

SCOMM

128:10

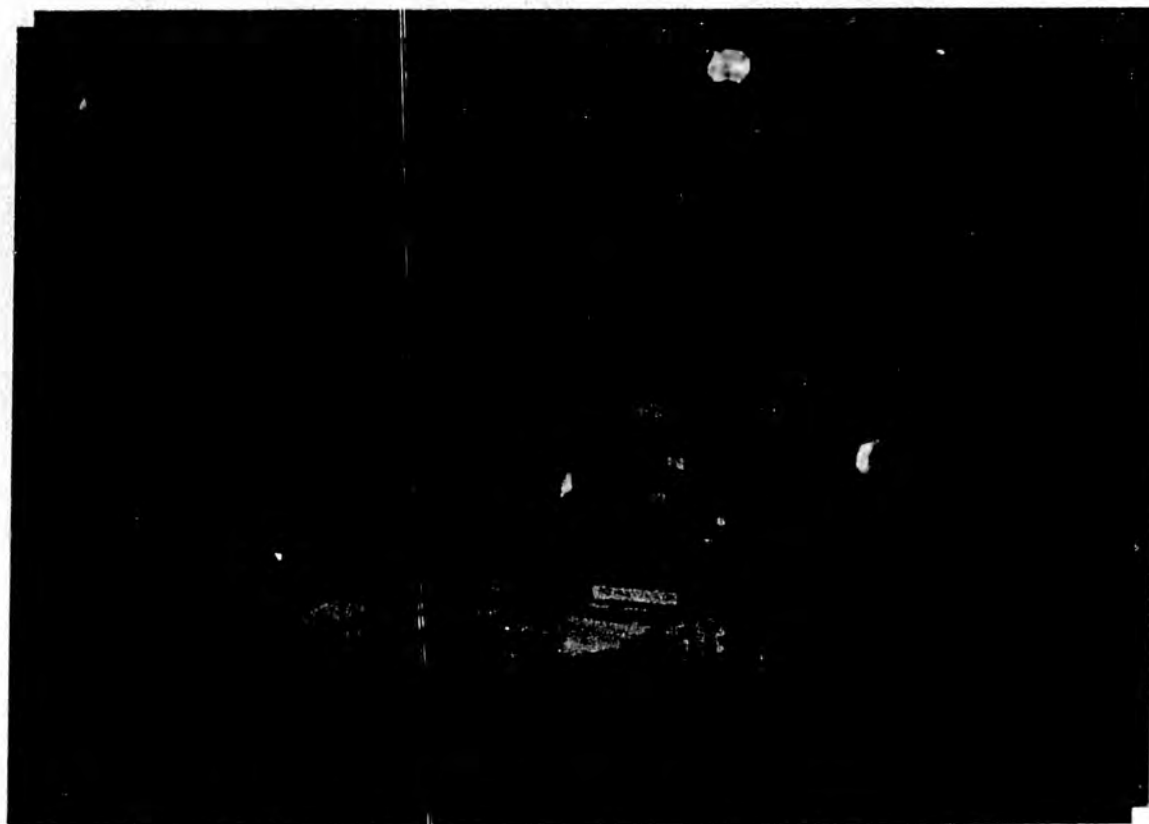
**Alaska Oil and Gas Conservation Commission
(AOGCC)**

House Oil & Gas Sub-Committee

March 23, 2001



**AOGCC
Summary**



West Macarthur Oil Field- Forest Oil Corporation

Alaska Oil and Gas Conservation Commission Outline

- **Introduction**
 - Mission
 - History
- **Function**
 - Primary Services
 - Customers
 - Operators and Other Owners
- **Key Initiatives/ Projects**
 - Permitting
 - UIC
 - Inspections
 - Field Studies
 - Electronic Data
- **Staffing**
- **Contacts**
- **Basic Drilling & Completion Operations**

Alaska Oil and Gas Conservation Commission (AOGCC)

Independent, quasi-judicial
agency

Established under the
Alaska Oil and Gas
Conservation Act (AS 31).



Regulatory authority-
outlined in Title 20,
Chapter 25 of the Alaska
Administrative Code.

Mission

**Protect the public interest in oil and gas resources.
The Oil and Gas Conservation Act requires all oil and
gas drilling, production and measuring operations to
be conducted in a manner that prevents physical
waste of the resource, promotes greater ultimate
recovery and affords all owners of oil and gas rights
an equal opportunity to recover their fair share of the
resource.**

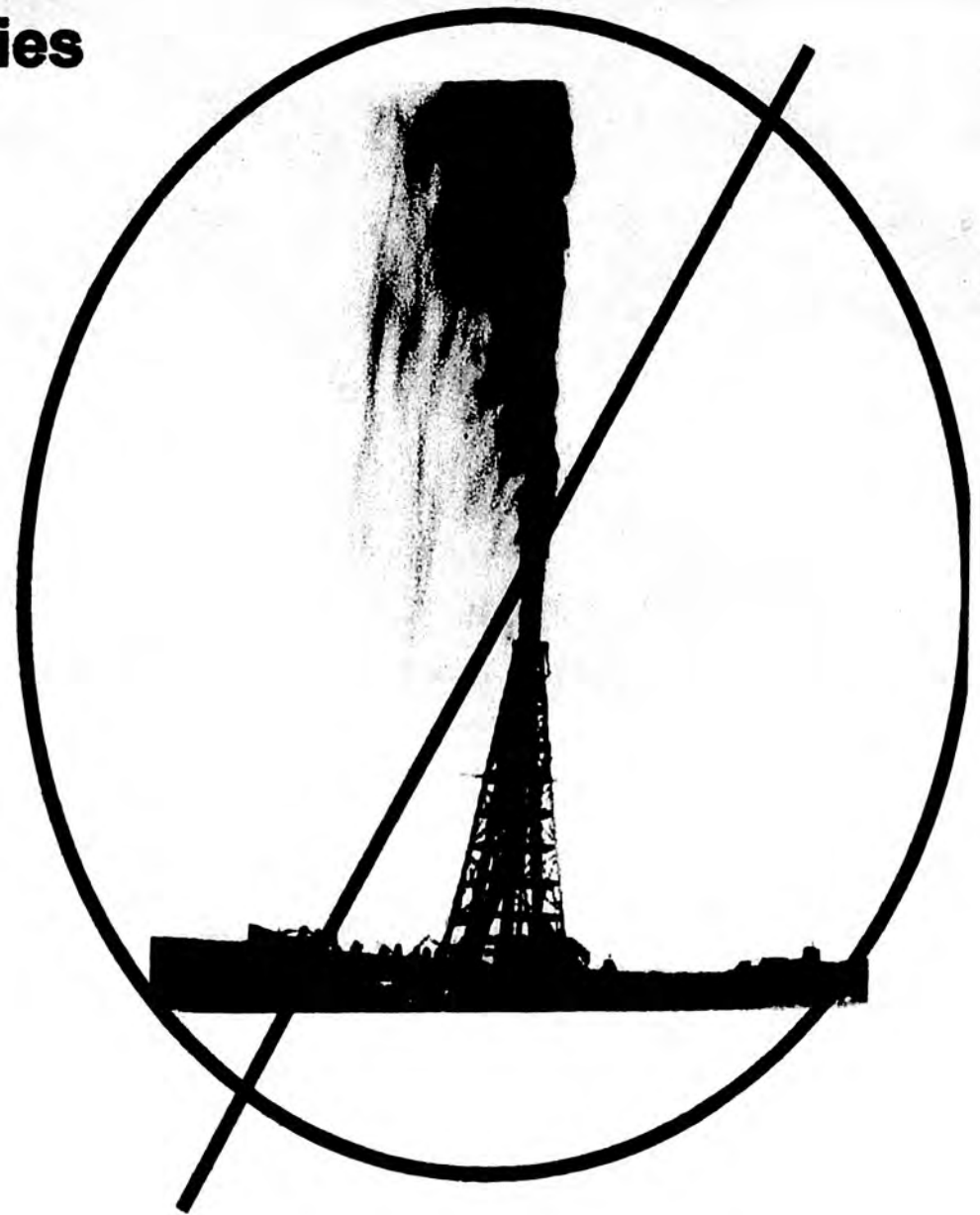
How Does AOGCC Fit In?

	Oil Company	DNR DO & G	AOGCC
Ownership of Resource	Lessee of Oil & Gas Lease (Has right to drill and produce)	Landlord & Lessor of Oil & Gas Lease	(Role is Regulatory, not proprietary)
Jurisdiction	Only on lands where they have right to drill and produce	State Land Only	State, Federal and Private lands
Economics	Profit Oriented	Manages State Owned Resources for Revenue & Other Value	Prevent Waste & Maximize Recovery
Net interest	Majority of Production	Minority of Production (Royalty)	None

AOGCC Goals and Strategies

PREVENT PHYSICAL WASTE OF THE RESOURCE

- **Evaluate drilling programs to ensure proper well design, construction and well control equipment.**
- **Inspect wells and drilling projects to verify compliance with approved regulations, procedures and safety requirements for drilling and production practices.**
- **Evaluate proposals for enhanced oil recovery, gas cap liquids recovery, and major gas sales.**



AOGCC Goals and Strategies (Continued)

ENSURE GREATER ULTIMATE RECOVERY

- **Analyze production data, including reservoir pressure, gas-oil ratios, water cut, etc., to ensure these variables fall within the accepted parameters necessary to provide for greater ultimate recovery.**
- **Review and approve development proposals, including plans for enhanced oil recovery operations.**

INDEPENDENTLY ASSESS OIL AND GAS DEVELOPMENT

- **Independently audit/verify that oil and gas exploration & development proposals are in compliance with the purposes and intent of Title 31.**

PROTECT ALASKA'S UNDERGROUND SOURCES OF DRINKING WATER

- **Provide engineering and geological review of all activities that affect potential sources of drinking water.**

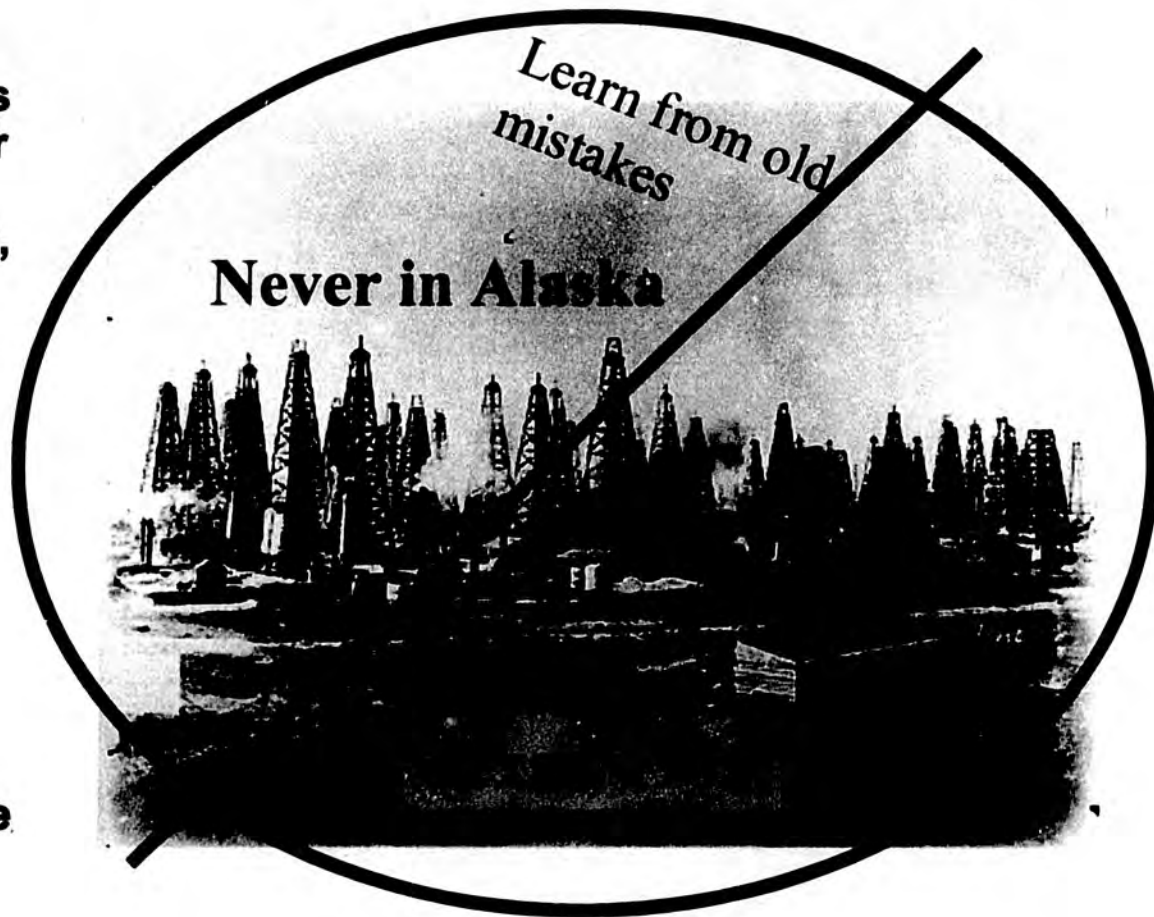
AOGCC Goals and Strategies (Continued)

PROTECT CORRELATIVE RIGHTS

- **Provide all owners of oil and gas rights the opportunity to recover their fair share of the resource through well spacing provisions, permit review, and pooling authority.**

ADJUDICATE DISPUTES BETWEEN OWNERS

- **Provide a public forum to resolve disputes between owners.**



History of the AOGCC

- **1955- Created Before Statehood-** Alaska Oil and Gas Conservation Act created the Alaska Oil and Gas Conservation Commission (AOGCC)- Governor of the Territory of Alaska, Commissioner of Mines, Highway Engineer.
- **1958-** Implementing regulations adopted by AOGCC
- **1959- At Statehood-** the State Organization Act, AOGCC abolished, function and authority transferred to the Department of Natural Resources (DNR). Hearings and decisions issued by Alaska Oil and Gas Conservation Committee consisting of Director of Division of Mines & Minerals, State Petroleum Geologist, the State Petroleum Engineer, Deputy Commissioner of DNR
- **1977 Onset of Prudhoe Bay Production**
- **1978 Legislation enacted to re-create the AOGCC to administer the Alaska Oil & Gas Conservation Act.** AS 31.05 amended by Chapter 158, SLA 1978
- **1979-** AOGCC re-created as an independent quasi-judicial agency within the executive branch of the state housed in DNR.
- **1980-** AOGCC placed in the Department of Commerce and Economic Development for administrative purposes.
- **1991-** AOGCC transferred to DNR for administrative purposes.
- **1994-** AOGCC transferred in the Department of Administration for administrative purposes.

AOGCC PRIMARY SERVICES

Regulate, monitor and inspect all subsurface activities directly related to oil and gas exploration and production including the design and integrity of wells, well control procedures and equipment, reservoir management plans and proposed underground injection programs.

- Issue pooling rules and conservation orders.**
- Approve and monitor plans for reservoir development and enhanced oil recovery.**
- Approve permits for initial drilling, re-drill, sidetrack, and remedial well operations. This includes the evaluation and approval of proposed designs for drilling fluids, well control, casing, cementing and well completion operations.**
- Inspect drill rigs and wells to insure compliance with AOGCC regulations.**
- Witness safety valve, mechanical integrity, and blowout preventer tests.**
- Witness meter-proving, calibration, and oil quality tests.**
- Enforce well spacing rules, monitor production rates, injection well pattern, gas/oil/water ratios, and pressure maintenance efforts.**
- Monitor and evaluate gas flaring.**
- Collect and maintain all oil and gas production records.**
- Collect and maintain all well history files and well log records.**
- Administer Alaska's Underground Injection Control (UIC) program and the annular waste disposal program.**

CUSTOMERS



- **Alaskans**
- **Oil & Gas Companies**
- **Alaska Department of Natural Resources**
- **Alaska Department of Revenue**
- **Alaska Department of Environmental Conservation**
- **U.S. Environmental Protection Agency**
- **U.S. Department of the Interior, Minerals Management Service, and Bureau of Land Management**
- **U.S. Department of Energy**
- **Trade Organizations**
- **Other Interested Parties**

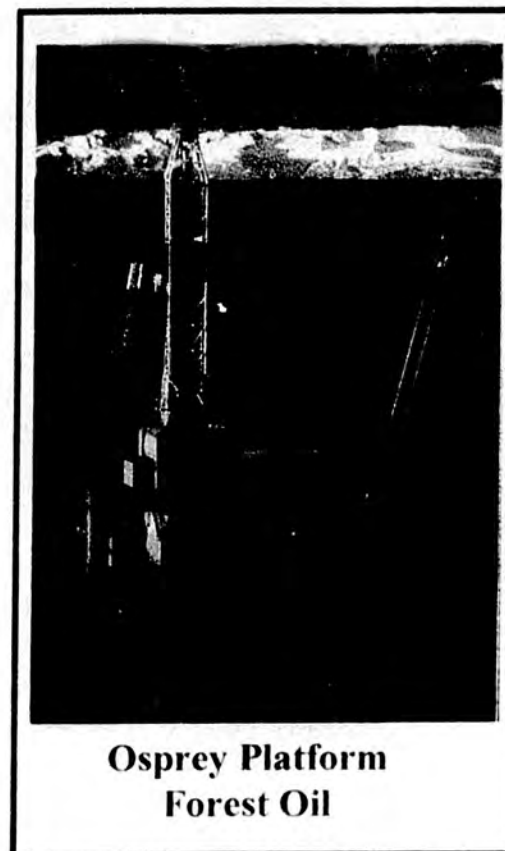
OIL AND GAS OPERATORS AND OWNERS NORTH SLOPE

- **BP Exploration (Alaska) Inc.**
- **Phillips Alaska Inc.**
- **Exxon- Mobil U.S.A.**
- **Chevron U.S.A.**
- **Murphy Petroleum**
- **Texaco**
- **Pennzoil**
- **Anadarko Petroleum Corp.**
- **Unocal**
- **Petrofina Delaware Inc.**
- **North Slope Borough**
- **U.S. Department of Interior**
- **UMC Petroleum Corporation**



OIL AND GAS OPERATORS AND OWNERS COOK INLET

- **Unocal**
- **Marathon Oil Company**
- **Phillips Alaska Inc.**
- **Cross-Timbers Oil Company**
- **Anadarko**
- **CIRI**
- **Forest Oil Corp.**
- **Northstar Energy**
- **Aurora LLC**
- **GRI**
- **Alaska Crude Corporation**
- **Ocean Energy**
- **Frontier Petroleum**
- **Escopeda**



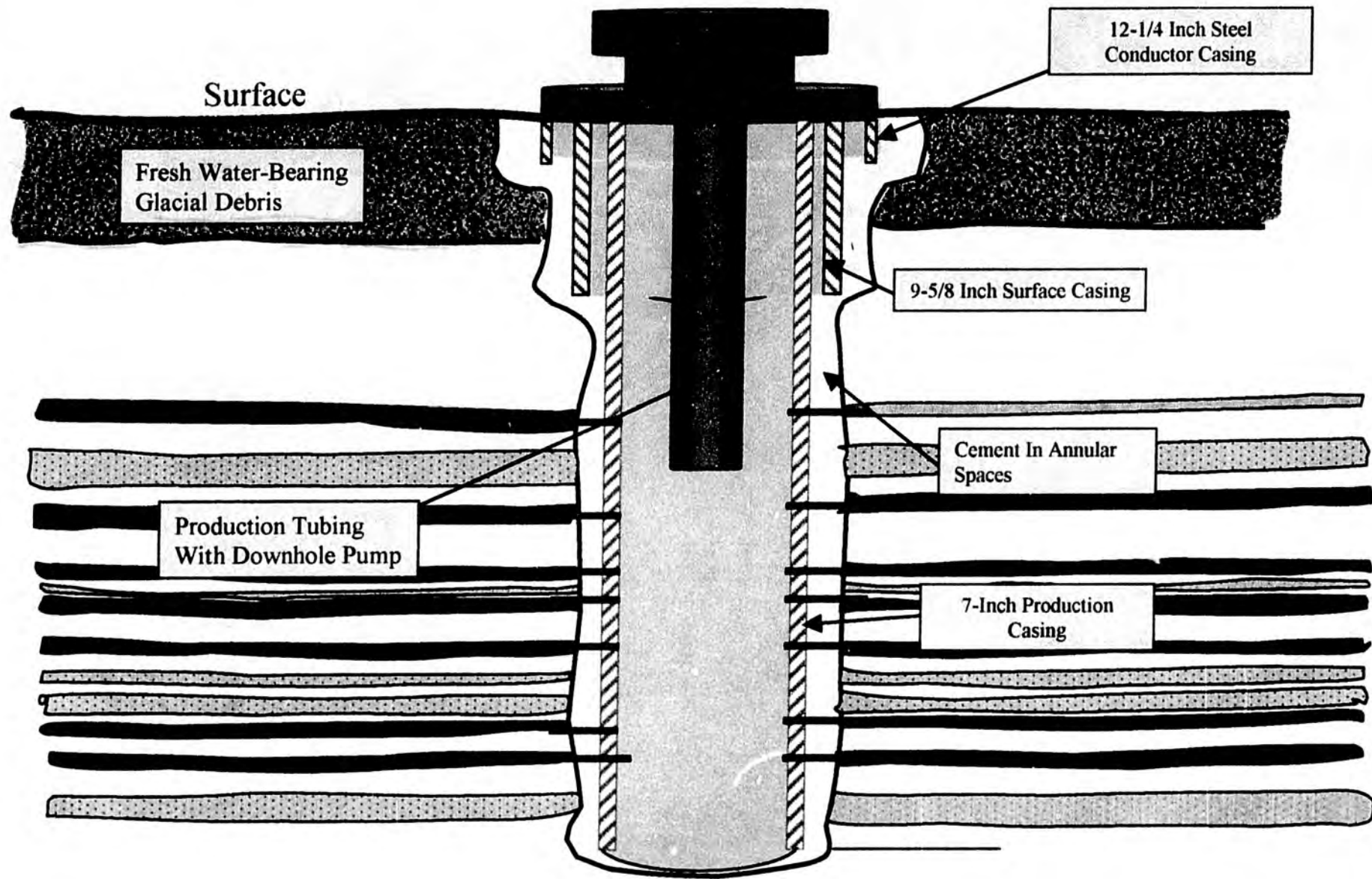
AOGCC MAJOR ACCOMPLISHMENTS

- Effectively and timely evaluated and issued approvals for numerous sub-surface oil and gas operations.
- Continued to efficiently oversee the UIC program. Gained a national voice regarding state management of underground injection and ground water protection.
- Fully implemented the requirements of Chapter 34 SLA 99 (SB 134) through the adoption of Regulatory Cost Charge regulations.
- Acquired software and successfully implemented Phase I of document imaging program, which will allow improved information management and access.
- Selected and contracted for an oil and gas relational database (Phase II of information technology project) for management of well data, which will allow improved information management and access.
- Completed initial project in conjunction with the Petroleum Development Laboratory at the School of Mineral Engineering at the University of Alaska, Fairbanks.

PERMITTING

- Evaluate well design and adequate well control equipment with regard to the geologic parameters in order to prevent surface waste by accident/blow out
- Evaluate well spacing, completion techniques, production rates, injection well patterns, and pressure maintenance efforts for impact on the ultimate recoverability of hydrocarbons.
- Average Drilling permits processed per year over last 10 years is 195
- Permit to Drill Applications up 20% over 10 year average.

Producing Well Simplified Wellbore Schematic





Pre-1970's wells were mainly drilled simple and straight. Many surface locations were necessary to define the field.

Extended Reach Well

Extended reach wells were developed to access reservoirs from fewer, smaller locations such as offshore platforms and in environmentally sensitive areas to minimize surface disruption.

