

Beneficial Reuse of Insoluble Manufacturing Process Waste for Construction of a Rail Spur in East Texas

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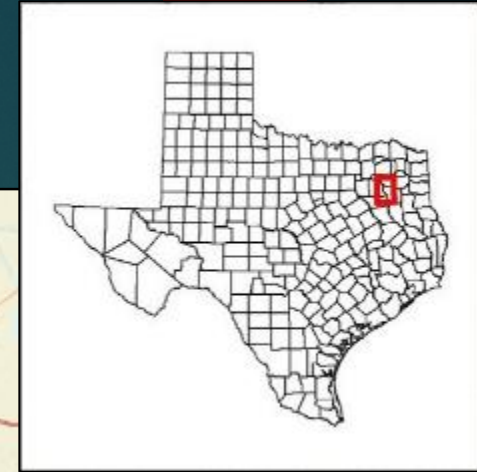
EDWARD FASULO, MORTON SALT, INC. PLANT MANAGER

DON YARBOROUGH, MORTON SALT, INC. ROCK PRODUCTION MANAGER



Background

- ▶ Morton Salt needed to increase rail car storage capacity on existing plant rail spur into the Klear Mine in Grand Saline, TX
 - ▶ Proposal to construct 1,600 linear feet of new rail line.
 - ▶ Rail line operated by UPRR
- ▶ FNI contracted to provided environmental permitting and civil engineering services
- ▶ Via Rail Engineering Inc.
- ▶ “The Mountain”



Project Site

- ▶ 250 million year-old salt dome formation in Grand Saline, Van Zandt County, Texas
- ▶ Owned and mined by Morton Salt
- ▶ Area first inhabited by Caddo and Cherokee Indians
- ▶ Unique habitat, including salt marshes and salt flats, around the plant location



