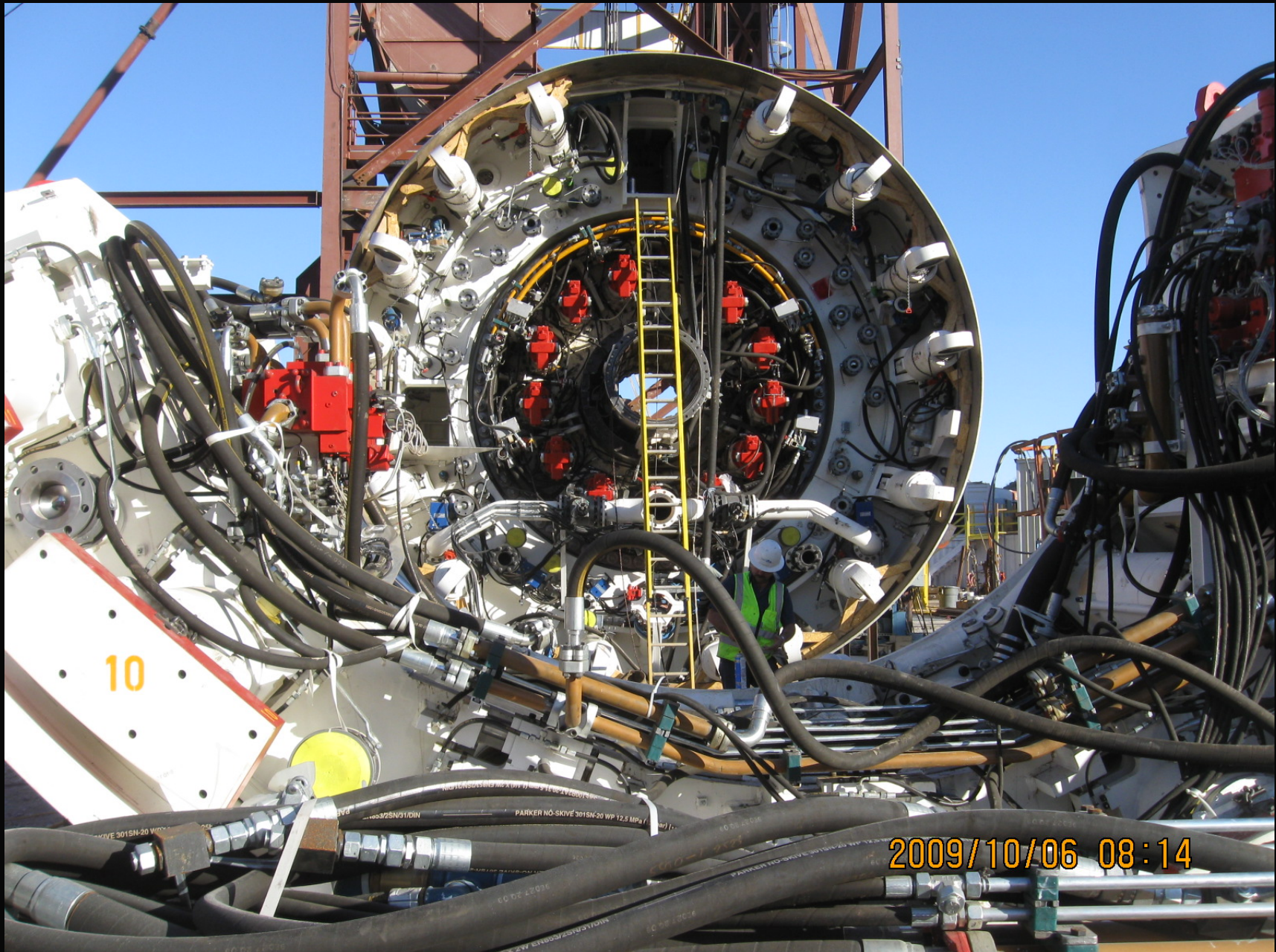


# *TBM Assembly Onsite*





# *TBM Assembly Onsite*





## *TBM Assembly Onsite*



**Cutter Head - Welding in temperature controlled tent**

# Precast Lining Segment Plant

Sloan, NV



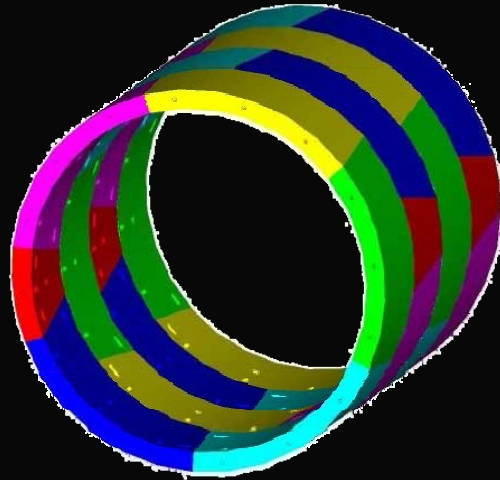
- Forms being filled with concrete



- Workers installing gasket

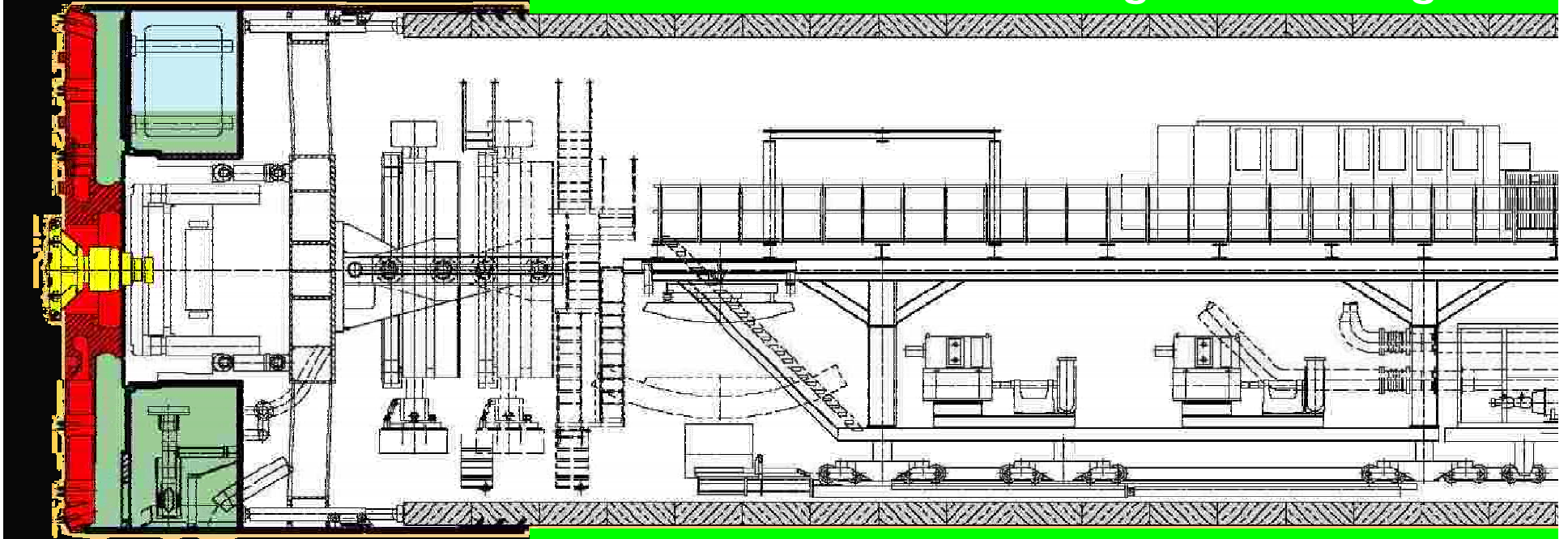


# Precast Concrete Segments



**TBM Shield**

**Precast concrete segmental lining**



# Precast Concrete Segments



~ 660 of 2500 rings onsite

# Segment Feeder





# Example: Installation of Segmental Lining





# Operator Cabinet



# Example: TBM Lowered into Access Shaft





# Example: TBM Lowering into the Access Shaft



# "01" - Intake No. 3 Shafts & Tunnel

## Intake Riser (under design)

- Underwater work
- Air lift mucking
- Blast & excavate
- Prefab structure
- Lower by barge
- Anchor w/  
underwater  
concrete
- GPS System
- TBM Docking
- Filling