Vertical Well

Side Track Well

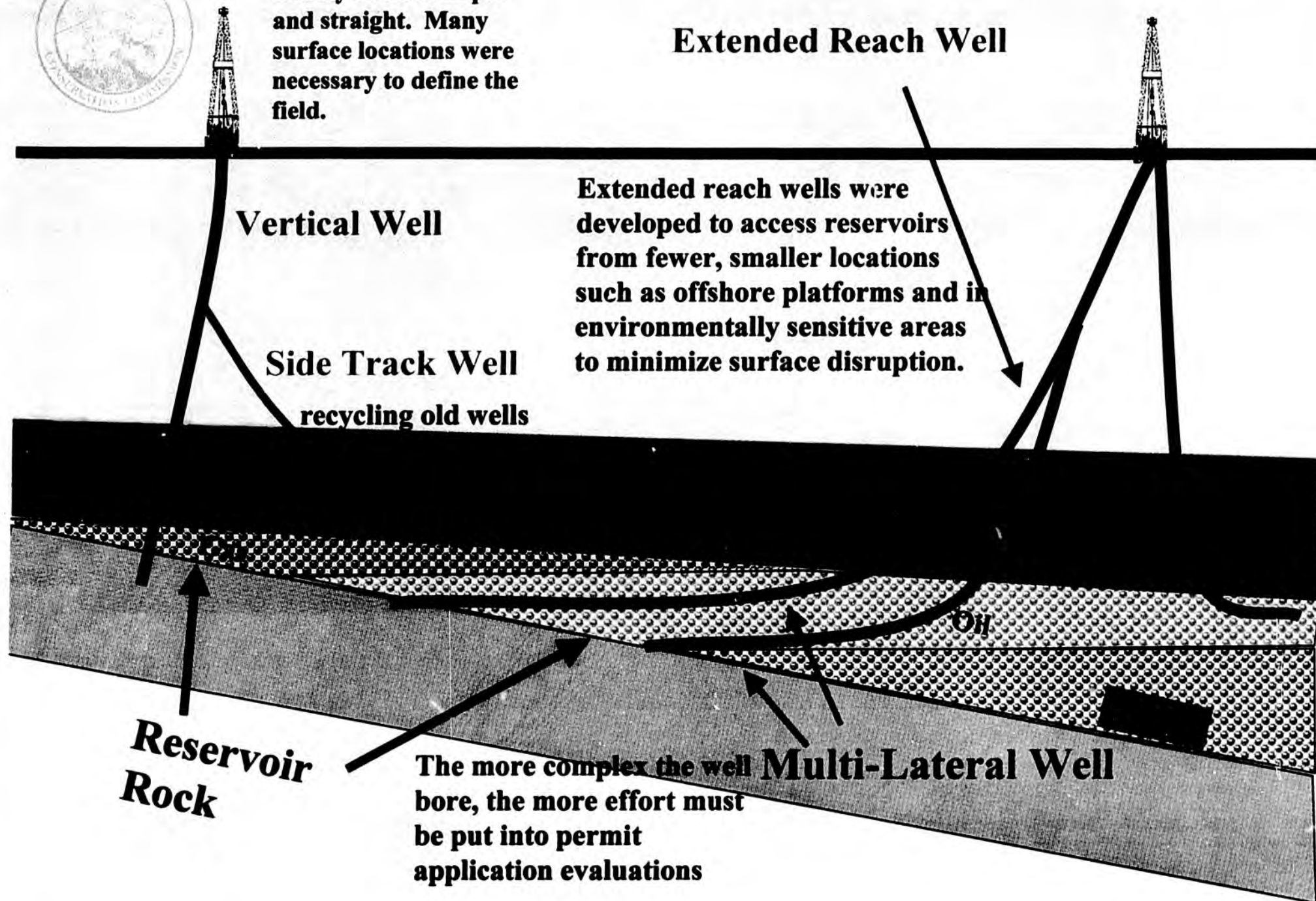
recycling old wells

Reservoir
Rock

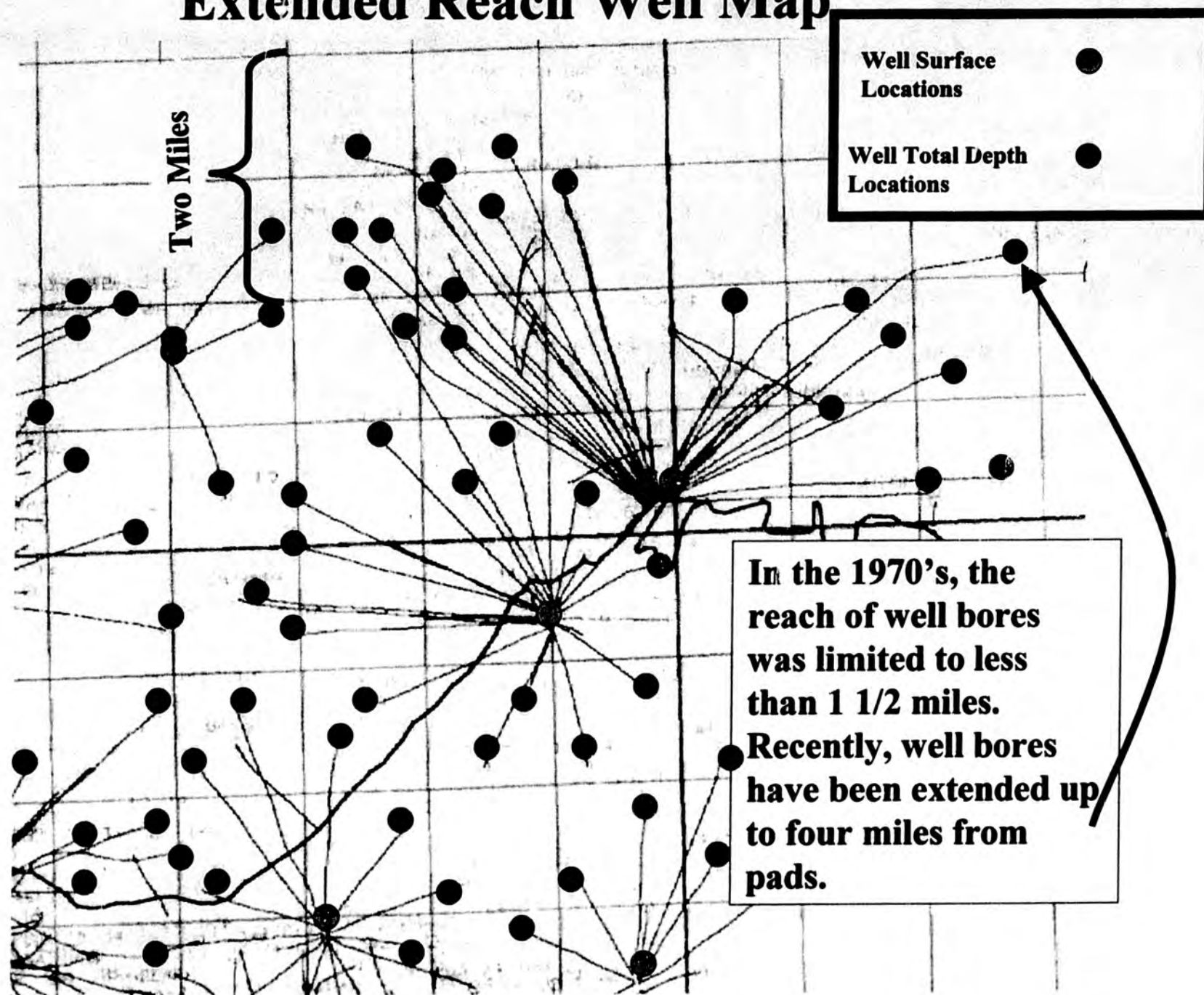
The more complex the well bore, the more effort must be put into permit application evaluations

Multi-Lateral Well

Oil



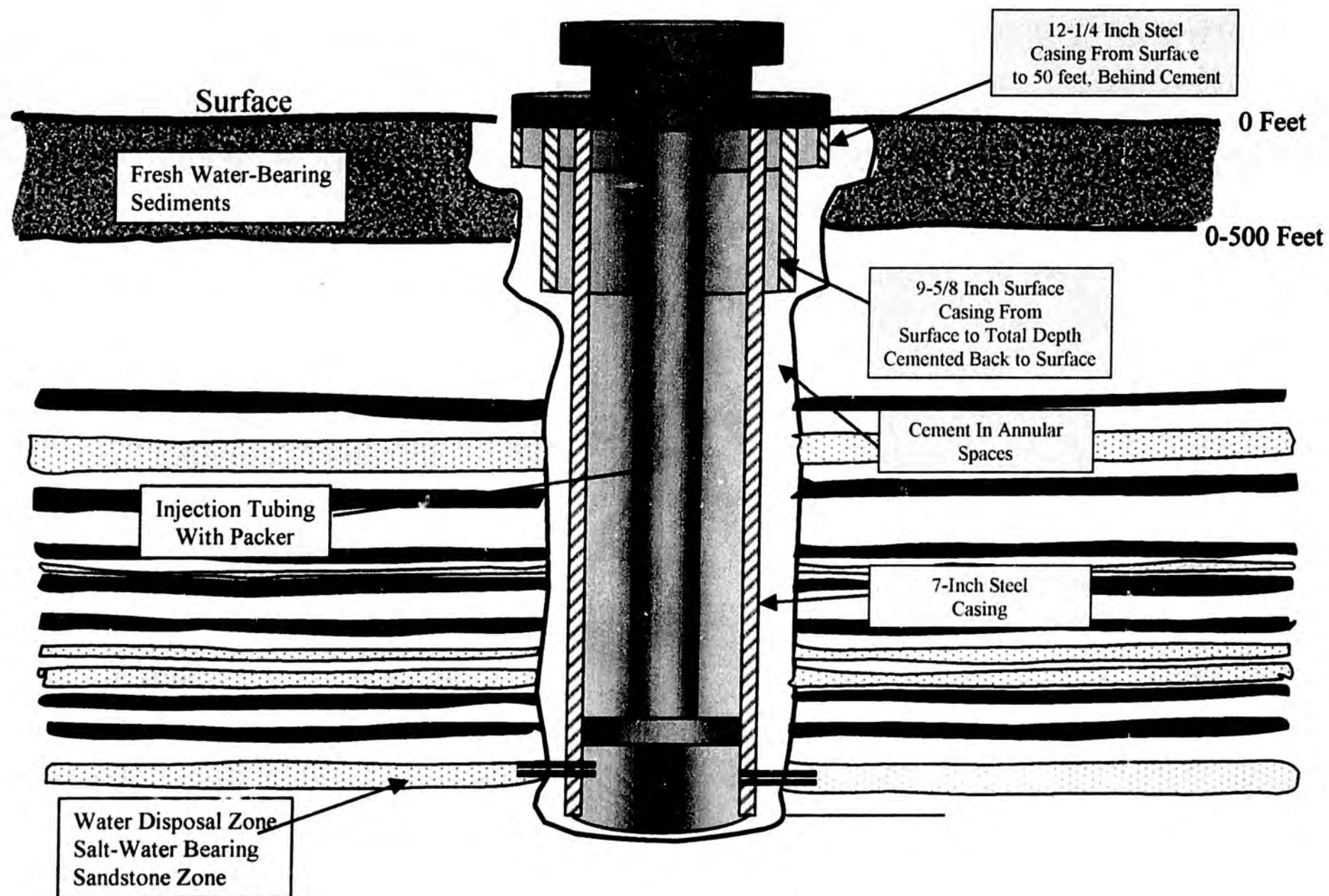
Extended Reach Well Map



UNDERGROUND INJECTION PROGRAM

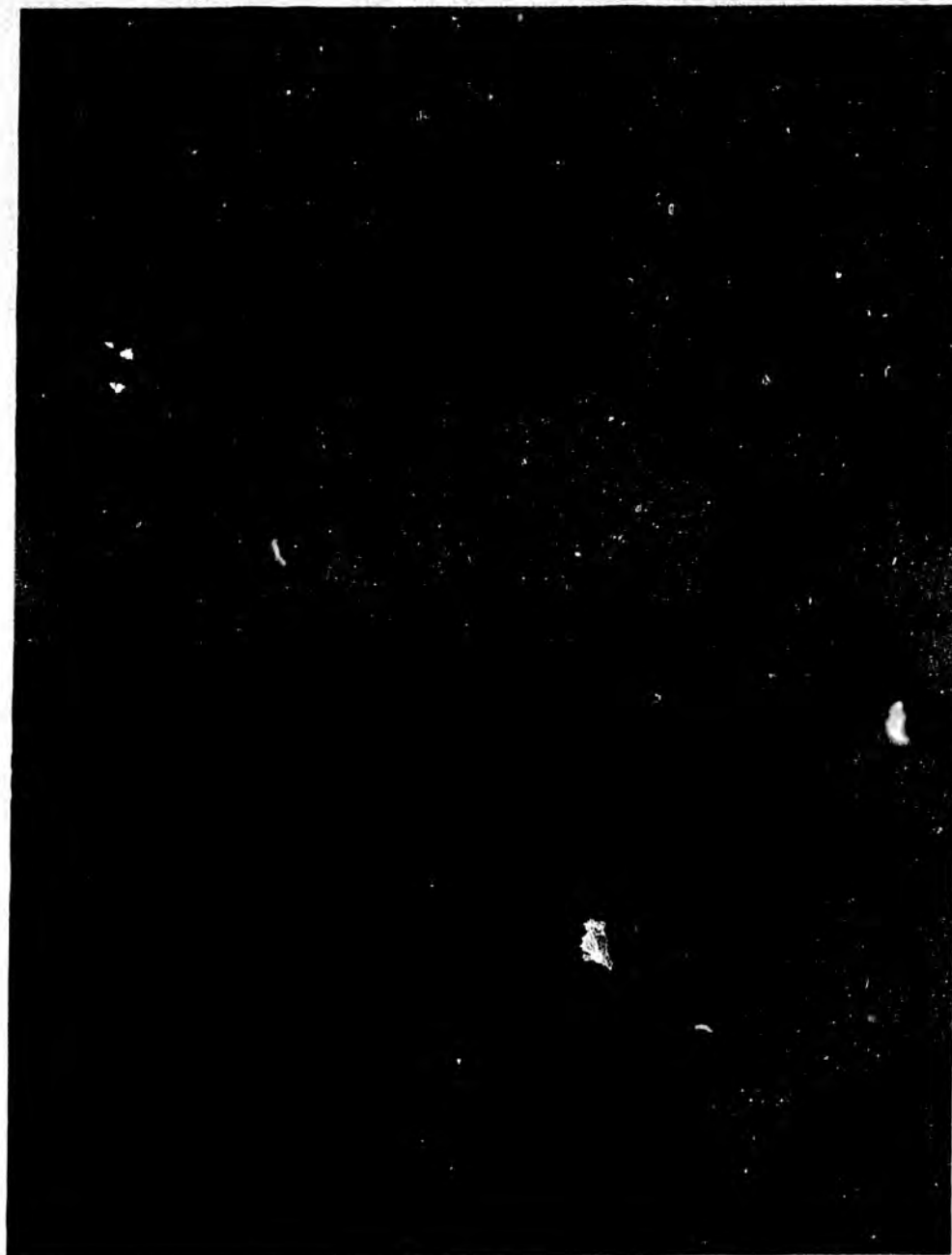
AOGCC has primacy for implementing the federal Underground injection control (UIC) program. This allows the state to regulate underground injection activities for the purposes of enhanced oil recovery and the most environmentally protective disposal of oil field waste.

Water Disposal Well Simplified Wellbore Schematic



Inspections

- Inspect and ensure compliance for drilling rigs, blow-out prevention equipment tests, safety valve, and mechanical integrity tests in order to prevent accidents and/or blowouts
- Meter proving and calibration ensure accurate volume measurement. Oil & Gas tax & royalty revenues are calculated based upon volumes reported from the meters.

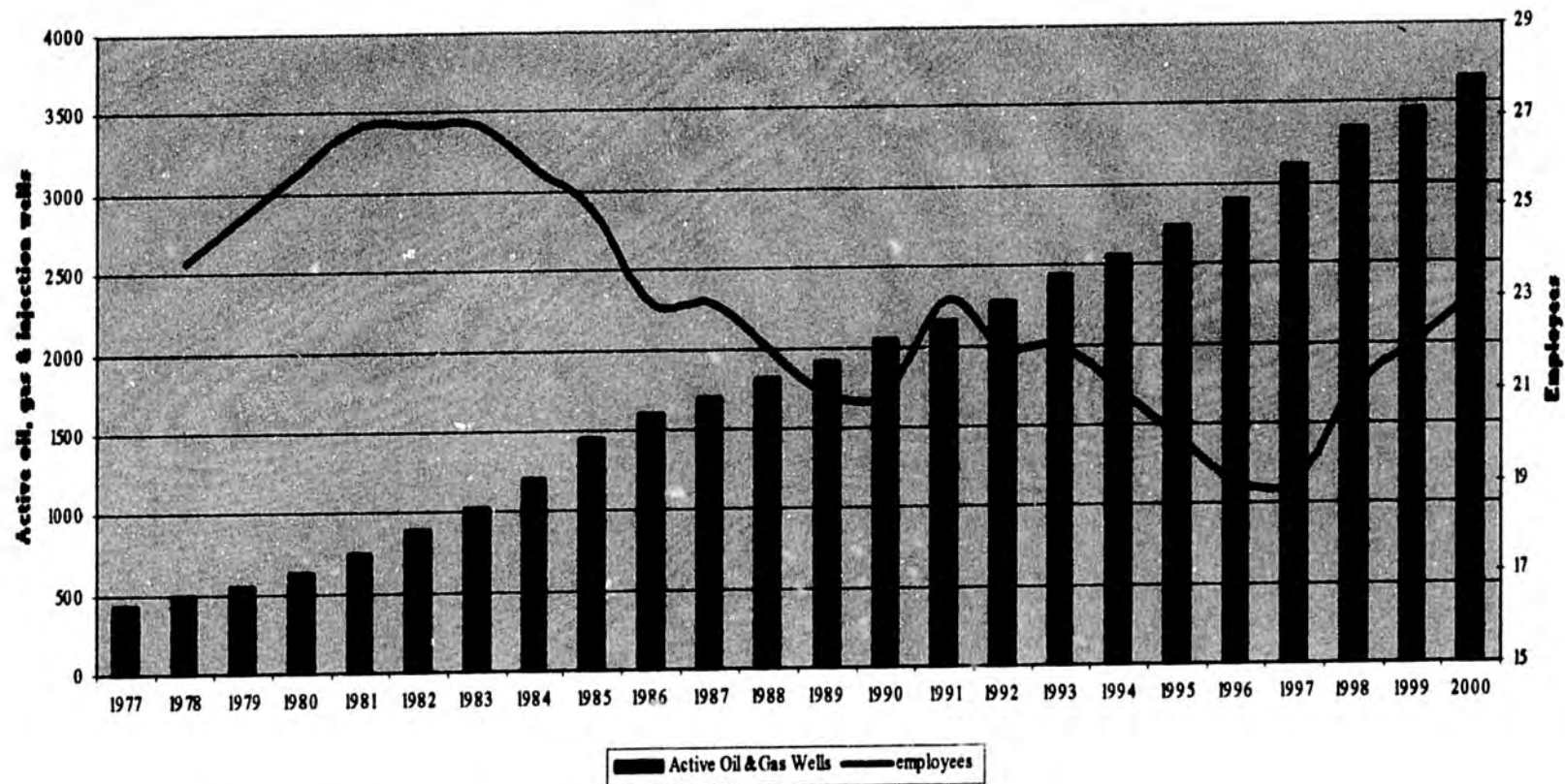


Inspections

- Inspection of well operations in Cook Inlet and North Slope

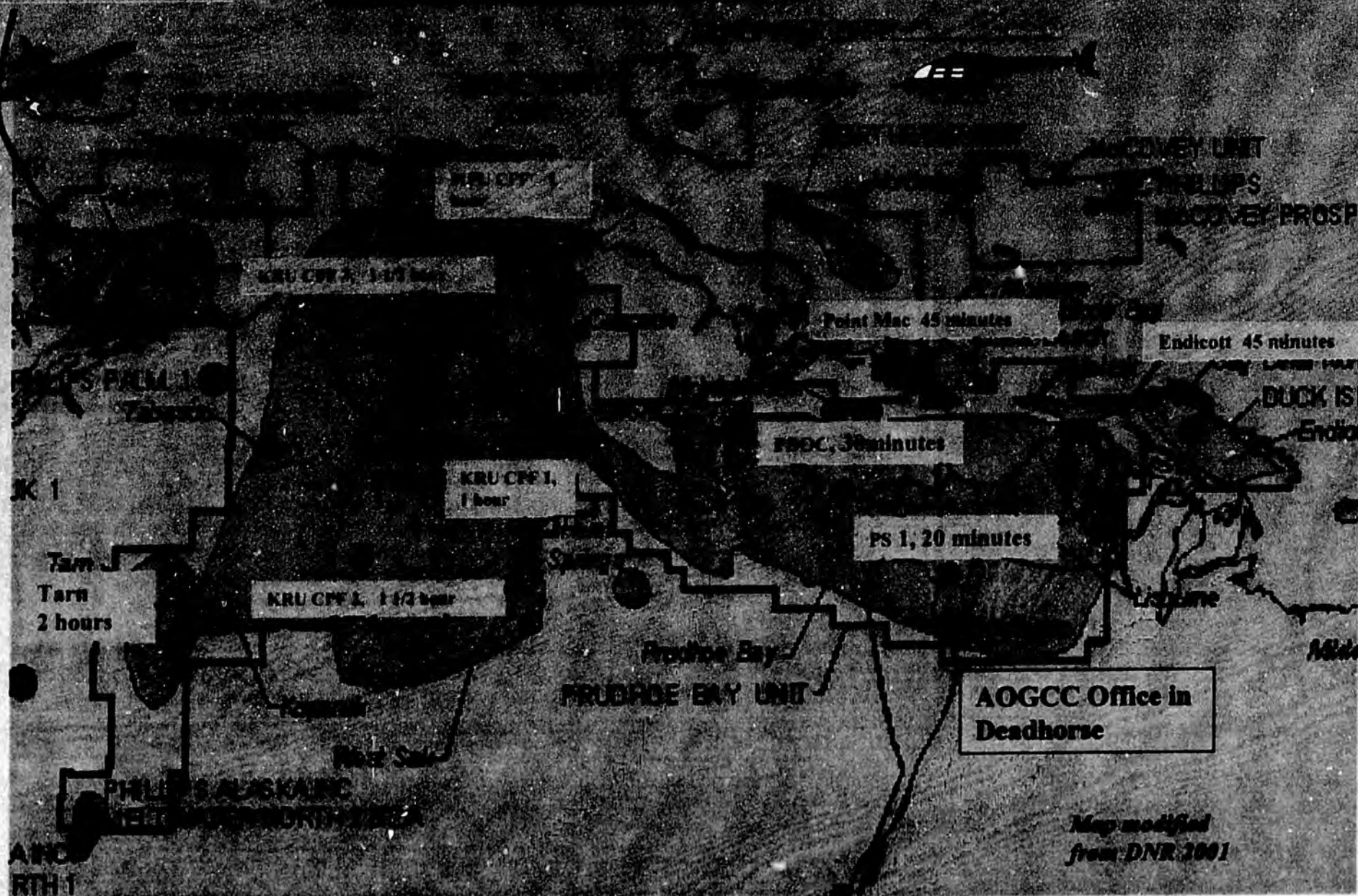
- Total Number of Active Wells - 3651

Alaska Oil and Gas Conservation Commission
Cumulative Count of Active Wells

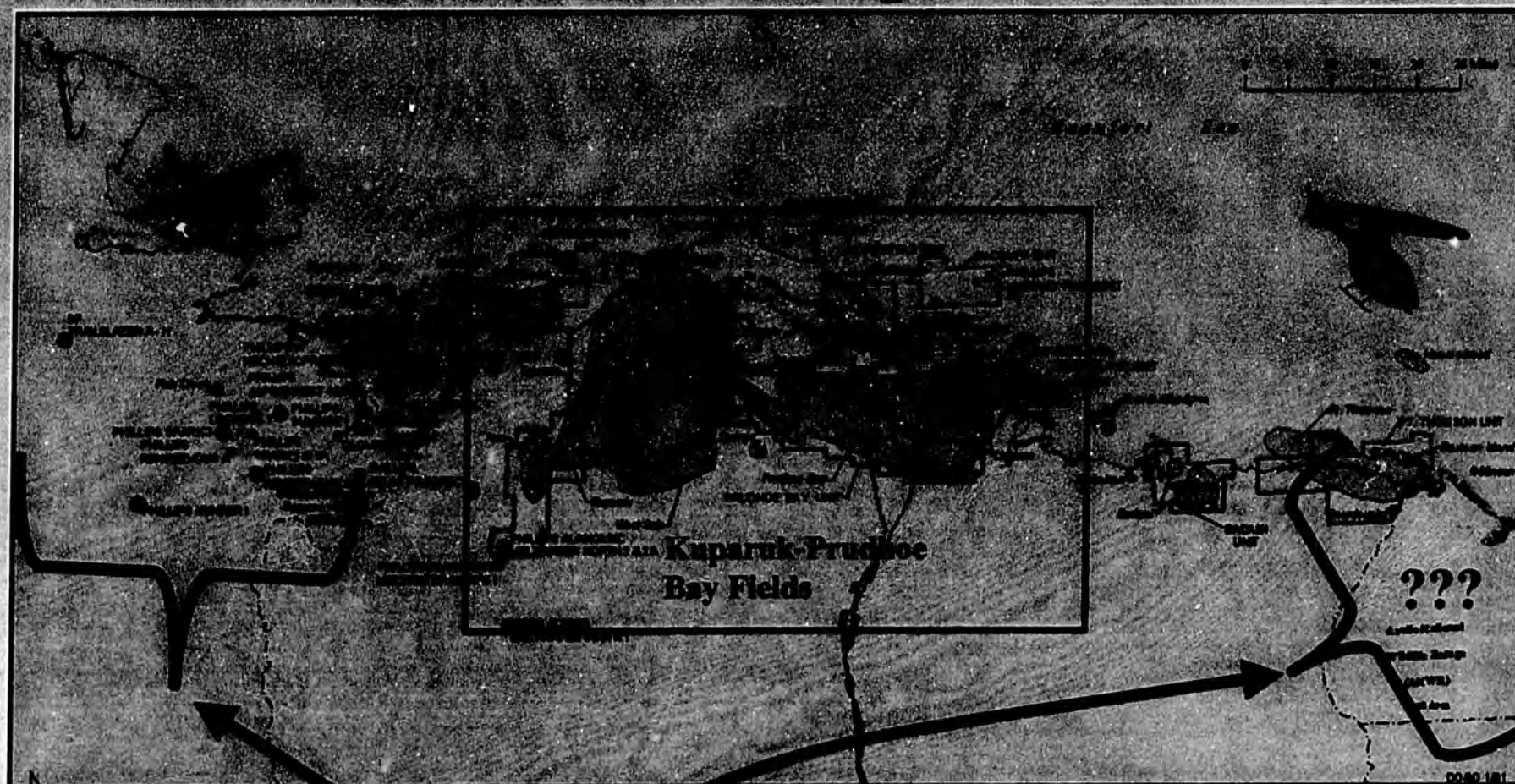


More inspections, well
workover permits (403's),

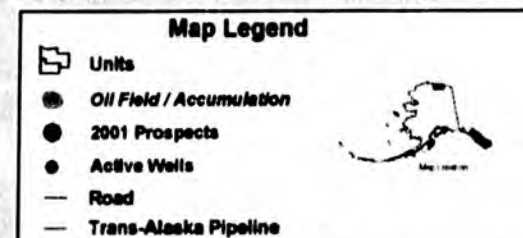
Calville Delta 8 hours,
probably 24+ Hours to
complete inspection



