

**Investigation of Complaint regarding  
Heating, Ventilation and Air Conditioning  
(HVAC) System of the  
National Gallery of Australia**

Report released under section 35A of the *Ombudsman Act 1976*

---

May 2001

## **1. THE COMPLAINT**

1.01 The original complaint alleged that ‘the maintenance and condition of the NGA’s Heating, Ventilation and Air Conditioning (HVAC) system presents an unreasonable health and safety hazard to staff and the public, and that the NGA collection is at serious risk of being damaged’.

1.02 I should say at the outset that I see this issue as having two elements: firstly, the existence of any immediate health and safety risk to staff, public and the collection arising from the maintenance regime and/or condition of the plant (health and safety issue); secondly, the efficiency and adequacy of the maintenance regime in maintaining the HVAC plant in such condition as to ensure minimal risk to the future health and safety of the staff, the public and the collection (efficacy issue). The NGA administration has a dual obligation to ensure that the NGA HVAC system is operating safely and maintained adequately.

## **2. THE INVESTIGATION**

2.01 After reviewing the large volume of documentation provided by the complainants, my investigation of the HVAC issue centred on an examination of five reports on the condition and maintenance of the NGA HVAC system – the Honeywell/Joint House report of 1995,<sup>1</sup> the Bligh Voller Nield Building Audit of March 1999,<sup>2</sup> the Comcare report of April 2000,<sup>3</sup> the Hennessy report of October 2000,<sup>4</sup> and a second Comcare report of December 2000.<sup>5</sup>

2.02 My investigator also examined the related documentation on Comcare’s investigation files, has toured some of the HVAC plant, and met on 16 February 2001 with some of those responsible for the maintenance of the HVAC staff in the company of three expert consultants, Mr Steve Hennessy (author of the Hennessy report), Mr Adrian Guilfoyle of the Joint House Department (co-authors of the 1995 report), and Mr Dan Mackenzie of Steensen Varming (co-authors of the 1999 audit). My investigator

---

1. Honeywell, ‘National Gallery of Australia: Heating Ventilation and Air Conditioning Report’, October 1995.

2. Steensen Varming (Australia) Pty Ltd, ‘Audit Report on Mechanical Plant Operation and Maintenance’ in Bligh Voller Nield, *National Gallery of Australia: Building Audit*, March 1999.

3. Comcare, *Investigation Report No. 1913, NGA Air Conditioning*, April 2000 (first Comcare report).

4. AHA Management Pty Ltd, *Investigation of Issues Related to the Operation and Maintenance Of The Air Conditioning Systems At The National Gallery of Australia – Canberra ACT*, October 2000 (Hennessy report).

5. [Comcare], *Report of Reactive Workplace Investigation: National Gallery of Australia*, December 2000 (second Comcare report).

revisited the NGA on 2 March 2001 to inspect maintenance documentation and to speak with the staff of the NGA workshop. I have also had the benefit of two detailed responses from the NGA on my earlier tentative views.

### **3. HVAC ISSUES SINCE 1995**

3.01 In October 1995, Honeywell and the Joint House Department provided the NGA with a commissioned report on the NGA building, including the HVAC system. Although the report focused on energy issues, it also noted some matters concerning health and safety, such as the recommendation that a study be carried out to assess the legionella risk within one year of the report's release.

3.02 Honeywell/Joint House also identified the pooling of water on the floor of the Air Handling Unit (AHU) 2 fan chamber (and to a lesser extent AHU 1) as a safety hazard for maintenance staff and contractors as well as causing corrosion of the plant walls and fan bases. They recommended improvements to the drainage in these areas, upgraded sealing around the drain trays, and changes to the design of the sprays and the eliminators. These were changes which it was recommended be made within one to five years after the report.

3.03 In 1998, the NGA commissioned Bligh Voller Nield to undertake an extensive building audit to report on the condition of the NGA and its compliance with current building standards. In March 1999, Steensen Varming (Australia), the firm employed by Bligh Voller Nield to investigate mechanical plant operation and maintenance, reported that AHUs 1, 2, 3, 4 and 5 were 'in need of urgent in house maintenance works' and noted the continuing problem of 'large pools of water' forming on the floors of the AHUs.<sup>6</sup> Steensen Varming also noted that this was a possible source of danger for maintenance staff and a possible breeding area for legionella bacteria.

