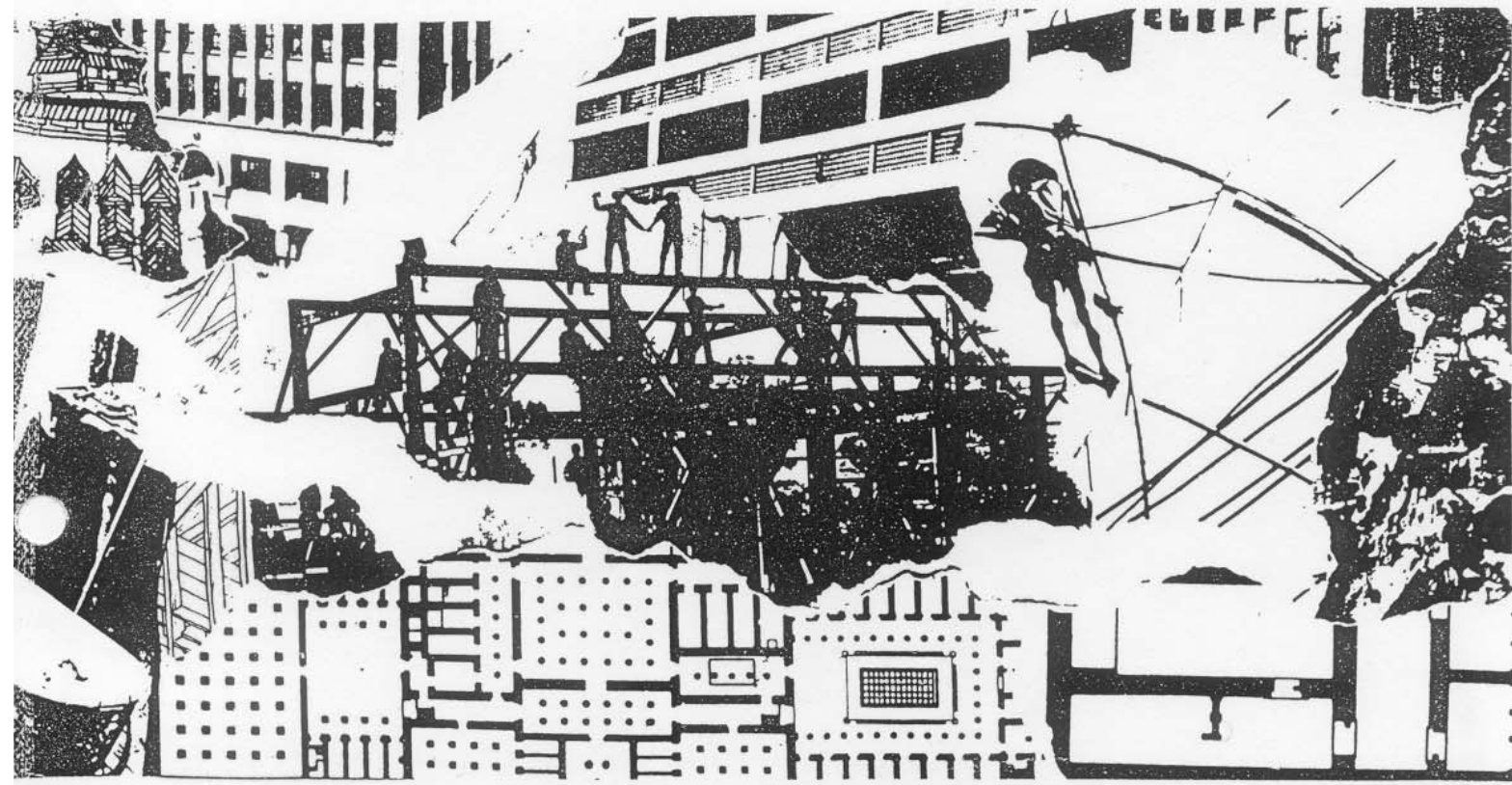




THE UNIVERSITY OF NEW SOUTH WALES

BUILDING RESEARCH CENTRE

CONDITION SURVEY OF APPLICATIONS USING RADCON FORMULA #7



COMMERCIAL IN CONFIDENCE

Report Prepared by the
Building Research Centre

on

CONDITION SURVEY
OF APPLICATIONS
USING
RADCON FORMULA #7

for

RADCRETE PACIFIC PTY. LTD.

August 1993

Prepared by: Roger Scerri

Checked by: 

Ref.: 20288



To Whom It May Concern

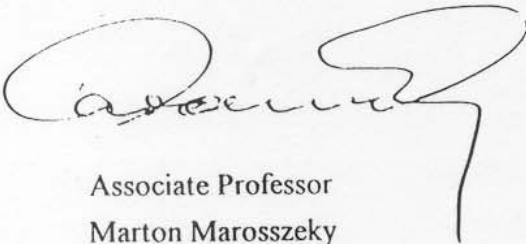
At present, the Building Research Centre (BRC) has been commissioned by the ABSAC to evaluate the product Radcon Formula 7 as a part of their appraisal process.