North Slope



With exploration & Development extending farther outside of the Kuparuk-Prudhoe infrastructure, AOGCC inspection logistics will grow much more complicated.

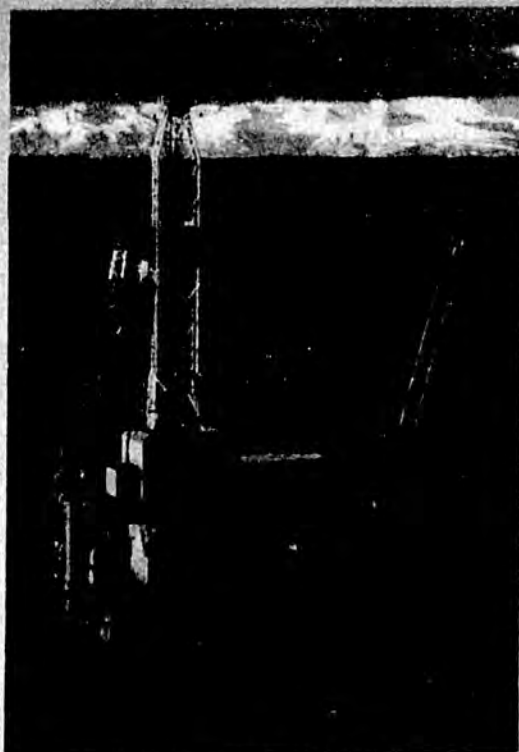


*Map modified
from DNR 2001*

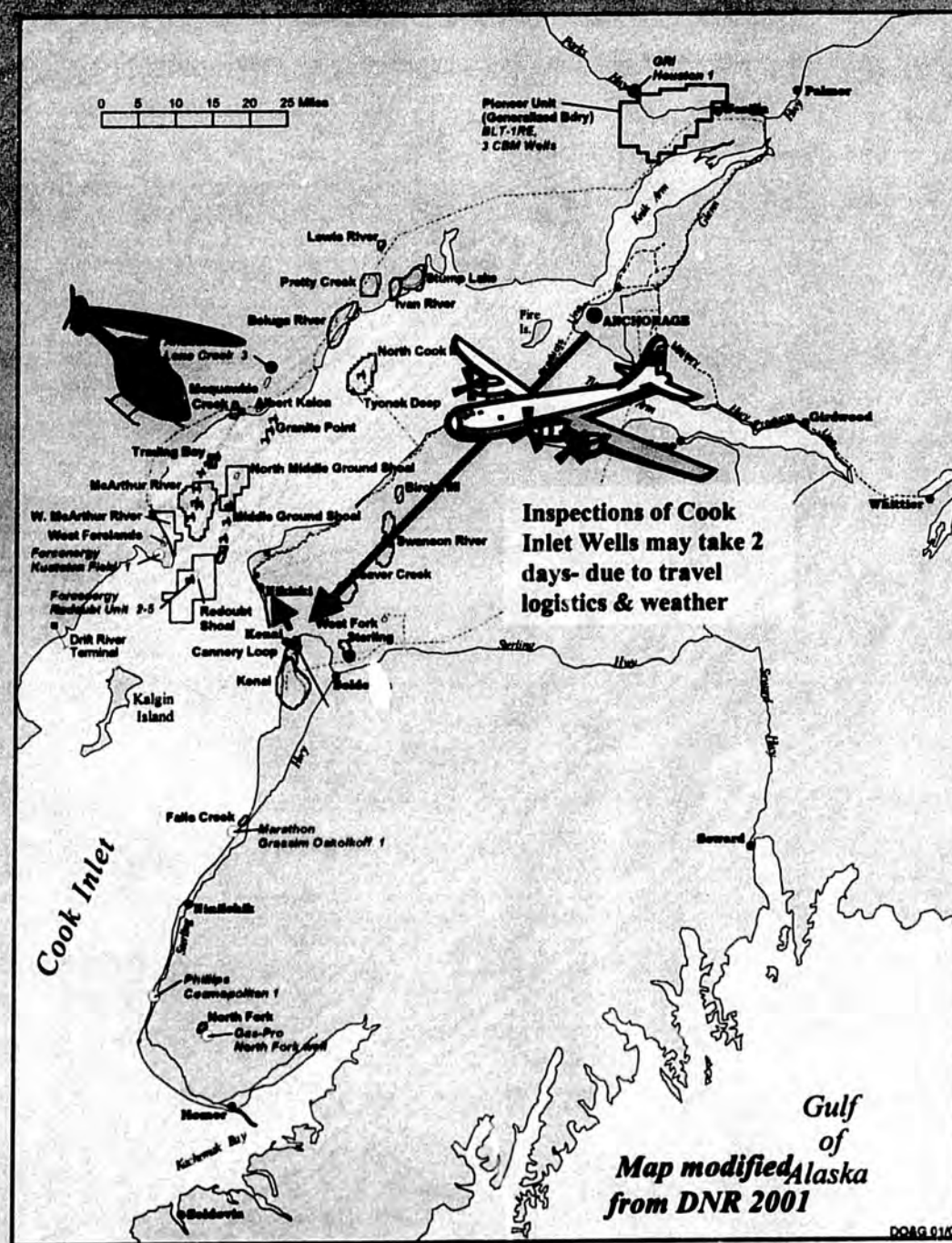
Cook Inlet

Map Legend

- Unit Boundary
- Oil Field / Accumulation
- Gas Field / Accumulation
- Selected Wells
- Proposed / Active Wells
- Platform
- Pipelines
- Production Facility



Osprey Platform- Forest Oil Corp.



DOAG 9/10

jrc/mep 01/01

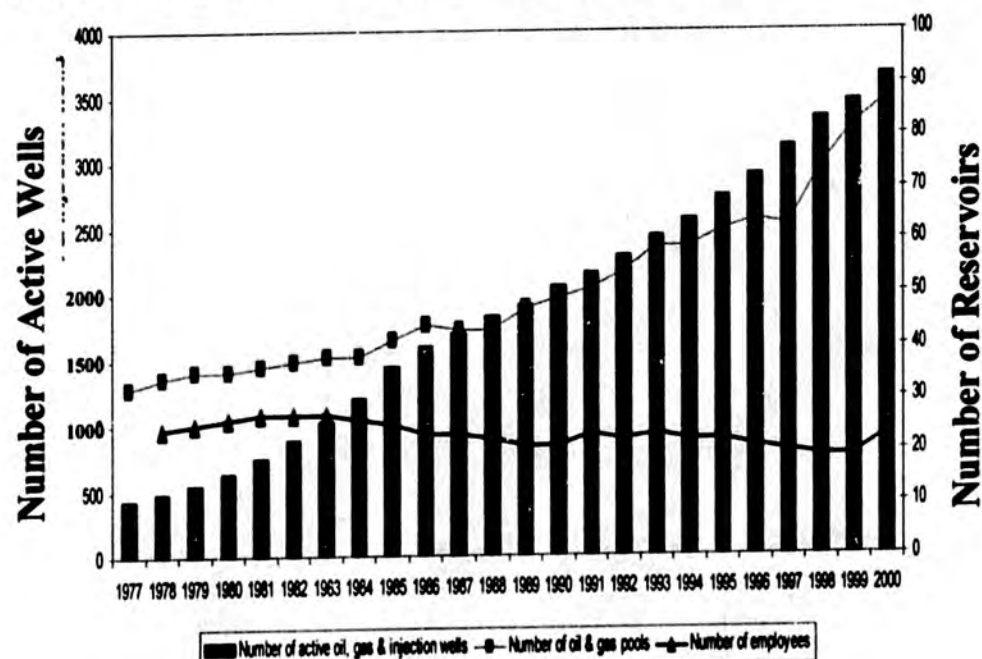
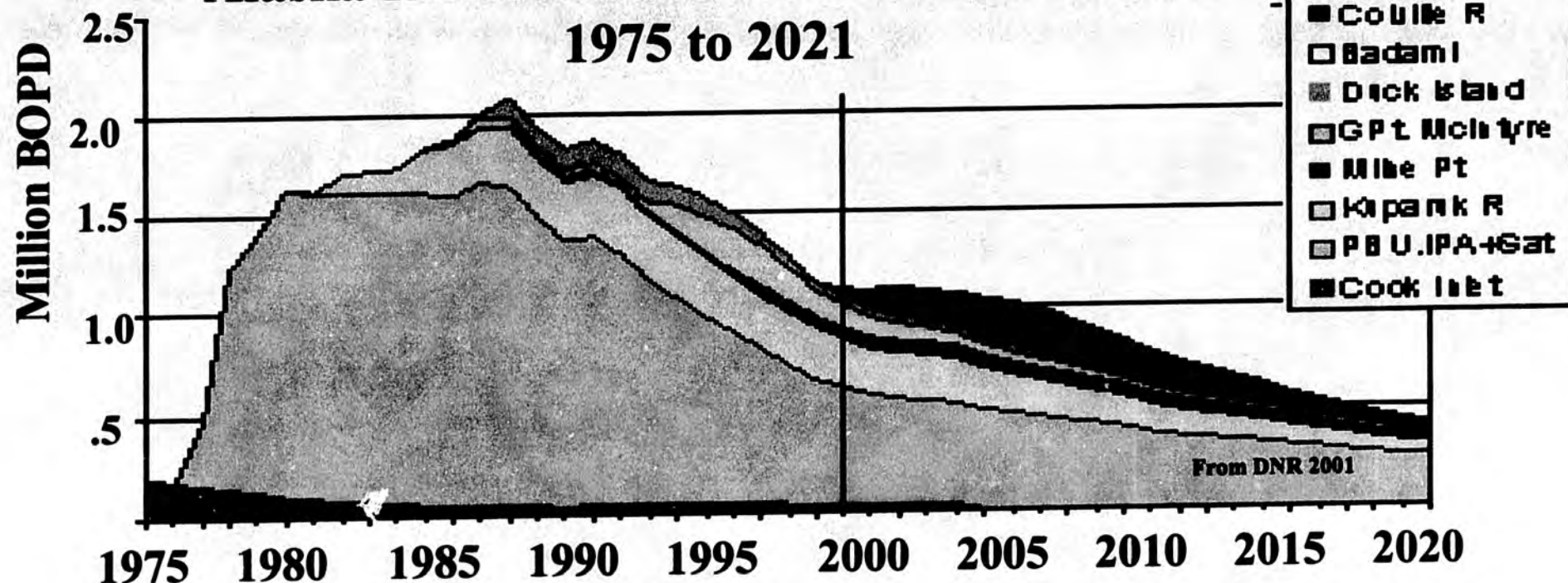
Field Studies/Reservoir Evaluations- Statute

- Review proposed plans of development
- Evaluate monthly production and injection reports
- Evaluate reservoir performance to promote greater ultimate recovery.

Field/Reservoir Evaluations

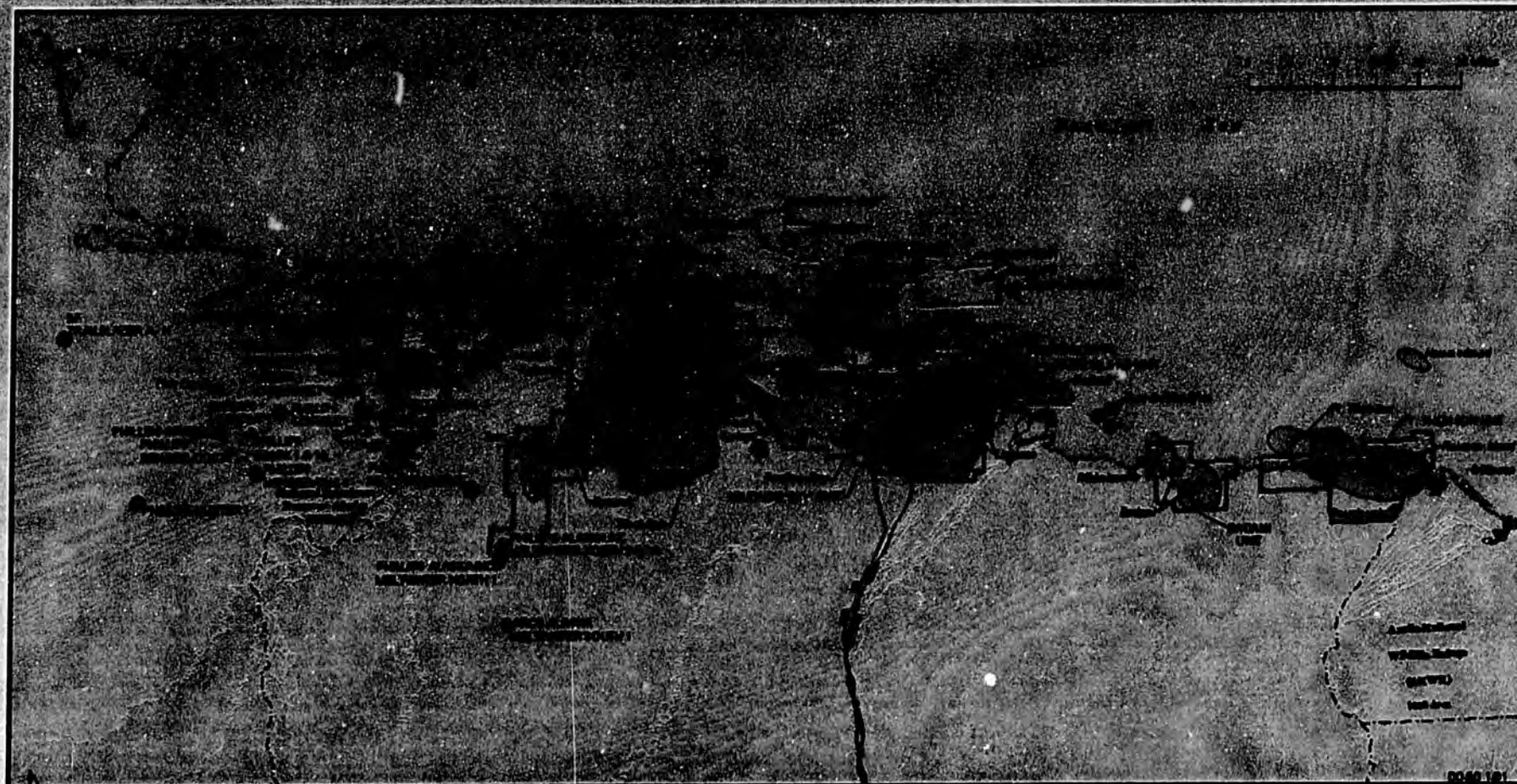
- **Phase one of in depth review completed of Alpine (FY00); Phase two in progress (FY01), UAF contracted**
- **Initiated evaluation of unique drilling issues at Northstar (FY00)**
- **Begun Phase one to study effects of Prudhoe Bay Gas Commercialization factors affecting Prudhoe Bay Oil Recovery (FY01), Phase two will evaluate effects (FY02)**
- **Monthly status checks for anomalies on production characteristics of 37 active oil reservoirs**
- **Quarterly status checks for anomalies on production characteristics of 20 active gas pools**
- **Other unpredicted studies (Aquifer Exemptions, Shallow gas hazards, C-plans, resulting from adjudications, etc (approximately 7 per year)**

Alaska Historic & Forecast Oil Production 1975 to 2021

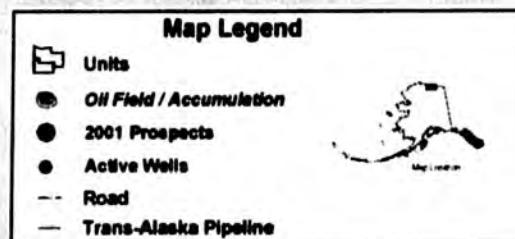


**More pools= increased oversight
(more decisions, field studies,
Inspections)**

AOGCC NORTH SLOPE RESERVOIR STUDIES



● Study



ELECTRONIC DATA INITIATIVE

AOGCC handles and maintains tremendous volumes of information

- **Paper Files**

- Documents (~1.6 million pages currently)

- Well Log Files (paper and sepia copies for
~ 5000 wells = 25,000 logs)

- **Electronic Files**

- Well History Files

- Production and Injection Information

- Well Log Digital Data

- Data Inventories

- Drilling Samples Inventory

ELECTRONIC DATA INITIATIVE

Currently Migrating to Electronic Data – moving to the new century

- **RBDMS:**

- Combines many PC and Mainframe databases

- User-friendly

- Data will be available to public thru Web

- Current funding largely through GWPC and DOE

- AOGCC contributions through staff time/hardware

- **GeoFrame:**

- Well location database – All wells in Alaska

- Single, comprehensive database (wall display)

- Allows better tracking of development efforts
and Reservoir Evaluations

- **Transmission of Reports and Data:**

- Receipt of some forms of well logs in electronic
format

ELECTRONIC DATA INITIATIVE

Planned Efforts – Continuing Onward

- **Online E-Permitting:**
Receipt of electronic permits / attachments
- **Transmission of Reports and Data through the Internet:**
Receipt of increasingly diverse types of reports and data electronically
Easily translated and stored in RBDMS
Public-domain data quickly available on Web via RBDMS
- **GIS (Geographic Information Systems):**
Data handling / analysis using Geographic interface

ELECTRONIC DATA INITIATIVE BENEFITS

- **AOGCC –**

- More Efficient & Cost Saving business practices

- Quicker receipt of data

- Faster processing / storage of data

- More time to perform AOGCC's mission

- Less data handling / cataloging

- Less storage space required

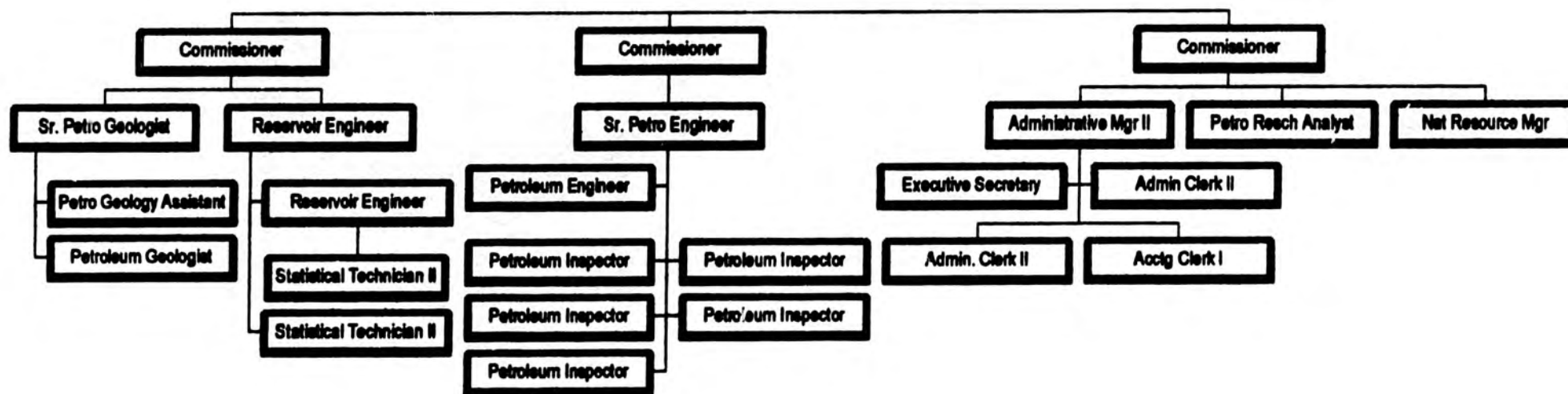
- **CUSTOMERS–**

- Vital information transmission to all customers including potential new operators

- Reduced paper handling and related costs

- Faster and Easier access to public-domain data by customers worldwide

Department of Administration
Alaska Oil and Gas Conservation Commission
 Organizational Chart
 FY 2001



Alaska Oil and Gas Conservation Commission (AOGCC)

Contact Information

Phone- (907) 297-1433

FAX: (907) 276-7542

State Of Alaska Web- www.state.ak.us/

AOGCC Web- www.state.ak.us/local/akpages/ADMIN/ogc/homeogc.htm

AOGCC Regulations-

www.state.ak.us/local/akpages/ADMIN/ogc/art199.htm

Alaska Oil & Gas Conservation Act-

[www.legis.state.ak.us/cgi-](http://www.legis.state.ak.us/cgi-bin/folioisa.dll/stattx99/query=*/doc/{t11885}?)