3.04 In April 2000, the first Comcare report acknowledged the possible poor condition of the plant as depicted in the complainant's photographs of December 1999, but noted considerable improvements in condition as of March 2000 and identified no existing health and safety risk at that time.

3.05 In July 2000, Mr Clive Broadbent, an expert consultant employed briefly during the first Comcare investigation, stated in a meeting with Comcare officials that 'the maintenance [of the NGA HVAC system] has been unsatisfactory for the high standards expected at such a site and could

---

6. Steensen Varming (Australia) Pty Ltd, 'Audit Report on Mechanical Plant Operation and Maintenance' in Bligh Voller Nield, *National Gallery of Australia: Building Audit*, March 1999, 6.3.3.1 and 6.3.2.2.

be described as inadequate but should not be described as poor maintenance'. He explained this distinction between 'inadequate' and 'poor' maintenance as being such as to affect the condition of the system, shortening the expected HVAC plant life by five to ten years, but not such as to create any unreasonable immediate risk to public health.<sup>7</sup>

3.06 This was confirmed by the findings of the Hennessy report. In October 2000, the Hennessy report noted that 'Whilst air quality tests have determined that there is no immediate health problem, AHUs in [the condition in which at least four of the NGA's nine AHUs were found] are considered to be 'at risk', and steps should be taken to rectify the problems'.<sup>8</sup> Mr Hennessy went on to make some 20 recommendations directly concerning HVAC repair and maintenance, including a 23-point AHU Action Plan.

3.07 Both the Hennessy report and Mr Broadbent's advice to Comcare did raise some further occupational health and safety (OH&S) issues, such as the use and storage of hazardous chemicals, the need to conduct risk assessments of the AHUs in accordance with confined space regulations, the continued problem of water pooling on AHU floors, and the need to improve maintenance documentation and recording. These were the subject of the second Comcare investigation and I am aware that Comcare is currently considering the NGA's response to the fourteen recommendations of that report.

#### **4. NGA RESPONSE TO HVAC ISSUES SINCE 1995**

4.01 At the time of the Honeywell/Joint House report, Asset Services managed the NGA HVAC maintenance. In 1997, partly in response to concerns about the adequacy of the outsourcing arrangement, the NGA established a dedicated HVAC/Electrical maintenance cell to manage the maintenance of the HVAC system (and other related plant). The in-house maintenance team is responsible for the day to day cleaning and maintenance of the unit, including standard repairs. Specialist contractors are used to service the plant and system (including much of the chemical cleaning) and to make more complex repairs if needed.

##### ***Legionella Risk Assessment***

4.02 In late 1995, Asset Services commissioned an audit of the NGA Cooling Towers. Although this audit dealt with some legionella issues in relation to the cooling towers, it did not address the issue of stagnant water in the underground sumps and drains. To my knowledge, although the NGA have maintained regular legionella testing, the full legionella risk assessment as recommended by the Honeywell/Joint House report was not

---

7. Clive Broadbent to Comcare, 14 July 2000.

8. Hennessy report, p. 20.

carried out until Mr Hennessy's report of October 2000, and this without reference to the Honeywell/Joint House report.

### ***In-House Maintenance***

4.03 From 1997, there is evidence that the newly established in-house HVAC/Electrical cell did turn its attention to the needs of the HVAC system. However, the manager of the cell informed my investigator that, by 1997, the condition of the plant was such that the HVAC/Electrical cell was so occupied attending to necessary *ad hoc* maintenance and repair that there was little time to develop effective regular maintenance regimes or maintain regular maintenance documentation.

4.04 There are sporadic maintenance records from this time, although the manager of the NGA HVAC/Electrical cell has stated that new maintenance documentation had to be developed following Asset Services' departure. Such documentation was in place by early to mid-1998, but was still not being fully maintained. The lack of adequate maintenance documentation was identified by Mr Hennessy's report. I understand that improving reporting procedures and maintenance documentation has been given a high priority by the NGA, but, according to Mr Hennessy, 'there is still some work to do'.<sup>9</sup>

4.05 In 1996, and in response to one of the 1995 Honeywell/Joint House recommendations, Asset Services applied a sealant to the spray tanks of the AHUs in an attempt to address the water problems, but to no effect. By the time of the Bligh Voller Nield audit in late 1998-early 1999, no further action had been taken in relation to the continued water problems in the AHU. Accordingly, the Bligh Voller Nield audit identified the continuing OH&S hazard of pooling of water on the floors of the AHUs.<sup>10</sup>

4.06 Only in mid-1999 did the NGA commission a firm to install drains in AHUs 1 and 2 as per the recommendation of the Honeywell/Joint House report. Similarly, guards were installed at the foot of the drainage trays to help prevent water spillage onto the floors of the fan rooms. This process was completed in February 2000.