Past testing carried out by Warnock Hersey, an internationally accredited testing authority, has been accepted by ABSAC. (Report attached)

The BRC has conducted a condition survey of sites where Radcon Formula 7 has been used to prevent water penetration through cracks where leaking was evident prior to Radcon Formula 7 treatment. (Report attached)

On the basis of the Warnock Hersey report and our condition survey, it is our opinion that a Radcon Formula 7 treatment meets the requirement of a protective surface coating as referred to in the note to Clause 4.3.1(c) of AS3600 Concrete Structures Code with regard to chloride and water permeability.

Yours sincerely



Associate Professor
Marton Marosszky

1.0 INTRODUCTION

The following condition survey was carried out on Friday 6, Monday 9 and Friday 13 August 1993 to assess the performance of installations of Radcon Formula #7. This report fulfils part of the requirement of the ABSAC appraisal process.

Radcon Formula #7 is a low viscosity liquid sealer for concrete. The manufacturer describes the product as:

"Radcon #7 is a clear, colourless and odourless sodium silicate-based material which penetrates up to 20mm into builders concrete. No change to the appearance of the concrete surface will occur after treatment. Unlike surface coatings and membranes, Radcon #7 seals deep into the concrete and is therefore not affected by surface damage. Radcon #7 will prevent water leakage and the ingress of salts and contaminants whilst allowing water vapour transmission."

The sites inspected were a combination of roof top slabs, car parks and water retaining structures.

Where practical, we conducted ponding tests to determine the effectiveness of the seal. The tests were conducted using an open ended container filled with approximately 40 mm of water to provide a hydrostatic head. A seal was provided to stop water leaking out from the bottom of the dam.

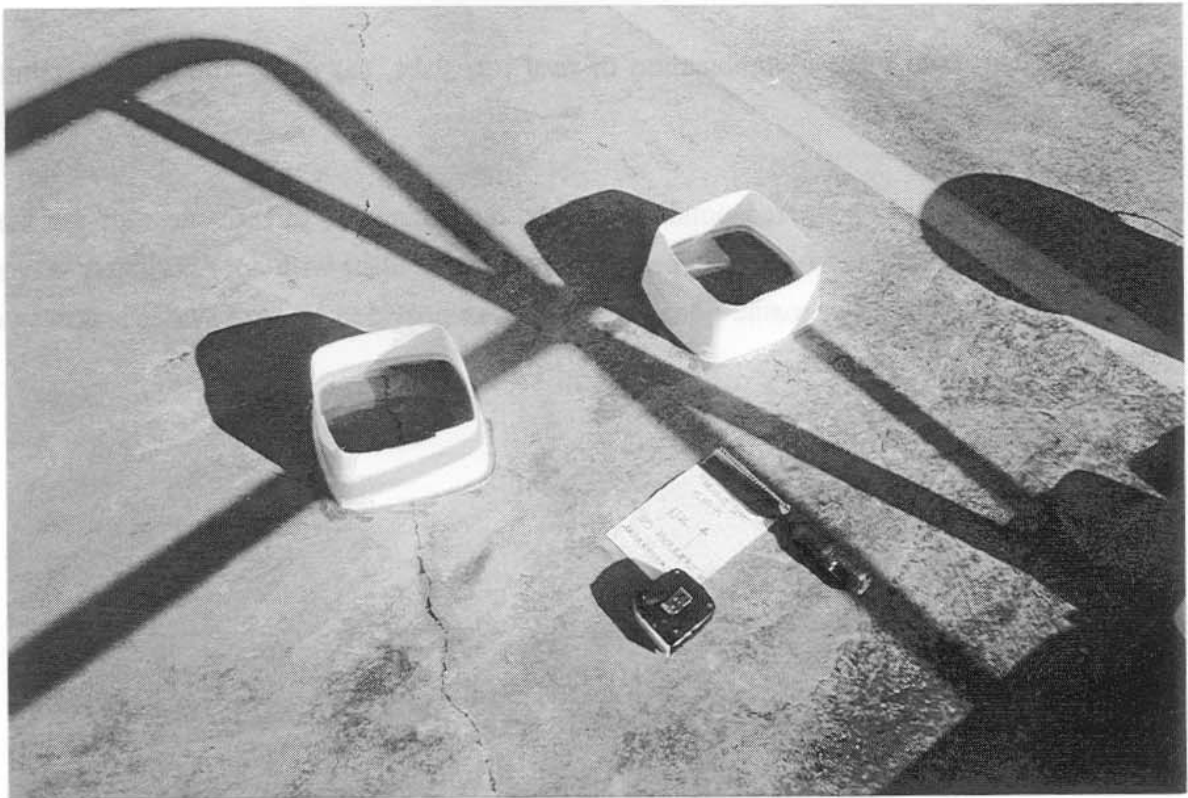
2.0 CONDITION SURVEY

Car Park, 39 Herbert Street, Artarmon,

Top level

The top level of this car park exhibits severe cracking which extends through the full thickness of the slab. The cracks range in width from hairline up to approximately 1.2 mm. As a result of these cracks, water falling onto the top of the slab would run through the slab. In July 1988 the slab was treated with Radcon Formula #7 to seal these cracks.

