PREVENTION FIRST 2006
WELL RE-ABANDONMENT

PREVENTION FIRST 2006
WELL RE-ABANDONMENT

DRILLING OF EXPLORATORY WELLS, CORE HOLES AND DEVELOPMENT WELLS IN THE CALIFORNIA STATE TIDELANDS BEGAN AT THE TURN OF THE 20TH CENTURY AND CONTINUED UP INTO THE 1980'S. HUNDREDS OF WELLS WERE DRILLED FROM DERICKS MOUNTED ON WOODEN PIERS STARTING AT THE RINCON AREA AND CONTINUING ALL THE WAY UP TO THE ELLWOOD FIELD IN SANTA BARBARA COUNTY.

THE EARLIEST OF THESE WERE DRILLED IN THE SUMMERLAND FIELD FROM ABOUT 1890 TO 1910. THESE WELLLS WERE DRILLED WITH CABLE TOOLS AND USED VERY LITTLE, IF ANY, CEMENT TO GROUT THE CASING STRINGS.

APPROXIMATELY 470 CORE HOLES WERE DRILLED IN STATE WATERS RANGING FORM 60' TO 250' IN WATER DEPTH DURING THE PERIOD FORM 1956 THROUH ABOUT 1965. THESE WELLS, DRILLED FROM DRILLSHIPS OR JACK-UP RIGS, WERE DRILLED TO TEST POTENTIAL HYDROCARBON BEARING STRATA AND WERE THE PRECURSOR TO THE INSTALLATION OF MOST OF THE OFSHORE PLATFORMS AND SUB-SEA COMPLETIONS HERE ON THE WEST COAST.

FOR THE MOST PART, THESE WELLS HAVE ALL PREVIOUSLY BEEN PROPERLY ABANDONED, HOWEVER, SEVERAL OF THE WELLHEADS AND SUPPORT STRUCTURES HAVE BEEN LEFT PROTRUDING ABOVE THE MUD LINE OR HARD SUBSTRATE ON THE LOCAL BEACHS.

THIS SESSION WILL DISCUSS THE PROBLEMS AND ISUES RELATED TO LOCATING, RE-ABANDONING WHEN NECESSARY AND FINALLY, REMOVAL OF STRUCTURES ASSOCIATED WITH THESE WELLS WITHIN THE STATE TIDELANDS.

PREVENTION FIRST 2006
WELL RE-ABANDONMENT

- **ABOUT PACIFIC MANAGEMENT TECHNOLOGIES, INC.-PMTI**
  - FORMED IN 2005.
  - COMBINED ASSTES OF FAIRWEATHER PACIFIC LLC AND FAIRWEATHER E&P
  - MANAGED SWARS PROJECT
  - MANAGED SDR PROJECT, MANAGED SUMMERLAND FIELD STUDY AND RE-ABANDONMENT PLAN
  - MANAGED ELLWOOD FIELD WELL RE-ABANDONMENT AND BIRD ISLAND DECOMISSIONING
  - MANAGED NUMEROUS GOM WELL ABANDONMENT AND RE-ABANDONMENTS
  - MANAGED NUMEROUS GOM PLATFORM DECOMMISIONING PROJECTS
  - WORKED ON GOLETA BEACH PROJECT INVOLVING 4 STATE TIDELANDS WELLS
  - MANAGING 3 SUB-SEA WELL RE-ABANDOMENTS IN MOLINO FIELD FOR SHELL AND CSLC
  - MANAGING DECOMISSIONING PLANNING FOR CONOCOPHILLIPS GREEN CANYON MARQUETTE AND JOLIET PLATFORMS AND TLP

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WELL RE-ABANDONMENT

- **CALIFORNIA STATE TIDELANDS STATISTICS**
  - 220 WELLS DRILLED IN SUMMERLAND FIELD
  - 55 WELLS DRILLED IN ELLWOOD FIELD (OFFSHORE)
  - COAL OIL POINT
  - 468 CORE HOLES DRILLED BETWEEN WEST MONTALVO AND POINT CONCEPTION BETWEEN 1956 AND 1965
  - HUNDREDS OF PORT OF LONG BEACH, WILLMINGTON AND SAN PEDRO AREA WELLS
  - IDLE SUB-SEA WELLS
  - BOLSA CHICA WELLS