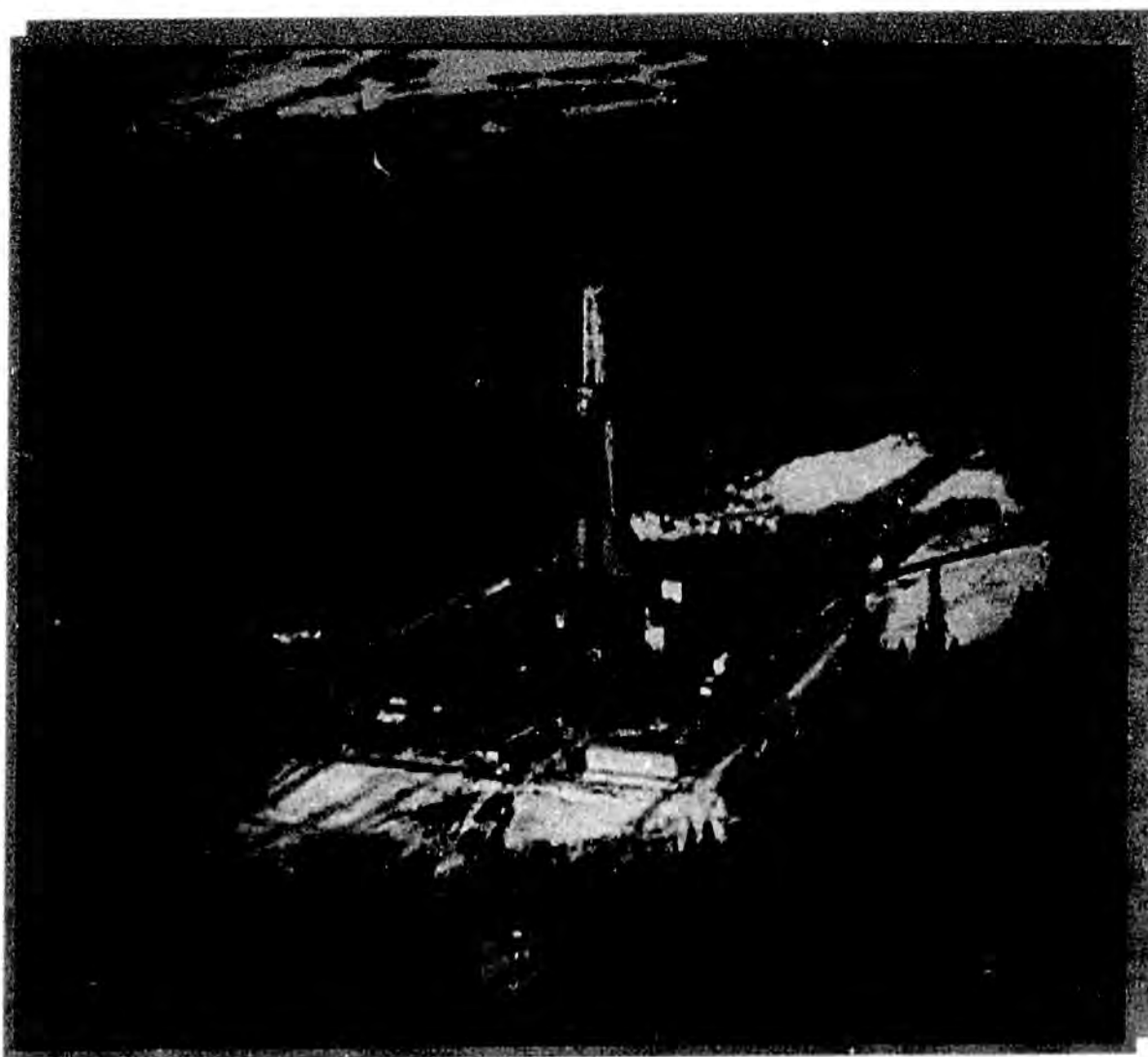
[bin/folioisa.dll/stattx99/query=*/doc/{t11885}?](http://www.legis.state.ak.us/cgi-bin/folioisa.dll/stattx99/query=*/doc/{t11885}?)

**Alaska Oil and Gas Conservation Commission
(AOGCC)**

House Oil & Gas Sub-Committee

March 23, 2001

Basic Drilling & Completion Operations



West Macarthur Oil Field- Forest Oil Corporation

Why Regulate Drilling and Completion Operations ?

- **Protect the Public interest in oil and gas resources.**
 - Prevent pollution of fresh water supplies.
 - Prevent blowouts.
 - Insure wells are drilled and completed in a manner that promotes greater ultimate recovery of hydrocarbon reserves.
 - Protect Correlative Rights.

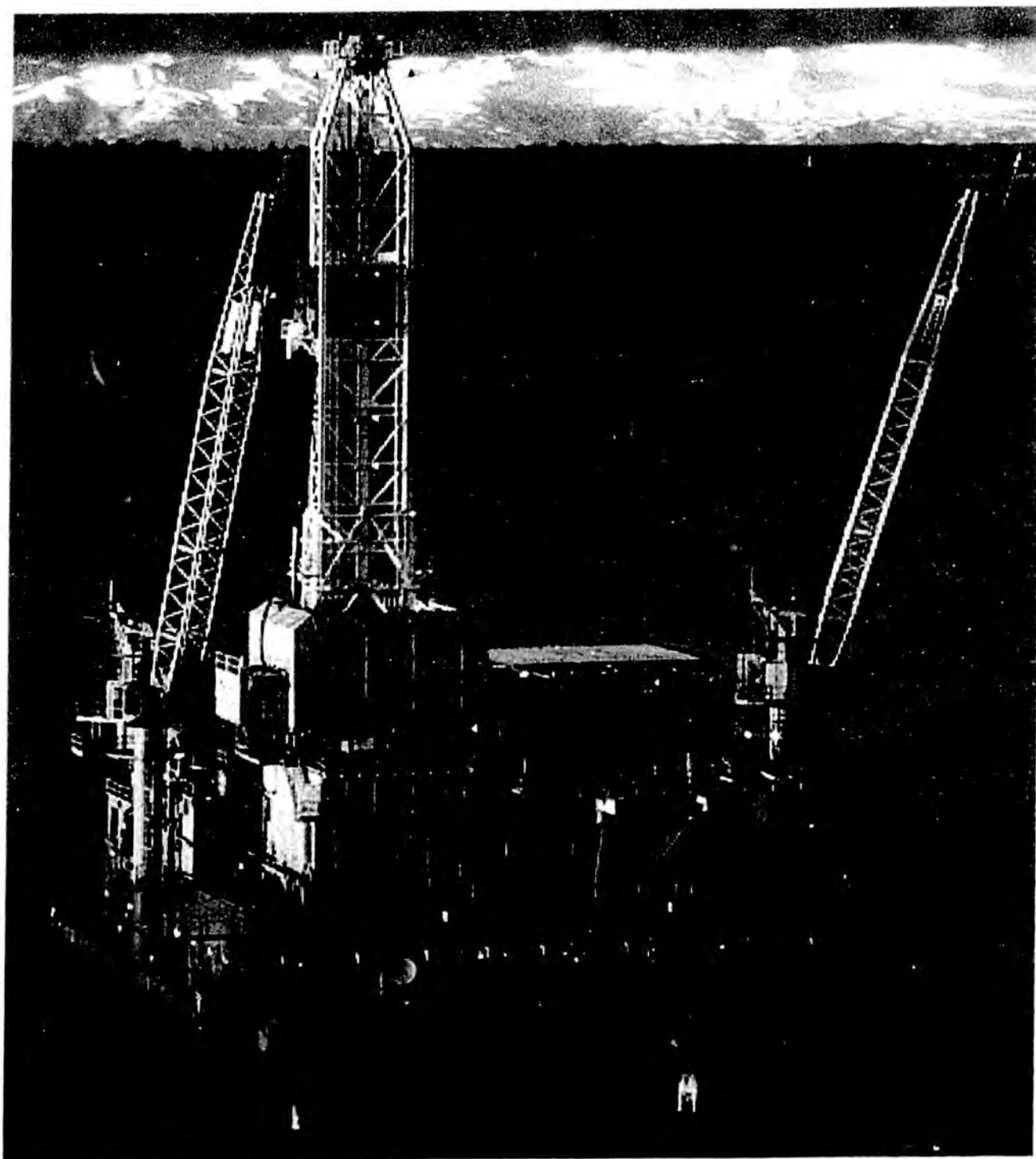
What Does The AOGCC Consider When Reviewing a Proposed Well Plan?

- **Evaluate drilling programs :**
 - Well location with respect to lease and pool boundaries.
 - Well spacing and construction to insure conformance with pool development plan and greater ultimate recovery of hydrocarbon reserves.
 - Information on, and proposed mitigation procedures for, potential drilling hazards such as shallow gas, H₂S, and over-pressure.
 - Casing design to isolate sources of drinking water and insure mechanical integrity of the well.
 - Cementing program to insure confinement of hydrocarbons and sources of drinking water.
 - Insure the proposed primary and secondary well control fulfills regulations.

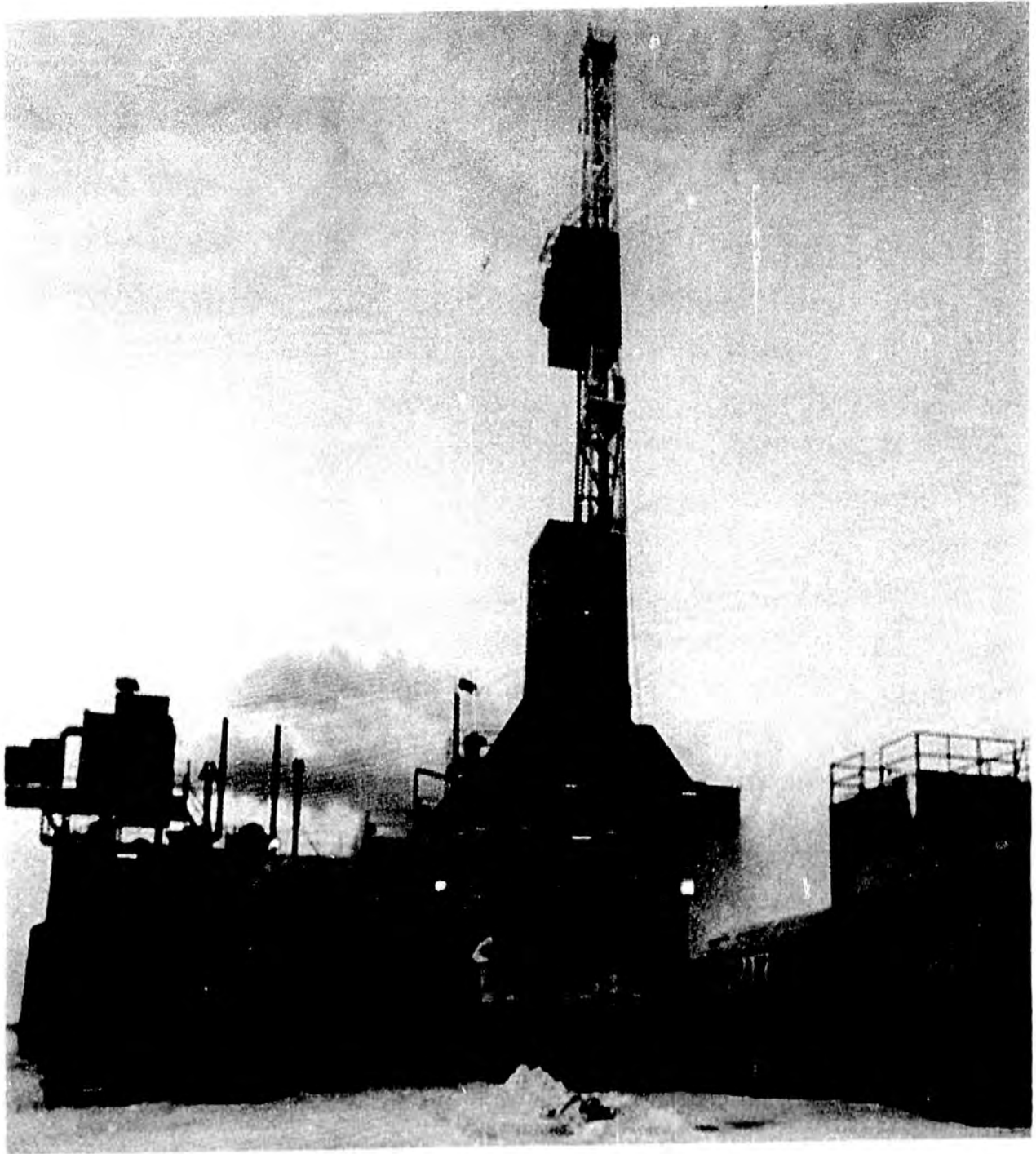
Why Does the AOGCC Carry Out On-Site Rig Inspections?

- **Verify compliance with approved regulations, procedures and safety requirements for drilling and production practices.**
 - Blow Out Prevention Equipment testing.
 - Verify rig is operating with all required primary and secondary well control equipment.
 - Verify gas detection equipment is present and in proper working order.

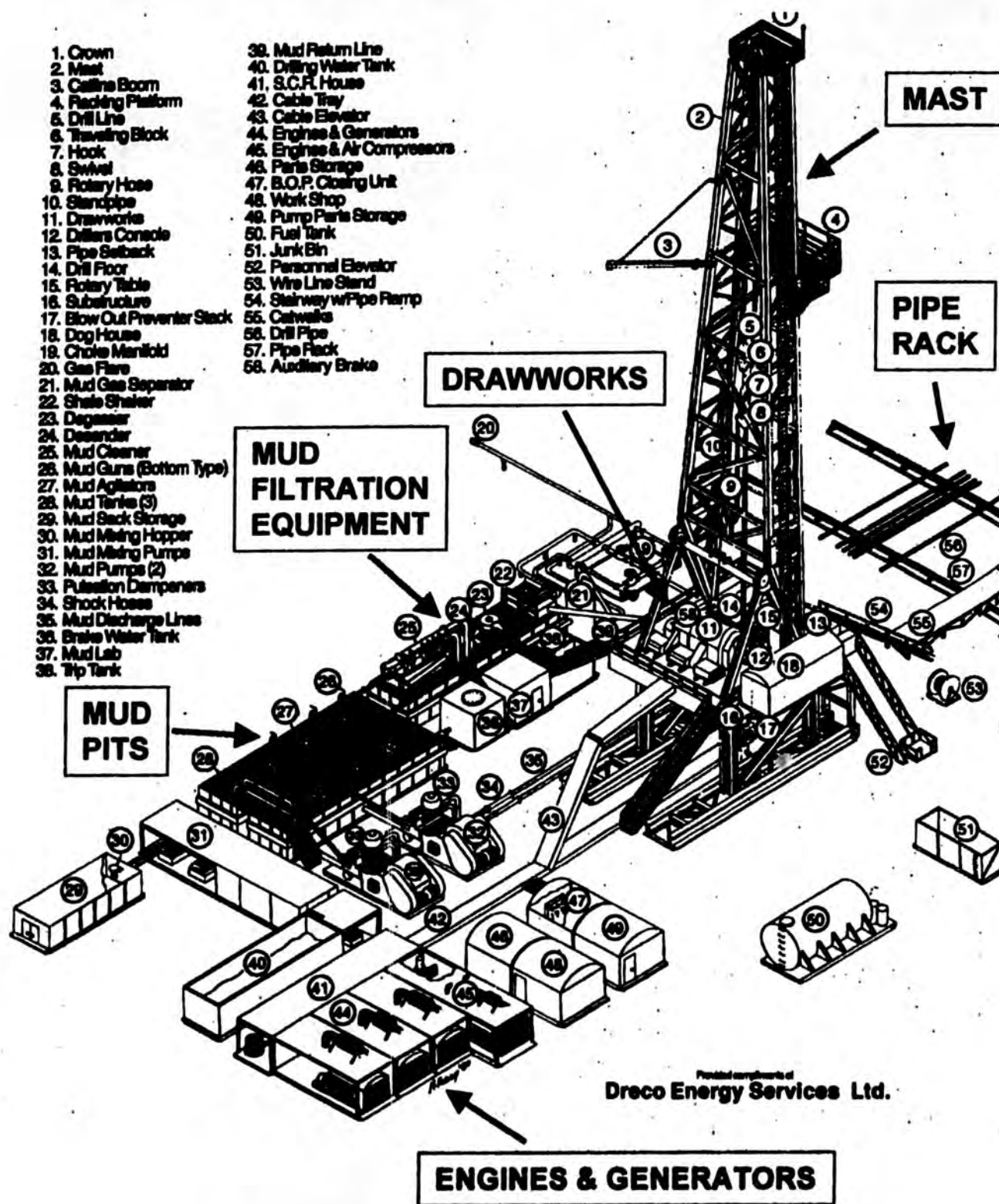
COOK INLET DRILLING PLATFORM



Typical Rotary Drilling Rig

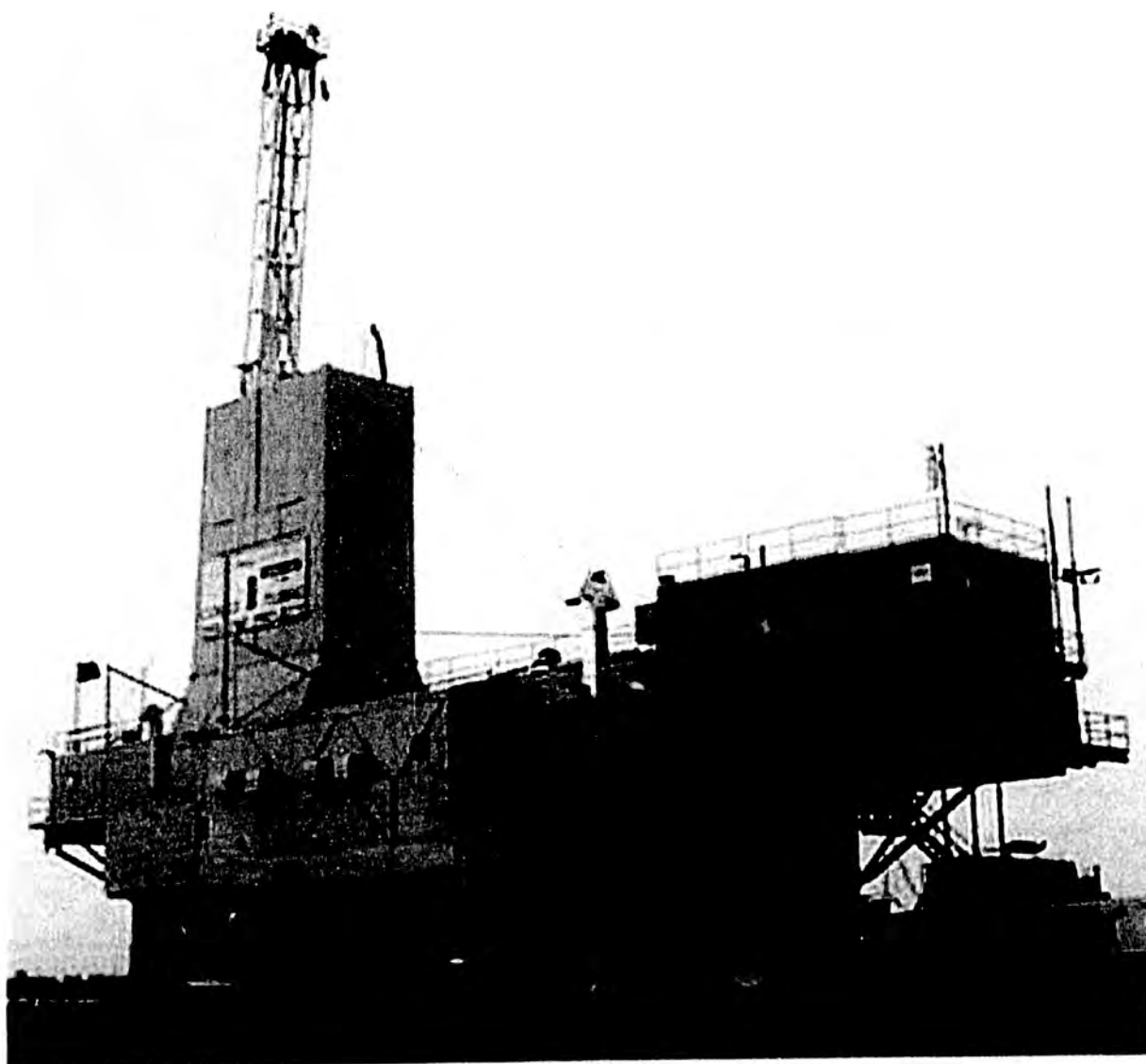


Main Rig Components



Provided compliments of
Dreco Energy Services Ltd.

Typical Coiled Tubing Drilling Rig

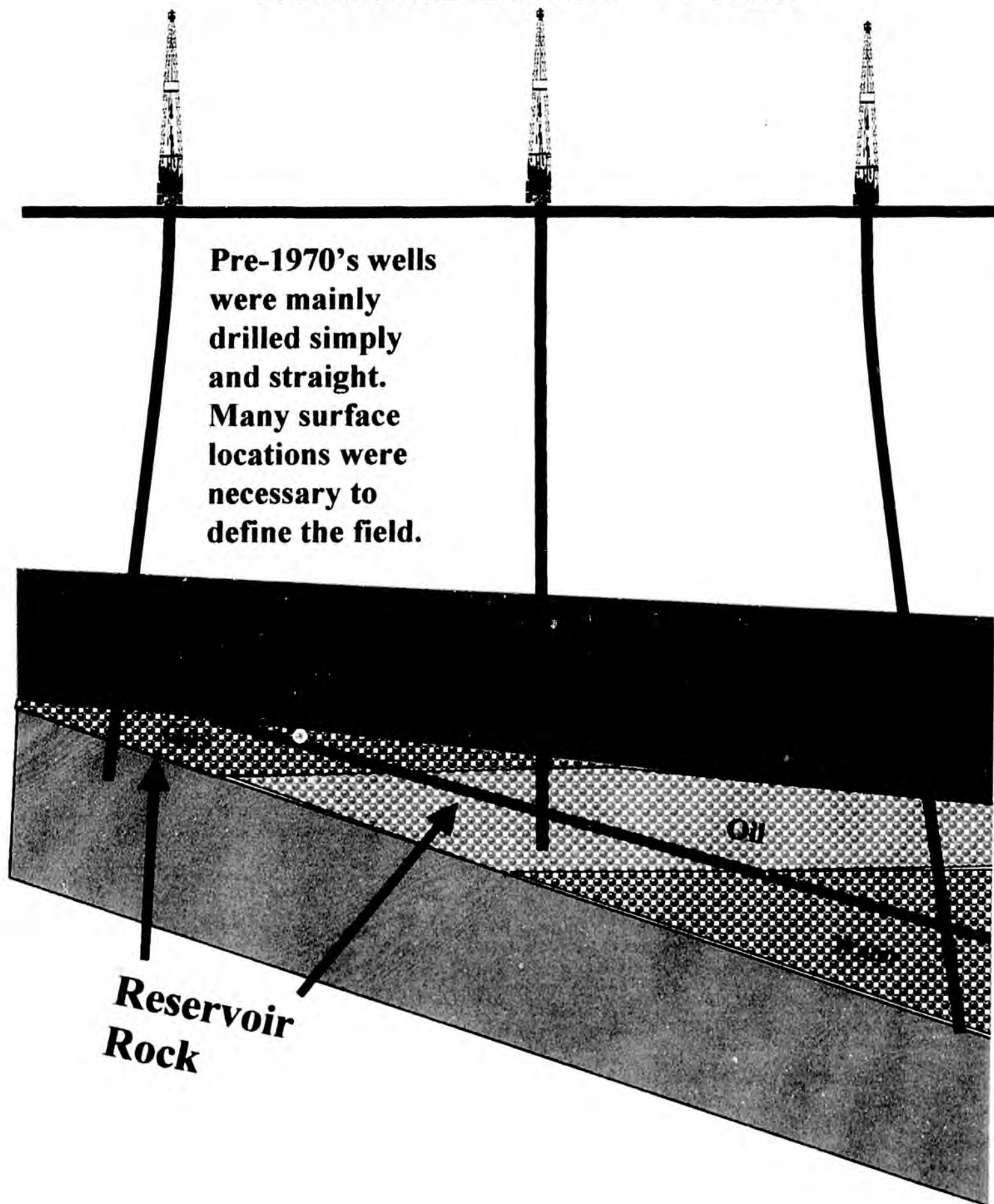


Types of Drilling Rigs & Their Uses

- **Conventional Rotary Drilling Rig**
 - Grassroots Well (Conventional Well)
 - Sidetracked Well
 - Multi-Lateral Well

