

# Human Health and Ecological Impact Analysis for a New Renewable Energy Facility in Florida

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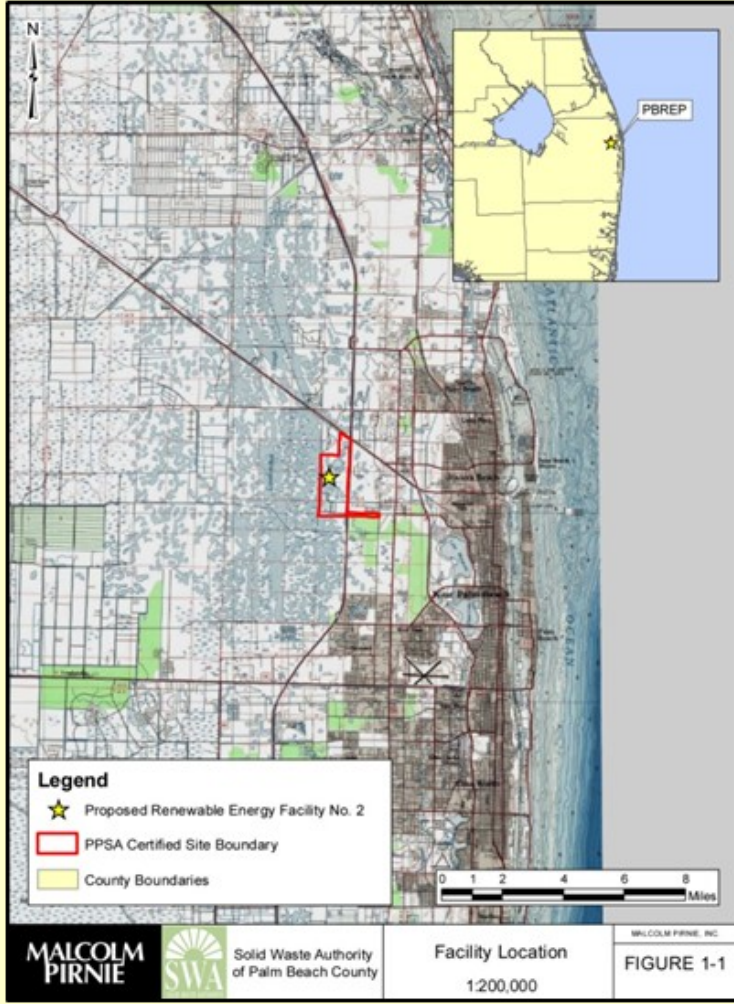
## Introduction

### Project Overview

- Conducted a human health and ecological impacts analysis
- Assessed potential impacts associated with stack emissions from existing RDF facility and proposed WTE facility combined
- Not a formal requirement for the permitting process
- Conducted to ensure that the new facility would not have an adverse impact on human health and the environment

