

July 2012

Report on the French – Australian/New Zealand Collaborative Research Exchange



**Study Tour by the Bushfire CRC of the SDIS13 Fire Agency of the Bouches du Rhône Department, France
(SDIS13 – SERVICE DEPARTEMENTAL D'INCENDIE ET SECOURS DES BOUCHES DU RHÔNE)**

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Report on the French – Australian/New Zealand Collaborative Research Exchange

Executive summary

Australia and France represent two of the most fire prone regions in the world. Each country faces challenges associated with, climate change with subsequently increased wildfire risk and longer fire seasons; increasing political and public scrutiny of fire incident management; increasing fuel loads in forested regions; and increased scrutiny on levels of training, capability development and organisational learning. Whilst the challenges are similar in both countries, the respective strategies employed are quite different.

These different approaches are shaped by historical, cultural, political and economic factors specific to their countries of origin. At the initiation of the Bushfire Co-operative Research Centre (Bushfire CRC), in July 2012 an Australian/New Zealand contingent (hereinafter called the Bushfire CRC study team) travelled to France to achieve the following objectives:

- compare the strategies employed for organising for effective incident management within French and Australian/New Zealand jurisdictions;
- discuss the challenges that each country needs to manage to learn from different approaches and to consider future demands;
- observe the strategies used by French and Australian/New Zealand national teams in a controlled (simulated) environment;
- share knowledge about strategies used, in particular, to manage the interfaces between emergency responders, media and threatened communities;
- identify research and development opportunities for future ongoing collaboration;
- investigate international innovation and practices which may be adapted for the Australian/New Zealand environment.

The benefits of the exchange were identified as follows:

- improving incident management performance in complex settings;
- improving simulation development opportunities;
- learning from international practice by comparing national strategies in incident management (e.g., resource pre-positioning; resource deployment strategies; communication and coordination).

The exchange took place between 5th and 13th July 2012. The Bushfire CRC study team consisted of 11 persons in all, composed of practitioners from Australian (n=6) and New Zealand (n=1) fire service agencies, 2 researchers and 2 executives from the Bushfire CRC.

The Bushfire CRC study team was given an introduction to the SDIS13 and the Bouches-du-Rhône area. The group also spent time at the SDIS training facility to learn more about the French approach to team training in decision making using the SDIS simulator. The research collaboration also included two days of simulation exercises. Each simulation exercise ran for three hours and prompted the team to respond to a number of factors including weather conditions, terrain, resource management, public safety and awareness, and incidents at the scene such as injuries. Accompanying researchers also recorded observations and data during the simulation. The Bushfire CRC study team was engaged in the exercises in the mornings and in the afternoon observed the French team managing the same simulated conditions.

The Bushfire CRC study team also observed a field exercise by SDIS13 members to simulate a large uncontained fire in the landscape which was undertaken to finalise preparations for the summer fire season. These exercises are routinely held in preparation for French forest fire season. The exercises also served to bring many of the features of the French incident management system observed in the simulations into a realistic context.

The French operational environment of short duration, high intensity incidents has created a command structure that appears to have limited capacity for longer duration events. This approach appeared similar to the way an urban fire service would manage a large structure fire or Hazmat incident in Australia and New Zealand. There was much discussion in the final debrief workshop about how both the Bushfire CRC and French teams could learn from each other about the similarities and differences in approach to incident management. In the final workshop the following observations were noted:

- **Benefits of AIIMS.** One unintended outcome of the exchange was reinforcing the benefits of AIIMS to the Australian participants. The Bushfire CRC study team met for the first time in France. Whilst this is not ideal, AIIMS provided team members with a common structure and process as a starting point for the exercises.
- **Pre-formed and ad-hoc teams.** It was noted that many fire services across Australia and New Zealand are focusing on the concept of pre-formed Incident Management Teams (IMTs). Based on members' experience, some have subsequently asked if there is also a need for a role to be developed to support the planning of ad hoc non-related personnel forming an IMT.
- **Rapid attack.** The French approach to incident management is to engage in aggressive, rapid attack within the first 30 minutes, with the aim of confining 95% of their wildfires to an area of less than 1 hectare. This requires a considerable amount of pre-incident planning such as pre-deployed strike teams, aircraft in the air and increased staffing during peak season; and a considerable effort went into achieving this goal.
- **Similar ICS frameworks.** The French approach has broadly the same functions as the Australian/New Zealand AIIMS/CIMS. Though there are important differences:
 - The French use 5 levels of response to manage an incident based on resource requirements for the type, scale and complexity of an incident.
 - The French use a centralised approach which was observed to lead to two outcomes: first the IC was much more focussed on the tactics of the fire ground and second the IC was the key depository of situational awareness. In contrast, the Bushfire CRC study team had

greater delegation of functions which was intended to spread role responsibility and situation awareness and ensure that no individual was overloaded with information and/or responsibilities.

- **Permanent camera surveillance.** Like Australia, the French use manned watchtowers in forest areas during peak-season. They also use automatic smoke plume detection to alert the com-centre to any forest fires.
- **Vehicle safety features.** There were a number of safety features noted on all vehicles that included; rollover protection, breathing air in the cab, drencher systems outside of the cab, and an emergency button that alerts the communications centre to their position and allows an aircraft to pinpoint them for an aerial drop. Some of these features are not used within Australia, i.e. breathing air in cab and emergency button. There is potential for these innovations to be reviewed.
- **Differences in the use of air operations.** For the French observers, the involvement of an Air Operation Manager and Air Attack Supervisor was interesting as these roles are not utilised in France. A difference in French air operations noted by the Bushfire CRC study team was the use of aircraft in the initial response to bushfires (supporting the French doctrine of rapid containment). There may be interest in reviewing how this approach would work in the Australian environment where the tendency is to wait until a request before aircraft are deployed.
- **Differences in attention to public information.** The emphasis given within the Australian approach to community engagement, media management and public information was also of particular interest to the French.
- **Fire-ground operations.** There were also similarities in the way teams on the ground are organised (e.g., strike teams and task forces), though the point was also made that the Australian/New Zealand approach does not specialise as much as the French approach and this is something that could be adopted. The following aspects were particularly noteworthy:
 - **Re-supplying a whole strike team at once.** The French have a specialist water supply function which is capable of re-supplying a whole strike team at once in about 6 minutes.
 - **Specialised fire-ground team operations.** In addition to the above-mentioned specialised team, the French also use specialist teams in the areas of hazmat, hose laying, motorcycle recon, bulk water transport, as well as retardant supply.
- **Preparedness for response.** The French approach had a number of features that were considered valuable for further discussion in Australia. These included:
 - **Pre-positioned water supplies.** The provision of water supply tanks across the response area, identifiable from both the ground and the air.
 - **Road and track numbering.** Either naming, or better still numbering, fire tracks like the French, was identified as a valuable strategy by the Bushfire CRC study team.

- **Considerable commitment to training.** It was noted that the French used every opportunity to practice how they will manage incidents, including the use of the simulator and the major exercise.
- **Opportunities for future research collaboration.** Finally, to complement this exchange, the academic researchers (from CERGAM, France and Bushfire CRC, Australia) then discussed some key points of interest from their observations in high reliability organisation and potential avenues for further investigation approaches in a future collaboration. The data that the researchers collected during the simulation exercises will be further analysed and can assist in identifying additional areas of mutual interest for collaboration between the teams who – along with Western United States – occupy two of the three regions of the world most affected by wildfires.

Both teams agreed that there are many possibilities for working together and the visit of the Bushfire CRC study team during this French study tour highlighted many such opportunities. Potential areas for knowledge exchange and problem-solving cooperation include functional management, fire behaviour modelling and analysis, community engagement, training tools and tactical operations.