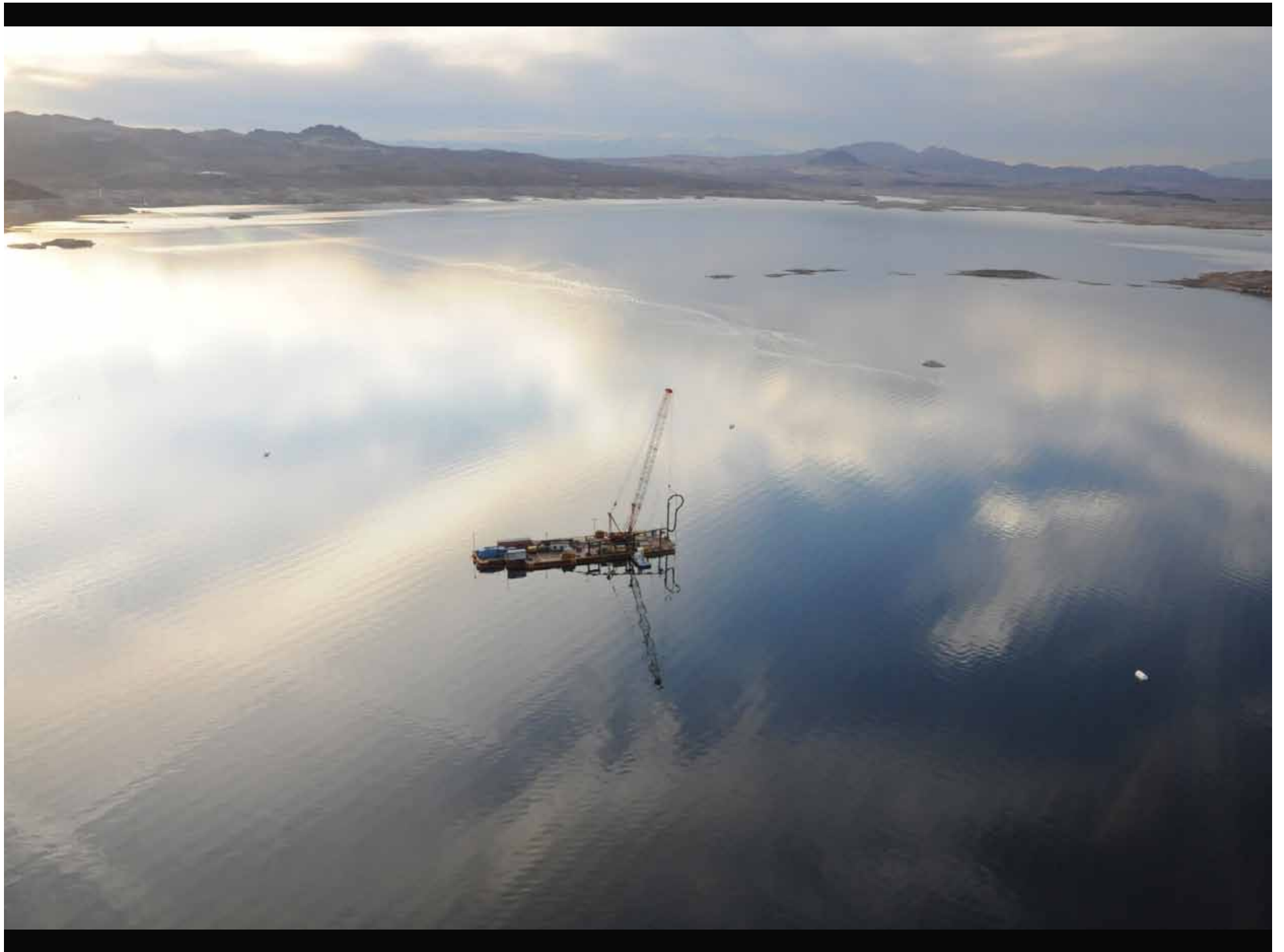




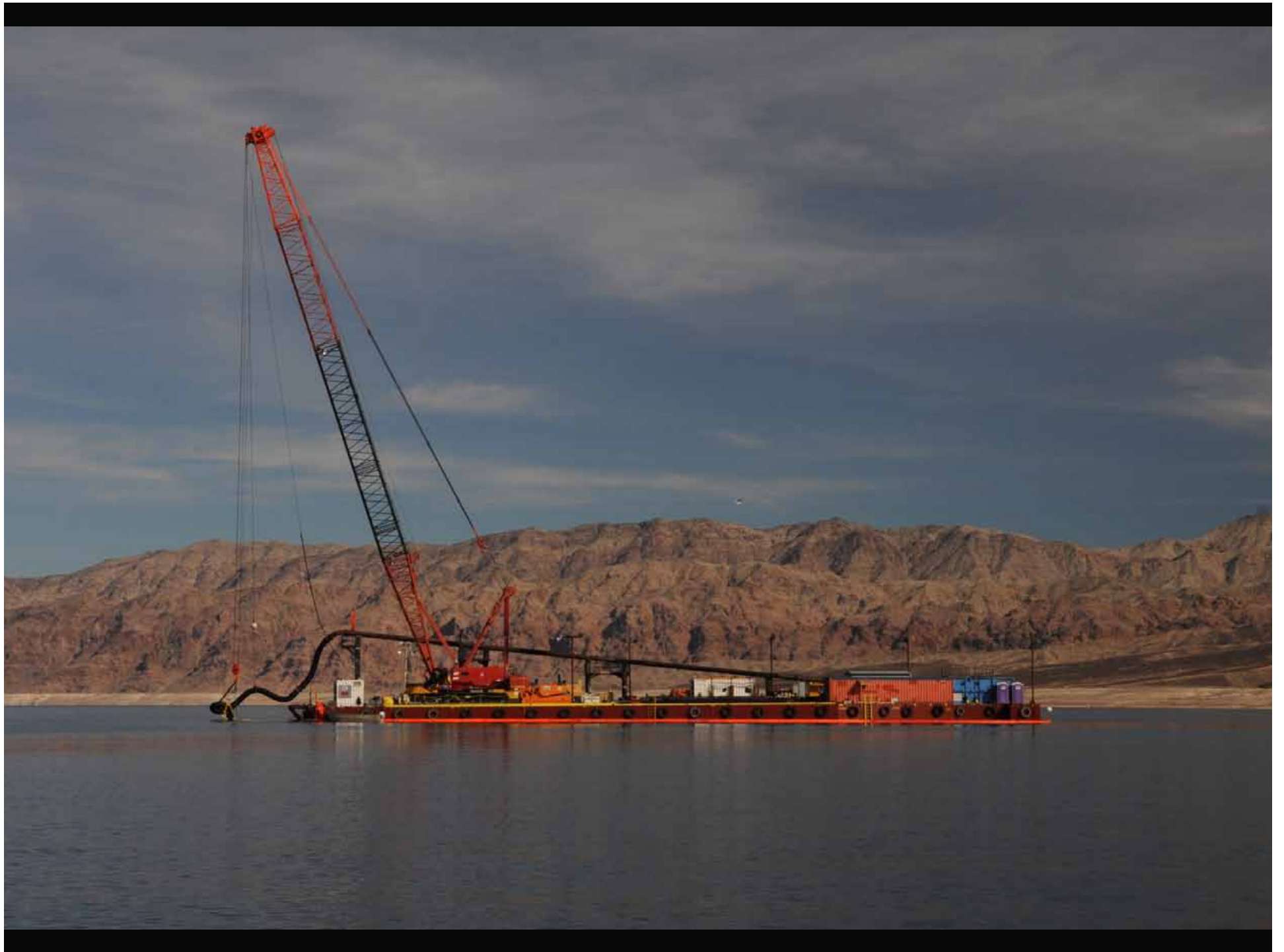
## *"01" - Intake No. 3 Shafts & Tunnel*



