

San Jacinto River Waste Pits Superfund Site Public Health Assessment

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and

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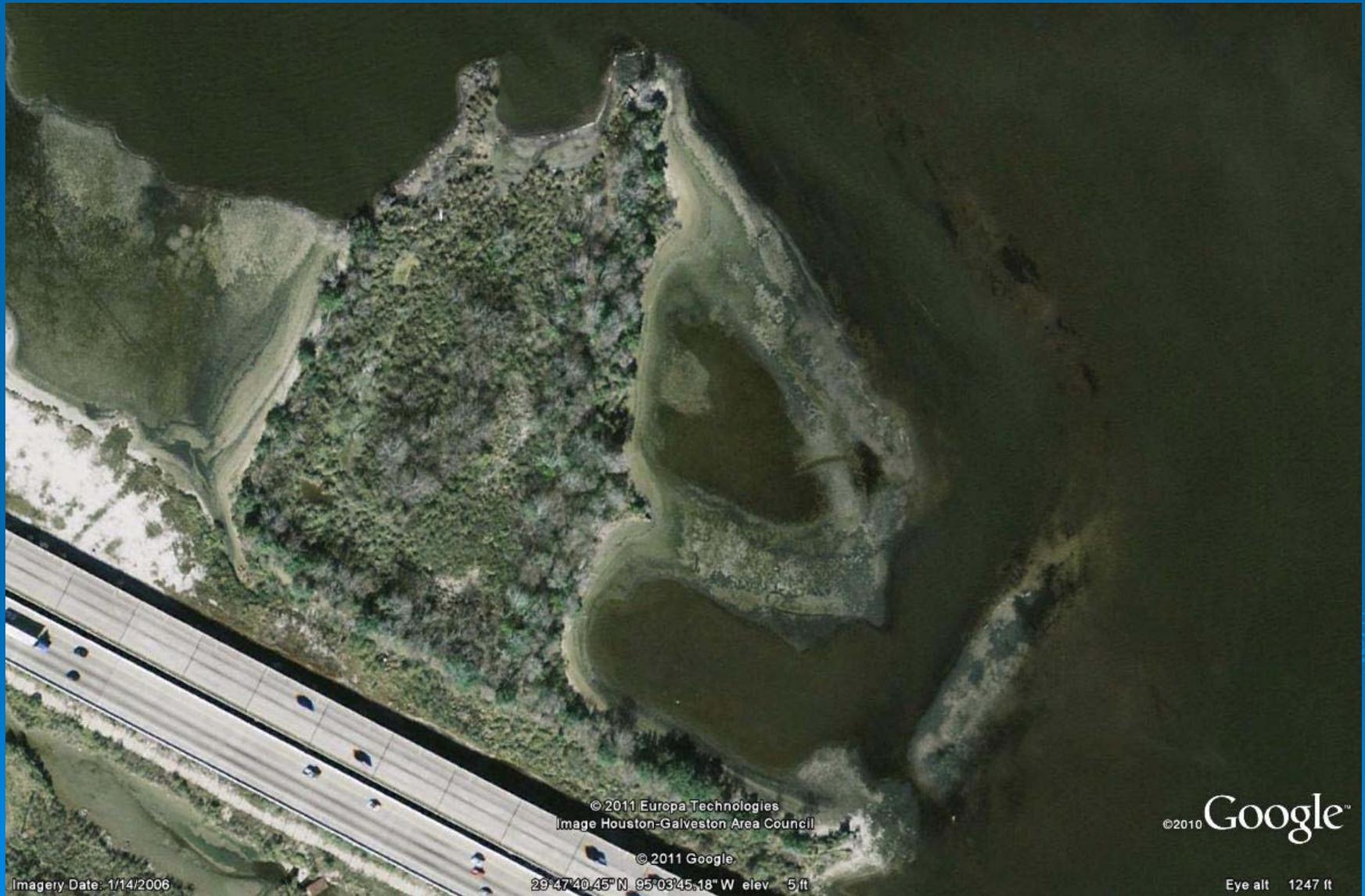


San Jacinto River Waste Pits

Background & Contaminants of Concern

- Approximately 20 acre tract of land
- Situated on west bank San Jacinto River
- Immediately north of I-10 Bridge
- Three surface impoundments (pits)
- Received paper mill waste 1964-1973
- Contaminated with polychlorinated dibenzodioxins and dibenzofurans (PCDDs & PCDFs)
- Land subsided since then and two pits now below water level of San Jacinto River

San Jacinto River Waste Pits (2006)



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29°47'40.45" N 95°03'45.18" W elev 5 ft

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Imagery Date: 1/14/2006

Eye alt 1247 ft

San Jacinto River Waste Pits (2007)



