The Dutch Archival Act and Harmonisation

John Havermans
TNO
Team Conservation Technology
The Netherlands Organization for Applied Scientific Research

- **Mission TNO**
  - To apply scientific knowledge with the aim of strengthening the innovative power of industry and government

- **TNO Law Art. 2**
  - Make technical science, natural science and other scientific research applicable for the society and combine natural science with social science

- **Team Conservation Technology**
  - 3 senoir scientist + 2 medior scientist
    - Historical buildings
    - Indoor Environment
    - Analysis
    - Materials technology
Framework

IAQ

Analysis repositories

Backgrounds

IAQ

Acknowledgment

Conclusion
Dutch Archival Act

• Archival act: 1995
  • Valid for legal corporations pertaining to public law
  • Authorities

• Is focussing on
  • Formation
  • Destruction
  • Public nature/publicity

• Storage is not the aim – having the objects accessible
  • This includes no significant deterioration within 100 years
    • Article 11
  • Indoor air quality parameters
    • Article 13

• Recently the archival act was updated (April, 2010)
Indoor environment

Origin according to Uhde and Salthammer 2007, modified by Havermans 2009
Relation with the archival Act

- Article 3 Archiefwet
- Object
- Indoor AQ
- Outdoor AQ
- Endogenous factors (emission)
- Exogenous factors (adsorption)

100 years
No significant deterioration

ACBAM Research program
According to Lanting 1989 & Havermans 1990
Building and collection materials indoors

- Primary emission
- Primary emission
- Secondary emission

Outdoor pollution as NO\textsubscript{x} and moist

- Ionisation by e.g. electronics (e\textsuperscript{-})

Deteriorated paper collection materials

- Gas-phase reactions

Indoor air composition

Paper collection materials
And it refers to standards (some examples)

- Paper and self adhesive labels: NEN 2728
- Packaging materials for photographic objects: ISO 18902
- Quality guidelines according to ICN
  - (however ICN is not existing anymore, it is now a part of RCE)
- Open sprinklers are not allowed
- Small Fire extinguishers allowed (CO₂). Only to be used by trained staff
- Newer systems as oxygen reduction are allowed
- Distance between upper tray in cabinet and ceiling: 30 cm
- Emission free building materials
A look at the archival storage room of the ministry

Not OK

OK

Not OK

Not OK
More historical facts

• 1998 - 1996: Deltaplan for Conservation
  • 1990-1994: STEP project on paper degradation by pollution
  • 1994: first report by Vosteen with recommendation on the indoor air quality in Archives
  • Development of the filter system: DELTA 1
  • This system was incorporated in the Archival Act (1998 and 2001)
    • Article 5: indoor environment for archival rooms
    • Article 32 – 42: indoor environment archival depots
needs for purification and IAQ levels

- Article 37
  - Air should be purified from SO₂, NOₓ, NH₄ and O₃
  - Only on locations with high traffic movements and the average outdoor pollutants are
    - 15 μg/m³ SO₂ (5.6 ppb)
    - 25 ppb NOₓ (no μg/m³ mentioned)

- Monitoring IAQ by OnGuards (Article 36)
  - 40 Ångström (Å) per 30 days
  - This is 7.5 times lower, than ISA class G1

- Note: It was not mentioning which metal is applied
What about ISA/ISO and Chris Muller

<table>
<thead>
<tr>
<th>Value presented in</th>
<th>Corrosion In Å</th>
<th>SO₂ In ppb</th>
<th>NOₓ In ppb</th>
<th>O₃ In ppb</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA G1</td>
<td>&lt; 300</td>
<td>&lt; 10</td>
<td>&lt; 50</td>
<td>&lt; 2</td>
</tr>
<tr>
<td>DELTA 1 (NL, Vosteen)</td>
<td>40</td>
<td>&lt; 1,33</td>
<td>&lt; 6,67</td>
<td>&lt; 0,27</td>
</tr>
</tbody>
</table>

**ANSI/ISA S71.04-1985 and NEN-EN-ISO 1184-1, Corrosion of metals and alloys**

**Classification of low corrosivity of indoor atmospheres**

**Paper by Chris Muller**

- Class S1: 40 Å per 30 days (Ag)
- Class C1: 90 Å per 30 days (Cu)
From ISA to normal values

- SO$_2$: 1.3 ppb (3.4 µg/m$^3$)
- NO$_x$: 6.7 ppb (13 µg/m$^3$ NO$_2$ and 21 µg/m$^3$ NO$_x$)
- O$_3$: 0.3 ppb (0.6 µg/m$^3$).

