated the critical need for a GIS and spatial analysis capacity particularly when dealing with large, prolonged fire events. The lack of integral mapping capability with data input from various field sources was a limiting factor in ensuring comprehensive disposition and predictive modelling maps were available in a timely manner for operations briefings. Such information provided from this area is critical to emergency management at both strategic and tactical levels.

Essentially, the need is for comprehensive mapping and analytical capacity to track fires, to assist in the assessment of fire behavior and in monitoring firefighting responses. The ESB has this capacity in embryonic form (one person), but a long event requiring 24-hour duty rosters quickly exceeded that capacity which is an essential feature of modern bushfire fighting. New equipment is also required (ESB's map plotting equipment broke down during January fire).

The additional capacity required would be provided by a new GIS and Spatial Analysis Cell is needed in the Risk Management Unit to provide this support. This cell would be comprised of 2 additional technical staff with the relevant skills and associated hardware, technical equipment and software. This capacity would also provide technical support to all ESB services in analysing patterns of emergencies and assist in identifying new, or refinement of, response strategies.

URBAN FIRE TRUCKS DEFECTS IN DESIGN

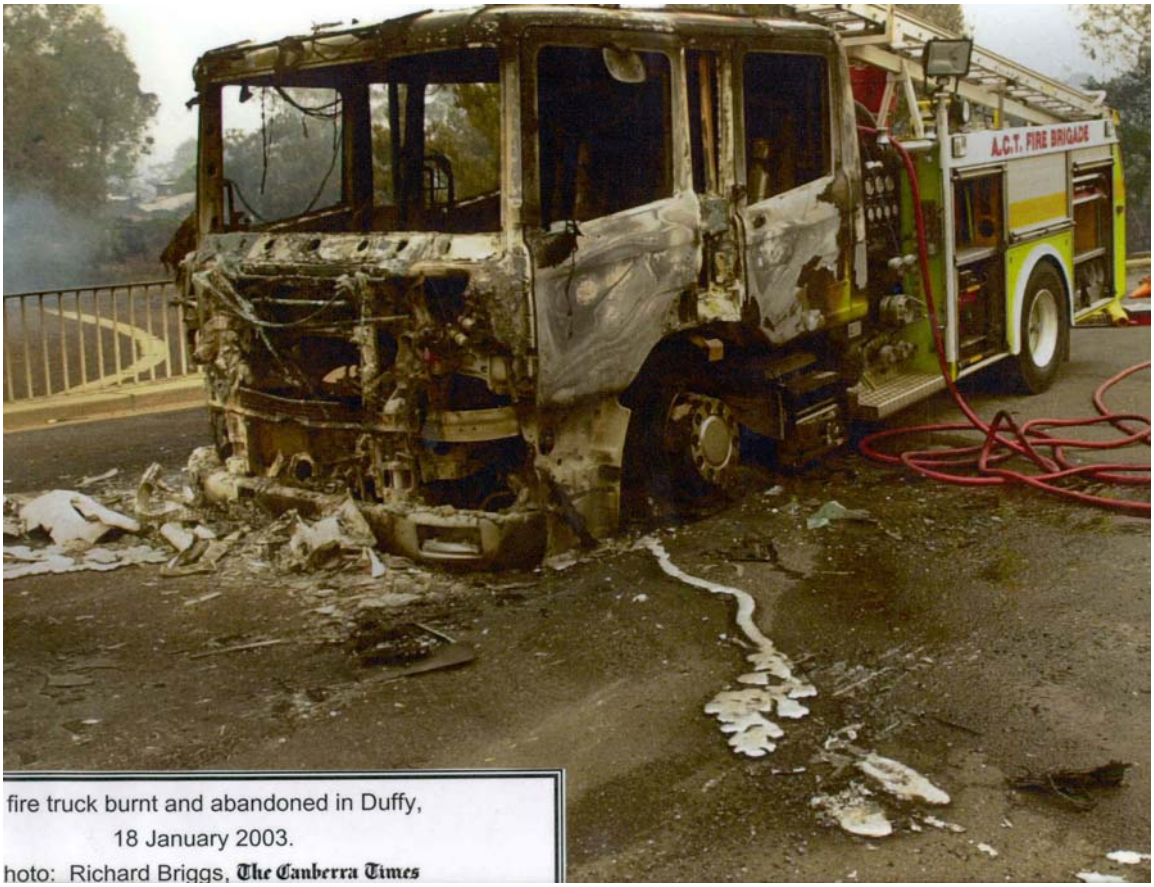
One issue which arose during the bushfires particularly when the fire impacted upon Duffy and at the Lower Molonglo Water Quality Control Centre, was a vulnerability of the Scania Urban Fire trucks. Five appliances broke down as a consequence of burning embers being ingested through the vehicles' air intakes. Burning embers set fire to the paper air filters used in these machines, partly caused by the intense airflow caused by the engine sucking in outside air. When the air filter burnt, the plastic housing melted and stopped any further air being sucked into the engine causing the engine to stop. When the engine stops the pumps on the appliance also stop. This caused an intense blaze which immobilised a number of appliances and resulted in the eventual destruction of one appliance.

