



Highways • Bridges • Treatment Plants • Tunnels • Oil & Gas • Hydroelectric Facilities • Office Buildings • Nuclear • Dams • Light Rail • Reservoirs • Hotels • Transit Systems • Power • Piers • Off-Shore Platforms



Modular Construction

May 13, 2008

Agenda

- **Introduction to Peter Kiewit & Sons**
- **Nuclear Experience**
- **Kiewit Offshore Services**
- **Modular Experience**
- **Modular Construction Sequence**

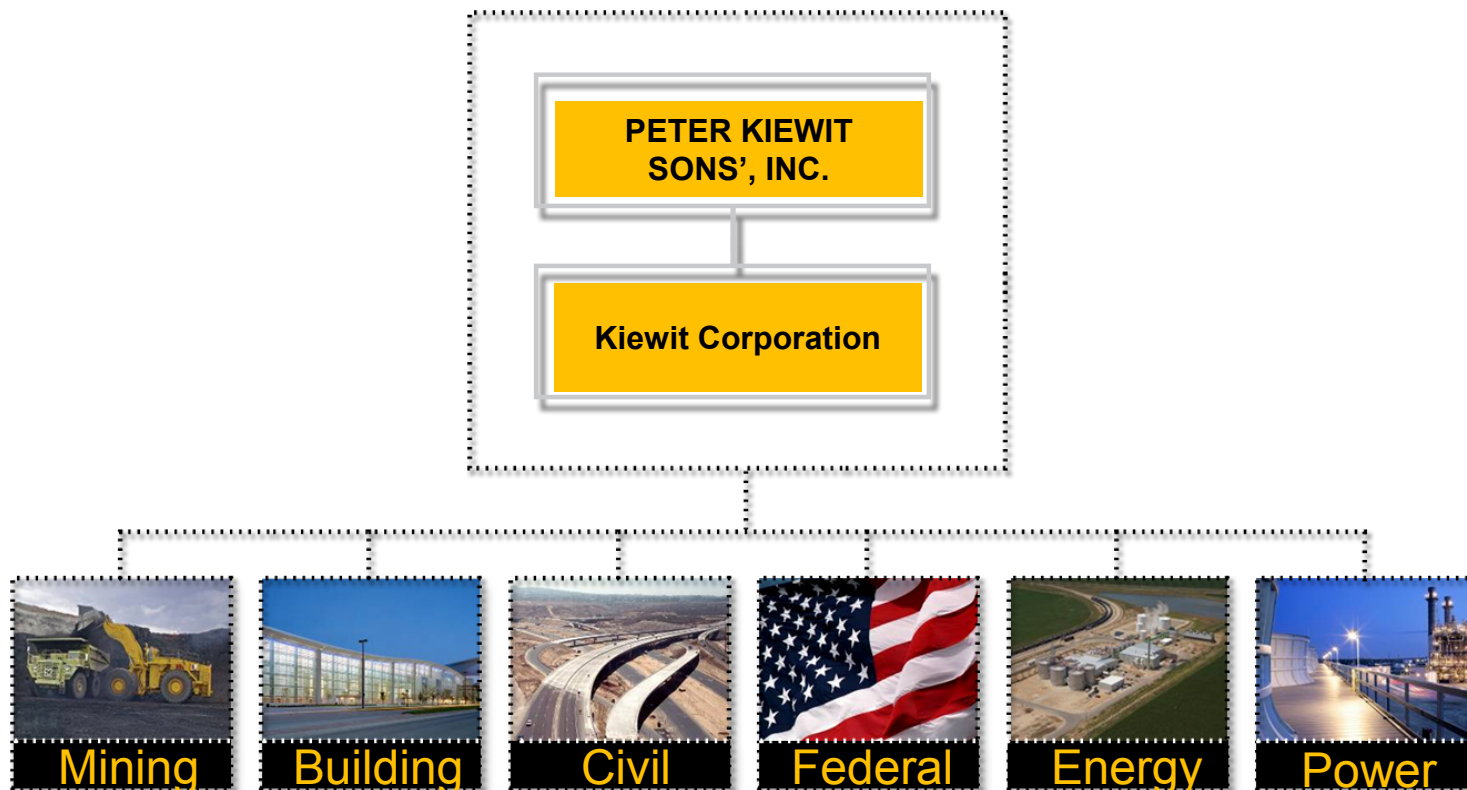


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WHO IS PKS ?

Kiewit Organization

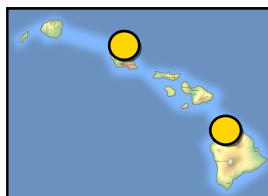
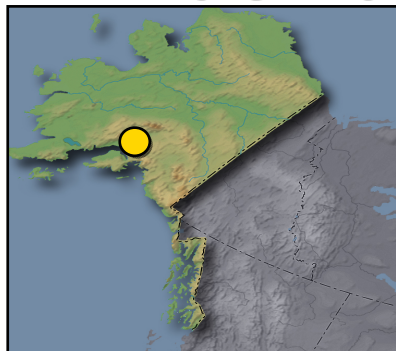


Peter Kiewit Sons', Inc.