Figure

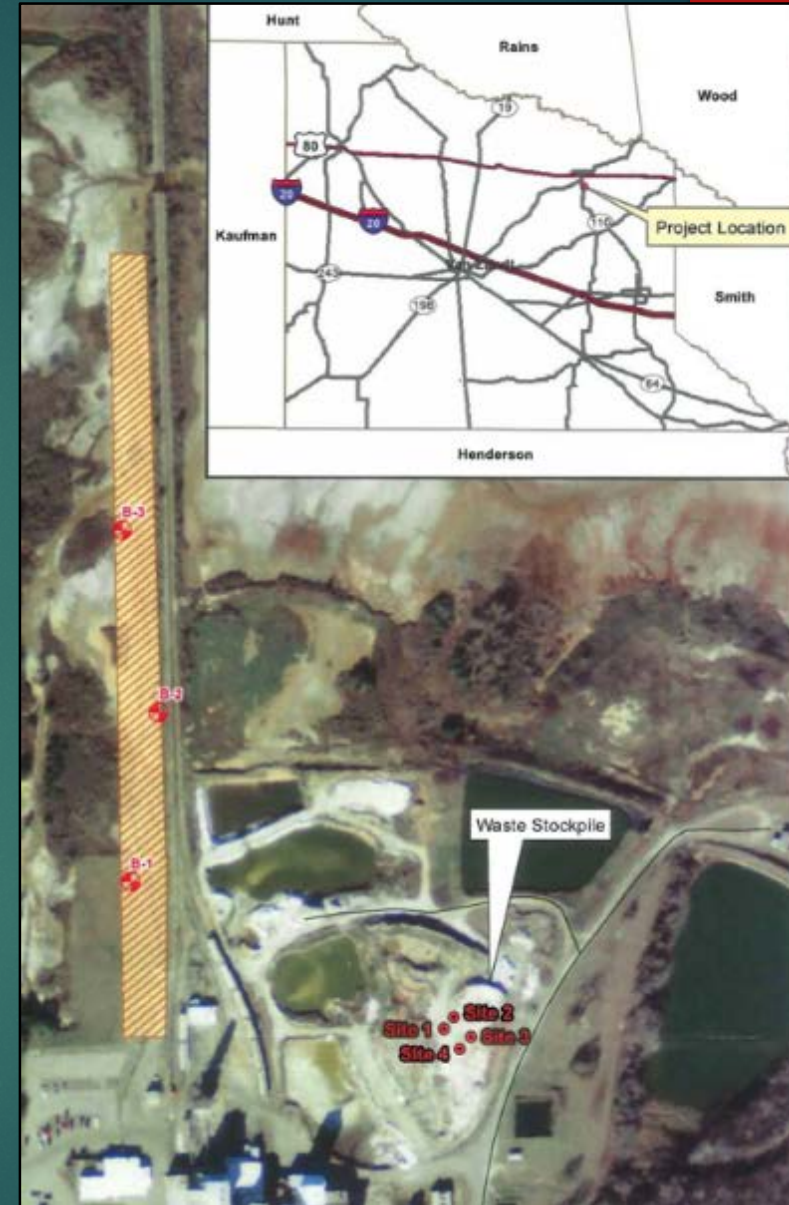
The Reuse Component

- ▶ Morton Salt interested in reusing 25,000 cubic yards of insoluble process waste from brine treatment and dust collection systems stored on location for rail spur base
- ▶ Process waste streams
 - ▶ Calcium sulfate-based waste
 - ▶ Brine treatment insolubles
 - ▶ Rock salt dust collection insolubles
- ▶ No precedent for beneficial reuse of waste



Sampling Sites

- ▶ Nov. 20, 2012 - FNI collected samples of the stock pile waste for geotechnical evaluation and environmental testing
 - ▶ TPHs
 - ▶ VOCs
 - ▶ Heavy Metals
 - ▶ General Waste Characterization and Moisture Content
- ▶ Dec. 14, 2012 – FNI collected soil samples at the proposed receiving/fill site.



Analytical results summary

- ▶ Stockpile sample results compared Texas-specific background concentrations (heavy metals), protective concentration limits (PCLs), and waste classification limits
- ▶ No VOCs detected
- ▶ Concentrations of total petroleum hydrocarbons (TPH) were found in some samples (30.5-575 mg/kg)
- ▶ Heavy metals well below action levels, except for lead; all were below Class 1 nonhazardous waste screening limits

Table 2. Ranges of Heavy Metal Concentrations Detected in Waste Stockpile & Receiving Site Samples

Heavy Metal	Background/Critical PCL ¹	Concentration Range (mg/kg)	
		Waste Stockpile	Receiving Site
Arsenic	5.9	ND to 1.32	ND to 3.0
Barium	300	1.63 to 42.1	6.85 to 29.7
Cadmium	1.5	ND to 0.205	ND
Chromium	30	0.546 to 4.97	3.6 to 5.36
Lead	15	5.39 to 16.8	4.04 to 8.09
Selenium	2.3	ND to 0.429	ND
Silver	0.48	ND to 0.21	ND
Mercury	0.04	ND to 0.0145	0.0118 to 0.0307

¹ – Highest value of Texas-specific background concentration and Tier 1 residential PCL



Geotechnical results summary

- ▶ Non-plastic, fine grain sand
- ▶ Suitable for embankment material, but not railroad ballast
- ▶ Requires stabilization of upper 6 inches with lime/cement
- ▶ Requires vibratory compaction equipment
- ▶ Should not be in direct contact with buried structures/concrete pavement (corrosion)

FRESE NICHOLS										LOG OF BORING NO. B-1									
Project Description: Morton Salt Rail Spur					Project Location: Grand Saline, TX					Project No.: MS112415					Phase No.: ****				
Date Drilling Started: 12/14/2012					Logged By: DJJ					Drilling Co.: Total Depth					Date Drilling Completed: 12/14/2012				
Rig Type: ATV Mobile					Northing/Latitude: 32.65976					Hammer Type: Automatic					Drill Method: CFA				
Easting/Longitude: -95.70577					Hammer Wt. & Drop: 140 lb.; 30 in.					Elevation:									
DEPTH, ft	SAMPLE						SYMBOL	MATERIAL DESCRIPTION	WATER CONTENT, %	UNIT DRY WEIGHT, pcf	% PASSING NO. 200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	UNC. COMPRESSIVE STRENGTH, lbf	STRAIN AT FAILURE, %	ELEVATION, ft		
	TYPE	BLOW COUNTS	HAND PNE. TROMETER (PI) / TORVANE (T), %	RECOVER, %	ROD, %														
U-1		2.4 (P)					CLAYEY SAND (SC), yellow-brown and brown, moist, loose	9		40	25	14	11						
SPT-2	6-3-3 (5)																		
SPT-3	9-0-0 (9)						LEAN CLAY (CL), light gray with red-brown, moist, soft to stiff, with sand, mottled with iron oxide	13											
U-4		3.5 (P)					-increasing sand below 7 feet	17		110	75	31	12	19	1.4	6.8			
U-5		4.25 (P)					CLAYEY SAND (SC), light brown with light gray, moist, medium dense, intercalated with stiff clay partings (Alluvium)	7											
U-6		3.25 (P)																	
SPT-7	6-9-13 (22)						light brown, light yellow-brown with red-brown, moist to wet below 9.5 feet												
SPT-8	2-5-15 (20)									17	16								
Total boring depth 15.0 ft.																			
Water Observations: 3.6 ft At Time Of Drilling																			
Remarks:																			

