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**INDEPENDENT EXPERT ADVISORY PANEL REPORT ON  
INVESTIGATION OF FOUR CASES OF RENAL CELL CARCINOMA IN  
FIREFIGHTERS AT CAREER FIRE AND RESCUE STATION IN  
HAMMOND ROAD, SUCCESS**

**2 June 2015**

**PREPARED FOR:**

Government of Western Australia  
Department of Fire & Emergency Services

**PREPARED BY:**

Independent Expert Advisory Panel

**DOCUMENT CONTROL & REVIEW DATA**

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## **TABLE OF CONTENTS**

<b>DOCUMENT CONTROL &amp; REVIEW DATA .....</b>	<b>1</b>
<b>TABLE OF CONTENTS .....</b>	<b>1</b>
<b>1. EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>2. BACKGROUND AND PURPOSE .....</b>	<b>3</b>
2.1 Independent Expert Advisory Panel .....	3
2.2 Background.....	3
2.3 Purpose .....	4
2.4 Terms of Reference .....	4
2.5 Definitions .....	4
2.6 Conflicts .....	4
<b>3. REVIEW OF WORKPLACE CONTAMINANT INVESTIGATION – SUCCESS CAREER FIRE AND RESCUE STATION REPORT .....</b>	<b>5</b>
3.1 Introduction/Background .....	5
3.2 Purpose and Approach.....	5
3.3 Conclusion .....	6
3.4 Discussion.....	6
<b>4. REVIEW OF WORKPLACE CONTAMINANT INVESTIGATION – SUCCESS FIRE AND RESCUE STATION SUMMARY REPORT .....</b>	<b>9</b>
4.1 Introduction.....	9
4.2 Background.....	9
4.3 Investigation Approach.....	9
4.4 Discussion.....	10
4.5 Conclusion .....	11
<b>5. EXTENDED SCHEME WATER SAMPLING AND ANALYSIS REPORT FOR SUCCESS FIRE STATION.....</b>	<b>12</b>
5.1 Scope of Work .....	12
5.2 Sampling Method .....	13
5.2.1 Building Water Sampling .....	13
5.2.2 Mains Incoming Water Sampling.....	13
5.2.3 Laboratory Analysis and Quality Assurance/Quality Control (QA/QC) .....	13
5.3 Water Quality Analysis Result.....	14
<b>6. INVESTIGATION OF KIDNEY CANCER CASES AT SUCCESS FIRE STATION .....</b>	<b>15</b>
6.1 Background.....	15
6.2 Success Fire Station Kidney Cancer Cases .....	15
6.3 Discussion.....	16
6.4 Recommendation .....	17
<b>7. DISCUSSION .....</b>	<b>17</b>
<b>8. RESPONSE TO DFES IN ACCORDANCE WITH THE TERMS OF REFERENCE .....</b>	<b>18</b>
<b>9. CONCLUSION .....</b>	<b>20</b>

## **1. EXECUTIVE SUMMARY**

In January 2015, an Independent Expert Advisory Panel (IEAP) was convened on request of Commissioner Wayne Gregson of the Department of Fire and Emergency Services (DFES). The IEAP was formed to facilitate the independent review of all matters surrounding the four cases of Renal Cell Carcinoma (RCC) in Fire Fighters at the Career Fire and Rescue Station in Hammond Road, Success (CFRSHRS).

The IEAP was established in March 2015 to provide independent response and advice to the DFES Commissioner and specifically in relation to the kidney cancers surrounding the CFRSHRS. A Terms of Reference has been established by DFES and the Panel has acted in accordance with such terms. The IEAP was supplied with reports from independent third parties engaged by DFES and encompassing environmental testing, medical screening and epidemiological study.

On the basis of such evidence and in accordance with the Terms of Reference, the following is tendered for the consideration of DFES:

1. The opinion of the IEAP is that DFES has acted appropriately and timely in accordance with the evidence supplied to the IEAP and specifically with regards to the reporting of kidney (renal) cancer cases.
2. The IEAP is satisfied that the appropriate investigations have been undertaken to establish an opinion relating to the relationship (if any) between the CFRSHRS station and kidney (renal) cancer.
3. The IEAP is satisfied that there is no evidence to support the proposition that the CFRSHRS station not be considered a safe place of work. The IEAP considers that there is no evidence to support an increased risk of kidney (renal) cancer and the current closure of the CFRSHRS station.
4. Whilst there remains outstanding matters for ongoing assessment, such matters are considered by the IEAP to not prevent an immediate re-establishment of the CFRSHRS station.

## **2. BACKGROUND AND PURPOSE**

### **2.1 Independent Expert Advisory Panel**

In January 2015, an Independent Expert Advisory Panel (IEAP) was convened on request of Commissioner Wayne Gregson of the Department of Fire and Emergency Services (DFES). The IEAP was formed to facilitate the independent review of all matters surrounding the four cases of Renal Cell Carcinoma (RCC) in Fire Fighters at the Career Fire and Rescue Station in Hammond Road, Success (CFRSHRS). With this, an IEAP was formed in March 2015 consisting of:

1. Occupational Physician
2. Medical Oncologist with specialist expertise in Renal Cell Carcinoma
3. Public Health Physician

In March, 2015, the IEAP was formed of Dr Joel Silbert (Occupational Physician), Dr Tom Van Hagen (Medical Oncologist), and Professor Phillip Weinstein (Public Health Physician).