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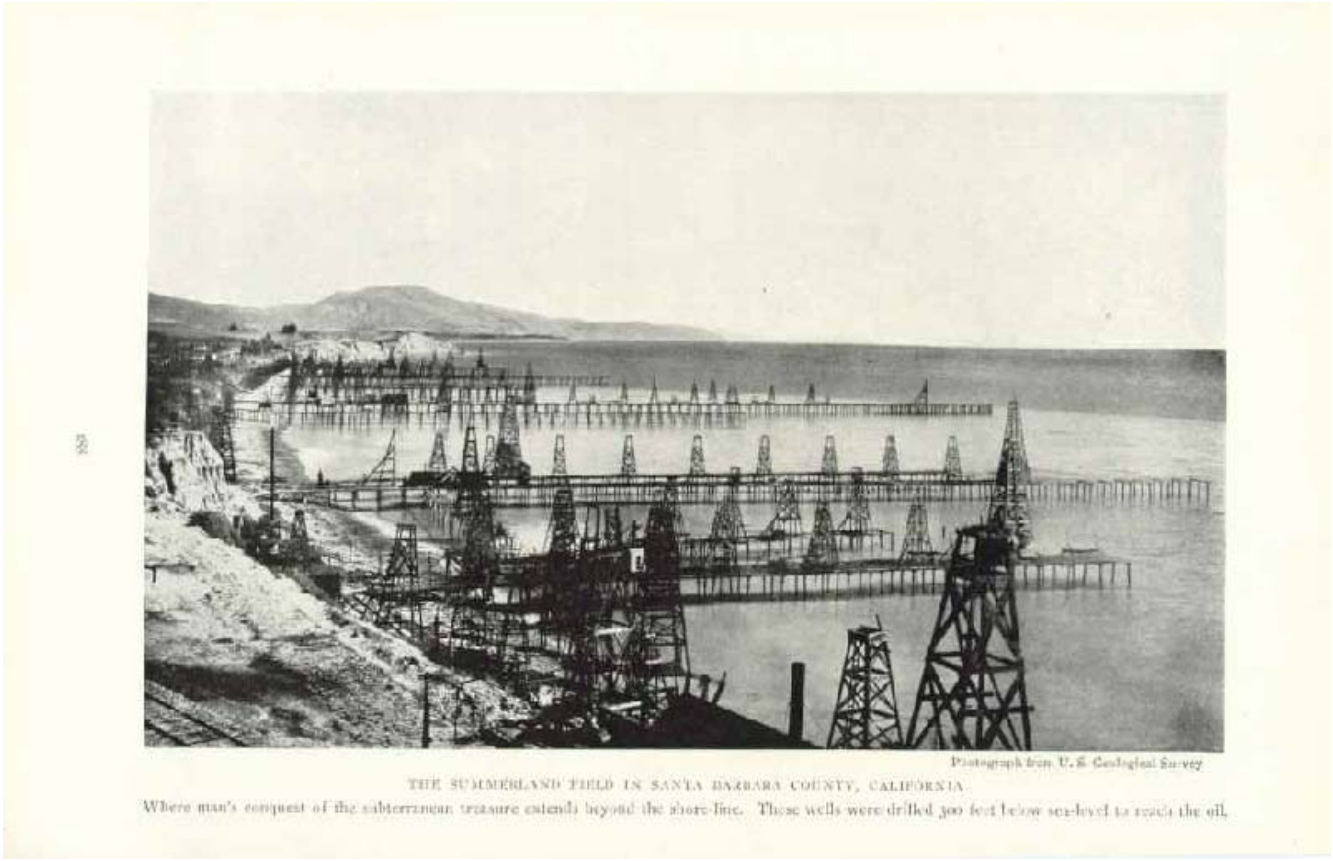
WELL RE-ABANDONMENT

SUMMERLAND FILED 1890-1910



Photograph from U. S. Geological Survey

THE SUMMERLAND FIELD IN SANTA BARBARA COUNTY, CALIFORNIA

Where man's conquest of the subterranean treasure extends beyond the shore-line. These wells were drilled 300 feet below sea-level to reach the oil.