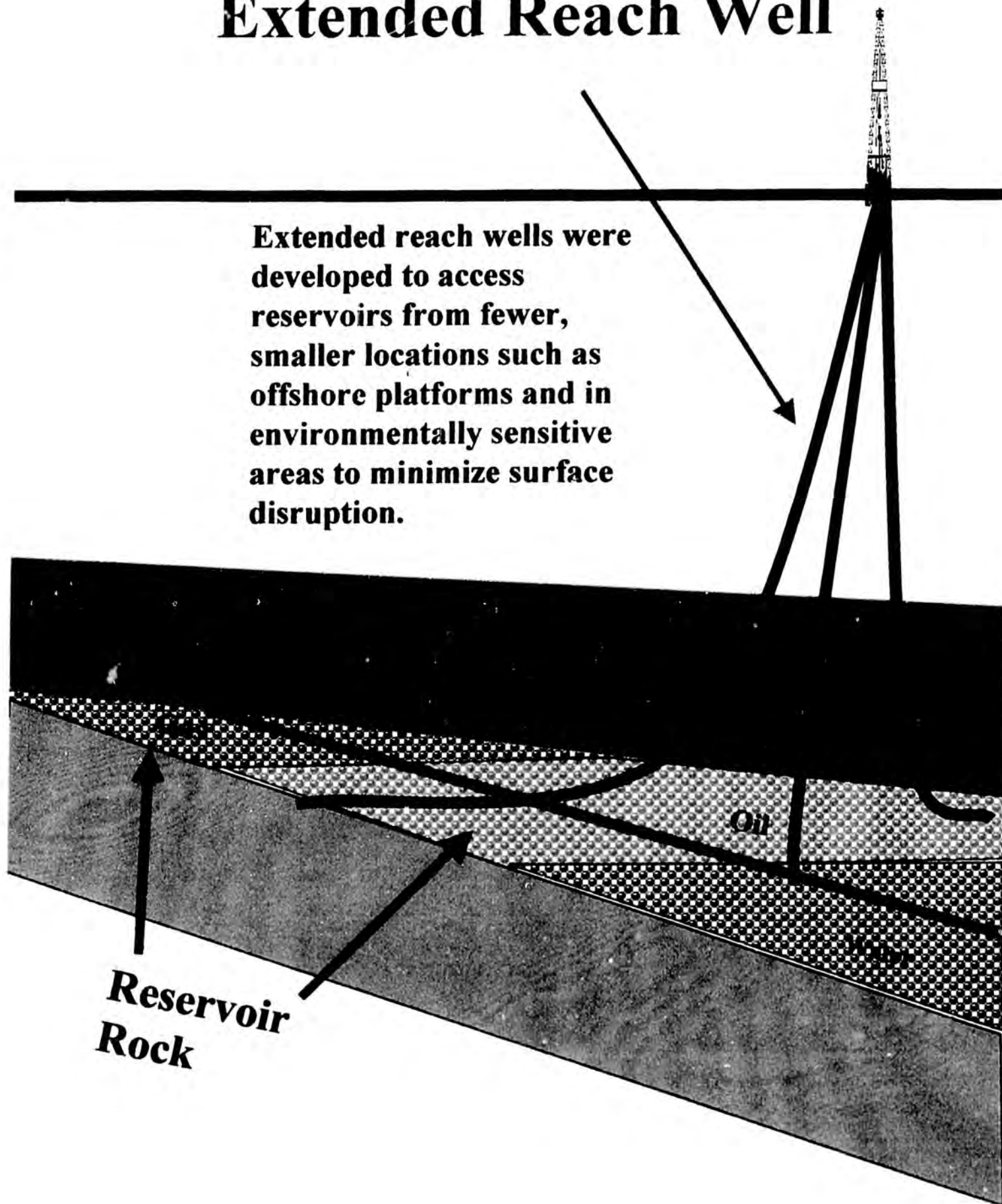
- **Coiled Tubing Drilling Rig**
 - Sidetracks
 - Multi-Laterals

Conventional Wells



Extended Reach Well

Extended reach wells were developed to access reservoirs from fewer, smaller locations such as offshore platforms and in environmentally sensitive areas to minimize surface disruption.



Side Track Well

The diagram illustrates a wellbore system. A main vertical wellbore is shown on the left, extending from the surface down into a reservoir rock layer. A side track wellbore branches off from the main wellbore at a depth within the reservoir rock layer. The side track wellbore is shown as a diagonal line extending from the main wellbore towards the right. The reservoir rock layer is depicted as a dark, textured area. The side track wellbore is shown as a diagonal line extending from the main wellbore towards the right. The side track wellbore is shown as a diagonal line extending from the main wellbore towards the right.

Side tracks from existing well bores using coil tubing have become the most common economic method of recycling old wells and bringing on new production throughout the state.

Oil

Reservoir Rock

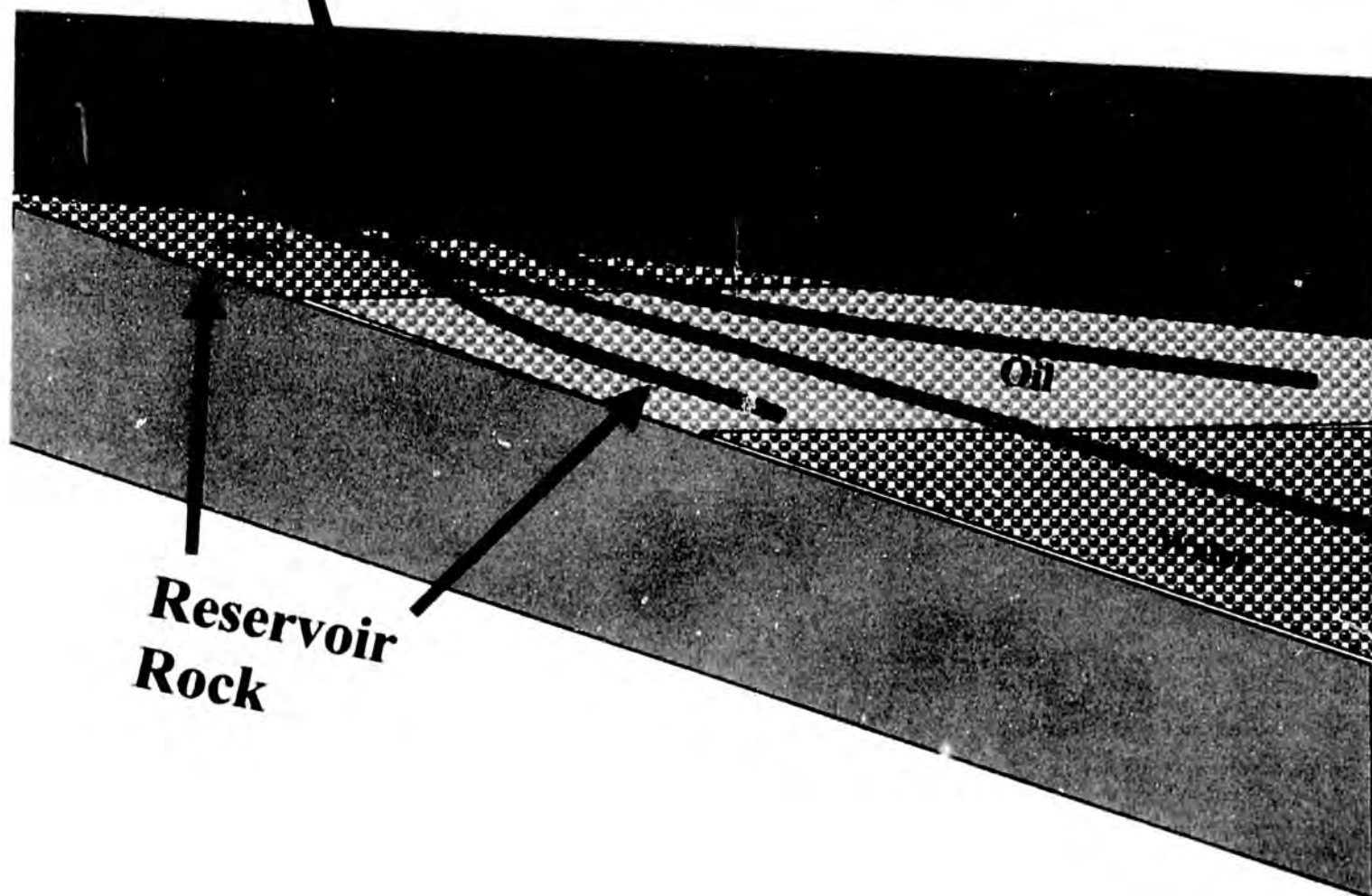
Side tracks from existing well bores using coil tubing have become the most common economic method of recycling old wells and bringing on new production throughout the state.

Reservoir Rock

Multi-Lateral Well

A recent innovation in drilling technology has been the use of multiple well bores to extract oil from reservoirs with less than optimum characteristics.

The more complex the well bore, the more effort must be put into permit application evaluations



Primary Well Control

- **Drilling Fluid System**
 - Sufficient Pit Volume with Pit Level Indicators
 - Measuring System for Accurate Determination of Drilling Fluid Volumes
 - Equipment to Keep the Drilling Fluid Properly Conditioned
 - Appropriately Sized Mud Pumps

- **Drilling Fluid Program**
 - Appropriate Fluid Weight and Rheological Properties to Safely Drill the Well
 - Carry Formation Cuttings to the Surface
 - Control Subsurface Formation Pressures
 - Lubrication and Cooling

Interesting Drilling Mud Factoids

- **Common Drilling Fluid Additives Derived From the Food Service Industry**
 - **Xanthum Gum**
 - Used to viscosify drilling fluids
 - Biopolymer from fermented cabbage
 - Salad Dressings, Ice Cream, Ketchup, Fat Free Mayonnaise
 - **Potato Starch**
 - Fluid loss additive
 - Thickens Gravy
 - **Sodium Chloride**
 - Inhibits swelling of shale during drilling operations
 - Table Salt
 - **Sodium Bi-Carbonate**
 - Drilling Fluid alkalinity control following cementing operations
 - Arm & Hammer Baking Soda
 - **Guar Gum**
 - Drilling Fluid viscosifier
 - Salad Dressings, Ketchup, Low Fat Mayonnaise

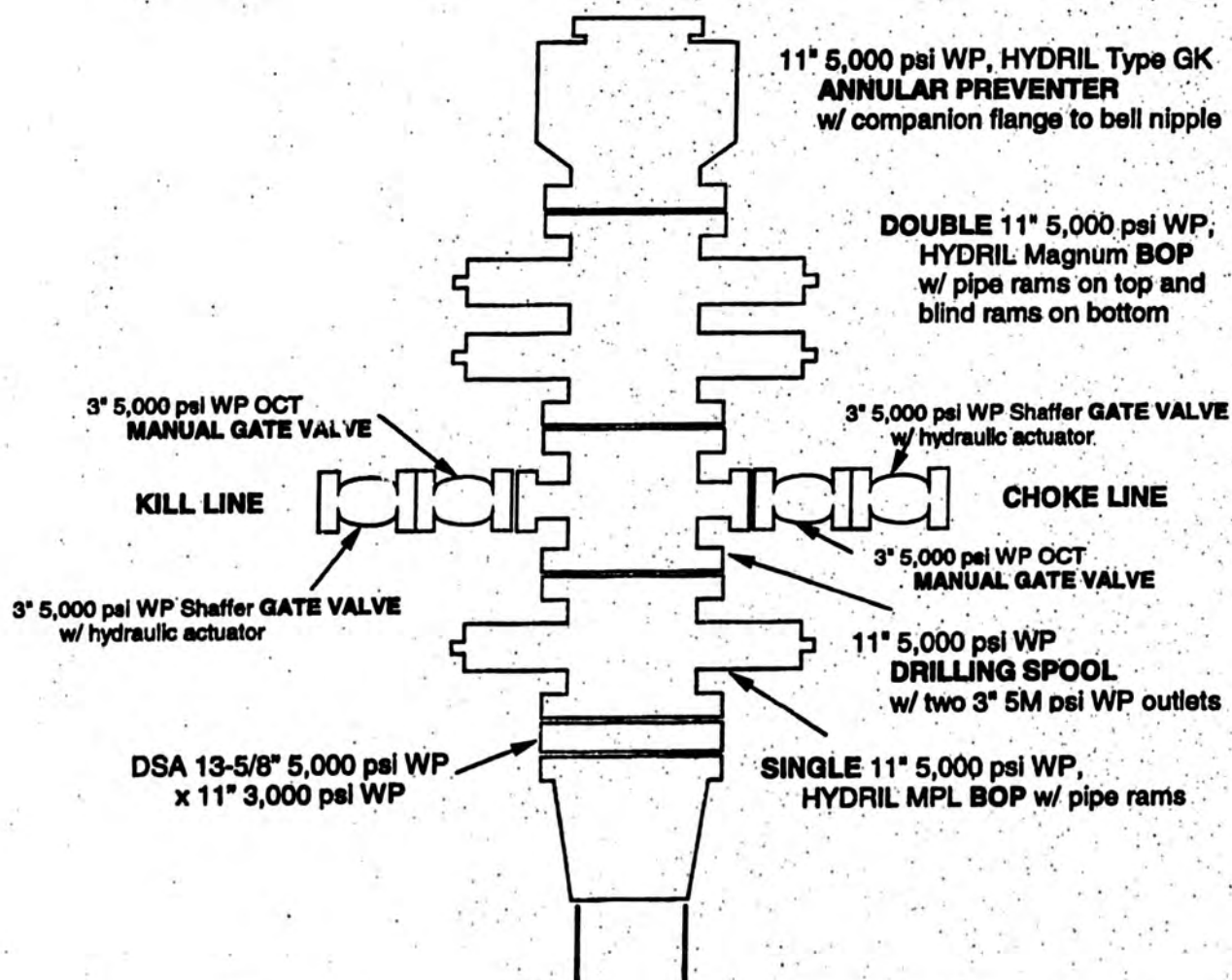
More Mud Factoids

- **Bentonite**
 - The original drilling fluid viscosifier.
 - Clay like substance mined from Wyoming Bentonite Mines
 - Ladies Cosmetics (face powder, foundation)
- **Barite**
 - Used to add weight to a drilling fluid.
 - Upper/Lower Gastrointestinal Evaluations
- **Calcium Carbonate**
 - Weighting Agent & Filtercake Properties
 - Main ingredient in dry wall mud

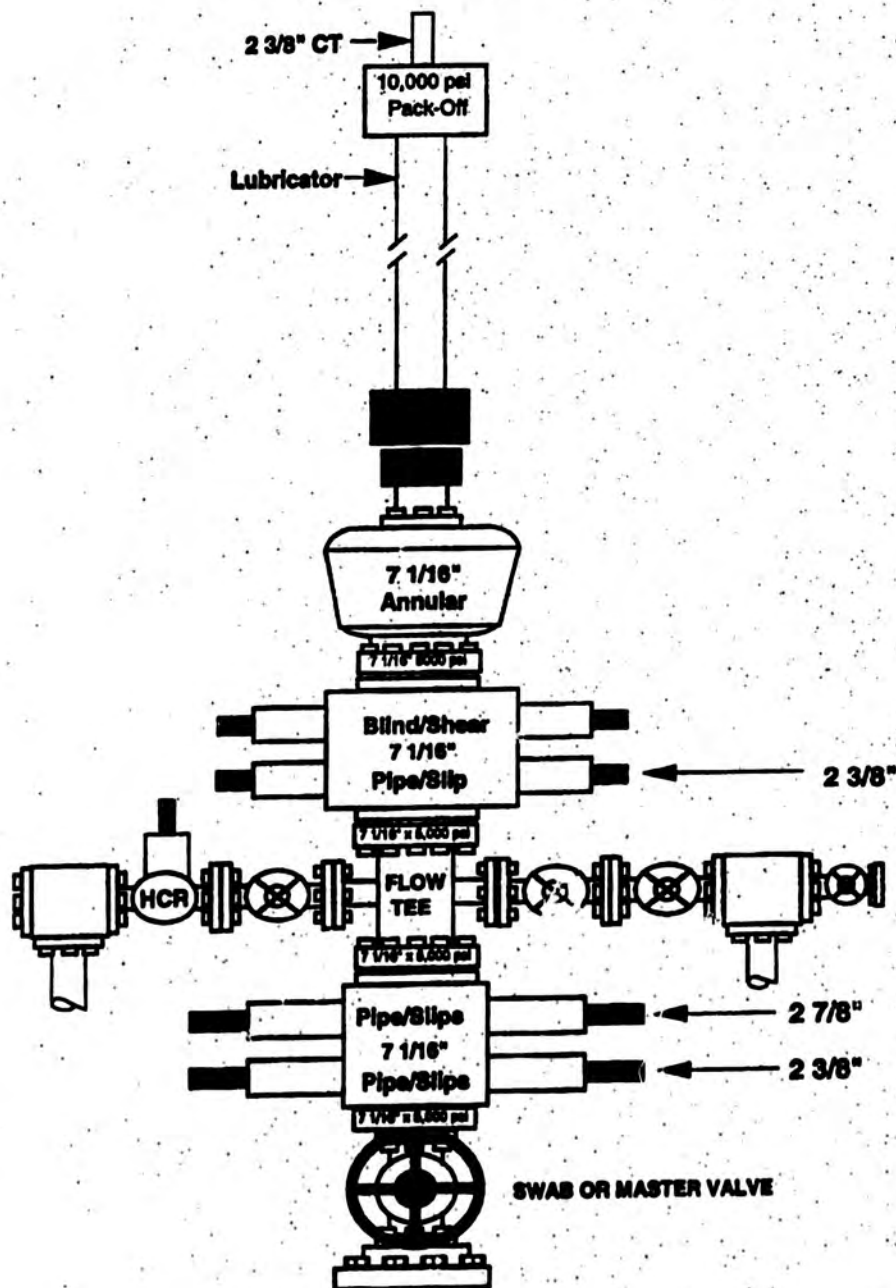
Secondary Well Control

- **Blowout Prevention Equipment**
 - Series of spools, rams and valves used to close in a well should a “kick” occur.
 - Kick – an influx of fluids from the reservoir into the wellbore.
 - Control of the well while circulating out the “kick” prevents a blowout, the uncontrolled release of wellbore fluids.

Typical Rotary Rig BOP Stack



Typical Coiled Tubing Rig BOP Stack



Main Steps To Drill A Well

- Drill the interval of interest.
- Acquire geological and reservoir information.
- Run casing over the interval.
- Cement the interval.
- Pressure test the cemented casing.
- Drill out 20 to 50 feet of new hole and perform Leak Off Test.
- Start all over again

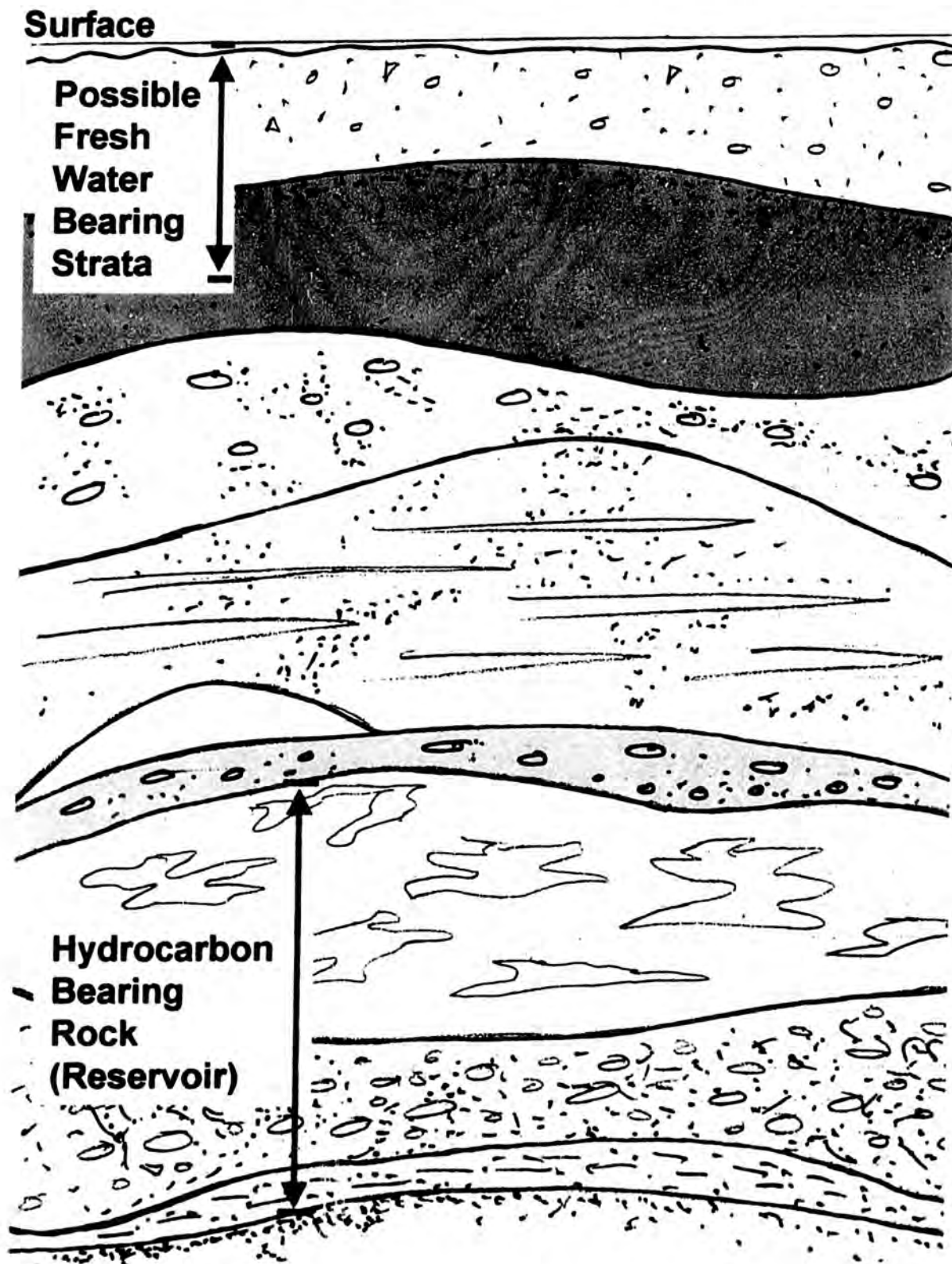
Typical Intervals Drilled

- **Conductor Hole**
 - 70 to 150 feet
- **Surface Hole**
 - Protect sources of drinking water
 - 1000 to 2500 feet TVD
 - North Slope – through the permafrost interval
 - Cook Inlet through sources of drinking water
- **Intermediate Hole**
 - Typically to just above the hydrocarbon bearing reservoir of interest
- **Production Interval**
 - Through the hydrocarbon bearing zone

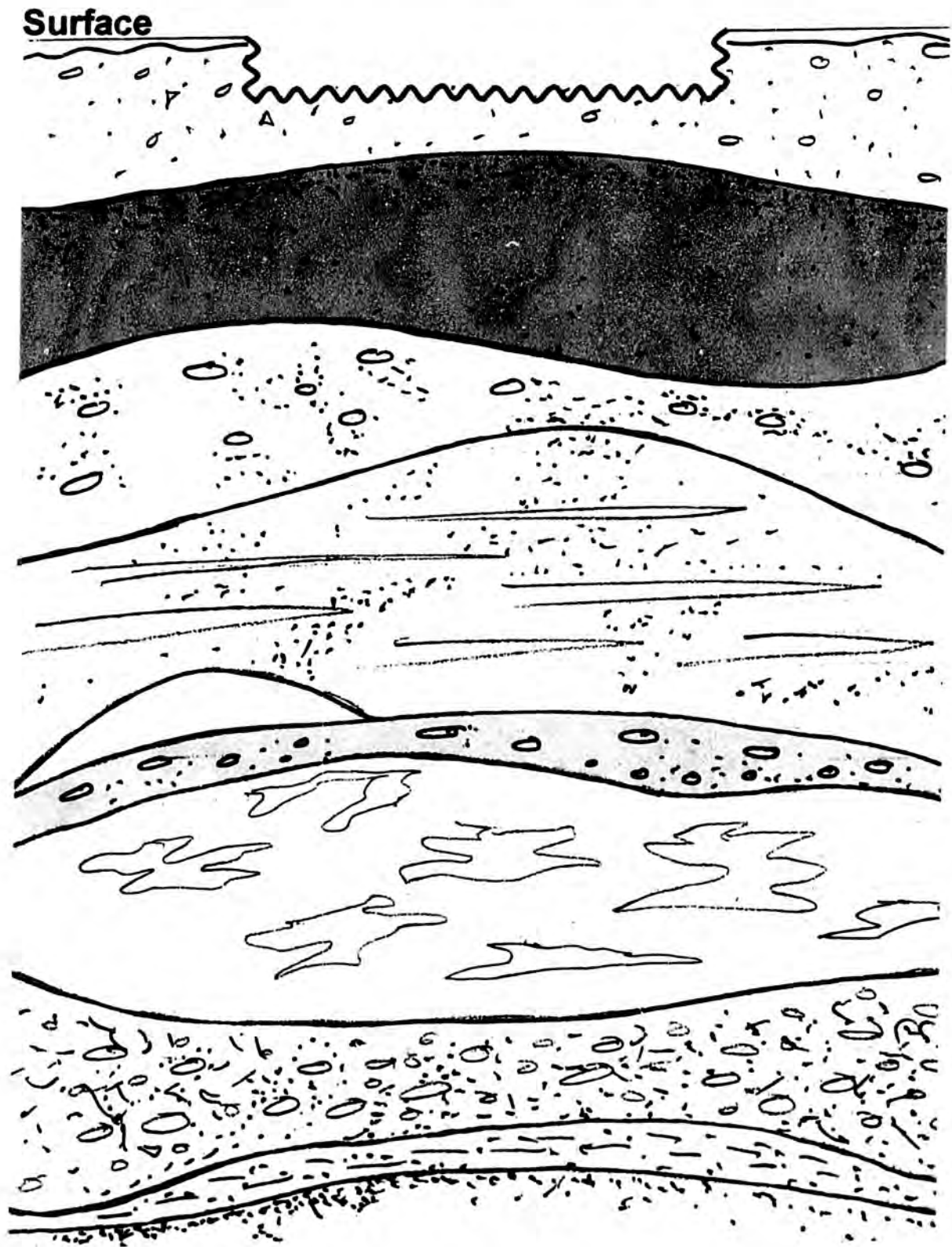
Typical Casing Uses

- **Conductor Pipe**
 - Provide sufficient anchor and fracture gradient for diverter system.
- **Surface Casing**
 - Protect sources of drinking water
 - Provide anchor for BOPE stack and sufficient fracture gradient and well control while drilling to the next casing setting point.
- **Intermediate Casing**
 - Provide anchor for BOPE stack and sufficient fracture gradient and well control while drilling to the next casing setting point.
- **Production Casing**
 - Cover all open hole and all previously set casing to allow comprehensive testing and production of reservoir fluids.