Team dynamics and behaviour recognised in operating within challenging and unknown environments and situations which ‘test’ individuals and teams, needs constant research and review so that the learning’s can be incorporated into ongoing training and skills maintenance. Bushfire CRC and SDIS13 plan to take the next steps in this partnership through detailed collaboration proposals.

The challenge for all of us in the future is to ensure that we collaborate and share knowledge, to in effect practice/implement “world’s best practice”. To do this we must actively support and allow our personnel to exchange ideas and research, and experience what is occurring around the world. It is incumbent on us to demonstrate an exhaustive approach to improving how we plan for and manage incidents now and in the future.

Report on the French – Australian/New Zealand Collaborative Research Exchange

Background

France and Australia are part of the most fire prone regions in the world. Both countries face escalating challenges associated with increases in the frequency and impact of fires; growing wild land-urban interfaces and fire seasons that are of longer duration, requiring jurisdictions to call on mutual aid to assist with resources. As a result, improving reliability of emergency services organisations is increasingly crucial. Understanding how incidents are managed is of special importance and was the purpose of this international research collaboration.

This collaboration builds on ones previously undertaken between Australia and France in fire and emergency management that commenced in 2002. In 2006, for example, representatives from Australia visited France to learn about similarities and differences between the two countries in aerial fire fighting strategies. One of the insights reported by this group related to the ways in which the French used simulation in building their education and training capability. The National Aerial Firefighting Centre (NAFC) report (2006) noted the particularly valuable approach taken in simulation with the integration of the operational roles, from incident management personnel to crew leaders, fire vehicle drivers and pilots of fixed-wing aircraft, within the computer-based training simulator. In 2008, through the Bushfire Co-operative Research Centre (Bushfire CRC), Dr Christine Owen hosted a French international visiting research fellow, Professor Pascal Beguin, who had an interest in workplace design and the challenges faced within incident management. Part of the discussion included the challenges of working in such a dynamic and open-ended domain and the demands associated with maintaining a distributed situation awareness between various actors involved in mitigating the emergency event.

More recently there have been a number of high level discussions to further develop international research collaboration and exchanges. These have included members of the Bushfire CRC (CEO Gary Morgan), New Zealand Rural Fire Authority Chief and Bushfire CRC Board member (Murray Dudfield) and the leadership of the Service Departmental D'Incendie et secours des Bouches du Rhone (SDIS-13) in Southern France (Col. Luc Jorda). In 2011, members from the SDIS-13 attended the Australasian Fire and Emergency Services Authorities Council (AFAC) - Bushfire CRC conference and from whence planning commenced to send a Bushfire CRC study team to France for mutual exchange.

The purpose of this research exchange included the following objectives:

- compare the strategies employed for organising for effective incident management within French and Australian/New Zealand jurisdictions;
- discuss the challenges that each country needs to manage to learn from different approaches and to consider future demands;
- observe the strategies used by the Bushfire CRC study team in a controlled (simulated) environment
- share knowledge about strategies used, in particular, to manage the interfaces between emergency responders, media and threatened communities;
- identify research and development opportunities for future ongoing collaboration.

The benefits of the exchange were identified as follows:

- improving incident management performance in complex settings;
- improving simulation development opportunities;
- learning from international practice by comparing national strategies in incident management (e.g., resource pre-positioning; resource deployment strategies; communication and coordination).

A proposal was prepared and expressions in interest to join the exchange sought from AFAC member agencies.

Personnel

The Bushfire CRC study team

The Bushfire CRC study team consisted of 11 persons in all, composed of practitioners from Australian (n=6) and New Zealand (n=1) fire service agencies, 2 researchers and 2 executives from the Bushfire CRC (see Appendix 1). The practitioners had considerable operational expertise in managing complex emergency events. The Bushfire CRC/CFA researchers contributed their expertise in incident management teamwork and coordination research and conducting observations in complex simulated environments. In addition, the CEO of the Bushfire CRC, Gary Morgan, and New Zealand Chief, Murray Dudfield, were present for the first part of the tour.

The French Team

The French team consisted of 28 personnel (see Appendix 2), which comprised the Chief, Colonel Luc Jorda, and five personnel involved in managing the exchange and the training project. In terms of the simulations, there were 5 involved in the simulation organisation and 9 personnel who operated as the French Incident Management Team (IMT). In addition there were 8 members who acted as translators/support officers.

International visit

The collaborative exchange to the SDIS-13 headquarters and training facility in Aix-en-Provence took place from 5th-13th July 2012. Table 1 shows the agreed schedule.

Day 1: Welcome and introduction – Friday 6th July

The visit commenced with a welcome ceremony and presentations at SDIS13 Headquarters. The Bushfire CRC study team met with key fire fighting personnel at the Bouches-du-Rhône Fire Department Headquarters in Marseille. Col. Luc Jorda welcomed the delegation and emphasised the opportunities that the visit presented for the exchange of best practices in forest fire incident response. In addition to Gary Morgan (CEO Bushfire CRC) and Murray Dudfield (NZ National Rural Fire Officer and Bushfire CRC Board Member), also present was Dale Dague (Branch Chief, Fire and Aviation Management, United States Department of Agriculture, Forests Service) and Johan Heine (Managing Director, Working on Fire, South Africa).

TABLE 1 - SCHEDULE OF ACTIVITIES

	Morning	Place	Afternoon	Place
Friday July 6th	Welcome and introduction	SDIS13 headquarters	Simulation presentation and orientation	Training School
Saturday July 7th Sunday July 8th	Area of Bouches-du-Rhône visits, fire stations and equipment presentations			
Monday July 9th	BCRC team simulation Scenario 1	Training School	French team simulation Scenario 1	Training School
Tuesday July 10th	BCRC team simulation Scenario 2	Training School	French team simulation Scenario 2	Training School
Wednesday July 11th	Large scale field exercise (BCRC team as observers of French large scale exercise)			Wild area north of Cassis
Thursday July 12th	Debriefing workshop and discussion	DD SIS		

Gary Morgan recognised Dr Kaddour Raissi (Science & Technology Attaché, French Embassy in Australia) who strongly supported the French-Australasian research and together with Colonel Luc Jorda, Capitaine Jean-Michel Dumaz, Dr Christine Owen, Dr Renaud Vidal and Dr Noreen Krusel, who made it become a reality.

Gary also acknowledged Tom Harbour (Director, Fire and Aviation Management, United States Department of Agriculture, Forests Service) who wished to be present but due to fire issues in the US, had to return to Washington. Gary noted that Tom is also a strong supporter of the international sharing of fire management knowledge. Gary stated that he was pleased that Dale was able to continue with the tour to represent Tom and the USDA FS.

Gary further reflected that the fire management relationship between the four countries (France, Australia, New Zealand and USA) has been developing over the last decade. It began in 2002, when Tom, Murray and Gary travelled to France and met with Colonel Luc Jorda, as part of the preparations for the 3rd International Wildland Fire Conference and Summit. He then mentioned that it was fitting that Johan had joined the group, to further the international sharing of fire management knowledge, as Working on Fire organised the 5th International Wildland Fire Conference.

Gary Morgan highlighted the strong similarities between the countries. He noted that there are many common links between Australian/New Zealand and French approaches. These include a desire to protect people and assets in a context where fires will be more challenging in the future. He noted that extending interactions between our nations provides us with the opportunity to learn from one another and that as the countries present include the most fire prone areas of the globe, he desires to see, amongst them, increased international collaborative research.