### Facility Location

Palm Beach County, Florida



### Facility Description

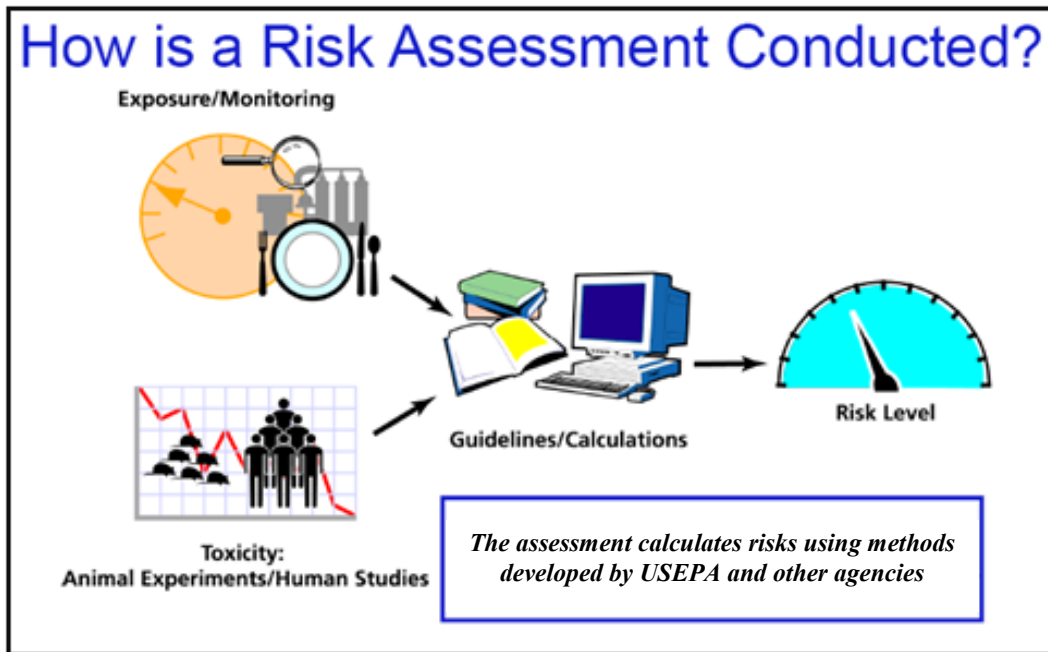
Located in 1,320 acre  
Palm Beach Renewable Energy Park



| Existing Facility                                                                                                  | New Facility                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Refuse derived fuel (RDF)                                                                                          | Mass burn                                                                                                      |
| 1,800 TPD (2 units)                                                                                                | 3,000 TPD (3 units)                                                                                            |
| 1989: Operational                                                                                                  | 2011: Permit awarded<br>2012: Under construction                                                               |
| 63 MW                                                                                                              | 105 MW                                                                                                         |
| Spray dryer absorber, fabric filter baghouse, selective non-catalytic reduction system, activated carbon injection | Spray dryer absorber, fabric filter baghouse, selective catalytic reduction system, activated carbon injection |