### **2.2 Background**

In March 2015, the IEAP received a Brief regarding the background circumstances and precipitating formation of the Panel and request for reporting. The IEAP acknowledges the following information provided for its consideration:

1. DFES have reported four Fire Fighters from CFRSHRS had been diagnosed with kidney cancers in the past seven years, being 2008, 2010, 2014 and most recently in October 2014. A study previously undertaken by Fire and Emergency Services Authority (FESA) in 2010 concluded the most probable connection between the reported cancers of 2008 and 2010 being chance.
2. CFRSHRS is noted to have opened in 2000, with at least 300 Fire Fighters having worked at the station since its opening.
3. DFES Reports being advised in July 2014 of a third Fire Fighter based at the CFRSHRS having been diagnosed with a RCC.
4. In July 2014, DFES engaged Medicomp Occupational Health Solutions to establish and operate a program of voluntary health surveillance of the Fire Fighters associated with CFRSHRS.
5. In October 2014, a fourth Fire Fighter of the CFRSHRS station had been diagnosed with a kidney tumour of unknown histopathological type.
6. On 29 October 2014, Golder Associates were engaged by DFES to undertake a Workplace Contaminant Investigation, with a final report issued in January 2015.
7. In 2014, DFES engaged the Department of Health Western Australia to investigate the four cases of kidney cancers arising from CFRSHRS. A Final Report was issued in February 2015.
8. On 31 October 2014, DFES was noted to have relocated operational personnel and equipment from CFRSHRS, and until such time as further investigation had been completed to assess the station and its surrounds and be considered a Safe Work Place.

### **2.3 Purpose**

The IEAP was established in March 2015 to provide independent response and advice to the DFES Commissioner and specifically in relation to the kidney cancers surrounding the CFRSHRS. A Terms of Reference has been established by DFES and the Panel has acted in accordance with such terms.

### **2.4 Terms of Reference**

The IEAP acknowledges the Terms of Reference as established by DFES specifically the IEAP has acted in accordance with:

1. Review the recent actions of DFES in responding to the number of cancer cases identified among Fire Fighters working from the CFRSHRS and provide comment as to the appropriateness and timeliness of those actions.
2. After examining each of the constituent parts (environmental testing, medical screening and epidemiological study), provide advice to the DFES Commissioner that as to whether the CFRSHRS is considered a safe place of work.
3. Examine (and comment upon) any further action that DFES proposes to undertake in respect of this matter.
4. Provide advice to the DFES Commissioner as to whether in the opinion of the IEAP there is further investigation or other work required to be undertaken by DFES.

### **2.5 Definitions**

For the purpose of this report, all scientific matters have been interpreted on the basis of standard scientific definitions and conventions. All words have been interpreted on the basis of definitions contained in the English Oxford Dictionary.

### **2.6 Conflicts**

The following Conflicts have been declared by the IEAP members:

1. **Dr Joel Silbert**  
Dr Silbert is the Owner and Managing Director of OSH Group Pty Ltd. In November 2014, OSH Group acquired Medicomp Occupational Health Solutions.
2. **Dr Tom van Hagen**  
Nil
3. **Professor Phillip Weinstein**  
Nil

### **3. REVIEW OF WORKPLACE CONTAMINANT INVESTIGATION – SUCCESS CAREER FIRE AND RESCUE STATION REPORT**

Prepared by Golder Associated

Issued January 2015

Report Number 1413531-001-R-Rev0

The Golder Associates Report (Report Number 1413531-001-R-Rev0) has been reviewed in its entirety. The IEAP acknowledges the following key findings of this report:

#### **3.1 Introduction/Background**

There have been four reported cases of kidney (renal) cancer amongst the firefighters stationed at the DFES Success Fire Station, 364 Hammond Road Success (the site), up to 21 November 2014. DFES has initiated a number of investigations into this matter to identify if there is an identifiable cause and what control measures can be implemented to prevent further occurrences.

DFES has reported the current known common elements across all four cases of kidney cancer are:

- All relate to career (full time) firefighters
- All have been stationed at the site, and
- All firefighters have been diagnosed with a form of kidney cancer

DFES has sought to identify if there is a link between the site, and the incidents of kidney cancer. The site was opened in 2000 and was staffed until 31 October 2014 when the firefighters were temporarily relocated during the course of investigations.

On 14 October 2014 Golder was engaged by DFES to undertake an environmental investigation to assess if there was evidence that contaminants present at the site and immediate surrounds could be associated with the development of the cancers. Golder proposed an approach based on assessing the site history and judgemental sampling to identify if there is a plausible link from the site to the diagnoses of cancer. Golder has been advised by DFES of concurrent investigations including a biological monitoring program of the Success firefighters and other firefighters who have previously worked at the station and independent epidemiological study initiated by the Department of Health (DoH) in Western Australia.