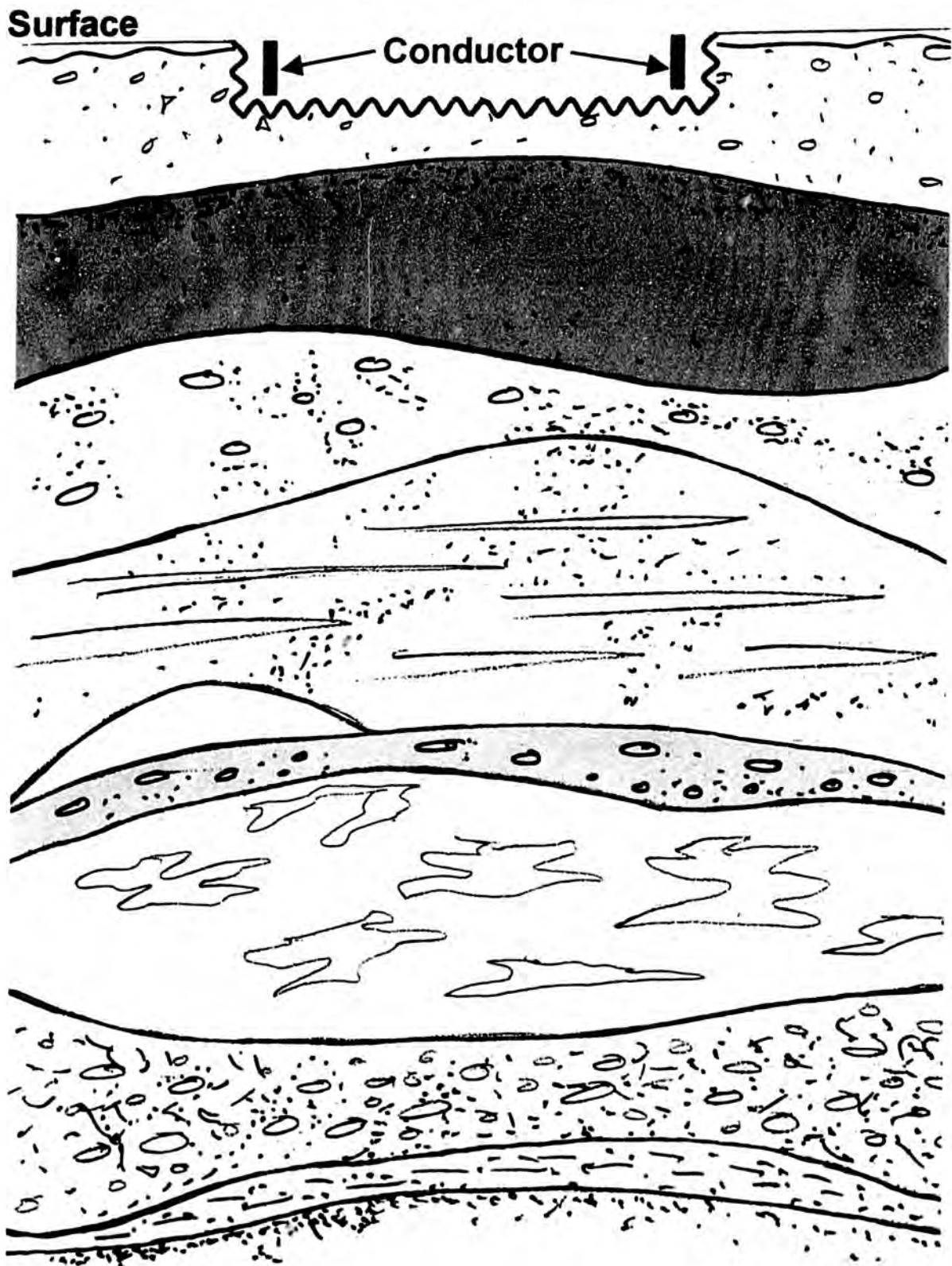
VIRGIN FORMATION



CONDUCTOR HOLE DRILLED



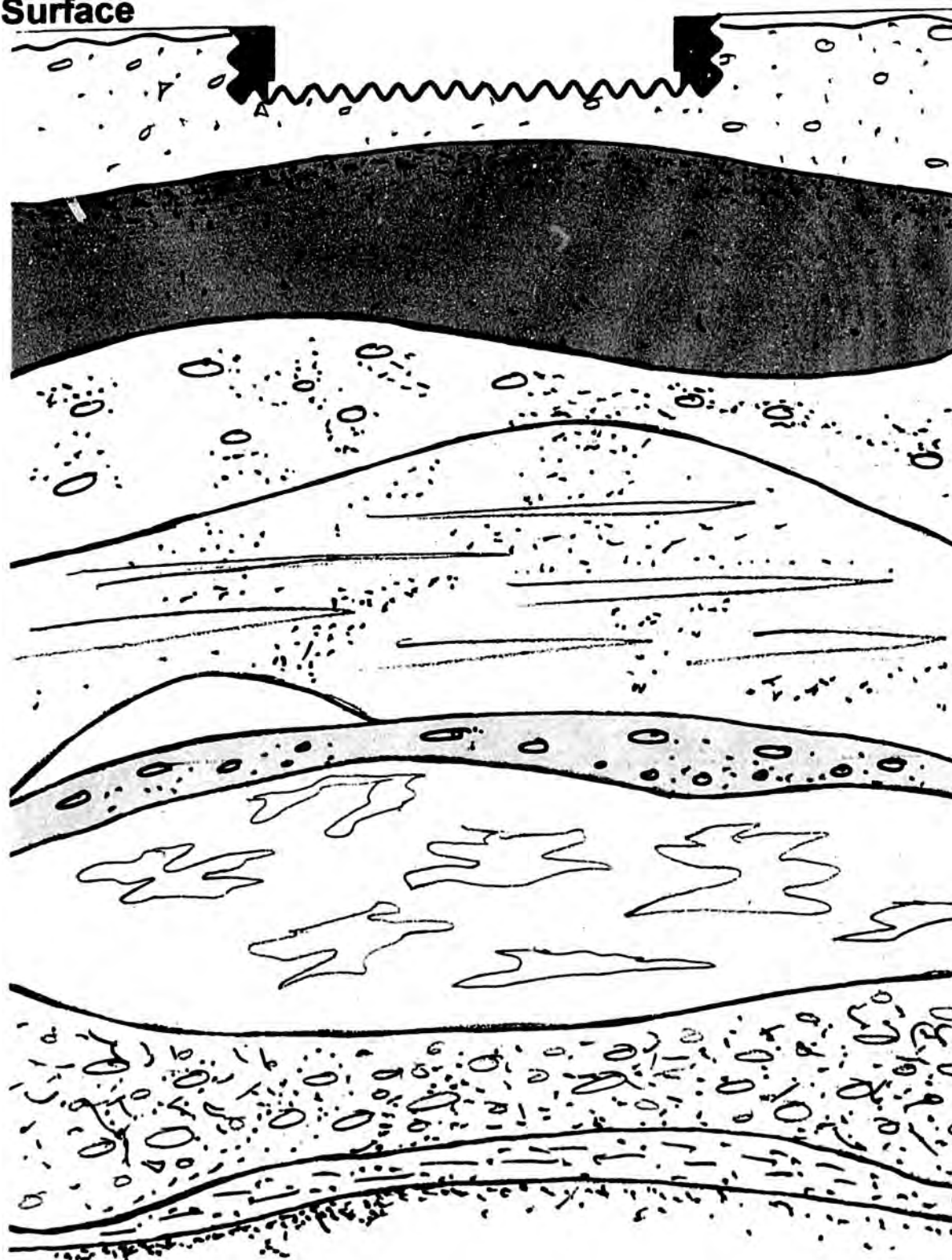
CONDUCTOR PIPE RUN



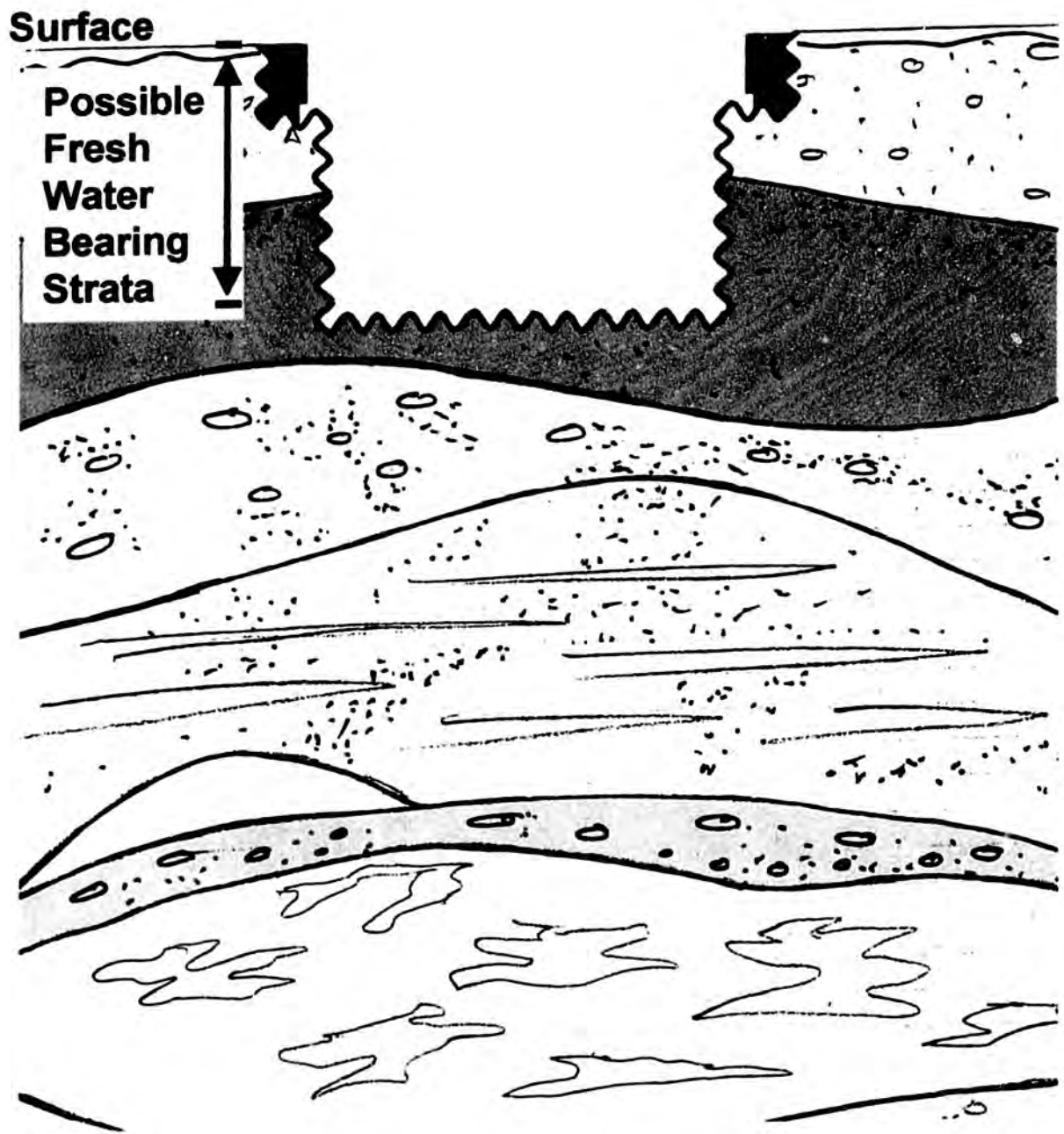
CONDUCTOR PIPE CEMENTED

Cemented to Surface

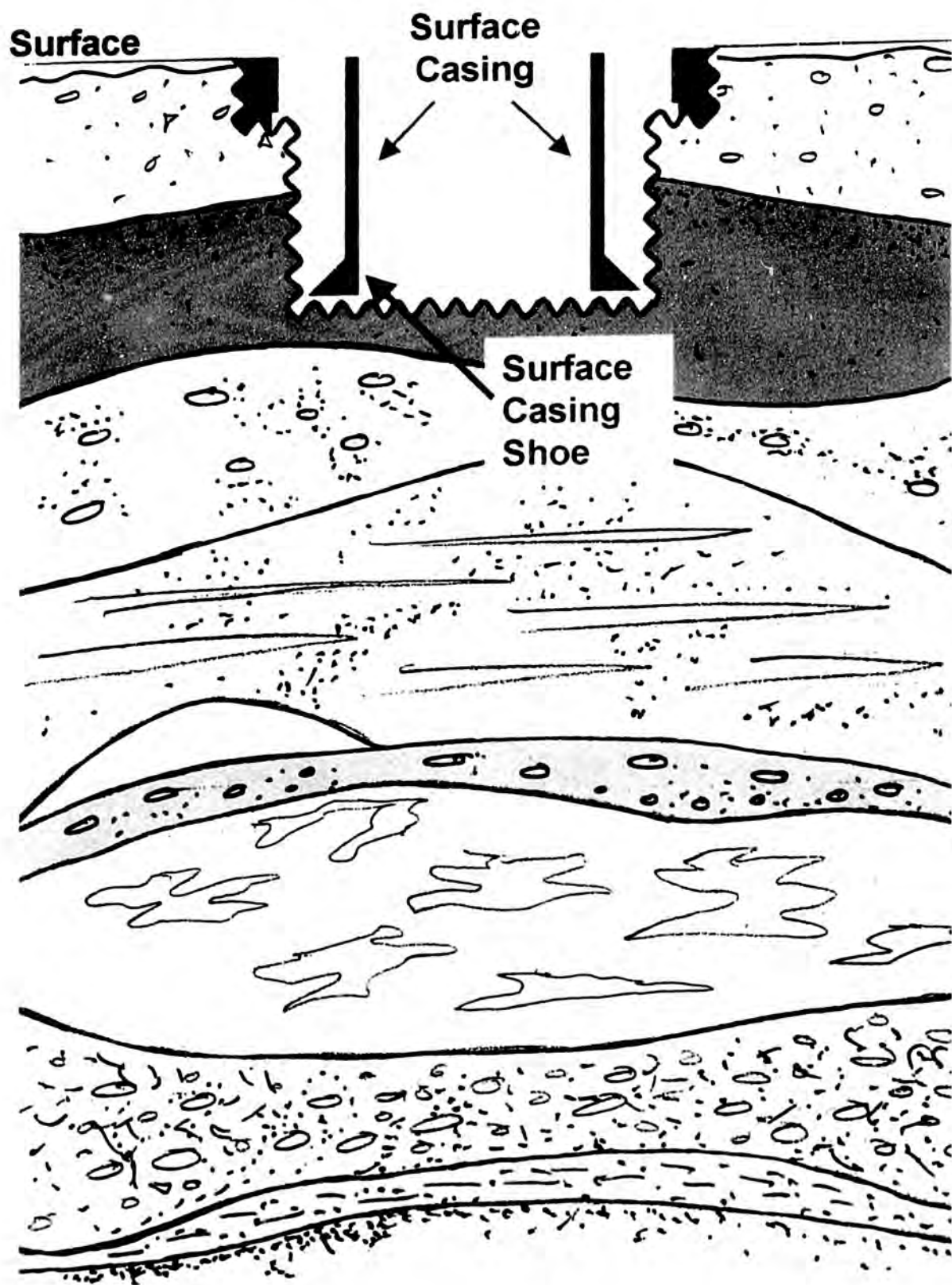
Surface



SURFACE HOLE DRILLED

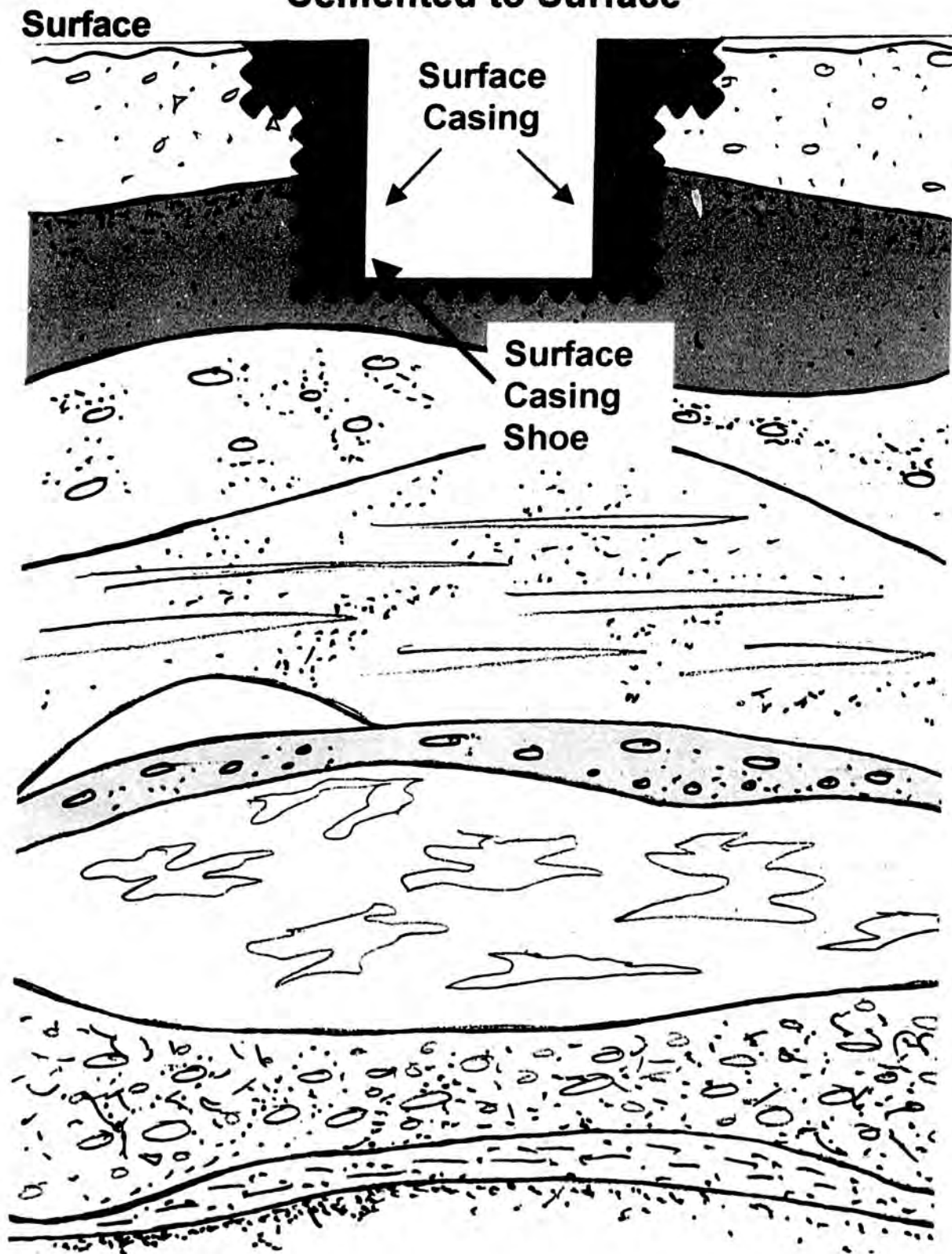


SURFACE CASING RUN



SURFACE CASING CEMENTED

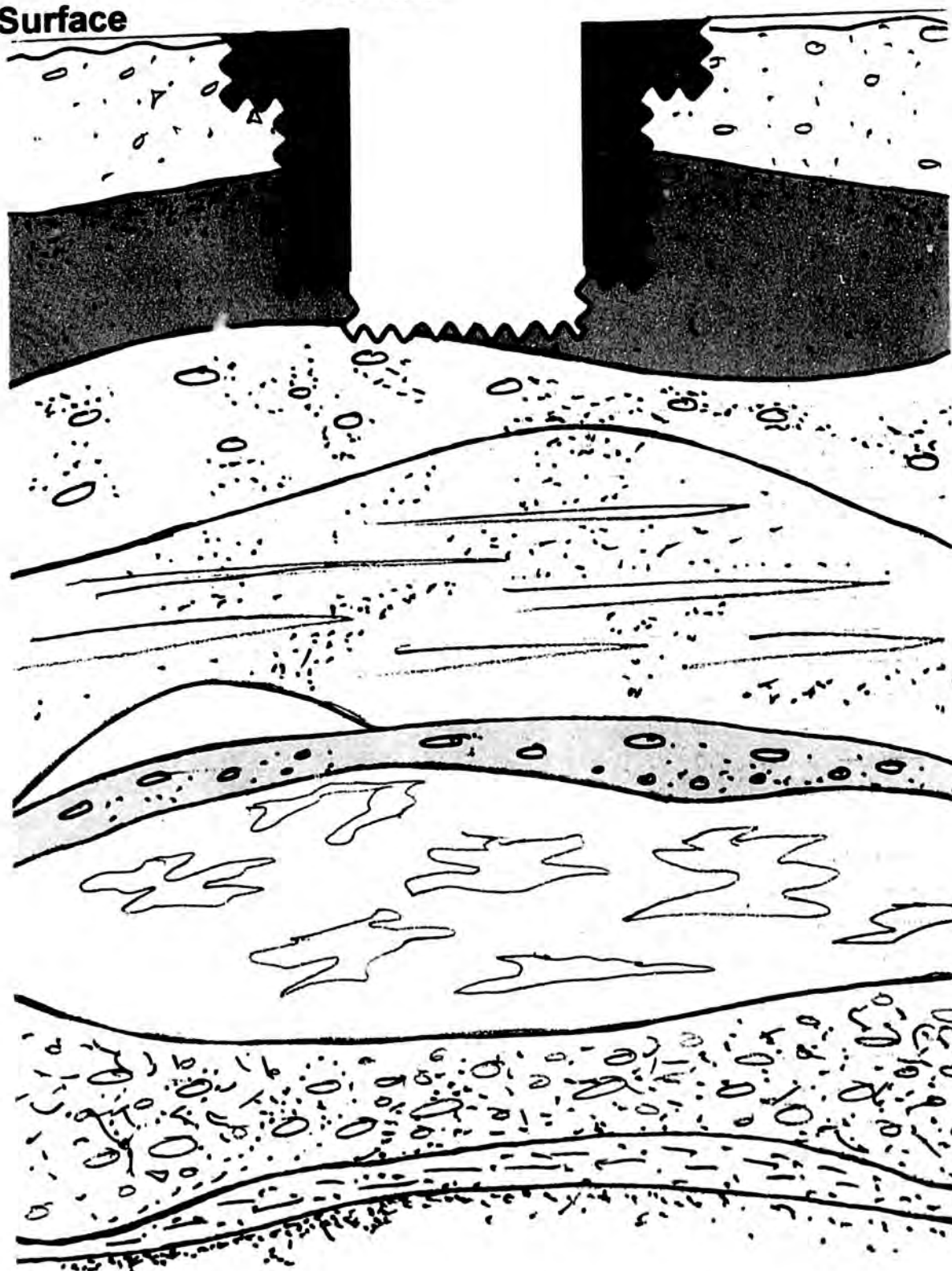
Cemented to Surface



20 FEET OF NEW HOLE DRILLED

For Leak-Off Test

Surface

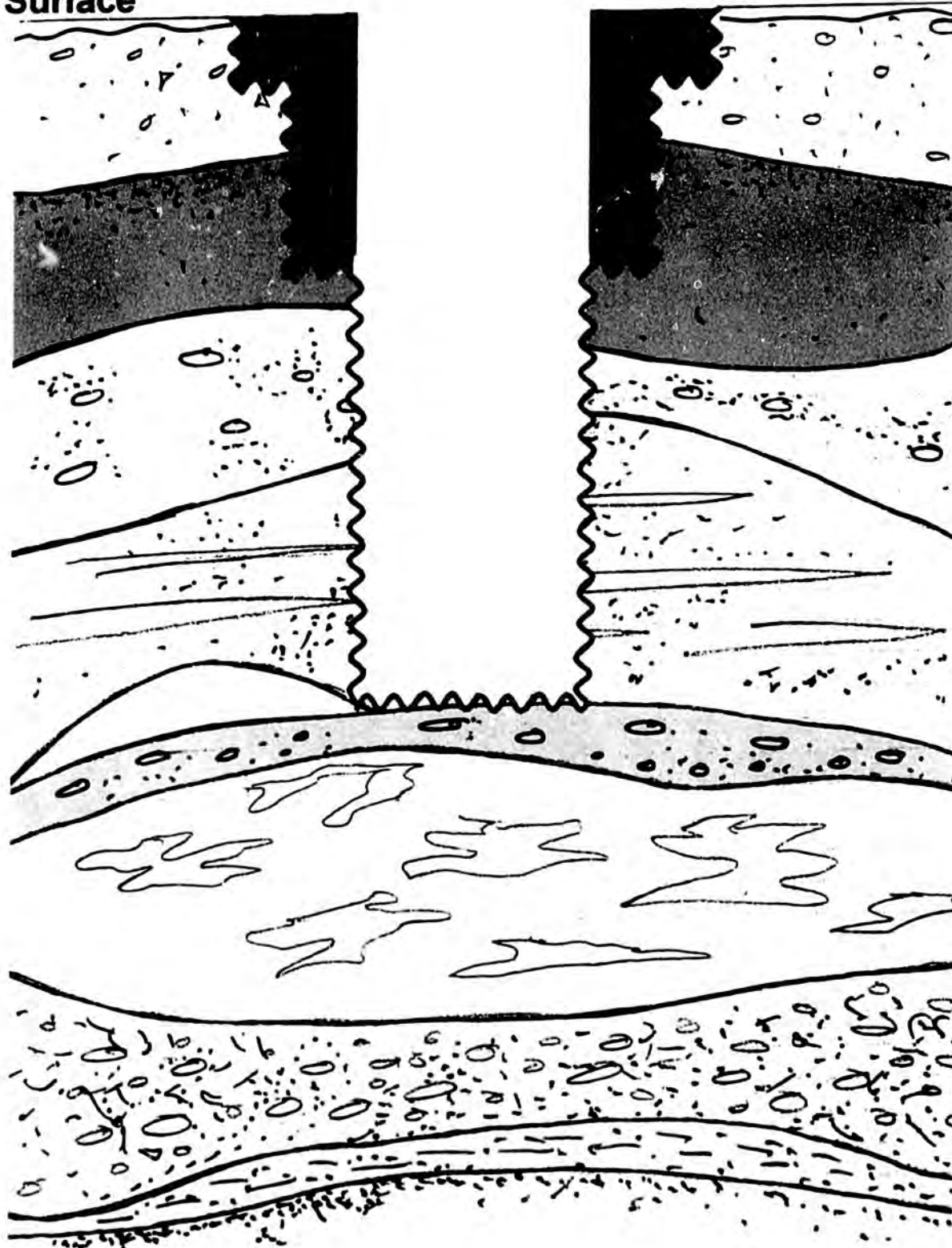


Formation Integrity Test

- Also referred to as a Leak Off Test
- Test must demonstrate the integrity of the casing shoe is sufficient to contain anticipated wellbore pressures identified on the Permit To Drill
- Determines whether the drilling program can proceed as proposed