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual. These logs are subject to the limitations, conclusions, and recommendations in the associated report. Sheet 1 of 1



Sampling Conclusions

- ▶ Key Lines of evidence
 - ▶ Absence of VOC's
 - ▶ Minor concentrations of TPH
 - ▶ Low metals concentrations
 - ▶ Only relocation of material
 - ▶ No reactivity, ignitability, or corrosivity concerns



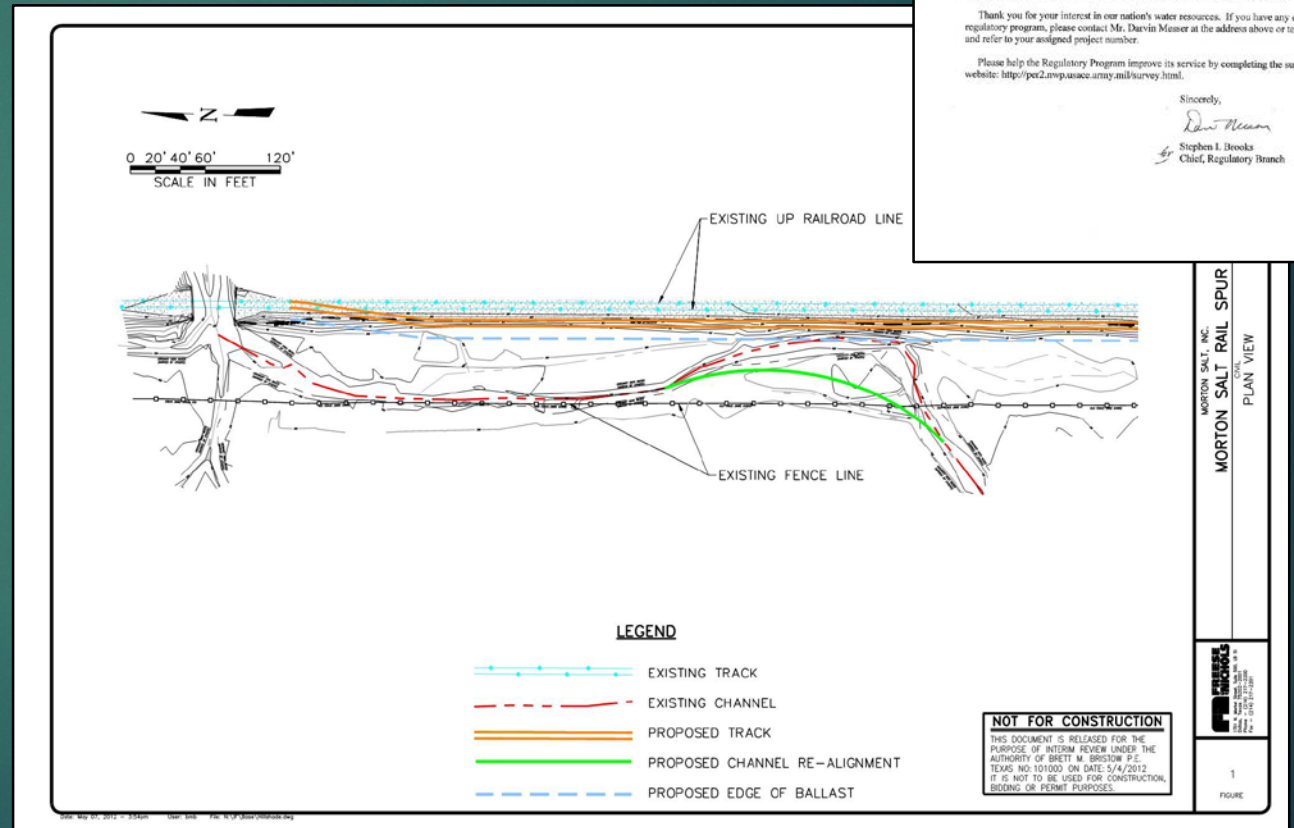
Section 404 Permitting

- ▶ Small channel flows south to north adjacent to rail spur
- ▶ Channel within salt flat – little definition, no established riparian area
- ▶ Potential downstream connectivity to salt flats/marshes



Section 404 Permitting

- ▶ Rail construction would only require minor realignment near toe of rail spur
- ▶ FNI met with USACE to discuss permitting options
- ▶ Obtained "No permit required" letter
 - ▶ Avoided PCN and Mitigation Costs



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1780
FORT WORTH, TEXAS 76102-0100

June 1, 2012

Planning, Environmental, and Regulatory Division
Regulatory Branch

SUBJECT: Project Number SWF-2012-00178, Morton Salt Rail Spur

Mr. Don Yarbrough
Morton Salt, Inc.
801 State Highway 110
Grand Saline, Texas 75140

Dear Mr. Yarbrough:

Thank you for your letter received April 10, 2012, and subsequent submittal dated May 8, 2012, concerning the proposal by Morton Salt, Inc. to construct a rail spur located in the city of Grand Saline, Van Zandt County, Texas. This project has been assigned Project Number SWF-2012-00178. Please include this number in all future correspondence concerning this project.