As part of our investigation, we conducted ponding experiments to ascertain the effectiveness of the seal. Two cracks approximately 1 mm wide were selected on the top level. The containers, with 40 mm of water in each, were kept in place for 30 minutes to see whether any water would penetrate the slab. No penetration was observed in either location.



Photograph 1: View of filled dams over cracks



Photograph 2: View of soffit before ponding test



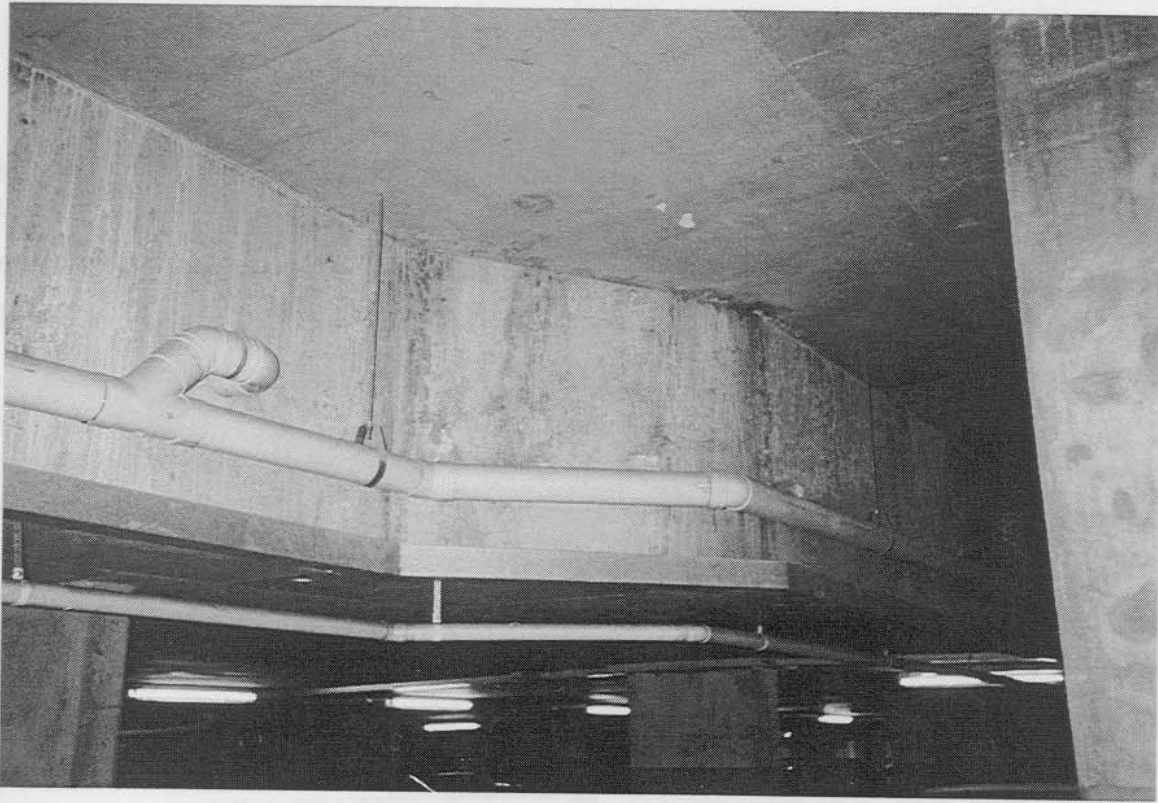
Photograph 6: View of soffit showing mid span crack.
Photograph 3: View of soffit after ponding test, (30 mins)

*Ramada Resort, North Ryde,
Suspended Lake.*

Radcon was used in this application to seal the slab when it was decided to create the lake. The application was carried out in November 1988, after the structure had been in service some years. According to reports, the slab was already cracked at this stage, and it was decided to use Radcon Formula #7 to seal those cracks. Inspection of the slab soffit revealed significant cracking. These areas showed no sign of water penetration. Areas which did show water leaking were along construction joints and joints between concrete and pipework penetrating the slab. The manufacturer does not recommend use of their product to seal these features.