**Crane/Excavation Barge – Dredging Pipe**







## *"01" - Intake No. 3 Shafts & Tunnel*

# Technical Challenge - Underwater Blasting

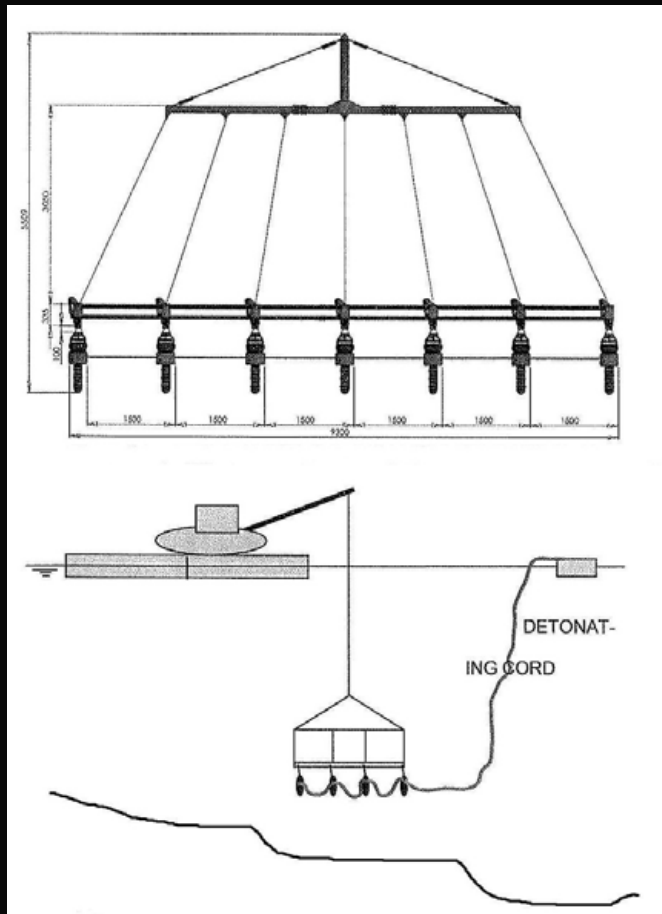


Fig. 1

Underwater Blasting Using Remote  
Controlled Frame With Charges

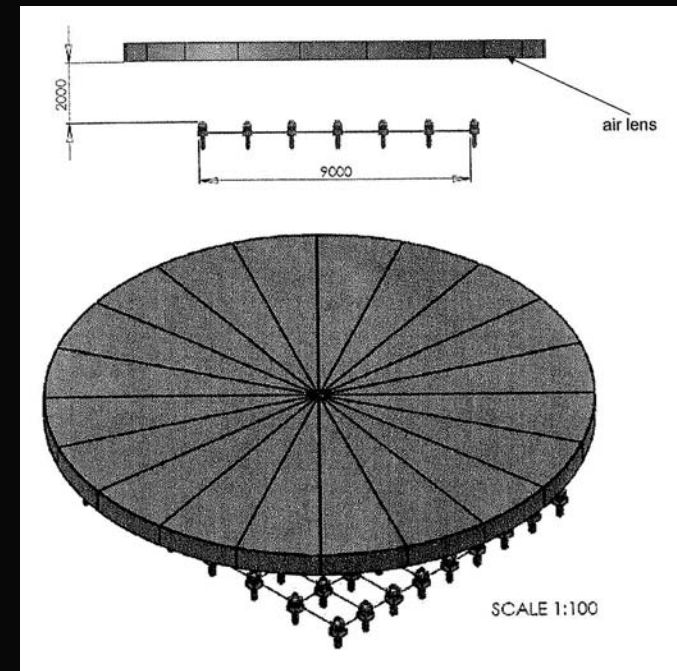


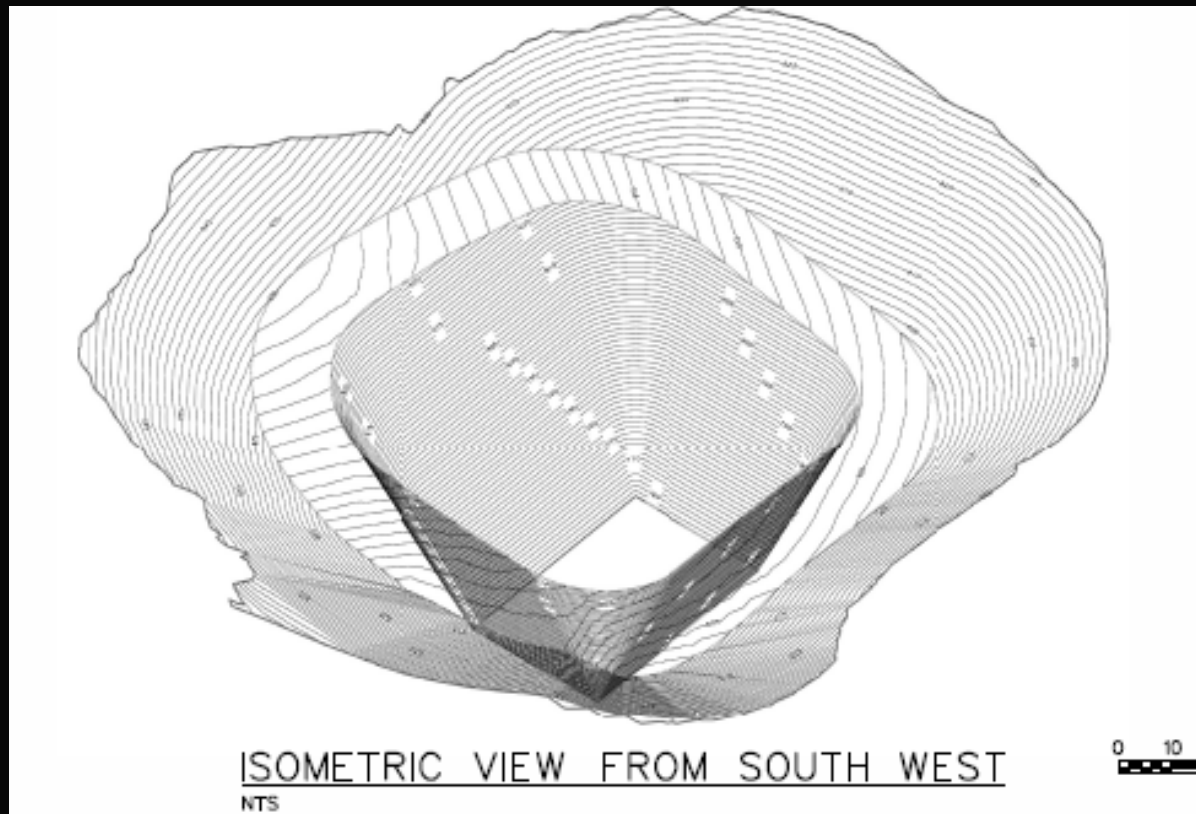