This problem of embers caught in pumper air filters was encountered first by ACTFB Scania Series 3 appliance when attending a fire in 1999 at Bungendore. The air intake on those vehicles is located above the cab making it more likely that airborne embers would be caught in the incoming air. Following that incident Brigade Officers worked with Scania to develop a solution which would prevent a re-occurrence. The solution involved fire retardant filter materials.

The subsequent Series 4 version of these vehicles incorporate a design changing in that the air intake is re-located in a way which was thought to have eliminated the problem of ember ingestion. As a consequence of the problems encountered on 18 January, the issue is being pursued with Scania by the ACTFB on behalf of National Fire Services Fleet Managers.

Information has since been obtained that a similar problem with Series 4 vehicles has occurred in other jurisdictions but, regrettably, that experience was not conveyed to the ACT prior to the January fires.

Two appliances also suffered extensive damage to some exposed nylon air lines, in particular the park brake line coming from the dash and through the fire wall behind the front bonnet and air lines running down the chassis from front to rear including pump engagement lines. This was not a vulnerability which is expected in an urban appliance because of their normal conditions of use. A solution to deal with this problem has since been developed.



fire truck burnt and abandoned in Duffy,
18 January 2003.
hoto: Richard Briggs, The Canberra Times

PUBLIC INFORMATION AND ADVICE IN AN EMERGENCY

The Emergency Plan has a Media Sub-Plan but one of the learning aspects from the Christmas 2001 fires was that the sub-plan needed to be rewritten and broadened to be a Community Information sub-plan. Therefore, during 2002 the Executive Director, ESB met with managers of Canberra Connect to explore the possibilities of the Canberra Connect Call Centre being able to be used during an emergency for public information dissemination. It was also seen that there needed to be an authorative source other than Police and ESB for road closure advice in an emergency relieve the pressures on those emergency services call centres.

In parallel with those discussions with Canberra Connect, the Executive Director, ESB also gave a presentation on Emergency Management to a 'Communications Network' group of public relations (PR) staff across all ACT Government agencies, chaired by the Manager, Public Relations, Chief Minister's Department. From that briefing developed a list of PR expertise that could be drawn on to assist with media and public information dissemination in an emergency. A roster of those PR staff available over the Christmas/New Year 2002-2003 period was prepared including contact numbers. That network was drawn on from approximately 10 January 2003 reaching a peak of PR staff involved in public information from 17 January to approximately 31 January 2003.

Following submissions by their managers to the Canberra Connect Board on the need for the emergency escalation capability, approval was given for Canberra Connect to provide the increased capacity for public information

service in emergencies. The Executive Director, ESB, finalised the coordination arrangements with Canberra Connect on 18 December 2002. From 17 January 2003 the Canberra Connect Call Centre number (132281) and website were publicised in the media as being another source of information on the bushfires and related matters. Discussions between the Executive Director, ESB and Canberra Connect Manager on Friday 17 January 2003 arranged that the call centre would be staffed on the Saturday from 0700hrs to 1900hrs but as a result of the event the centre went to 24 hour operation from 18 January 2003 until the declaration of the emergency was lifted by the Chief Minister.