Photograph 4: View across suspended lake



Photograph 5: View of soffit showing sides

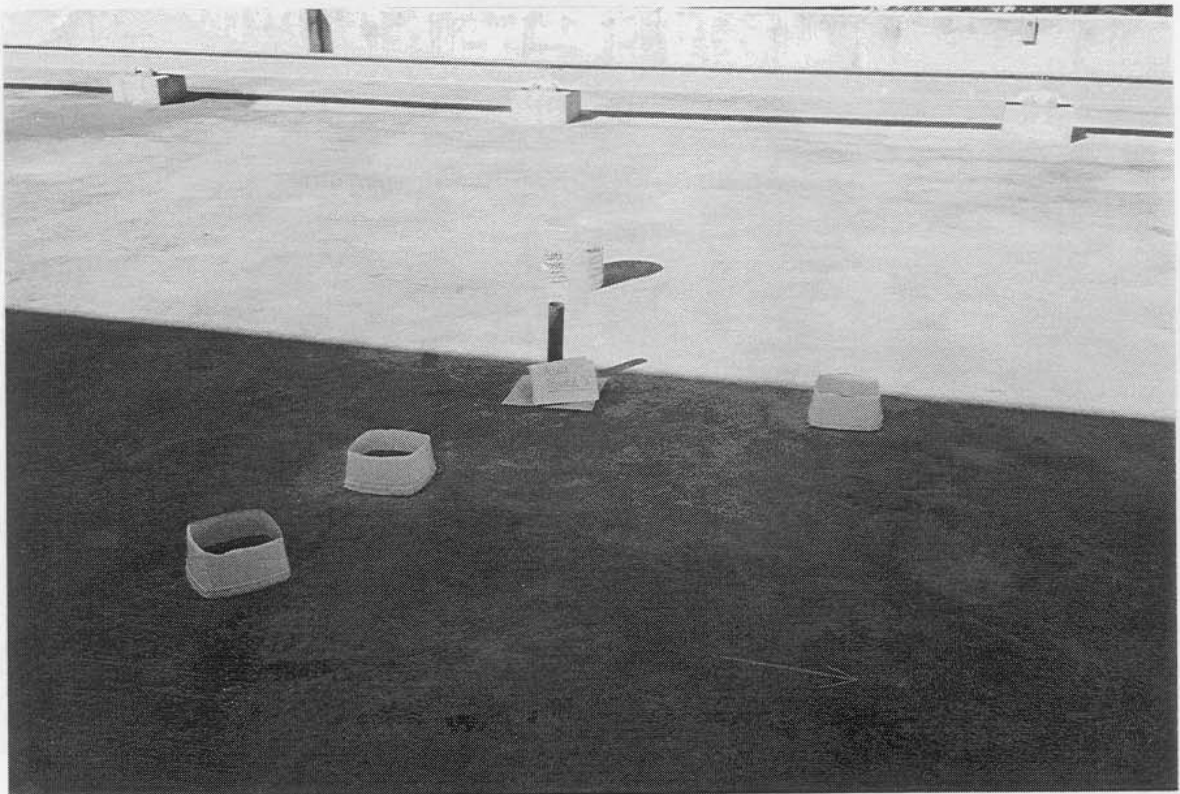


**Photograph 6: View of soffit showing mid span crack,
Note no water marks.**

***AWA Tower, Talavera Rd., Ryde,
Roof Slab***

This slab was treated with Radcon Formula #7 during construction in June 1988, after the concrete was completely cured, in an effort to avoid leaking caused by future cracking. A visual inspection of the top revealed some cracking occurred towards the south east corner of the building. Subsequent inspection of the slab soffit in this area showed the cracks extended through the slab. No signs of water penetration were found on the soffit.

