



## IRRIGATION RESEARCH & EXTENSION COMMITTEE

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### **Monolayer barriers for evaporation control from storage dams**

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There are an estimated 22,000 enterprises with on-farm storage across Australia. Accurate data on volume of water stored is surprisingly not available. Estimates suggest in excess of 8,000,000ML water is held in these storages.

Annual evaporation losses from farm storages can potentially exceed 40% of storage volume. Seepage losses are variable but typically range from 2 to 15% of storage volume. Water loss from on-farm storages and channels through evaporation and seepage is thus a significant loss in the farm water balance.

Through appropriate planning, design and construction, seepage losses can largely be controlled and a number of amelioration techniques are available (e.g. compaction, bentonite-type material application or in extreme cases bed or channel lining).

Evaporation loss is largely related to climatic potential evaporation and the surface area of open water. Evaporation losses from storages can be minimised to some extent during design and construction through deep, small surface area storages and construction of storages with cells and wind barriers. Covering the water surface (floating covers, shade structures, chemical additives) offers the greatest opportunity to reduce evaporation on an existing storage/channel. Recent large scale engineering assessments of evaporation mitigation technologies (EMTs) for farm storages have highlighted the potential for reducing evaporation losses.

This paper will highlight recent developments in the area of seepage and evaporation measurement and evaporation mitigation. New technologies that can be used to measure seepage and evaporation will be highlighted. The deployment of these instruments on a large scale to improve the water use efficiency of on farm storages will be discussed. Commercial products to reduce evaporation losses will be described and a "Ready Reckoner" that can be used to calculate the cost/benefit of deploying these systems will be illustrated.

In many areas large storages (>10ha) dominate the landscape. Commercially available evaporation control products are less economically viable or suitable on these large storages. Chemical monolayer products have shown potential but require further analysis on factors affecting performance and improved application and management strategies. The CRC Irrigation Futures is undertaking challenging new research to develop new science based technology solutions to the national problem of storage water losses due to evaporation. An alliance with the CRC Polymers and Cotton Catchment Communities CRC is being forged to further support this area.

The current research is leading to a better understanding of factors affecting monolayer evaporation mitigation. Key objectives of the project are the development of technology and systems to evaluate evaporation and seepage losses from water storages and development of improved monolayer based evaporation mitigation systems that can be applied to large scale water storages (>10 Ha). A number of key questions are being researched:

1. How can we better measure evaporation and seepage rates from storages?
2. How significant are evaporation losses from storages across Australia and how can we better account for these losses?
3. Do we understand how current monolayer products work and can we improve our management of these systems?
4. Can we develop better monolayer products?
5. What better application, monitoring and control systems are required?

The paper will give a brief update on progress in these areas and discuss research challenges.