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WELL RE-ABANDONMENT

ELLWOOD FIELD--1930

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WELL RE-ABANDONMENT

- **CALIFORNIA STATE TIDELANDS STATUS**
  - **SUMMERLAND FIELD**
  - **ELLWOOD FIELD**
  - **COAL OIL POINT & GOLETA BEACH**
  - **CORE HOLES**
  - **PORT AND HARBOR WELLS**
  - **GOLETA BEACH HAZARDS**
  - **IDLE SUB-SEA WELLS**
  - **BOLSA CHICA WELLS**
  - **MOLINO FIELD**

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WELL RE-ABANDONMENT

TYPICAL ISSUES REQUIRING RE-ABANDONMENT OPERATIONS IN STATE TIDELANDS WELLS:

- FAILURE TO PROPERLY REMOVE WELLHEAD (TYPICAL OF OFFSHORE COREHOLES)
- INSUFICIENT SURFACE PLUG, INCLUDES LACK OF CEMENT AND USE OF WOODEN PLUGS
- INSUFFICIENT PRIMARY CEMENT OUTSIDE OF CASING STRINGS
- FAILURE TO REMOVE WELLHEAD, CASINGS,& CAISSONS TO PROPER DEPTH BELOW MUDLINE OR GRADE
- FAILURE TO REMOVE CAISSONS OR DERRICK SUPPORT STRUCTURES
- FAILURE TO COMPLETELY REMOVE DEBRIS FROM WELL AREA (OFFSHORE WELLS)
- Indication/observation of well fluid or gas seepage

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TYPICAL ISSUES THAT COMPLICATE PLANNING AND PROJECT EXECUTION:

- SITE ACCESS FOR EQUIPMENT AND PERSONNEL(WETLANDS, BEACH AND BERM ACCESS ROUTES)
- SEASONAL AND OPERATIONAL RESTRICTIONS AT WORK SITE DUE TO SENSITIVE SPECIES.
- LIMITED HISTORICAL WELL DATA
- THE DETERMINATION OF THE CAUSE AND REQUIRED CORRECTIVE ACTIONS WHEN SEEPAGE OR BUBBLES HAVE BEEN DETECTED .
- RE-ENTRY INTO OLDER WELLS IS DIFFICULT AND SHOULD BE CAREFULLY WEIGHED AGAINST POTENTIAL DAMAGE TO FRAGILE EQUIPMENT OR THE ENVIRONMENT
- AVAILABILITY OF SPECILIZED EQUIPMENT ON WEST COAST DEPENDING UPON WATER DEPTH (SLEDS, CRANE/DERRICKBARGES, JACK-UP RIGS ETC.)
- DETERMINATION OF ACCURATE BUDGETS/SCHEDULES (DUE TO UNFORESEEN DELAYS AND UNKNOWNS).

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MINIMUM ABANDONMENT STANDARDS:

- CEMENT PLUG ACROSS & 100' ABOVE PRODUCING ZONES
- CEMENT PLUG ACROSS & 100' ABOVE AND BELOW PRODUCTION AND SURFACE CASING LAPS
- SUFFICIENT CEMENT OUTSIDE OF CASING STRINGS TO ISOLATE HYDROCARBON BEARING STRATA FROM SURFACE
- WATER SHUT OFF (WSO) AT BASE OF USABLE FRESH WATER FOR LAND AND TIDAL ZONE WELLS
- 25' (or more in offshore wells) CEMENT SURFACE PLUG
- INERT MUD OF SUFFICIENT DENSITY TO CONTROL WELL PRESSURE BETWEEN ALL CEMENT PLUGS
- REMOVE WELLHEAD AND CASING TO A DEPTH NOT TO EXCEED 5' BELOW MUDLINE OR GRADE