San Jacinto River Waste Pits (2007)



San Jacinto River Waste Pits (2011)



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Imagery Date: 3/10/2011

29°47'40.26" N 95°03'47.42" W elev 5 ft

Eye alt 1005 ft

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San Jacinto River Waste Pits

Site Visit – December 2007

- Point at north end of site was well beaten down
- Point was littered with cans, food wrappers, charcoal briquettes, fishing line in trees, an old crab trap, and other miscellaneous trash
- Shallow area directly over two of the pits on east side of site was conducive to wading
- Obviously a popular fishing location

San Jacinto River Waste Pits

- Sand mining operation reported immediately northwest of site by the University of Houston in their Dioxin TMDL Project Report
- Destination of sands mined from this location is currently unknown
- Concentrations of dioxins in mined sands is currently unknown
- Some of the contaminated pit sediments may have washed downstream during heavy rains & run-off

San Jacinto River Waste Pits (SJRWP)

Public Health Assessment – Data Sources

- DSHS evaluated 7 on-site samples and 4 off-site samples from the Hazard Ranking System (HRS) Documentation Record collected by the TCEQ
- Also evaluated 2 on-site samples and 208 off-site samples from 84 locations in the SJR, HSC, & UGB collected by the University of Houston under the Dioxin TMDL Project (2002-2005)
- Also evaluated 9 fish & crab samples collected near the site & the I-10 bridge by the DSHS SALG (2004)

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Most Likely Pathways for Exposure

- Oral contact with contaminated sediments through hand-to-mouth transfer
- Dermal absorption of contaminants through skin contact with sediments
- Ingestion of fish containing elevated levels of dioxins and furans

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Unlikely Pathways for Exposure

- Airborne contaminated dust is unlikely due to heavy vegetation cover on site & low volatility for congeners with dioxin-like toxicity
- Groundwater exposure unlikely – no nearby wells, groundwater brackish, dioxins tightly bound to sediments
- Surface water ingestion unlikely – waters are brackish & dioxins tightly bound to sediments

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TCDD Toxic Equivalency (TEQ)

- Each sediment & fish sample was tested for 15-17 of the PCDD & PCDF congeners thought to have 2,3,7,8-TCDD-like toxicity
- Concentration of each congener multiplied by its individual toxicity equivalency factor (TEF) and the results were summed to obtain the total 2,3,7,8-TCDD toxic equivalency (TCDD TEQ) for each sample
- The resultant TCDD TEQ for each sample was used in all subsequent risk calculations

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Three Adult Exposure Scenarios

- **Subsistence fisherman** – fishes at site 5 days per week, 52 weeks per year, for 30 years
- **Weekend fisherman** – fishes at site 1 day per week, 52 weeks per year, for 30 years
- **Sporadic fisherman** – fishes at site 1 day per month, 12 months per year, for 15 years
- All assumed to have oral & dermal contact and catch & eat fish for each day they fish at site

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Three Child Exposure Scenarios

- **Child of Subsistence Fisherman** – accompanies a fishing parent to site 5 days per week, 52 weeks per year, for ages 3-50 years (child becomes a **Subsistence Fisherman** in adult years)
- **Child of Weekend Fisherman** – accompanies a fishing parent to site 1 day per week, 52 weeks per year, for ages 3-50 years (child becomes a **Weekend Fisherman** in adult years)
- **Child of Sporadic Fisherman** – accompanies a fishing parent to site 1 day per month, 12 months per year, for ages 3-35 years (child becomes a **Sporadic Fisherman** in adult years)
- All assumed to have oral & dermal sediment contact and catch & eat fish for each day they fish at the site

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Oral Exposure Parameters for Scenarios

- Small child (3-6 yr) assumed to ingest 200 mg of contaminated sediment on each day at the site
- Older child (7-17 yr) assumed to ingest 100-200 mg of contaminated sediment on each day at the site
- Adult (18 + yr) assumed to ingest 100 mg of contaminated sediment on each day at the site
- Oral absorption factor for TCDD from sediments assumed to be 50%

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Dermal Exposure Parameters for Scenarios

- Small child (3-6 yr) assumed to contaminate 826 cm² of skin (hands & forearms) with sediment (1 mg sed/cm²) on each day at the site
- Older child (7-17 yr) assumed to contaminate 1,514 cm² of skin (hands & forearms) with sediment (1 mg sed/cm²) on each day at the site
- Adult (18 + yr) assumed to contaminate 2,187 cm² of skin (hands & forearms) with sediment (1 mg sed/cm²) on each day at the site
- Dermal absorption factor for TCDD from sediments assumed to be 3% of total amount in sediment adhering to skin