An introduction to the SDIS13 and the Bouches-du-Rhône area was presented. In this region, fires are aimed to be controlled within the first hour though the challenges of climate change and an increasing urban-interface are also of increasing concern, as with Australia/New Zealand. The Bushfire CRC study team members then introduced themselves and provided a brief presentation of their respective agencies. This included outlining the particular geographic, population and organisational challenges that various regions of Australia and New Zealand face, and how some of those challenges might compare with those found in France. Table 2 provides a synopsis and a comparison with France. In addition the meeting heard from Reagan Key, Fire Services Commissioner's Office in Victoria about a new approach in that state to integrate three fire services to provide coordinated control of a major fire response; develop and drive fire services reform and develop incident management capability and performance standards.

Simulation presentation and orientation

The group then moved to the SDIS training facility to learn more about the French approach to team training in decision making using the SDIS simulator. At the SDIS training facility, the group was provided with an overview of the training undertaken as well as the plans for the future.

The computer based simulator uses a 3D environment with GIS data from the Bouches-du-Rhône area to recreate a realistic image of the area in a 25km² grid. Fire created in the grid area can be viewed from different angles and positions based on the location of the viewer, in effect they see the same fire relative to their position. Fire fighting resources are included and replicate the real resources. That is, tankers look like the real tankers, and act in a similar way to the real resource.

The simulator is based on actual wild land fire events and computer based injects are based on actual fire propagation models, however its purpose is to develop team decision-making and not as a fire-behaviour modelling tool.

In the simulation activation control room, directors manage the fire simulation using three computers. Here they establish the fire, its perimeter and direction as well as model the smoke plume based upon wind, terrain and fuel types. The directors can change any elements of the unfolding scenario, such as wind direction, fire-fighter accidents and people in distress in the forest.

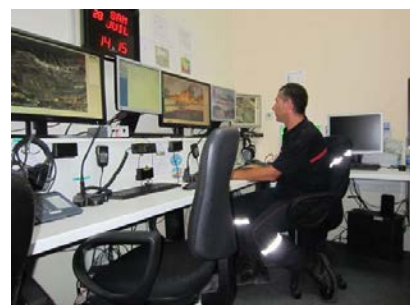


TABLE 2 - FRENCH AND AUSTRALASIAN AGENCY COMPARISONS

Agency	Approx. Jurisdiction Area (km ²)	Personnel	Vehicles /Aircraft	Incidents per Year	Tasks
SDIS 13, France	5,000	4,500 vol. 1,200 career (67 brigades)	1,600	115,000 +	Wildfires; Structure fires; Hazardous material & radiological incidents; De-pollution incidents; Search & Rescues - urban, missing persons, confined spaces, vertical (rope), water; Emergency first-aid & medical response
SA Country Fire Service	1,000,000	15,500 vol. 130 career (423 brigades)	786 / 16		Bushfires - private land, DENR land, Forestry SA land, interstate; Structure fires; Vehicle fires; Vehicle accident rescue; Hazardous material incidents
VIC Country Fire Authority	150,000	54,848 vol. 2,294 career (1,220 brigades)		35,000 +	Bushfires & structure fires - private land outside Melbourne metro area; Rescues (shared with VIC SES) - road, high angle, confined space, trench, industrial, urban, aviation, marine; Hazardous material incidents; Community education, awareness & safety; Technical services - building code related inspections, post incident analysis, fire investigation; Fire safety & prevention; Land use planning advice
NSW State Emergency Service		10,000 vol. 246 career (228 units)	585 (+ 348 flood boats)	34,000 +	Floods, storms, tsunamis; Evacuation & community welfare coordination; Community education, awareness & preparedness; Support to Police, Fire, Rural Fire & Ambulance; Rescues - land, vertical, alpine search & rescue
NSW Rural Fire Service	800,000	70,448 vol. 920 career (2,039 brigades)	7,452 / 200 +	20,000 +	Bushfires, grass fires and other emergency incidents in rural fire district; Bushfire risk management & mitigation; State Air Desk - aircraft tasking for various govt departments, NSW Fire & Rescue, SES, Police, ACT Emergency Services
New Zealand Fire Service	268,000	10,120 (482 brigades)	761	76,885	Urban fires; Rural fires; Hazardous substance incidents; Motor Vehicle Accidents; Weather incidents; Rescues - urban search & rescue, line rescue; Community education; Building inspections

Part of the simulation (in separate simulation rooms) involves participants operating flight simulators which include a birds-eye view of the fire-ground. Air tankers and helicopters can deliver foam, water or retardant drops which dynamically interact with the fire.

In another set of rooms, command staff and personnel drive fire appliances on the simulated fire ground. All of this activity is managed and monitored by the incident management team operating in another part of the facility and in touch with these actors through the use of radios.



Days 2 and 3: Area of Bouches-du-Rhône visits – Saturday/Sunday 7th-8th July

The Bushfire CRC study team was also provided with a tour of the dispatch centre at SDIS13 Headquarters.



The team also had the opportunity during the tour to visit a number of fire stations and to discuss equipment used, including:

- Aix-en-Provence;
- Luynes;
- Cassis.



Days 4 and 5: The simulation exercises – Monday/Tuesday 9th-10th July



Prior to the start of the simulation, basic ground rules were provided to each team during a presentation which outlined the main purpose of the exercise and the intent (see Appendix 3 for Monday's exercise and Appendix 4 for Tuesday's exercise). The intent included the goal of the simulation exercises to compare High Reliability Organisations (HRO) and related organisational behaviours during incident operations.

Comparisons of national strategies, such as doctrines for resource pre-positioning and resource ordering effectiveness were not examined. Further, to ensure a level playing field, the simulations were set up so that the similitude was not impacted. Both teams were asked to work as close as possible to their normal operating modes.

The Bushfire CRC study team had already conducted earlier preparations for how they would operate in the simulation. This consisted of seeking support from French participants to play the roles of the fire ground crews as well as pilots involved in air operations. Two of the Bushfire CRC study team played the roles of Divisional Commanders, with shadow supports from the French team to facilitate communication with fire ground personnel and another performed the role of Air Attack Supervisor. The rest of the Bushfire CRC study team filled IMT positions of IC, Planning (Anticipation), Operations (Operations) and Public Information and Safety Officer.



The team had also previously conducted a “pre-mortem” session on the Sunday evening prior to the scenarios. This session was designed to ensure that the team had pre-emptively considered all the possible “worse case” outcomes resulting from the simulation. Assuming “catastrophic” failure allowed for team members to voice individual concerns and to review and reflect on assumptions. This pre-mortem had been audio-recorded to examine the impact of worst case scenario thinking on enhancing communication as part of the Bushfire CRC research program.

During this session the team also confirmed their objectives, outlining the desired outcomes and assigned roles to each of the participants. Both the “pre-mortem” and the confirmation of objectives provided the direction as well as a positive team orientation to the scenario exercises scheduled for the following days.

On the Monday, the first simulation exercise was conducted. The Bushfire CRC study team went first and was briefed on the first simulation scenario and conditions (Appendix 3). The Incident Management Team organised a strategy to attack the fire with the available resources, with some team members positioned in the simulation cubicles representing Divisional Commanders “on the ground” or “in the air”.



The simulation ran for three hours and prompted the team to respond to a number of factors including weather conditions, terrain, resource management, public safety and awareness, and incidents at the scene such as injuries. Accompanying researchers also recorded observations and data during the simulation. The French team arrived at noon and the two groups shared lunch. The French team then undertook the same exercise while the Bushfire CRC study team observed.

The process was repeated on Tuesday with a second simulation and a more complex exercise, found in Appendix 4.



Following the simulations, and at the end of the visit as part of the debrief, the two teams discussed the key similarities and differences in their functional organisation, tactical approaches and decision-making processes (discussed below).