#### **3.2 Purpose and Approach**

The scope of Golder's investigation deals with the environmental setting of the site and its immediate surrounds. We have based our approach on the *Source-Pathway-Receptor* model, which is an accepted and readily applicable approach to understanding how potentially harmful substances can make their way through the environment and cause harm to people, animals or plants. In this case, the receptors are the firefighters working at the site. The assessment of potential sources and pathways was the focus of the investigation. Information gathered to inform his model include:

- A Preliminary Site Investigation (PSI) in general accordance with the Department of Environment Regulation (DER) *Contaminated Sites Management Series*.
- Judgemental sampling which included the development of a list of chemicals of interest (COI) from substances known to be associated with the development of kidney cancer for the targeted screening sampling and the sampling and analysis of site media (soils, water and air) for those COI.
- Comparison of the COI sample results against health investigation levels or environmental values.

The list of COI was also informed by concerns raised by the firefighters during a site visit on the 18 October 2014 and a meeting held at the site on 31 October 2014 and also from concerns raised by the firefighters and passed on to Golder by DFES representatives.

We have presented the *Source-Pathway-Receptor* model in the form of a conceptual site model (CSM) to help communicate the interpretation of the results. The CSM in Figure 1 below and provides the potential sources, pathways and the sampling approach.

### 3.3 Conclusion

The scope of the investigation was to assess whether there was an identifiable link between the environment at site and the incidents of kidney cancer. The COI included chemicals known to cause renal cancer based on animal studies and epidemiological studies in humans. The majority of the COI identified as plausible causative agents of kidney cancer in the firefighters, in various environmental media at or near the site, were not detected. The COIs cadmium, arsenic and PFOA were detected and the concentrations were sufficiently low as to not be a concern for health of the firefighters. There was not a complete pathway for exposure of firefighters to PFOA present in the stormwater drain. Accordingly, there is no plausible link identified between the site and the incidence of kidney cancer experienced, that would be suggestive of the need for any further investigation.

### 3.4 Discussion

The purpose of this investigation was to identify if there was a unique situation at the site that could be a cause for the cancer incidents. The investigation aimed to identify if there were sources of chemicals known to cause kidney cancer at the site and assess if there was a plausible pathway and hence potential for exposure. To meet the aim of the investigation, judgemental sampling was undertaken based on the development of the conceptual site model with the intent of identifying if there was a "source" that would have a plausible "pathway" to the firefighters ("receptors"). As described in this report, the results of the PSI and judgemental sampling conducted at the site have not identified an exposure risk that is consistent with the development of kidney (renal) cancer.

While PFOA was detected in the stormwater drain on the north side of the site there is not a complete pathway for firefighters to be exposed to PFOA present in the stormwater. Further, the level detected within the stormwater is below the guideline values to be protective of health in drinking water. The source of the PFOA detected in the stormwater drain cannot be established from the single sample taken. The identification of where the

detected compound originated would not alter the fact that there is no plausible exposure pathway and therefore does not present any identifiable risk to firefighter health.

In relation to groundwater, no COI or VOCs were detected in the sampling. The groundwater wells were located upgradient of the site and results of sample analysis indicate there is not an ongoing source of groundwater contamination. There is also no complete pathway from groundwater.

The screening for VOCs was conducted throughout the building on the day that other samples were taken and VOCs were not identified as being present. The results are considered representative of site conditions due to absence of VOCs in other media such as ground water.

Whilst the COI arsenic was identified in the soil samples, it was well below published health investigation levels and the interaction with soil at the site is limited to infrequent maintenance of a vegetable garden and general garden maintenance. Accordingly there is no cause for concern from this source.

Swab sampling detected COI arsenic and cadmium on surfaces at the station. The results for arsenic and cadmium were compared to screening values developed for the World Trade Center and to WHO toxicity reference values in the form of a TDI. The level of cadmium detected was below screening levels. Arsenic was detected in four of the seven samples relating to the outer windows and dorm room 2 and 3 windows. The concentration of arsenic in one sample marginally exceeded the reference value (10%). An exposure calculation was completed to compare to WHO TDI levels and the level is equivalent to 2.4% of the TDI. Accordingly the levels are not a cause for concern for firefighters health.

A number of concerns were raised by firefighters and the UFU of WA relating to water quality and the proximity of the Water Corporations' water treatment plant. The fire station is located outside of the initial odour buffer zone of 300m and the current buffer zone of 200m and the products used at the Water Corporation's facility and the sediment materials do not have a link with the development of kidney cancer.

The Water Corporation has a comprehensive testing regimen that addresses microbiological, chemical (including fluoride) and radiological testing to monitor performance in meeting drinking water quality criteria. The regimen includes assessment of water treatment by-products, the concentration of which were well below the ADWG health guideline value e.g. trihalomethane (THM), during the period in question. Similarly the results for haloacetic acids (HAA) were well below WHO guidelines, values (note: there is no current value for HAA provided in the ADWG). Accordingly, the scheme supply of water to site and activities at the water treatment plant are not considered a source. Had any hazard associated with the Water Corporation's activities been present at the adjacent site, then one would expect workers at that site to be similarly affected.