When ESB became aware on 18 January 2003 that the three major fires were spotting considerable distances the first of the Standard Emergency Warning Signal (SEWS) was issued to the media at 1345hrs on 18 January 2003. However it is understood that it was some time before some of the media received the formal message by fax. This message was also provided to Canberra Connect and the message listed the suburbs on the western urban edge in Belconnen and Weston Creek to be alert for approaching fires. It also provided advice on precautionary measures residents could undertake if fire approached their houses. The use of SEWS does not require a declaration of an emergency to be activated. During subsequent broadcasts of the SEWS during 18 January 2003 additional suburbs were added to those on the alert list.

Some of the issues to be addressed in relation to public information are:

- Improved alerting mechanisms for residents prior to an emerging danger period. (Some suggestions from the public have included air

raid type sirens; colour coding alert messages for increased threat levels, and specific SEWS message information to major shopping centres).

- Improved media communications systems and facilities at ESB HQ.
- Greater coordination of whole-of-government media release content and messages.
- Consideration of back-up power availability for the Canberra Connect call centre.
- Rewriting of the Community Information sub-plan of the Emergency Plan to reflect the broader needs than just media arrangements.
- Familiarisation sessions for the media prior to each bushfire season.
- Examine the need for an experienced Media Director to be available in an Emergency to coordinate media and public information messages.

URBAN INTERFACE FIRE FIGHTING AND PREPAREDNESS

The ACTFB has 9 front line urban fire fighting appliances with three second line back-up appliances. The ACTFB also cross crew's 2 tankers and 4 light tankers transferred from the Bushfire Service in addition to 3 tankers traditionally used by the Fire Brigade for providing back-up bulk water capacity. Perhaps the spares ratio for urban appliances could be reviewed, but apart from the January 2003 fires the response standards for ACT fire services are amongst the best in Australia. Even considering inter-state assistance arrangements, large scale emergencies can arise with relatively sudden impact that will inevitably over-run the standing fire fighting capability in a peak period of the emergency.

Apart from the obvious suggestion for more full-time staffed fire appliances at considerable cost, it may be more appropriate to explore the concept of Community Fire Units that have been a success in some communities in NSW.

COMMUNITY FIRE UNITS

Following the 1994 bushfires in NSW, street based units were set up in some fire prone areas adjoining bushland in Sydney's Southern suburbs. These units are supported by the NSW Fire Brigade and have since been expanded to include areas in the Blue Mountains. Community groups are provided with a trailer of equipment (stand pipe, hose, etc) and given training in its use. It is intended as a self-help initiative which equips local communities to protect their properties more effectively than is now possible (with garden hoses, etc) when fire fighting appliances are unavailable or delayed. There have already

been suggestions from residents in a number of areas (Chapman, O'Connor) who are very interested in this concept.

These types of units would boost the effective fire fighting capability at considerable savings compared to increasing the standing full-time capability. It may be worthwhile considering a number of such trial units for evaluation in Canberra.

In addition to Community Fire Units there is the need for increased community awareness and education programs to be provided to various cross sections of the community.

COMMUNITY FIRE AWARENESS AND PREPARATION

Managing the threat of bushfires is becoming increasingly complex. With the emergence of urban/bush interface communities, issues such as the efficacy of any evacuation advice, the development of effective warning systems, and the creation of self-reliant and resourceful communities needs to be improved. The growing community desire to conserve our natural environment will need to be reconciled with fuel reduction burning, firebreak construction and other environmental modification strategies. The limitation of traditional fire suppression and prevention strategies under major bushfire conditions will need to be more widely understood by land managers and communities alike.

In the face of these challenges, the fire management agencies of the ACT will need to be able to draw upon a diverse but integrated mix of strategies to effectively manage the bushfire threat. The most appropriate mix of strategies for any particular community will vary enormously. For example, fire brigade

authorities charged with protecting traditional urban only communities will employ substantially different fire protection strategies than those agencies concerned with urban/bush interface communities, plantations or national parks.

Traditionally, the options for reducing the bushfire threat have been confined by the notion that hazard is influenced only by features of the environment. Broadening our understanding of hazard to include all factors that make a particular community vulnerable to bushfire, including those less tangible factors such as the extent to which a community understands the bushfire threat and the resulting survival strategies developed by that community, will dramatically increase the options for ACT fire authorities and land management agencies.

