



NorthernStar Natural Gas INC.

**LNG Interagency Working Group**  
**August 31, 2006**

**Clearwater Port LLC**



- Project Update
- Project Description
- Agency Issues
- Project Enhancements
- Project Schedule



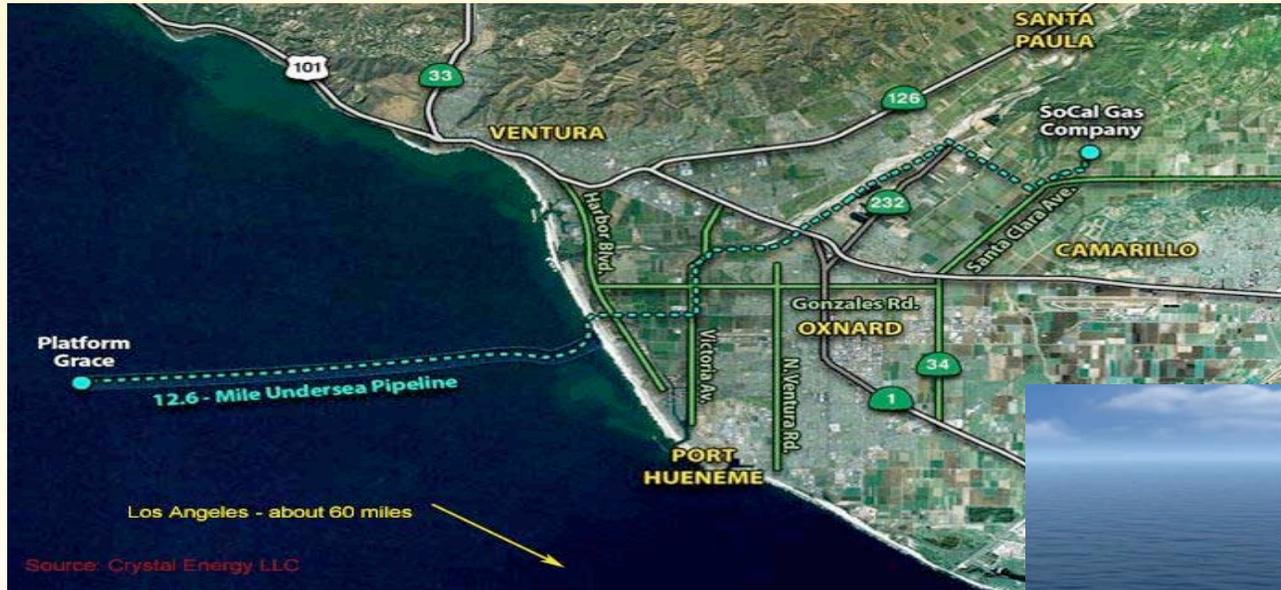
## ***SIGNIFICANT RECENT DEVELOPMENTS***

- Amended & Restated Application filed June 30, 2006
- Amended Development Production Plan (DPP) Filed July 3, 2006
- Initial Agency Responses Received – August 2006
- Agency Meetings Scheduled



# Clearwater Port

# 12.6 Miles Off-Shore



Source: Crystal Energy LLC

Landfall at  
Mandalay Power  
Station



NorthernStar Natural Gas INC.



- ✓ **Project Description**
  - Relationship with Venoco
  - No conjunctive use of platform
  
- ✓ **Platform Analysis**
  - Structural analysis, scope of required upgrades, remaining life
  
- ✓ **Offshore Geotechnical Surveys**
  - Follow MMS guidance documents for OCS developments
  - Cultural and biological surveys
  
- ✓ **Integration with SoCalGas system**
  - Detailed analysis of onshore pipelines and routes
  - Potential cumulative impacts due to Clearwater Port and Cabrillo Port projects

*Source: As outlined by USCG letter to Crystal Energy dated May 12, 2005*



- ✓ **Conversion of Platform Grace into an LNG Receiving and Re-gasification Facility**
  - Maximum use of existing infrastructure and technology
  - Minimizes incremental environmental impacts
- ✓ **Design capacity of 1.2 Bcf/day, Peak capacity of 1.4 Bcf/day**
  - Interconnect to SoCalGas pipeline and access to onshore storage fields
  - Provides natural gas for local and regional markets
- ✓ **SSP Floating Berth offset from Platform to Safely Moor LNG Vessels**
  - ABS Approval in Principal of mooring system
  - Familiar to LNG boat captains
  - Dual berth maximizes availability, minimizes delivery interruption
- ✓ **LNG Transfer from Vessel to Platform**
  - Conventional Marine Loading Arm System
  - Cryogenic Pipe-in-Pipe



- ✓ **LNG Regasification using Ambient Air Vaporizers**
  - Highly efficient, low emission process
  - Eliminates need for intake of sea water or combustion of fuel
- ✓ **36 inch Offshore and Onshore Gas Pipeline**
  - Conformance with all safety and mechanical code requirements
  - Existing pipeline corridors and public right of ways used to limit new environmental impacts
- ✓ **Interconnect to Existing SoCalGas System**
  - Routes established with SoCalGas participation
  - Use of existing SoCalGas onshore storage facilities avoids the need for LNG storage tanks



## ✓ Investments in Platform Structural Analysis

- M&H / MMI are conducting platform structural analysis
- ABS to serve as Certified Verification Agent (CVA)
- Systematic approach follows API RP 2A requirements providing comprehensive analyses

### – Phase 1

- Compile data, develop model - **Completed**
- Detailed analysis/computer modeling of strength, seismic, storm wave, fatigue - **Completed**
- Develop inspection plan – **Completed**