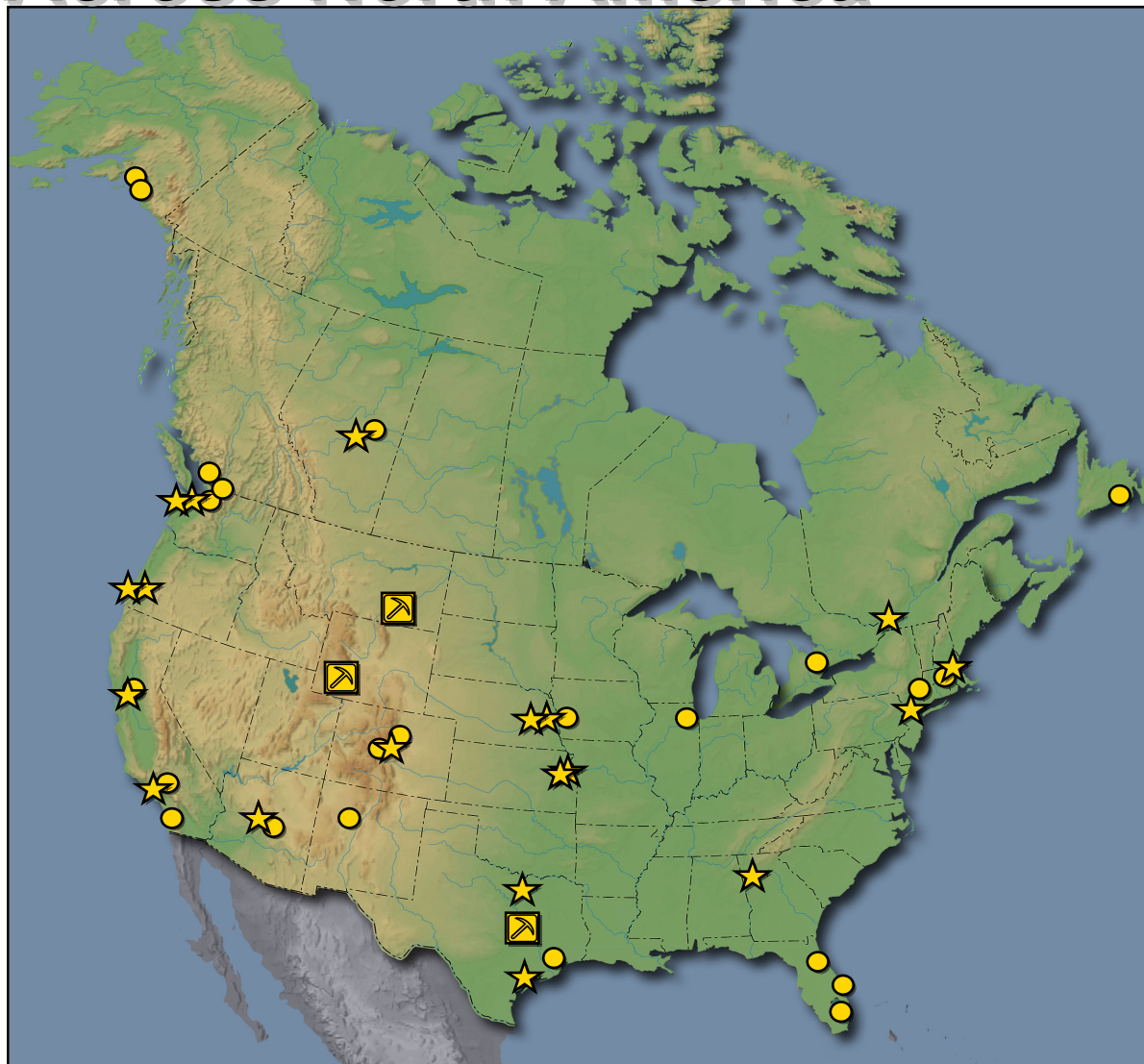
- Established in 1884
- Headquarters: Omaha, Nebraska
- One of North America's largest contractors and most successful contractors
- Industry leader in Design/Build
- Owned entirely by active employees
- PKS backlog exceeding \$11 billion
- Highly de-centralized
- Balanced, diversified, stable
- Outstanding safety record