# WORKPLACE POTENTIAL CONTAMINANT INVESTIGATION

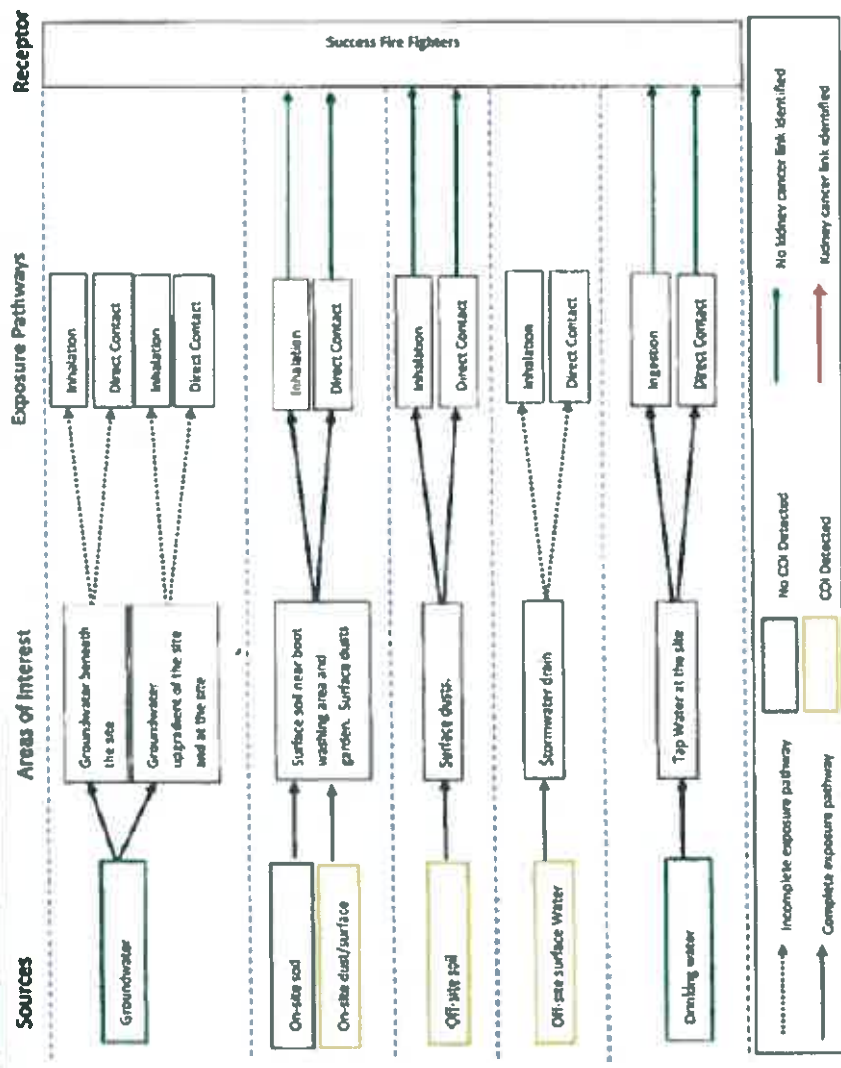


Figure 2: Investigation Outcome Conceptual Model



## **4. REVIEW OF WORKPLACE CONTAMINANT INVESTIGATION – SUCCESS FIRE AND RESCUE STATION SUMMARY REPORT**

Prepared by Golder Associated

Issued January 2015

Report Number 1413531-006-R-Rev0

### **4.1 Introduction**

This summary report presents the findings of an environmental investigation to assess if the Success Career Fire and Rescue Station site (Fire Station or the Site) may be linked to the diagnoses of kidney cancer in four Success firefighters. The full report is provided in the *1413531-001-R-Rev0 Workplace Potential Contaminant Investigation – Success Career Fire and Rescue Station, January 2015* and provides detail on the approach, rationale as well as the findings presented here.

### **4.2 Background**

There have been four reported cases of kidney (renal) cancer amongst the firefighters stationed at the DFES Success Fire Station (the Site) between 2008 and 21 November 2014. DFES has initiated a number of investigations into this matter to assess if there is an identifiable cause.

DFES has reported the current known common elements across all four cases of kidney cancer are:

- All relate to career (full time) firefighters
- All have been station at the site, and
- All firefighters have been diagnosed with a form of kidney cancer.

DFES has sought to identify if there is a link between the site, at 365 Hammond Road Success, and the incidents of kidney cancer. The site was opened in 2000 and was staffed until 31 October 2014 when the firefighters were temporarily relocated during the course of investigations. Golder Associated Pty Ltd (Golder) was engaged by the DFES to undertake this investigation.

### **4.3 Investigation Approach**

Golder has followed the accepted model for understanding exposure to hazardous chemicals of interest (COI). This is known as the *Source-Pathway-Receptor* model. For a COI to cause ill-effects to a person, there must be a complete pathway with all three elements of the model present. A visual representative of how the model works is provided as Figure 1 below.

#### 4.4 Discussion

The purpose of this investigation was to identify if there was a unique situation at the site that could be a cause for the cancer incidents. The investigation aimed to identify if there were sources of chemicals known to cause kidney cancer at the site and assess if there was a complete pathway and hence potential for exposure. To meet the aim of the investigation judgemental sampling was undertaken based on the development of the conceptual site model with the intent of identifying if there was a "source" that would have a plausible "pathway" to the firefighters ("receptors"). As described in this report, the results of the PSI and judgemental sampling conducted at the site have not identified an exposure risk that is consistent with the development of kidney (renal) cancer.