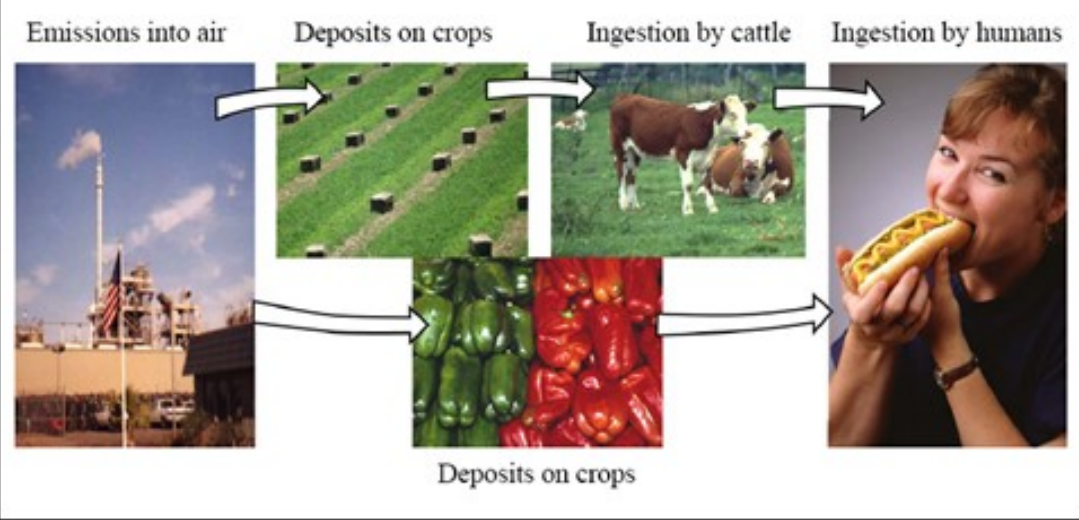
## Human Health Risk Assessment

### Methods

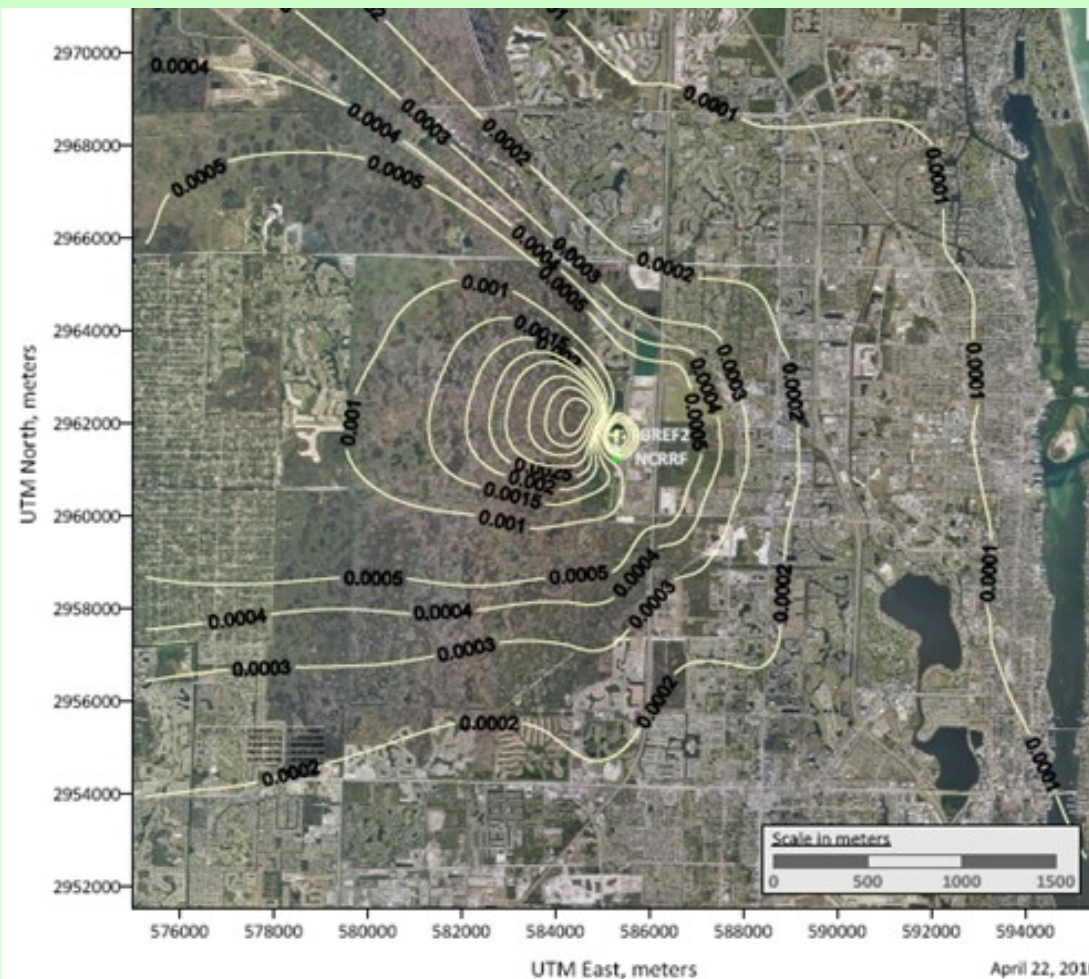


- USEPA guidance – refined analysis
- Evaluated risks for:
  - 10 selected chemicals or chemical classes: metals, PCDDs/PCDFs, acid gases, ammonia
  - different types of individuals (adults, children, infants)
  - varying combinations of exposure pathways (inhalation, ingestion of produce, animal products & fish, incidental ingestion of soil, infant ingestion of breast-milk)
- Chemical-specific toxicity data obtained from USEPA-recommended databases
- Incorporated many site-specific inputs: emission rates, site-specific surveys, meteorology, inputs for environmental fate and transport models, exposure pathways, exposure locations
- Calculated environmental concentrations using mathematical modeling: air dispersion and deposition, environmental fate and transport