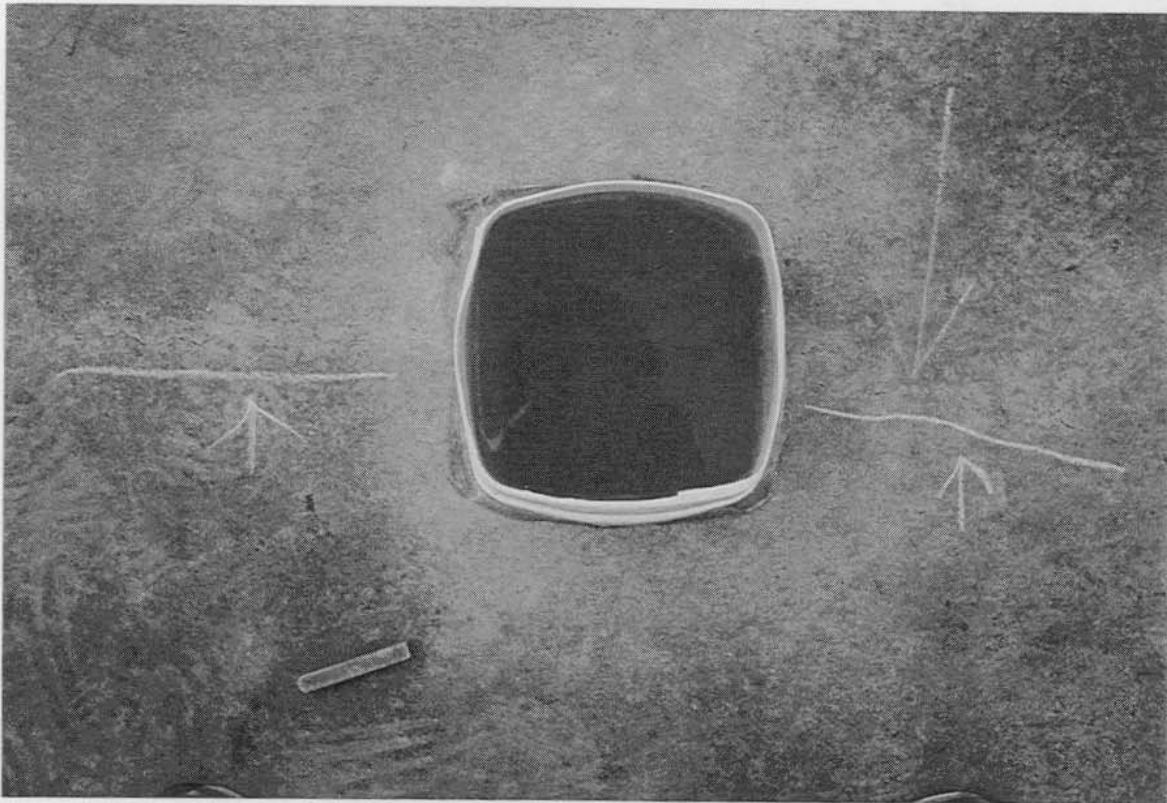
Water ponding tests were conducted on these cracks with hydrostatic heads of 40 and 100 mm. No evidence of water penetration on the soffit was noted, further, close inspection of the cracks on either side of the test area showed no leakage of water, indicating that the cracks were well sealed near the surface of the slab.



Photograph 7: View of filled containers over cracks



Photograph 8: View of soffit after ponding test, (30 mins)



Photograph 9: View of dam after ponding test, (30 mins).

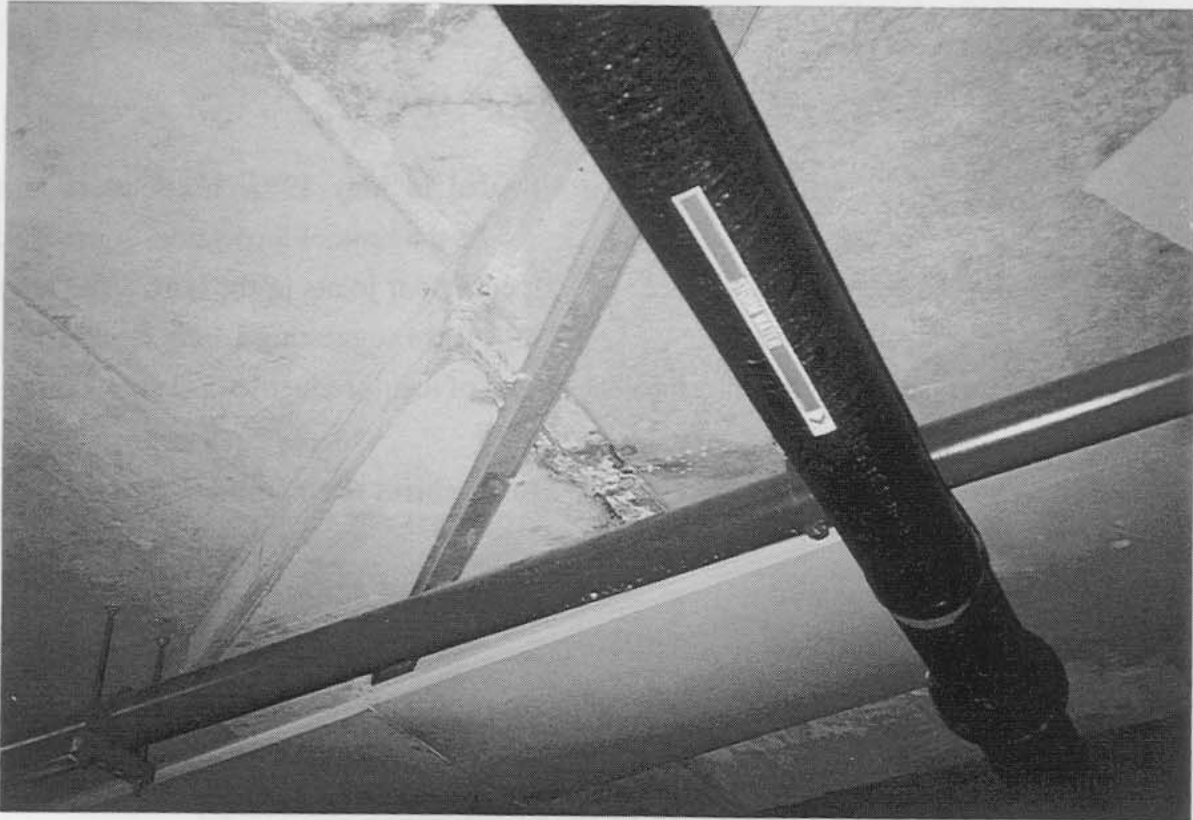
Note no evidence of water seeping along crack.