While PFOA was detected in the stormwater drain on the north side of the site there is not a complete pathway for firefighters to be exposed to PFOA present in the stormwater. Further, the level detected within the stormwater is below the guideline values to be protective of health in drinking water. The source of the PFOA detected in the stormwater drain cannot be established from the single sample taken. The identification of where the detected compound originated will not alter the fact that there is not a complete exposure pathway and therefore does not present a risk to firefighter health.

In relation to groundwater, no COI or VOCs were detected in the sampling. The groundwater wells were located upgradient of the site and results of sample analysis indicate there is not an ongoing source of groundwater contamination. There is also no complete pathway from groundwater.

The screening for VOCs was conducted throughout the building on the day that other samples were taken and VOCs were not identified as being present. The results are considered representative of site conditions due to absence of VOCs in other media such as ground water.

Whilst the COI arsenic was identified in the soil samples, it was well below published health investigation levels and the interaction with soil at the site is limited to infrequent maintenance of a vegetable garden and general garden maintenance. Accordingly there is no cause for concern from this source.

Swab sampling detected COI arsenic and cadmium on surface at the station. The results for arsenic and cadmium were compared to screening values developed for the World Trade Center and to WHO toxicity reference values in the form of a TDI. The level of cadmium detected was below screening levels. Arsenic was detected in four of the seven samples relating to the outer windows and dorm room 2 and 3 windows. The concentration of arsenic in one sample marginally exceeded the reference value (10%). An exposure calculation was completed to compare to WHO TDI levels and the level is equivalent to 2.4% of the TDI. Accordingly the levels are not a cause for concern for firefighters health.

A number of concerns were raised by firefighters and the UFU of WA relating to water quality and the proximity of the Water Corporations' water treatment plant. The fire station is located outside of the initial odour buffer zone of 300m and the current buffer zone of 200m and the products used at the Water Corporation's facility and the sediment materials do not have a link with the development of kidney cancer.

The Water Corporation has a comprehensive testing regimen that addresses microbiological, chemical (including fluoride) and radiological testing to monitor performance in meeting drinking water quality criteria. The regimen includes assessment of water treatment by-products the concentration of which were well below the ADWG health guideline value e.g. trihalomethane (THM), during the period in question. Similarly the results for haloacetic acids (HAA) were well below WHO guidelines, values (note: there is no current value for HAA provided in the ADWG). Accordingly, the scheme supply of water to site and activities at the water treatment plant are not considered a source.

#### **4.5 Conclusion**

The scope of the investigation was to assess whether there was an identifiable link between the environment at site and the incidents of kidney cancer. The COI included chemicals known to cause renal cancer based on animal studies and epidemiological studies in humans. The majority of the COI identified as plausible causative agents of kidney cancer in the firefighters, in various environmental media at or near the site, were not detected. The COIs cadmium, arsenic and PFOA were detected at concentrations sufficiently low as to not be a concern for health of the firefighters. There was not a complete pathway for exposure of firefighters to PFOA present in the stormwater drain. Accordingly, there is no identified link between the site and the incidents of kidney cancer experienced.

## **5. EXTENDED SCHEME WATER SAMPLING AND ANALYSIS REPORT FOR SUCCESS FIRE STATION**

**Prepared by Golder Associated**

**Issued 15 April 2015**

**Report Number 1413531-011-L-Rev2**

The Golder Associates Report (report number 1413531-011-L-Rev0) has been reviewed in its entirety. The IEAP acknowledges the following key findings of this report:

### **5.1 Scope of Work**

The scope of work was presented to DFES in a letter dated 24 November 2014 (Golder 2014). Briefly this comprised:

- Mains incoming water sampling and analysis.
  - Collection of water samples from outlet closest to the mains water supply entering the site.
  - Conducted on nine separate occasions.
  - Laboratory analysis (NATA accredited) of samples and results compared to the Australian Drinking Water Guidelines (ADWG) and reporting.
- Building water sampling and analysis
  - Collection of water samples from furthest outlets from the supply or ring main.
  - Collection of three samples from the cold water system (sampling from three different outlets) and six samples from the hot water system (two samples per outlet) on one visit.
  - Laboratory analysis (NATA accredited) of samples and results compared to the ADWG and reporting.

Field screening for volatile organic compounds (VOCs) was conducted on all samples collected using a photo ionization detector (PID) and water samples were submitted to a NATA accredited laboratory for analysis of:

- Chlorine, metal/metalloid suite (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zine), bromate, phosphate.
- VOC's and Trihalomethanes (THMs).

The initial water sampling was carried out by Mr Mick Woods and Dr Alison Turner on the 6 January 2015. Follow up site visits were carried out by Dr Alison Turner between the 15 January and the 20 February 2015.

## **5.2 Sampling Method**

### **5.2.1 Building Water Sampling**

Hot and cold water circuits were identified from a set of on-site construction drawings for the building. Three ensuite taps (ENS1, ENS2 and ENS3) with hot and cold flow were nominated as representative of the water with the longest residence time in the pipework system of the building at the time of sampling.