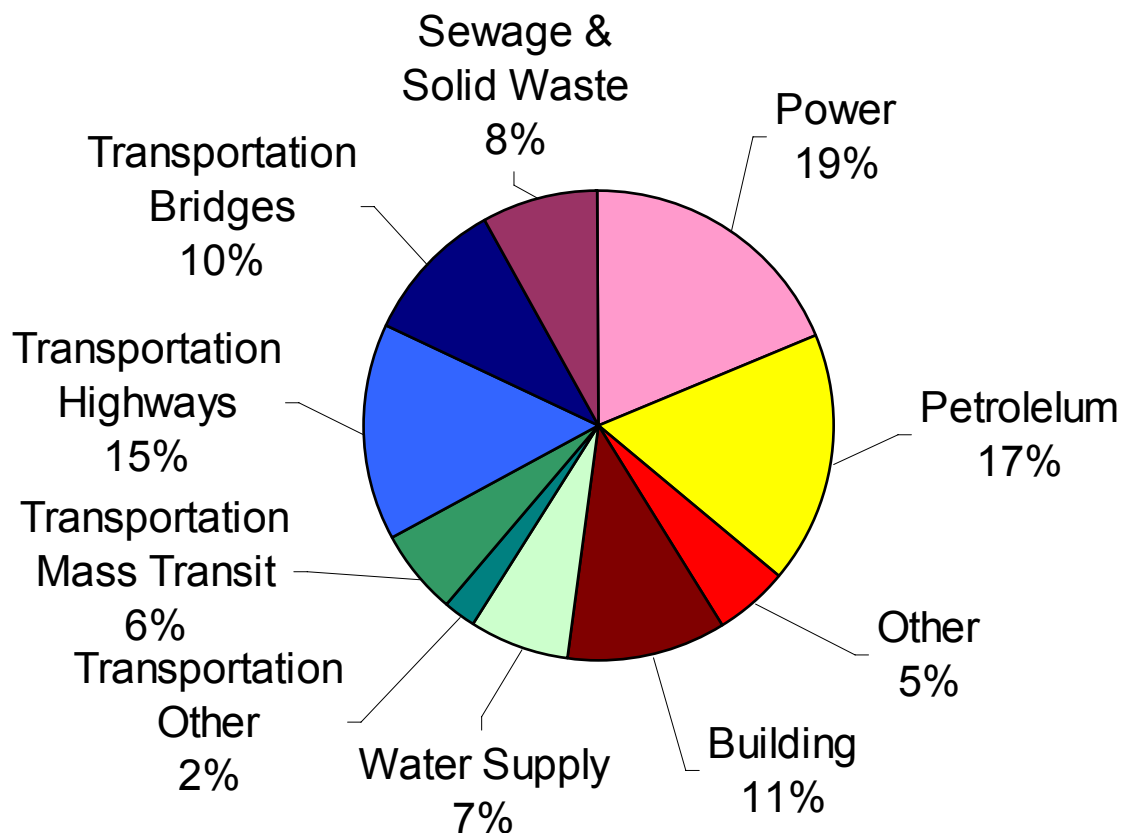
Facilities Across North America



- ★ District Office
- Area Office
- ▣ Mine



Backlog by Type of Work

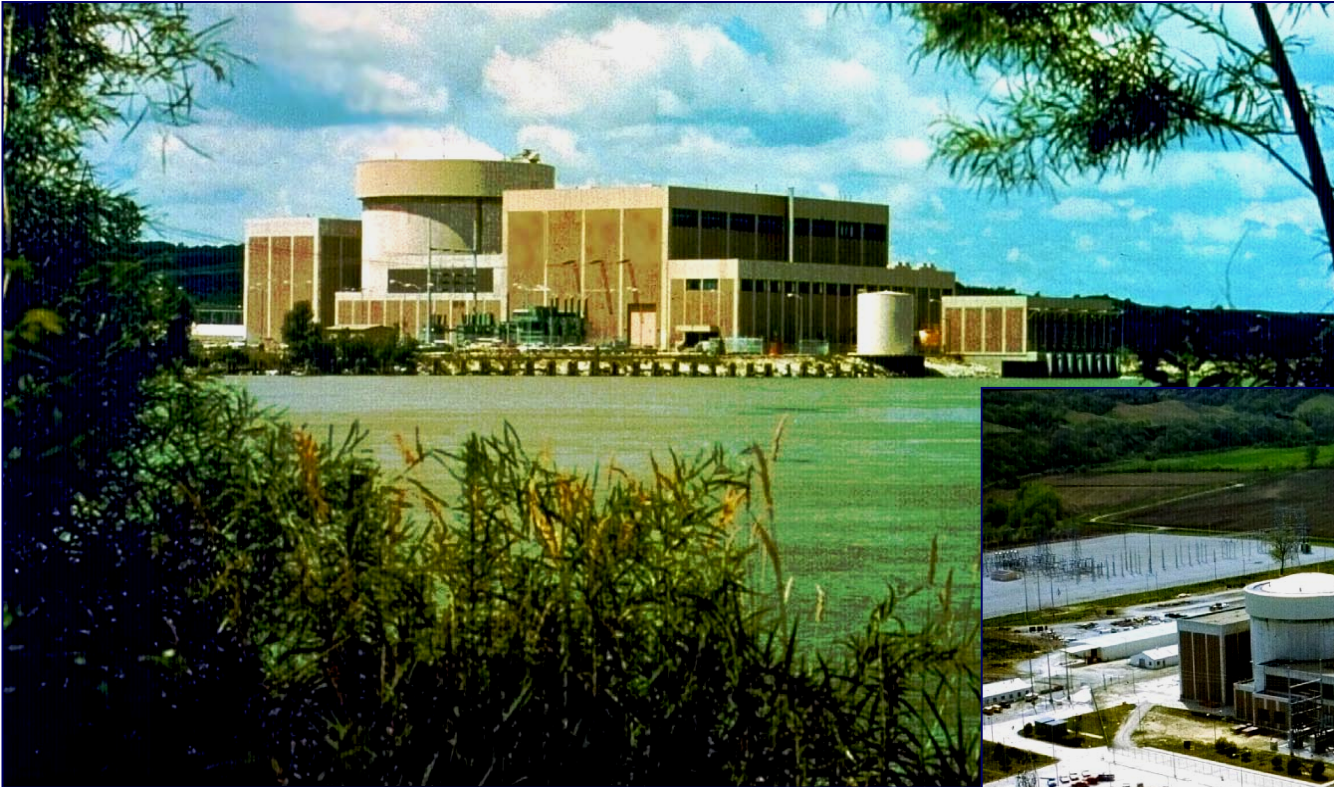


NUCLEAR EXPERIENCE



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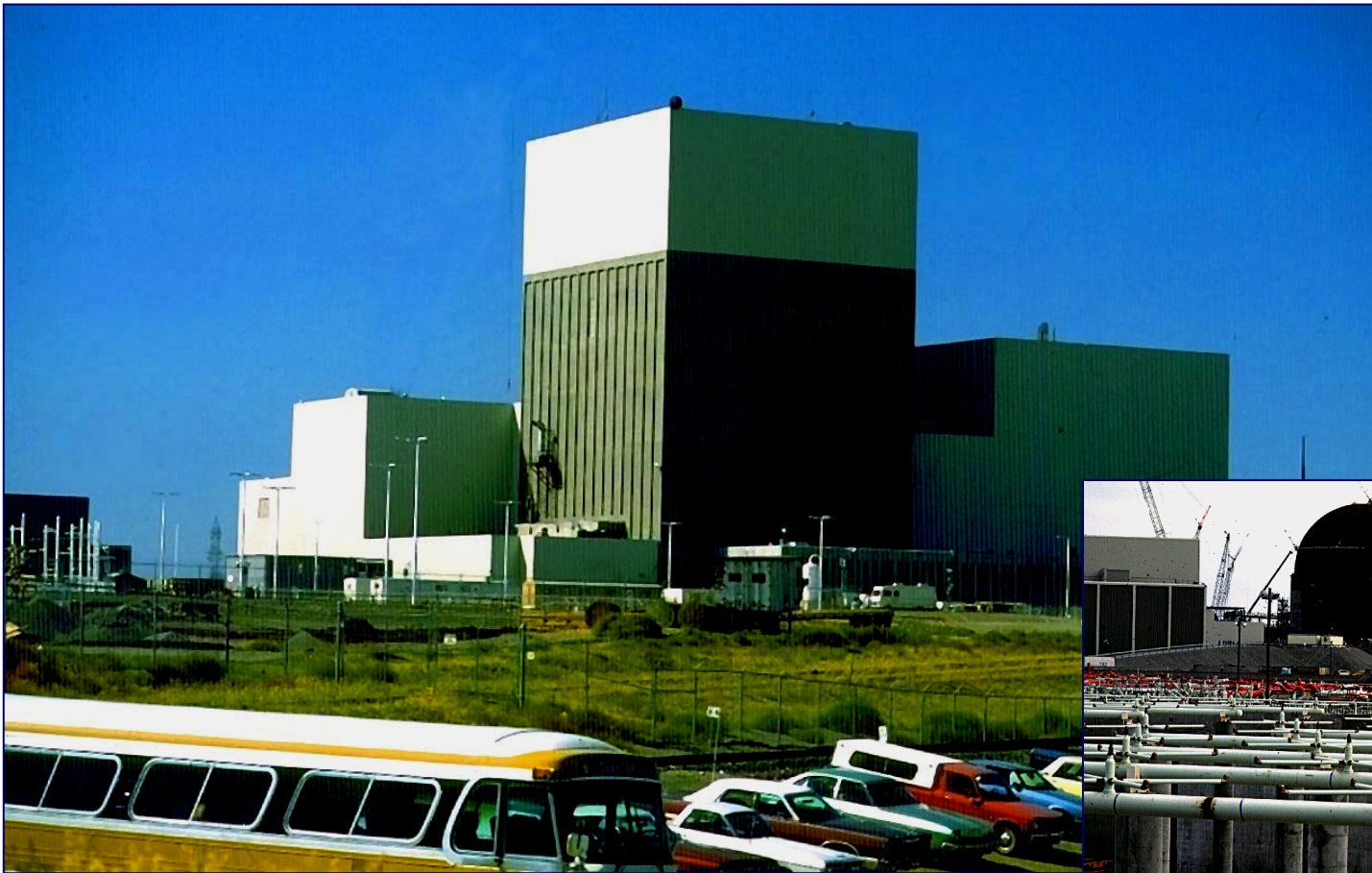
Fort Calhoun Nuclear Facility