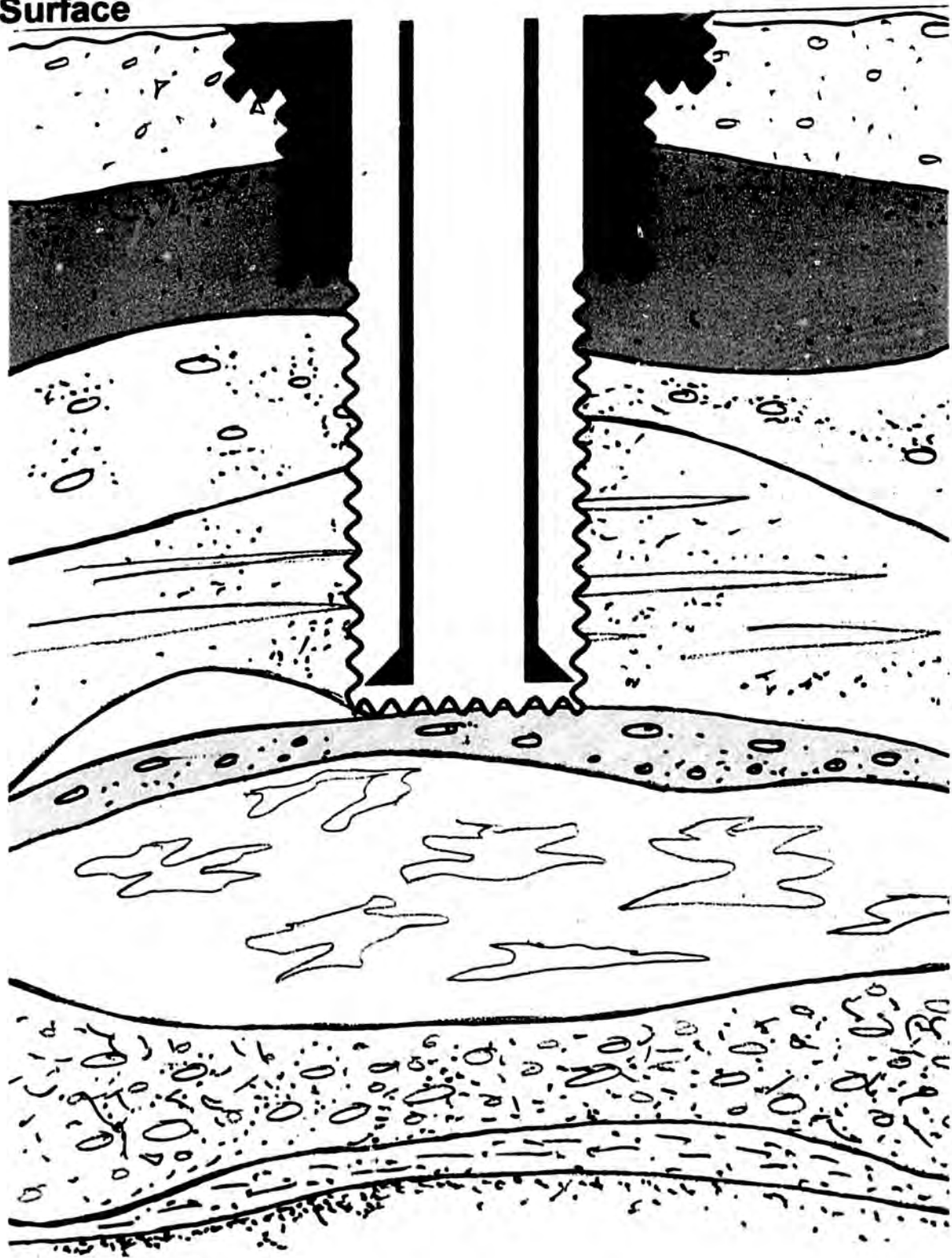
REMAINDER OF INTERMEDIATE HOLE DRILLED

Surface



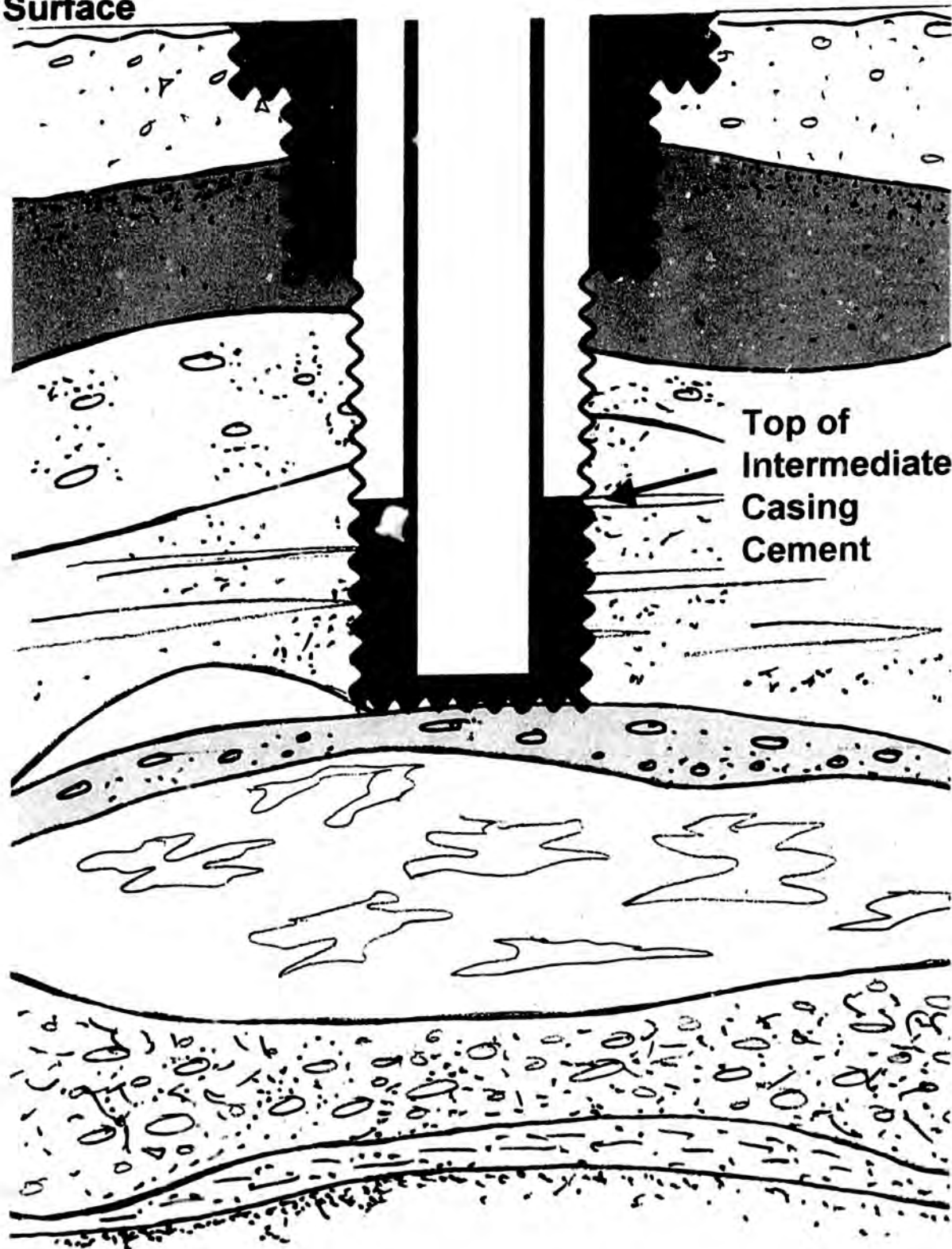
INTERMEDIATE CASING RUN

Surface

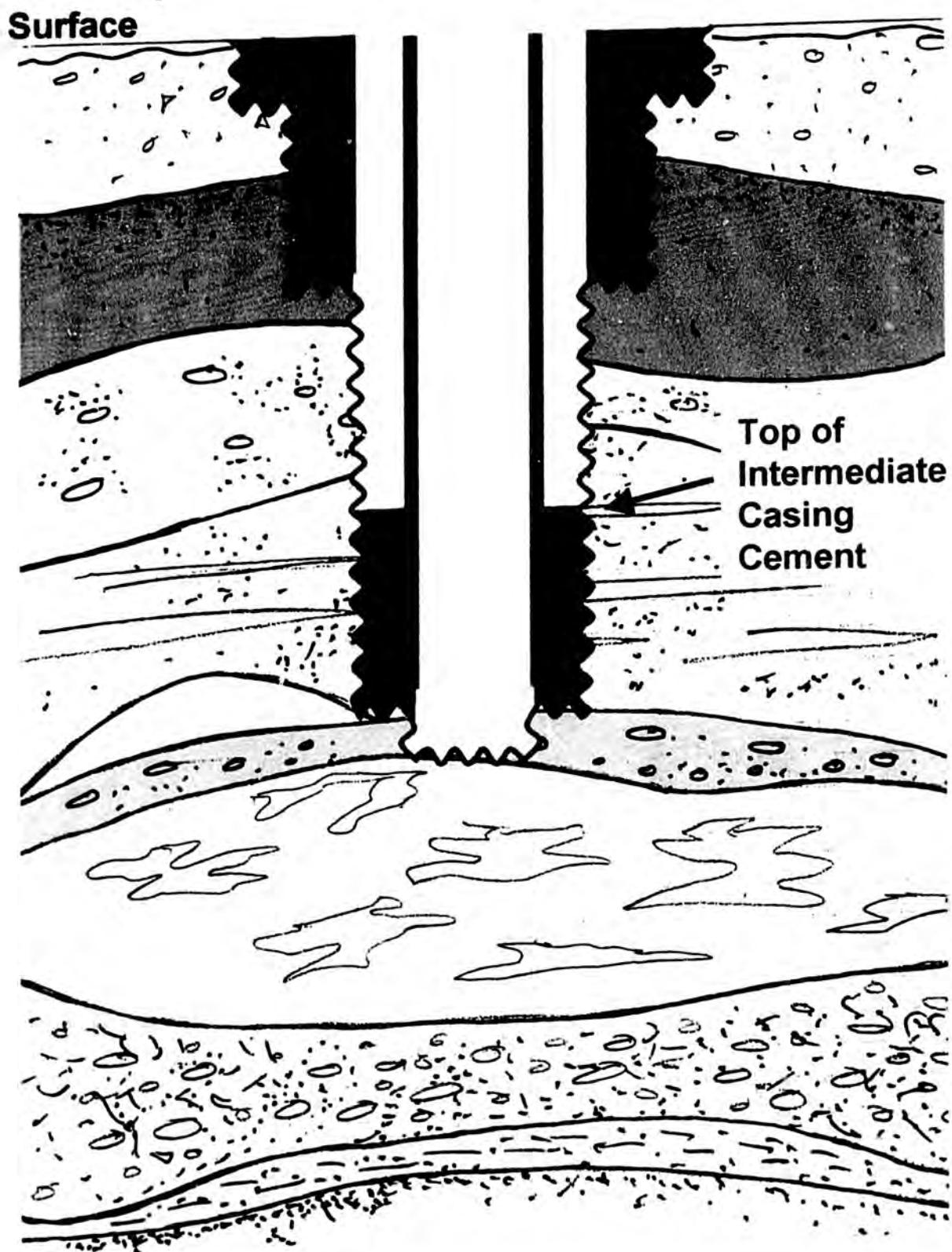


INTERMEDIATE CASING CEMENTED

Surface

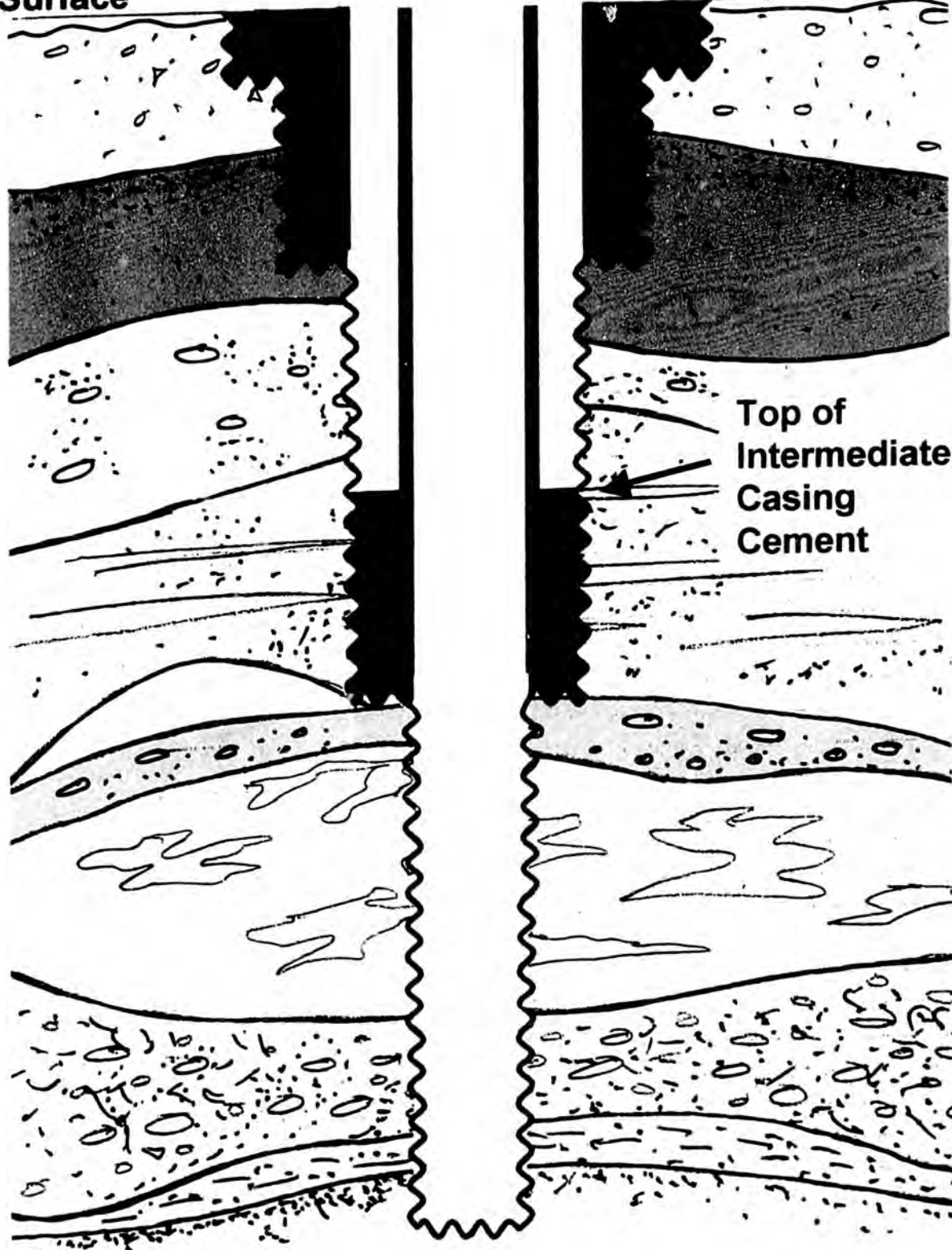


20 FEET OF NEW HOLE DRILLED (For Second Leak-Off Test)



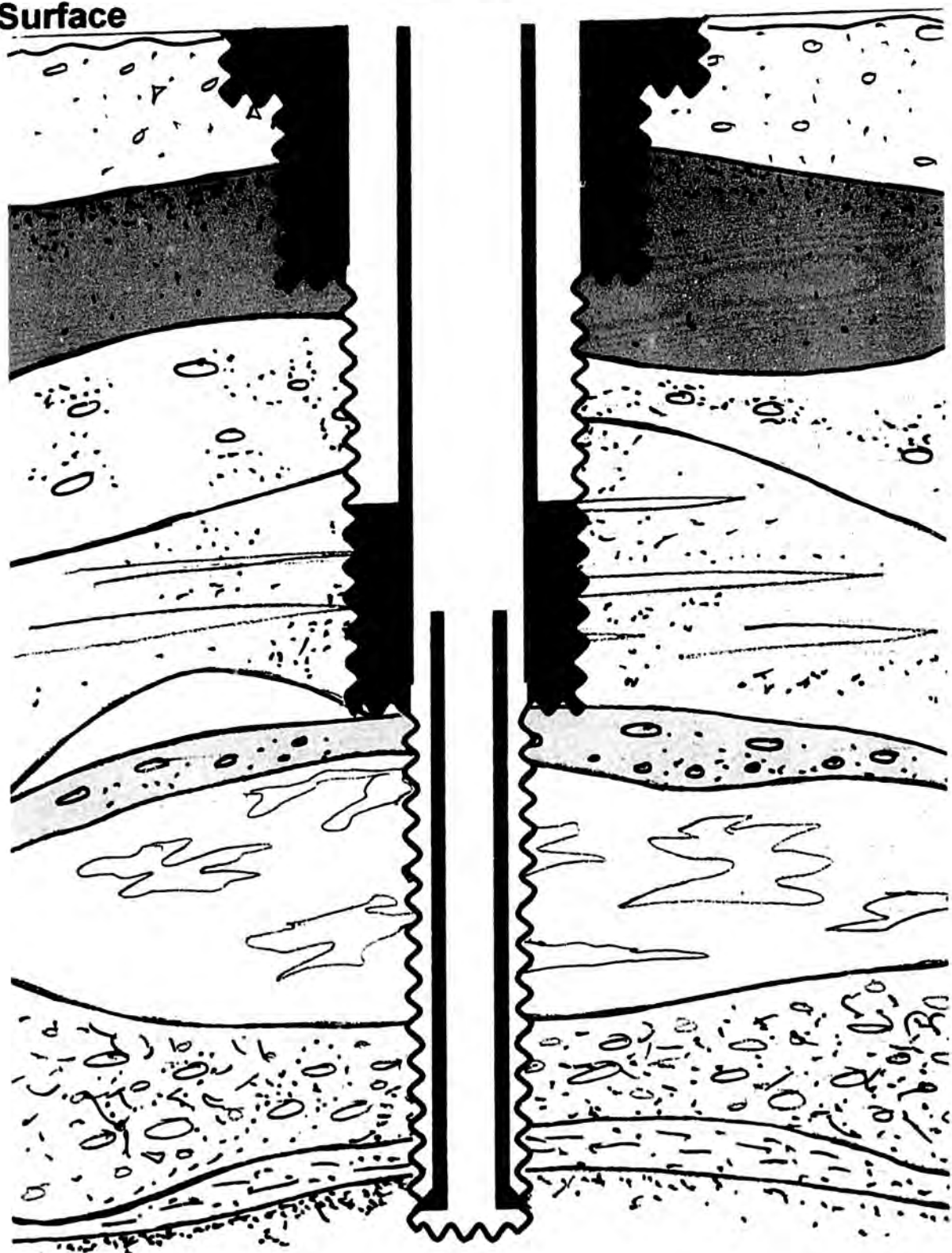
REMAINDER OF PRODUCTION HOLE DRILLED

Surface



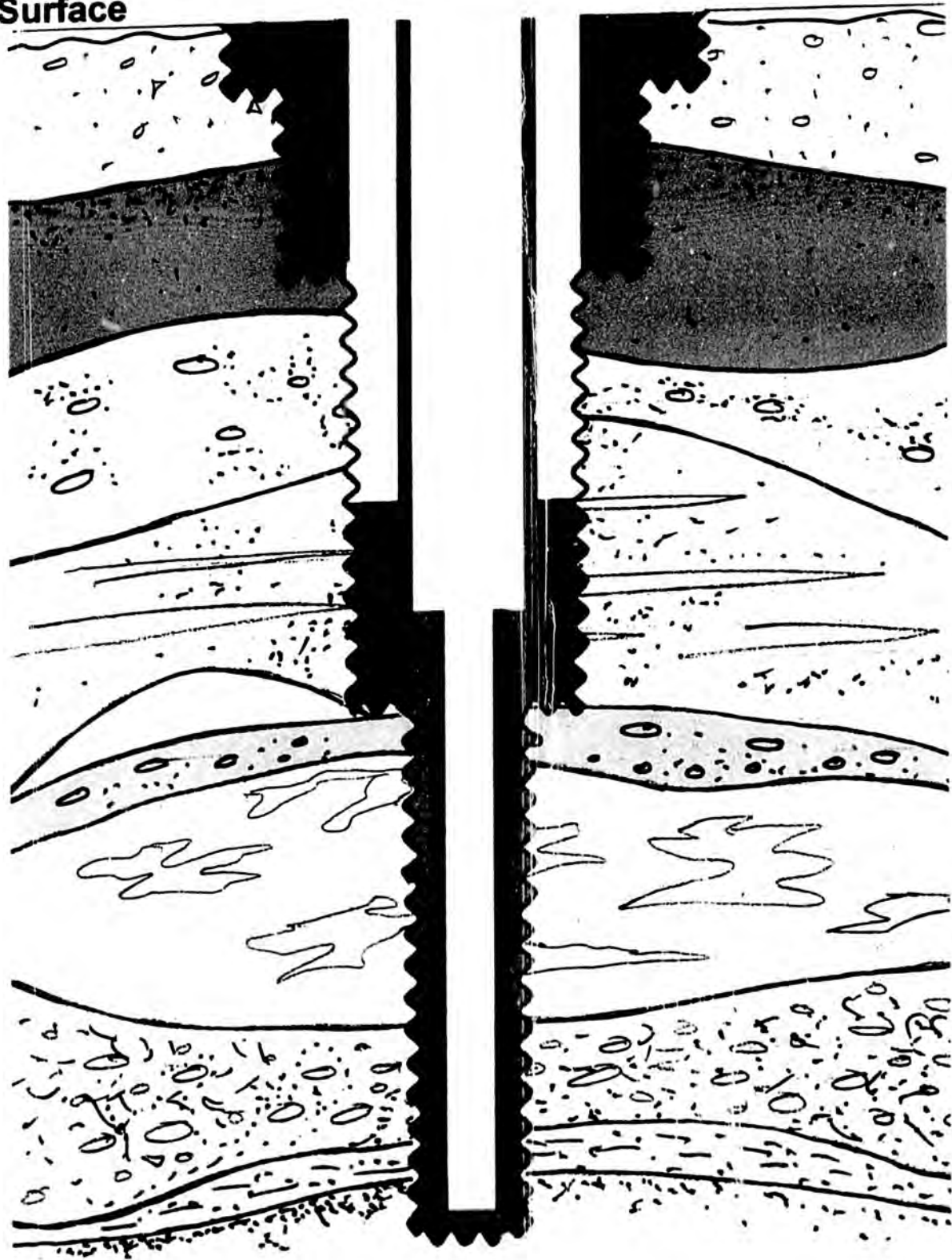
PRODUCTION LINER RUN

Surface



PRODUCTION LINER CEMENTED

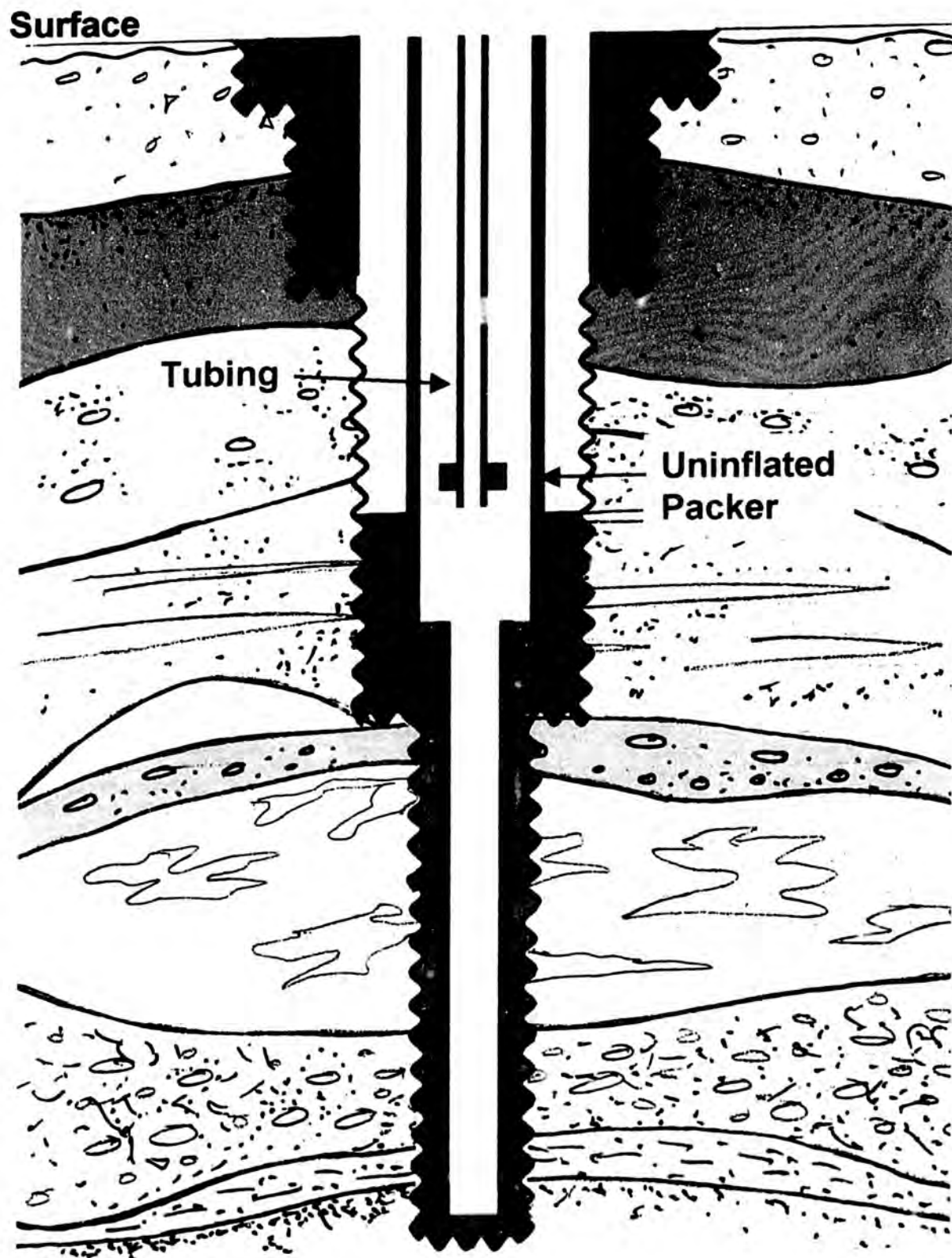
Surface



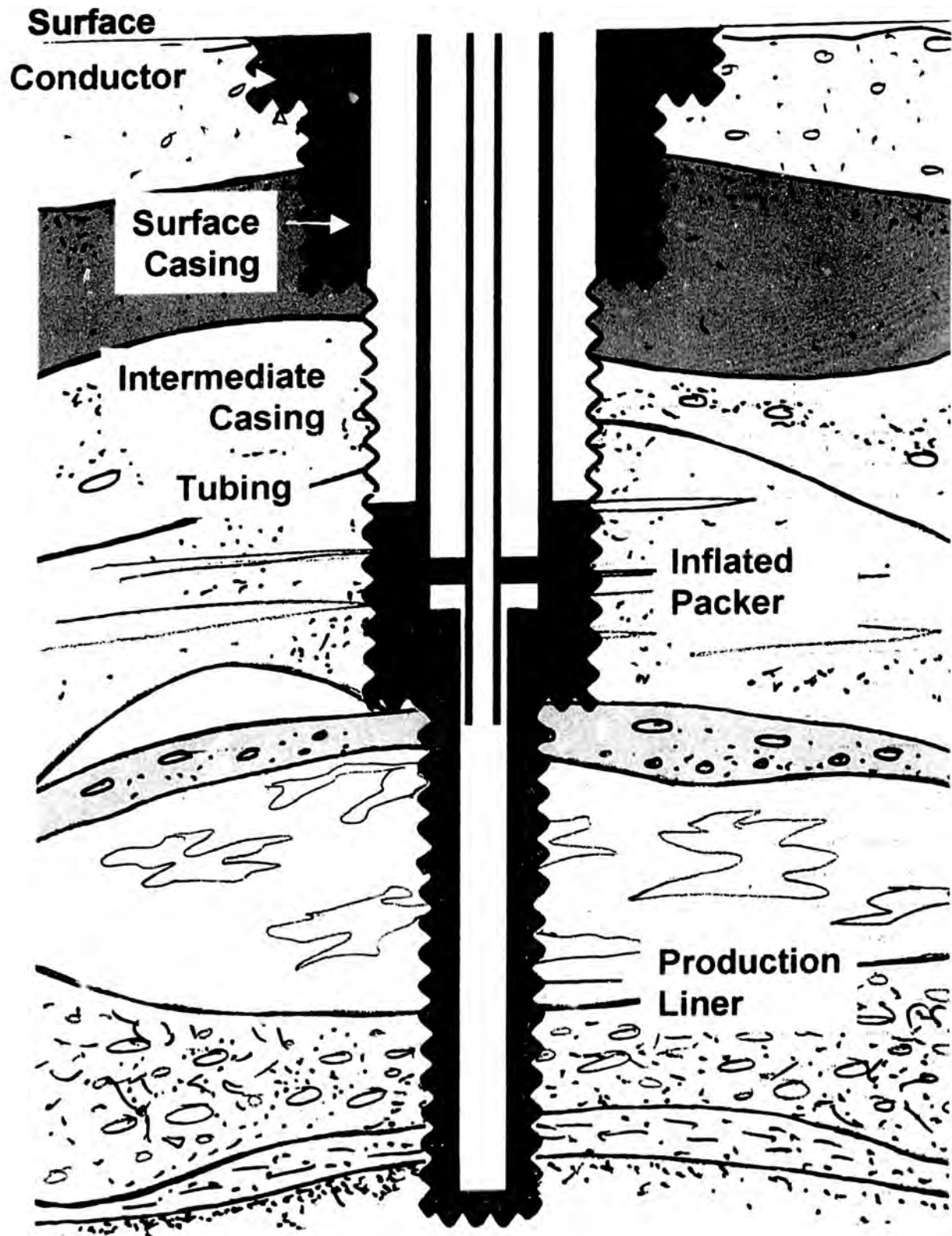
Typical Well Completion Activities

- **Run tubing and packer**
 - Allows a flow path for wellbore fluids to flow to surface where they are processed at production facilities.