Fig. 2

Air Mirror Over Charge Field To  
Reduce Peak Overpressure



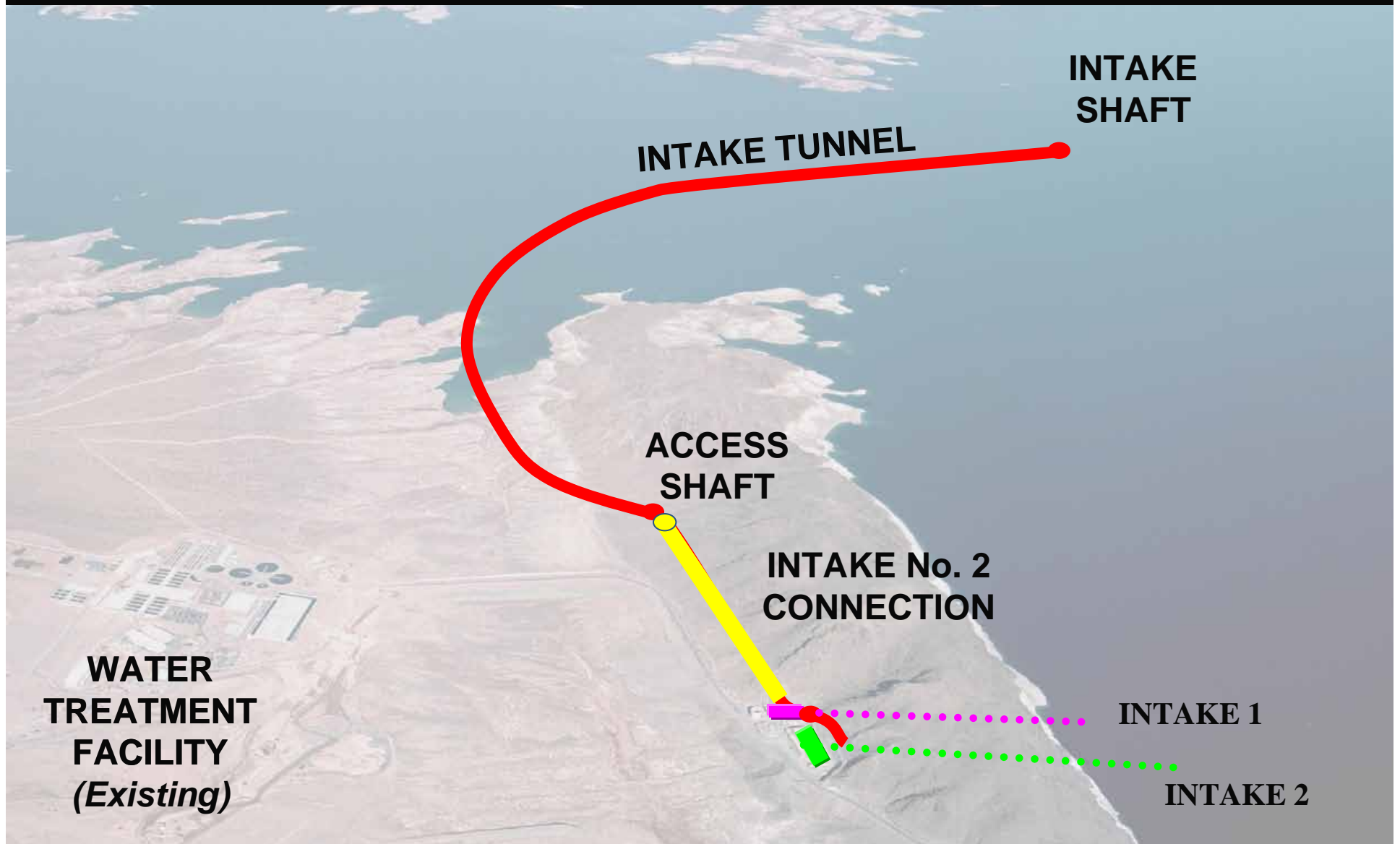
# *"01" - Intake No. 3 Shafts & Tunnel*

## Rock Excavation



- Blasting with shaped charges
- Airlift mucking
- Underwater placement of excavated materials
- Monitoring with ROV and Sonar (fish and location)