Satsop Nuclear Facility



Hanford Nuclear Facility



Kiewit Nuclear Plan

- **Kiewit Power Constructors**
 - **Nuclear Quality Program Development**
 - **ASME Section III Program Manual**
 - **Accreditations Division 1 and Division 2**
- **Kiewit Offshore Services**
 - **Nuclear Quality Program Development**
 - **ASME Section III Program Manual**
 - **Certifications in 2008 – NA, NPT, NS and CC-Structural Division 1 and Division 2 (metallic parts only)**
 - **ASME Survey May 2008**

KIEWIT OFFSHORE SERVICES



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KOS Yard Location & Access



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Kiewit Offshore Services, Ltd.

FACILITIES



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KOS Facilities

**Skills
Center**





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Skills Center





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KOS Facilities

**Structural
Assembly
Building**

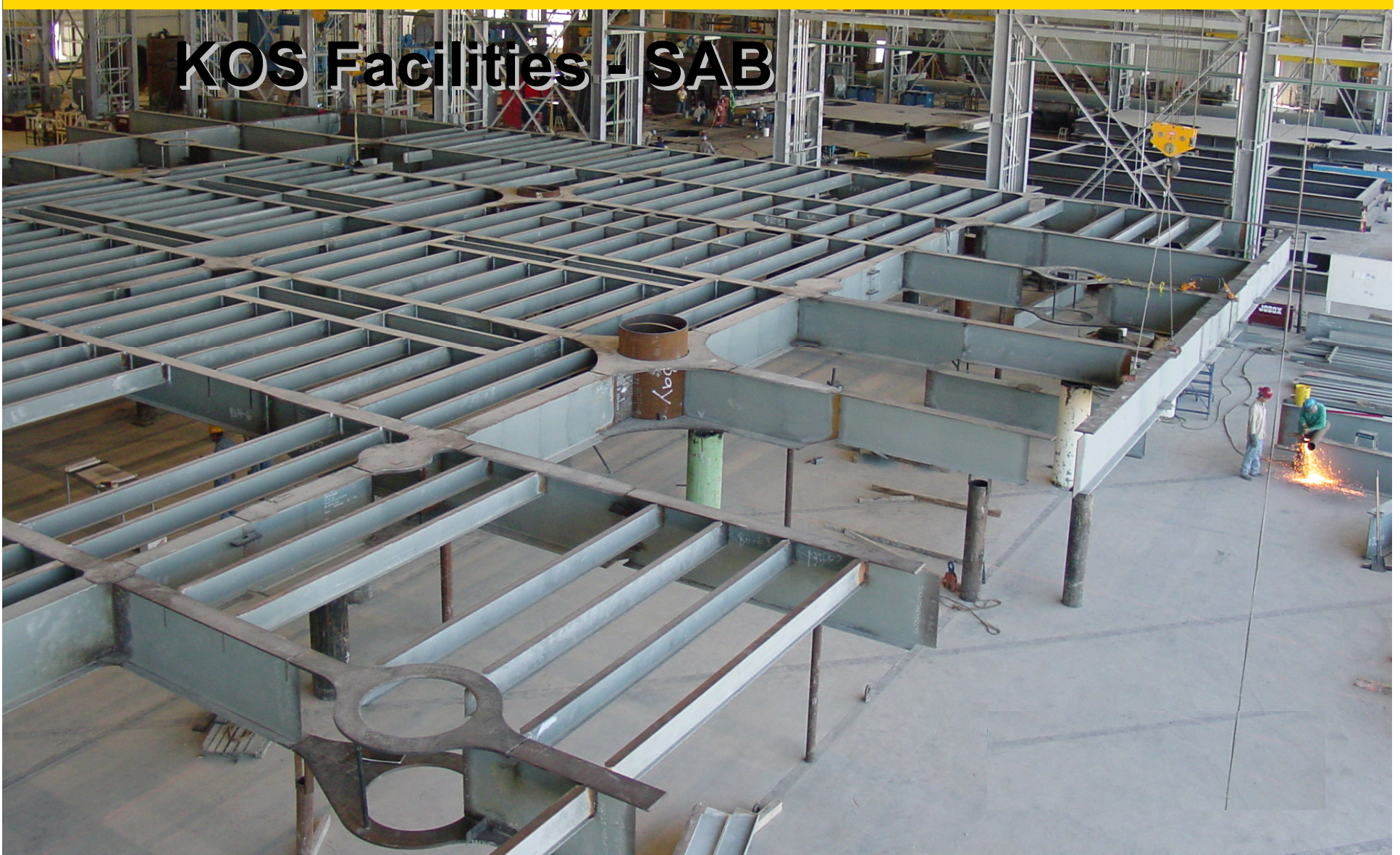




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KOS Facilities - SAB





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Beam Cutting



KOS Facilities – Plate Rolling





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QUALITY



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Quality Manual

- **Based on ISO 9001:2000**
 - **AISC Certified**
 - **ASME Survey**
- Scheduled May 2008**

American Institute of Steel Construction, Inc.

is proud to recognize

Kiewit Offshore Services, LTD.

Ingleside, TX

for successfully meeting the quality certification requirements for

Simple Steel Bridges and Major Steel Bridges

Fracture Critical Endorsement

Sophisticated Paint Coating Endorsement-Exposed



Roger E. Ferch



Bobbi Marsteller

Certification valid through April 2008

Quality Procedures

- **Material Control**
 - **Mill Test Reports Verification**
- **Material Traceability**
- **Weld Traceability**
- **Welding Procedure Specification**
- **Procedure Qualification Record**
- **Corrective Actions**
- **Continuous Improvement/Lessons Learned**
- **As Built Drawings**



PROJECT EXPERIENCE



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Independence Hub





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BP Thunder Horse



Equipment Skid





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Zafiro



TRANSPORT OPTIONS



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Transportation - Road





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Transportation - Rail



Transportation - Water





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Loadout and Heavy Lifts



MODULARIZATION



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Modularization

- **Benefits**
- **Module Construction**
 - **Offshore Oil/Gas**
 - **Refineries**
 - **Civil**
 - **Nuclear**
- **Typical Fabrication Sequence**
- **Inspection**

