APPENDIX 2

The computation losses along the distributary canals and main canals are explained here. Comparison of the losses computed between the model and the department is also made.

A2.1 COMPUTATION OF THE LOSS ALONG THE DISTRIBUTARY CANALS

Loss along the distributary canals (as they are unlined) is considered to be 2 per cent per kilometre based on the measurements taken in a few distributary canals. A straight reach of 500 m is chosen in the distributary canals 9R, 10R and 11R A&B in the Left Bank Canal. The flows at the start and end of the reach were measured using the current meter. These flow measurements were used to arrive at the percentage loss per kilometre using the following formula (Hiemke, 1992).

\[ Q_d = \frac{1}{(1 - \text{loss})^{\text{length}}} \times Q_r \]

where,

- \( Q_d \) is the discharge that is required at head including the losses,
- loss is expressed in per cent per kilometre (as fraction) and length is expressed in kilometre and \( Q_r \) is the discharge realised at the end of the reach. The above formula can be rewritten as,

\[ \text{loss} = 1 - \left( \frac{Q_r}{Q_d} \right)^{\text{length}} \]

and the computed loss is given in the table below:
Table A2.2 Computation of the loss along the main canals

<table>
<thead>
<tr>
<th>S.No</th>
<th>Main canal</th>
<th>Length in km</th>
<th>Qd in m³/s</th>
<th>Qr in m³/s</th>
<th>Loss in % per km</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>LBC</td>
<td>15.30</td>
<td>9.912</td>
<td>8.421</td>
<td>1.06</td>
</tr>
<tr>
<td>2.</td>
<td>RBC</td>
<td>29.12</td>
<td>5.664</td>
<td>3.965</td>
<td>1.20</td>
</tr>
<tr>
<td>3.</td>
<td>LBC</td>
<td>27.12</td>
<td>7.080</td>
<td>5.259</td>
<td>1.09</td>
</tr>
<tr>
<td>4.</td>
<td>RBC</td>
<td>15.30</td>
<td>5.664</td>
<td>5.074</td>
<td>0.71</td>
</tr>
<tr>
<td>5.</td>
<td>LBC</td>
<td>35.46</td>
<td>7.080</td>
<td>5.060</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Source: Report of PWD 1993

On an average, the loss is taken as 1 per cent per kilometre for the main canals.

A2.3 COMPARISON OF THE LOSS COMPUTED BETWEEN THE MODEL AND THE DEPARTMENT

In the present operational plan, losses are not accounted in proportion to length of the distributary canals and reaches of the main canal. The table below indicates the variation in estimation of the loss between the department and the model.

Table A2.3.1 Comparison of the losses in the distributaries computed between the model and the department

<table>
<thead>
<tr>
<th>DY Name</th>
<th>Chainage in km</th>
<th>% of loss as per Department</th>
<th>% of loss as per model</th>
</tr>
</thead>
<tbody>
<tr>
<td>DY 1R</td>
<td>7.18</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>DY 6R</td>
<td>11.10</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>DY 9R</td>
<td>21.13</td>
<td>15</td>
<td>23</td>
</tr>
<tr>
<td>DY 10R</td>
<td>26.98</td>
<td>15</td>
<td>31</td>
</tr>
</tbody>
</table>

Conveyance loss, being a crucial factor influencing the equity in water distribution, it has be to be accounted properly. Similarly, the water
delivery schedule prepared by the Irrigation Department in the irrigation season in 1995 also indicates lack of proper accounting for the conveyance loss in the canals.

Table A2.3.2 Allowances made for the daily losses along the main canals

<table>
<thead>
<tr>
<th>Period</th>
<th>Main canal release in cusecs per day</th>
<th>Sum of the releases in the distributaries in cusecs per day</th>
<th>Loss in cusecs per day</th>
<th>Loss in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.12.94 to 1.1.95</td>
<td>300</td>
<td>291</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>2.1.95 to 8.1.95</td>
<td>350</td>
<td>271</td>
<td>79</td>
<td>23</td>
</tr>
<tr>
<td>9.1.95 to 15.1.95</td>
<td>300</td>
<td>267</td>
<td>33</td>
<td>11</td>
</tr>
<tr>
<td>16.1.95 to 22.1.95</td>
<td>350</td>
<td>291</td>
<td>79</td>
<td>23</td>
</tr>
<tr>
<td>23.1.95 to 29.1.95</td>
<td>300</td>
<td>271</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>30.1.95 to 5.2.95</td>
<td>350</td>
<td>267</td>
<td>83</td>
<td>24</td>
</tr>
</tbody>
</table>

Source: Water delivery schedule of the LBC in the season 1995 of the PWD

It could be noticed that there are wide variations in the allowances provided for losses at different periods. In the existing procedure, losses are computed as a whole for system and this results in inequitable distribution of water. Presently, the water requirement for the season is computed as follows:

Duty of 12 acres/mcft and 6 acres/mcft are assumed by the department to compute the requirement for ID command and tank command respectively. A loss of 15 per cent is assumed.
A2.3.1 Duty based demand estimation adopted by the O&M division

Left Bank Canal:

ID demand at a duty of 12 acres/mcft = 1,750 mcft or 49.35 mcum
Wet demand at a duty of 6 acres/mcft = 250 mcft or 7.05 mcum
(meeting 50 % of the tank demand)
Canal loss at 15 per cent = 300 mcft or 8.46 mcum

Total demand = 2,300 mcft or 64.86 mcum

(Right Bank Canal:

ID demand at a duty of 12 acres/mcft = 1,334 mcft or 37.62 mcum
Wet demand at a duty of 6 acres/mcft = 417 mcft or 11.76 mcum
(meeting 50 % of the tank demand)
Canal loss at 15 per cent = 263 mcft or 7.42 mcum

Total demand = 2,014 mcft or 56.80 mcum

A2.3.2 Demand estimation as per MIS model

Left Bank Canal:

Estimated crop water requirement = 32.60 mcum
Total requirement at minor outlet with 85 & 90 % application and
distribution efficiencies = 42.60 mcum
Total requirement at the head of
the distributary canals = 46.80 mcum
Total requirement at the head of the main canal = 60.15 mcum

Right Bank Canal:

Estimated crop water requirement = 26.45 mcum
Total requirement at minor outlet with 85 & 90 % application and distribution efficiencies = 34.60 mcum
Total requirement at the head of the distributary canals = 38.55 mcum
Total requirement at the head of the main canal = 50.25 mcum

It could be observed from the model estimation that the loss along the Left bank main canal accounts to be 12 mcum (29 per cent) whereas the estimation by the Irrigation Department accounts to be only 8.5 mcum (15 per cent). This clearly indicates the underestimation of the loss.

There is a need for proper accounting of the losses in the system. This has also been revealed during the discussions with the PWD officials.