### – Phase 2

- Inspection – visual, NDE, material samples - **Underway**
- Integrate inspection data with analysis - **October '06**
- Develop strengthening plans and remedial measures – **Oct '06**



**Results To Date:**

- Future topsides loads
  - Loads significantly reduced from original design (topsidess and conductor removal)
  - Environmental conditions significantly increased from original design (wave and earthquake)
- Structural analysis
  - Performance for storm condition is excellent
  - Structure may require some strengthening for earthquake and fatigue
  - Inspection plan will be reviewed with MMS
- Overall
  - Grace is a well-designed structure
  - The level of retrofit should be minimal
  - Final result depends on inspection

**Structure Improvements:**

- Currently planned
  - Removal of conductors and unneeded equipment
  - Optimize new deck structure and equipment layout
  - Minimize deck weight and payload
  - Marine growth management
  - Grouting leg/pile annulus
- Potential
  - Removal of conductor framing and other superfluous components
  - Strengthening of select members
  - Repair of any fatigue or corrosion damage
  - Some currently identified – still in progress
  - Replacement of cathodic protection system
  - Painting / surface protection at waterline



- **Mooring System Enhancements**
  - Dual berth configuration
  - Mooring system offset from platform
  - LNG unloading and transfer system
- **Platform Structural Enhancements**
  - Replacement of existing topsides with new modular system fabricated offsite
  - Reduction of loading on platform
  - Platform improvements
- **Regasification Enhancements**
  - Ambient Air Vaporizers



Component /System	Previous Design	Enhanced Design	Project Benefits
Berths	One	Two	Continuous send out; Greater Availability
Mooring	Adjacent to platform	Offset from platform	Allows dual berth; Reduced collision risk; Separates offloading and process area
LNG Transfer	Platform mounted cryogenic hose	Loading Arm, Sub sea cryogenic pipe	
Platform topsides	Reuse of existing deck structure	New topside structure and decks	Optimized facility layout; reduced weight; use of cryogenic materials; decreased installation time
LNG Vaporizers	Submerged Combustion	Ambient Air	Increased Process efficiency; Greatly reduced fuel use; Minimizes emissions
Heat Recovery	NA	Economizer	



- **Offset, 2-berth mooring**
- **Reduced risk to LNG carriers**

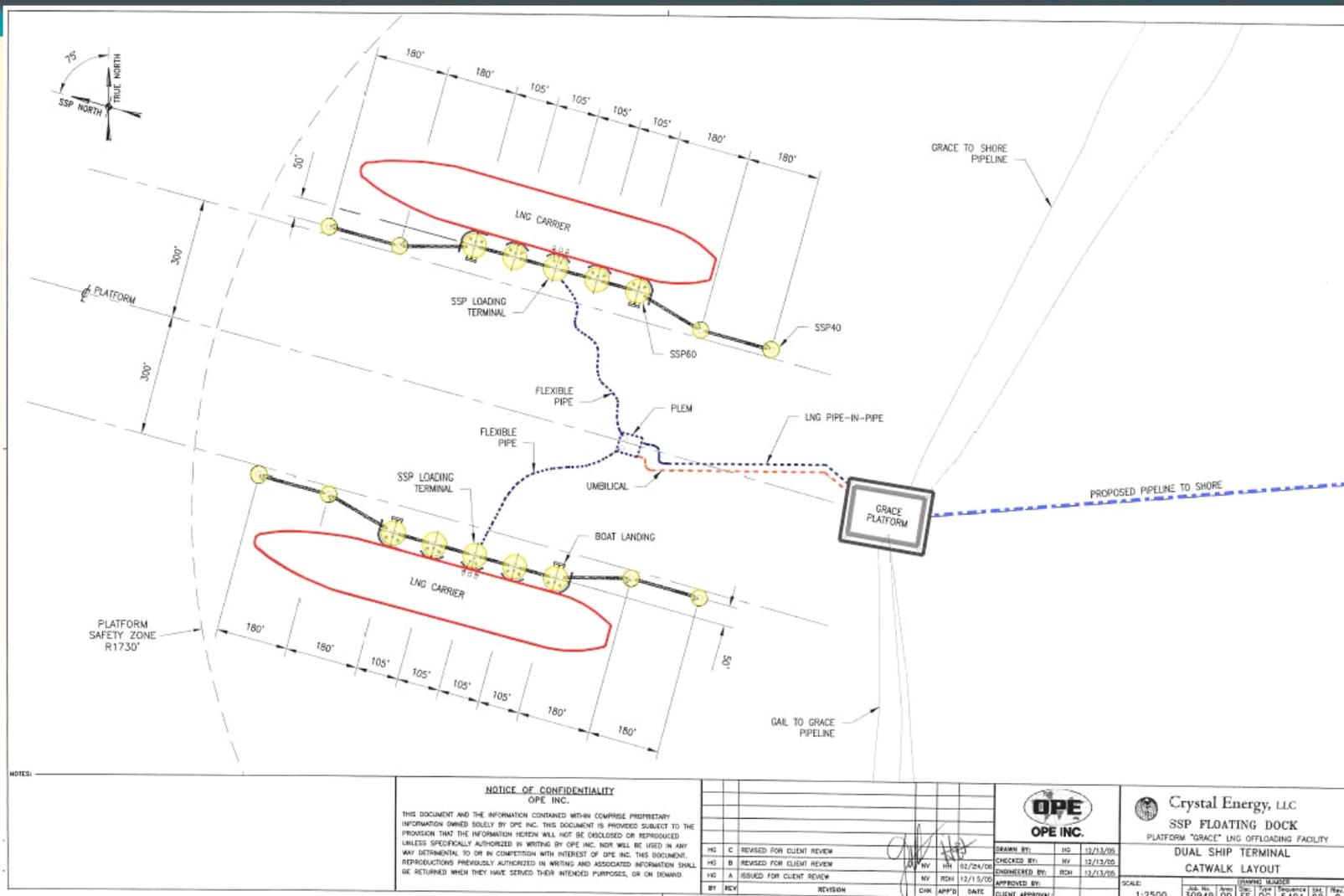
- **Increased availability**
- **Firm deliverability**





