

Environmental Development Reviews

*A method for reducing the
environmental impact of product
manufacturing*

Engineering Tech Center
Richard Lambert
Jeff Fleming



Answers That Matter.

Acknowledgements

- Steve Leeper

- “Grandfather” of current Environmental Development Review Process

- Ron Pitzer and Linda Farrington

- Six Sigma Team leadership which refined and integrated Environmental Development Review process into molecule planning map

- Jeff Fleming

- Engineering Tech Center Teammate and co-owner of current Environmental Development Review process

Key Points

*Environmental Development Reviews are an important **PIECE** of the overall effort to understand, document, and reduce the impact to the environment from product development and manufacturing*

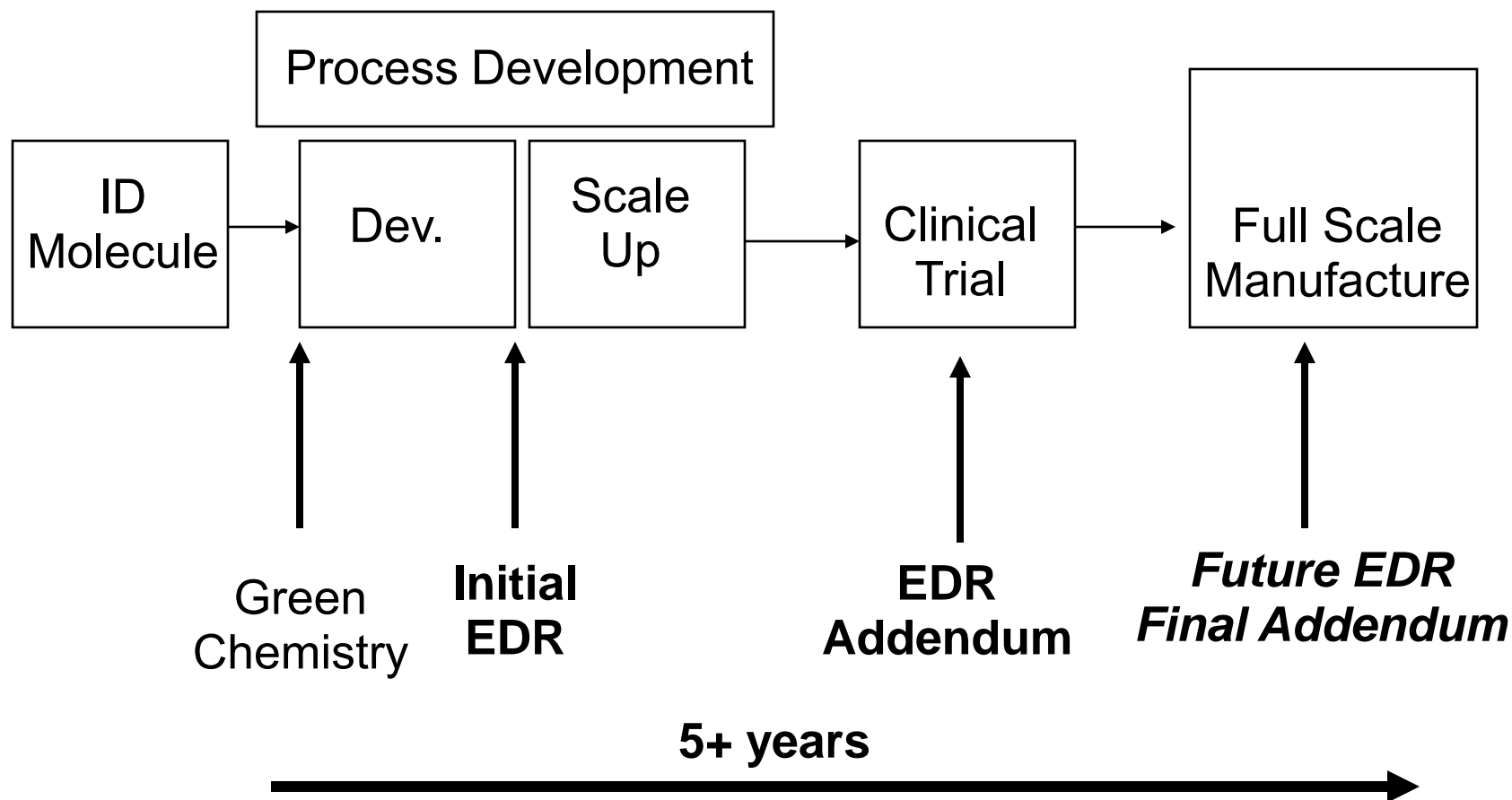
- **Environmental Development Reviews help Lilly:**

- *Reduce fugitive and point source emissions*
- *Meet and exceed Corporate Health, Safety, and Environmental Goals*
- *Reduce load to treatment processes*
- *Reduce load to landfill*
- *Increase Reuse*
- *Reduce cost of manufacturing*

What is an Environmental Development Review

- EDR for short
- Early review of how molecule is to be manufactured
 - Understand all chemical steps
 - Create mass balance for each step of process
 - Understand Process Mass Intensity
 - *Document and Estimate* potential environmental impact of chemical or biological processes for the specific manufacturing sites
- Typical EDR can take 4-8 months for completion

Where does the EDR fit in the Molecule Development and Manufacturing Process



Sources of Waste Streams from a Manufacturing Process

Manufacturing Process

Chemical Synthesis

Biological Production

Purification

Rig Cleaning

Column Regenerations

Laboratory

→ Solid Waste →
Landfill
Thermal Treatment
Land apply mycelia

→ Liquid Waste →
WWTP
Thermal Treatment
Solvent Recovery

Examples of Waste Streams from Manufacturing

•Effluent to Waste Water Treatment

- Will effluent from manufacturing meet effluent guidelines for organics, inorganic, affect BOD, etc..?
- Will effluent contain material that will compromise function of waste water treatment facility ?
- Do we understand the potential concentration of active product in effluent ?

•Primary and Secondary Solvent

- Thermal treatment capacity or Recover
- Solvents compatible with treatment system
- Inorganic (fluorine, chlorine, iodine, etc) and affect on treatment systems
- Water based waste treated by waste treatment ?
- Regulatory guidelines

Examples of Waste Streams from Manufacturing

•Solid Waste Treatment

- Do we understand the volume packages from cleaning operations ?
- Will we treat the mycelia from biological process or will we land apply, maybe both ?
- What solid waste is thermally treated and what is land filled ?

•Emissions

- Predict/measure fugitive and point source emissions
- Document expected carbon footprint

EDR Reviews Require Resources

- Approximately 20 EDR reports finalized over past five years
- 2010 has approximately 11 molecules scheduled for EDR reviews
- Each EDR is approximately 4-8 month activity

Continued streamlining of EDR process to incorporate increased volume of reports required with fixed personnel

Impact of past EDR Reports

Examples of Predicted Financial Benefits

- Product 1 = annual savings of \$2.2 million
 - Elimination of problem solvents and reduce Pd catalyst
- Product 2 = annual savings of \$18.5 million
 - Reduction of problem solvent
 - Recovery of another solvent and selling/re-use
- Product 3 = annual savings of \$1 million
 - Reduction of problem solvent

Continued Improvement

- Process update EDR reports as molecules progress through manufacturing
 - Addendums
- Manage volume of new EDRs
- Use of EDR reports for contract manufacturing
- Continue to use EDR to drive Corporate HSE goals

Final Thoughts

- EDR reports help manufacturing understand the potential environmental impact from manufacturing a specific molecule
- EDR's help drive Corporate Health and Safety Goals
- Past EDR's have shown financial benefits and this is expected to continue