

## BILL MOFFAT

### THE SELECTION OF AN APPROPRIATE WELL SCREEN MATERIAL FOR A DEVELOPING COUNTRY

This short paper is an attempt to present in a simple format the important properties of the various materials used in the manufacture of well screens. No attempt is made to describe the size and type of screen openings required for a particular formation or the design of the accompanying gravel pack. These calculations are fully documented in Johnson 1966 and Hunter Blair 1968 and 1970.

The selection of the correct and appropriate well screen is important in any context, but especially so in a developing country where equipment and personnel may not be available to correct any future failure or fault.

An appropriate screen should fulfil the following conditions:

1. The expected life of the screen should be at least similar to the expected life of the rest of the well installation.
2. The material used should not be corroded by the groundwater, and if encrustation is expected the screen material should be unaffected by the chemical or method used to remove the encrustation.
3. The weight and construction of the screen should be such that it can be transported easily and safely by whatever means are readily available.
4. The material should not deteriorate in storage under hot and/or humid conditions.
5. The cost should not be so high that the total number of wells that can be drilled are severely restricted.
6. There is some advantage in having material that can be slotted or constructed in the country of use. Delivery times are frequently so long with imported material that the screen has to be ordered long before the aquifer grading is known, and the correct opening size calculated.

In assessing the benefits of a borehole supply in a developing country some factor should be included for the social and psychological benefit obtained from having a borehole supply working continuously. If frequent screen problems (collapse, blockage) are encountered the users will lose confidence in the new scheme and revert to

the old, perhaps polluted source. Cheap first cost and low life materials may thus not be the most satisfactory selection.

#### Comments on Table

Temperature range - refers only to the temperatures which may be met with in normal working conditions, ie storage in the sun.

Corrosion resistance - this refers only to chemical conditions normally found in ground water and chemicals which may be used to regenerate wells.

Transport problems - includes only those transport problems which can be caused by the properties of the material.

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Production cost - the relative costs at place of production.

Total cost - the relative costs including transport and installation.

Suspended length - the maximum length that can be freely suspended in a water well without causing collapse of the screen or failure of the joints.

Opening types - the types of screen openings which are commonly available.

- |       |                |
|-------|----------------|
| Coded | 1 slots        |
|       | 2 perforations |
|       | 3 wire wound   |
|       | 4 bridge       |

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Any errors in interpreting the supplied information are however mine.

Material						Weight	Cost		Storage problems	Suspended casing length	Notes
							screen	total			
Carbon Steel	1	7.9	No effect	Low unless protected	Weight	High	High	None	Unlimited		
Stainless Steel	2	7.8	No effect	V good	Weight	Very High	High	None	Unlimited		
Glass reinforced plastic	3	1.6	No effect up to 100°C	V good	Medium	High	Medium	Few delaminates	1000m		
UPVC	4	1.4	0-60°C	V good	Low	Low	Low	Heat and sunlight	250m +		
Polyolefin	5	0.93	-10 to +110°C	V good	Low	Low	Low	None	200m		
Brass	6	8.4	No effect	Medium	Weight	Very high	High	None	Unlimited		
Bronze	7	8 +	No effect	Good	Weight	Very High	High	None	Unlimited		
Bamboo	8	0.4	No effect	Poor	-	Very low	Low	-	Low		
Terracotta	9	2.3	-	Good	Weight	Low	Low	None	Low		
Rainwater PVC	10	1.35	0-60°C	Good	Low	Low	Low	Heat and sunlight	Low		
Yellow PVC	11	1.3	0-60°C	Good	Low	Low	Medium	Heat and sunlight	Low	Difficult to install	
Rope	12	-	-	Poor	Low	Low	Very low	-	Depends on former	Wound on former	
Polypropylene fabrics	13	low	-	V good	V low	Low	Low	None	Depends on former	Wound on former	
ABS	14	1.06	-40 to +85°C	Good	Low	Low	Low	Heat and sunlight	150m +		