***Park Royal Hotel, cnr. O'Riordan and Bourke Streets Botany,
Pavement slab over underground car park.***

Radcon Formula #7 was applied during construction to stop the penetration of water from external landscaped areas into the car park below. This is an example of an installation carried out without reference to the manufacturer, or the manufacturer's specification and recommendations. The Radcon Formula #7 had been used without appropriate sealing of construction joints, with the result that the joints continued to weep due to the inability of the Radcon to bridge the large voids within.



Photograph 10: View across paved area over car park.



**Photograph 11: View of soffit under paved area.
Note leakage from pour joint.**



Photograph 12: View of soffit showing dampness in poorly compacted area.

*Tempe Water Tower,
Inside of elevated tank*

The internal surfaces of the water tank were treated in May 1991, many years after construction, after significant leaks had developed. At the time of inspection, some leaks were noted and were identified as associated with cold pour joints in the tank. The areas noted showed significant calcium leaching around the leaks suggesting a long term leaking problem. The manufacturer does not recommend use of their product to seal cold joints.



Photograph 13: View of tank showing cold joints

Photograph 14: View of construction joints from inside tower.

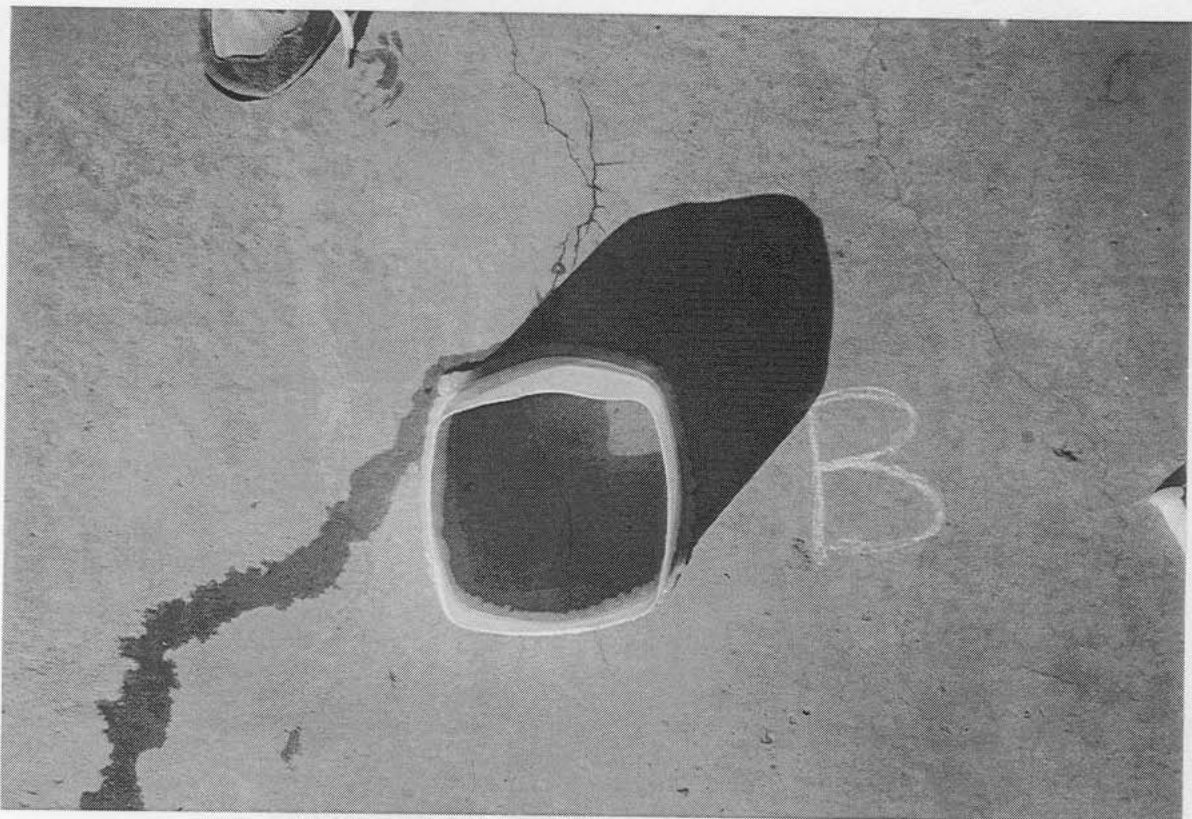


Photograph 15: View of weeping construction joint from inside tower. Note large build up of Calcium deposits.