So,

now it is clear what the indoor levels should be
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Conclusion
Analysis and locations

- SO$_2$
  - API 100 Fluorescent SO$_2$ analyser
- NO$_x$
  - API 200 Chemiluminescence NO$_x$ analyser
- O$_3$
  - API 400 Absorption O$_3$ analyser
There is a need for purification (Article 37)

Data from LML, RIVM/TNO

For NO$_x$: average is 28 ppb $>$25 ppb

- **D2-NOx**
- **D2-SO2**
- **D2-O3**

Concentration [ppb]

<table>
<thead>
<tr>
<th>Year</th>
<th>D2-NOx</th>
<th>D2-SO2</th>
<th>D2-O3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td></td>
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<td>1997</td>
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<tr>
<td>2003</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
National or Royal Library

4 repositories

<table>
<thead>
<tr>
<th>No.</th>
<th>Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01A</td>
<td>19th century collection (books)</td>
</tr>
<tr>
<td>2</td>
<td>01C</td>
<td>Newspaper</td>
</tr>
<tr>
<td>3</td>
<td>02E</td>
<td>Modern Journals</td>
</tr>
<tr>
<td>4</td>
<td>2B</td>
<td>Rare collection incl.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>handwritings</td>
</tr>
</tbody>
</table>
National or Royal Library

NOx in repositories

Maximum allowed concentration NO2: 6.7 ppb
Maximum allowed concentration SO2: 1.3 ppb

Maximum allowed concentration O3: 0.3 ppb
Repository of the Ministry of Culture

$\textit{NO}_x \text{ max found: 115 ppb}$

- $\text{SO}_2$ peak: Dag 7
- $\text{NO}_x$ peak: Dag 7

Graph showing $\text{NO}_x$, $\text{O}_3$, and $\text{SO}_2$ concentrations.
Discussion - 1

• Archival act
  • Not that easy for interpretation

• Backgrounds missing
  • For application of the Ag/Cu corrosion
  • Art. 36: x Å per y days

• ISA and ISO
  • Are not that clear.
  • ISO classification in mg/m²

• Monitoring is important
  • Please note, more companies are making apparatus like the OnGuard
  • What to monitor?
Discussion - 2

- Non purified storage rooms/repositories
  - $\text{NO}_x$ and $\text{O}_3$ far too high (act-classification)

- Act should also include
  - Library and other paper based collections

- Missing
  - Effect of indoor pollutants (VOC, mVOC)

- Classification
  - S1/C1

Recommendation based on current classification

<table>
<thead>
<tr>
<th>Gas</th>
<th>Max. in ppb</th>
<th>Max. in $\mu$g/m$^3$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{SO}_2$</td>
<td>1.3</td>
<td>3.4</td>
</tr>
<tr>
<td>$\text{NO}_2$</td>
<td>6.7</td>
<td>13 (or 21 as $\text{NO}_x$)</td>
</tr>
<tr>
<td>$\text{O}_3$</td>
<td>0.3</td>
<td>0.6</td>
</tr>
</tbody>
</table>
Discussion – 3 Update Archival Act in 2010!

- **Till 2010**
  - Continue monitoring with OnGuard
  - Cu/Ag corrosion
  - ISO 11844-1:2006
    - Class S1:
      - 40 Å per 30 days (Ag)
    - Class C1
      - 90 Å per 30 days (Cu)
  - SO₂
    - 1.3 ppb = 3.4 µg/m³
  - NO₂
    - 6.7 ppb = 13 µg/m³
  - O₃
    - 0.3 ppb = 0.6 µg/m³
- **Article 36 & 37**
  - Regeling Bouw en inrichting archiefbewaarplaatsen

- **From 2010**
  - No continue monitoring of the pollution needed?
  - Only T & RH?
    - Article 52: guarding storage conditions
  - SO₂
    - 5.5 ppb = 14.5 µg/m³
  - NO₂
    - 10 ppb = 19 µg/m³
  - O₃
    - 5 ppb = 9.9 µg/m³
- **Article 51**
  - Regeling Bouw en inrichting archiefbewaarplaatsen

What went wrong?
Knowledge $\Delta$

- Research
- Delivering of knowledge
- Deliverers SMEs
- Needs for knowledge
- Needs for products

Safeguarding
Restoration
Conservation Technology

End users

Delivers products
Framework

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Conclusion

- Administrators need scientists for e.g. interpretation and updating

- Scientists must be involved in discussions on evaluation National Acts, as the archival act

- Need for standardization of environmental storage parameters and monitoring systems

- In case of validity of the old Archival act
  - NOx is a main problem and replaces in most areas SO2
  - Archival storage conditions should be applied to library storage

- The new archival act is again under discussion
Acknowledgement

- National Archives, The Netherlands
  - Ted Steemers
- Royal or National Library, the Netherlands
  - Henk Porck
- Ministry of Culture
- Colleagues at TNO
  - Eric Cornelissen, Hadeel Abdul Aziz, Paul Molenberg
- COST Action D42
- EU FP2 program STEP
- ESF
- Local Organizers of this nice IAQ Event
  - Christian Degrigny
- SMEs: Helicon, Twin Filter, Wagner, Preservation Technologies, Breukijn
- Intermediars: NEN, Restauratoren Nederland
To be or not to be stored