# "02"- Intake No. 3 Connector Tunnel





Intake Pumping  
Station No. 1

Intake Pumping  
Station No. 2

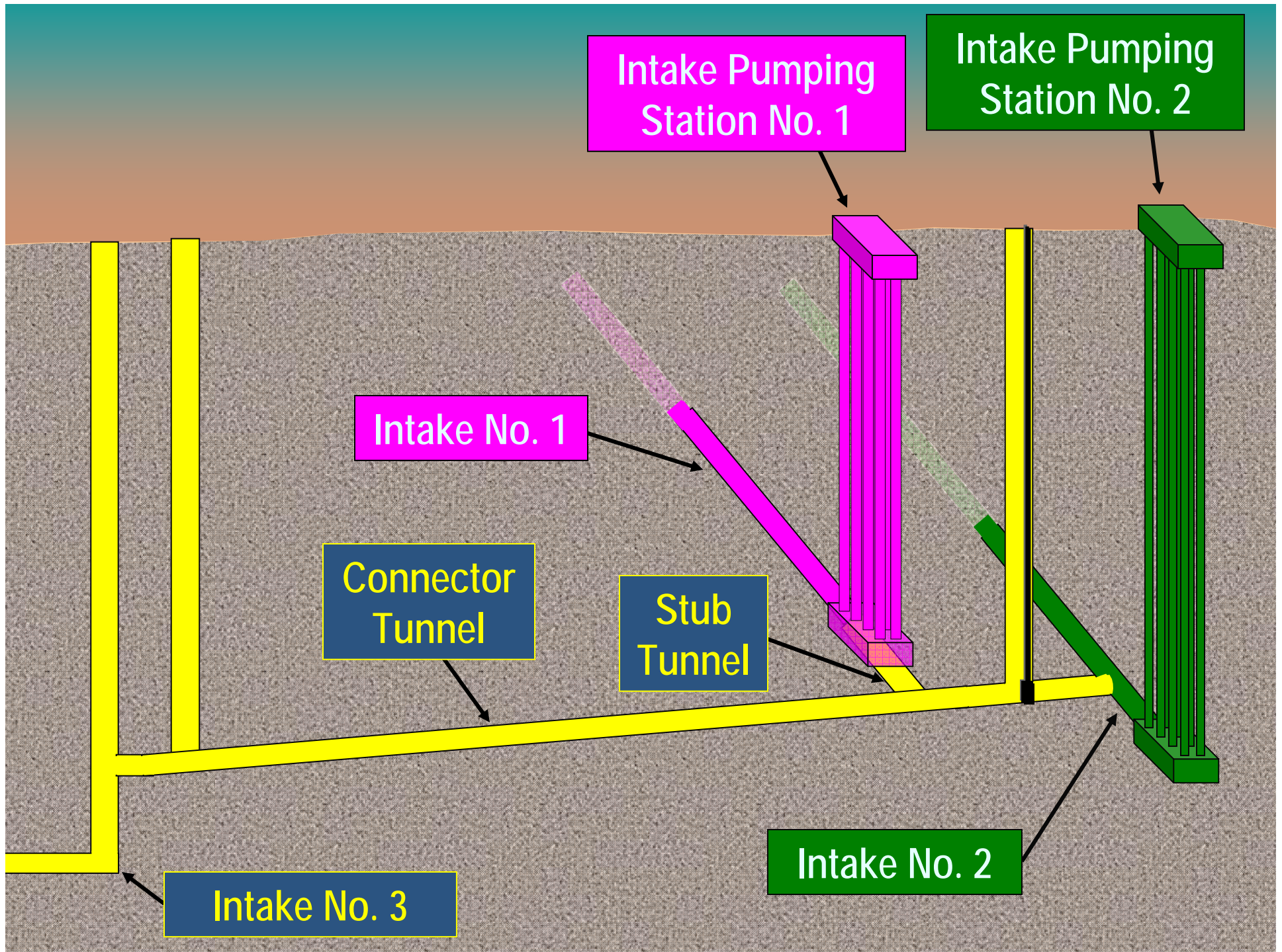
Intake No. 1

Connector  
Tunnel

Stub  
Tunnel

Intake No. 2

Intake No. 3



# "02"- Intake No. 3 Connector Tunnel

Renda Pacific (Design-Bid-Build) ~ \$42 million

Access Shaft (IPS-3 Surge Shaft)