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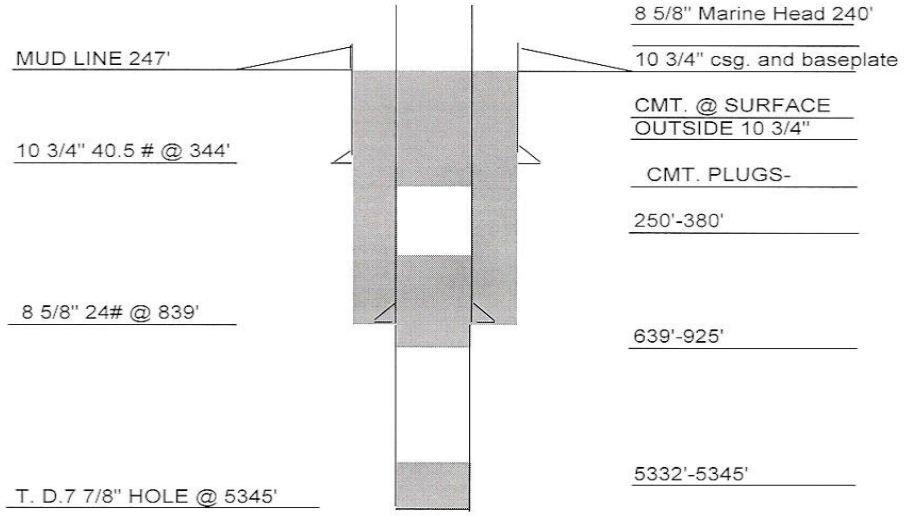
OFFSHORE WELL THAT REQUIRES RE-ABANDONEMNT

PAULEY PETROLEUM, INC.
CORE HOLE # 7B-19

LOCATION X= 1,346,304 Y= 349,600 LAMBERT ZONE 5
WATER DEPTH 224' RKB 23' ABOVE SEA LEVEL

CURRENT CONDITION

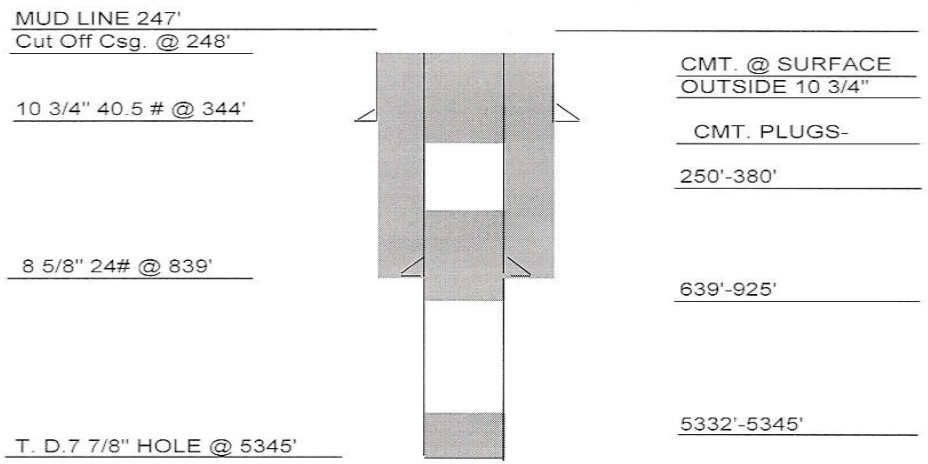


PREVENTION FIRST 2006
WELL RE-ABANDONMENT
PROPERLY ABANDONED OFFSHORE WELL

PAULEY PETROLEUM, INC.
CORE HOLE # 7B-19

LOCATION X= 1,346,304 Y= 349,600 LAMBERT ZONE 5
WATER DEPTH 224' RKB 23' ABOVE SEA LEVEL

PROPOSED CONDITION



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WELL RE-ABANDONMENT
EXAMPLE OF LOCATING NEARSHORE/SURFZONE WELLHEAD

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PREVENTION FIRST 2006
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EXAMPLE OF DAMAGED CASING ON SURFZONE WELL