In the second simulation a fire was already underway and out of control and included a major public event that involved 5,000 civilians who could not be safely evacuated. Civilian injuries were also included to add complexity to the scenario.



During the debriefing the teams discussed the instruments and technology commonly deployed in their respective countries; the use of the media as an information source during an incident; prevention and preparation programs; and in-simulation observations such as situational awareness, task management, and team decision-making. Also discussed was the simulation platform and its potential applications. Details of the insights from the simulation debriefs are included in the final workshop discussed below.

Day 6: Real time field exercises – Wednesday 11th July

The Bushfire CRC study team also observed a field exercise by SDIS13 members to simulate a large uncontained fire in the landscape which was undertaken to finalise preparations for the summer fire season. The exercise took place in a forested area between La Ciotat and Cassis.



Under the direction of Col. Jorda, these exercises are routinely held in preparation for French forest fire season. The exercises also served to bring many of the features of the French incident management system observed in the simulations into a realistic context.



The exercise scenario was inspired by a real-life fire that ignited in the area thirty years ago during an outdoor barbeque held by tourists and quickly spread, burning nearly 1,092 hectares before being stopped. In the exercise, the fire start was announced over the radio at 9:00am and the point of origin was signalled by red smoke. More than 200 fire fighters and 80 vehicles including water-bombing aircraft were deployed in order to contain the fire and extinguish the flames. Some fire fighters also played the role of victims that had to be rescued during the operation.



Throughout the exercise the Bushfire CRC study team were able to observe the SDIS 13 incident management, tools and resources and how coordination played out on the ground.

The exercise attracted the attention of the French media, with some members of the Bushfire CRC study team being interviewed for news broadcasts.



The Bushfire CRC study team made the following observations of the exercise:

- The deployment of crews and resources was performed using “lights & sirens” indicating the seriousness with which the field exercise was approached; this included the application of water to create fire breaks and the refilling of tankers to rehearse the management of resources of the fire ground.
- It was interesting to note that the community was not pre-warned or informed that a major exercise was occurring in their area.
- Transfer of control was a key issue for the exercise and there appeared to be a strong focus on executing this part effectively.
- Gaining and maintaining situational awareness involved a considerable amount of verbal communication, however the recording of information and the ability to share maps and other records was limited, and during the transfer of control the risk of losing important information appeared high.
- The focus of the exercise appeared to emphasise rehearsing a fire fighting response and management. It was not apparent or explicit regarding the coordination between agencies and the community. In addition, the presence of other agencies, i.e. Police, appeared to be more as observers than participants. The SDIS later noted that liaison with the community was not something for which they were responsible; this occurred from the Mayor’s office. However, better information provision to the community was something they were interested in pursuing in the future and represented a possible area for collaboration.

Day 7: Debrief workshop and discussion - Thursday 12th July

The final day consisted of a concluding workshop to discuss insights and opportunities. There are many similarities and some interesting differences that the groups discussed.

The Bushfire CRC study team noted that as part of the exchange they had hoped to use the simulation to demonstrate how AIIMS/CIMS worked, including:

- the role of public information;
- the role of air attack supervisor;
- the process of developing an incident action plan to handover to an oncoming shift.

They had also come to learn about the simulator and its applications and observe how the French approach managing large incidents.



Benefits of AIIMS

One unintended outcome of the exchange was reinforcing the benefits of AIIMS to the Australian participants. The Bushfire CRC study team met for the first time in France. Whilst this is not ideal, AIIMS provided team members with a common structure and process as a starting point for the exercises. Once various roles had been determined, members were able to fulfil their role responsibilities, effectively managing a fire in unknown terrain and with relatively unknown technologies and resources. The principles and objectives of AIIMS allowed the group to adapt it to the environment in an effective and efficient manner, even though they had not previously worked together.

Pre-formed and ad-hoc teams

It was noted that many fire services across Australia and New Zealand are focusing on the concept of pre-formed IMTs. Based on members' experiences, some have subsequently asked if there is also a need for a role to be developed to support the planning of ad hoc non-related personnel forming an IMT. It was suggested during the debrief that this may be of particular interest in future research collaborations to test the dynamics, for example, of forming a mixed (French/Australian/New Zealand) IMT for future exercises.

Rapid attack

The French approach to incident management is to engage in aggressive, rapid attack within the first 30 minutes, with the aim of confining 95% of their wildfires to an area of less than 1 hectare. This requires a considerable amount of pre-incident planning such as pre-deployed strike teams, aircraft in the air, and increased staffing during peak season; and a considerable effort went into achieving this goal.

Similar ICS frameworks

The group discussed the similarities and differences in the various incident management approaches. In France, the incident command system (ICS) is known as the *gestion operationnelle de commandement* (GOC). There are similarities in the way incident management is structured across the two systems. The French approach has broadly the same functions as the Australian/New Zealand AIIMS/CIMS. Though there are important differences:

- The GOC has a slightly different configuration than the ICS. Functions are progressively transferred from the Department Operations Centre (CODIS), which oversees all operations, to the incident management team (IMT).
- The French use 5 levels of response to manage an incident based on resource requirements for the type, scale and complexity of an incident. This approach is very similar to metropolitan/urban fire response. They have a strong 'tactical' approach to managing an incident with the 'Incident Controller/Commander' centralising all information and decision making.
- This more centralised approach was observed to lead to two outcomes. First, the IC was much more focussed on the tactics of the fire ground than in the Australian/New Zealand context. Secondly, and as a consequence, this also resulted in the IC being the key depository of situational awareness. In contrast, the Bushfire CRC study team had greater delegation of functions which was intended to spread role responsibility and situation awareness and ensure that no individual was overloaded with information and/or responsibilities.
- As an incident escalates, the French command structure expands but not necessarily in the same way as AIIMS. In part this is because of the emphasis on short duration events of generally less than one day.
- There was much discussion in the debrief about how both the Bushfire CRC and French teams could learn from each other. In the context of AIIMS/CIMS, it is long recognised as being a good system for longer term fires and when the fire is already established. While AIIMS provides a flexible and scalable approach to apply the structure of AIIMS to escalating incidents, it too has been criticised for being challenging to establish in short duration incidents. There is potential for AIIMS to complement and support the French approach to developing their capacity to transition effectively to events of longer duration, and for Australia and New Zealand to learn from the French in terms of organising for short duration events.

Permanent camera surveillance

Like Australia, the French use manned watchtowers in forest areas during peak-season. They also use automatic smoke plume detection to alert the communications centre to any forest fires. This information is also available in the cab of a vehicle. Some comments suggested that these provided the opportunity to gather information from these cameras whilst en-route and this may be an area for future research opportunity if this is the case.

Vehicle safety features

There were a number of safety features noted on all vehicles that included; rollover protection, breathing air in the cab, drencher systems outside of the cab, and an emergency button that alerts the communications centre to their position and allows an aircraft to pinpoint them for an aerial drop. Some of

these features are not used within Australia, i.e. breathing air in cab and emergency button. There is potential for these innovations to be reviewed.



Differences in the use of air operations

For the French observers, the involvement of an Air Operation Manager and Air Attack Supervisor was interesting as these roles are not utilised in France. Within France, the lead pilot takes a lead role (rather than using an air attack supervisor) and bombs in formation with Canadair's. The French management of aircraft use during the peak season includes the requirement for aircraft to participate in exercises – it is included in the contract. This is something Australian fire agencies should consider.

A difference in French air operations noted by the Bushfire CRC study team was the use of aircraft in the initial response to bushfires (supporting the French doctrine of rapid containment). There may be interest in reviewing how this approach would work in the Australian environment where the tendency is to wait until a request before aircraft are deployed.