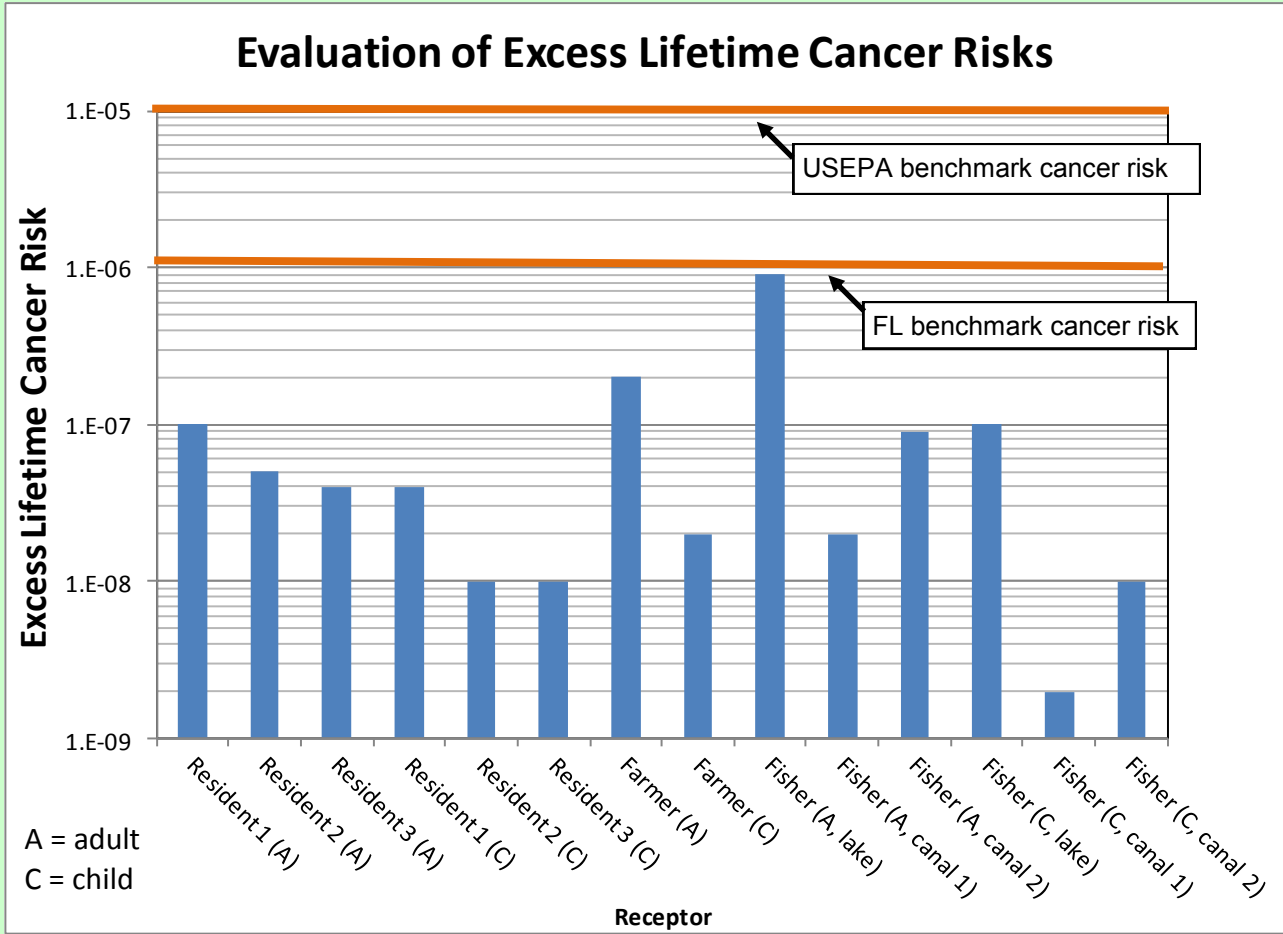
### Example Exposure Pathways for Humans