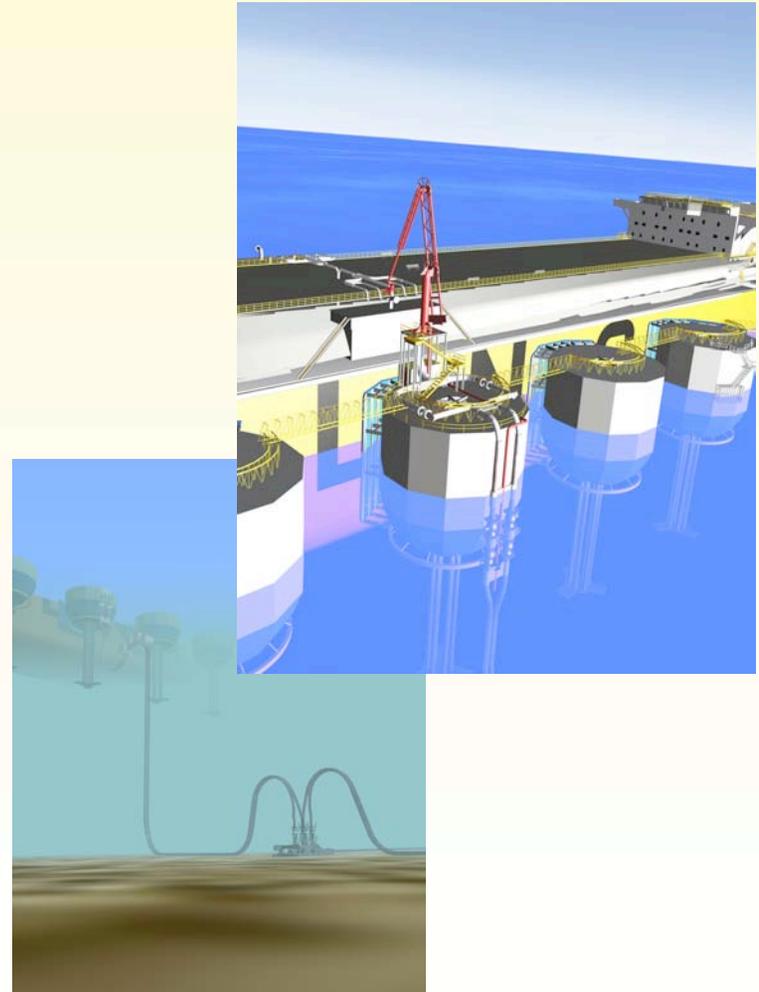
# Clearwater Port

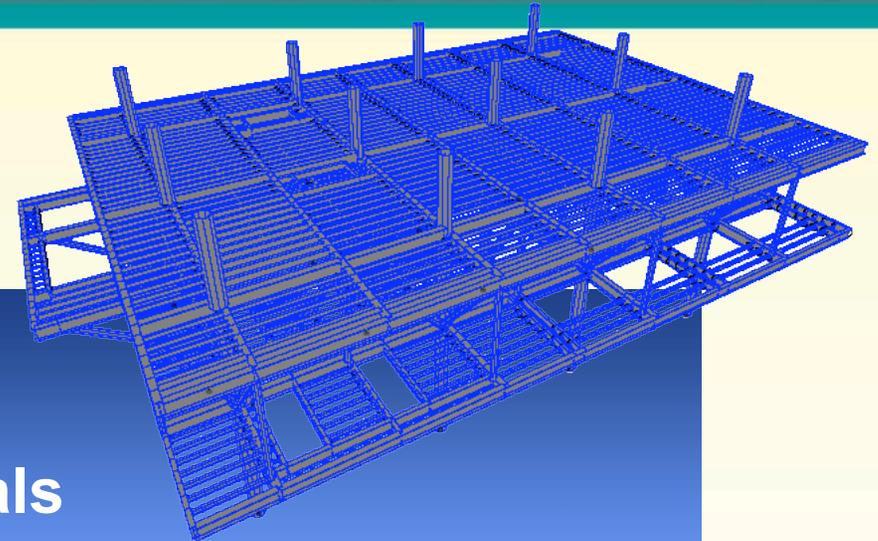
# Offset Dual Berth Mooring





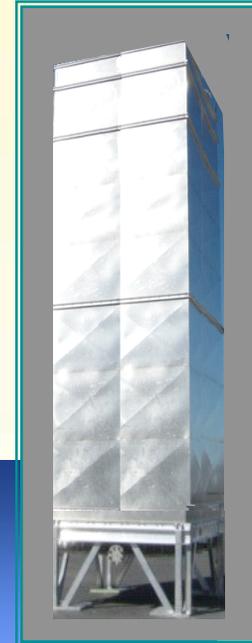
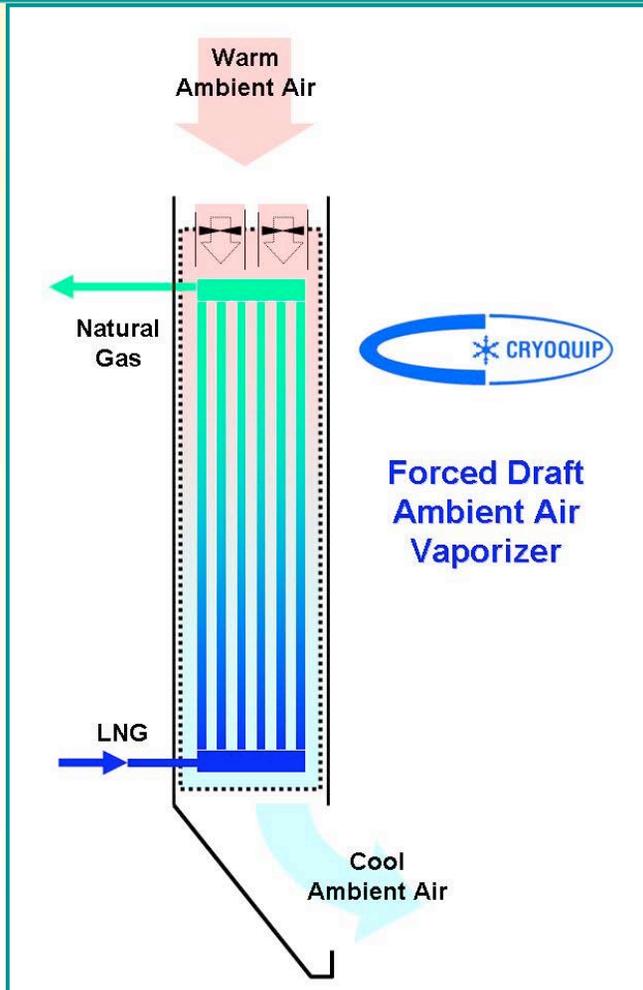
- **SSP Unloading Buoy**
  - Designed to track vessel movements
  - Offshore Marine design loading arm
- **Flexible Pipe Riser – Plem to SSP Unloading Buoy**
  - Working with US Hose - existing manufacturer of flexible LNG lines
  - Successfully tested 20” hose for ship to ship LNG transfer for Exxon
- **Sub Sea LNG Pipe in Pipe**
  - Existing proprietary design
  - Standard cryogenic materials
  - In sub sea refrigerated LPG service since 1996
  - Conforms with ASME B31.3





- **New topside structural members to be constructed with cryogenic rated materials**
- **Two deck design minimizes weight**
- **Offsite fabrication, minimizing site specific construction time**
- **Allows for optimized layout of process facilities**





**KEY FEATURES**

- Counter-flow design
- High thermal efficiency
- High-flow, low pressure drop
- Ice forms safely at bottom of vaporizer
- Proven heat transfer design