- ~ 450' deep
- 26' interior diameter

Tunnel

- ~2578' long
- Horseshoe
- Drill & Blast





## *"02" - Intake No. 3 Connector Tunnel*



**1<sup>st</sup> Blast – October 7, 2009**

*"02" - Intake No. 3 Connector Tunnel*



**1<sup>st</sup> Blast – October 7, 2009**

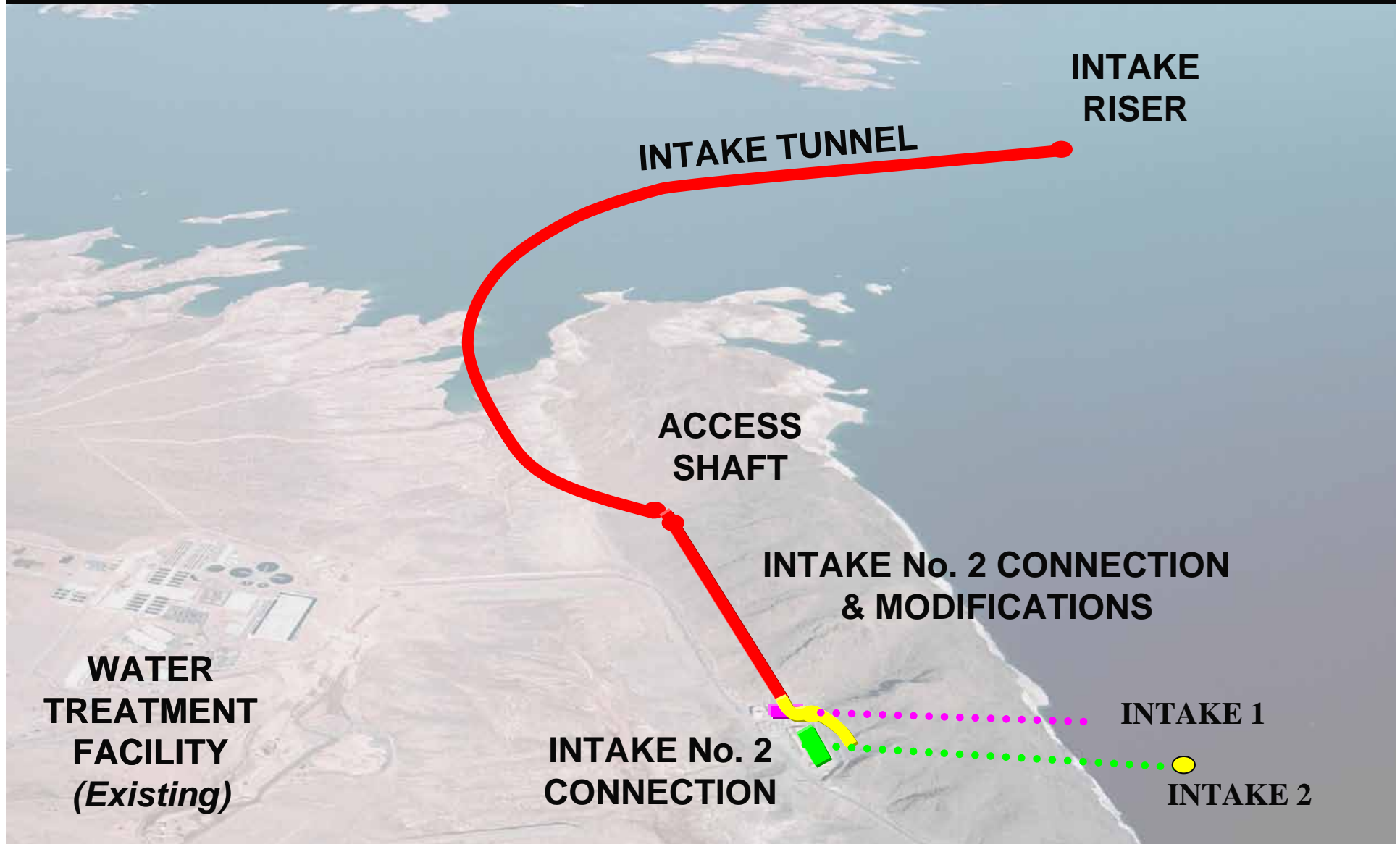


# "02"- Intake No. 3 Connector Tunnel



Current Progress – 290 feet excavated

# "05" - Intake No. 2 Connection & Modifications





Intake Pumping  
Station No. 1

Intake Pumping  
Station No. 2

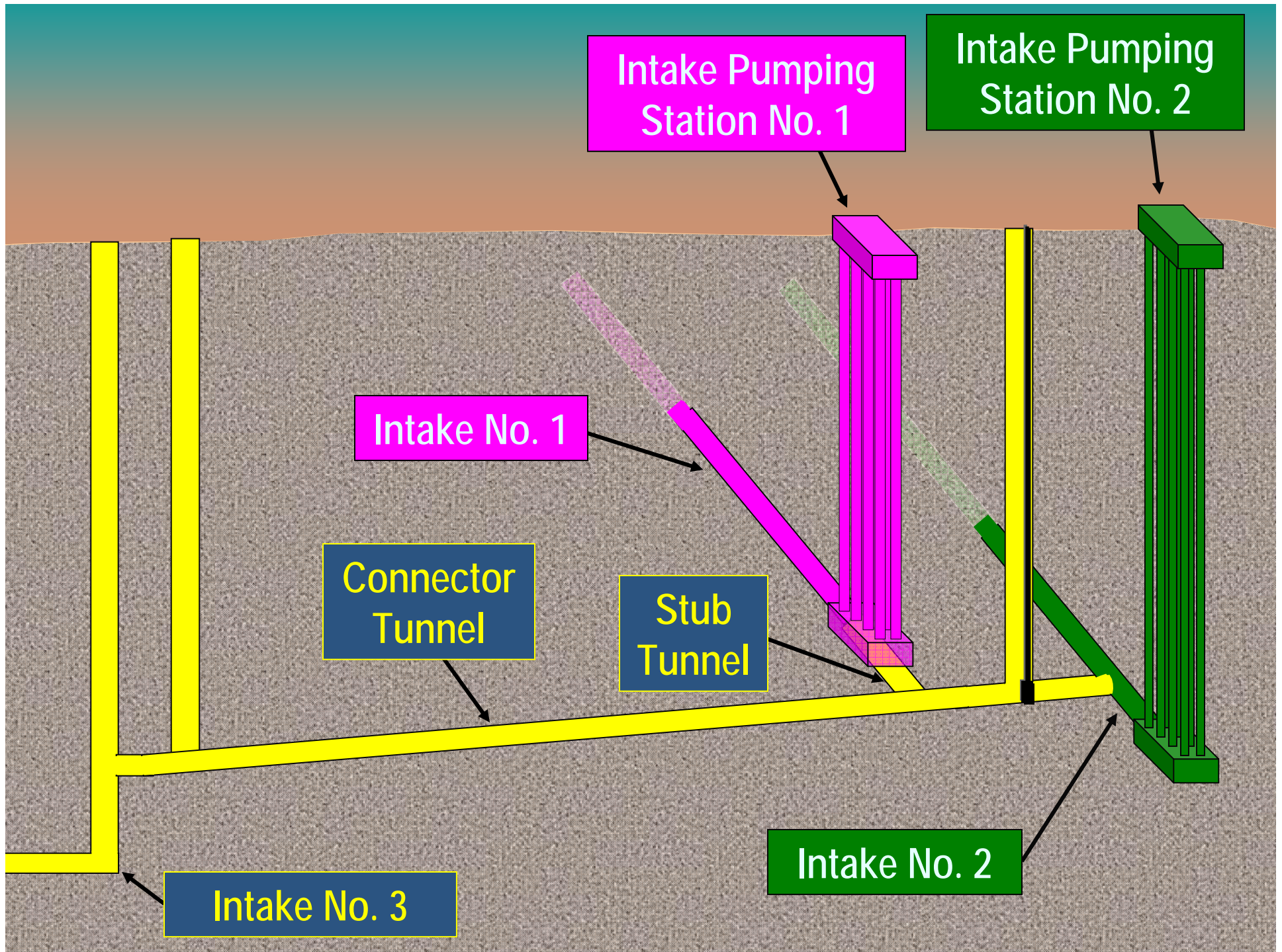
Intake No. 1

Connector  
Tunnel

Stub  
Tunnel

Intake No. 2

Intake No. 3



# "05" - Intake No. 2 Connection & Modifications

Barnard (Design-Bid-Build) ~ \$30 million

## Access Shaft (Isolation Gate)

- ~ 380' deep
- 22' interior diameter

## Isolation Gate

- 12' w x 14' h stainless steel

## Tunnel

- ~500' long
- Horseshoe
- Drill & Blast

## Inlet Modifications





## *"05" Intake No. 2 Connection & Modifications*

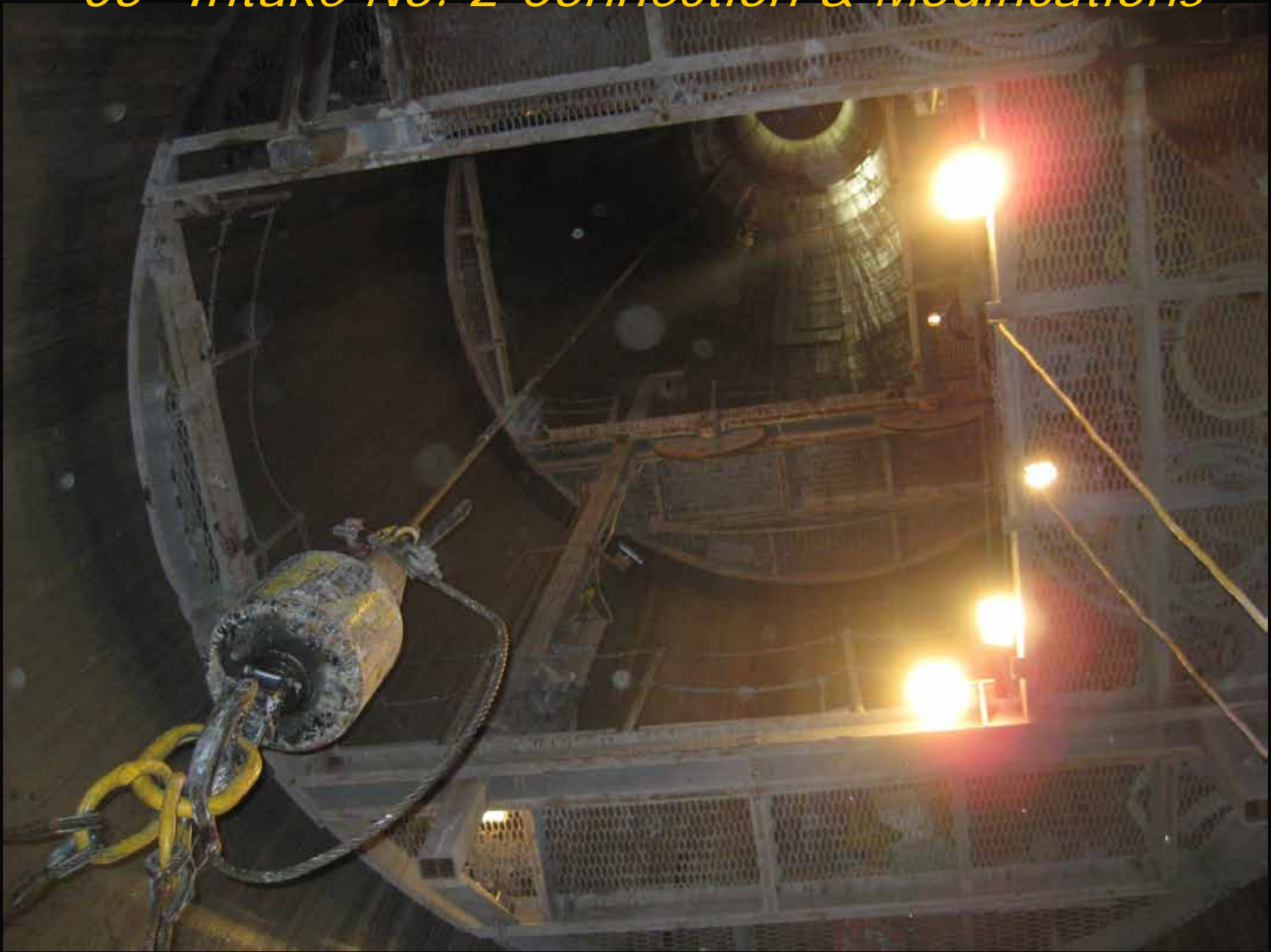


*Close quarters...*

**Work adjacent to  
operational Intake  
Pumping Station No. 1 and  
No. 2**



*"05" Intake No. 2 Connection & Modifications*



Looking Up Access Shaft Thru Galloway – 26 March 2009



## *"05" Intake No. 2 Connection & Modifications*





## *"05" Intake No. 2 Connection & Modifications*





## *"05" Intake No. 2 Connection & Modifications*



**Isolation Gate – December 2009**



## *"05" Intake No. 2 Connection & Modifications*



**Gate Guide Rails – Stainless Steel**



## *"05" Intake No. 2 Connection & Modifications*



Isolation Gate