The ACT has a large property exposure to bushland on its urban periphery and on the margins of parks within the urban area. Preparation of these properties to minimise fire risk clearly requires improvement if the last minute rush of the January fires is to be avoided in future. Essentially, the task is one of improving community education, risk assessment and provision of more effective, on site advice to occupiers. A program could include community awareness campaigns, encouraging self-help, advice and training, risk assessment, working with existing landcare and similar groups and providing more specific advice to residents in areas at risk.

The RMU within ESB is a very small unit and currently has very little capacity for broad scale community education programs such as envisaged. Without

additional resources in this area this more intensive program cannot be delivered. It is suggested that a Community Support Officer should be employed to deliver such a program.

COMMUNICATIONS

It is recognised that the radio communications systems did not meet the substantial demands created by an event of this magnitude. Some of the problems experienced included:

- Severe congestion of voice traffic due to the urgency of many events on 18 January and the sheer number of units attempting to access the communications system in a very short space of time.
- Apparent loss of some voice communications apparently due to the affect of the dense smoke shielding reception.
- Difficulty in ground to air communications for some aircraft due to different operating frequency bands and modulation application.
- Interoperability communications issues with NSW RFS were exacerbated due to the fast moving nature of the fire and the dispersal of units away from the liaison points with the taskforces.

Given the operational and business requirements of the ESB, performance and reliability, together with redundancy and survivability, are essential features of its communications and IT systems. For a variety of reasons,

including Year 2000 compliance, the upgrading of the current communications systems within the COMCEN was commenced in 1999.

In broad terms the ESB Communications Upgrade Project seeks to provide a contemporary public safety industry standard integrated communications system. This system will improve the ESB's overall emergency service delivery and meet current and future business requirements consistent with contemporary 'public safety' industry standards. Major benefits of the upgraded system include:

- Improved core business capability and service delivery to the community;
- Improved inter-agency and cross border interoperability;
- The provision of strategic systems survivability and redundancy;
- The improvement of technical support arrangements; and
- The provision of a major component of a common communications platform for all emergency services.

COMMUNICATIONS UPGRADE

PROJECT HISTORY

There was an unsuccessful Budget submission in 1998-1999 for funds to resolve Y2K issues, upgrade the existing computer aided dispatch systems (CAD) and the existing radio infrastructure.

The budget proposal was resubmitted for the 1999-2000 ACT Budget and funding was approved to resolve the Y2K issues and procure a new CAD. The proposed radio upgrade was deferred by the government for later consideration after a further business case was developed.

Y2K ISSUES

- In 1999-2000 the Y2K issues relating to the ESB voice communications systems and existing dispatch systems were addressed.

NEW CAD

- In 2000 preparatory work was undertaken for developing the CAD specifications.
- In February 2001 the ESB commenced development of Statement of Requirements & Request for Tender (RFT) documentation for the new CAD system.
- In November & December 2001 respectively, the Approved Procurement Unit and Government Procurement Board approved the RFT for release.

- In January 2002 the new CAD Tender was released and subsequently closed at the end of February 2002.
- The tender responses were extensively evaluated from March to July 2002.
- The Tender Evaluation Report was submitted to, and approved by, the ESB Steering Committee in early July 2002.
- In July 2002 the Tender Evaluation Report was provided to the Delegate (CEO Department of Justice & Community Safety) for approval to progress to Preferred Tender status, contract negotiation and implementation.
- From August to December 2002 there were ongoing discussions between the Department and Treasury regarding the CAD funding structure to address a shortfall in funds.
- On 14 January 2003 approval was received from the Delegate to confer Preferred Tenderer status on Fujitsu Australia and proceed to contract negotiation and subsequent implementation.
- Contract negotiation commenced in February and a Contract was signed on 3 May 2003.
- The implementation phase of the new CAD project is planned to start on Contract signature and be completed by early December 2003. That is, the new CAD system is expected to be operational in December 2003.