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ELLWOOD FIELD WELL CONDUCTER WITHIN PIER STRUCTURE

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PREVENTION FIRST 2006
WELL RE-ABANDONMENT
SLIP ON WELLHEAD INSTALLED ON CLEAN CASING STUB

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WELL RE-ABANDONMENT

RIG
&
RIGLESS

APROACHES
TO WELL ACCESS AND
DOWNHOLE/SURFACE
RE-ABANDONMENT OPERATIONS

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PREVENTION FIRST 2006
WELL RE-ABANDONMENT
SNUBBING UNIT USED AT BOLSA CHICA & PLANNED FOR USE @ GOLETA BEACH

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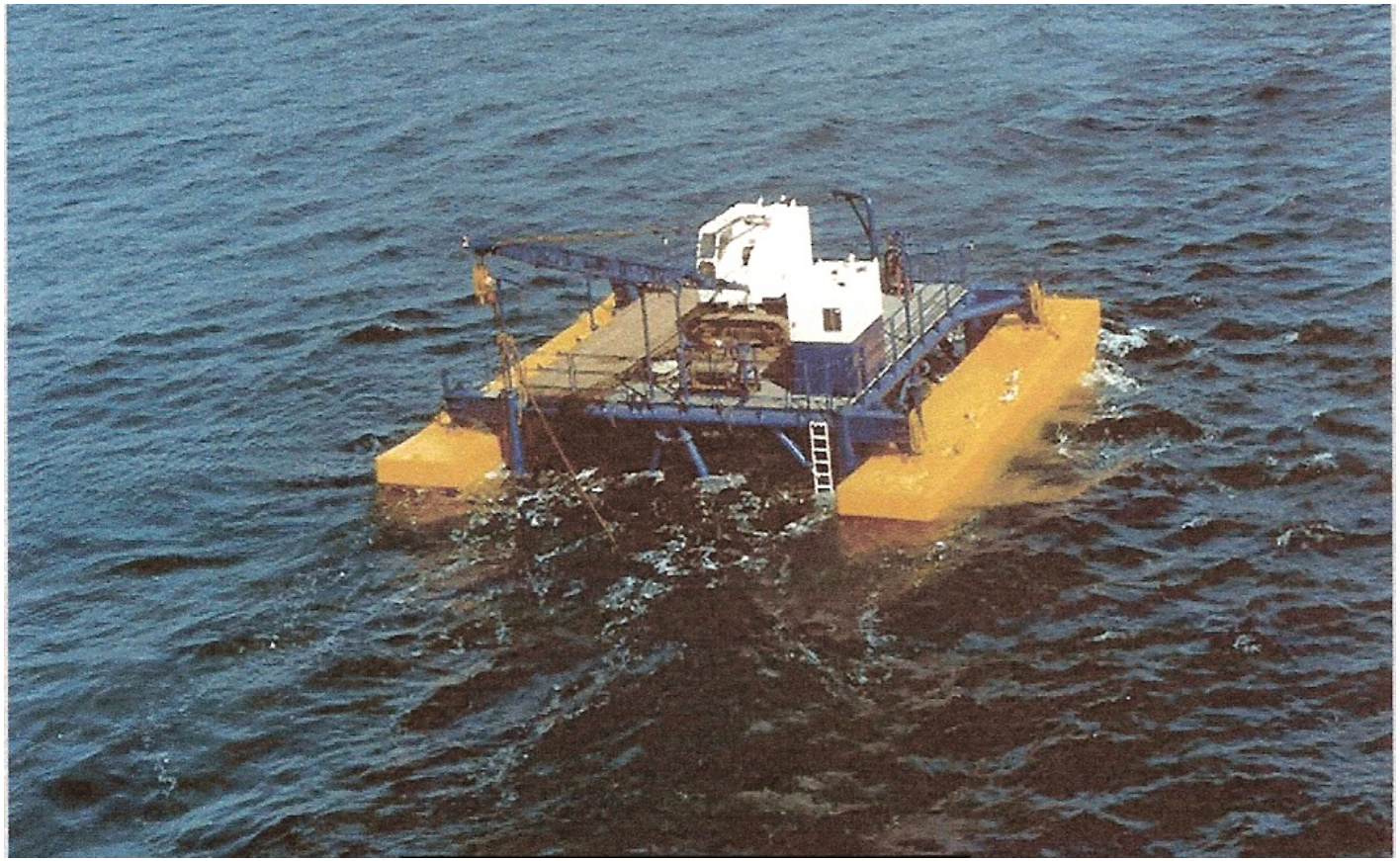
PREVENTION FIRST 2006
WELL RE-ABANDONMENT