- **Inflate packer**
 - Seals the annular space between casing and tubing. Protects the casing from potentially corrosive produced fluids.
- **Install Wellhead**
 - Assembly of valves, spools, flanges and connections that control the flow of fluids from a well
- **Perforate**
 - Puts holes through the production liner, cement and into the formation to provide way for fluids to flow from the formation into the wellbore

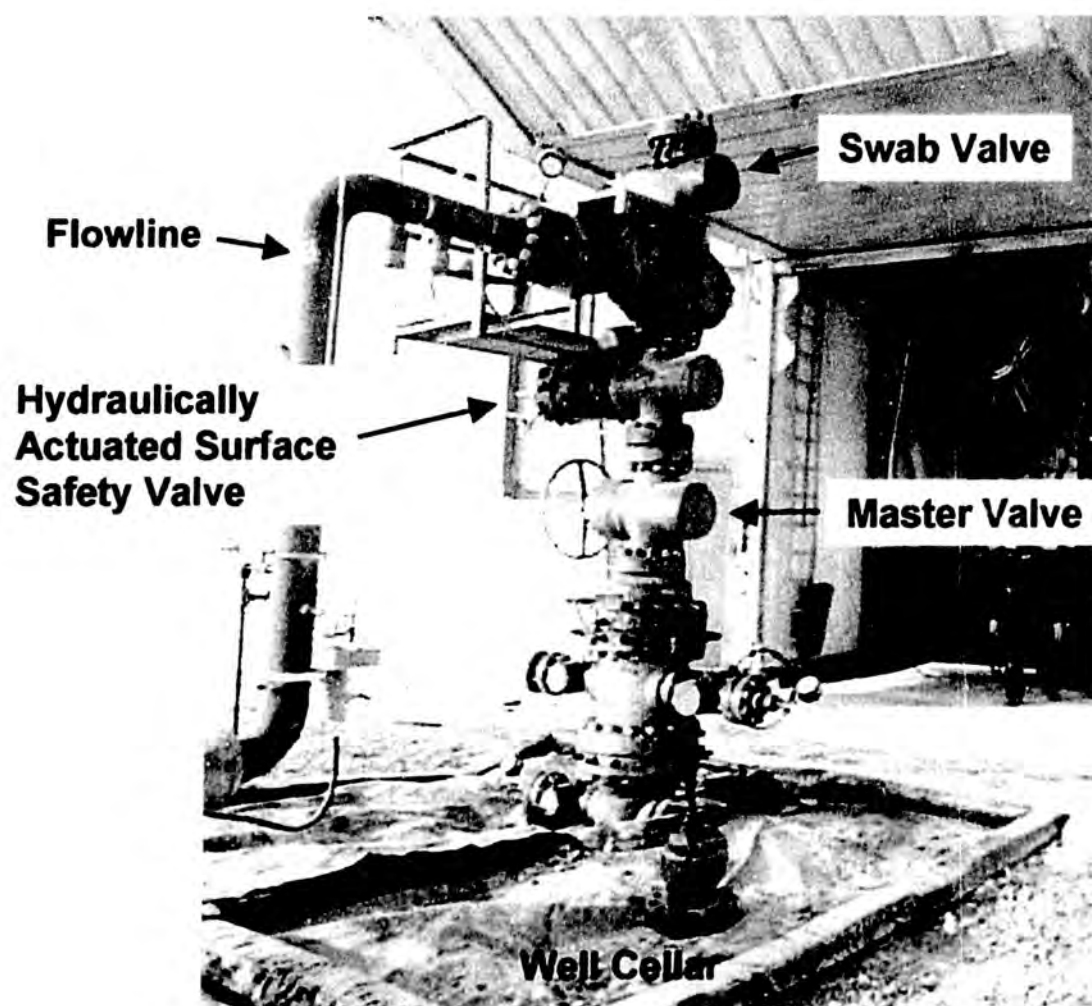
PRODUCTION TUBING & INFLATABLE PACKER RUN



PACKER INFLATED

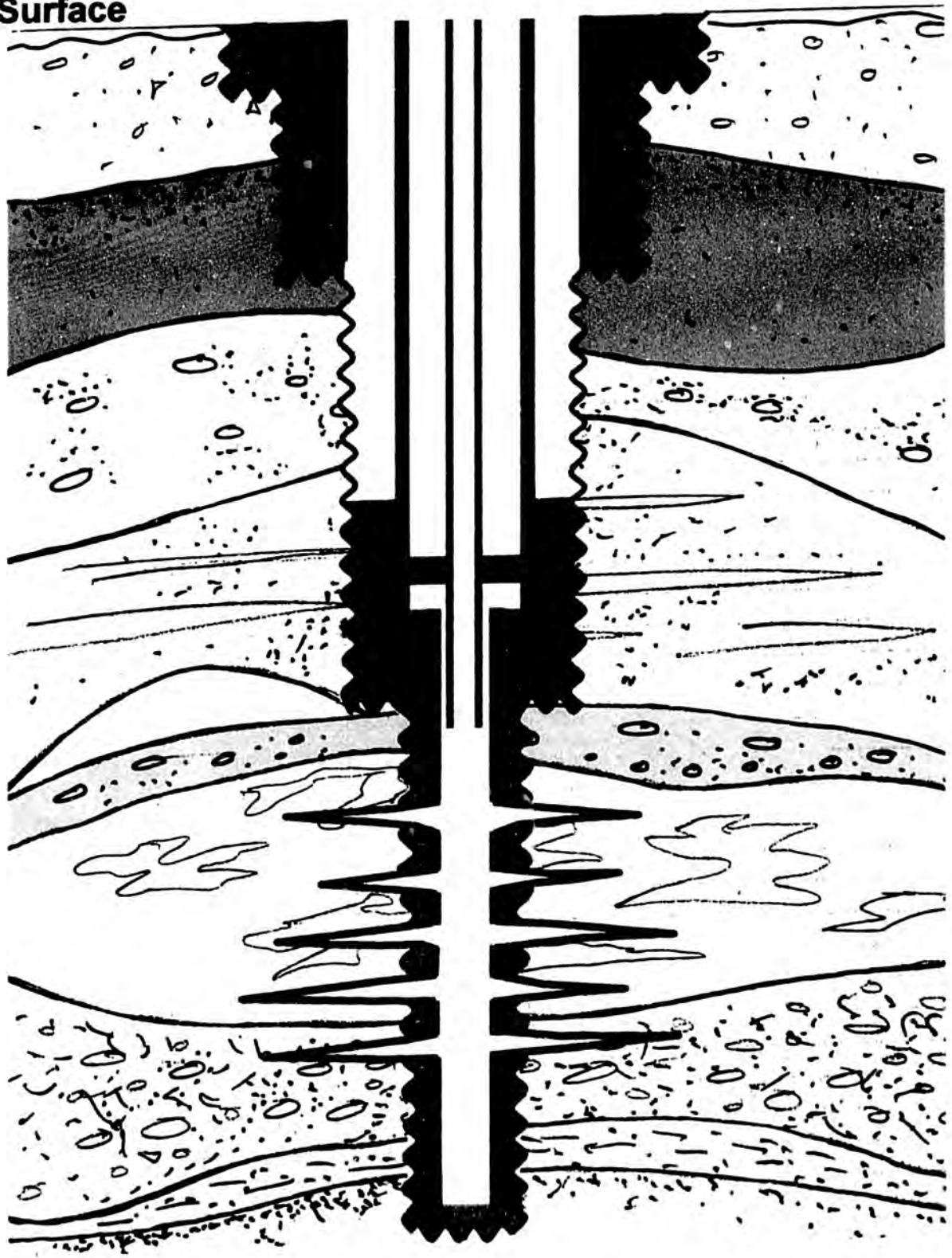


Typical Wellhead



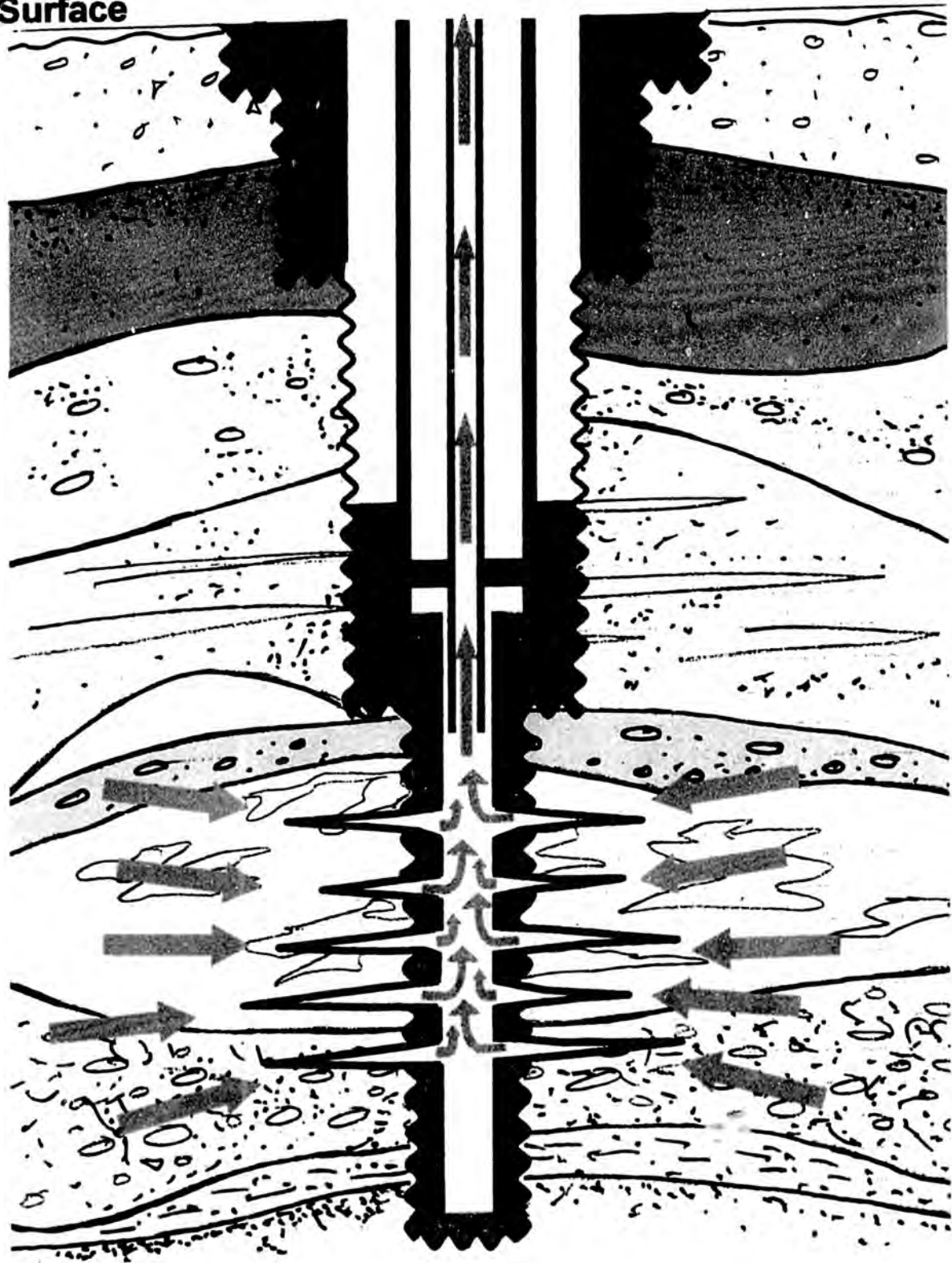
RESERVOIR INTERVAL PERFORATED

Surface



FLOWING WELL (Producer)

Surface



WELL ON INJECTION (Injector)

