Economic Analysis of Job Creation from Contaminated Site Remediation

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Outline

• Objective
• Previous analyses and their limitations
• Our Approach
• Sites Used and Employment Types
• How Disposal Costs and Tipping Fees were modelled
• Case Study: Remediation and Jobs at LeBreton Flats, Ottawa
Objectives:

- Develop a documented composite measure of Job Creation for site remediation expenditures in terms of annual full-time equivalent (FTE) jobs per $1M using actual data
- FCSAP Overall Objective: Reduce environmental and human health risks from known federal contaminated sites and associated federal financial liabilities

Why?
- Accountability: creating employment is secondary benefit of FCSAP
- Site Remediation is not a uniquely defined industry sector by Statistics Canada
- There is value in calculating the magnitude of the employment in a verifiable way
Previous Analyses and Limitations - Statistics Canada

A previous analysis had been done using StatsCan’s employment categories most relevant to remediation, namely:

- Professional, Scientific and Technical
- Construction
- Engineering

These employment categories are not remediation industry specific, but are derived from the entire construction and engineering sector. Feeding in some typical remediation type projects using StatCan’s job creation multipliers produced the following results.
Example Sites using Statistics Canada’s Job Multipliers in Full-time equivalent per-annum per $M (FTE pa/$M)

<table>
<thead>
<tr>
<th>Remediation Type</th>
<th>Job Creation Custom Multiplier FTEs pa/$M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site 1: Soil Excavation &amp; Groundwater Extraction, with Disposal at Landfill</td>
<td>6.88</td>
</tr>
<tr>
<td>Site 1: Soil Excavation &amp; Groundwater Extraction &amp; Onsite Ex Situ Treatment</td>
<td>8.49</td>
</tr>
<tr>
<td>Site 2: Soil Excavation &amp; Groundwater Extraction, with Disposal at Landfill</td>
<td>8.71</td>
</tr>
<tr>
<td>Site 2: Soil Excavation &amp; Groundwater Extraction &amp; Onsite Ex Situ Treatment</td>
<td>9.48</td>
</tr>
<tr>
<td>Mean</td>
<td>8.39</td>
</tr>
<tr>
<td>Median</td>
<td>8.18</td>
</tr>
</tbody>
</table>
Economic Analysis of Job Creation from Contaminated Site Remediation

Other available employment creation studies for site remediation were reviewed to get an idea of the range of job creation multipliers.

<table>
<thead>
<tr>
<th>Sydney Tar Ponds</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Project is managed by an operating agency established by the government of Nova Scotia to implement the clean-up of the Sydney Tar Ponds and Coke Ovens.</td>
<td>• 44,364 person days over 4 years</td>
</tr>
<tr>
<td>• Analysis of Job Creation between 2004-2008 done by NS government.</td>
<td>• 44,364 person days converts to 177.5 years of employment (FTEs)</td>
</tr>
<tr>
<td>• Employment data captured by NS government reported 44,364 total person-days of employment over 4 years with $51.7M spent.</td>
<td>• 177.5 FTE / 4 years = 44.36 FTE pa</td>
</tr>
<tr>
<td></td>
<td>• $51.7/4 years = $12.92 M average annual spend</td>
</tr>
<tr>
<td></td>
<td>• 44.36 FTE pa / $12.92M</td>
</tr>
<tr>
<td></td>
<td>• = 3.43 FTE pa / $1M</td>
</tr>
</tbody>
</table>

Job Creation Multiplier 3.43 FTEs pa/$M
Our Approach – Data Collection

**Essential fields**
- Remediation type.
- Location of site.
- Duration of the work.
- Total FTEs for the site.
- Dollar value of the site remediation.

**Assumptions**
- Job Creation Multiplier is FTEs per year per $M.
- 241 working days per year.
- Equal dollars are spent in equal time intervals.
- The ratio of pay to non-pay is similar for all sites.

Annual FTEs

Dollar per annum

Custom Multiplier
## Our Approach – Sites Overview

### Sites Used for Employment Data Analysis

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Project Cost</th>
<th>Description</th>
</tr>
</thead>
</table>
| NCC Lebreton Flats          | ON - Ottawa      | $6.04M       | • Contaminated soil remediation  
                             |                  | • Dig & dump at proponent’s landfills site                                |
| DND DEW Line Clean Up (FOX-2)| NWT              | $21.05M      | • Demolition, and contaminated soil remediation                            
                             |                  | • Disposal at landfill site constructed onsite                            
                             |                  | • Dig & dump at proponent’s landfills site                                |
| AANDC Tundra Mine           | NWT              | $53.94M      | • Northern, remote, mine closure                                           
                             |                  | • Includes capping of tailings and water treatment of tailings pond        
                             |                  | • Some contaminated soil/rock bio treatment                               |
| AANDC Hidden Lake Mine      | NWT              | $1.90M       | • Northern, remote, mine closure                                           
                             |                  | • Includes tailings capping, contaminated soil treatment and onsite disposal|
| AANDC Abandoned Sawmill     | BC – Vancouver Island | $5.59M     | • Contaminated soil remediation                                             
                             |                  | • Dig and dump-off site                                                    |
| AANDC Generator Station     | BC – Vancouver Island | $0.94M     | • Contaminated soil remediation                                             
                             |                  | • Dig and bio remediate onsite                                             |

**Total Cost of Projects** $89,46M
Our Approach – Methodology

Payroll data collected
1) Convert total hours involved to eight hour days.
2) Identify total days per year (as an average), if the site remediation lasted over one year.
3) Divide days of employment by work days available per year (241).