OFFSHORE SURF SLED USED IN SUMMERLAND



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PREVENTION FIRST 2006
WELL RE-ABANDONMENT
OFFSHORE SURF SLED USED IN SUMMERLAND

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PREVENTION FIRST 2006
WELL RE-ABANDONMENT
OFSHORE SURF SLED USED IN SUMMERLAND

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WELL RE-ABANDONMENT

GLOMAR ADRIATIC IV JACKUP RIG USED FOR SWARS PROJECT

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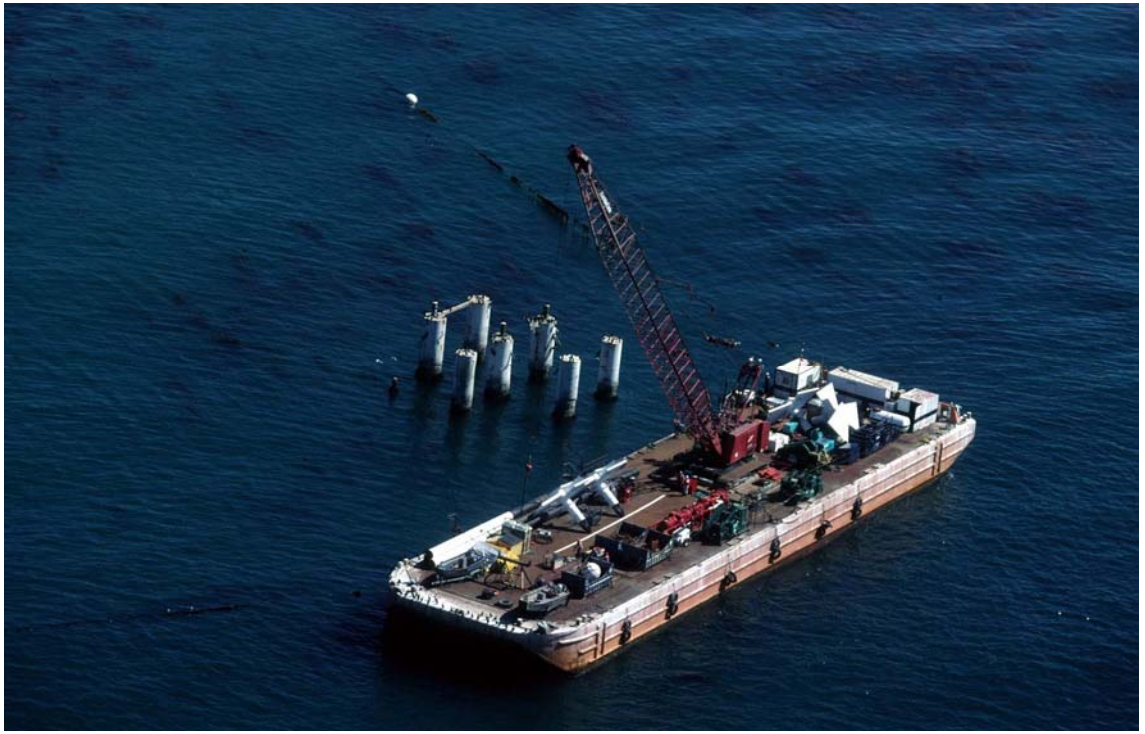
USE OF CRANE BARGE TO ASSIST IN WELL RE-ABANDONMENT



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TYPICAL 4 POINT MOORED DIVE SERVICE VESSEL