Modularization

Benefits

- **Up Front Planning & Engineering**
- **On Site Labor Requirements Reduced**
- **Fabrication in Controlled Environment**
- **Improve Critical Path Schedule**
- **Labor Cost Savings**

MODULES



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Process Module





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Piperack Module



Modules in Japan

- **Candidates for large modules**
 - **RCCV – liner & rebar = 1,000 tons**
 - **Reactor internals**
 - **Condenser/Turbine Island**
 - **Balance of Plant**

Nuclear Modules – Hitachi Approach



ABWR COST/SCHEDULE/COL PROJECT
AT TVA'S BELLEFONTE SITE

4.1 Construction Schedule

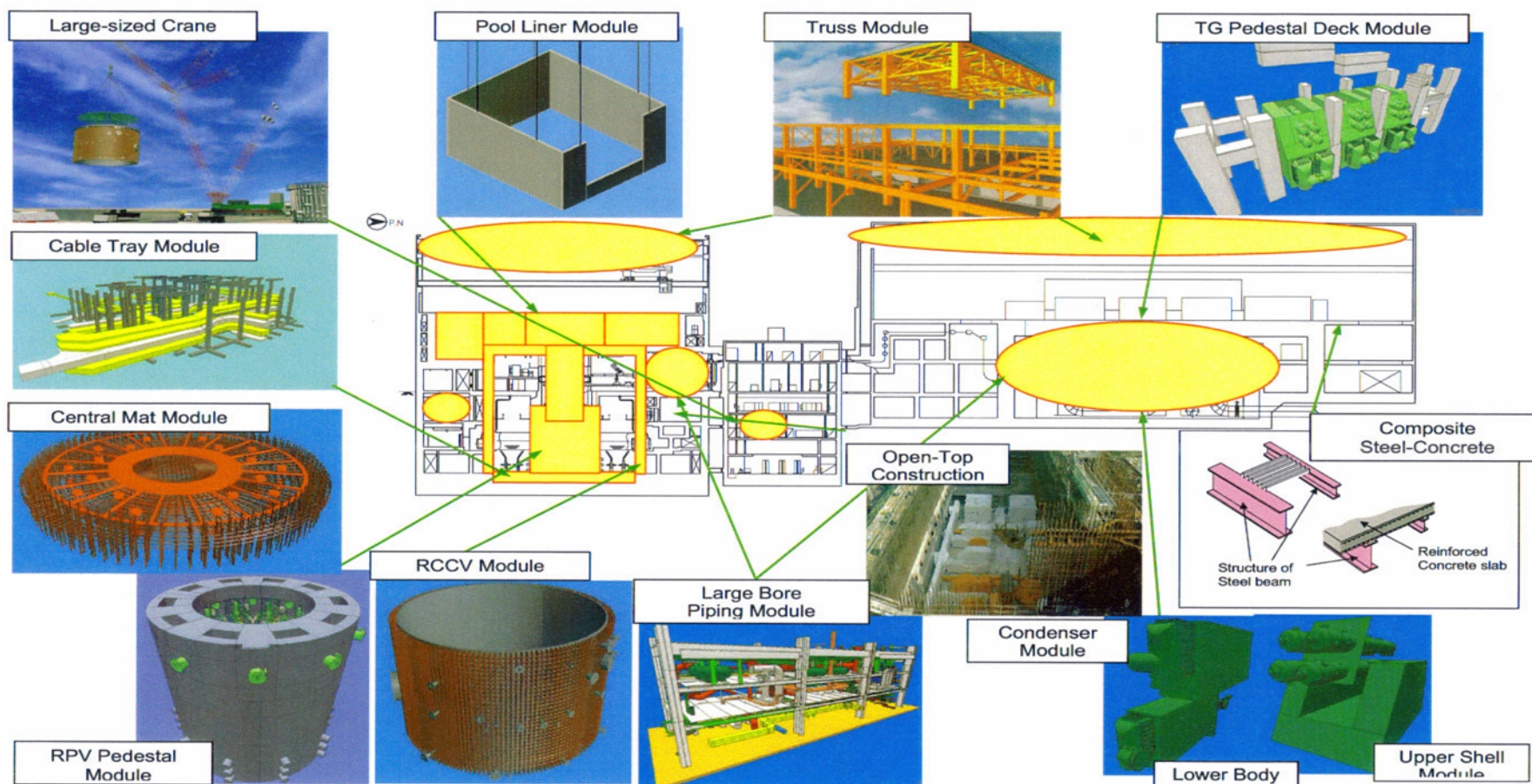


Figure 4.1-2 Principal Construction Method for ABWR

Nuclear Modules – Hitachi Approach



Off-gas Equipment Module



Piping Unit in T-G Pedestal Module



CUW Heat Exchanger Module



MSV/CV Module



Condensate Demineralizer Module



CUW Reheat Exchanger Module

FABRICATION SEQUENCE



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The site plan illustrates the layout of the KOS Property Boundary. Key features include:

- Infrastructure:** Avenue B runs along the top left. The LA Quinta Channel is located on the right side.
- Industrial Facilities:** Plate Rolling Facility, Tank Farm I, Compressor Building, Ice House, Water Fill Station, Switch Yard, Beam Cutting Building, Structural Assembly Building, Warehouse, Maintenance Facility, Wash Rack, and Tank Farm.
- Parking Areas:** Craft Parking Lot II, Craft Parking Lot I, and Applicant/Training Parking Lot I.
- Office and Training:** Main Office Building, Client Subcontractor Area, Learning Center Safety/Human Resources, and Client Office Facility.
- Other Structures:** HLD Control Room, Bulkhead, and various colored rectangular areas (blue, red, green, yellow, pink).
- Measurements:** Distances are marked along the bottom boundary, such as (-)155' MLT, (-)177' MLT, (-)38' MLT, (-)25' MLT, and (-)38' MLT.
- Scale:** A scale bar at the bottom right indicates 0, 500, and 1000 feet.