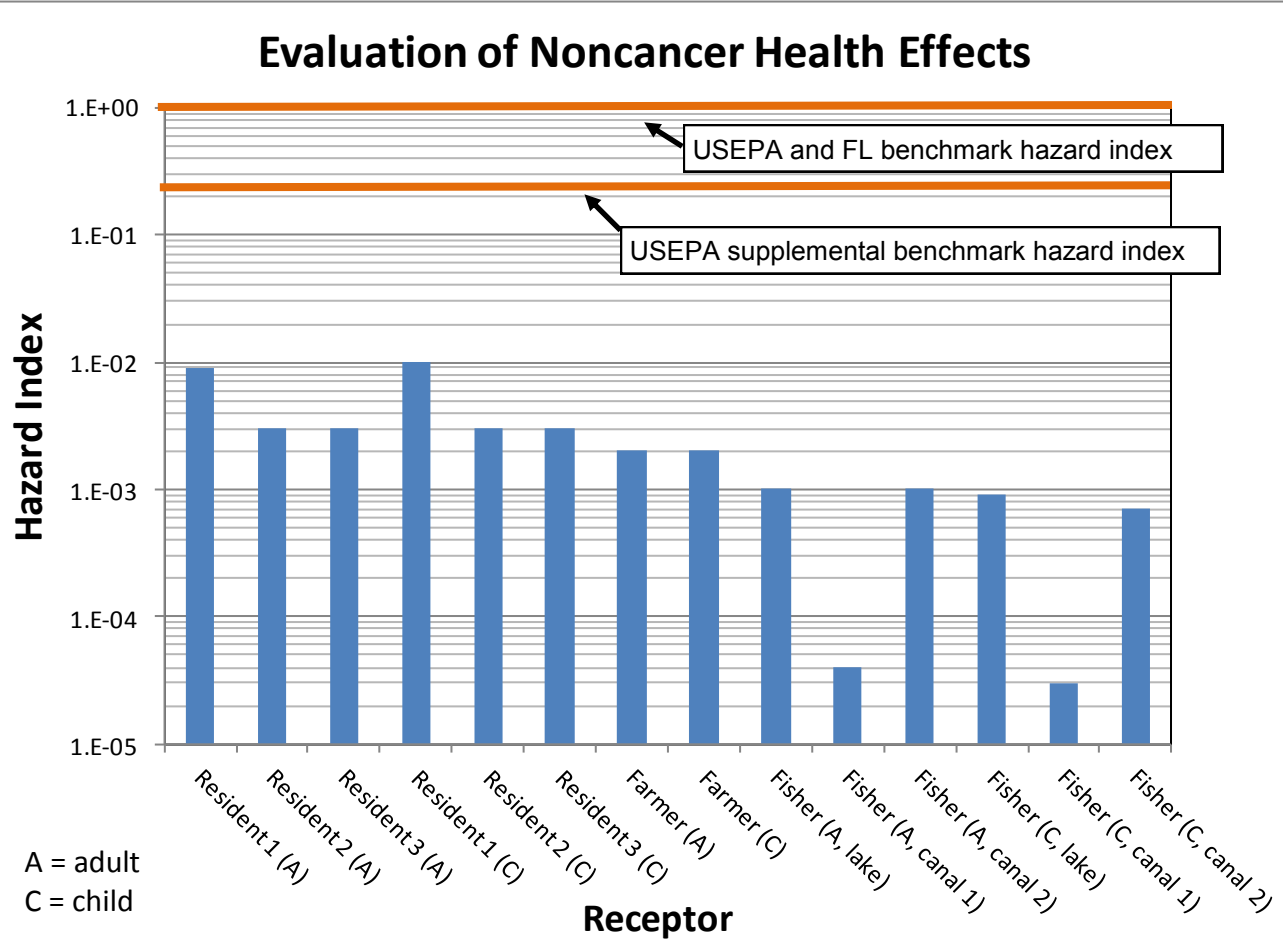
Unitized Annual Average Total Deposition Rates, Vapor Phase,  
Proposed Stack (g/m2-yr per 1 g/sec)



