

PLATFORM INFORMATION

COOK INLET, ALASKA

Compiled by

Belmar Engineering, Redondo Beach, California

for the

Cook Inlet Regional Citizens Advisory Council

First Edition 1993

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INTRODUCTION

1. General

This document is a compendium of available information on the fifteen off-shore platforms that were installed in upper Cook Inlet from 1964 to 1986. The report was prepared by Belmar Engineering for the Cook Inlet Regional Citizens Advisory Council (Cook Inlet RCAC) as Task 1 of a study to compile background information of the Cook Inlet platforms and to examine the structural integrity of a number of sample platforms. The location and the current operators of the platforms are shown on Figure 1.

2. Data Sources

The information, including design data, photographs, drawings, and maps were obtained from the operating companies and from Belmar files.

3. Report Organization

The platforms are listed in the report in the sequence in which they were constructed. Tables 1, 2, 3 and 4 list the platforms by, respectively, installation date, alphabetical by name, alphabetical by field name, and by operator.

4. Data Sheet Information

The information that is condensed on the data sheets includes general information regarding the design, fabrication, installation and operation of each platform. Environmental design criteria that were used for the design are listed. Summary information is included regarding any modifications that have been made to the topsides and whether or not the structure has been re-assessed. Also included is information regarding the corrosion protective systems and information regarding API RP 2A underwater inspections.

5. Glossary

A glossary of the terminology used in this compendium is included on page 5 of the introduction.

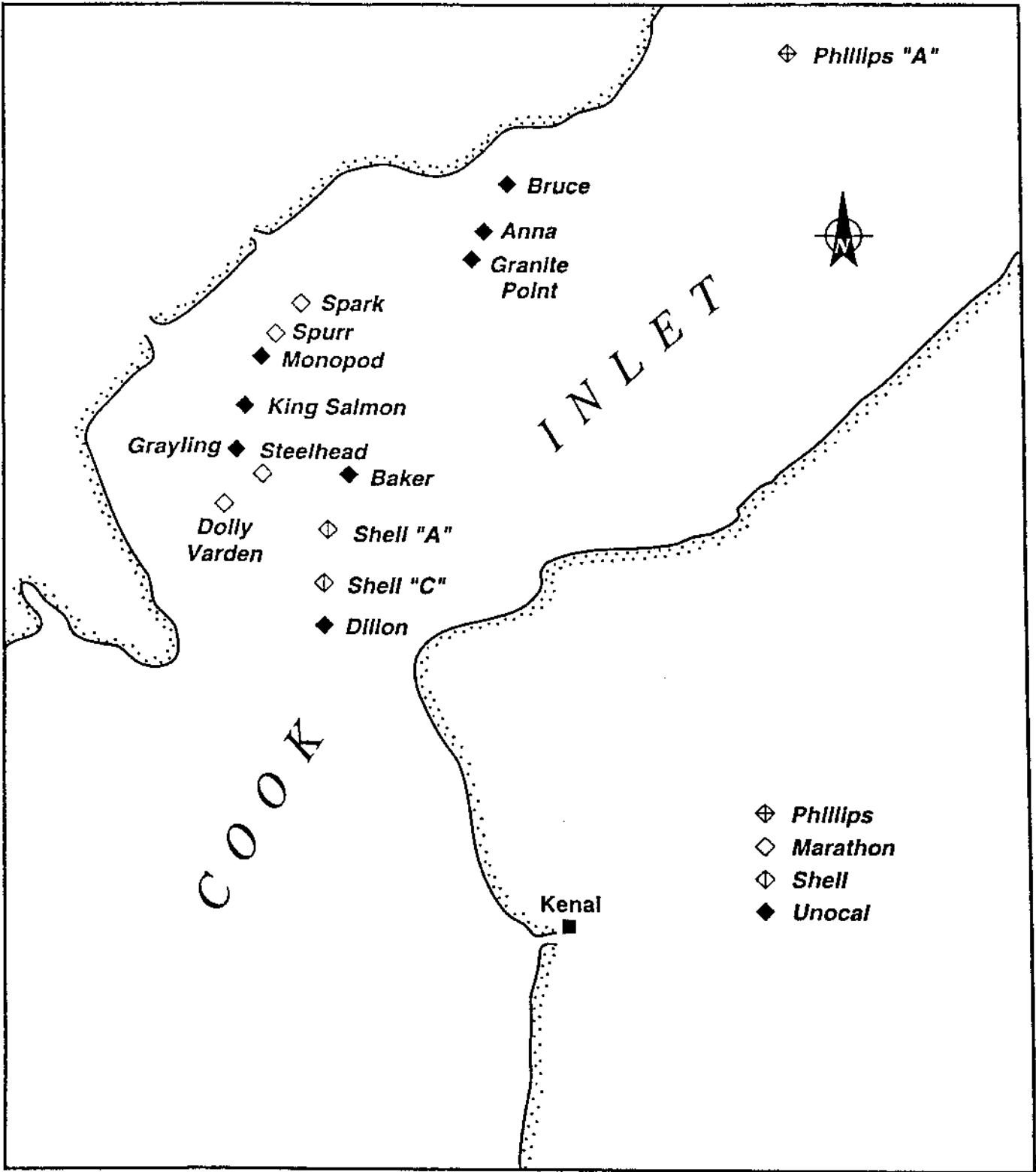


Figure 1. Cook Inlet platform location map

Table 1. Sequenced by platform installation date.

1.	Middle Ground Shoal	Platform A	1964
2.	Middle Ground Shoal	Platform Baker	1965
3.	Granite Point	Platform Granite Point	1966
4.	Trading Bay	Platform Monopod	1966
5.	Granite Point	Platform Anna	1966
6.	Granite Point	Platform Bruce	1966
7.	Middle Ground Shoal	Platform Dillon	1966
8.	Middle Ground Shoal	Platform C	1967
9.	McArthur River	Platform King Salmon	1967
10.	McArthur River	Platform Grayling	1967
11.	McArthur River	Platform Dolly Varden	1967
12.	North Cook Inlet	Platform Tyonek	1968
13.	Trading Bay	Platform Spurr	1968
14.	Trading Bay	Platform Spark	1968
15.	McArthur River	Platform Steelhead	1986

Table 2. Alphabetical by platform name.

A	Middle Ground Shoal	1
Anna	Granite Point	5
Baker	Middle Ground Shoal	2
Bruce	Granite Point	6
C	Middle Ground Shoal	8
Dillon	Middle Ground Shoal	7
Dolly Varden	McArthur River	11
Granite Point	Granite Point	3
Grayling	McArthur River	10
King Salmon	McArthur River	9
Monopod	Trading Bay	4
Spark	Trading Bay	14
Spurr	Trading Bay	13
Steelhead	McArthur River	15
Tyonek	North Cook Inlet	12

Table 3. Alphabetical by field name.

Granite Point.....	Platform Anna	5
Granite Point.....	Platform Bruce	6
Granite Point.....	Platform Granite Point	3
McArthur River	Platform Dolly Varden	11
McArthur River	Platform Grayling	10
McArthur River	Platform King Salmon	9
McArthur River	Platform Steelhead.....	15
Middle Ground Shoal.....	Platform A	1
Middle Ground Shoal	Platform Baker	2
Middle Ground Shoal.....	Platform C	8
Middle Ground Shoal.....	Platform Dillon.....	7
North Cook Inlet.....	Platform Tyonek.....	12
Trading Bay.....	Monopod.....	4
Trading Bay.....	Platform Spark.....	14
Trading Bay.....	Platform Spurr	13

Table 4. Sorted by operator.

Marathon.....	McArthur River.....	Dolly Varden	11
Marathon.....	McArthur River.....	Steelhead.....	15
Marathon.....	Trading Bay	Spark.....	14
Marathon.....	Trading Bay	Spurr	13
Phillips.....	North Cook Inlet.....	Tyonek.....	12
Shell.....	Middle Ground Shoal.....	Platform A.....	1
Shell.....	Middle Ground Shoal.....	Platform C.....	8
Unocal.....	Granite Point.....	Anna	5
Unocal.....	Granite Point.....	Bruce.....	6
Unocal.....	Granite Point.....	Granite Point.....	3
Unocal.....	McArthur River.....	Grayling.....	10
Unocal.....	McArthur River.....	King Salmon	9
Unocal.....	Middle Ground Shoal.....	Baker.....	2
Unocal.....	Middle Ground Shoal.....	Dillon.....	7
Unocal.....	Trading Bay	Monopod	4

GLOSSARY

AISC.....	American Institute of Steel Construction
API.....	American Petroleum Institute
API RP 2A.....	Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms
Cantilever	Platform deck extension buttressed by a support frame
fps.....	Feet per second
kips.....	Kilopounds, i.e., one thousand pounds
ksi	Kips per square inch
MLLW	Mean Low Low Water
psi.....	Pounds per square inch
Seismic ground motion.....	Horizontal ground acceleration due to an earth- quake
Shadow effect.....	Front legs take the brunt of the ice load.
UBC.....	Uniform Building Code

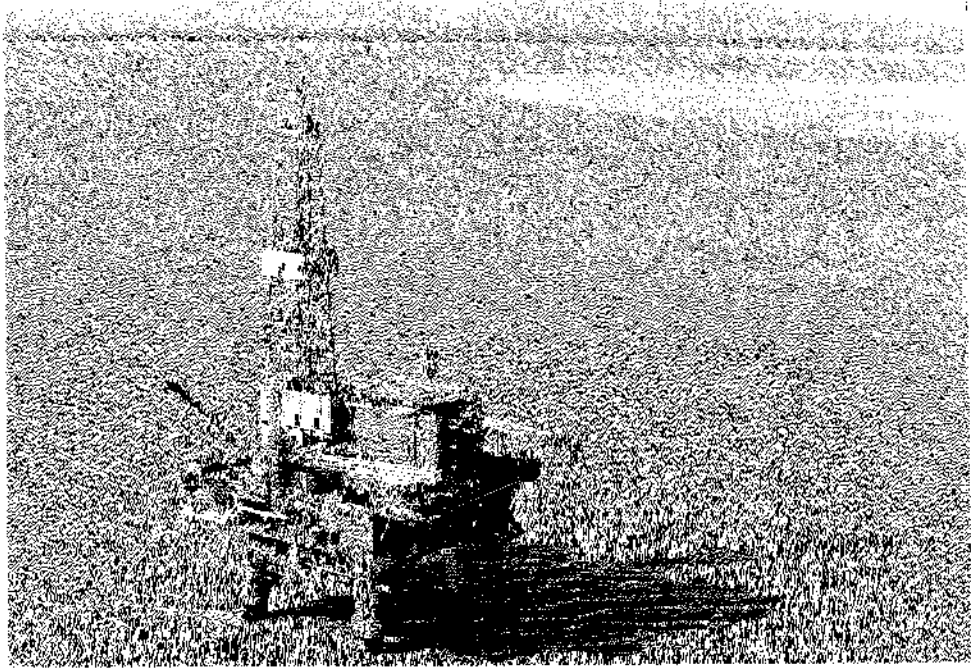
PLATFORM A

MIDDLE GROUND SHOAL FIELD

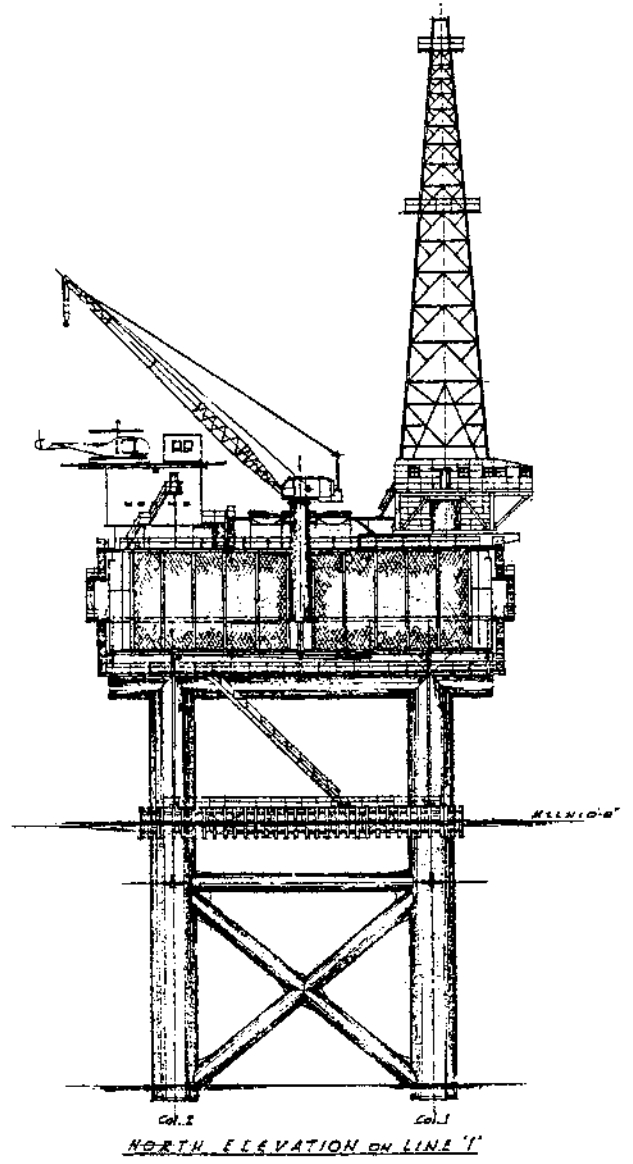
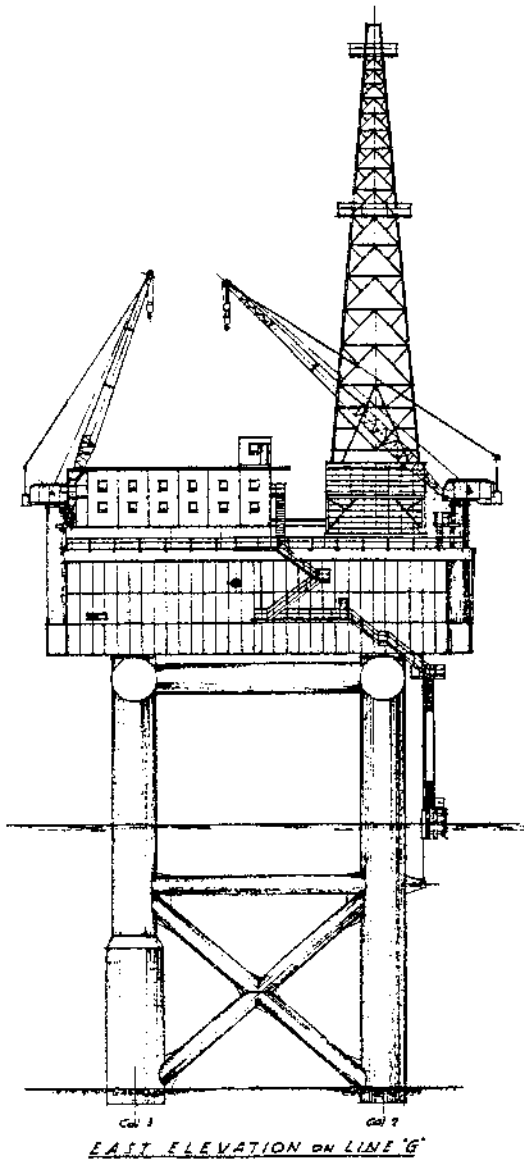
INSTALLED 1964

MGS Platform A

1. *Field name:*.....Middle Ground Shoal field
 2. *Platform operator:*.....Shell Western E&P Inc.
 3. *Platform owners:*.....Shell Western E&P Inc.
 4. *Original operator:*.....Shell
 5. *Structural design firm:*.....Earl & Wright
 6. *Fabrication yard (structure):*.....Kaiser Steel in Oakland, California
 7. *Installation year and contractor:*.....1964, Kaiser Steel
 8. *Waterdepth (at MLLW):*.....83 feet
 9. *Number and diameter of legs:*.....Four legs; 14.5 feet diameter. Legs 3 and 4 bell out to 18.5 feet diameter below minus 29 feet MLLW.
 10. *Number, size and penetration of piling:*.....Thirty two 32-inch diameter piling with 30 feet penetration
 11. *Number, size and penetration of inner piling:*.....Thirty two 24-inch diameter with 120 feet penetration
 12. *Method of installation (driven, drilled, combination):*..... 32-inch driven, 24-inch drilled
 13. *Length of grouted interval in legs:*.....From -20 to +36 ft MLLW
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....AISC; Zone 3 UBC (1961)
-
15. *Number of completed wells in each leg through piling:*..... Eight wells in each of legs 1, 2 and 4
 16. *Other completed wells in each leg:*..... None
 17. *Top girders used as storage tanks ?*..... Yes
 18. *If so, what type of liquid:*..... Diesel fuel
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*..... 6 ft on two front legs, 3 ft on two back legs; 300 psi
 - (2) *Wave height and period:*..... 41.5 feet with a 10.8 second period
 - (3) *Wind:*..... 65 mph with 100 mph gusts
 - (4) *Earthquake:*..... 0.15 g per UBC 1961, Zone 3
 - (5) *Temperature:*..... Minus 38° F above water, plus 28° F below water
 - (6) *Current:*..... 10 feet per second
 20. *Design considerations:*..... 20 year design life
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Yes, added lower deck in 1965, 40 x 30 foot gas compressor cantilever and 12 x 30 radiator cantilever in early 1970's, new quarters building and drilling rig in 1989.
 23. *Any significant structural damage incidents ?*.....In 1971 the six foot horizontal brace between legs 1 and 4 was sheared off due to an iceberg becoming trapped inside the tower frame. The brace was replaced the same year. Reference: 1975 OTC paper 2165.
 24. *Has platform structural design been re-assessed ?*.....Yes
 25. *If so, by whom and for what reason:*.....In 1971 by Earl & Wright and by Shell Head Office Civil Engineering to analyze consequences of loss of horizontal brace. In 1988 by Earl & Wright to review adequacy of deck structure. In 1993 dynamic analysis by Shell HOCE for new drilling program
-
26. *Type of steel used; above water and below water:*.....Lukens Lt-75-QT and Sheffield Super-Lo-Temp where low temperature steel required. A-36 elsewhere.
 27. *Steel corrosion allowance used:*.....None initially. Corrosion wraps added in 1965 and 1966 through the tidal zone on all four legs.
 28. *Type of cathodic protection:*.....Impressed current system
-
29. *Dates and API RP 2A levels of underwater inspection:*.....Level II in 1971 and 1978. Level III in 1978, 1983 and 1988.