## *"05" Intake No. 2 Connection & Modifications*



**Hemispherical Cap**



## *"05" - Intake No. 2 Connection & Modifications*





## *"05" Intake No. 2 Connection & Modifications*



**Intake No. 2 – Dewatered Forebay (South)**



## *"05" Intake No. 2 Connection & Modifications*



**Intake No. 2 – Dewatered Tunnel (~ 1000 gpm inflow)**



## *"05" Intake No. 2 Connection & Modifications*



typical

**Intake No. 2 - Quagga Colonization**



# Project Location

## Lake Mead National Recreation Area



# Stakeholders

- Boaters, divers, jet skiers, fishermen
- Marinas, concessions and other park vendors
- National Park Service
- Bike trail users
- Delivery/contractor staff
- Air traffic over project site
- Rescue personnel
- SNWA Operations, security, management
- Trade media, local media
- Contracting community





**Southern Nevada  
Water Authority**

**& Clean  
Water Coalition**



## Contractor Outreach Forum



Monday, December 10th  
Grand Canyon Room  
100 City Parkway  
Las Vegas, Nevada 89193  
1p.m to 6p.m. Briefing and Tour

Questions / RSVP:  
Please contact Blake Schmidt at  
702-862-3418 or  
blake.schmidt@snwa.com by  
December 5th to register

Map of project area and directions to SNWA office on back

### Forum Goal:

\*Increase awareness of upcoming projects  
for SNWA's Intake No. 3 and CWC's Systems  
Conveyance and Operations Program

### SNWA upcoming Projects:

- \*Approximately \$400 million in value
- \*Intake pumping station
- \*Intake No. 2 Connection and Modifications
- \*2200 ft of 12' diameter Conveyance Pipeline
- \*69 KV power facilities

### CWC Upcoming Projects:

- \*
- \*
- \*
- \*

### Forum will include:

- \*Overview of all projects
- \*Meet and greet with SNWA and CWC design  
and management teams
- \*Design Briefing on key features
- \*Question and Answer session
- \*Site tour



# Contractor Outreach Tours





## Trade and Mainstream Media Attention

- ENR