Differences in attention to public information

The emphasis given within the Australian approach to community engagement, media management and public information was also of particular interest to the French. In France, informing the public was the role of the local Mayor, and it was acknowledged that they have limited focus on community engagement, media management and/or public information which in the future could result in significant “backlash” from the community, in particular if there is loss of life or property. There was discussion in the debrief about the need to be more proactive in this area.

Fire-ground operations

There were also similarities in the way teams on the ground are organised (e.g., strike teams and task forces), though the point was also made that the Australian/New Zealand approach does not specialise as much as the French approach and this is something that could be adopted. The following aspects were particularly noteworthy:



Re-supplying a whole strike team at once. The French have a specialist water supply function which is capable of re-supplying a whole strike team at once in about 6 minutes. The set-up consists of a large capacity bladder tank or fixed water supply tank, a large capacity volume pump and a manifold which allows all 4 appliances to be filled at once. This makes the re-supply of strike teams very efficient.



Specialised fire-ground team operations. In addition to the above-mentioned specialised team, the French also use specialist teams in the areas of hazmat, hose laying, motorcycle recon, bulk water transport, as well as retardant supply.

Preparedness for response

The French approach had a number of features that were considered valuable for further discussion in Australia. These included:

- **Pre-positioned water supplies.** The provision of water supply tanks across the response area. These tanks are identifiable from both the ground and the air. It was noted that some jurisdictions (e.g., CFS) have installed large capacity storage tanks in strategic locations, though more could be done in this area, particularly where water is a challenge.
- **Road numbering.** The French use a road numbering system to identified tracks and minor roadways for use during fire-fighting operations. In Australia, all surveyed roads are named in some jurisdictions, however it was noted there are many fire tracks that are not named or numbered. Either naming, or better still numbering, fire tracks like the French, was identified as a valuable strategy by the Bushfire CRC study team.
- **Considerable commitment to training.** It was noted that the French used every opportunity to practice how they will manage incidents, including the use of the simulator and the major exercise.
 - Their use of the computer based simulator has a high level of acceptance amongst their officers and command staff, though the French contingent note that it took about three years for this acceptance to become embedded. The simulator is used to continuously practice and rehearse incidents before participating in field exercises as well as preparing for the fire season. The simulator has been in operation for 10 years providing the French with a lot of experience in the effectiveness of the simulator. This is an area the Bushfire

CRC team felt needed to be explored, particularly as some agencies develop their own simulation strategy and implement the use of simulators.

- In addition, the emphasis of using the simulator to target team decision-making was a real strength and one Australian and New Zealand agencies are considering adopting in some form.
- As noted above, transfer of control in both the Australian/New Zealand and French contexts was regarded as challenging and allowed for potential loss of important data/information. Both countries recognised this and see it as a possible avenue of research development, particularly in the HRO sphere (see below).
- In terms of the major exercise, each district in the Bouche-de-Rhône region is required to perform a major field deployment exercise each year. Their approach to these exercises is serious and committed. The exercise the Bushfire CRC team observed was based on a fire approximately 30 years ago, which provided a good basis to compare the outcomes of the real event with the exercise. This approach of rehearsing a real event is a sound principle for rehearsing pre-fire plans.
- The inclusion of aircraft in full deployment exercises demonstrated the benefits of including this important asset to ensure not only integration into operations, but to develop improved communications and understanding of capacity and operational limitations.

Research Exchange

Finally, to complement this exchange, the academic researchers (from CERGAM, France and Bushfire CRC, Australia) then discussed some key points of interest from their observations in high reliability organisation and three potential avenues for further investigation approaches in a future collaboration:

1. To collaborate further on the data collected from the research observations of the simulation conducted during this study tour;
2. To consider future areas of research collaboration in high reliability organisation;
3. Other mutual areas that are of interest to the Bushfire CRC; e.g. fuel management, fire behaviour modelling.

Observation of the simulation

One of the advantages of this particular research observation was that it provided the opportunity to compare, for example, how the French made sense of what was going on under familiar conditions and how the Australians were operating under unfamiliar conditions. In addition, the researchers intend to focus on the approach of using a pre-mortem as an aid to worst case scenario thinking and to assess the degree to which this enhanced subsequent incident management teamwork and communication. The data that the researchers collected during the simulation exercises will be further analysed and will be used to assist in identifying additional areas of mutual interest for collaboration between the teams.

Future areas of research collaboration in high reliability organisation

In their meetings, the researchers had discussed the prospect of collaborating in the domains of High Reliability Organising, Operational Risk Management, Leadership Development, Human Factors, Safety, as well as Education and Training. They identified three potential areas for further follow up that included:

1) Advancing HRO knowledge in incident management operations

This would continue the development of the existing HRO project to examine how each country's teams undertake mindfulness and how collective mindfulness (Weick & Sutcliffe, 2007) can be taught and evaluated using a platform such as the simulator. This includes the development of HRO metrics as well as learning and development feedback tools for use in capacity development. In addition there is the potential to use the simulator to investigate communication and decision making at the strategic and coordination levels of organisations and how information flows are shared between teams to support awareness, decision-making and monitoring across operational, tactical and strategic layers in incident command and control.

2) HRO and organisational impacts to new technologies, doctrine change

Any change (e.g., doctrine, risk management decision tools, new technologies) impacts sense-making processes in unanticipated ways. The research can examine the impacts of these changes in a simulated environment and identify optimal adaptations in processes.

3) Fire resistant communities/population resilience

During crises, people in respective communities hold important information (i.e. on citizens/properties at risk) and they are eager to share their knowledge with others through the use of social media technologies such as smart phones. This information has varying degrees of reliability and is overwhelming, but can't be ignored. How can incident management response personnel make better use of this key information source to make better informed decisions?

International research collaboration parameters

There is also the potential to extend the projects to include a tripartite France-Australia/New Zealand- USA international research collaboration. It is anticipated that these collaborations could be managed in the following ways:

- 3 year horizon, with well-defined expected outcomes;
- Minimising cost, especially travel costs;
- Collaborate on scientific protocol;
- Collect data separately in each country;
- Collective analysis;
- One workshop a year.

Additional areas of research interest and mutual exchange

The following were identified throughout the debrief and workshop discussion by participants as areas where there could be benefits in exchange. Some of these could be knowledge sharing and some of these lend themselves to further research collaboration opportunities:

- An understanding of fire behaviour modelling;
- An understanding of different tactics used and the employment of those tactics (e.g., back burning in Australia; laying hose from aircraft in France; comparative uses of aircraft operations);
- An understanding of approaches to community engagement both in the preparedness and prevention and awareness stages as well as in fire events. (Col Jorda noted that there was increasing expectation from members of the community that needs to be managed);
- An understanding of incident management approaches and whether there is the possibility to form a hybrid approach that builds on the best of both – for short initial attack and longer term operations;
- There is interest in pursuing how the simulator may benefit the development and preparedness of incident management teams. This includes placing teams in unfamiliar environments and mixing teams to develop adaptability and flexibility.
- Innovation in the design and use of various resources to ensure that advances in technology and operational practices are considered and actioned accordingly.

Next steps

Both teams agreed that there are many possibilities for working together and the visit of the Bushfire CRC fire fighting delegation during this French study tour has highlighted many such opportunities. Potential areas for knowledge exchange and problem-solving cooperation include functional management, fire behaviour modelling and analysis, community engagement, training tools and tactical operations. Team dynamics and behaviour whilst operating within challenging and unknown environments and situations is seen as an important issue to collaborate on, so as to provide teams with the best training and support to function effectively.