MGS Platform "A" with new quarters and drilling rig.



Elevations of MGS Platform A with original quarters and drilling rig.
 Note the adjustable boat landing which was removed during
 the first year of operation.

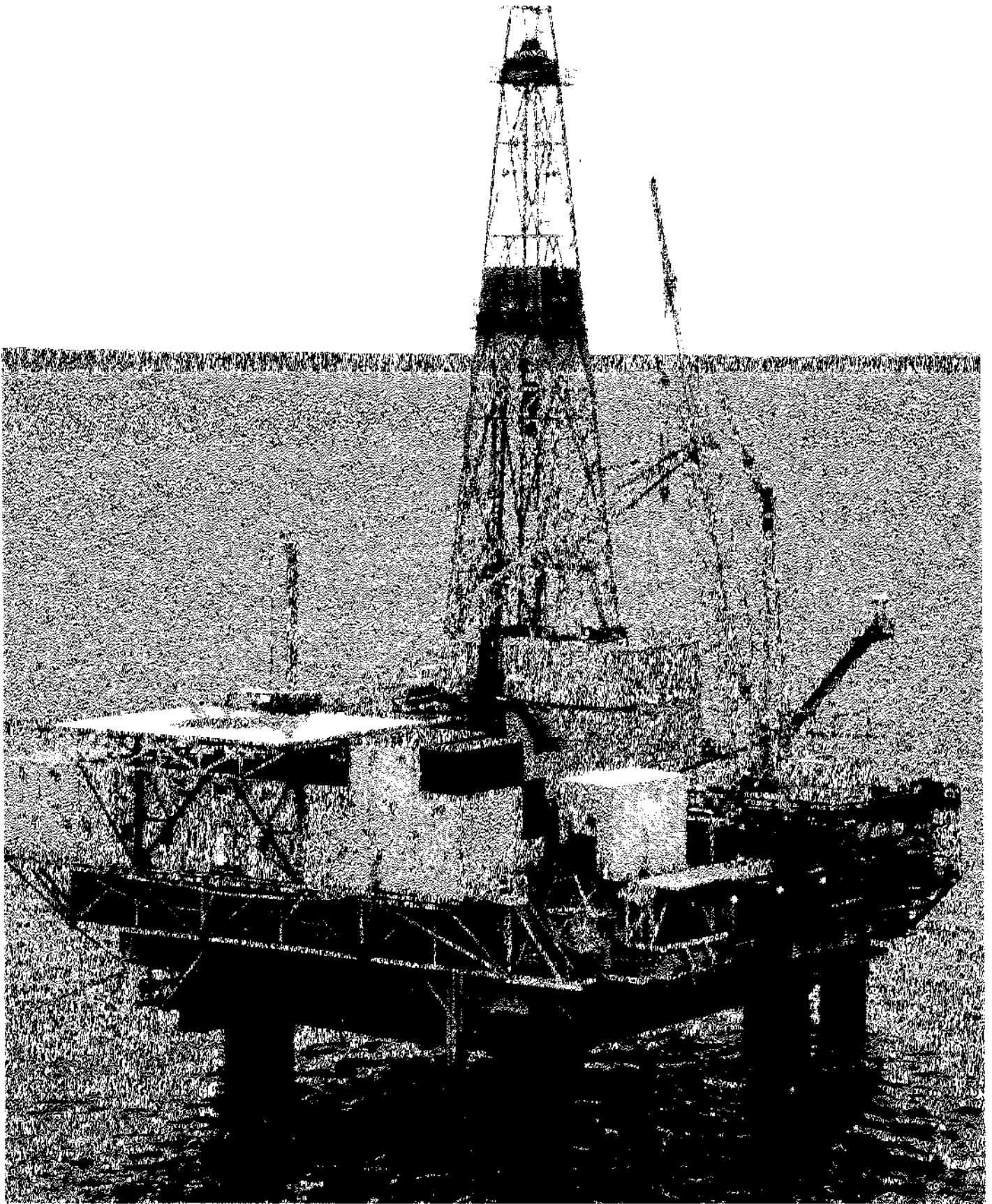
PLATFORM BAKER

MIDDLE GROUND SHOAL FIELD

INSTALLED 1965

Platform Baker

1. *Field name:*.....Middle Ground Shoal field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Unocal
 4. *Original operator:*.....Amoco
 5. *Structural design firm:*.....Earl & Wright/McDermott
 6. *Fabrication yard (structure):*.....Kaiser Steel, Oakland, California
 7. *Installation year and contractor:*.....1965; McDermott
 8. *Waterdepth (at MLLW):*.....102 feet
 9. *Number and diameter of legs:*.....Four legs; 14 feet diameter, one well protector leg
 10. *Number, size and penetration of piling:*.....Thirty two 33 inch diameter piling with 85 feet penetration. Each leg has seven piles in an outer ring and one pile in the center.
 11. *Number, size and penetration of inner piling:*.....None
 12. *Method of installation (driven, drilled, combination):*.....Combination
 13. *Length of grouted interval in legs:*.....136 feet
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....Three legs have respectively 5 wells, 7 wells, and 5 wells. One leg does not have any wells.
 16. *Other completed wells:*.....One well in the well protector leg.
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Potable water, drill water, produced water, diesel fuel, crude oil, power oil.
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Front legs 120 kips/ft of diameter, back legs 50 kips/ft
 - (2) *Wave height and period:*.....30 feet with 9 second period
 - (3) *Wind:*.....80 mph above elevation 25 feet
 - (4) *Earthquake:*.....0.1 g seismic ground motion
 - (5) *Temperature:*.....
 - (6) *Other:*.....3900 kips per leg impact load. Seismic, ice and current loads applied simultaneously.
 20. *Design considerations:*.....Shadow effect
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Quarters extension and Sea King crane.
 23. *Any significant structural damage incidents ?*.....None (there was a 1968 or 1969 tank explosion)
 24. *Has platform structural design been re-assessed ?*.....Yes, 1993
 25. *If so, by whom and for what reason:*.....Hopper & Associates; Acquisition by Unocal from Amoco, planned drilling program and evaluation of non-low temperature steel concerns.
-
26. *Type of steel used; above water and below water:*.....A-537 Sheffield in critical areas above water; 50 MV below water.
 27. *Steel corrosion allowance used:*.....An 1/2 inch thick A-36 wear plate in the tidal zone.
 28. *Type of cathodic protection:*.....Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*.....Annual - cathodic protection surveys. 1992 - Level III scour and flooded member surveys.



Platform Baker in the Middle Ground Shoal field.

Installed 1965
 Designed by Earl & Wright
 Jacket Wt. 2533 tons

8 Piles per leg 33" dia.
 Penetration 85'

Leg dia. 14.0'

Wind Speed
 80 mph above 25' elev.

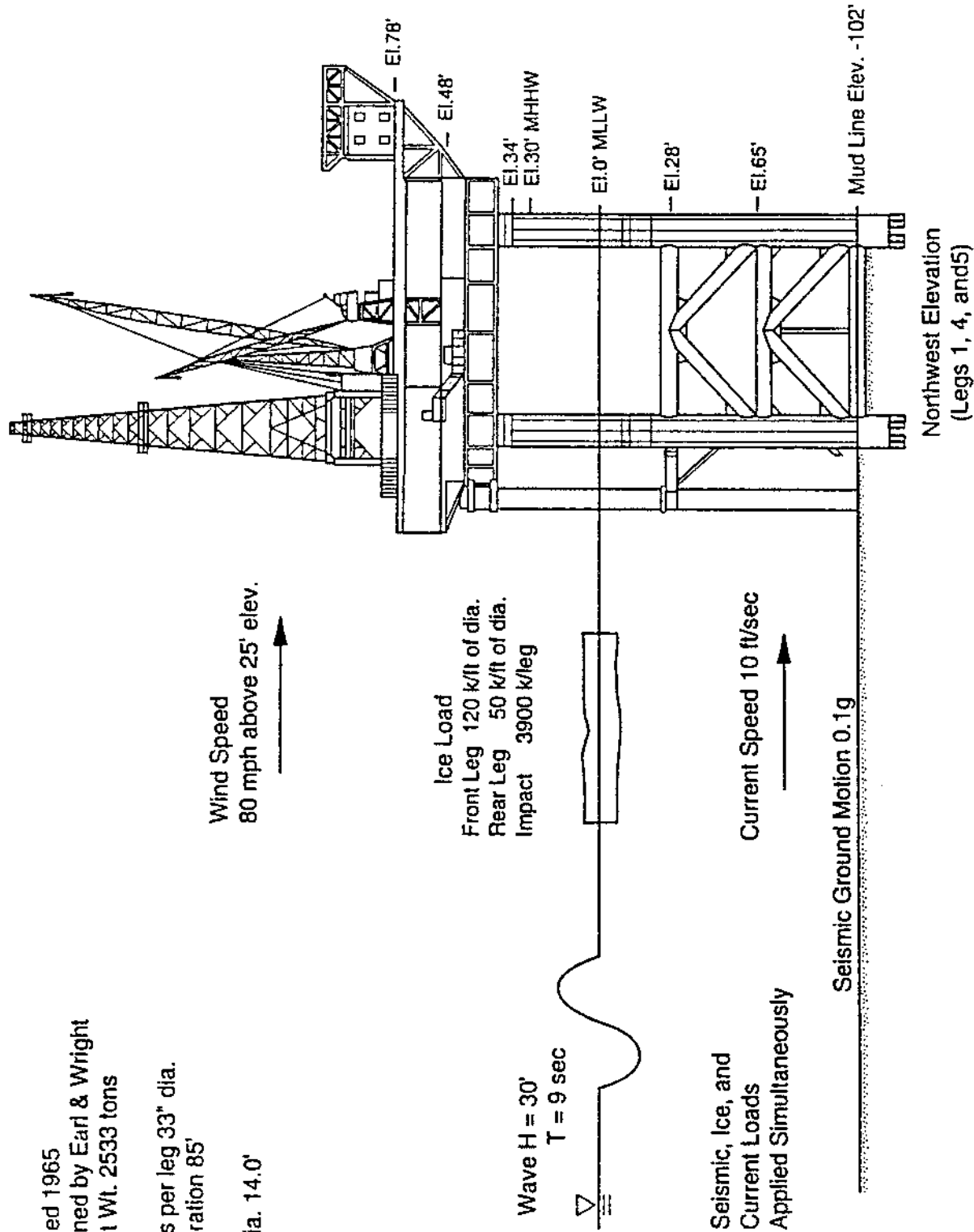
Ice Load
 Front Leg 120 k/ft of dia.
 Rear Leg 50 k/ft of dia.
 Impact 3900 k/leg

Wave H = 30'
 T = 9 sec

Seismic, Ice, and
 Current Loads
 Applied Simultaneously

Current Speed 10 ft/sec

Seismic Ground Motion 0.1g



Northwest Elevation
 (Legs 1, 4, and 5)

Elevation of MGS field platform Baker. Note the fifth leg which contains one well.

PLATFORM GRANITE POINT

GRANITE POINT FIELD

INSTALLED 1966

Platform Granite Point

1. *Field name:*.....Granite Point field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Mobil and Unocal
 4. *Original operator:*.....Mobil
 5. *Structural design firm:*.....Brown & Root
 6. *Fabrication yard (structure):*.....Kaiser Steel, Oakland, California
 7. *Installation year and contractor:*.....1966; Brown & Root
 8. *Waterdepth (at MLLW):*.....75 feet
 9. *Number and diameter of legs:*.....Four legs; 17 feet diameter
 10. *Number, size and penetration of piling:*.....Twelve piles per leg; 33 inch diameter; driven to 40 feet
 11. *Number, size and penetration of inner piling:*.....Twelve piles per leg; 26 inch diameter; driven to 105 feet
 12. *Method of installation (driven, drilled, combination):*.....Driven
 13. *Length of grouted interval in legs:*.....137 feet
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....Leg 1 - nine wells; Leg 3 - eleven wells;
No wells in Legs 2 and 3
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Potable water; drill water; Cook Inlet water; diesel fuel;
crude oil.
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Five foot thick; 43.2 ksi/ft
 - (2) *Wave height and period:*.....28 feet
 - (3) *Wind:*.....Not available
 - (4) *Earthquake:*.....
 - (5) *Temperature:*.....Minus 38° F to plus 70° F
 - (6) *Current:*.....Current speed 8 knots
 20. *Design considerations:*.....
-
21. *Unusual circumstances during installation ?*.....Platform adrift prior to setting down.
 22. *Significant modification or additions to topsides:*.....Added waterflood; currently expanding waterhandling
capacity.
 23. *Any significant structural damage incidents ?*.....None
 24. *Has platform structural design been re-assessed ?*.....No
 25. *If so, by whom and for what reason:*.....
-
26. *Type of steel used; above water and below water:*.....Above water A-537; below water A-36
 27. *Steel corrosion allowance used:*.....½ inch corrosion wrap through the tidal zone.
 28. *Type of cathodic protection:*.....Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*.....None
-



View of Granite Point platform in the Granite Point field.

Installed 1966
 Designed by Brown & Root
 Jacket Wt. 3400 tons
 3 Primary Deck Trusses 500 tons each
 12 Piles per leg 33" dia.
 Penetration 40' 26" insert
 Piles driven to 105' penetration

Wind Speed ?

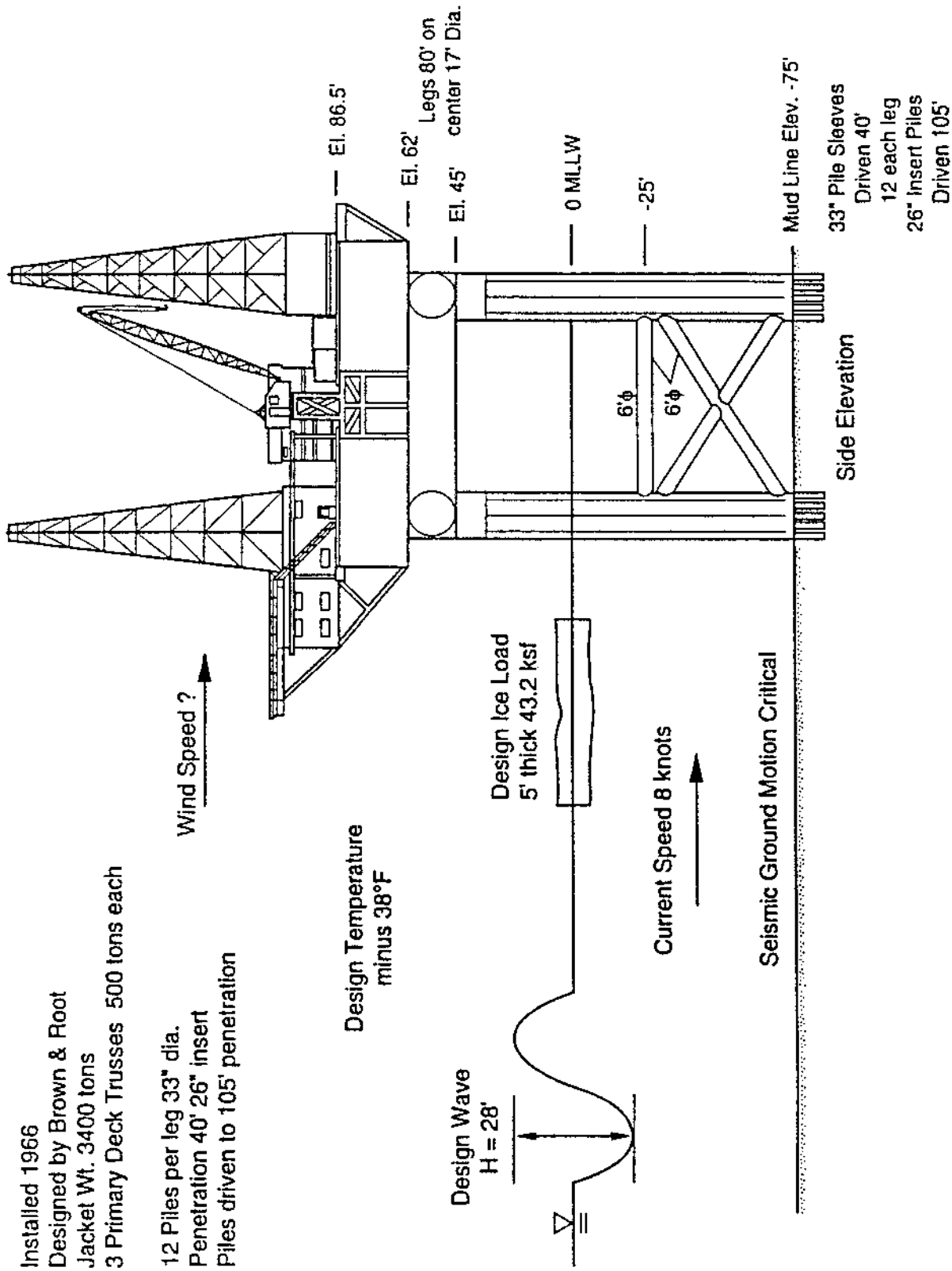
Design Temperature
minus 38°F

Design Wave
H = 28'

Design Ice Load
5' thick 43.2 ksf

Current Speed 8 knots

Seismic Ground Motion Critical



Elevation view and summary details of platform Granite Point.