Under Section 404 of the Clean Water Act the U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged and fill material into waters of the United States, including wetlands. USACE responsibility under Section 10 of the Rivers and Harbors Act of 1899 is to regulate any work in, or affecting, navigable waters of the United States. Based on your description of the proposed work, and other information available to us, we have determined this project will not involve activities subject to the requirements of Section 404 or Section 10. Therefore, it will not require Department of the Army authorization pursuant to Section 404 or Section 10. The USACE based this decision on a preliminary jurisdictional determination that there are no waters of the United States within the project site.

Thank you for your interest in our nation's water resources. If you have any questions concerning our regulatory program, please contact Mr. Darwin Meuser at the address above or telephone (817) 856-1744 and refer to your assigned project number.

Please help the Regulatory Program improve its service by completing the survey on the following website: <http://per2.mwp.usace.army.mil/survey.html>.

Sincerely,

Stephen I. Brooks
Chief, Regulatory Branch

MORTON SALT, INC.
MORTON SALT RAIL SPUR
PLAN VIEW



NOT FOR CONSTRUCTION

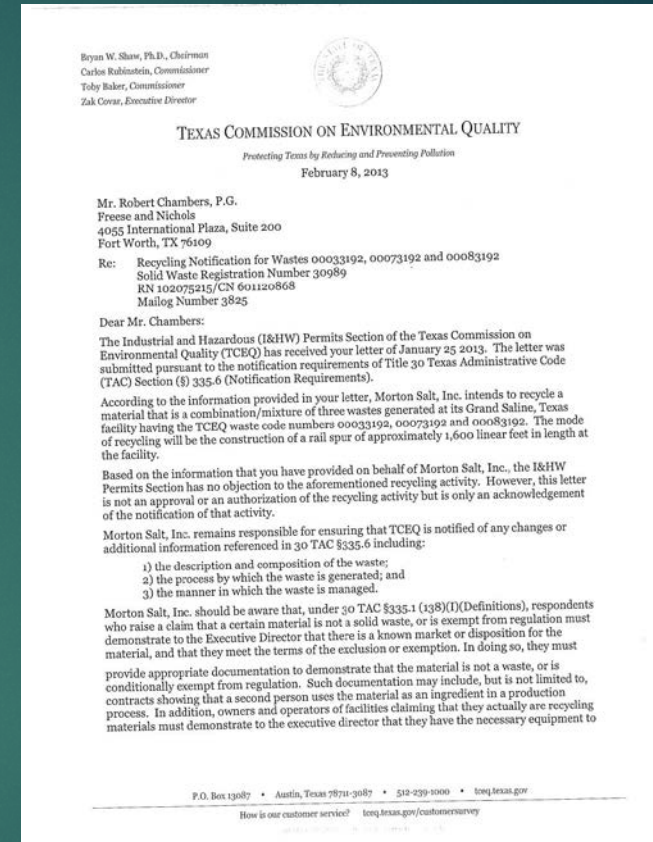
THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF WITHIN REVIEW UNDER THE AUTHORITY OF BRETT M. BRISLOW P.E., TEXAS NO. 101002 ON DATE 5/4/2012. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