Bushfire CRC and SDIS13 plan to take the next steps in this partnership through detailed collaboration proposals. In the immediate term, it is anticipated that the Australasian fire services will host a visit by a French delegation in the coming summer. Col Jorda extended an invitation to the Bushfire CRC delegation to return in 2013 when the new training facility would be completed and when further research work could be undertaken.

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- Weick, K. E., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty*. San Francisco: Jossey-Bass.

Bushfire CRC French Study Tour 2012
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IMT Training project

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JPS - DDSIS 13



EXERCISE N°1

ALPILLES



SCENARIO

- Today is 5 August, with the meteorological conditions of the Alpillles region and specifically the droughts. For the past several days the situation has been very concerning. Many large forests have been affected by fires ignited by accidental or suspicious origins.
- The weather conditions of the day are as follows:
- Wind from 340° at 50 km/hr. The water reserve at ground level is at 12 mm, the rate of spread is 1500 m/h. The ground temperature is 30°.



SCENARIO

The prevention patrol group during the day for the Northern District is as follows:

- **ARLES Strike Team 1: Position / St GABRIEL HD 86 F3.4**
- **ARLES Strike Team 2: Position / LA CAUME KD 06 A2.5**
- **ARLES Strike Team 3: Position / LE COUSSOUL KD 04 D8.4**


- **1 HOTSHOT CREW Position CSP ARLES**
- **1 HOTSHOT CREW Position CSP St REMY**
- **1 coastline Air Tanker Patrol**

- **2 CL 415 Position / MARIGNANE**



Timeline (1)

- 14:15 : T 0': Individual: ***Smoke suspected in the proximity of locality "Mas du Diable" at HD 86 F 3.3***
- 14:16 : T+3': Emergency Centre (CODIS): Start of fire confirmed ***in the proximity of locality "Mas du Diable" at HD 86 F 3.3***
- 14:16 : T+4': Emergency Centre (CODIS): **ARLES Strike Team 1, intervention deployment to the area of fire origin *in the proximity of locality "Mas du Diable" at HD 86 F 3.3***
- This fire is affecting an area with significant values-at-risk. The Alpilles site is a place frequented by many tourists.



Timeline (2) Site Conditions Report T + 10mn

- **ARLES Strike Team 1 Leader:** “I am in transit to the fire on HD 86 F3.3. I see a large plume of smoke in a wooded forest threatening several hundreds of hectares. I am requesting ground and aerial reinforcement.”



Emergency Centre T + 11 mn

- Deployment of ARLES Strike Teams 2 and 3, Task Group officer, and informed Incident Management Team.
- Request for Air Tanker Patrol is sent to Regional Command Centre



OBJECTIVES OF THE AGENCY ADMINISTRATOR

- Protect the people, assets, goods, and the environment.



CHALLENGES

Chronological challenges

T + 15' Prevent the fire from developing in the Alpilles forest

T + 1h Prevent the fire from crossing Track AL 101 to the SOUTH, Track AL 203 to the EAST

T + 2h30 Protect the fire tower at LE GRES

T + 4h00 Prevent the fire from crossing Track AL 102 and threatening the farmhouses on the piedmonts south of the Alpilles.



Timeline (2) Message from ARLES Strike Team Leader

- 14:25 : T+10' Houses threatened at the right flank and rear flank
- 14:30 : T+15' Emergency Centre: 3 strike teams in transit and Air Tanker Patrol requested
- 14:35 : T + 20' **ARLES Strike Team 1: arrival on-site**
- 14:40 : T + 25' **ARLES Strike Team 1: Site Conditions Report: "It is a resinous fire, 300 to 400 meters long by 100 to 150 meters wide. Its progression is being carried out on a NW-SE axis. I am protecting a house on the right flank and I am trying to contain the fire on the AL 202. The fire is freely developing. I am requesting confirmation of the request for reinforcement."**
- G.H.14:45 : T + 30 Incident Management Team arrival on-site



AVAILABLE RESOURCES

TYPE 1 S/T

Station	Type	Response Time	Manpower
Salon 1	Strike Team	30 mn	18
Salon 2	" " "	30 mn	18
Salon 3	" " "	40 mn	18
ARLES	Heavy Strike Team	40mn	6
SALON	" " "	45 mn	6
AIX	Strike Team	45 mn	18
AIX	" " "	1h	18
MARTIGUES	" " "	1h30	18
MARTIGUES	" " "	2h00	18
AUBAGNE	" " "	2h00	18
AUBAGNE	" " "	3h30	18



AVAILABLE RESOURCES

■ FIRE PUMP and HOTSHOT CREW

Station	Type	Response Time	Manpower
■ JOUQUES	Fire-Pump	1h	2
■ GARDANNE	" " "	2h	2
■ BERRE	HotShot Crew	30 mn	20
■ St REMY	" " "	45 mn	20
■ LAMBESC	" " "	1h	20
■ AURIOL	" " "	2h	20
■ LA CIOTAT	" " "	3h	20



AVAILABLE RESOURCES

OTHER

Station	Type	Response Time	Manpower
■ ARLES	Dozer	1h	2
■ AIX	Dozer	2h30	2



AVAILABLE RESOURCES

AERIAL RESOURCES

Station	Type	Response Time	Manpower
■ MARIGNANE	CL 415	45 mn	2
■ MARIGNANE	CL 415	1h	2
■ VITROLLES	HWB type3	1h	2
■ AIX	" "	1h	2