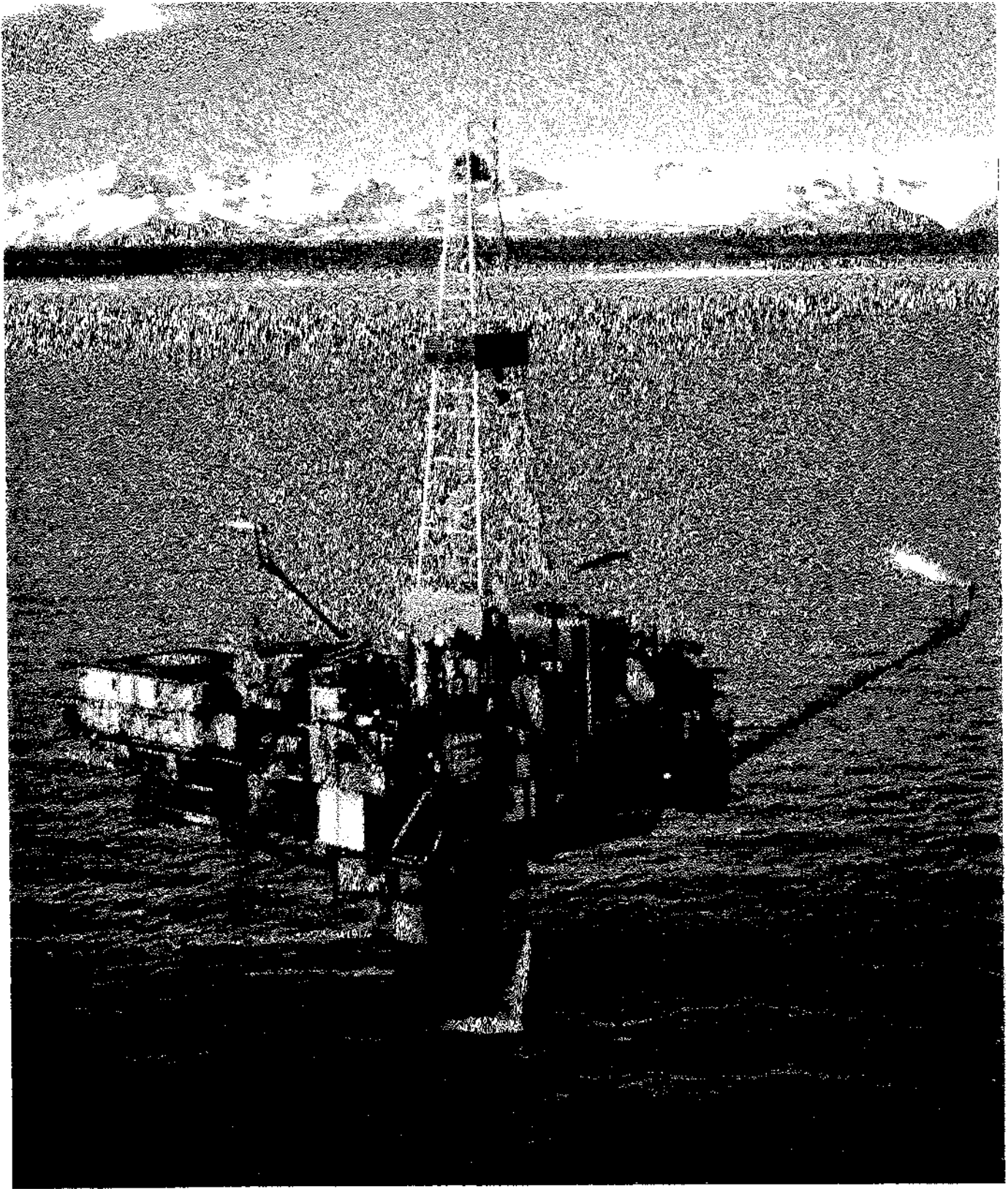
MONOPOD PLATFORM

TRADING BAY FIELD

INSTALLED 1966

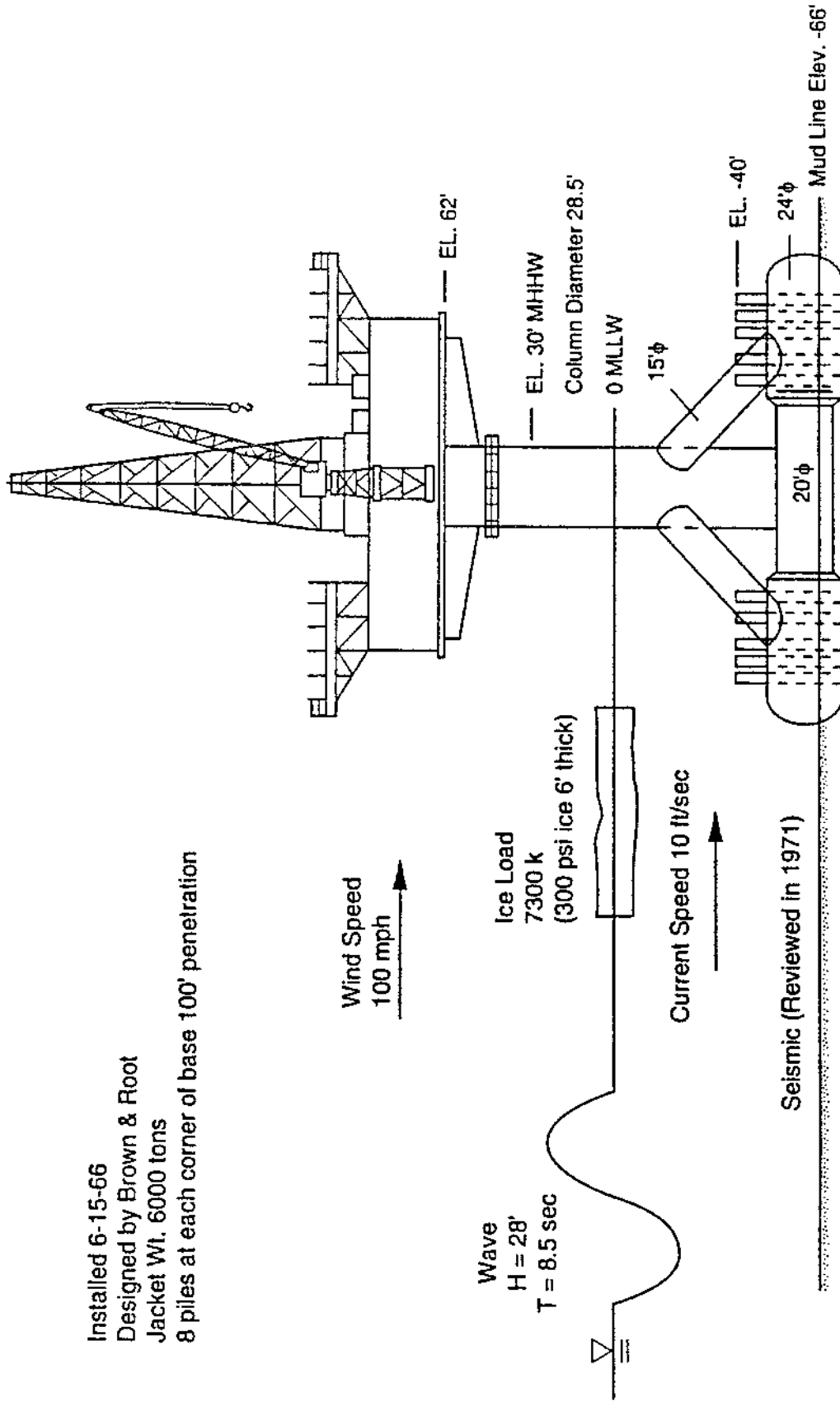
Platform Monopod

1. *Field name:*.....Trading Bay field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Unocal & Marathon
 4. *Original operator:*.....Unocal
 5. *Structural design firm:*.....Brown & Root
 6. *Fabrication yard (structure):*.....American Pipe & Construction, Vancouver, Washington
 7. *Installation year and contractor:*.....1966; Brown & Root
 8. *Waterdepth (at MLLW):*.....66 feet
 9. *Number and diameter of legs:*.....One leg, 28.5 feet in diameter
 10. *Number, size and penetration of pontoon piling:*.....32 piles; 36 inch diameter with 101 feet penetration
 11. *Number, size and penetration of leg piling:*.....32 conductor piles; 20 inch diameter with 97 feet penetration
 12. *Method of installation (driven, drilled, combination):*.....Driven
 13. *Length of grouted interval in legs:*.....Center leg has 33 feet of grout
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....32
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Diesel fuel
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Six feet; 300 psi (7300 kips)
 - (2) *Wave height and period:*.....28 feet with 8.5 second period
 - (3) *Wind:*.....100 mph
 - (4) *Earthquake:*.....0.1 g seismic ground motion
 - (5) *Temperature:*.....
 - (6) *Other:*.....
 20. *Design considerations:*.....Single caisson
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Added waterflood system
 23. *Any significant structural damage incidents ?*.....None
 24. *Has platform structural design been re-assessed ?*.....Yes, 1971, 1991 and 1993
 25. *If so, by whom and for what reason:*.....Brown & Root (1971 and 1991), Bea (1993); lack of redundancy.
-
26. *Type of steel used; above water and below water:*.....A-537 above water, A-36 below MLLW
 27. *Steel corrosion allowance used:*.....½ inch wear plate through tide zone.
 28. *Type of cathodic protection:*.....Impressed current anodes
-
29. *Dates and API RP 2A levels of underwater inspection:*.....1991 - Internal column thickness survey; 1993 - Level III underwater inspection.
-



Monopod platform in the Trading Bay field.

Installed 6-15-66
 Designed by Brown & Root
 Jacket Wt. 6000 tons
 8 piles at each corner of base 100' penetration



Max. Meas. Ice Load 45 k

Elevation view and summary details of the Monopod platform.

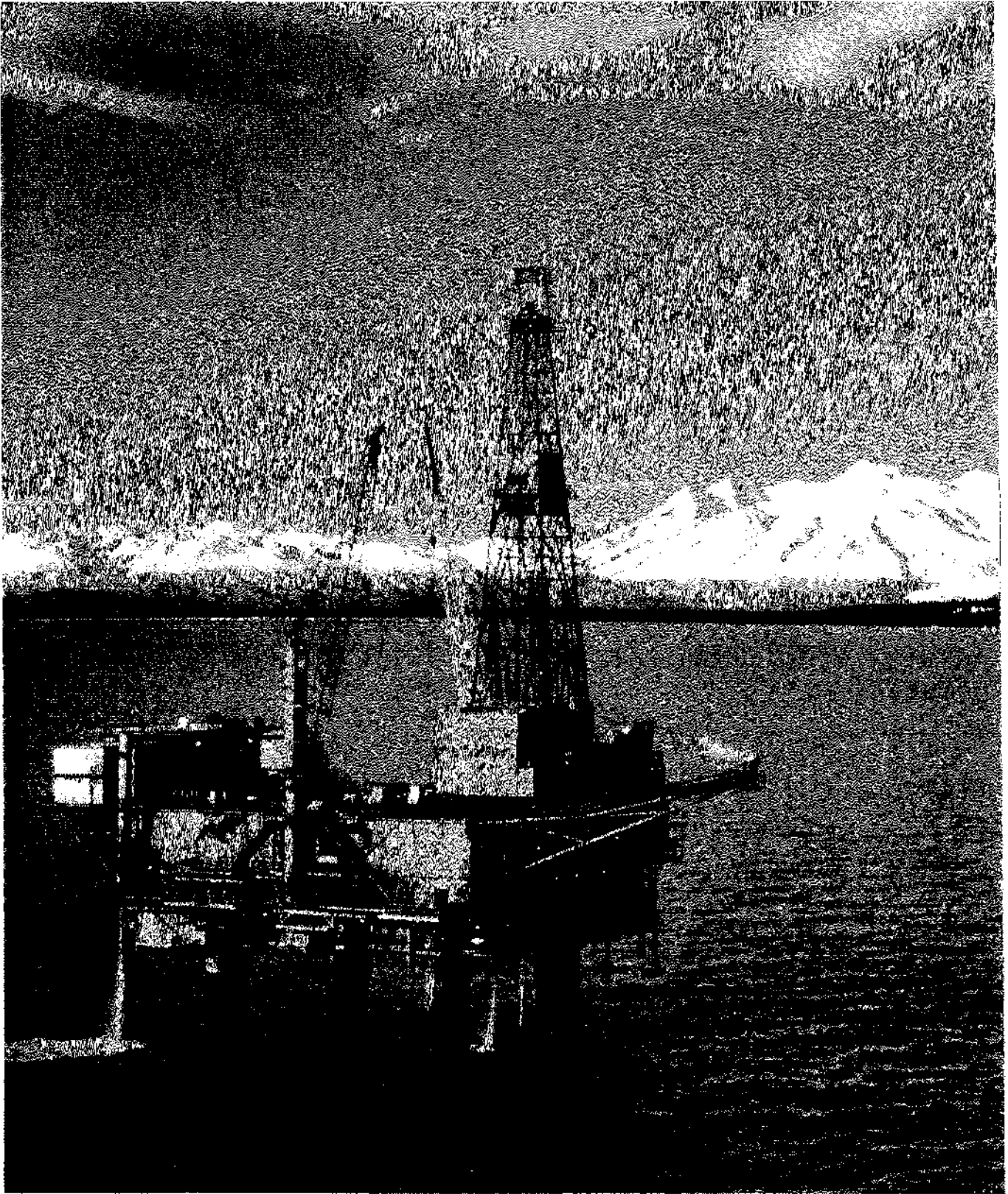
PLATFORM ANNA

GRANITE POINT FIELD

INSTALLED 1966

Platform Anna

1. Field name:.....Granite Point field
 2. Platform operator:.....Unocal
 3. Platform owner(s):.....Unocal
 4. Original operator:.....Amoco
 5. Structural design firm:.....Earl & Wright/McDermott
 6. Fabrication yard (structure):.....Kaiser Steel in Oakland, California
 7. Installation year and contractor:.....1966; McDermott
 8. Waterdepth (at MLLW):.....77 feet
 9. Number and diameter of legs:.....Four legs; 14 feet diameter
 10. Number, size and penetration of piling:.....Eight piles per leg; 30 inch diameter; 87 feet penetration.
 11. Number, size and penetration of inner piling:.....None
 12. Method of installation (driven, drilled, combination):.....Combination
 13. Length of grouted interval in legs:.....137 feet
 14. Design codes used (UBC, AISC, API RP 2A, etc):.....UBC, AISC
-
15. Number of completed wells in each leg through piling:.....Total of 26 wells, eight wells in three legs, two in one leg.
 16. Other completed wells in each leg:.....None
 17. Top girders used as storage tanks?.....Yes
 18. If so, what type of liquid:.....Drill water, potable water, produced water, diesel oil, power oil, crude oil.
-
19. Design criteria used:
 - (1) Ice thickness and strength:.....Front legs 120 kips/ft of diameter, back legs 50 kips/ft
 - (2) Wave height and period:.....30 feet with 9 second period
 - (3) Wind:.....80 mph above elevation 25 feet
 - (4) Earthquake:.....0.1 g seismic ground motion
 - (5) Temperature:.....
 - (6) Other:.....3900 kips per leg impact load, seismic, ice and current loads applied simultaneously.
 20. Design considerations:.....Shadow effect
-
21. Unusual circumstances during installation?.....None
 22. Significant modification or additions to topsides:.....Sea King crane
 23. Any significant structural damage incidents?.....Leg dents, ice damage due to a bad cement job. Grout replaced. Sixteen feet long sleeve installed in dented area all four legs. Sleeves grouted.
 24. Has platform structural design been re-assessed?.....Yes, 1993, Global platform assessment, module support structure and quarters support frame.
 25. If so, by whom and for what reason:.....Mc Dermott and ASCG; Chakachatna development (new rig) and evaluation of non-low temperature steel concerns.
-
26. Type of steel used; above water and below water:.....Low temperature steel above minus 8 feet; 50 MV steel below minus 8 feet.
 27. Steel corrosion allowance used:.....½ inch A-36 steel wear plate through tidal zone.
 28. Type of cathodic protection:.....Impressed current
-
29. Dates and API RP 2A levels of underwater inspection:.....1993 - Level III; 1990 - Cathodic protection survey.



Platform Anna in the Granite Point field.

Installed 1966
 Designed by Earl & Wright
 Jacket Wt. 1515 tons
 Deck Wt. 1200 tons

8 Piles per leg 30" dia.
 Penetration 87'
 Column & Beam Tank 14.0' dia.
 Horizontal Brace 4' dia.
 Vertical Diagonal Brace
 4.5' dia. (85' slide)
 4.0' dia. (70' slide)

Wind Speed
 80 mph above 25' elev.