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Lower Level Assembly - Shop



Process Module – Field Assembly





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Pipe Support Installation





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Spool Racking





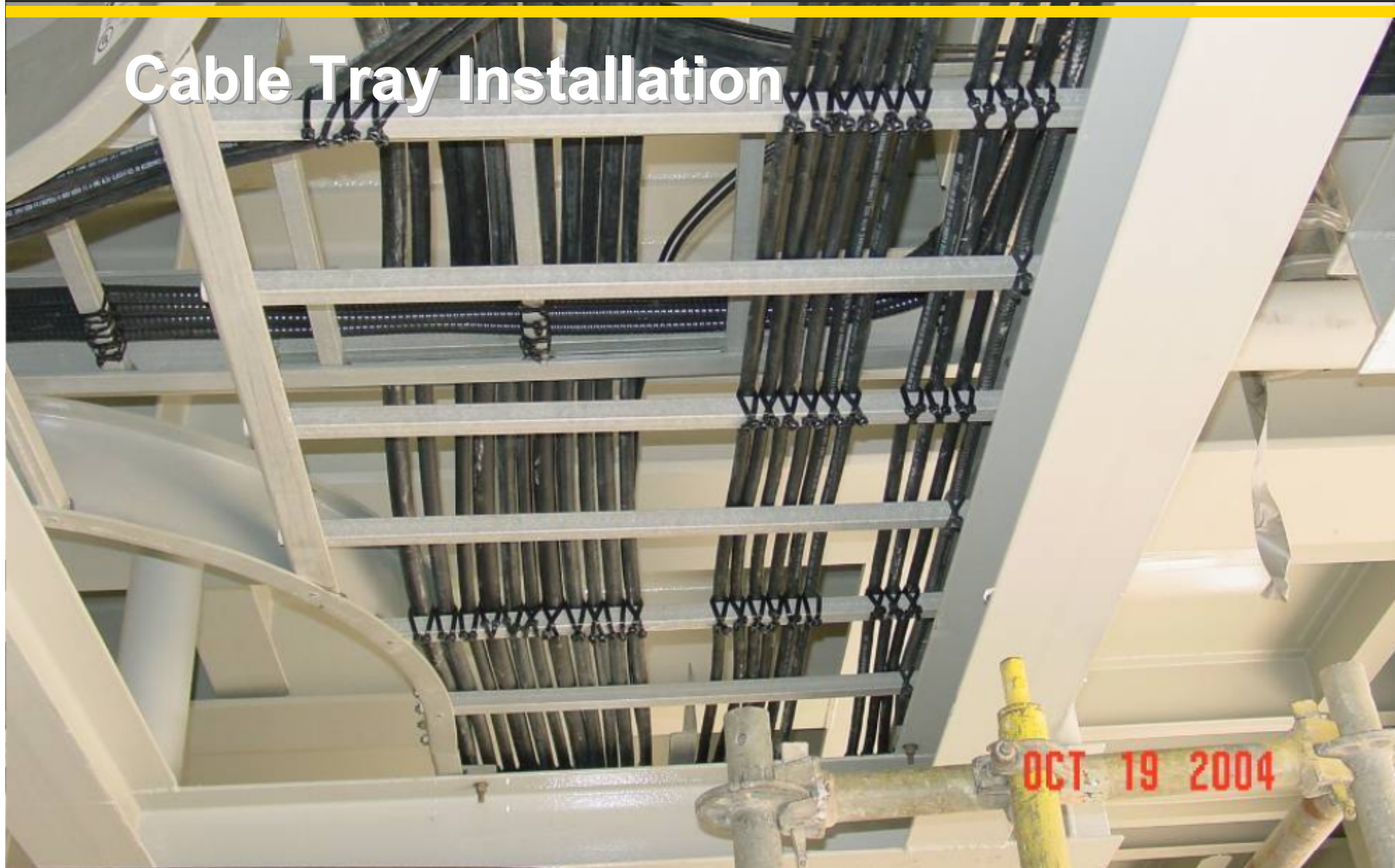
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Process Module Fabrication



Cable Tray Installation



Equipment Assemblies



Testing & Commissioning



Process Module Movement



Process Module Loadout



Modularization

Inspection

- **Material Controls**
- **Weld Traceability**
- **PQR/WPS**
- **Corrective Action Program**
- **Testing and Commissioning**
- **ITAACS**

QUESTIONS



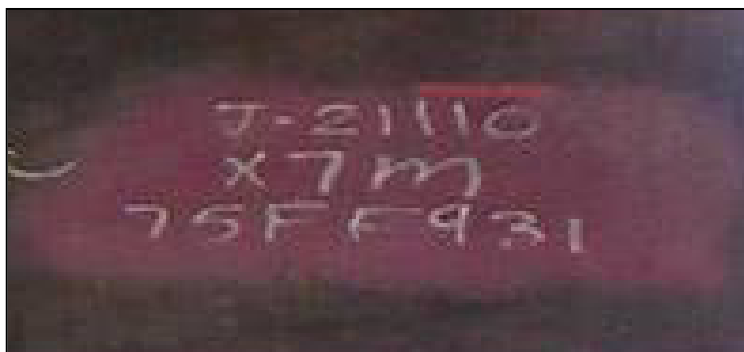
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Material Control / Traceability

■ Material

- Mill Test Reports and Material Chemistry Verification
- As Builds

Prepared By: Don Blanchard		MATERIAL & WELD TRACEABILITY MATRIX				Client Approval	
Rev. 0 8/16/06		SHENZI					
		JOB No. 21114 TOPSIDE					
Component	Sub-assembly	Material Grade Verified against PO at time of Receipt	Code Symbol Hard Stamped on Material	Material Code Symbol Documented on Work Drawings	Material Code Symbol Documented in E-File	Weld Map on Drawings	NDE Documented in E-File
Deck							
	Fabricated Pipe API-2B	Yes	Yes*	No	Yes	No	Yes
	Legs	Yes	Yes*	Shop Drawings	No	Shop Drawings	Yes
	Plate Girders & Stiffeners	Yes	Yes*	Shop Drawings	No	Shop Drawings	Yes
	Truss Row Braces and Main Framing Beams	Yes	Yes *	No	Yes	Piece Marked Drawing	Yes
	Stringer Beams and Beams not on Truss Rows	Yes	Yes *	No	Yes**	Piece Marked Drawing	No***
	Stairs and Stair Landings	Yes	Yes *	No	No	No	No***
	Handrails, Drain troughs, etc.	Yes	Yes *	No	No	No	No***
	Pad-eyes and Trunnions	Yes	Yes *	Shop Drawings	No	Shop Drawings	Yes
	Crane Pedestal	Yes	Yes*	Shop Drawings	No	Shop Drawings	Yes
	Flare Boom	Yes	Yes *	No	Yes	Piece Marked Drawing	Yes
	Bridge	Yes	Yes *	No	Yes	Piece Marked Drawing	Yes
	Helideck	Yes	Yes *	No	No	Piece Marked Drawing	No ***



Material Specifications

- **Material Chemistry and Mechanical Requirements**
- **Mill Certificates Entered and Checked Against Specifications**