The following water samples were taken:

- First flush of cold water from the right mixer tap feed (CWFF)
- First flush of hot water from left mixer tap feed (HWFF)
- Equilibrated hot water sample (HWEQ), taken after hot water was discharged from the system via showers and hot taps for 5 mins prior to sampling.

Sample bottles were filled for analysis, metals (with HNO<sub>3</sub> preservative) and VOC (2 x glass vials). A PID reading was taken from the water (CWFF, HWFF and HWEQ) discharging into the sink.

### **5.2.2 Mains Incoming Water Sampling**

An outside tap located next to the front access door at the Fire was identified as the sampling point closest to the incoming mains supply. A sample of the first flush was taken on the initial visit. Subsequently the tap was allowed to run for 5 minutes and samples of water for analysis were taken.

Sample bottles were filled for analysis, metals (with HNO<sub>3</sub> preservative) and VOC (2 x glass vials). A 10 L metal bucket was used to capture water in order to allow PID readings to the discharging water.

### **5.2.3 Laboratory Analysis and Quality Assurance/Quality Control (QA/QC)**

Samples were chilled with ice and delivered to the analytical laboratory, namely the National Measurements Institute (NMI), within 2 hours of sampling.

All reasonable effort was made to minimize external and cross contamination of the samples. Nitrile gloves were worn during sampling and a fresh pair used for each sample location.

A trip blank was included for analysis of VOC's for 7 of the sampling rounds. The trip blank sample was analysed for VOC's and THM's. The results from analysis of the trip blanks are presented alongside water samples in Table B1 (Attachment B).

Chain-of-custody (COC) documentation sent to the laboratory with the samples is included with laboratory certificates in Attachment A.

A calibration check of the PID detector on each day for usage against 100 ppm iso-butylene gas completed. The acceptance criterion was 100 ±5 ppm.

### 5.3 Water Quality Analysis Result

The analytical results are contained in Table 1A (attachment). Samples that reported detectable concentrations of analyses that were identified as chemicals on interest (COI) are listed in Table 3. These substances are trihalomethanes. The ADWG state the following with respect to these compounds in drinking water.

*“In Australia, trihalomethanes are present in drinking water principally as the result of disinfection using chlorination or, to a much lesser extent, chloramination. Chlorine, which produces hypochlorous acid when added to water, can react with naturally occurring organic material, such as humic and fulvic acids, to produce trihalomethanes”*

The ADWG state that in major Australian reticulated supplies, concentrations of total trihalomethanes range up to 0.5mg/L. Further the concentration of these substances, either individually or in total, in drinking water should not exceed 0.25 mg/L. The combined concentrations recorded in water samples from the Success fire station are all below this value.

## **6. INVESTIGATION OF KIDNEY CANCER CASES AT SUCCESS FIRE STATION**

Prepared by Department of Health, WA

Issued February 2014

### **6.1 Background**

The Success Fire Station was opened in 2000 and built on vacant land with no land use history (Golder Associates, 2015). In October 2014, the firefighters at the Station were temporarily relocated pending the outcome of the investigations into the four cases of kidney cancer reported among the firefighters from 2009 to 2014.

Staff first became concerned about potential hazards in the building after a third firefighter was diagnosed with kidney cancer in 2014, following two previous cases diagnosed in 2009 and 2010. A fourth firefighter was diagnosed with kidney cancer in 2014, increasing the fears of a cancer cluster among staff.

The Department of Fire and Emergency Services (DFES) raised the health concerns of the firefighters with the Department of Health, WA (DoH). DFES sought assistance to determine if there is an increased risk of contracting kidney cancer as a direct result of working at the Success Fire Station and, if so, to help identify a cause for the increased risk. Further investigations into the existence of contaminants at the Station (Golder Associates, 2015) and medical screening of firefighters for kidney cancer were commissioned by DFES.

In response to the concerns raised by DFES, the DoHWA has undertaken a preliminary study to assess the likelihood of a cancer cluster among the firefighters at the Station based on the initial evidence.

### **6.2 Success Fire Station Kidney Cancer Cases**

No information has been gathered about the occurrence of any other type of cancers other than kidney cancer among the firefighters. Four cases of kidney cancer have been identified among the male firefighters at the Station over a six-year period from 2009 to 2014, with cases diagnosed in 2009, 2010 and 2014.

All four cases have been registered with the WA Cancer Registry and verified as clear cell adenocarcinoma cases.

The ages of the men at diagnosis ranged from 45 to 52 years, with an average age of 47.8 years.

For the purpose of this study, the exposure is defined as the time spent employed at Success Fire Station. Records of service for the four firefighters indicate that the potential time of exposure ranged from 7.6 years to 14.7 years.



**Table 1: Number of kidney cancer cases and Standardised Incidence Ratios (SIR) for residents of Cockburn, 2008 to 2012.**

Gender	N	SIR	95% CI
Males	46	1.40	1.00-1.83
Females	13	0.77	0.37-1.24

Note: SIR is the ratio of observed cases to expected cases. A SIR which is statistically significantly greater than one indicates that the cancer incidence in a cohort is higher than the rate of the comparison population (State). Statistical significance is indicated by the 95% confidence interval (95% CI) being greater than one.