Costs collected
4) Collect total dollar value.
5) Adjust using the average multiplier
   (jobs : dollars) where non-pay costs
   are provided separately.
4) Calculate average dollars spent per year.

Calculation
7) Calculate for both mean and median:

<table>
<thead>
<tr>
<th>Sample Sites</th>
<th>Project Custom Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCC Lebreton Flats</td>
<td>6.29</td>
</tr>
<tr>
<td>DND DEW Line Clean Up (FOX-2)</td>
<td>6.15</td>
</tr>
<tr>
<td>AANDC Tundra Mine</td>
<td>2.79</td>
</tr>
<tr>
<td>AANDC Hidden Mine</td>
<td>3.39</td>
</tr>
</tbody>
</table>

Mean                      Median
4.65                      4.54
Our Approach – Soil Disposal Fees Resolved into Jobs Data too.

Soil disposal costs often is a major part of remediation project cost. It would not have been resolvable into jobs data if simply handled as “Non-pay expenses”.

All the projects analyzed included on-site construction of landfills, tailings covers, or soil treatment centres. Detailed cost information was available. Soil disposal costs were resolved into jobs data too. We feel this is reliable because:

• On-site disposal does not have a commercial landfill operator’s profit built in (may be cheaper)
• On-site disposal however, it is a one-off endeavour and may lack a commercial landfill operator’s cost efficiency (might be more expensive)

The Job Creation Multiplier applies to total project costs.
Economic Analysis of Job Creation from Contaminated Site Remediation

Our Approach – Conclusion

- Other employment creation models in the public domain produced job creation multipliers of 3.13 (CERNER), 3.43 (Sydney Tar Ponds).
- The StatsCan job creation multiplier is higher than our obtained value of 4.54 jobs per annum per $1M, however it was a macroeconomic top down calculation drawing on national data in the overall construction industry for the three types of employment involved.
- Our analysis is bottom-up and uses payroll data and the total dollar value, for a small sample of sites, where we could get sample data.
- The results indicate that the evaluation methodology developed in this analysis is likely to be reliable, given that the “Top Down” macroeconomic results are in the same range as our “Bottom Up” analysis of real data from a range of sites.
- Additional research indicated that an additional 1.2 indirect jobs (essentially outside the Remediation StatsCan Code) per annum per $1M can be expected to be created.
Case Study: Remediation and Jobs at LeBreton Flats, Ottawa

Remediation Project Synopsis

• LeBreton Flats is a former mixed-use area (lumber industries, rail yard, and residential just east of downtown Ottawa);

• Razed in the 1960s, sat dormant for 50 years, used as a snow dump, soil was contaminated in polycyclic aromatic hydrocarbons (PAHs) and metals;

• Site assessment via 100s of boreholes and test pits;

• “The Project” was A-Z: investigation, planning, construction
LeBreton Remediation Project Synopsis (cont’d)

- 108,612 m³ of soil was removed, down to bedrock;
- Contaminated soil was beneficially reused at a closed landfill owned by the proponent (NCC);
- Soil disposal and landfill final capping were done by the contractor;
- Remediation was tendered by public process and won by Milestone/Tomlinson, a consortium of local contractors;
- Golder wrote the tender specs and monitored the performance of the contractor at the excavation site and landfill.
LeBreton Flats, Ottawa

Broad Street Station at LeBreton in 1892. National Archives of Canada (looking west)

View along Wellington towards Downtown during remediation, June 2013
Ridge Road Landfill, capped and covered as part of the contract cost.

LeBreton Material being placed in Landfill

Ridge Road Landfill with clean cover material being put in place.
Remediation and Jobs at LeBreton Flats

- Full Project Costs were $6.04M
- Cost and person-day for Eng and Scientific Phases from timesheets
- Construction Costs were $4.5M – lump sum & pay items, person-days known from the job-site.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Main Employment Type</th>
<th>Cost</th>
<th>Person-days</th>
<th>Cost/P-d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning &amp; Investigation</td>
<td>Scientific and Technical</td>
<td>$450,483</td>
<td>564</td>
<td>$798</td>
</tr>
<tr>
<td>Design &amp; Specs</td>
<td>Engineering</td>
<td>$490,657</td>
<td>554</td>
<td>$885</td>
</tr>
<tr>
<td>Remediation</td>
<td>Construction</td>
<td>$4,500,000</td>
<td>7,195</td>
<td>$625</td>
</tr>
<tr>
<td>Monitoring Validation &amp; Reporting</td>
<td>Scientific and Technical</td>
<td>$600,000</td>
<td>842</td>
<td>$712</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>$6,040,000</td>
<td>8,960d (37.2 FTE)</td>
<td>\</td>
</tr>
</tbody>
</table>

**Full Time Equivalent / $1M**

6.29 FTE/$1M
Thank You
and
Questions