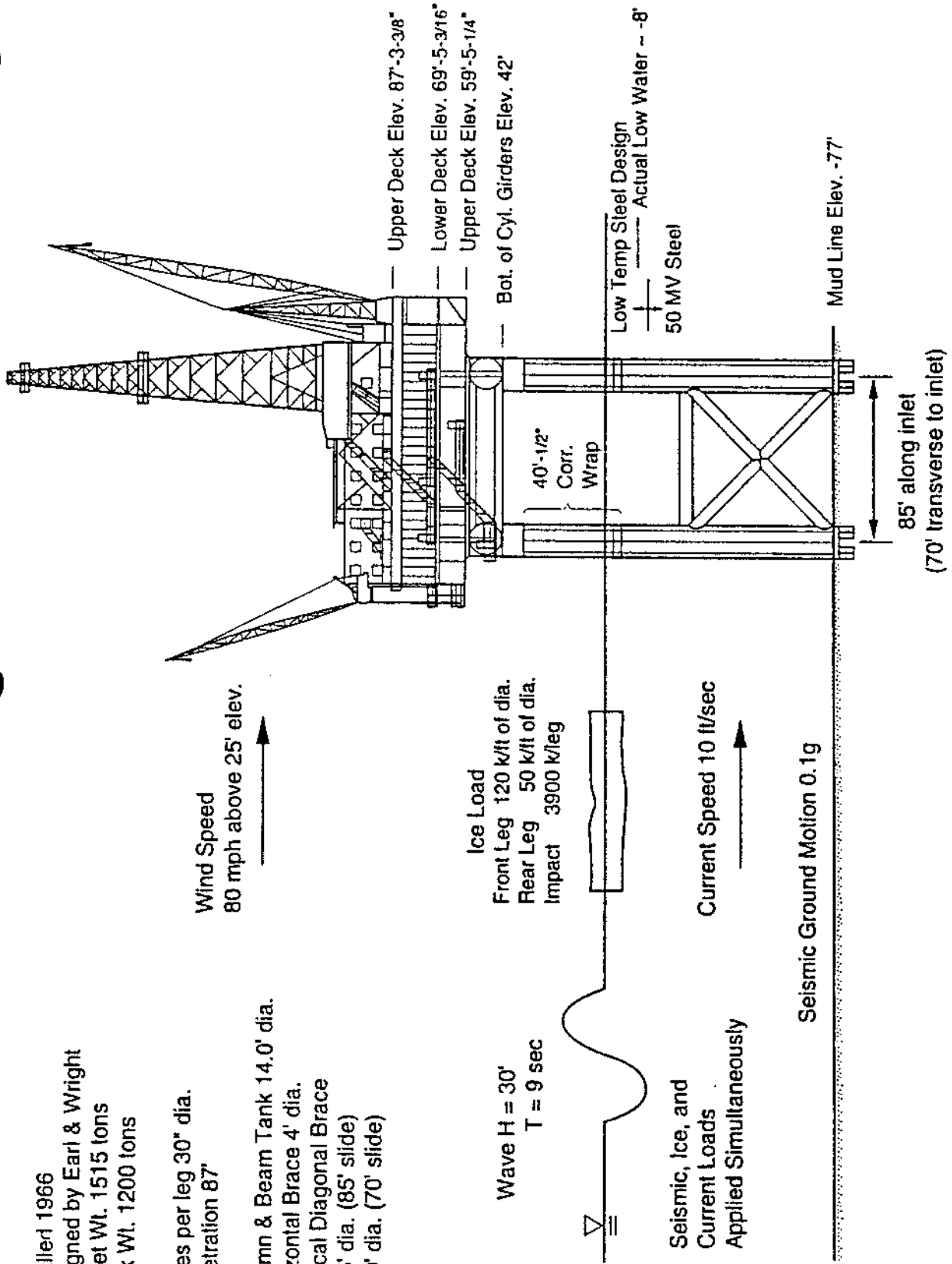
Wave H = 30'
 T = 9 sec

Ice Load
 Front Leg 120 k/ft of dia.
 Rear Leg 50 k/ft of dia.
 Impact 3900 k/leg

Seismic, Ice, and
 Current Loads
 Applied Simultaneously

Current Speed 10 ft/sec

Seismic Ground Motion 0.1g



Elevation view and summary details of platform Anna.

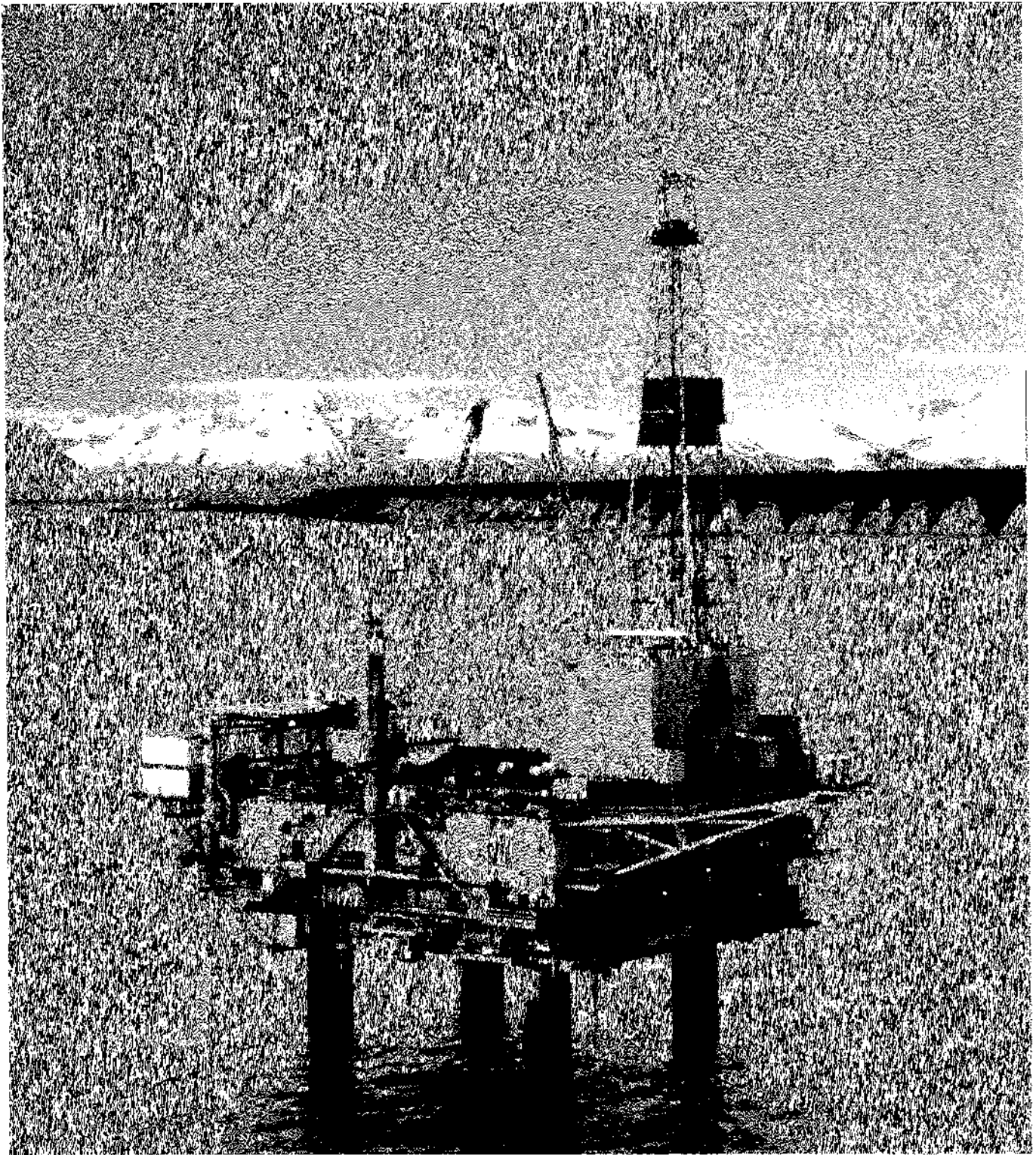
PLATFORM BRUCE

GRANITE POINT FIELD

INSTALLED 1966

Platform Bruce

1. *Field name:*.....Granite Point field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Unocal
 4. *Original operator:*.....Amoco
 5. *Structural design firm:*.....Earl & Wright/McDermott
 6. *Fabrication yard (structure):*.....Kaiser Steel in Oakland, California
 7. *Installation year and contractor:*.....1966; McDermott
 8. *Waterdepth (at MLLW):*.....62 feet
 9. *Number and diameter of legs:*.....Four legs; 14 feet diameter
 10. *Number, size and penetration of piling:*.....Eight piles per leg; 30 inch diameter; 65 feet penetration.
 11. *Number, size and penetration of inner piling:*.....None
 12. *Method of installation (driven, drilled, combination):*.....Combination
 13. *Length of grouted interval in legs:*.....122 feet
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....Leg 1 - 5 wells; Leg 2 - 1 well;
Leg 3 - 7 wells; Leg 4 - 5 wells.
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Drill water, potable water, produced water, diesel oil,
power oil, crude oil.
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Front legs 120 kips/ft of diameter, back legs 50 kips/ft
 - (2) *Wave height and period:*.....30 feet with 9 second period
 - (3) *Wind:*.....80 mph above elevation 25 feet
 - (4) *Earthquake:*.....0.1 g seismic ground motion
 - (5) *Temperature:*.....
 - (6) *Other:*.....3900 kips per leg impact load, seismic, ice and current
loads applied simultaneously.
 20. *Design considerations:*.....Shadow effect
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Sea King crane
 23. *Any significant structural damage incidents ?*.....None
 24. *Has platform structural design been re-assessed ?*.....Yes, 1993; Quarters support frame.
 25. *If so, by whom and for what reason:*.....McDermott; evaluation of non-low temperature steel
concerns.
-
26. *Type of steel used; above water and below water:*.....A-537 Sheffield above water; A-50 below water.
 27. *Steel corrosion allowance used:*.....½ inch A-36 wear plate in tidal zone.
 28. *Type of cathodic protection:*.....Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*.....Annual - Cathodic protection surveys; 1987 - scour and
corrosion survey.
-



Platform Bruce in the Granite Point field.

Installed 1966
 Designed by Earl & Wright
 Jacket Wt. 1415 tons
 Deck Wt. 1200 tons

8 Piles per leg 30" dia.
 Penetration 65'

Column & Beam Tank 14.0' dia.
 Horizontal Brace 4' dia.
 Vertical Diagonal Brace
 4.5' dia. (85' slide)
 4.0' dia. (70' slide)

Wind Speed
 80 mph above 25' elev.

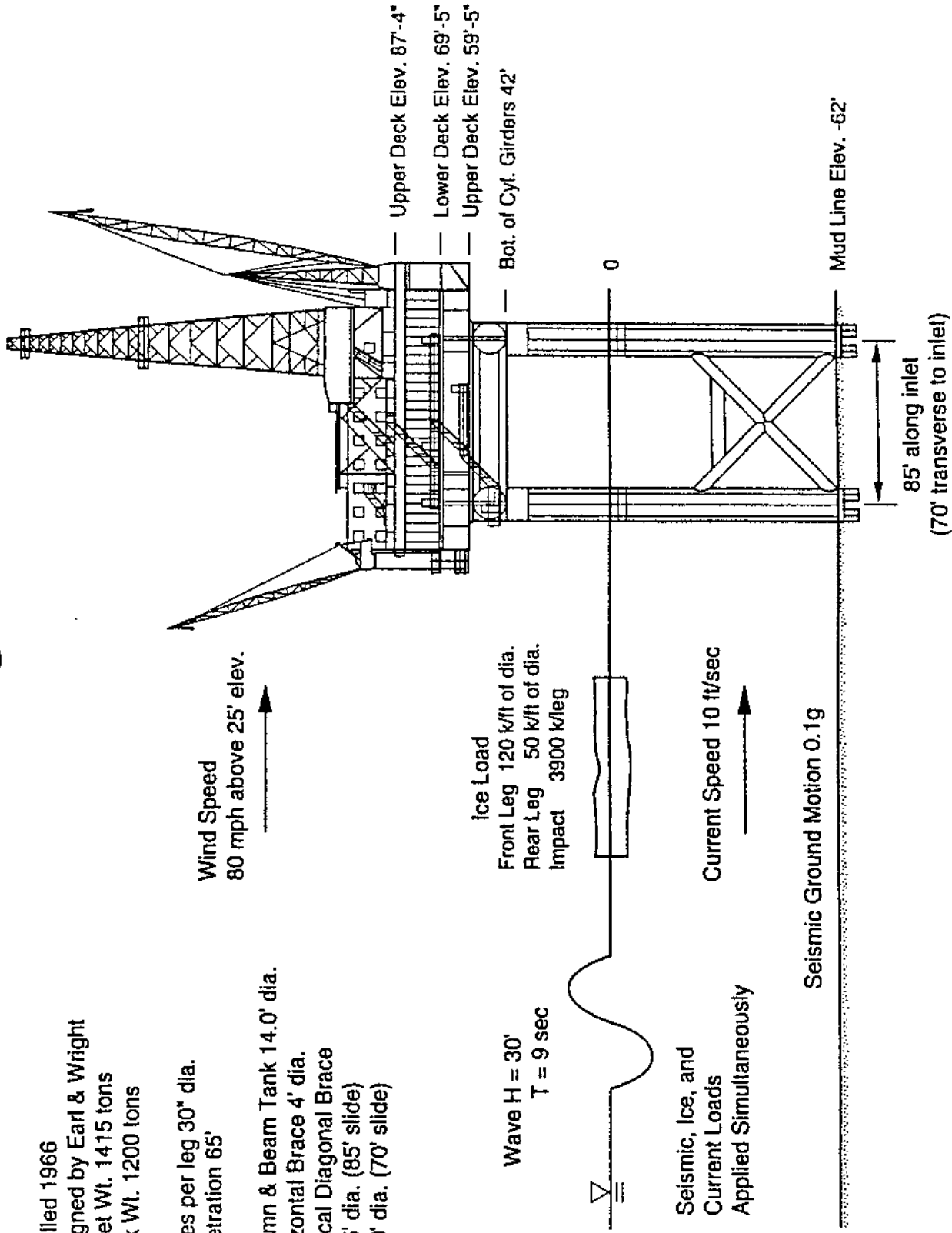
Wave H = 30'
 T = 9 sec

Ice Load
 Front Leg 120 k/ft of dia.
 Rear Leg 50 k/ft of dia.
 Impact 3900 k/leg

Seismic, Ice, and
 Current Loads
 Applied Simultaneously

Current Speed 10 ft/sec

Seismic Ground Motion 0.1g



85' along inlet
 (70' transverse to inlet)

Elevation view and summary details of platform Bruce.