- Tunnels and Tunneling
- LV Review-Journal/Sun
- Popular Mechanics
- Southwest Contractor
- Tunnel Business
- Bloomberg News







## River Mountains Loop Trail Box Culvert





## Additional Borings

Geotech drilling on Lake  
Mead and on land



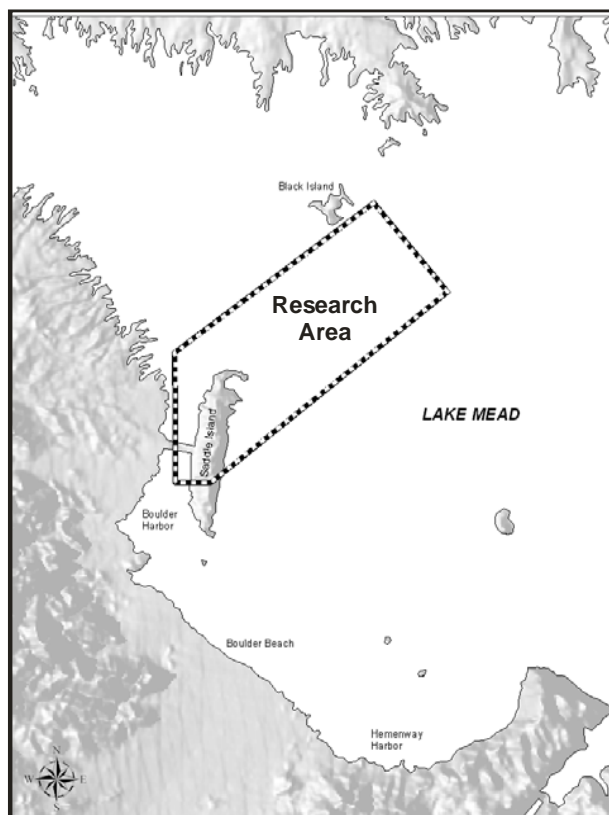




SOUTHERN NEVADA  
WATER AUTHORITY

ATTENTION LAKE MEAD  
VESSEL OPERATORS AND MARINAS

# RESEARCH AREA



Contractors for the Southern Nevada Water Authority will be performing underwater geological research activities near Saddle Island and Black Island.

**Drilling barges may be located in the research area from November 2008 through \_\_\_\_\_ 2009.**

**Please maintain a 100-yard distance from the barges and equipment at all times.**

Thank you for your cooperation.

Questions?  
Contact SNWA at  
702-862-3405

# Project Schedule

- "01" - Intake No. 3 Shafts & Tunnel
  - Cavern/Stub/Starter Complete 5/26/2010
  - TBM Lowering 8/2010
  - TBM Tunneling Begins 11/2010
  - TBM Tunnel to Intake Complete Q4/2012
  - Final Completion Q1/2013
- "02" - Intake No. 3 Connector Tunnel
  - Final Completion 7/27/2012
- "05" - Intake No. 2 Connection & Modifications
  - IPS-2 Shut Down Complete 1/21/2010
  - Final Completion Q2/2010



# Deferred Contracts

Contract	Description	Advertising Est.
Intake No. 3 Pumping Station	Pumping station forebay and well shaft excavation, build-out, chlorine building construction, yard piping	Future
Substation and permanent power supply (by CRC)	69/13.8 kV Electrical substation, pre-purchase of equipment, 69 kV Duct bank	Future
Discharge pipeline	~2,130 feet of 144-inch and diameter discharge pipeline, ~4,050 feet of 24-inch diameter potable water pipeline, etc.	Future

# Questions?