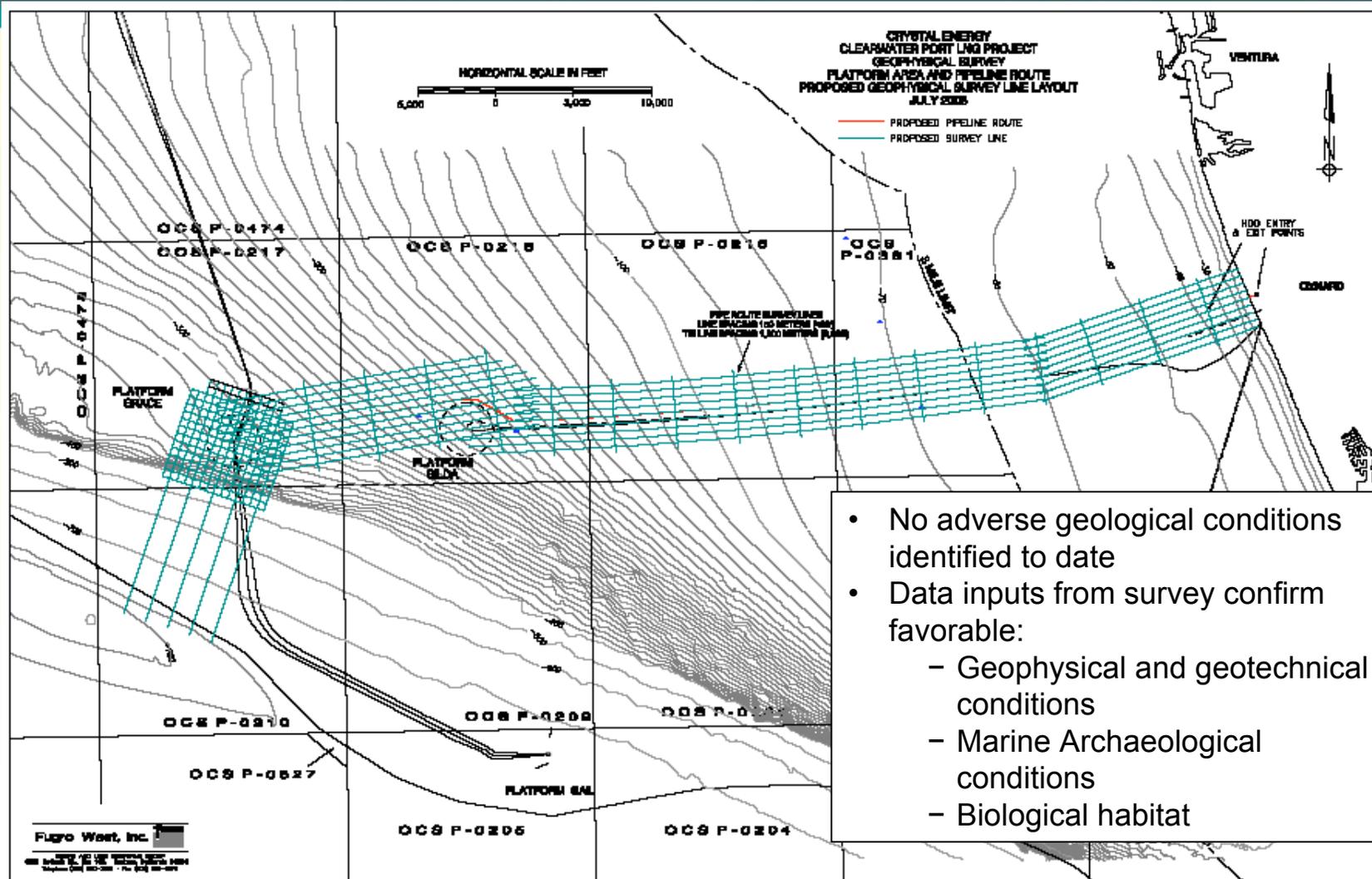


## ✓ Investments in Geophysical Surveys

- Completed expanded desktop study to address geological issues raised in USGS white paper
- Extensive offshore survey conducted in response to interagency comments outlined in USCG letter dated May 31, 2005
- Survey complies with the requirements of Mineral Management Service Notice to Lessees (NTL) Nos. 98-13 and 98-05
  - High-frequency penetration survey to be conducted if required



- Survey work conducted by Fugro survey in Dec 2005 / Jan 2006
  - Multi-beam bathymetry,
  - Side scan sonar imagery,
  - Magnetometer data, and
  - High-resolution, seismic reflection data using two systems including:
    - A shallow penetration, X-Star Chirp, system,
    - A mid-depth penetration system with a “boomer” sources,
  - Full coverage multi-beam bathymetry and side scan sonar data of the survey area
  - Total survey lines as follows:
    - Multi-beam and side scan sonar bottom charting: 516 line-kilometers (278 line miles)
    - Magnetometer data collection: 259 line-kilometers (139 line-miles)
    - Seismic reflection data collection: 312 line-kilometers (169 line-miles)





Clearwater Port

## Pipeline Landfall Reliant Energy's Mandalay Power Station

Facilities to include:

HDD beach pipeline crossing

Odorant injection skid

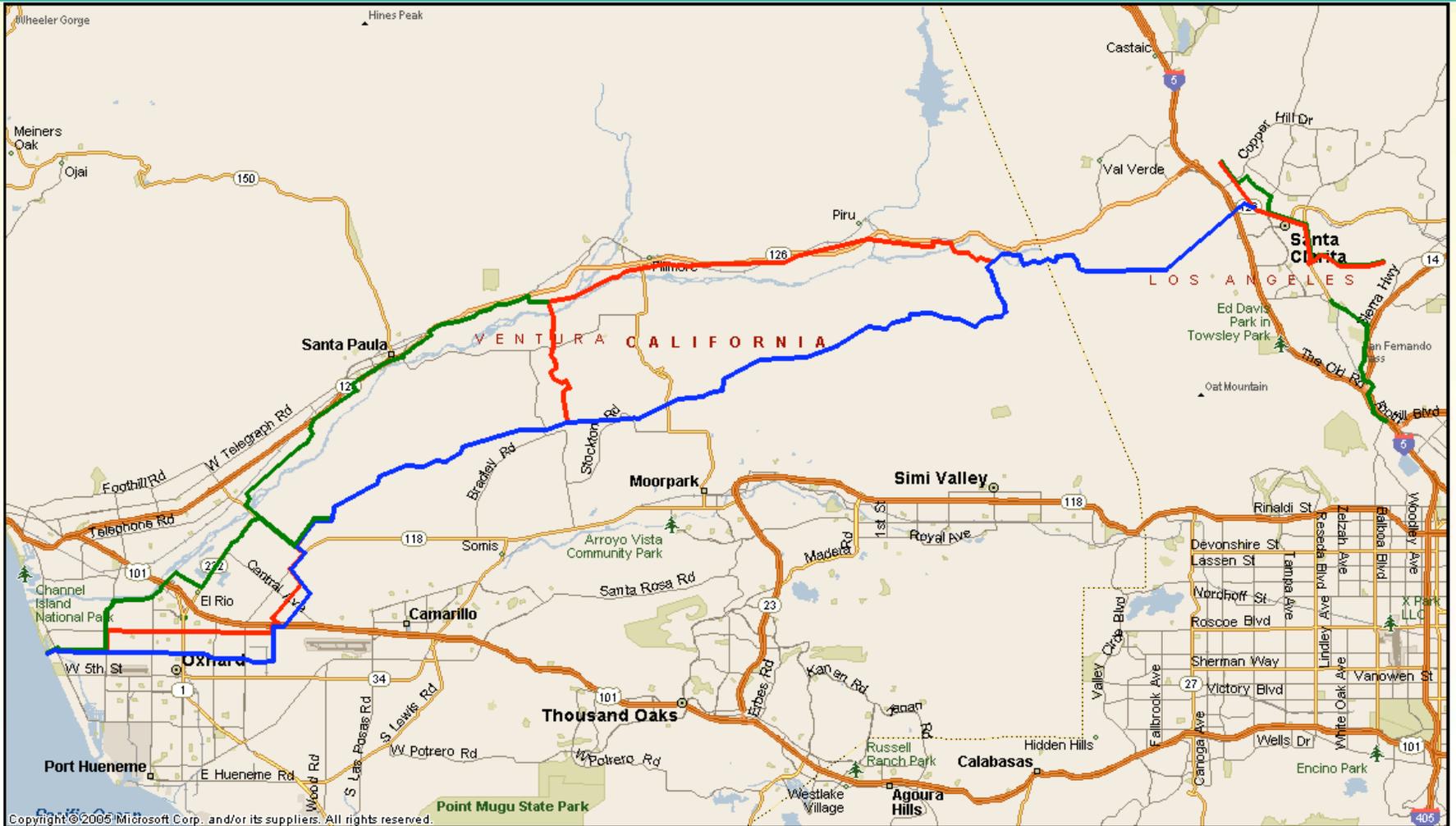
Gas regulation, metering, transfer to SoCalGas