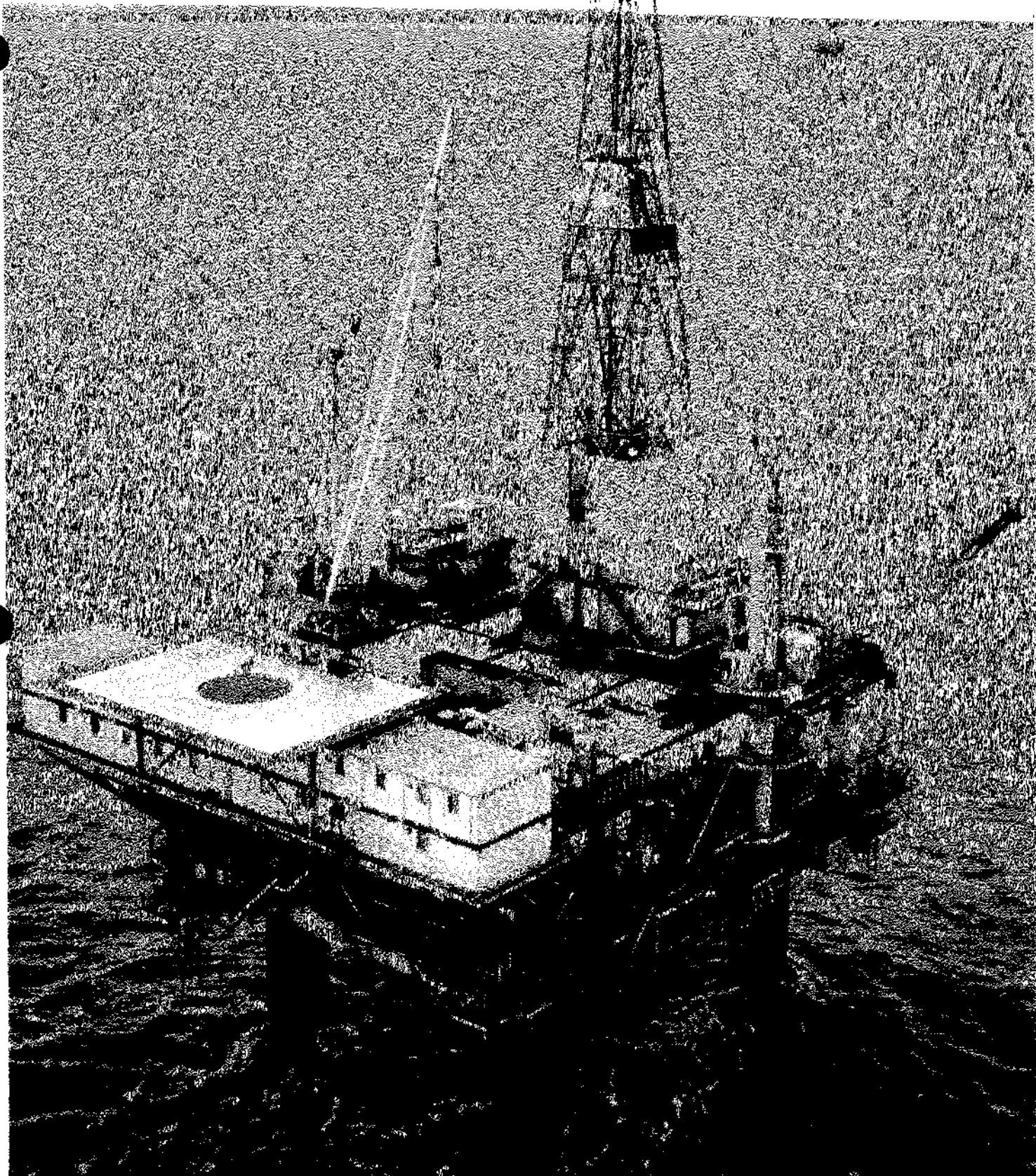
PLATFORM DILLON

MIDDLE GROUND SHOAL FIELD

INSTALLED 1966

Platform Dillon

- | | | |
|-----|---|---|
| 1. | Field name:..... | Middle Ground Shoal field |
| 2. | Platform operator:..... | Unocal |
| 3. | Platform owner(s):..... | Unocal |
| 4. | Original operator:..... | Amoco |
| 5. | Structural design firm:..... | Earl & Wright/McDermott |
| 6. | Fabrication yard (structure):..... | Kaiser Steel in Oakland, California |
| 7. | Installation year and contractor:..... | 1966; McDermott |
| 8. | Waterdepth (at MLLW):..... | 92 feet |
| 9. | Number and diameter of legs:..... | Four legs; 14 feet diameter |
| 10. | Number, size and penetration of piling:..... | Eight piles per leg; 30 inch diameter; 88 feet penetration. |
| 11. | Number, size and penetration of inner piling:..... | None |
| 12. | Method of installation (driven, drilled, combination):..... | Combination |
| 13. | Length of grouted interval in legs:..... | 152 feet |
| 14. | Design codes used (UBC, AISC, API RP 2A, etc):..... | UBC, AISC |
-
- | | | |
|-----|--|---|
| 15. | Number of completed wells in each leg through piling:..... | Eleven total wells in two legs |
| 16. | Other completed wells in each leg:..... | None |
| 17. | Top girders used as storage tanks?..... | Yes |
| 18. | If so, what type of liquid:..... | Drill water, potable water, produced water, diesel oil, power oil, crude oil. |
-
- | | | |
|-----|----------------------------------|---|
| 19. | Design criteria used: | |
| (1) | Ice thickness and strength:..... | Front legs 120 kips/ft of diameter, back legs 50 kips/ft |
| (2) | Wave height and period:..... | 30 feet with 9 second period |
| (3) | Wind:..... | 80 mph above elevation 25 feet |
| (4) | Earthquake:..... | 0.1 g seismic ground motion |
| (5) | Temperature:..... | |
| (6) | Other:..... | 3900 kips per leg impact load, seismic, ice and current loads applied simultaneously. |
-
- | | | |
|-----|-----------------------------|---------------|
| 20. | Design considerations:..... | Shadow effect |
|-----|-----------------------------|---------------|
-
- | | | |
|-----|---|--|
| 21. | Unusual circumstances during installation?..... | Decks were lost en-route. Replaced following year |
| 22. | Significant modification or additions to topsides:..... | Sea King crane |
| 23. | Any significant structural damage incidents?..... | One dent found; poor grout job which was corrected. |
| 24. | Has platform structural design been re-assessed?..... | Yes, 1993; Quarters support frame. |
| 25. | If so, by whom and for what reason:..... | McDermott; evaluation of non-low temperature steel concerns. |
-
- | | | |
|-----|---|--|
| 26. | Type of steel used; above water and below water:..... | A-537 Sheffield above water; 50 MV below water. |
| 27. | Steel corrosion allowance used:..... | An 1/2 inch thick A-36 wear plate in the tidal zone. |
| 28. | Type of cathodic protection:..... | Impressed current |
-
- | | | |
|-----|---|--|
| 29. | Dates and API RP 2A levels of underwater inspection:..... | 1993 - Level III; 1990 - Cathodic protection survey. |
|-----|---|--|



Platform Dillon in the Middle Ground Shoal field.

Installed 1967
 Designed by Earl & Wright
 Jacket Wt. 1585 tons
 Deck Wt. 1200 tons

8 Piles per leg 30" dia.
 Penetration 88'

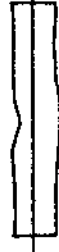
Leg dia. 14.0'

Wind Speed
 80 mph above 25' elev.



Ice Load

Front Leg 120 k/ft of dia.
 Rear Leg 50 k/ft of dia.
 Impact 3900 k/leg



Current Speed 10 ft/sec

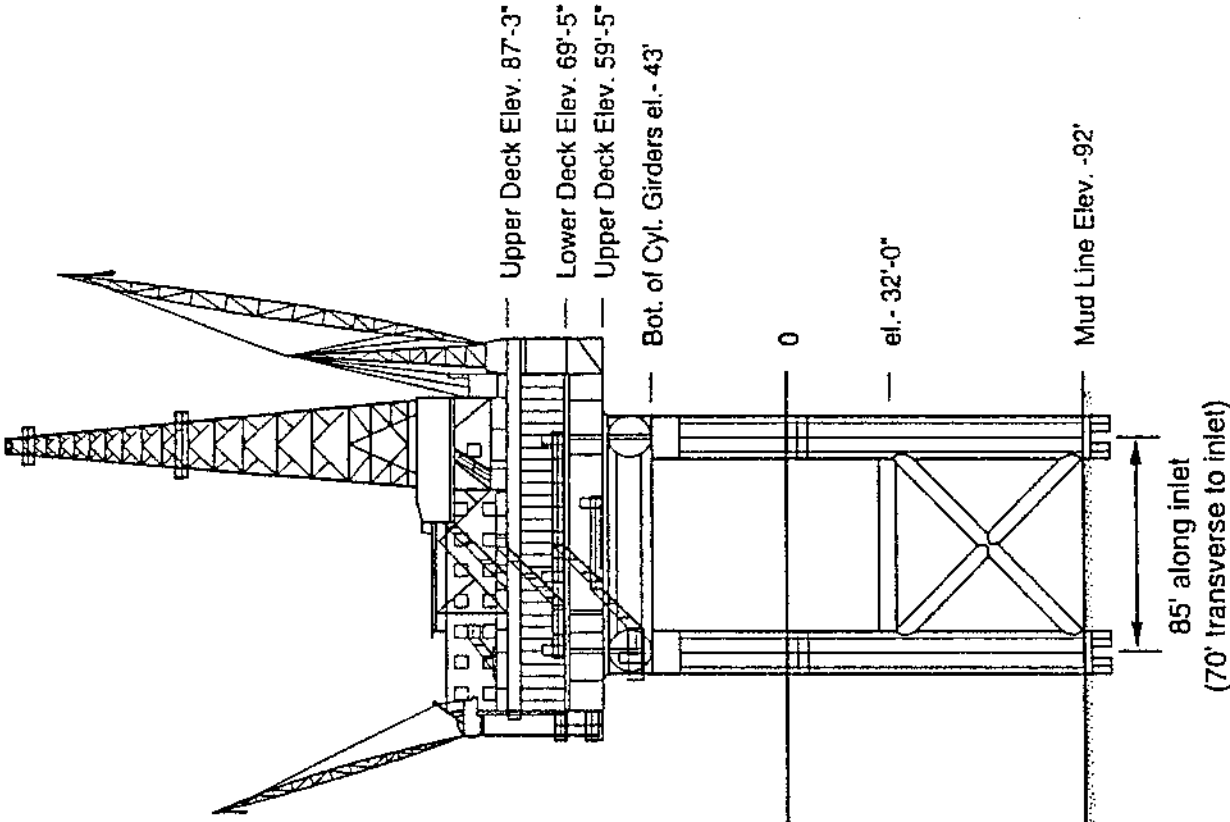


Wave H = 30'
 T = 9 sec



Seismic, Ice, and
 Current Loads
 Applied Simultaneously

Seismic Ground Motion 0.1g



Elevation view and summary details of platform Dillon.

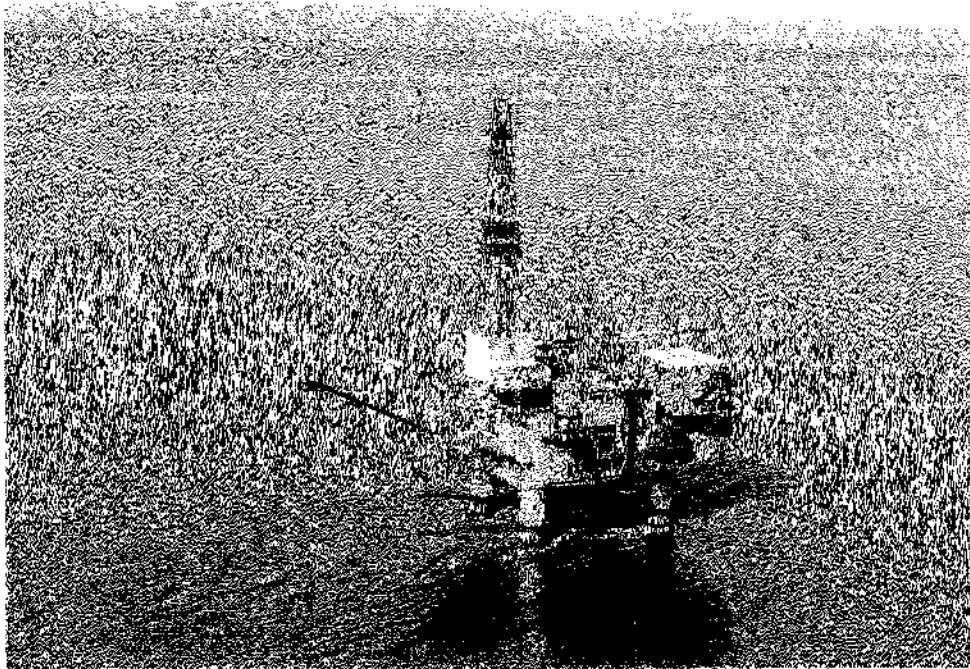
PLATFORM C

MIDDLE GROUND SHOAL FIELD

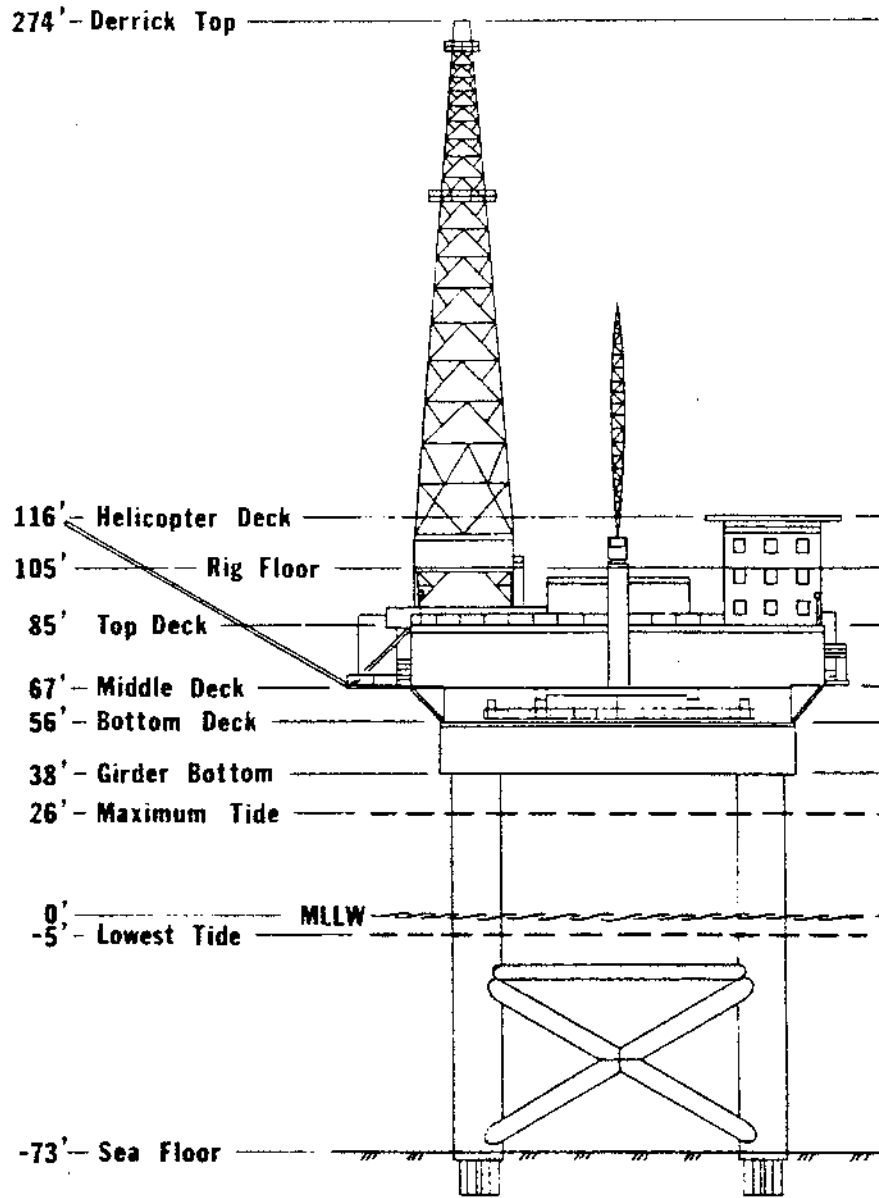
INSTALLED 1967

MGS Platform C

1. *Field name:*Middle Ground Shoal field
 2. *Platform operator:*Shell Western E&P Inc.
 3. *Platform owners:*Shell Western E&P Inc.
 4. *Original operator:*Shell
 5. *Structural design firm:*Earl & Wright
 6. *Fabrication yard (structure):*Kaiser Steel in Oakland, CA
 7. *Installation year and contractor:*1967, McDermott
 8. *Waterdepth (at MLLW):*73 feet
 9. *Number and diameter of legs:*Four - 15.5 feet
 10. *Number, size and penetration of piling:*Thirty two 36-inch to minus 100 feet
 11. *Number, size and penetration of inner piling:*Thirty two 24-inch to minus 190 feet
 12. *Method of installation (driven, drilled, combination):*36-inch driven, 24-inch drilled
 13. *Length of grouted interval in legs:*Bottom to top
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*AISC; Zone 3 UBC (1964)
-
15. *Number of completed wells in each leg through piling:*Eight wells in each of legs 1, 2 and 3
 16. *Other completed wells in each leg:*None
 17. *Top girders used as storage tanks ?*Yes
 18. *If so, what type of liquid:*Diesel fuel
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*42 inch; 300 psi
 - (2) *Wave height and period:*28 feet with 8.5 second period
 - (3) *Wind:*65 mph with 100 mph gusts
 - (4) *Earthquake:*0.06 g per UBC 1964
 - (5) *Temperature:*Minus 40° F above water, plus 28° F below water
 - (6) *Current:*12 feet per second
 20. *Design considerations:*20 year design life
-
21. *Unusual circumstances during installation ?*None
 22. *Significant modification or additions to topsides:*Installed 40 x 30 foot gas compressor cantilever and 8 x 20 radiator cantilever in early 1970's.
 23. *Any significant structural damage incidents ?*None
 24. *Has platform structural design been re-assessed ?*No
 25. *If so, by whom and for what reason:*
-
26. *Type of steel used; above water and below water:*ASTM A-537 Grade A and B where low temperature steel required. A-36 and A-441 elsewhere.
 27. *Steel corrosion allowance used:*0.7 inch
 28. *Type of cathodic protection:*Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*Level II in 1978 and 1983; Level III in 1988



Platform "C" in the Middle Ground Shoal field.



Elevation view of MGS platform C.