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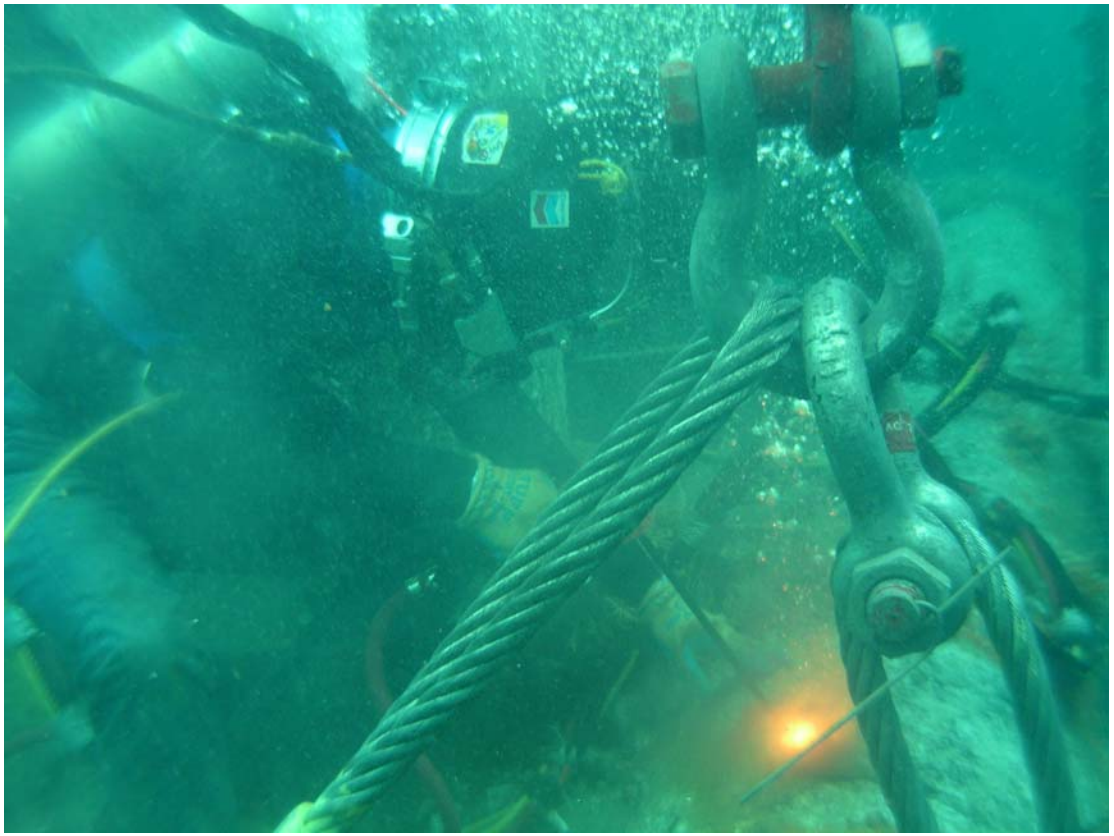
PREPARATION FOR SUBSEA INTERVENTION USING DIVERS



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WELL RE-ABANDONMENT

SUMMARY & CONCLUSIONS:

- ACCESS TO WELL IS USUALLY LIMITED
- WETLANDS/BEACH ACCESS AND SENSITIVE SPECIES ISSUES EXTEND PLANNING TIME AND OVERALL PROJECT COST
- LOCATING WELLHEAD CAN BE DIFICULT AND COSTLY
- CONDITION OF WELLHEAD IS TYPICALLY UNKNOWN UNTIL SUCH TIME AS THE WELL IS LOCATED AND INSPECTED (ADDS COST BECAUSE TYPICAL JOB PLANNING IS LIMITED UNTIL JOB HAS STARTED)
- EXTREME AND EXPENSIVE MEASURES MUST BE UNDERTAKEN FOR A LIMITED PROJECT SCOPE
- WELLS DRILLED TODAY SHOULD CONSIDER ABANDONMENT ISSUES DURING NEW WELL PLANNING TO BENEFIT FROM THE LESSONS LEARNED TO DATE

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