NO<sub>2</sub> injection facilities (if necessary)





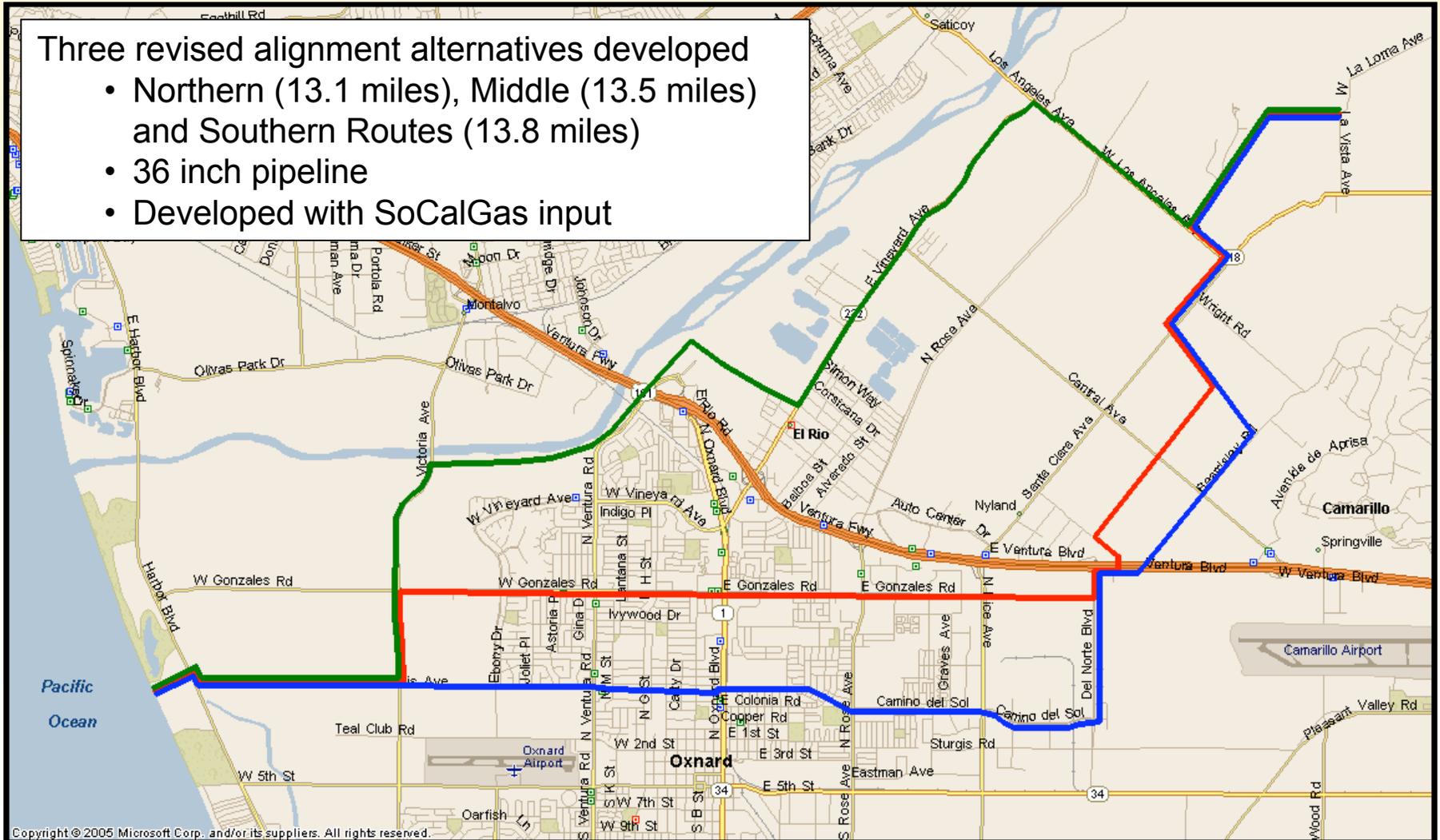
- ✓ Investments in Onshore Pipelines and Facilities
  - Routes developed with SoCalGas participation
  - Onshore Pipeline Alignments
    - Mandalay to Center Road
    - 324 Loop (Center Road to Santa Clarita)
    - 225 Loop (Santa Clarita Bridge Crossings)
    - 3008 Extension
  - Project Specific and Cumulative Project Design and Impact Assessments