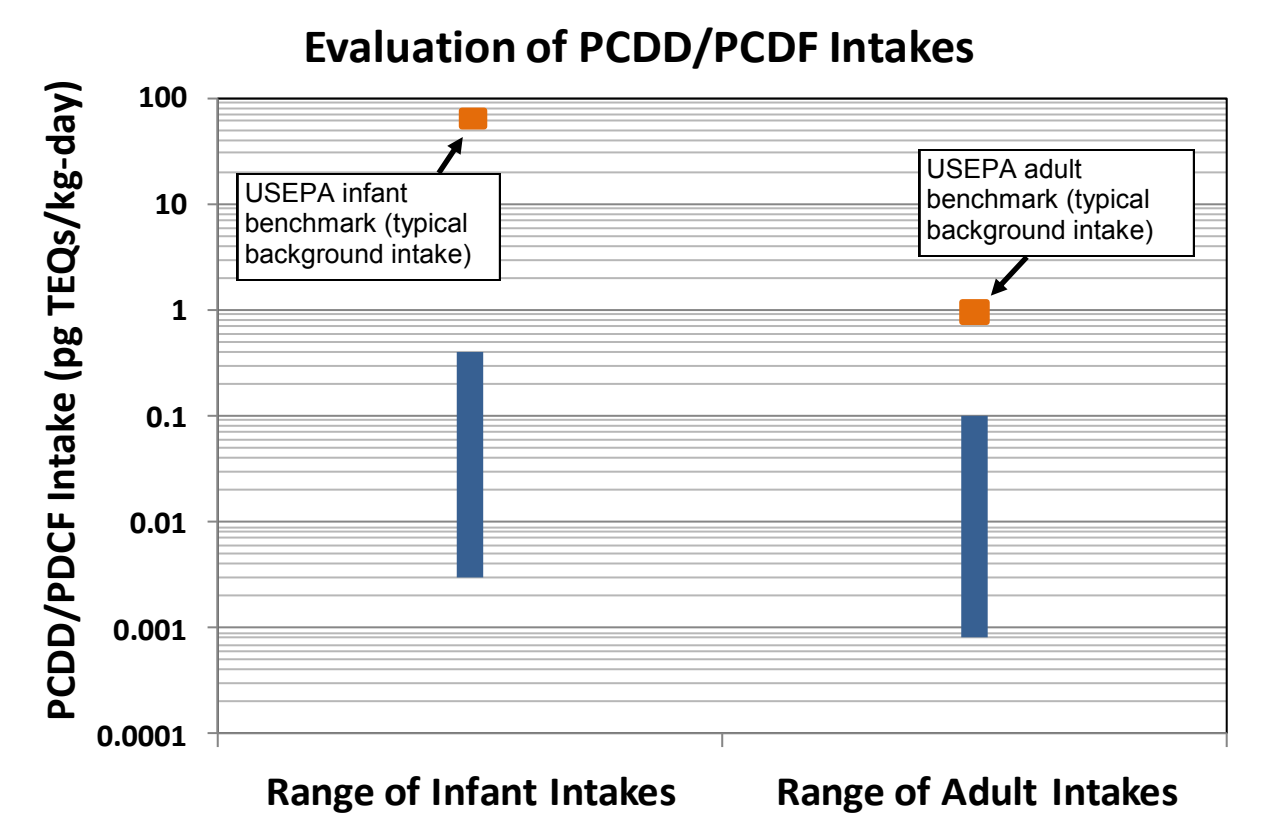
Long-term cancer risk –  
Compared to 1 in 100,000 (1E-5) USEPA benchmark cancer risk and 1 in 1,000,000 (1E-6) State benchmark cancer risk