KOS Trace www.kos.com

Job Setup | **Material Specifications** | Mill Certs | Lookup Tables | Admin

Back Forward

Material Specification

Approved ☐ Print New Save Delete

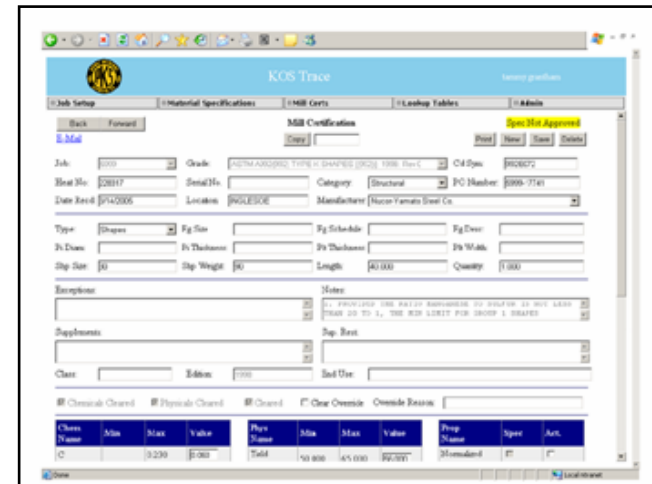
Job: 1715 Material Grade: 475 (21 GRADE 50 440) Material Cat: 1a
 Type: Plate Material Desc: 475P, 36 Edition: 49185
 Revision No: 1 Std Use: Steel Logs, Plate Under, Case Prod, Char

Supplements: H, H1, H4, H5
 as when specified by the engineer.

Sup. Desc: None

Notes: 1) Concrete segregation shall be monitored by source with method (not auditor printing).
 The proposed method shall be included in a RFI to be approved by CONTRACT prior to start of production.

Chem Name	Min	Max	Note	Phys Name	Min	Max	Note	Prop Name	Note
C		0.140		Yield Strength	50,000	74,000		Normalized	
Mn	1.100	2.000		Tensile Strength	70,000	84,000		ESC or 300 (Max)	
P		0.014						July Edid	
S		0.008		2" Elongation	25,000	30,000		Chemical Test	



KOS Trace www.kos.com

Job Setup | **Material Specifications** | **Mill Certs** | Lookup Tables | Admin

Back Forward

Mill Certification

Spec Not Approved ☐ Print New Save Delete

Job: 1715 Grade: 475 (21 GRADE 50 440) Std Use: 1a
 Heat No: 28817 Serial No: Category: Structural PC Number: 0000-1741
 Date Recd: 07/12/2005 Location: INGLEWOOD Manufacturer: Nucor Yarnets Steel Co

Type: 1 Shapes Pg Size: Pg Schedule: Pg Desc: 1
 H Desc: H Thickness: H Thickness: H Width: 1
 Std Use: 10 Std Weight: 10 Length: 40,000 Quantity: 1,000

Exemption: None

Notes: 1) APPROVED FOR REVIEW SUBMITTING TO REVIEW BY 08/11/2005
 FROM 08/11/2005 TO 08/11/2005 FOR GROUP 1 SHAPES

Supplements: Sup. Desc: None

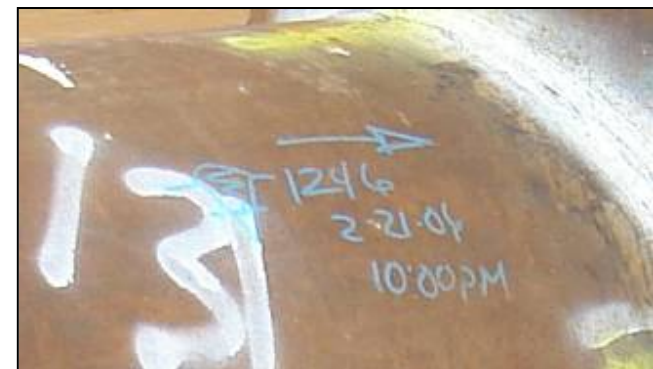
Class: 1 Edition: 1 Std Use: 1

☐ Chemicals Checked ☐ Physicals Checked ☐ Checked ☐ Clear Overwrite Overwrite Reason:

Chem Name	Min	Max	Value	Phys Name	Min	Max	Value	Prop Name	Spec	Act
C	0.230	0.300		Yield	50,000	84,000	62,000	Normalized		

Weld Traceability

- **Weld Time and Welder**
- **WPS**
- **NDE**



Welding Procedure Specification (WPS)

- Consolidation of Codes/Specs
- Variable Ranges
- Issued for Production
- Deviation Will Alter Mechanical Properties

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P.O. Box 8, Ingalls, Texas 75640
Telephone (281) 775-1440 Facsimile (281) 775-0880

Page 1 of 2

WPS: B TIG 10 Ref. QIR: B TIG 15-0
Rev.: 0
Date: 5-23-05
Use: Process Pipe, Open Root
TIG, Argon Welded (Carbon to Stainless)

Code: ASME IX / B31.3

Process: GTAW
Type: Manual

Post Weld Heat Treatment
Temperature: None
Soak Time: N/A
Ramp Rate: N/A
Other: N/A

WPS: B TIG 10
Rev.: 0

Joint Details



Bevel = 45° - 75°
Root = 1/16" - 3/16"
Land = 0" - 1/16"

Preheat / Interpass

NOM. Thickness	Min. Preheat	Max. Interpass
1 to 3/16"	70 °F	300 °F

- Preheat will be applied with gas torches.
- Preheat/Interpass will be measured using temperature indicating crayons or calibrated infrared thermometers.
- Preheat shall be measured 3" from the weld groove, and interpass 1" from the groove.
- Weld repairs require an increase by 50 °F for the appropriate thickness specified.

Approved By: *Richard P. Marshall*
Richard P. Marshall
Kiewit Offshore Services, Ltd.