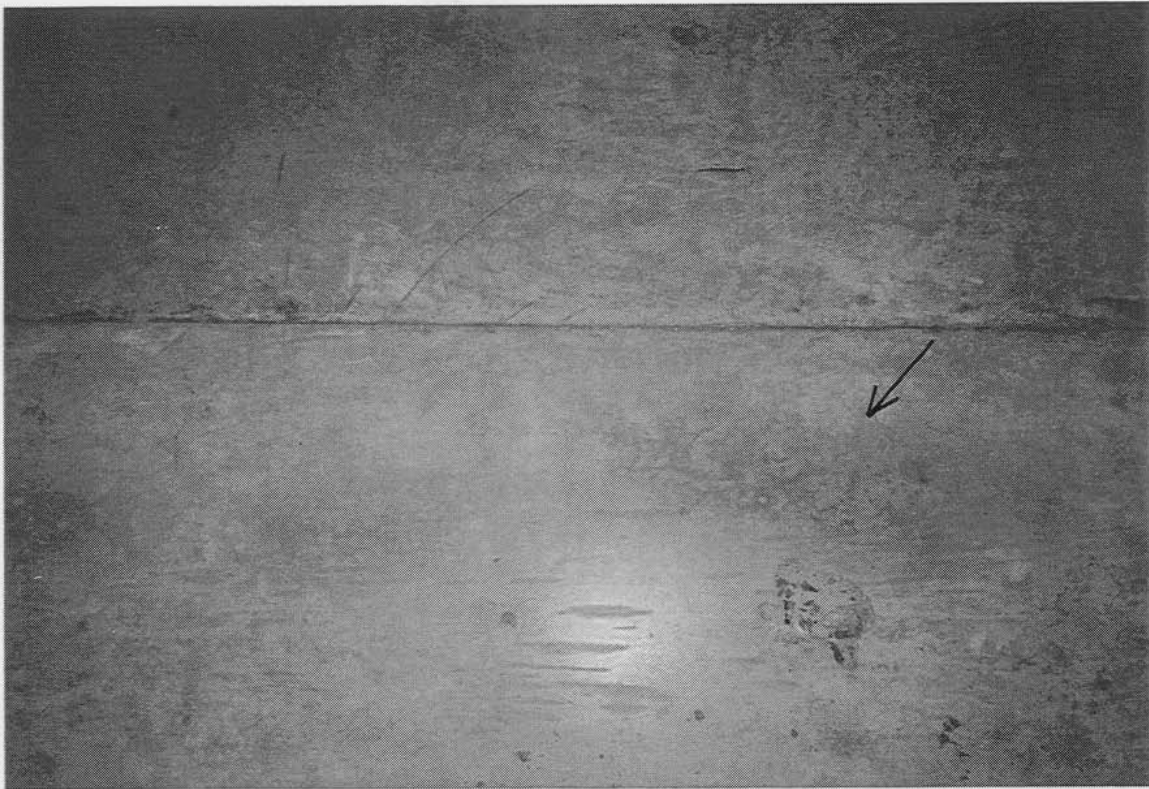
*Block of units at 10-14 Dural Street, Hornsby
Suspended car park and access way*

The top surface of this 150 mm thick reinforced concrete slab was treated with Radcon Formula #7 in July 1993. Ponding tests were conducted on two cracks to assess the effectiveness of the treatment. After 30 minutes under a hydrostatic head of 40 mm, no water penetration to the slab soffit was noted. However, water was seen tracking along the cracks on the top of the slab. This was not seen on other ponding tests and Mr Tony Hilder of Radcrete Pacific stated that this is believed to be due to the short time since placement allowing insufficient time for adequate growth of the material to take place, and, given sufficient incidence of wetting, this growth will take place within a few months, filling the crack to the surface.

One issue of concern was the high deflections noted on the slab, especially due to moving loads such as cars driving in and out. These high dynamic loads may cause cracking of the Radcon in the existing cracks, requiring recrystallisation. However, given the movements noted at the time of inspection, the Radcon was effective in sealing the cracks and performing according to the manufacturer's claims.