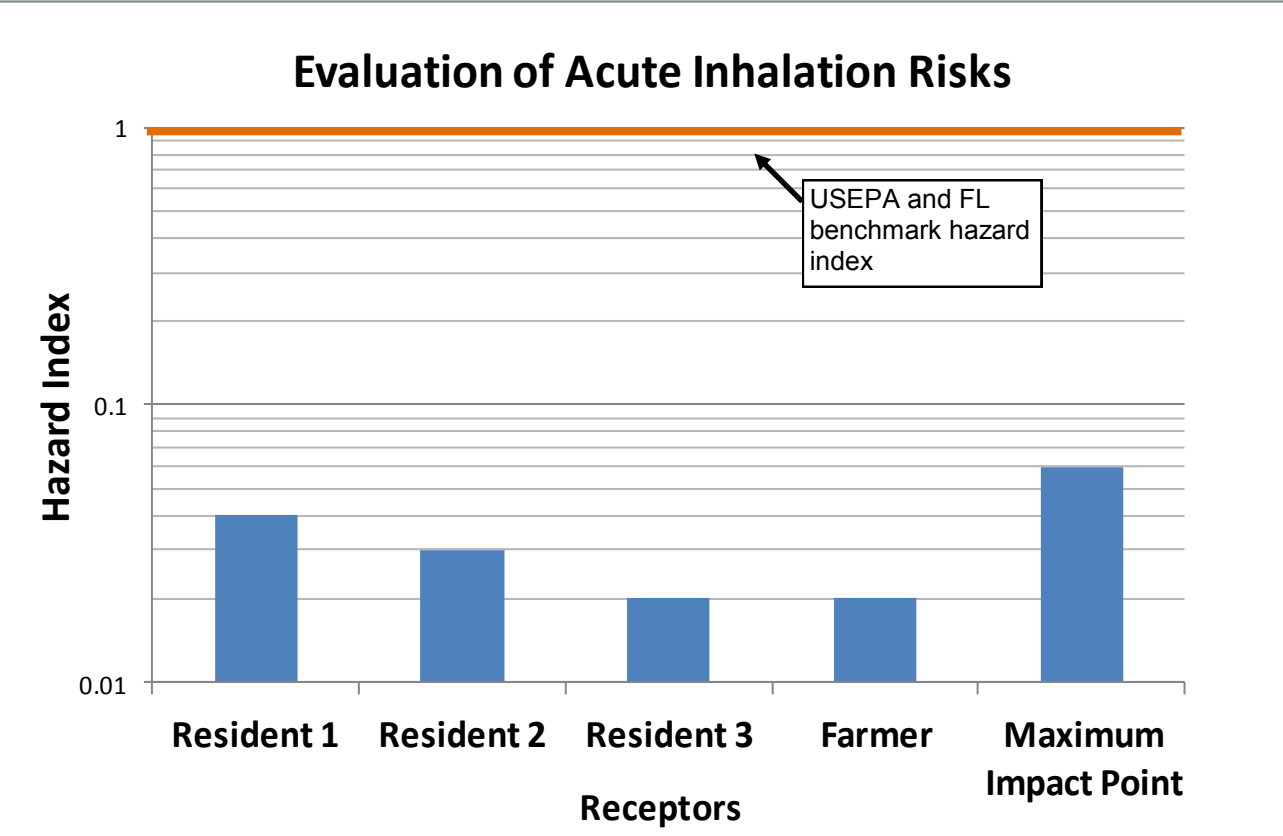
Long-term noncancer effects –  
Compared to 1.0 USEPA and State benchmark hazard index and 0.25 supplemental USEPA benchmark hazard index



Exposure to dioxins & furans –  
Compared to typical background levels



Acute inhalation risks – Compared to  
1.0 USEPA and State benchmark hazard index