4.07 In mid to late 2000, the NGA HVAC/Electrical cell began fitting a new humidifier system, designed by the cell's manager, to AHU 7, converting it from the old spray humidifier to an atomising humidifier. This has largely removed the problem of water saturation identified by Mr Hennessy. I understand that the remaining spray humidifiers are all to be converted to atomising humidifiers as part of the HVAC upgrade.

---

9. Hennessy to NGA, 17 February 2001.

10. See Steensen Varming (Australia) Pty Ltd, 'Audit Report on Mechanical Plant Operation and Maintenance' in Bligh Voller Nield, *National Gallery of Australia: Building Audit*, March 1999, 6.3.3.1 and 6.3.2.2.

4.08 When the NGA HVAC/Electrical cell took over management of the HVAC system in 1997, they retained the process of daily vacuuming excess water from the floors of AHUs 1 and 2, a process which continues today. This is generally done first thing in the morning, or as early as other urgent work permits.

4.09 When my investigator was taken on a tour of the site on 16 February 2001 he observed some water on the floors of the fan chambers of AHU 1 and 2, and evidence that this water had at times completely covered those floors. Mr Hennessy, who was leading the tour, stated that provided the water was not allowed to pool or stagnate, the risk from bacteria was minimal. In his opinion, the HVAC/Electrical cell was aware of this and managing the situation adequately.

4.10 There was considerable evidence of water damage (corrosion) in the fan chambers and also evidence of some water damage (corrosion) in those rooms adjacent to the fan chambers. During discussions of 16 February 2001, the Head of Planning and Facilities at the NGA explained that there was little point in repairing the corrosion while the water problems continued. The three engineering consultants present at that meeting confirmed this view.

4.11 In response to Hennessy's 20 recommendations of October 2000, the NGA have instituted an action plan dealing with each of these recommendations and incorporating Hennessy's thirty-two point AHU Action Plan. During my investigator's site inspection of 16 February 2001, Mr Hennessy pointed out what actions the NGA have taken in response to his report and what future actions are planned. Mr Hennessy stated that he was largely satisfied with the NGA's response to date.

### ***Cleaning Regime***

4.12 On taking over responsibility for the NGA HVAC system in 1997, the HVAC/Electrical cell retained the cleaning regime of Asset Services. Apart from general cleaning of plant rooms, this work was almost entirely undertaken by contractors. My investigator was shown invoices and documentation in relation to these services that indicate that the services were supplied regularly.

4.13 The observations of the first Comcare report are consistent with the statement of the manager of the NGA HVAC/Electrical cell, that he had begun to notice a decline in the efficiency and effectiveness of the hydrogen peroxide cleaning agent from mid-1999 and had instituted a review in late 1999. A new product was trialled in the following months along with some new processes. The system now employed to clean the AHUs is

considerably different from that employed between 1997 and 2000. This new regime has been assessed by Mr Hennessy and found to be adequate.

4.14 No such independent assessment exists for the adequacy of the cleaning regime employed prior to 2000, however the NGA has stated that they had received advice from a number of engineers and consultants as to the adequacy of the earlier regime. In particular, the NGA refers to ongoing informal consultations with the Joint House Department about HVAC cleaning and maintenance. This has been confirmed by Mr Adrian Guilfoyle of the Joint House Department.

4.15 There have also been specific allegations made about the appropriateness – from both an OH&S and collection safety perspective – of using hydrogen peroxide as a cleaning agent for the cooling coils in the NGA HVAC system. Hydrogen peroxide has been recommended to the NGA by both Mr Clive Broadbent, a recognised expert in the HVAC field, and by the Joint House Department. Moreover, Mr Hennessy’s assessment of the cleaning regime found the use of hydrogen peroxide to be appropriate.<sup>11</sup> In the absence of any evidence to the contrary, I am satisfied that there is no substance to these allegations.