The new CAD solution to be provided under the Contract with Fujitsu will also include the mobile data system (MDS) and automatic vehicle location system

(AVL) for the services, and a direct turnout system (DTS) for the fire brigade. The following provides a brief outline of the systems:

- **CAD System** – this system will primarily be an 'off the shelf' CAD system that is currently operational on numerous emergency service sites in the UK and NSW. The CAD will provide a common multi-agency CAD platform for all ESB operational services. The system provides the necessary functionality for structured call taking, dispatching and coordination of emergency service resources to incidents in both an emergency and non-emergency setting. The CAD will interface to a range of sub-systems to improve and where possible automate resource activation and communication processes including MDS, DTS, paging, fax and messaging systems.
- **Mobile Data Sub-System** – The AVL component of the sub-system will provide real time information to the operators on the location of ambulance and fire brigade resources. This will ensure the allocation of the most appropriate and nearest resource to an emergency and improve safety for crews. The mobile data component of the sub-system will support the resource activation process and enable the provision of incident details and update information to the crews. This sub-system will provide a growth path for implementation in other ESB operational service (Bushfire & Emergency Services) once the radio infrastructure in rural areas is upgraded.
- **Direct Turnout Sub-System** – This sub-system will provide a predominantly automated activation process for fire brigade resources in fire stations. This will primarily include the activation of station turnout signal, automated voice announcement, incident printout and

door opening/closing. This sub-system will provide a growth path for implementation in other ESB operational service stations over time.

PROPOSED NEW RADIO SYSTEM

A budget proposal was submitted for the 2002-2003 ACT Budget and funding was approved to obtain specialist assistance to review our existing radio infrastructure and develop future options to upgrade or replace it. This activity included the development of a business case to support a budget proposal for the 2003-2004 financial year.

Specialist advice was recently provided to the ESB on the options for upgrading or replacing the existing radio infrastructure. These options broadly are as follows:

1. Upgrade existing Private Mobile Radio (PMR) systems;
2. Procure new urban digital trunked and rural PMR radio systems;
3. Procure a new analogue trunked and separate mobile data radio system; and
4. Procure a new urban & rural digital trunked radio system.

It would appear that option 4 is seen as the best long term option for the replacement of the existing radio infrastructure.

This project will provide an effective multi-agency mobile radio communications system and associated equipment to provide quality emergency services support to the citizens of the ACT. The project includes provision of:

a. A shared radio system that provides common access for all agencies for both voice and data with improved geographic coverage across the ACT and near region

b. Improved vehicle mounted and personal handheld portable radio communications devices used by front line fire fighters, paramedics, emergency service and land management personnel

c. Improved mobile data capability for the exchange of time and mission critical information between front line that will be integrated with the new computer aided dispatch system to improve response times

d. Automatic vehicle location (satellite based) equipment to enable the rapid and accurate selection and dispatch of the nearest and most appropriate resource to be responded to an emergency. This will also provide improved capability for resource management within any area of operations during an emergency situation

e. Emergency radio relay equipment to support front line personnel, deployed field command units, and ground-to-air capability

f. of care to front line personnel through duress alarms that interface with global positioning systems that will locate the person in extreme emergency

g. Improved ability to interface with the radio communications used by other organisations that are called upon to assist the ACT.

A budget proposal has been submitted for funding over four years commencing in the 2003-2004 financial year to replace the existing radio infrastructure.

This replacement proposal is essential to overcome some of the communications issues that stem from both the historic separate frequency boards for each of the services and some of the geographic features in the Territory.

LEGISLATION

There are a number of relevant Acts underpinning facets of the bushfire arrangements. The *Emergency Management Act (1999)*, the *Bushfire Act (1939)*, the *Fire Brigade Act (1957)* and the *Fire Brigade Administration Act (1974)* have a number of inter-relationships in the event of bushfires.

The *Emergency Management Act (1999)* (EM Act) governs the preparation measures for large-scale emergencies and the management of a declared emergency. When the EM Act was being drafted there were concerns that the continuum of emergency response needs to be maintained with the person having expertise most relevant to the nature of the emergency continuing to be responsible for the event after an emergency is declared. Hence, the EM Act provides not only for a Territory Controller but permits the appointment to an Alternate Controller. On January 18, the Chief Minister considered it imperative that the CFCO maintain responsibility for managing the fire emergency. Therefore, the CFCO was appointed as the Alternate Controller immediately following the Declaration of the Emergency.

However, these parts of the EM Act require re-consideration as there is ambiguity surrounding the position of Territory Controller when the Alternate Controller is appointed. Although this ambiguity did not appear to affect the management of this emergency because there was a reasonably clear and logical division of authority between the Controller and Alternate Controller (e.g. whilst the CFCO continued to direct the fire fighting effort, the Chief Police Officer as the Territory Controller commenced the immediate task of coordinating the Recovery efforts), this ambiguity needs resolution. In addition, it is considered that there needs to be more options in escalating emergency arrangements without decoupling normal ministerial involvement from what is essentially an important Government activity.