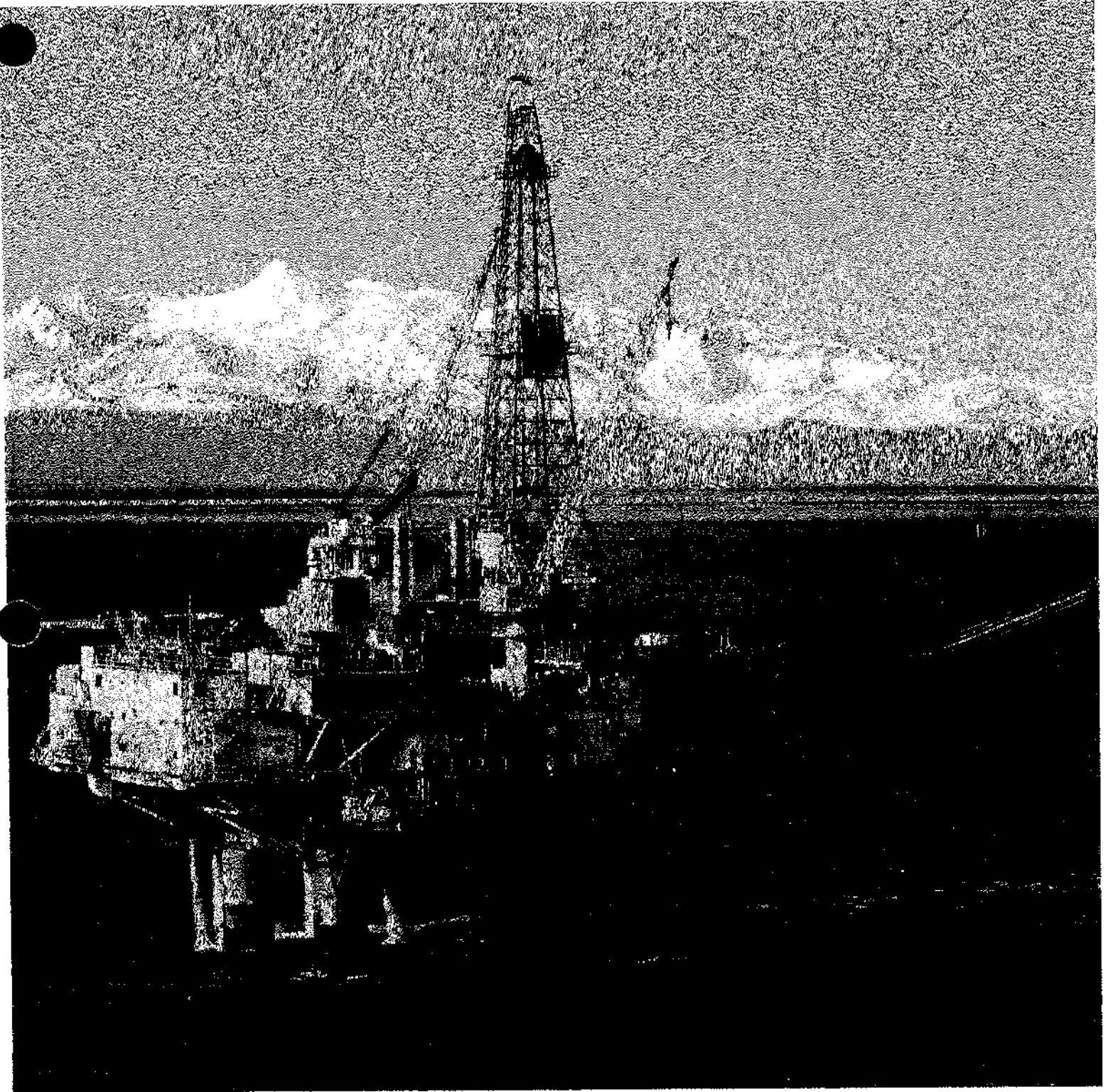
PLATFORM KING SALMON

McARTHUR RIVER FIELD

INSTALLED 1967

Platform King Salmon

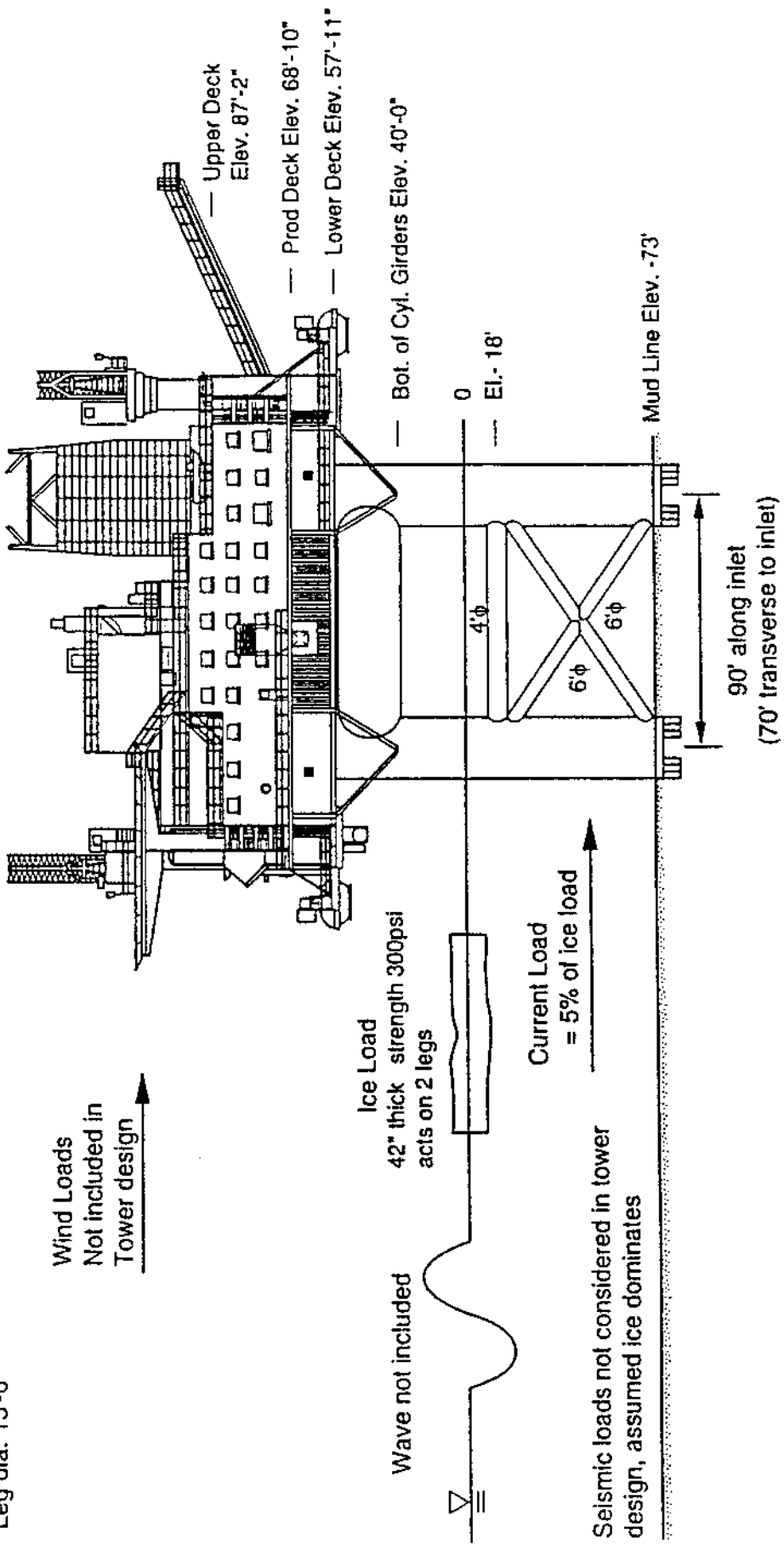
1. *Field name:*.....McArthur River field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Unocal & Marathon
 4. *Original operator:*.....Arco
 5. *Structural design firm:*.....Earl & Wright
 6. *Fabrication yard (structure):*.....Kaiser Steel in Oakland, CA
 7. *Installation year and contractor:*.....1967; McDermott
 8. *Waterdepth (at MLLW):*.....73 feet
 9. *Number and diameter of legs:*.....Four legs; 15.5 feet
 10. *Number, size and penetration of piling:*.....Eight piles per leg; 36 inch diameter; 100 feet penetration;
33 inch sleeves near mudline.
 11. *Number, size and penetration of inner piling:*.....Eight per leg; 24 inch diameter; 260 feet penetration.
 12. *Method of installation (driven, drilled, combination):*.....Combination
 13. *Length of grouted interval in legs:*.....128 feet
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....Eight wells each in Legs 1, 2 and 4. None in Leg 3.
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Drill water, diesel fuel, crude oil, drain water.
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....42 inch; 300 psi
 - (2) *Wave height and period:*.....28 feet with 8.5 second period
 - (3) *Wind:*.....65 mph with 100 mph gusts
 - (4) *Earthquake:*.....0.06 g per UBC 1964
 - (5) *Temperature:*.....Minus 40° F above water, plus 28° F below water
 - (6) *Current:*.....12 feet per second
 20. *Design considerations:*.....20 year design life
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Added waterflood and compressors
 23. *Any significant structural damage incidents ?*.....Explosion on April 8, 1976 in sub-deck required floor replacement and plate girder repair.
 24. *Has platform structural design been re-assessed ?*.....No
 25. *If so, by whom and for what reason:*.....
-
26. *Type of steel used; above water and below water:*.....ASTM A-537 Grade A and B where low temperature steel required. A-36 and A-441 elsewhere.
 27. *Steel corrosion allowance used:*.....0.7 inch
 28. *Type of cathodic protection:*.....Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*.....1985 - Cathodic protection survey; 1984 - Scour survey.
-



Platform King Salmon in the McArthur River field.

Designed by Earl & Wright in 1967
 Jacket Wt. 1585 tons
 Deck Wt. 1200 tons

8 Piles per leg 36" dia.
 Penetration 100'
 33" x 30.5" sleeves (near mudline)
 24" insert pile 260' penetration
 Leg dia. 15'-6"



Elevation view and summary details of platform King Salmon.

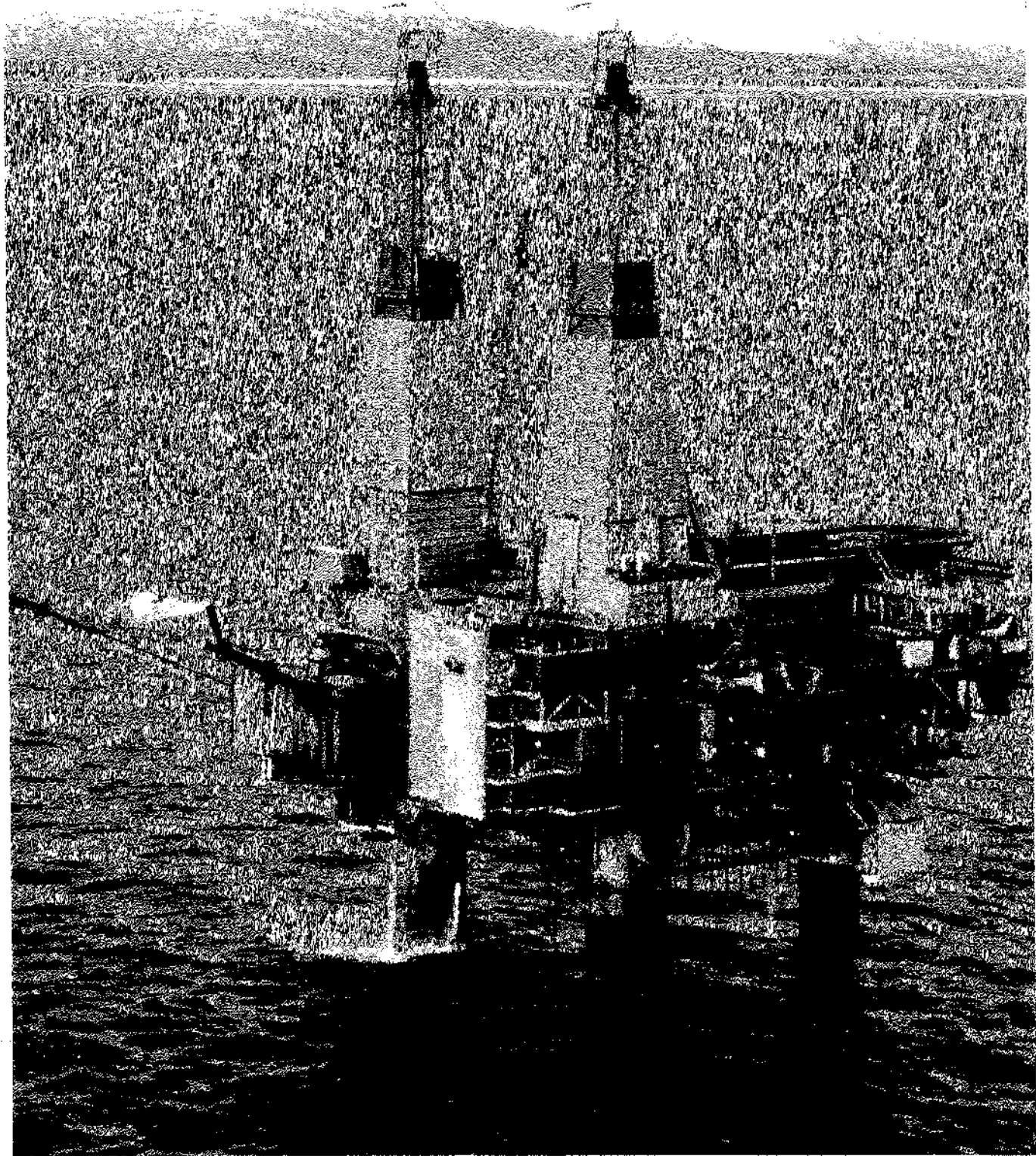
PLATFORM GRAYLING

McARTHUR RIVER FIELD

INSTALLED 1967

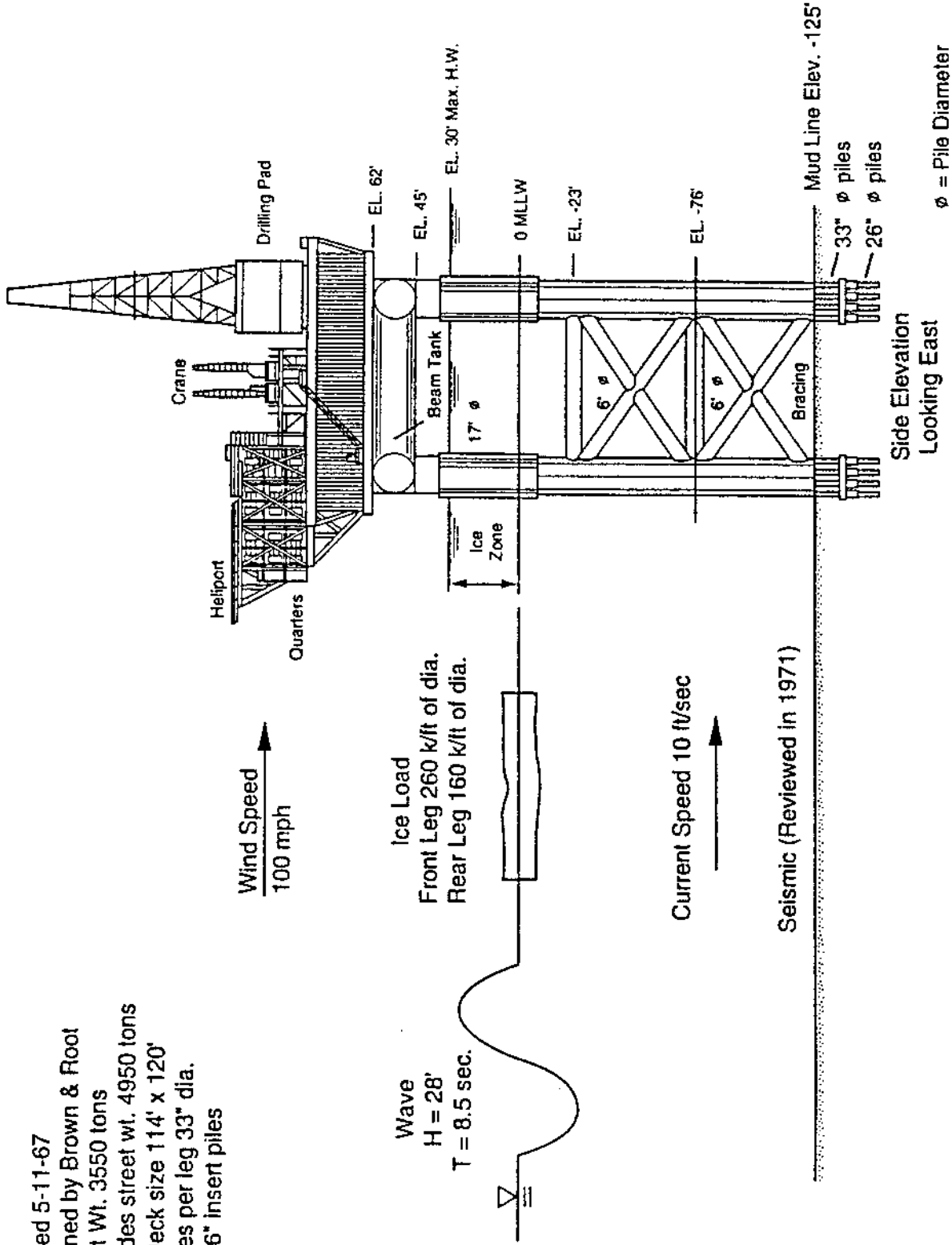
Platform Grayling

1. *Field name:*.....McArthur River field
 2. *Platform operator:*.....Unocal
 3. *Platform owner(s):*.....Unocal & Marathon
 4. *Original operator:*.....Unocal
 5. *Structural design firm:*.....Brown & Root
 6. *Fabrication yard (structure):*.....American Pipe & Construction, Vancouver, Washington
 7. *Installation year and contractor:*.....1967; Brown & Root
 8. *Waterdepth (at MLLW):*.....125 feet
 9. *Number and diameter of legs:*.....Four legs; 17 feet diameter
 10. *Number, size and penetration of piling:*.....Twelve piles per leg; 33 inch diameter; driven to 70 feet
 11. *Number, size and penetration of inner piling:*.....Twelve piles per leg; 26 inch diameter; driven to 130 feet
Leg 1 has 20 inch inner piles to 190 feet
 12. *Method of installation (driven, drilled, combination):*.....Combination
 13. *Length of grouted interval in legs:*.....192 feet
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....UBC, AISC
-
15. *Number of completed wells in each leg through piling:*.....Twelve wells in legs 2, 3 and 4. One well in leg 1.
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Potable water; drill water; Cook Inlet water; diesel fuel; crude oil.
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Front legs 260 kips/ft of diameter, back legs 160 kips/ft
 - (2) *Wave height and period:*.....28 feet with 8.5 second period
 - (3) *Wind:*.....100 mph
 - (4) *Earthquake:*.....0.1 g seismic ground motion
 - (5) *Temperature:*.....Minus 15° F to plus 70° F.
 - (6) *Other:*.....
 20. *Design considerations:*
-
21. *Unusual circumstances during installation ?*.....Yes, tower leak required repair prior to upending.
 22. *Significant modification or additions to topsides:*.....Four cantilevers increased deck space by one third.
 23. *Any significant structural damage incidents ?*.....Blowout underneath leg 1 in 1985.
 24. *Has platform structural design been re-assessed ?*.....Yes
 25. *If so, by whom and for what reason:*.....PMB, 1989; Bea, 1990; Requalification, confirm blowout repair adequacy.
Reference: 1992 OTC paper 6935
-
26. *Type of steel used; above water and below water:*.....Above water A-537; below water A-36
 27. *Steel corrosion allowance used:*.....½ inch corrosion wrap through tidal zone
 28. *Type of cathodic protection:*.....Impressed current
-
29. *Dates and API RP 2A levels of underwater inspection:*.....1990 - Level II and III.



