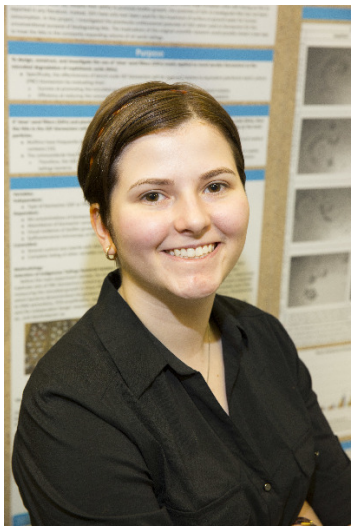
# CWSF 2014 - Windsor, Ontario



## Hayley Marie Todesco

### Waste to Water: Biodegrading Naphthenic Acids with Novel Sand Filter Bioreactors

**Challenge:** Environment
**Category:** Senior
**Region:** Calgary Youth
**City:** Calgary, AB
**School:** Queen Elizabeth Junior Senior High School

**Abstract:** This project involved designing, constructing, and testing the effectiveness of sand filters newly applied as bioreactors to the biodegradation of toxic naphthenic acids. Reductions in acid concentrations and development of large biofilms over three weeks revealed that these new bioreactors were fourteen times more efficient than batch bioreactor controls. Application of these inexpensive and sustainable bioreactors could significantly accelerate the detoxification of oil sands tailings.

## Biography

I have discovered an absolute passion for environmental science. I don't know where it came from because neither of my parents have an interest in this area. When I was younger, I was never really exposed to science. Fortunately, I went to the public viewing of a science fair for the first time when I was nine and my fascination has grown since then. Over the last eight years, I have been searching for a specific area of environmental science that I want to spend the rest of my life researching. Through my participation in science fair, I have found it. My previous projects explored the areas of atmospheric science, solar energy, geology, and hydrocarbon bioremediation. I've always wanted to do a project on bioreactors and I was given the opportunity this year. Engineering my bioreactors has been the most challenging and exciting project I have undertaken. I hope to use the skills that I have acquired in a career as a microbiologist. Participating in science fair over the last eight years has been a life-changing experience and I am very excited to be participating in my last Canada-Wide Science Fair. I know it will be an amazing final fair.

| Awards | Value |
|---|---|
| Canadian Stockholm Junior Water Prize<br>Sponsor: Canadian WEF Member Associations, the Canadian Water and Wastewater Association, and Jacobs | $2 000 |
| The Manning Innovation Achievement Award<br>Sponsor: Ernest C. Manning Awards Foundation | $500 |
| Excellence Award - Senior - Silver Medal<br>Sponsor: Youth Science Canada | $300 |
| Dalhousie University Faculty of Science Entrance Scholarship<br>Senior Silver Medallist - $2500 Entrance Scholarship<br>Sponsor: Dalhousie University, Faculty of Science | $2 500 |
| UBC Science (Vancouver) Entrance Award<br>Senior Silver Medallist - $2000 Entrance Scholarship<br>Sponsor: The University of British Columbia (Vancouver) | $2 000 |
| University of Ottawa Entrance Scholarship<br>Senior Silver Medallist - $2000 Entrance Scholarship<br>Sponsor: University of Ottawa | $2 000 |
| Western University Scholarship<br>Silver Medallist - $2000 Entrance Scholarship<br>Sponsor: Western University | $2 000 |
| Total | $11 300 |