### ***Refurbishment***

4.16 The NGA has had refurbishment plans in place since 1996/97. Although some refurbishment has taken place – such as the replacement of the boilers and the modification to the AHU 7 spray humidifier – there remains significant refurbishment work still to be done. The NGA has provided me with evidence of its attempts since 1996 to obtain additional funding for necessary refurbishment work, all of them unsuccessful. The NGA currently has a proposal for additional funding of several million dollars over several years for refurbishment and \$500,000 annually for supplemental maintenance.

## **5. OPINIONS**

5.01 My investigator’s analysis of the five reports on the condition and maintenance of the NGA HVAC system<sup>12</sup> and the NGA’s various submissions to me during the course of my investigation indicate that the design, operation and maintenance of the HVAC system prior to 1997 has led to the notable deterioration of parts of the system, particularly in a few of the older AHUs, although it would appear not to such an extent as to create any immediate threat to public health and safety or the safety of the collection.

---

11. Hennessy report, p. 30.

12. See 2.01 above.

5.02 When the NGA took over direct responsibility for the HVAC system, action was taken to begin minor repairs and maintenance such as was within the capabilities of the NGA HVAC/Electrical cell. However, ***in my opinion***, the NGA HVAC/Electrical cell was not provided with adequate resources (including funding) to undertake or arrange for all the necessary upgrades recommended in the 1995 Honeywell/Joint House report.

5.03 I appreciate that efforts were made by the NGA in the face of difficult problems. However, ***in my opinion***, it would still appear that too little was done between the time the NGA took responsibility for the HVAC system in 1997 and mid-1999. As such, when Steensen Varming reported on the state of the HVAC system in March 1999, the OH&S hazards identified in 1995 (from pooling water on the floors of the relevant AHUs) were still in evidence. I acknowledge that the 1995 Honeywell/Joint House report had recommended dealing with many of these issues as a medium-term recommendation – that is, to be instituted within one to five years. However, as this matter was an OH&S issue and as implementation of the recommendation did not require special funding (as evidenced by its implementation in early 2000), it was ***in my opinion*** unreasonable for the NGA to allow this identified OH&S hazard to continue between 1995 and 1999.

5.04 I understand that the NGA still has considerable refurbishment work planned in accordance with the recommendations of both the 1995 Honeywell/Joint House report and the 1999 Building Audit. I appreciate that the NGA management have attempted to seek extra funding for this every year since 1996 but that extra funding has not been granted. I understand that the NGA have received some commitment from the government in relation to additional funding, although a final decision on that is still pending. ***In my opinion***, the HVAC upgrade should continue to be a matter of high priority for the NGA.

5.05 It would also appear that the NGA has enthusiastically pursued measures to improve the maintenance of the HVAC system since mid-1999 and particularly through the course of 2000. I am particularly pleased to see the NGA's creation of a special internal working group to deal with the HVAC issues raised by the Hennessy report and their adoption of an action plan which contains Hennessy's 36 recommendations and 23-point AHU Action Plan. I am similarly pleased that Mr Hennessy is satisfied with the progress being made by the NGA in implementing his recommendations.

5.06 ***In my opinion***, the NGA should have taken action in response to the Honeywell/Joint House recommendation that the NGA commission a relatively inexpensive legionella study, especially given the high legionella count that had caused the HVAC system to be shut down and



decontaminated in May 1995. Moreover, the NGA have not been able to provide any documented explanation as to why no full legionella risk assessment was carried out as recommended, with Mr Froud stating in his letter to this office of 4 May 2001, 'why they did not include the water in sumps and on the floors in AHUs is not known'. *In my opinion*, and in the absence of any documented contemporary explanation as to why a full assessment was not conducted, the NGA's failure to implement the 1995 Honeywell/Joint House report recommendation in relation to the commissioning of a full legionella risk assessment was unreasonable. However, I understand that Mr Hennessy's report of October 2000 may well have provided an adequate legionella risk assessment.

## **6. CONCLUSION AND RECOMMENDATIONS**

6.01 It would appear that the past problems with the NGA HVAC system are in the process of being addressed in accordance with the recommendations of the various reports into the system to date. As such, **I recommend that the NGA should continue to implement the Hennessy and Comcare recommendations and continue to address those HVAC-related issues raised by the Bligh Voller Nield audit.** I intend to continue to monitor the issue and will review the NGA's progress in implementing my recommendation by the end of December 2001.

**R N McLeod**  
**Commonwealth Ombudsman**