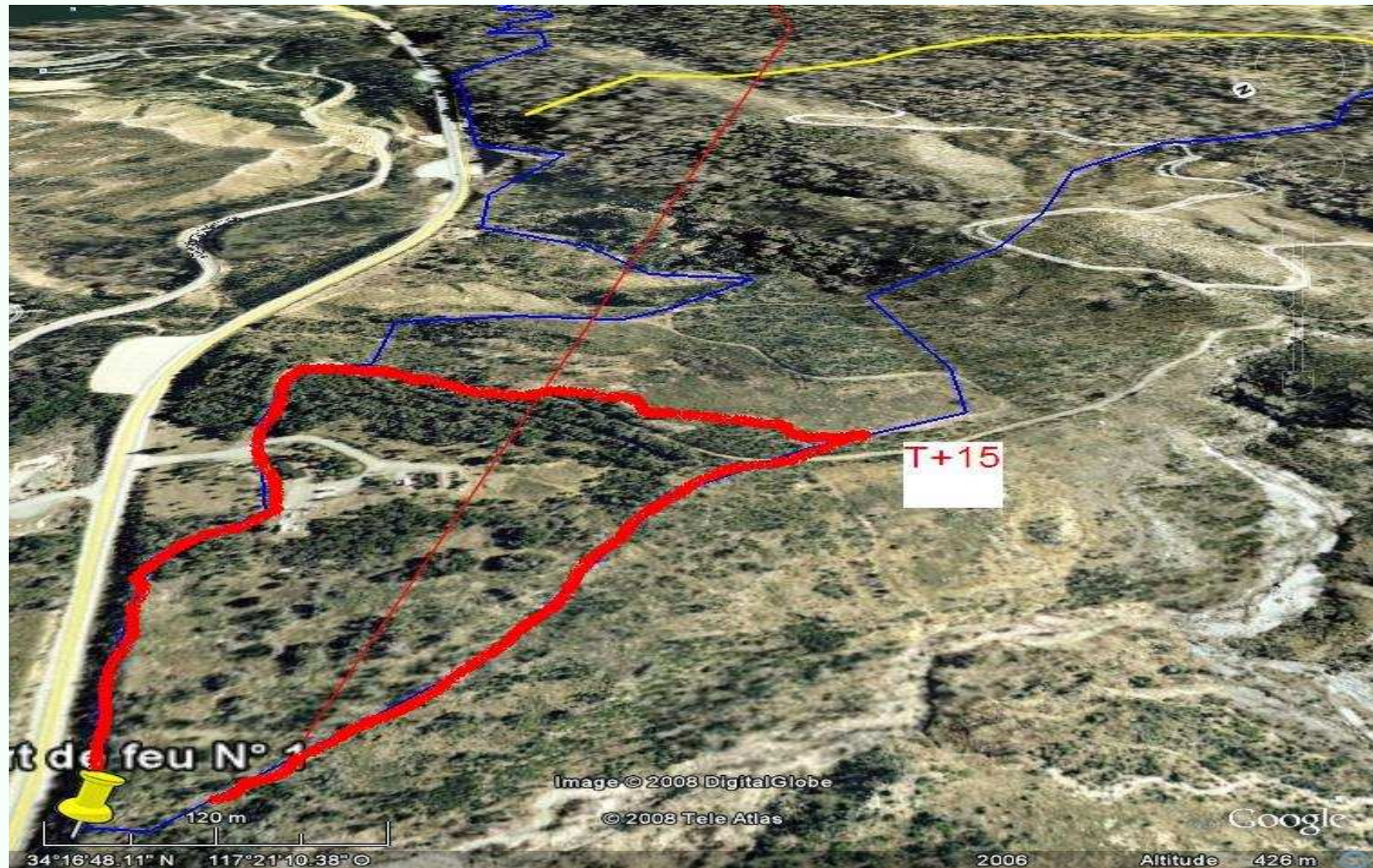
FIRE PERIMETER



BASIS OF CALCULATIONS

ACTION	Strike Team	CL 415	S 2F	CIVIL ENGINEERING	HOTSHOT CREW
Control fire head	1/80m	1 L/80m	1 L/50m		
Surveillance of fire head	1/320m	1 L/80m	1 L/50m		
Control flanks	1/320m	1 L/80m	1 L/50m		
Complete extinction	1/400m				
Deep extinction	1 fire pump/ Hectare				
Create access				1.5 to 2 Km/h	
Prescribed fire					
Deforestation					400 m/h

T + 15'





INPUTS

List of Inputs for Exercise N° 1

- Aerial resources unavailable
- Impossible progression
- Vehicle breakdown
- Vehicle accident
- Minor or serious injury
- Lack of water
- Spot fires
- Change of wind
- Change of values-at-risk
- Radio towers unavailable



EXERCISE N° 2

CONCORS Region

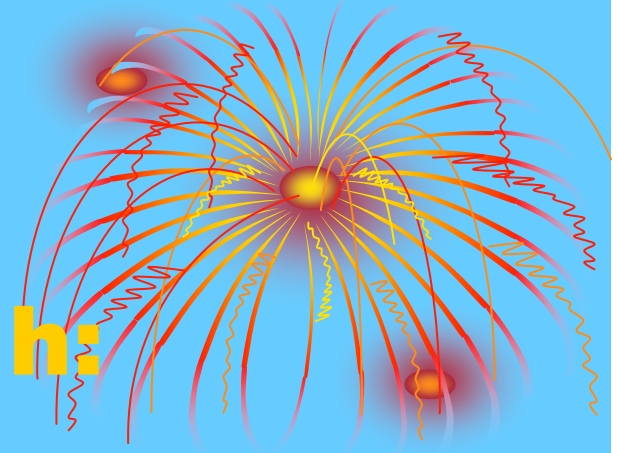
SCENARIO



- **Today is 11 July, 14:30 with the meteorological conditions of the Concors region and specifically the droughts. For the past several days the situation has been very concerning. Many large forests have been affected by fires igniting from accidental or suspicious origins.**
- **The weather conditions of the day are as follows:**
- **Wind from 50° at 60 to 80 km/hr. The water reserve at ground level is at 10mm, the rate of spread is 1800 m/h. The ground temperature is 35°. The hygrometry is from 4 to 6%.**

SCENARIO

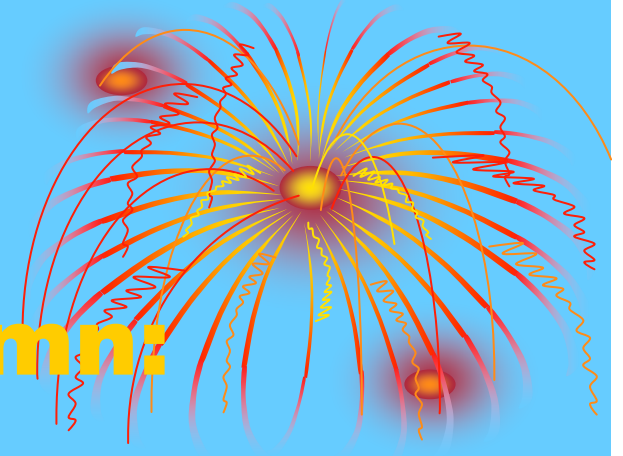
SITUATION at T + 24 h:



A forest fire has been declared in the county area of Taulisson. In around 1 hour this fire will be threatening the first houses located at the left flank. The Emergency Centre calls upon your Incident Management Team. This fire is spreading in forested public park area containing ecological assets. It grew in size when the wind speed increased. Vulnerable points are threatened in front of the fire. The first incident responders that you must replace did not take the necessary measures in order to contain the fire. The Incident Controller has just learned that a group of adolescents are located on excursion path GR 9.

SCENARIO

SITUATION at T + 40 mn:

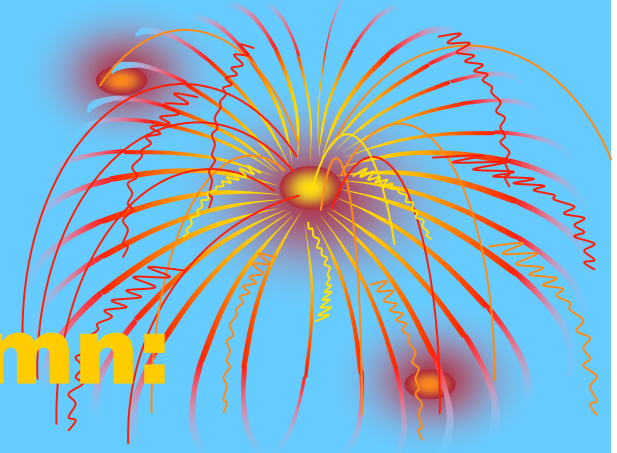


The burned surface area is around 10 hectares. The rescue crews on site are the following:

- **AIX Strike Team 1 / position: Les Grandes Vignes**
- **AIX Strike Team 2 / position: CONCORS Fire Tower**
- **AIX Strike Team 3 / position: Le Taulisson**

SCENARIO

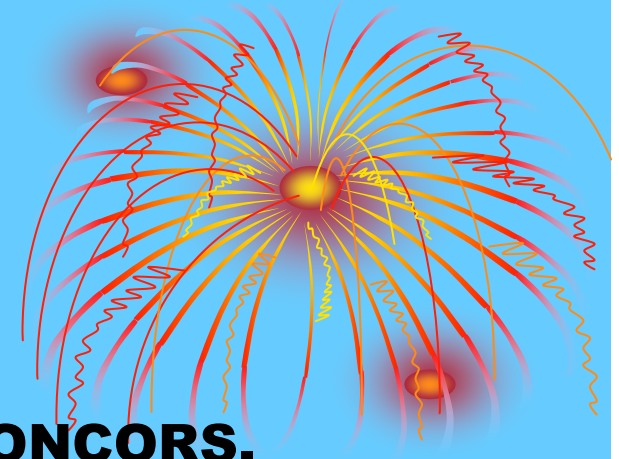
SITUATION at T + 40 mn:



