6. Footnotes

[1] Copper, steel and other roofs offered by a number of manufacturers are described in detail on the Sweets Catalog website at: <http://www.sweets.com>. Links are provided from that site to the individual home pages of each manufacturer.


[3] Personal communication with Mr. Tyler Radonich, Roofer’s Supply Co., San José, 12/99. RSC is a specialty contractor that does copper roofing projects.

[4] Sales Literature, Copper Coats, Inc., San Diego. CCI is a manufacturer of copper patina chemical products.


[10] Composition shingle roofs are described in detail on the Sweets Catalog website at: <http://www.sweets.com>. Links are provided to the individual home pages of each manufacturer.

Architectural Uses Of Copper


[22] Personal Communication with Bryan Boulanger, 1/00.


[26] Rainwater and runoff data from tests conducted April - June, 2000, upon two roofing panels (each 1.14 sqm). The first panel is algae-resistant, while the other is a standard composition shingle. Both are located at the Palo Alto RWQCP. See Appendix for photo.


[29] The conversion from rainfall intensity to runoff is 1mm/hr = 1 liter/sqm/hr.


[31] RWQCP tests indicate the following bulk copper contents and release rates for ordinary and algae-resist composition shingles:

<table>
<thead>
<tr>
<th></th>
<th>Ordinary Shingles</th>
<th>Algae-Resist Shingles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Copper Content</td>
<td>12.7</td>
<td>24.5</td>
</tr>
<tr>
<td>(mg/kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper Release via Rainfall</td>
<td>0.009</td>
<td>0.13</td>
</tr>
<tr>
<td>(g/sqm/yr)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional tests are planned to refine upon these release rates.

[32] Weather data for California is available at <http://cdec.water.ca.gov>. The station ID for Palo Alto is "PAA".

[33] The key value of 1.0 g/sqm/yr for copper release from roofs is conservatively adapted from the tests made in Connecticut, Oregon, Sweden, and Switzerland. Tests conducted on gutters of uncertain age indicate somewhat higher values.
Annual wet and dry copper deposition rates in Stockholm are 1.2 mg/sqm/yr and 1.4 mg/sqm/yr, respectively. Local rainfall is 0.5 m/yr. Personal e-mail communication with U. Mohlander, Env. Health Protection, City of Stockholm, 9/26/00.


He, W., et al., "A Laboratory Study Of Copper And Zinc Runoff During First Flush And Steady State Conditions", Department of Materials Science & Engineering, Royal Institute of Technology, Stockholm, 2000.


This and other satellite photos of the San Francisco Bay area are available from a project website sponsored jointly by the US Geological Survey and Pacific Gas and Electric Company. The internet address is: <http://www.sqftbayquakes.org/thumbnails.html>.

"Metal Control Measures Plan", Santa Clara Valley Runoff Pollution Prevention Program, 2/12/97. Table 4-3 presents data on metals loading measured in local creeks. The MCMP report is available at: <http://www.city.palo-alto.ca.us/cleanbay/publications.html>.

Ekstrand, E., et al., "Digital Air Photo Processing For Mapping of Copper Roof Distribution And Estimation Of Related Copper Pollution, Swedish Environmental Protection Agency, 1999.

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Ghaffari, Javad, "Pretreatment Program Annual Report 1999", City of Palo Alto RWQCP.
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Coated Steel Shingle Roof On A Home
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Page 6  Train Station, Hartsdale NY
Page 21 Coated Steel Roof • School, Redwood City CA
Page A4 Algae-Resist Shingle Test Stand at RWQCP