### 6.3 Discussion

Typically, cancer clusters are identified by a single cancer type occurring in large numbers in a cohort. Four kidney cancer cases of the same type were diagnosed among the firefighters based at the Success Fire Station in a six year period. The type of kidney cancer is common and accounts for 90 percent of all kidney cancers, indicating that the cancers are not rare types. However, it is unusual that only kidney cancers have been reported among the firefighters and it is unknown if other types of cancer cases were diagnosed among the same cohort during the same time. It may be that ascertainment, demographics characteristics, lifestyle behaviours, occupational practices or associated reporting reliability alter the detection and/or notification of more common types of cancers (lung, prostate, colorectal and melanoma) among this cohort.

Statistically, the number of cases and the person years of exposure were too small to assess if there were an excess number of cases diagnosed among firefighters, in the period, compared to the Perth Metropolitan male population. Even if an excess number of cases were found, this alone is not evidence of a cancer cluster as the characteristics of the cases need to meet certain criteria to establish the cases were not due to chance.

While the ages at diagnosis of the four cases were at the younger end of the expected age range for kidney cancer, based on State information presented by the WA Cancer Registry, around 16 percent of cases are diagnosed at these ages (45 to 54 years) throughout the state (Threfall and Thomson, 2014). Also, the average age at diagnosis would be expected to be younger among firefighters compared to the general population as the cohort is entirely of working age.

With the lack of identification of any potential carcinogenic agents from environmental testing at the Station (Golder Associated, 2015), it is impossible to demonstrate a causal pathway for the development of kidney cancer involving the environment around and in the Station, even though the four cases had potential exposure times ranging from 7.2 to 14.7 years. Without an identified carcinogen and the levels of exposure, the duration of exposure alone is meaningless. This suggests that cancers were the result of influences other than around and within the station.

As the kidney cancer incidence in the Cockburn Local Government Area for males and females was similar to the State incidence for both genders, it is unlikely that there is a large scale environmental factor influencing the kidney cancer incidence at the Station.

Considering together the details of the four kidney cancer cases and the lack of possible environmental causes, if a cancer cluster does exist, then it is likely to be by result of chance alone.

Firefighting is a dangerous occupation with risks to health as highlighted by the cancer risk reported by IARC, including reports of increased risk of renal cell carcinoma amongst firefighters in general, with Delahunt (Br J Urol, 1995) reporting a relative risk for the development of renal cell cancer 4.89 compared to the general population. While a level of uncertainty remains around the finding that there is no cancer cluster at the station due to the small number of cases investigated, the results of the environmental testing should reassure firefighters based at the Station.

#### **6.4 Recommendation**

While the number of kidney cancer cases reported by firefighters at the Success Fire Station was too small to determine if their occurrences was due to chance, findings from the investigation of the characteristics of these cases were not consistent with the criteria of a cancer cluster. Further investigation into the kidney cancer cases is unlikely to uncover a single cause due to the small number involved.

## **7. DISCUSSION**

Following consideration of all supplied information, the IEAP has established conclusions and recommendations based on the information referenced above and made available to the IEAP. In addition, the IEAP acknowledges the Terms of Reference as established by DFES. With this the IEAP has concluded that:

1. All information necessary for the IEAP to respond in accordance with the Terms of Reference has been provided.
2. No information has been withheld.
3. The investigations undertaken and reviewed have been deemed appropriate for purpose and able to be relied upon for the IEAP to reach a conclusion.
4. There has not been any influence or restriction to the IEAP undertaking its process.
5. The IEAP panels are sufficiently qualified and experienced to undertake reporting to DFES in accordance with the Terms of Reference
6. The conclusions and recommendations presented are based on the information available at the time of writing

## **8. RESPONSE TO DFES IN ACCORDANCE WITH THE TERMS OF REFERENCE**

In accordance with the Terms of Reference and as established under cover of the IEAP request of 13 March 2015, the following is tendered for consideration:

1. *Review the recent actions of DFES in responding to the number of cancer cases identified among Firefighters working from the CFRSHRS and provide comment as to the appropriateness and timeliness of those actions.*

The opinion of the IEAP is that DFES has responded appropriately and timely and in accordance with the information provided to date and documented above. Specifically, the IEAP considers that:

1. There is no evidence that any action was indicated by DFES on the diagnosis of a kidney (renal) cancer in 2008.
2. There is no evidence that a second cancer reported in 2010 would require any additional action other than that undertaken by DFES (previously FESA).
3. DFES is considered to have acted appropriately and in a timely fashion, following the report of a third kidney (renal) cancer in 2014.
4. DFES is considered to have acted appropriately on confirmation of a fourth kidney (renal) cancer in October 2014.

The opinion of the IEAP is that the responses by DFES have been appropriate, inclusive but not limited to:

1. Appropriate reporting of each case of kidney (renal) cancer.
  2. Engagement of the appropriately qualified consultants to DFES for investigation and advice.
  3. Withdrawal of DFES employees from the CFRSHRS, until such time as further investigation had been completed to assess the station and its surrounds.
2. *After examining each of the constituent parts (environmental testing, medical screening and epidemiological study), provide advice to the DFES Commissioner that as to whether the CFRSHRS is considered a safe place of work.*

The opinion of the IEAP is that there is no evidence within any of the independent and specialist level assessments to classify the CFRSHRS as anything other than a safe place of work.