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Fish Exposure Parameters for Scenarios

- Small child (3-6 yr) assumed to eat an average of 83.4 g (2.94 oz) of fish following each visit to the site
- Older child (7-17 yr) assumed to eat an average of 171 g (6.03 oz) of fish following each visit to the site
- Adult (18 + yr) assumed to eat an average of 252 g (8.89 oz) of fish following each visit to the site
- Absorption factor for TCDD from fish assumed to be 100% of total amount in fish portion eaten
- Child fish consumption rate scaled in proportion to the $3/4^{\text{th}}$ power of the body weight relative to an adult

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TCDD TEQ Levels in Sediments

Sediment Sample Collection General Location	Count	Avg (pg/g)	Min (pg/g)	Max (pg/g)
SJRWP, On-Site Samples	9	15,594	80.92	34,028
Down-Stream from SJRWP, in SJR, HSC, & UGB	59	13.75	0.739	86.16
SJRWP Site-Vicinity, SJR Near the SJRWP	31	82.24	1.997	572.5
Houston Ship Channel, Above/West of SJR	62	65.69	4.904	856.8
Up-Stream & Tributaries to SJR, HSC, or UGB	56	15.97	0.759	102.9
All Off-Site Samples	208	40.04	0.739	856.8

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TCDD TEQ Levels in Fish/Shellfish

Fish or Shellfish Species	Count	Average (pg/g)
Blue Crab	2	3.107
Blue Catfish	2	6.04
Spotted Seatrout	2	0.233
Hybrid Striped Bass	1	1.541
Red Drum	2	0.097
All Fish Species	7	2.04
All Species	9	2.277

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Theoretical Lifetime Risk, Oral Sediment Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Subsistence Fisherman	Weekend Fisherman	Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
SJRWP, On-Site Samples	15,594	1.69E-04	3.38E-05	3.99E-06	E-02	Very High Risk
Down-Stream of SJRWP, in SJR, HSC, or UGB	13.75	1.49E-07	2.98E-08	3.52E-09	E-03	High Risk
SJRWP Site-Vicinity, in SJR Near SJRWP	82.24	8.92E-07	1.78E-07	2.10E-08	E-04	Moderate Risk
Houston Ship Channel, Above/West of SJR	65.69	7.12E-07	1.42E-07	1.68E-08	E-05	Low Risk
Up-Stream & Tributaries to SJR, HSC, or UGB	15.97	1.73E-07	3.46E-08	4.08E-09	E-06	No Apparent Risk
All Off-Site Samples	40.04	4.34E-07	8.68E-08	1.02E-08	E-07	No Risk

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Theoretical Lifetime Risk, Oral Sediment Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Child of a Subsistence Fisherman	Child of a Weekend Fisherman	Child of a Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
SJRWP, On-Site Samples	15,594	3.74E-04	7.48E-05	1.40E-05	E-02	Very High Risk
Down-Stream of SJRWP, in SJR, HSC, & UGB	13.75	3.30E-07	6.60E-08	1.23E-08	E-03	High Risk
SJRWP Site-Vicinity, in SJR Near SJRWP	82.24	1.97E-06	3.94E-07	7.38E-08	E-04	Moderate Risk
Houston Ship Channel, Above/West of SJR	65.69	1.58E-06	3.15E-07	5.89E-08	E-05	Low Risk
Up-Stream & Tributaries to SJR-HSC-UGB	15.97	3.83E-07	7.66E-08	1.43E-08	E-06	No Apparent Risk
All Off-Site Samples	40.04	9.60E-07	1.92E-07	3.59E-08	E-07	No Risk

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Theoretical Lifetime Risk, Dermal Sediment Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Subsistence Fisherman	Weekend Fisherman	Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
SJRWP, On-Site Samples	15,594	4.17E-04	8.35E-05	9.76E-06	E-02	Very High Risk
Down-Stream of SJRWP, in SJR, HSC, & UGB	13.75	3.68E-07	7.36E-08	8.61E-09	E-03	High Risk
SJRWP Site-Vicinity, in SJR Near SJRWP	82.24	2.20E-06	4.40E-07	5.15E-08	E-04	Moderate Risk
Houston Ship Channel, Above/West of SJR	65.69	1.76E-06	3.52E-07	4.11E-08	E-05	Low Risk
Up-Stream & Tributaries to SJR, HSC, or UGB	15.97	4.27E-07	8.54E-08	1.00E-08	E-06	No Apparent Risk
All Off-Site Samples	40.04	1.07E-06	2.14E-07	2.51E-08	E-07	No Risk