The EM Act, in separate parts, already provides for the roles, responsibilities and functions of the ACTAS and the ACTES. It is suggested that both the *Fire Brigade Act (1957)* and the *Bushfire Act (1939)* be modernised by repealing them and incorporating their provisions into separate parts for each Service in the EM Act. This would provide the opportunity to clarify the roles and responsibilities for the Fire Brigade including reflecting the more recently acquired functions of rescue, hazardous materials response and urban search and rescue. It also would provide a continuum of emergency response from small-scale emergencies to large scale 'disasters'.

By including the Bushfire Service also in a separate part of the EM Act all the Territory's emergency arrangements would be located in a single piece of legislation with consistency of terminology and clarity of inter-relationships, roles and responsibilities.

There is also a need to review and modernise the role of the Bushfire Council. The current Bushfire Council has been operating very successfully in an advisory capacity and it agrees there should be a formal change in legislation to reflect that role. By including the Bushfire Services in the EM Act to join with the various protection provisions for volunteers already within the Act, will also extend these protections to the large number of bushfire volunteers.

ESB HEADQUARTERS (HQ) BUILDING, CURTIN

The ESB HQ is located in a former primary school and when refurbished in 1993, it was not completed as designed due to the competing refurbishment of the South Building for the Legislative Assembly having a higher priority. The 2002-2003 Capital Works program provided funding for a Feasibility Study into options for either further refurbishment or a purpose designed building on a greenfield site or possible refurbishment of a more suitable existing Government owned building.

Many of the inadequacies of the building were highlighted firstly in the Christmas 2001 fires but more severely in the January 2003 fires. The business case for the Feasibility Study outlined some of the deficiencies of the current building including:

- poor layout for the various ESB Services in their day to day in-house interaction;
- does not meet many current Building Code of Australia requirements due to its age, particularly fire safety issues like location of hose reels;
- does not have a ducted air-conditioning system throughout which is essential for 24 hour working, (often in extreme weather conditions);
- not functional for inter-action by the public with areas such as Fire Safety and Community Education;
- less than adequate physical security measures;
- significant water leaking in major storms due to building design defects;
- lack of extra usable space to cater for increased functions and staff since the original occupation in 1993; and

- particularly exposed during the January 2003 fires was the lack of a modern secure upgraded communications centre (COMCEN) and purpose designed operations rooms.

During the build-up of Emergency Management functions for the January 2003 fires, the Curtin HQ building was unable to properly accommodate the additional personnel and the operational cells which were created. The physical separation of, particularly, the operations and planning sections meant added pressure for runners to communicate information and duplication of requirements for mapping. The operations room was totally inadequate for the eventual size of the emergency with briefing maps and operations sub-elements having to occupy corridor space to remain adjacent to the operations room. Also the necessary relationship between COMCEN, the operations room and some of the critical complementary agency functions (e.g. ACTFB) was difficult to maintain because of their physical limitations. Some of the other deficiencies highlighted during the emergency included:

- lack of backup power to supply the whole building (only certain functions like COMCEN and some connections in the operations room are part of the backup power);
- lack of adequate sized operations and associated multi-purpose use rooms to effectively accommodate the expanded management team and liaison personnel;
- lack of modern technology to display the disposition of all deployed resources (this deficiency will be partly addressed by the Computer Aided Dispatch project and the communications upgrade project);

- lack of shared consoles to escalate and separate the call taking and dispatch functions in COMCEN in a major emergency;
- increased difficulty in maintaining building security during the emergency;
- lack of adequate expansion capability by the strategic location of portable building facilities (no hard standing adjacent to parts of the building with service connections);
- lack of media briefing and media connections facilities; and
- lack of whole-of-government Territory Government Coordination facility located at ESB HQ where the bulk of emergency agencies in the Territory have their command and control capability.

During the emergency the initial recovery coordination had to be located at the Winchester Police Operations Centre due to the lack of space at ESB Curtin. This then duplicated the significant inter-agency liaison requirements to ensure coordination between response and recovery requirements for their services. The liaison with Winchester Police Operations Centre was also not helped by the lack of connections to whole-of-ACT-Government network systems (telephone, fax, IT) in the Winchester Police Operations Centre. (Virtual Private Network connections were provided but such connections are not adequate for the many agencies needing connections).