Platform Grayling in the McArthur River field.

Installed 5-11-67
 Designed by Brown & Root
 Jacket Wt. 3550 tons
 Topsides street wt. 4950 tons
 Drill Deck size 114' x 120'
 12 Piles per leg 33" dia.
 with 26" insert piles



Elevation view and summary details of platform Grayling.

PLATFORM DOLLY VARDEN

McARTHUR RIVER FIELD

INSTALLED 1967

Platform Dolly Varden

1. *Field name:*.....McArthur River field
2. *Platform operator:*Marathon
3. *Platform owner(s):*.....Marathon and Unocal
4. *Original operator:*.....Marathon
5. *Structural design firm:*.....McDermott
6. *Fabrication yard (structure):*.....American Pipe & Construction, Vancouver, Washington
7. *Installation year and contractor:*1967; McDermott
8. *Waterdepth (at MLLW):*.....112 feet
9. *Number and diameter of legs:*.....Four; 17 feet diameter
10. *Number, size and penetration of piling:*.....Twelve per leg; 34.5 inch diameter; 180 feet penetration
11. *Number, size and penetration of inner piling:*.....None
12. *Method of installation (driven, drilled, combination):*.....Combination
13. *Length of grouted interval in legs:*.....Bottom to top in annulus,
bottom to -12 feet inside inner sleeve
14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....AISC, UBC

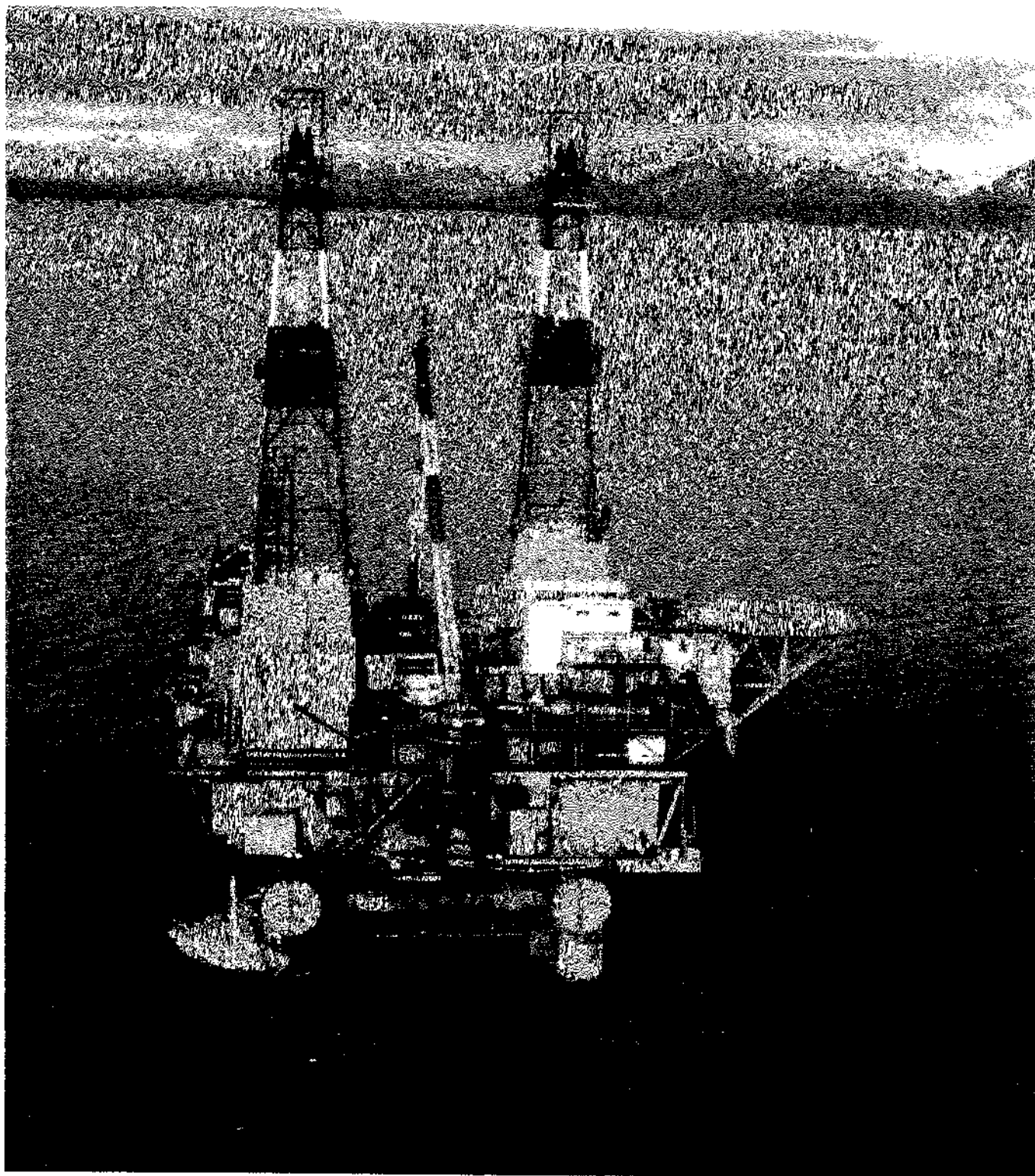
15. *Number of completed wells through piling:*.....22 oil wells; 2 gas wells; 11 waterflood injectors
16. *Other completed wells in each leg:*.....None
17. *Top girders used as storage tanks ?*.....Yes
18. *If so, what type of liquid:*.....Water, diesel oil

19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....6 ft on two front legs, 3 ft on two back legs; 300 psi
 - (2) *Wave height and period:*.....28 feet, 8.5 sec period
 - (3) *Wind:*.....60 mph with 80 mph gusts
 - (4) *Earthquake:*.....0.1 g per 1967 UBC
 - (5) *Temperature:*.....Minus 40° F above water, plus 20° F below water
 - (6) *Current:*.....10 feet per second
20. *Design considerations:*.....Twenty year design life

21. *Unusual circumstances during installation ?*.....No
22. *Significant modification or additions to topsides:*Yes, to accommodate waterflood equipment and gas compressors cantilevered decks and a mezzanine deck were added in the 1969 to 1971 time period.
23. *Any significant structural damage incidents ?*.....A minor dent without structural implications was found on a horizontal member in 1991. A strength analysis was performed by PMB
24. *Has platform structural design been re-assessed ?*.....Yes, in 1992 on the tower only
25. *If so, by whom and for what reason:*.....By PMB (Houston). Extended platform life.

26. *Type of steel used; above water and below water:*.....A 537
27. *Steel corrosion allowance used:*.....½ inch through tidal zone
28. *Type of cathodic protection:*.....Impressed current

29. *Dates and API RP 2A levels of underwater inspection:*Level II and III in 1991; Level II in 1988, 1983, 1981 and 1980.



Platform Dolly Varden in the McArthur River field.

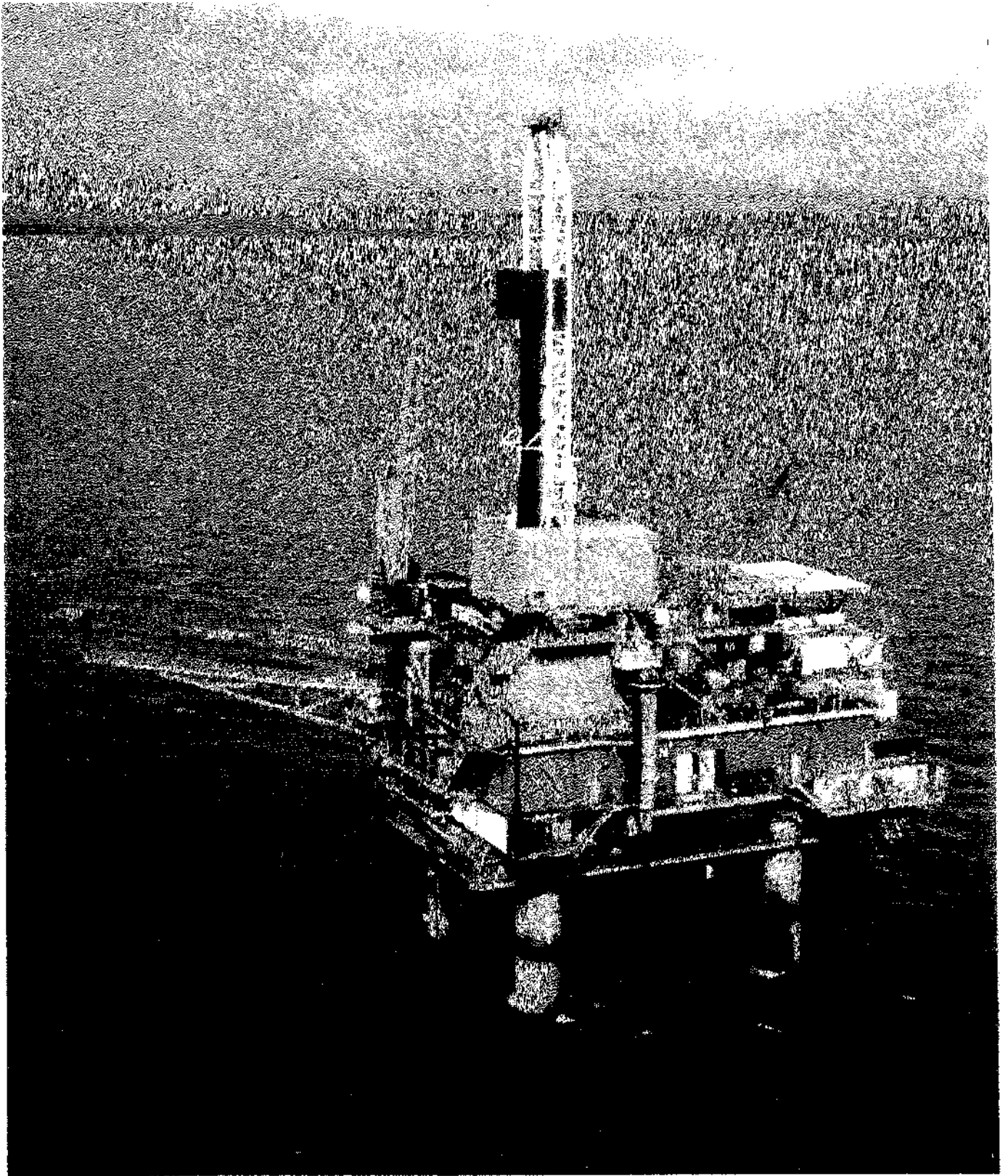
PLATFORM TYONEK

NORTH COOK INLET FIELD

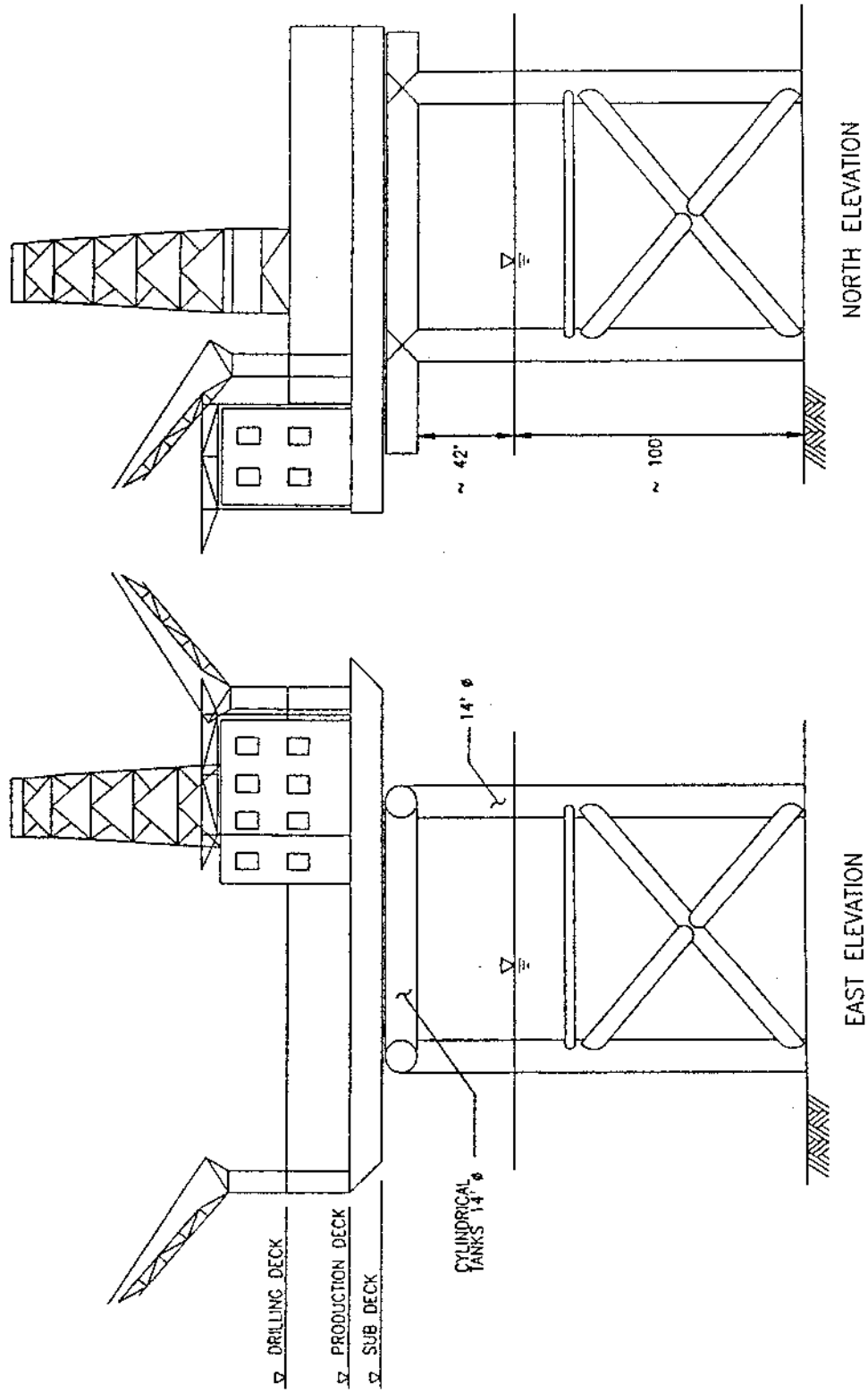
INSTALLED 1968

Platform Tyonek

1. *Field name:*.....North Cook Inlet field
 2. *Platform operator:*.....Phillips Petroleum
 3. *Platform owner(s):*.....Phillips Petroleum (100%)
 4. *Original operator:*.....Phillips Petroleum
 5. *Structural design firm:*.....McDermott
 6. *Fabrication yard (structure):*.....Mitsubishi Heavy Industries, Hiroshima, Japan
 7. *Installation year and contractor:*.....1968; McDermott
 8. *Waterdepth (at MLLW):*.....100 ft
 9. *Number and diameter of legs:*.....Four; 14 ft diameter
 10. *Number, size and penetration of piling:*.....Eight per leg; 30 inch diameter; 175 ft penetration
 11. *Number, size and penetration of inner piling:*.....None
 12. *Method of installation (driven, drilled, combination):*.....Driven
 13. *Length of grouted interval in legs:*.....Annulus grouted from bottom to top of leg
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....AISC; UBC, edition current in 1967
-
15. *Number of completed wells in each leg through piling:*..... Leg 1 - one well plus one well drilling; Leg 2 - three wells; Leg 3 - eight wells; Leg 4 - none
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Water, diesel, oily water, well test crude
-
19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....Used 120 kips/ft of leg diameter for front legs; 50 kips/ft for back legs; impact load of 1500 ton ice at 10 fps (3900k)
 - (2) *Wave height and period:*.....27.5 ft, 8.5 sec period (per A.H. Glenn)
 - (3) *Wind:*.....80 mph
 - (4) *Earthquake:*.....0.1 g lateral load per 1967 UBC
 - (5) *Temperature:*.....Steel -40° F; piping -50° F
 - (6) *Current:*.....Current 10.14 fps full depth
 20. *Design considerations:*.....Twenty year design life
-
21. *Unusual circumstances during installation ?*.....None
 22. *Significant modification or additions to topsides:*.....Heavier drilling rig
 23. *Any significant structural damage incidents ?*.....None
 24. *Has platform structural design been re-assessed ?*.....Yes
 25. *If so, by whom and for what reason:*.....Hopper and Associates; Addition of a larger drilling rig and anticipated long service life (40 years)
-
26. *Type of steel used; above water and below water:*.....Above and below water A-516 Grade 70 Mod A.
 27. *Steel corrosion allowance used:*.....½ inch from minus 12 to plus 31 feet
 28. *Type of cathodic protection:*.....Ten seabed impressed current anode sields; Impressed current anodes in each inner leg.
-
29. *Dates and API RP 2A levels of underwater inspection:*.....Level II and III surveys in 1983, 1986 and 1990. Additional survey scheduled for 1993. Level III inspection performed on selected joints until all critical joints were inspected.



Platform Tyonek in the North Cook Inlet field.



Elevation views of platform Tyonek

PLATFORM SPURR

TRADING BAY FIELD

INSTALLED 1968

Platform Spurr

1. Field name:.....Trading Bay field
2. Platform operator:.....Marathon
3. Platform owner(s):.....Marathon and Unocal
4. Original operator:.....Texaco
5. Structural design firm:.....McDermott
6. Fabrication yard (structure):.....Japan
7. Installation year and contractor:.....1968;
8. Waterdepth (at MLLW):.....67 feet
9. Number and diameter of legs:.....Three; 13 feet diameter
10. Number, size and penetration of piling:.....Six per leg; 36 inch diameter; 190 feet penetration
11. Number, size and penetration of inner piling:.....None
12. Method of installation (driven, drilled, combination):.....Combination
13. Length of grouted interval in legs:.....
14. Design codes used (UBC, AISC, API RP 2A, etc):.....