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Theoretical Lifetime Risk, Dermal Sediment Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Child of a Subsistence Fisherman	Child of a Weekend Fisherman	Child of a Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
SJRWP, On-Site Samples	15,594	6.78E-04	1.36E-04	2.19E-05	E-02	Very High Risk
Down-Stream of SJRWP, in SJR, HSC, & UGB	13.75	5.98E-07	1.20E-07	1.94E-08	E-03	High Risk
SJRWP Site-Vicinity, in SJR Near SJRWP	82.24	3.58E-06	7.15E-07	1.16E-07	E-04	Moderate Risk
Houston Ship Channel, Above/West of SJR	65.69	2.86E-06	5.71E-07	9.25E-08	E-05	Low Risk
Up-Stream & Tributaries to SJR, HSC, or UGB	15.97	6.94E-07	1.39E-07	2.25E-08	E-06	No Apparent Risk
All Off-Site Samples	40.04	1.74E-06	3.48E-07	5.64E-08	E-07	No Risk

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Theoretical Lifetime Risk, Fish Consumption Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Subsistence Fisherman	Weekend Fisherman	Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
Blue Crab	3.107	4.38E-04	8.75E-05	1.02E-05	E-02	Very High Risk
Blue Catfish	6.040	8.51E-04	1.70E-04	1.97E-05	E-03	High Risk
Spotted Seatrout	0.233	3.28E-05	6.57E-06	7.62E-07	E-04	Moderate Risk
Hybrid Striped Bass	1.541	2.17E-04	4.34E-05	5.04E-06	E-05	Low Risk
Red Drum	0.097	1.37E-05	2.73E-06	3.17E-07	E-06	No Apparent Risk
All Fish Species	2.040	2.87E-04	5.75E-05	6.67E-06	E-07	No Risk
All Species	2.277	3.21E-04	6.42E-05	7.44E-06		

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Theoretical Lifetime Risk, Fish Consumption Exposures

Sediment Sample General Location	Avg TCDD TEQ (pg/g)	Child of a Subsistence Fisherman	Child of a Weekend Fisherman	Child of a Sporadic Fisherman	Numeric Risk Range	Qualitative Risk Level
Blue Crab	3.107	7.07E-04	1.41E-04	2.27E-05	E-02	Very High Risk
Blue Catfish	6.040	1.37E-03	2.75E-04	4.41E-05	E-03	High Risk
Spotted Seatrout	0.233	5.30E-05	1.06E-05	1.70E-06	E-04	Moderate Risk
Hybrid Striped Bass	1.541	3.51E-04	7.01E-05	1.13E-05	E-05	Low Risk
Red Drum	0.097	2.21E-05	4.41E-06	7.08E-07	E-06	No Apparent Risk
All Fish Species	2.040	4.64E-04	9.28E-05	1.49E-05	E-07	No Risk
All Species	2.277	5.18E-04	1.04E-04	1.66E-05		

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Conclusions – Sediment & Fish Exposures

- Repeated oral and/or dermal exposure to sediments on the site for 1 year or longer could harm people's health and increase the risks for cancer under the **Subsistence Fisherman** scenario for both children and adults
- Eating fish and/or crabs caught near the site for 1 year or longer could harm people's health and increase the risks for cancer under both the **Subsistence** and the **Weekend Fisherman** scenarios for both children and adults

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Conclusions – Air, Surface, & Groundwater Exposures

- Exposures to airborne contaminants is not expected to harm people's health due to heavy vegetation cover on site & low volatility for congeners with dioxin-like toxicity
- Exposure to groundwater near the site is not expected to increase people's risk for adverse health effects from site contaminants
- Exposure to surface water near the site is not expected to increase people's risk for adverse health effects from site contaminants

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Conclusions – Sand-Mining Exposures

- Because we do not know the level of contaminants in the sand that has been mined, we cannot determine whether past or present exposure to sand from the mining activities near the SJRWP site could harm people's health

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Conclusions – Off-Site Migrated Sediment Exposures

- Because the extent of contaminated sediments off-site has not been thoroughly evaluated, we cannot conclude whether past or present exposure to contaminants that have migrated could harm people's health
- Exposures to off-site sediments from the SJR, HSC, & UGB (collected under the Dioxin TMDL Project) are not expected to increase people's risk for cancer or other health effects on basis of measured dioxin levels (other contaminants not measured or evaluated)

SJRWP Public Health Assessment

Document Availability for Review

- The public health assessment document is available on-line at www.dshs.state.tx.us/epitox/posted and at
- Stratford Branch Library
- 509 Stratford Street
- Highlands, Texas 77562-2547
- Pasadena Public Library
- 1201 Jeff Ginn Memorial Drive
- Pasadena, TX 77506
- DSHS will be accepting public comments on the health assessment document until May 31, 2011.