Approved By: *Samuel E. Hines*
Samuel E. Hines
100% Argon
30 - 50 CFH
100% Argon @ 3-13 CFH
N/A

All Uphill

Direct Straight (0) N/A
1/8" to 1/4" 1/8" BWTs-2 Electrode, A5.12

Current	Amperage	Voltage	Travel rate	KJ/in
AP (1)	80 - 100	9 - 11	2 - 4	11 - 33
AP (2)	100 - 140	10 - 12	3 - 5	12 - 33

Approved by acceptance with the same NDE method as used to originally



Procedure Qualification Record (PQR)

- **Written Record Welding Variables**
- **MTR**
- **NDE Report**
- **Mechanical Test Report**

Coupon Welding



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Page 1 of 2

QOR No: C-FI 174
Date: 12-15-04 (Revised of, 1-25-06 (1F and 2F)
Use: FCAW-G, Filler Welds - 1F, 2F, 3F and 4F
 Carbon Steels

Ref. WPS: C-FI 4
Code: AWS D1.4E

Process

Process: FCAW-G
Type: Semi-Auto

Post Weld Heat Treatment

Temperature: None
Hold Time: None
Ramp Rate: N/A

Filler Metal

Classification: E71T1-FC60 (E71T1-FC60-H4)
Specification: AWS A5.23
Diameter: .035 (1/32)
Mfg.: Arctic Arc
Trade Name: Select 71T-60P
Other: N/A

Shielding Gas/SAW Flap

Process: FCAW-G
Gas Type: 75% Ar & 25% CO₂
Flow Rate: 4-6 CFI
Post Rate: N/A
LD Purge: N/A
SAW Flux: N/A
Other:

Base Metal

Spec: ASTM A570-50 (Type 2)
Thickness: N/A
1.8" (2):
Base Joint:
Heat: 7000-802
Cl:
Poss: 29
Cr: .41

Position

Process: FCAW-G
Position: 1F, 2F, 3F and 4F
Progression: Up

Techniques/Technical

Process: FCAW
Current: DC
Polarity: Rev (C)
Stick: N/A
Travel: 3/8" (15.9 - 31.8) (21.2)

Joint Prep/Cleaning

Joint Prep: Flare can followed by grinding to bright shiny metal.

Interpass Clean:

Interpass Clean: Wire was removed by wire brushing. Grinding was not performed unless required to remove superficial contamination on as-received basis.

Back Grouping:

None

Note:

Metric conversions are in parentheses ()

- Temp = °F to °C
- Temp = °C to °F
- Heat Input = KJ/in to KJ/mm
- Size = in to mm

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Page No. C-PG 11-6

Page 2 of 2

Joint Design

18" = 1/2" (13)
28" = 1/2" (13)
38" = 1/2" (13)
48" = 3/8" (100)

18" = 5/16" (8)
28" = 5/16" (8)
38" = 5/16" (8)
48" = 5/16" (8)

Mix. Multi Pass Fillet

Join. Single Pass Fillet

Welding Parameters

Pass	Electrode	W in	Preheat/ Interpass °F	Current Amps	Volts	Travel IPPM	Root Width in	Root Space Width
1st - Multi	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
1st - Multi	Subco. TIG-GP	.045 to .052	500-550	DC MP (12)	28-30	12-15/24	N/A	20-10/16
2nd - Multi	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	10-10/16
1st - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
2nd - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
3rd - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
4th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
5th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
6th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
7th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
8th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
9th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
10th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
11th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
12th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
13th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
14th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
15th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
16th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
17th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
18th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
19th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
20th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
21st - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
22nd - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
23rd - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
24th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
25th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
26th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
27th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40-10/16
28th - Single	Subco. TIG-GP	.045 to .052	450-500	DC MP (12)	28-30	12-15/24	N/A	40

[illegible]



Corrective Action / Root Cause

Quality Issue Log

File Edit View Reports Help

Co: 203 Kiewit Offshore Services Ltd. Issue Date: 05-10-06
 Job: 7379 Devon BM-G-Bucklet Cost To Date: 0 Estimated Cost: 0 Closure Date:

Business Function: Construction Responsible Supervisor: Project Manager
 SubFunction: Building the Work
 Category: Workmanship
 Work Plan: Did not Follow Plan
 Checklist: No Check List

Lesson Learned

☐ Non-Conformance
☒ Issue
☐ Incident
☐ Alert

☐ Nominate
☐ Rejected
☐ Accepted

Success Story

☐ Nominate
☐ Rejected
☐ Accepted

Attachments

Description (Dist + 3): Action (Dist + 4): Analysis (Dist + 5): Comments (Dist + 6):
 What is the issue's location and detailed description?
 Location: Brace Field
 Description: B3, A3 Legs as built was longer than specified requirement on legmake up drawings. Legs need to be cut to correct length.

TAMMY GRANTHAM

Kiewit Kiewit Offshore Services
 7379 Devon Deck
 2440 Kiewit Rd, Ingleside TX 78302

Quality AT EVERY STEP

Lesson Learned Report

ISSUE DATE: 12-05-2005
 SUB-FUNCTION: Building the Work
 DISTRICT CAUSE: Lack of Attention to Details
 TYPE OF PROBLEM: Fitting-Cutting
 LESSON LEARNED:
 LL: Table Operator was not paying attention. A web plate to be cut had a 3/4" notch on one of the long sides. The operator input the shorter width into the computer so that the notch was cut out and most of the web plate is 3/4" too narrow. A new plate had to be transferred over to replace the incorrectly cut plate.

1) Operator not paying attention -- Talked to all operators about issues Leadman
 2) No plate check list and no operator sign off sheet and plate not nested by rolling -- Leadman now are required to sign off all plate that does not go thru rolling before another cut is made.

Lesson Learned

☒ Nominate
☐ Rejected
☐ Accepted

Success Story

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Type of Problem: Fitting - GC
 District Cause: Lack of Attention to details
 Subcontractor or Supplier:

Description (Dist + 3): Action (Dist + 4): Analysis (Dist + 5): Comments (Dist + 6):
 Describe the issue's cause or perform a root cause analysis:
☐ Quality Alert View ☒ Root Cause Analysis View

ID	Cause	Corrective Action	Assigned To	Due Date
1	Poor look of attention to detail by Brace / Pipe Mill management.	Write a lesson learned and address it with everyone. Double check latest revision and check measurements of drawing to piece.		

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Quality AT EVERY STEP

Root Cause Analysis Report

Issue: 22 - Weld Repair P72 (Capehart Plate Conn)
 Type of Problem: Welding
 Date Opened: 10-13-05
 Date Closed: 10-20-05
 Location: Field, Diaphragm Vertical P72
 Description: Stag inclusion non-fusion was found on the vertical joint (Approx 6.8')

ID	Cause	Corrective Action	Assigned To	Due Date	Comments
1	Poor Welding Technique, Batch of Root Wire, Not Following Parameters, Unskilled welders.	Leadman/GC checked parameters to WPS, perform training with weld wire, review welder repair history, select all non-removable defect welders.	Quane Caperton	10-15-05	Qualified welders were on the project but unable to perform complex field welds. Those welders were removed from the Project.