3. *Examine (and comment upon) any further action that DFES proposes to undertake in respect of this matter.*

The IEAP acknowledges that DFES has undertaken further action, subsequent to the reporting of four cases of renal cell carcinoma. This has been reported by DFES to be:

1. Relocation of firefighters from the CFRSHRS.
2. Engagement of a medical services provider by DFES to conduct voluntary health monitoring of firefighters associated with the CFRSHRS.

3. All firefighters and their families offered support through the DFES Wellness Branch and the DFES EAP.

The IEAP acknowledges the intention of DFES to consider re-establishment of the CFRSHRS. The IEAP provides the following comments relating to further action that DFES proposes to undertake in respect of this matter:

1. The opinion of the IEAP is that DFES has acted appropriately and timely in accordance with the evidence supplied to the IEAP and specifically with regards to the reporting of kidney (renal) cancer cases.
2. The IEAP is satisfied that the appropriate investigations have been undertaken to establish an opinion relating to the relationship (if any) between the CFRSHRS station and kidney (renal) cancer.
3. The IEAP is satisfied that there is no evidence to support the proposition that the CFRSHRS station not be considered a safe place of work. The IEAP considers that there is no evidence to support an increased risk of kidney (renal) cancer and the current closure of the CFRSHRS station.
4. Whilst there remains outstanding matters for ongoing assessment, such matters are considered by the IEAP to not prevent an immediate re-establishment of the CFRSHRS station.
5. Scientific review and modification (if indicated) of the voluntary health monitoring program of firefighters associated with the CFRSHRS is recommended.
6. Continuation of periodic screening for renal cell carcinoma amongst voluntary health monitoring of firefighters associated with the CFRSHRS is recommended.
7. Continuation of support through the DFES Wellness Branch and the DFES EAP is recommended.
8. Collation and periodic review of health monitoring/screening results is recommended.
9. A formal review of the above processes and findings be undertaken on a periodic basis, until such time as continuation of this process is no longer appropriate.

4. *Provide advice to the DFES Commissioner as to whether in the opinion of the IEAP there is further investigation or other work required to be undertaken by DFES.*

The Panel considers that further histological assessment of all four cases of kidney (renal) cancer be independently assessed by an expert pathologist.

The ongoing health surveillance program implemented by DFES be reviewed by the IEAP for consideration/modification and on the basis of the IEAP findings through the accompanying documentation.

Pursuit of further clarification from the Department of Health Western Australia, regarding further investigation, surveillance and interpretation of statistical data.

This is given the occurrence of four cases is noted to exceed the number expected and as referenced in the Department of Health report.

Ongoing health surveillance of DFES staff of the CFRSHRS continue on a periodic basis and with review of data annually for over a further minimum period of 5 years.

Communication to all DFES staff relating to reversible/avoidable risk factors for kidney (renal) carcinoma inclusive but not limited to:

- Obesity
- Smoking
- Hypertension

The IEAP suggests further epidemiological interrogation of data arising from all medical records available to date and ongoing health surveillance.

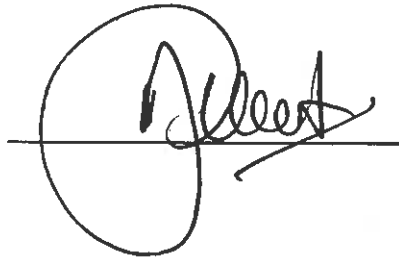
## **9. CONCLUSION**

The IEAP has undertaken formal scientific review of all supplied evidence and assessed such evidence in accordance with the Terms of Reference as established by DFES. With this, the IEAP has concluded that:

1. The IEAP acknowledges four cases of clear cell adenocarcinoma diagnosed from Firefighters stationed at the CFRSHRS between 2008 and 2014.
2. All appropriate investigations have been undertaken to assess any workplace potential contaminant, without any evidence to support a plausible link between the environment at the site and the incidence of kidney cancer cases.
3. The cases as identified and investigated by the Department of Health Western Australia, are not consistent with the criteria of a cancer cluster and that further investigation is unlikely to uncover a single cause, due to the small numbers involved.
4. Ongoing health surveillance is recommended of the CFRSHRS firefighters.
5. The response by DFES is deemed to have been appropriate and timely.
6. The CFRSHRS station is considered a Safe Place of Work.
7. There is no indication to consider any further investigation or other work required by DFES, in addition to ongoing health surveillance monitoring.
8. These conclusions are established on the basis of all information as supplied at the time of convening of the IEAP and within the Terms of Reference.


Signed by all members of the IEAP.

Dr. Joel Silbert  
(Occupational Physician)

A handwritten signature in black ink, appearing to read 'J. Silbert', written over a horizontal line.

Date: 2.6.2015

Dr. Tom Van Hagen  
(Medical Oncologist)

A handwritten signature in black ink, appearing to read 'Tom Van Hagen', written over a horizontal line.

Date: 02/06/2015

Professor Phillip Weinstein  
(Public Health Physician).

A handwritten signature in black ink, appearing to read 'P. Weinstein', written over a horizontal line.

Date: 2/6/15