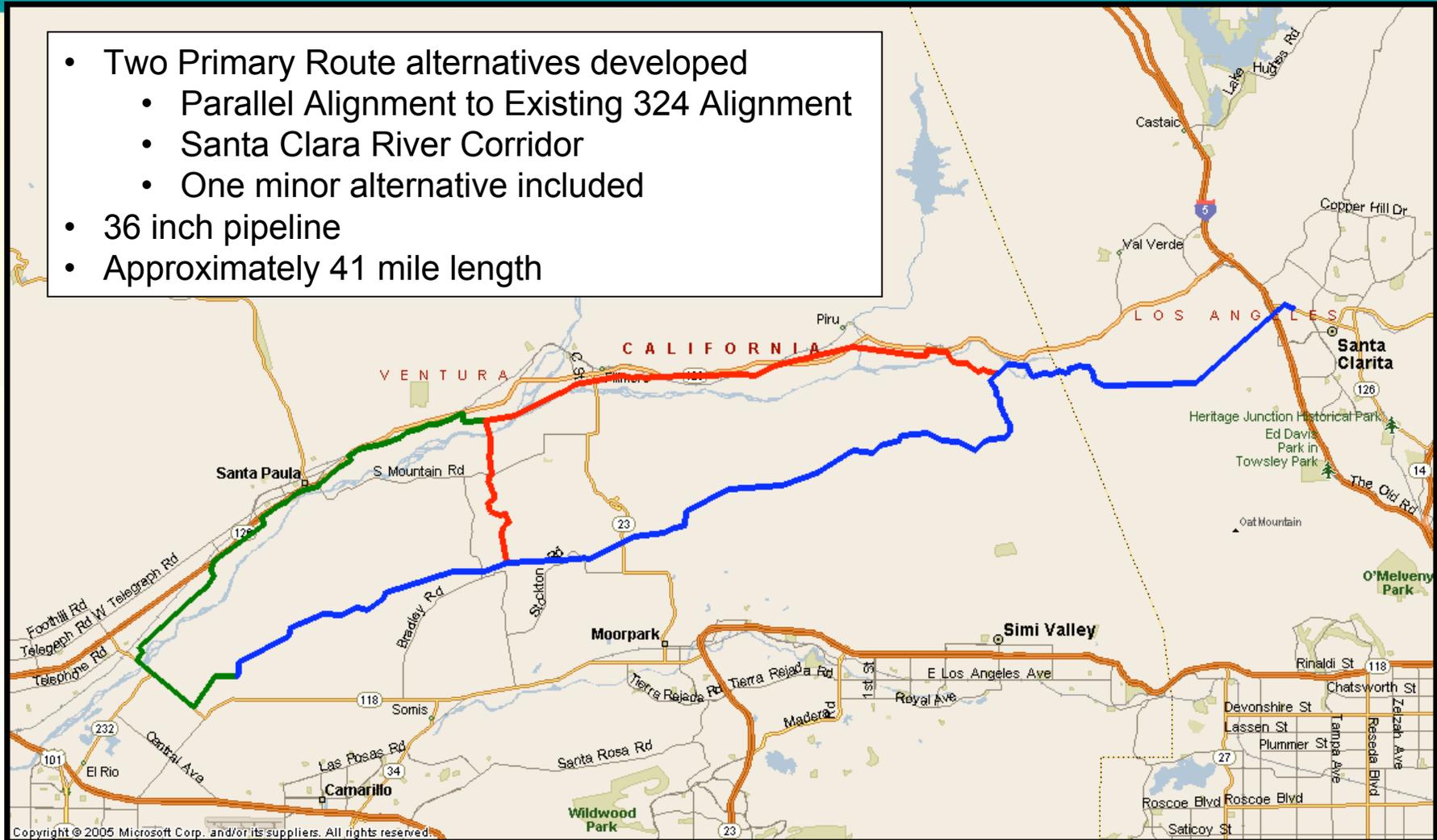
Three revised alignment alternatives developed

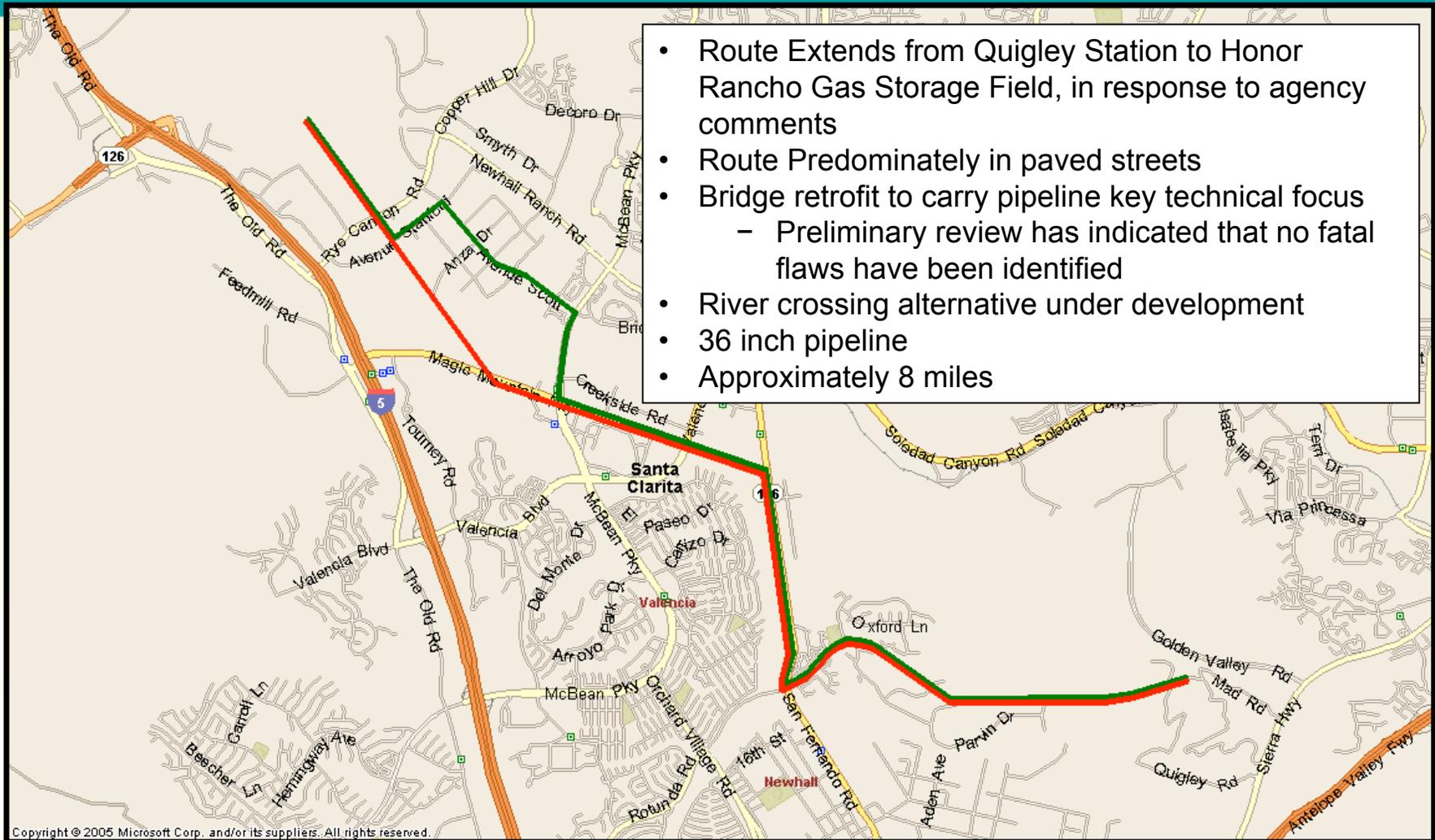
- Northern (13.1 miles), Middle (13.5 miles) and Southern Routes (13.8 miles)
- 36 inch pipeline
- Developed with SoCalGas input