**Photograph 16: View of dam during ponding test, (30 mins).
Note water tracking along crack.**



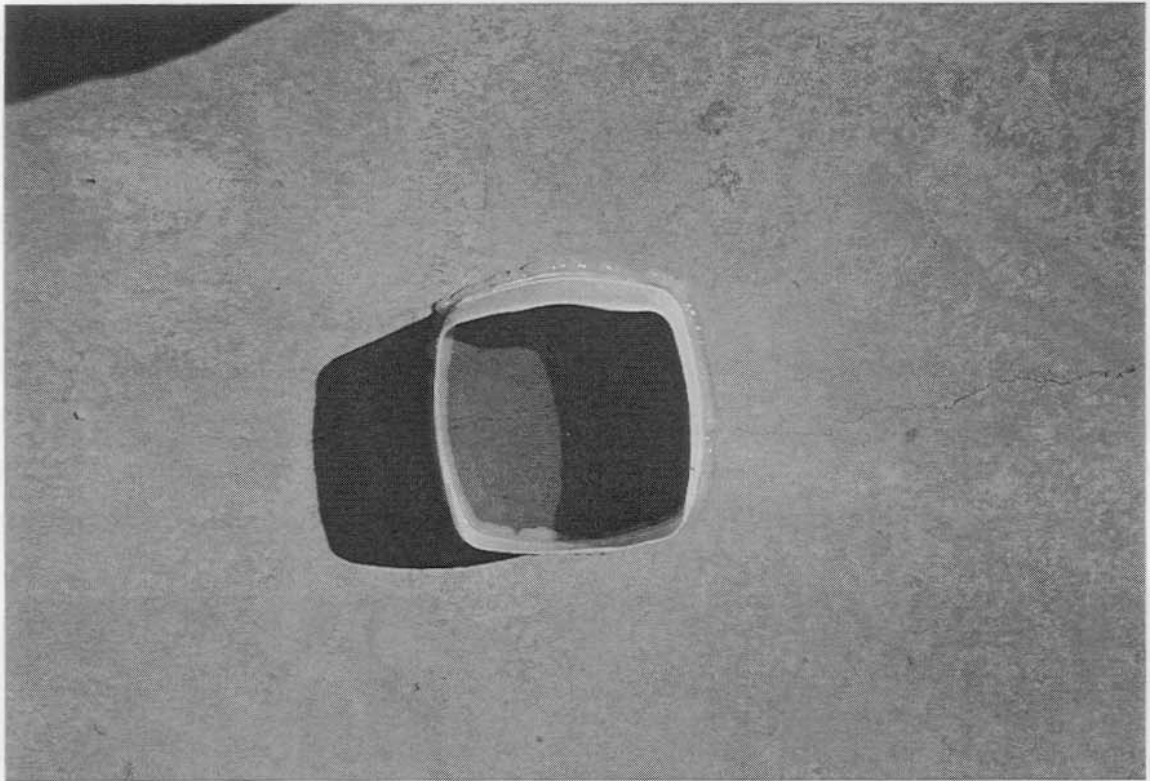
Photograph 17: View of soffit under pond before test.



**Photograph 18: View of soffit after test, (30 minutes).
Note no evidence of water penetration.**

Private Residence at 1 Burran Avenue, Mosman
Suspended tennis court.

This application was placed in May 1993. Ponding tests on the slab showed no water penetration after 50 mm of hydrostatic head was applied for a period of 30 minutes. It is interesting to note that no tracking of water was observed on the top surface of the cracks.



Photograph 19: View of dam after ponding test, (30 mins).



Photograph 20: View of soffit under pond before test.



**Photograph 21: View of soffit after test, (30 minutes).
Note no evidence of water penetration.**

3.0 CONCLUSIONS

The conclusion of this survey is that the use of Radcon Formula #7 demonstrated an ability to seal new or existing cracks in concrete.

Radcrete Pacific recommend that the material should not be used in situations where the slab is subjected to large deflections due to moving loads. Radcrete Pacific claim that while Radcon Formula #7 will recrystallise when wetting recurs, some water penetration may occur before the seal again becomes effective.

As can be seen from this survey, Radcon Formula #7 cannot be used to seal construction or expansion joints or areas where large interconnecting voids have been caused by segregation; the material is not intended to bridge such large gaps. Radcrete specify in their literature that their product is not recommended for use in these areas without the use of remedial works and membranes to effectively seal these large gaps. We understand Radcrete provide suitable kits to approved applicators for use in these applications.

From our observations, we believe the material is performing according to the manufacturer's claims with respect to crack bridging. We also note that the instances of continuing leakage are directly related to areas which are specifically excluded in their documentation.

Another important issue is the age of the application and consequently the amount of curing undergone. This curing phase, which takes place in the first few months after application, increases the extent of crystallisation in the cracks, filling the cracks almost to the surface. This phenomenon can be seen when comparing the Hornsby and Mosman applications.