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FIGURE

Coordination with State Agencies

- ▶ Formal letter to the Texas Commission on Environmental Quality (TCEQ) requesting reuse approval
- ▶ TCEQ issued “No Objection Letter”
- ▶ No Geotechnical Concerns
- ▶ Morton Salt proceeds with rail spur construction



**TEXAS COMMISSION
ON ENVIRONMENTAL QUALITY**



The Finished Product

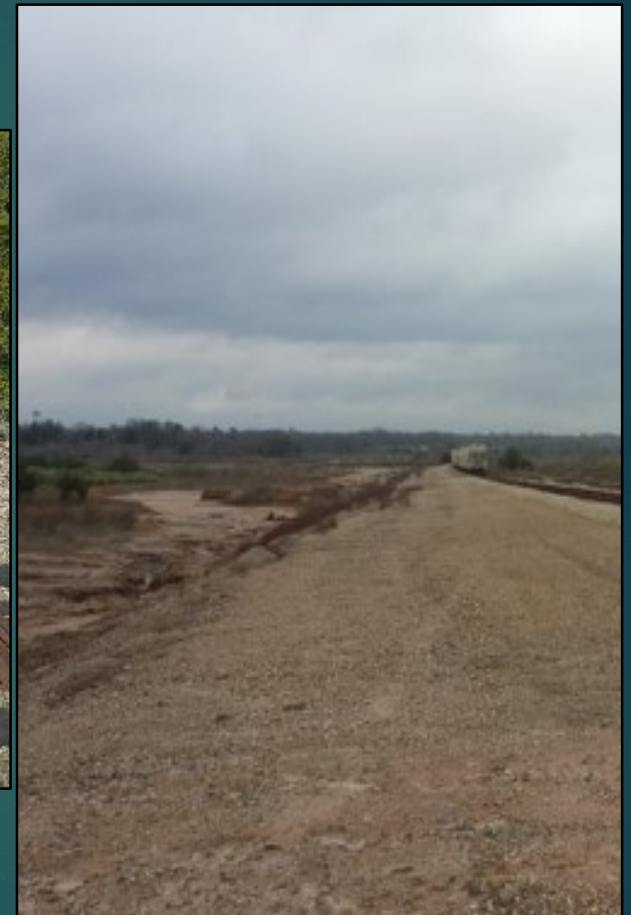
Before - 2010



After - 2014



The Finished Product



Challenges

- ▶ Insoluble hardened material and cement in place
- ▶ Required backhoe to breakup material



Benefits

- ▶ Avoided transport of offsite fill material
- ▶ Reduced construction costs
- ▶ Beneficial reuse of onsite waste
- ▶ Coordination with agencies provides opportunity for additional reuse
- ▶ Little study of the waste stream for rail or other infrastructure construction
- ▶ Morton Salt able to use for future construction projects



Sustainable Client Service

- ▶ Innovative approach to meet client needs
- ▶ FNI able to provide host of services needed to evaluate feasibility – environmental analysis, geotechnical investigation, agency coordination, engineering.
- ▶ Cost saving and environmentally friendly
- ▶ One-stop shop that helps with all the bumps in the road
- ▶ Integrates client needs with designer requirements



Future study and applications

- ▶ Additional investigation needed to explore marketability and potential offsite use
- ▶ Knowledge gap using this particular process waste in railroad and other types of construction
- ▶ After 3 years rail spur still shows great stability 3 - 4 times a weeks



Future study and applications

- ▶ Need to investigate adhesive properties to prevent cement in storage
- ▶ Morton Salt actively exploring opportunities for potential reuse in other projects
- ▶ Salt stockpile storage facility



Questions and Credits



A BIG thanks to:
Morton Salt, Inc.
&
Via Rail Engineering Inc.