When the ESB HQ was under potential fire threat from fires encroaching on the Curtin suburb (where some houses were lost), and power was interrupted to much of the building, consideration was given by elements of the Emergency Executive to the feasibility of moving the management function. It

was considered that such a move in the middle of the emergency would be chaotic and critical communications capability would be lost, so additional relief firefighting resources were deployed for a period to protect the HQ.

The original HQ Feasibility Study has been extended to consider these additional operational deficiencies and requirements highlighted by the January 2003 fires. Due to the nature of the ESB operational command and control requirements, it is essential that any new operational facility be located on or close to the geographical East-West axis of the city. Quick access to Canberra's arterial road system is also a desirable requirement. It is also important that, like other jurisdictions, a physical redundancy capacity in Emergency Management, operations, communications, and command and control between Police and the ESB emergency agencies be maintained.

One of the significant initiatives instituted following the 2001 fires was the activation of the Canberra Connect Call Centre to a major role in the provision of community information during an emergency. Currently that call centre is located in an office building with no back-up power capability. Consideration could be given to co-locating the Canberra Connect Call Centre facility on the same site as the ESB HQ.

AERIAL FIRE FIGHTING CAPABILITY

Although ground suppression capability, fuel management activity and fire prevention strategies will ameliorate the bushfire threat, aerial firefighting capacity is playing an increasingly valuable and necessary role in bushfire suppression. The use of large capacity aerial water bombing capability by such aircraft as Erickson Air Crane to supplement a variety of smaller capacity water bombing aircraft has been part of the larger States' bushfire fighting approach for a number of years.

The ACT has used helicopters for bushfire fighting for some time. Aircraft water bombing is an essential part of the initial attack on a bushfire if it is available. The ACT has traditionally contracted a light helicopter (Squirrel) for a twelve week period each bushfire season. In addition, since the introduction of the Snowy Hydro SouthCare Aeromedical Rescue Service in 1998, there is some additional water bombing capability when it is not required for medical missions. The contracted Bushfire Service helicopter, Snowy Hydro SouthCare and one additional contracted light helicopter were available to the ACT for aerial operations from early stages of the January bushfires until one of the light helicopters crashed on 13 January 2003.

Progressively over the period from the start of the fires through to approximately 2 February 2003, up to 18 rotary wing helicopters were used by NSW initially to attempt to contain the McIntyre's fire. As the fires approached the urban areas on 18 January 2003, many of these aircraft were very effectively used to save property and extinguish some burning houses in the fire impacted suburbs of Canberra. However, the dense smoke even in the

preceding days and extreme weather conditions on the 18 January did limit and affect air operations.

Despite these operational limits, the effectiveness of the additional aircraft used during the 2003 fires demonstrated an increased need for their use in the ACT. Due to overall aviation cost pressures, the ACT budget allocated for aerial firefighting will now only purchase approximately 70% of the use available in previous years. The use of more than one aircraft has become a necessity to ensure added water bombing capacity as well as air observation for efficient direction of both ground and aerial firefighting resources.

The Director, ACT Bushfire and Emergency Services was part of a national working group set up in 2002 by the AFAC to look at boosting national aerial firefighting capability. Their report, entitled a National Aerial Firefighting Strategy, was presented to the Department of Transport and Regional Services (DOTARS) for consideration by the Federal Government. The report sought an amount of $22.86m from the Federal Government to be matched by an additional $5.36m from the States and Territories on top of the existing $26.9m per annum already spent by States and Territories on aerial firefighting capability. Unfortunately this approach was rejected by the Federal Government, but they did agree to provide additional funding for transport and lease of 2 heavy helicopters (primarily for NSW and Victoria) to the approximate value of $8m, and approximately $300 000 to Western Australia for lease of additional aircraft. During the January fires in NSW, ACT and Victoria, the Federal Government also funded the transport and part lease costs of an additional helicopter.

Independent of further consideration at a national level of additional national aerial firefighting capability it is considered that supplementary resourcing for the ACT is needed. An equivalent capability of 1 – 2 medium helicopters should be considered the minimum increase for leasing over a four-month bushfire season.