- Two Primary Route alternatives developed
  - Parallel Alignment to Existing 324 Alignment
  - Santa Clara River Corridor
  - One minor alternative included
- 36 inch pipeline
- Approximately 41 mile length

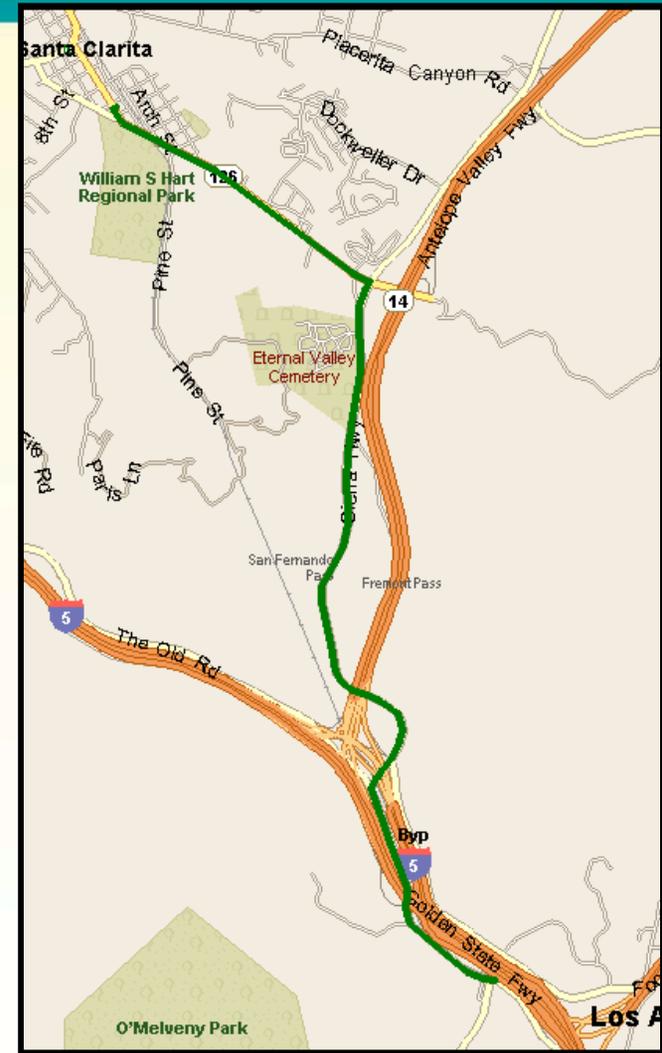




- Route Extends from Quigley Station to Honor Rancho Gas Storage Field, in response to agency comments
- Route Predominately in paved streets
- Bridge retrofit to carry pipeline key technical focus
  - Preliminary review has indicated that no fatal flaws have been identified
- River crossing alternative under development
- 36 inch pipeline
- Approximately 8 miles



- Responds to agency comments
- Route Extends from Newhall Station to Balboa Station in Santa Clarita
- 36 inch pipeline
- Approximately 5 miles
- Predominately in paved streets and public right of ways





<b>Project:</b>	Natural Gas Terminal Service Provider for Ventura County & California
<b>Location:</b>	12.6 miles offshore from Oxnard, California
<b>Facility Design:</b>	Existing-Fixed-Platform Offshore Natural Gas Importation Terminal
<b>Base / Peak Capacity:</b>	1.2 / 1.4 Bcf/d
<b>On-site LNG Tank Storage:</b>	None
<b>Initial Application Filing:</b>	2004 -- 3rd Quarter - Completed
<b>Updated Application Filing:</b>	2006 -- 2nd Quarter - Completed
<b>Final EIS/EIR (target):</b>	2007 -- 4th Quarter
<b>Agency Permits (target):</b>	2008 -- 1st Quarter
<b>Begin Construction (target):</b>	2008 -- 1st Quarter
<b>Begin Commercial Operations (target):</b>	2009 -- 4th Quarter