The rescue crews en route are the following:

- **T+15mn : 1 Heavy Strike Team AIX**
- **T+30mn : 1 Strike Team AUBAGNE**
- **T+45mn : 1 Strike Team SALON**
- **T+1h : 1 Strike Team MARTIGUES and ARLES**
- **T+2h30 : 1 Dozer**

Situation Report



- **I am Lieutenant WIKI at the fire at CONCORDS.**
- **I see a fire directed towards the St Jean Valley, in a steep area difficult to access. The area wind is from NE, with an acceleration due to the relief. Many spot fires. No civil or firefighter victims. Several vulnerable points are threatened.**
- **I am currently protecting several vulnerable points with 2 strike teams.**
- **I anticipate a very large development.**
- **I am under obligation to leave for family reasons.**

AVAILABLE RESOURCES



Station	Type	Response time	Manpower
AIX	HST	30 mn	6
LUYNES	GRST	45 mn	8
SALON 1	ST	1h00	18
SALON 3	ST	1h00	18
AUBAGNE 2	ST	1h00	18
AUBAGNE	HST	1h30	6
MARTIGUES	ST	2h00	18
MARTIGUES	ST	2h00	18
ARLES	ST	2h30	18
ARLES	ST	2h30	18
VAR	Task Group	2h30	54
VAUCLUSE	Task Group	3h00	54
GARD	Task Group	3h00	54

Other resources are available with a response time greater than 3 hours

AVAILABLE RESOURCES

FIRE PUMP, HOTSHOT CREW, and DOZER

Station Manpower	Type	Response time	
AIX SALON	Fire-Pump	1h	2
	" " "	2h	2
AUBAGNE MARTIGUES	" " "	2h	18
	" " "	3h	18
AIX SALON AUBAGNE MARTIGUES ARLES	HotShot Crew	30 mn	20
	" " "	45	20
	" " "	1h	20
	" " "	2h	20
	" " "	3h	20
BRIGNOLES 2	Dozer	3h	2

Other resources are available with a response time greater than 3 hours

AVAILABLE RESOURCES



Aerial Resources

	Response Time	Type
•	45 mn	CL 415
•	1h	CL 415
•	1h	CL 415
•	2h	DASH
•	3h	DASH
•	15 mn	Helicopter water bomber Type 3
•	20 mn	Helicopter water bomber Type 3
•	1 H	DRAGON

Other aerial resources are available with a response time greater than 2 hours

Objectives of the Agency Administrator



Primary Objective:

- **Protect the people specifically the group of adolescents.**
- **Protect the touristic area.**

Secondary Objective:

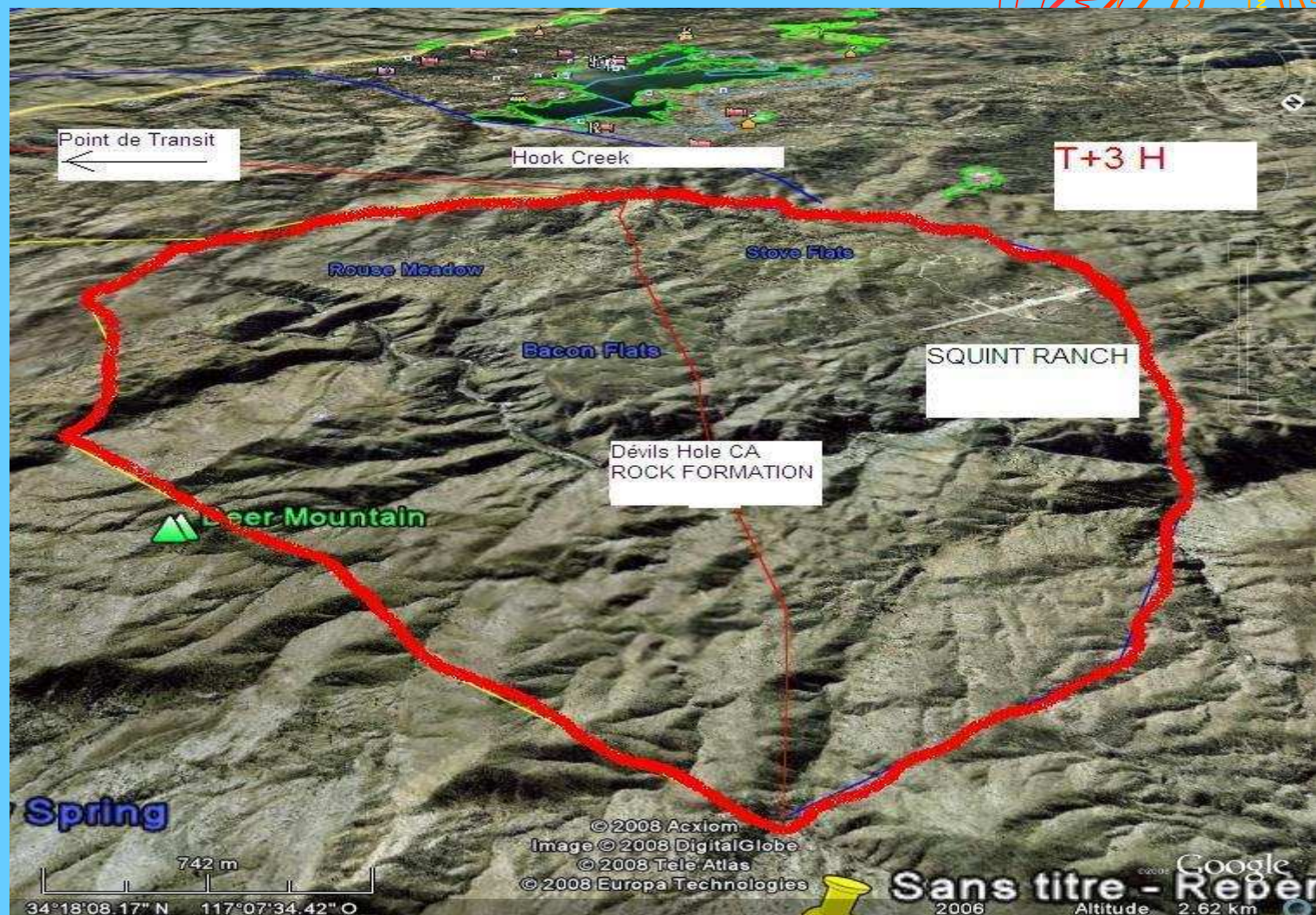
- **Limit the fire spread while protecting the people, goods, property, and the environment.**

BASIS OF CALCULATIONS



ACTION	Strike Team	CL 415	S 2F	GRST	CIVIL ENG	HOTSHOT CREW
Control fire head	1/80m	1/80m	1/50m			
Surveillance of fire head	1/320m					
Control flanks	1/320m	1/80m	1/50m			
Complete extinction	1/400m					
Depth extinction	1 fire-pump/ Hectare					
Spreading				1 Km/h		
Create access					1.5 to 2km/H	

SITUATION A T + 24h



INPUTS

List of Inputs for Exercise 2



- **Aerial resources unavailable, crash, etc.**
- **Impossible progression**
- **Vehicle breakdown**
- **Vehicle accident**
- **Minor or serious injury**
- **Lack of water**
- **Spot fire**
- **Change of wind**
- **Change of values-at-risk**
- **Radio tower unavailable, threatened by fire**
- **Agency Administrator changes objective**
- **Unsolicited arrival of a VIP**
- **Journalists**
- **Breakdown of hydraulic network**
- **Hiker**
- **Vulnerable points: communication tower, water tower, touristic site, camping, public buildings, etc.**