15. Number of completed wells in each leg through piling:.....Six oil wells, one gas well and two water injection wells.
All wells are T&A
16. Other completed wells in each leg:.....None
17. Top girders used as storage tanks?.....
18. If so, what type of liquid:.....

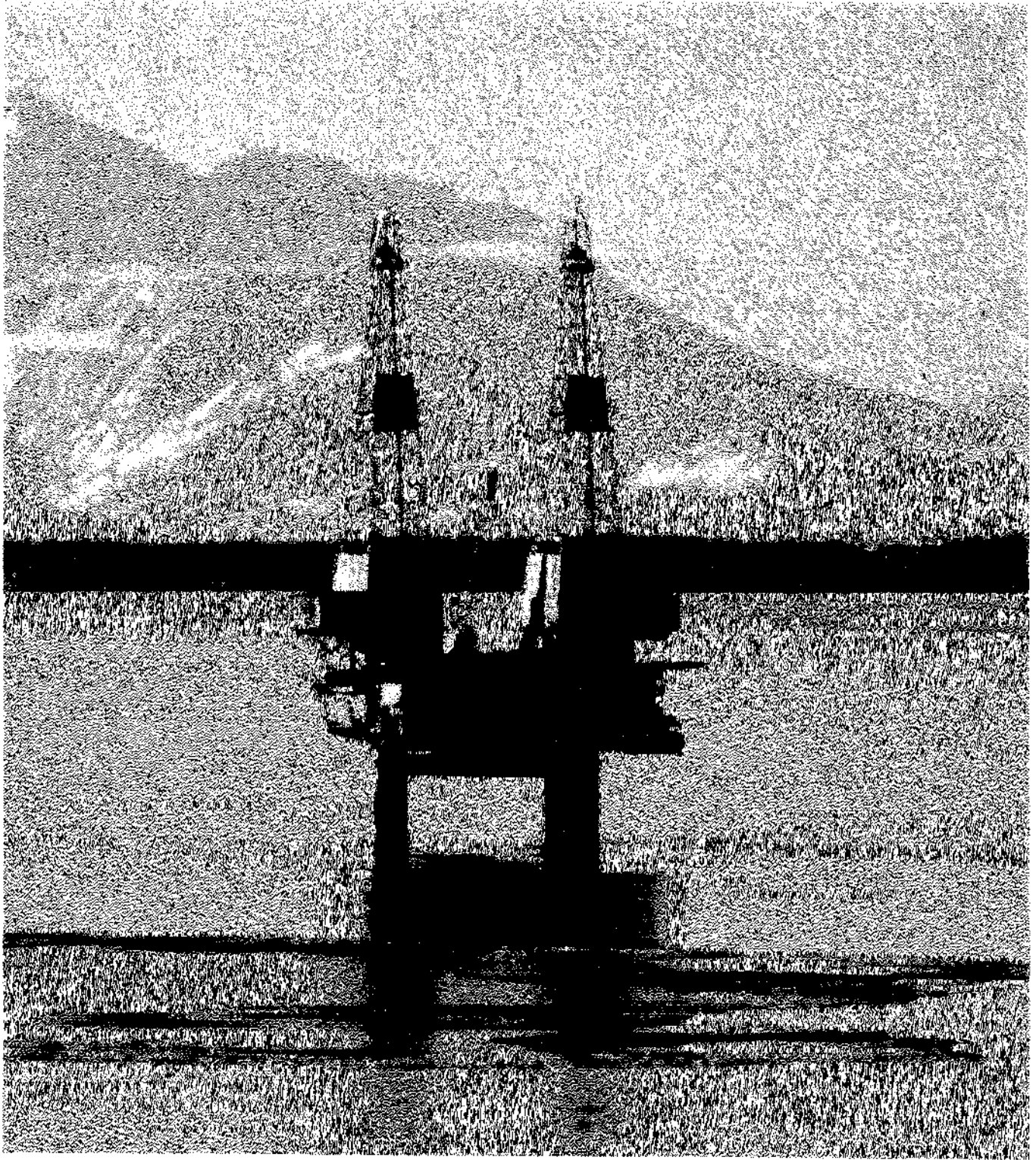
19. Design criteria used:
 - (1) Ice thickness and strength:.....3.5 feet
 - (2) Wave height and period:.....28 feet with 8.5 second period
 - (3) Wind:.....60 mph with 80 mph gusts
 - (4) Earthquake:.....UBC
 - (5) Temperature:.....Minus 40° F above water, plus 20° F below water
 - (6) Current:.....10 feet per second
20. Design considerations:.....Twenty year design life

21. Unusual circumstances during installation?.....
22. Significant modification or additions to topsides:.....
23. Any significant structural damage incidents?.....
24. Has platform structural design been re-assessed?.....
25. If so, by whom and for what reason:.....

26. Type of steel used; above water and below water:.....A 537-A
27. Steel corrosion allowance used:.....½ inch
28. Type of cathodic protection:.....Impressed current

29. Dates and API RP 2A levels of underwater inspection:.....Level II and III in 1993

Note: Platform not in operation



Platform Spurr in the Trading Bay field.

PLATFORM SPARK

TRADING BAY FIELD

INSTALLED 1968

Platform Spark

1. Field name:.....Trading Bay field
 2. Platform operator:.....Marathon
 3. Platform owner(s):.....Marathon
 4. Original operator:.....Arco
 5. Structural design firm:.....McDermott
 6. Fabrication yard (structure):.....Japan
 7. Installation year and contractor:.....1968; McDermott
 8. Waterdepth (at MLLW):.....62 feet
 9. Number and diameter of legs:.....Three; 13 feet diameter
 10. Number, size and penetration of piling:.....Six per leg; 24 inch diameter; 250 feet penetration
 11. Number, size and penetration of inner piling:.....None
 12. Method of installation (driven, drilled, combination):.....Combination
 13. Length of grouted interval in legs:.....
 14. Design codes used (UBC, AISC, API RP 2A, etc):.....UBC, AISC
-
15. Number of completed wells through piling:.....Six oil wells and two water injection wells. All wells are plugged.
 16. Other completed wells in each leg:.....None
 17. Top girders used as storage tanks?.....
 18. If so, what type of liquid:.....
-
19. Design criteria used:
 - (1) Ice thickness and strength:.....3.5 feet
 - (2) Wave height and period:.....28 feet with 8.5 second period
 - (3) Wind:.....60 mph with 80 mph gusts
 - (4) Earthquake:.....UBC
 - (5) Temperature:.....Minus 40° F above water, plus 20° F below water
 - (6) Current:.....10 feet per second
 20. Design considerations:.....Twenty year design life
-
21. Unusual circumstances during installation?.....
 22. Significant modification or additions to topsides:.....
 23. Any significant structural damage incidents?.....
 24. Has platform structural design been re-assessed?.....
 25. If so, by whom and for what reason:.....
-
26. Type of steel used; above water and below water:.....A 516
 27. Steel corrosion allowance used:.....½ inch
 28. Type of cathodic protection:.....
-
29. Dates and API RP 2A levels of underwater inspection:.....Level II and III in 1993
-

Note: Platform not in operation

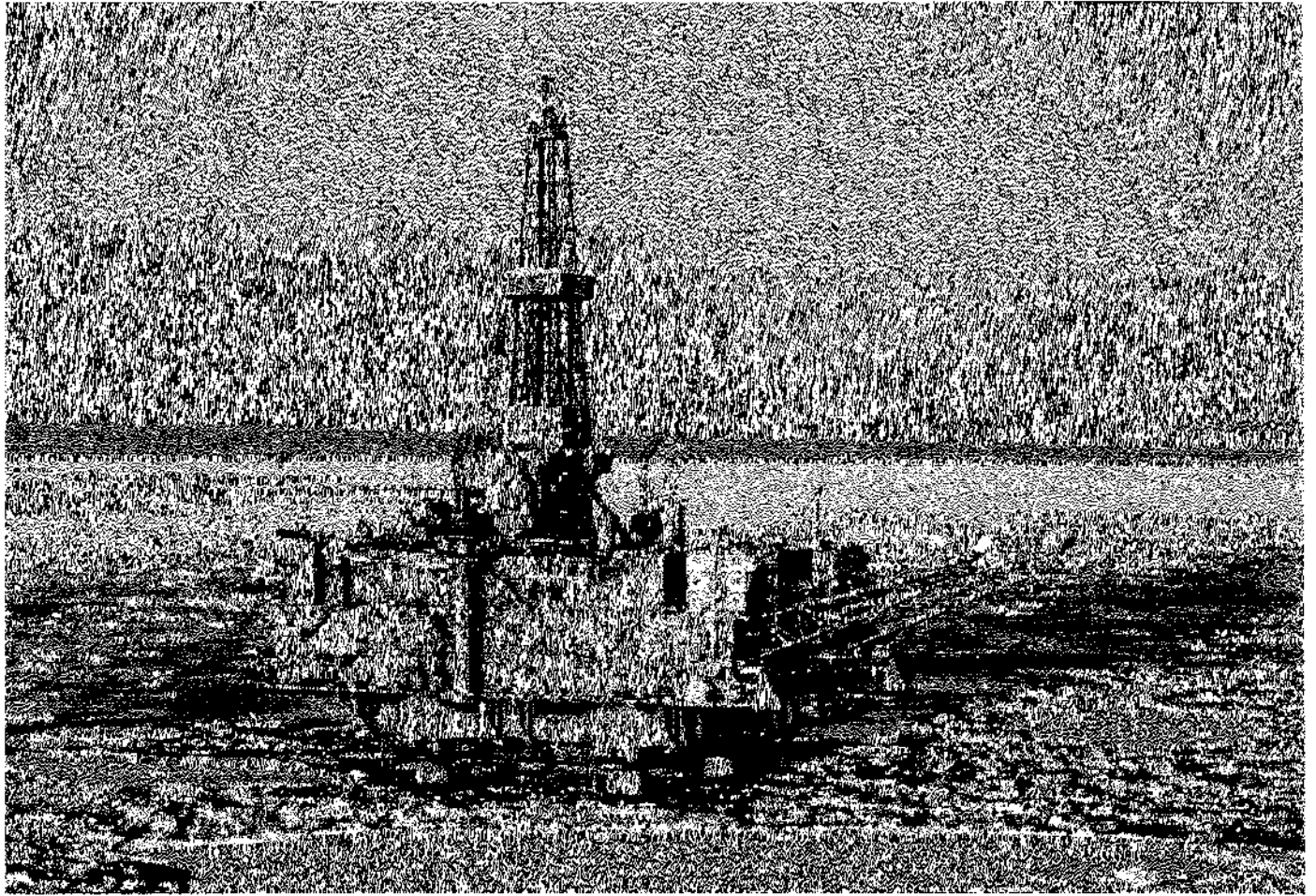
PLATFORM STEELHEAD

McARTHUR RIVER FIELD

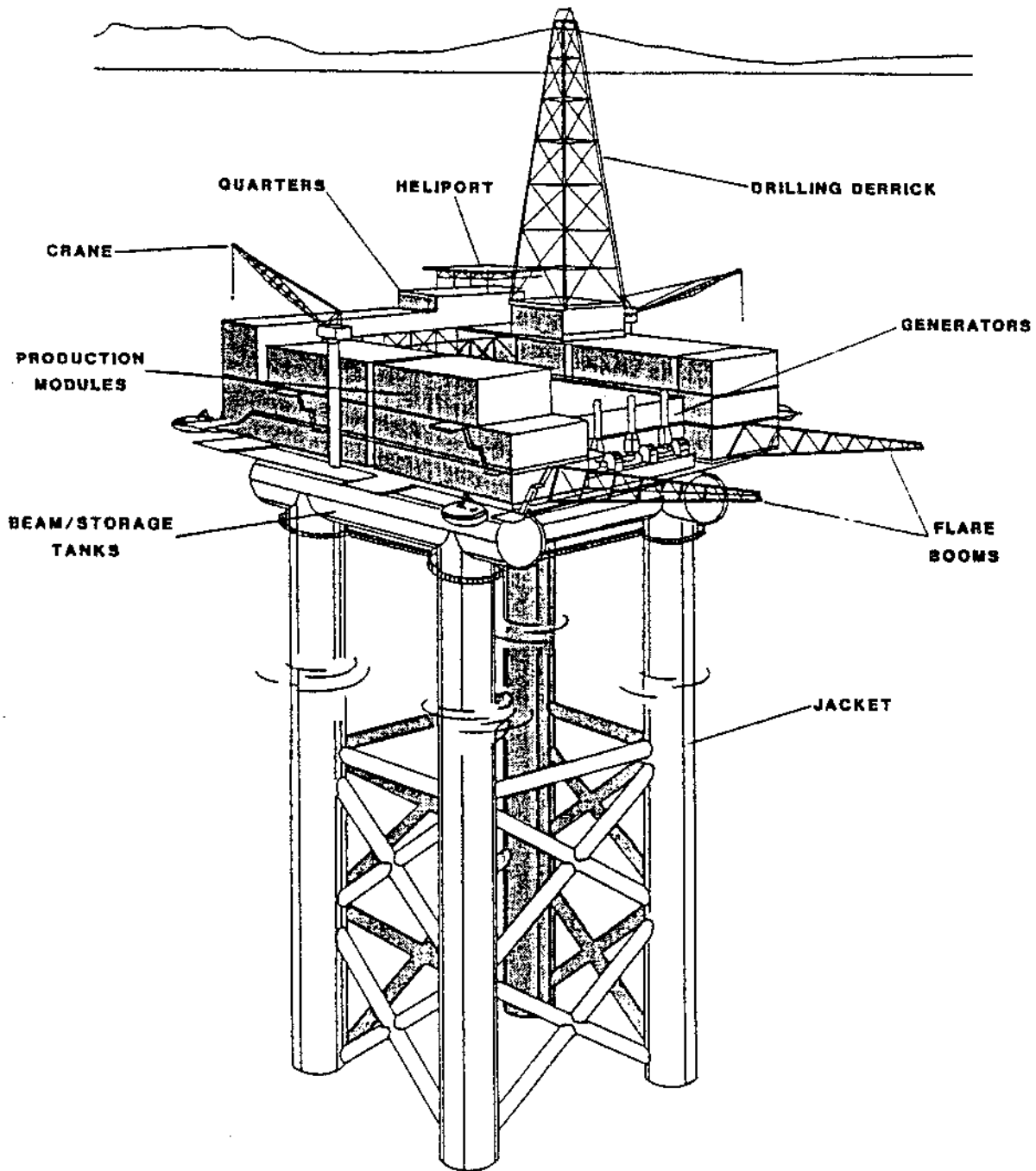
INSTALLED 1986

Platform Steelhead

1. *Field name:*.....McArthur River field
 2. *Platform operator:*.....Marathon
 3. *Platform owner(s):*.....Marathon & Unocal
 4. *Original operator:*.....Marathon
 5. *Structural design firm:*.....McDermott
 6. *Fabrication yard (structure):*.....NKK, Japan
 7. *Installation year and contractor:*.....1986; Brown & Root
 8. *Waterdepth (at MLLW):*.....183
 9. *Number and diameter of legs:*.....Four; 18 feet diameter
 10. *Number, size and penetration of piling:*.....Twelve per leg; 34 inch diameter; 135 feet penetration
 11. *Number, size and penetration of inner piling:*.....Ten 26 inch drilled inner piling installed to 650 feet in leg B1 following 1989 blowout
 12. *Method of installation (driven, drilled, combination):*.....24 driven, 24 combination with drilled pilot hole
 13. *Length of grouted interval in legs:*.....Annulus grouted from bottom to top of leg
 14. *Design codes used (UBC, AISC, API RP 2A, etc):*.....API RP 2A
-
15. *Number of completed wells in each leg through piling:*.....Three oil wells, eight gas wells and two waterflood injection wells
 16. *Other completed wells in each leg:*.....None
 17. *Top girders used as storage tanks ?*.....Yes
 18. *If so, what type of liquid:*.....Water, diesel oil
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19. *Design criteria used:*
 - (1) *Ice thickness and strength:*.....50 inch thick; 300 psi
 - (2) *Wave height and period:*.....28 feet with 8.5 second period
 - (3) *Wind:*.....80 mph with 107 mph gusts
 - (4) *Earthquake:*.....Site specific, Ertex, C.B. Krause
 - (5) *Temperature:*.....Minus 20° F above water, plus 28.6° F below water
 - (6) *Current:*.....12.65 feet per second
 20. *Design considerations:*.....Twenty year design life
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21. *Unusual circumstances during installation ?*.....Yes, derrick barge crane collapse. No structural damage
 22. *Significant modification or additions to topsides:*.....Waterflood and gas transmission module added (part of original design)
 23. *Any significant structural damage incidents ?*.....Blowout under leg B1 in 1989; dumped 60,000 ton of gravel and added ten 26 inch diameter insert piling.
 24. *Has platform structural design been re-assessed ?*.....Yes
 25. *If so, by whom and for what reason:*.....By PMB following 1989 blowout
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26. *Type of steel used; above water and below water:*.....A-633-C
 27. *Steel corrosion allowance used:*.....½ inch
 28. *Type of cathodic protection:*.....Impressed current plus sacrificial anodes.
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29. *Dates and API RP 2A levels of underwater inspection:*.....Level II inspections in 1986 (boom collapse) and 1989 (blowout)



Platform Steelhead in the McArthur River field.



Isometric view of platform Steelhead