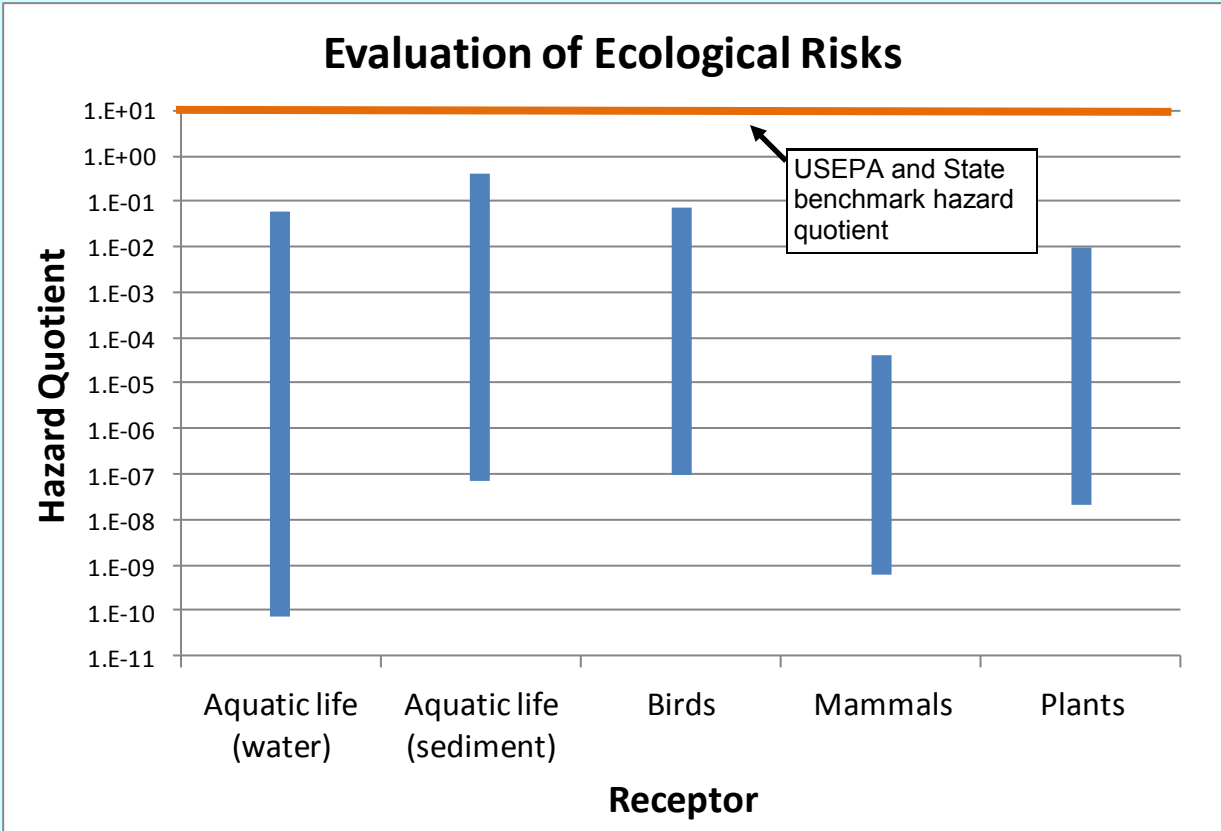
## Ecological Risk Assessment

### Methods

- USEPA guidance – screening-level analysis
- Evaluated risks for:
  - Same set of compounds
  - Variety of ecological receptors
- Focused on wildlife and other species considered to be at greatest risk based on habitat use, exposure potential, population status
- Selected receptors: aquatic life, wood stork, Everglades Snail Kite, river otter, plants
- Ecotoxicity screening values based on standards, criteria, guidance or ecological benchmarks available from USEPA and Florida databases or other published reports
- Incorporated many site-specific inputs and calculated potential exposures using mathematical modeling



Exposure to ecological receptors -  
Compared to 1.0 benchmark screening level hazard quotient



## Conclusions

- The new facility would not have an adverse impact on human health or the environment
- Potential risks associated with stack emissions from the two assessed facilities were below regulatory and other benchmark risk levels for both human health and ecological receptors
- Calculated incremental environmental concentrations associated with stack emissions from the two facilities would not measurably increase the typical concentrations of chemicals in the environment
- The results were consistent with studies of other modern waste-to-energy facilities that are designed, constructed and operated in accordance with federal and state laws and regulations
- Similar methodologies can be used to assess alternative waste conversion technologies