OncoLogic® Version 9 at U.S. EPA
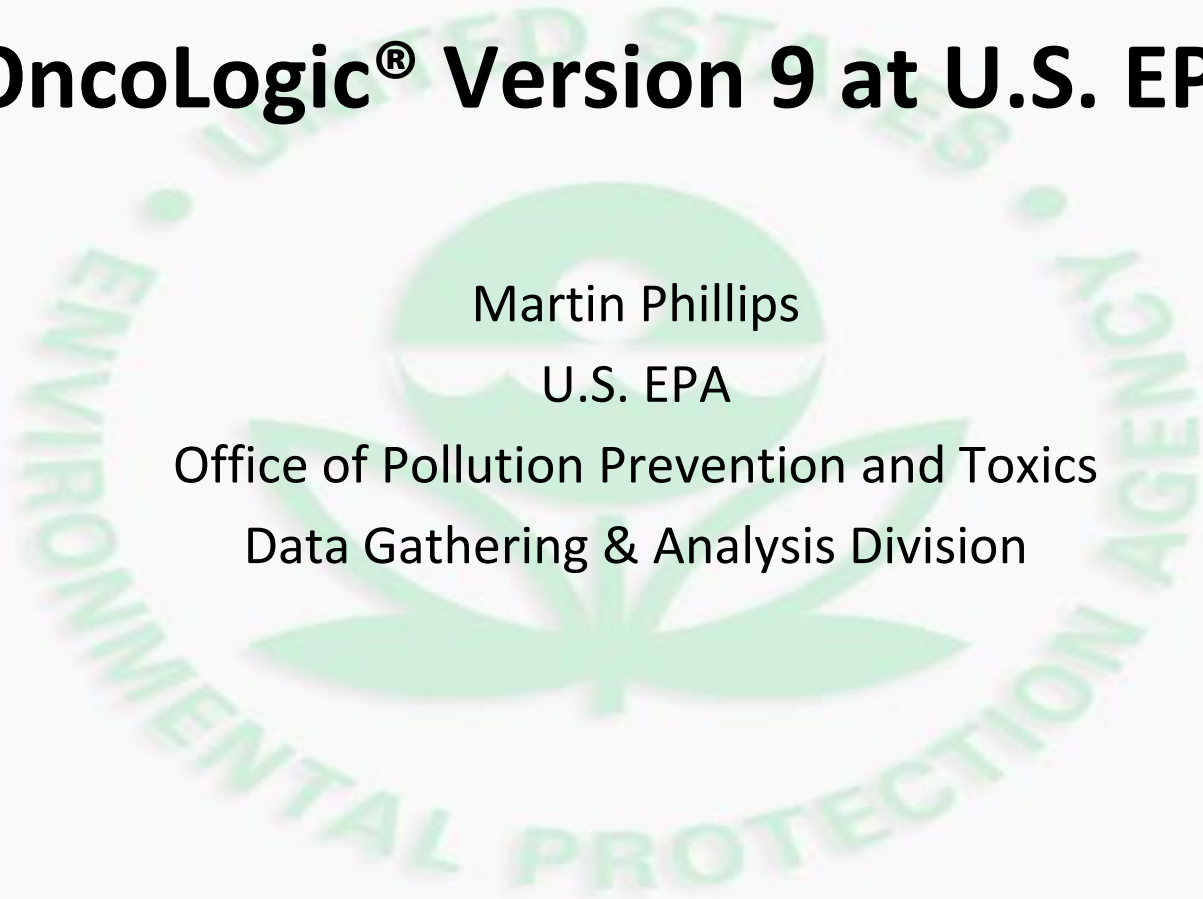
Martin Phillips

U.S. EPA

Office of Pollution Prevention and Toxics

Data Gathering & Analysis Division

OncoLogic®: A mechanism-based expert system for predicting carcinogenic potential

- Developed by domain experts in collaboration with expert system developer

- Knowledge from SAR on >10K chemicals

- Class-specific approach to optimize predictive capability

- Consider all relevant factors including biological input when possible

- Predictions with scientific rationale and semi-quantitative ranking

OncoLogic® - Expert System

HOW IT WORKS

- Mimic the thinking and reasoning of human experts using knowledge-based rules for chemical classes to predict cancer concern

  – Assigns a baseline concern level ranging from low to high

  – Evaluates how substituents on the chemical may affect carcinogenicity
    - Concern level changes accordingly

BENEFITS

- Expedites the decision-making process
- Allows sharing of knowledge
- Reduces/eliminates error and inconsistency
- Formalizes knowledge rules for cancer hazard identification
- Allows non-experts to reach scientifically supportable conclusions
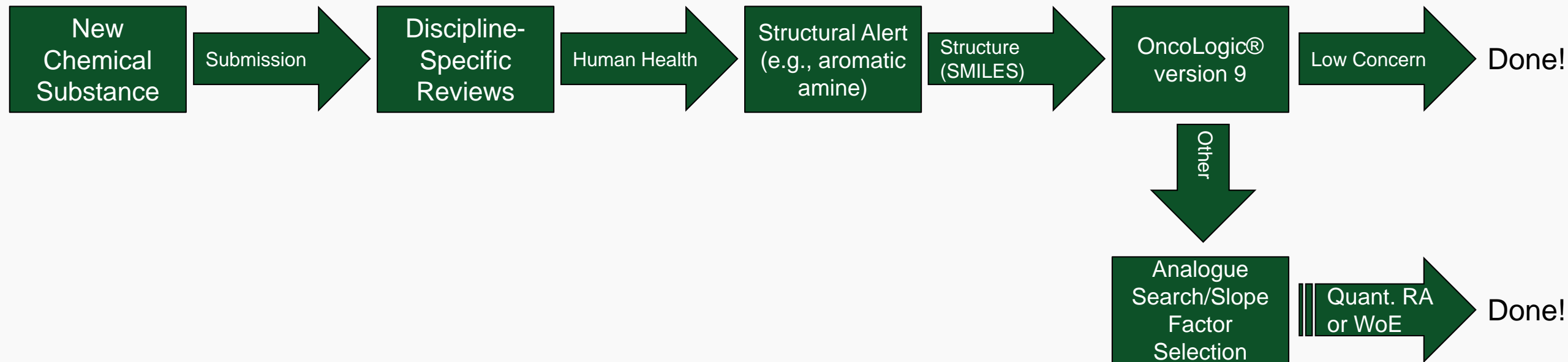
OncoLogic® - Concern Levels

OncoLogic® Concern	Definition
Low	Unlikely to be carcinogenic
Marginal	Likely to have equivocal carcinogenic activity
Low – Moderate	Likely to be weakly carcinogenic
Moderate	Likely to be a moderately active carcinogen
Moderate – High	Highly likely to be a moderately active carcinogen
High	Highly likely to be a potent carcinogen

EPA TSCA New Chemicals Workflow

OncoLogic® Concern
Low
Marginal
Low – Moderate
Moderate
Moderate – High
High

- Refines class-based structural alerts to better predict cancer hazards

New Chemical Substance → Submission → Discipline-Specific Reviews → Human Health → Structural Alert (e.g., aromatic amine) → Structure (SMILES) → OncoLogic® version 9 → Low Concern → Done!

OncoLogic® version 9 → Other → Analogue Search/Slope Factor Selection → Quant. RA or WoE → Done!

THANK YOU!