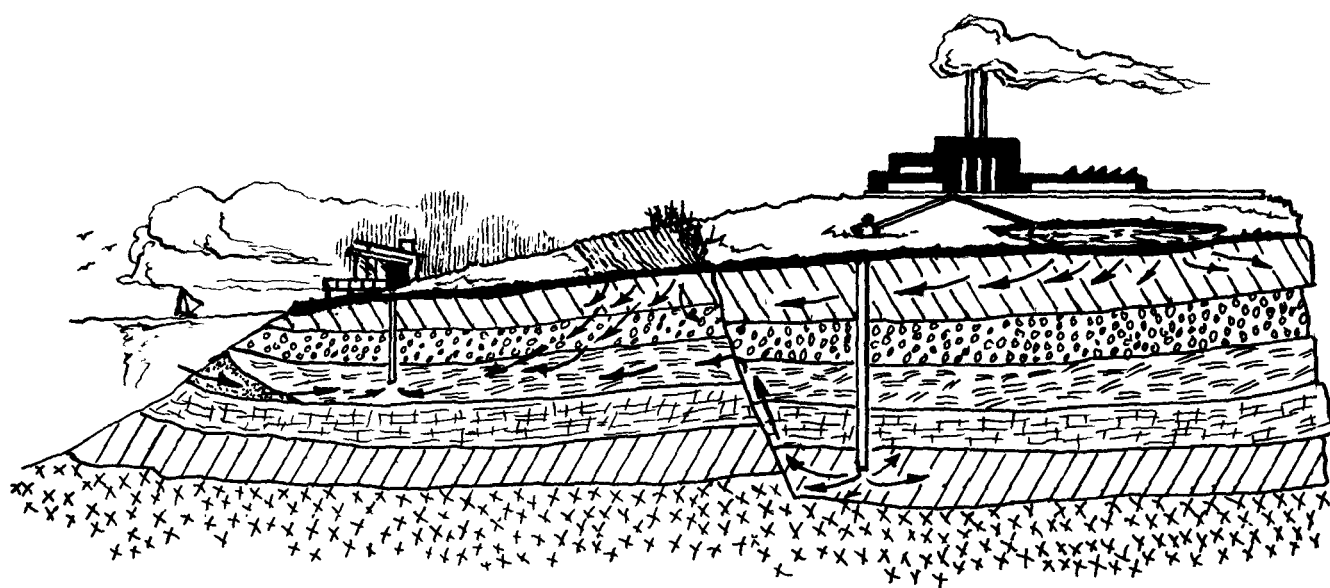




OFFICE OF WATER PROGRAMS

# **Subsurface Water Pollution A Selective Annotated Bibliography**

## **Part II Saline Water Intrusion**



U.S. ENVIRONMENTAL PROTECTION AGENCY

# SUBSURFACE WATER POLLUTION

A Selective

Annotated Bibliography

## PART II

### SALINE WATER INTRUSION

Produced in cooperation with  
Water Resources Scientific Information Center  
Office of Water Resources Research  
U.S. DEPARTMENT OF THE INTERIOR

U.S. ENVIRONMENTAL PROTECTION AGENCY  
Office of Water Programs  
Division of Applied Technology  
Water Quality Protection Branch  
Fresh Water Pollution Section  
Washington, D.C. 20460

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ENVIRONMENTAL PROTECTION

## FOREWORD

Subsurface Water Pollution is a selective bibliography produced by the Fresh Water Pollution Section, Office of Water Programs, Environmental Protection Agency from the computerized data base of the Water Resources Scientific Information Center, Office of Water Resources Research, U.S. Department of the Interior. This bibliography represents published research in water resources as abstracted and indexed in the semimonthly journal, Selected Water Resources Abstracts (SWRA). This bibliography represents a search of a 33,980-item data base, covering SWRA from October 1968 through December 1971, and is published in three parts. Part I covers pollution associated with subsurface waste injection, Part II covers pollution associated with saline water intrusion, and Part III covers pollution associated with percolation from surface sources.

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# SUBSURFACE WATER POLLUTION

## A Selective Annotated Bibliography

### INTRODUCTION

Ground water in the United States has historically been a quantitatively minor water source whose chief role was in individual homes or small communities. Today, ground water accounts for nearly 20 percent of the Nation's requirements for water, and has been viewed by some as the answer to the Nation's water supply problems. The problems associated with ground water management and its use in satisfying the future's enormous needs for water storage and supply are extremely complex. Other than basic relationships describing flow due to differences in gravity head; predictive relationships for mixing, flow times, dispersion, and stratification are only poorly developed. The concept of irreversibility in ground water pollution is widely accepted. Once an aquifer has been contaminated, it is difficult or infeasible to flush or pump out the contaminants and restore the aquifer to its original quality. To assure the continuing availability of large volumes of water of acceptable quality, research and technology must combine efforts to fill the basic knowledge gaps in the earth sciences that allow understanding and prediction of the causes and effects of subsurface water pollution.

Sources of ground water pollution generally fall into one of three distinct categories: 1) subsurface waste injection, 2) intrusion of saline water into fresh water aquifers, and 3) percolation from surface sources. Accordingly, this bibliography is divided into the same three basic categories. Within each category, the bibliography references articles pertaining to technology for prevention and control of pollution, documented cases of pollution, litigation, and laws and regulations affecting subsurface disposal of wastes.

Because the various aspects of the problems of ground water pollution cover a wide spectrum of science and engineering, articles bearing on the subject are widely dispersed in the scientific and technical literature. It is hoped that this bibliography will serve as a handy reference for scientists, engineers, and managers concerned with protection of the subsurface environment.

Selections in this bibliography were made by Clinton W. Hall, Geologist, Fresh Water Pollution Section, Office of Water Programs, Environmental Protection Agency.

## ARRANGEMENT

### Significant Descriptor Index

This index (blue pages) is made up of a fraction of the descriptors and identifiers by which each paper in this bibliography has been indexed, and represents weighted terms (indicated by asterisks) that best describe the information content.

### Bibliography

Subsurface Water Pollution is divided into three sections: 1) pollution associated with the deliberate injection of wastes below the water table, 2) pollution associated with the intrusion of saline waters into fresh water aquifers, and 3) pollution associated with the percolation of wastes from surface sources. In each section, the bibliography contains references to technology dealing with the prevention or abatement of pollution, litigation pertaining to incidences of pollution, and laws and regulations pertaining to the construction and operation of subsurface waste disposal facilities. Abstracts in each section are listed in ascending order according to accession number.

### Comprehensive Index

This index (yellow pages) is subdivided into three sections, corresponding to the subdivisions of the bibliography, and represents all of the descriptors and identifiers by which each paper has been indexed. Through permutation, each word in a multiple-word descriptor or identifier is made to file in its normal alphabetic order, thus affording a multiple access to each abstract.

## USING THE INDEXES

Having thought of a few key words describing your subject matter of interest, scan the indexes for their presence. The number in the right margin locates the full record in the bibliography section, which is arranged in ascending accession number sequence.

#### AVAILABILITY OF COPIES

Neither the Environmental Protection Agency nor the Water Resources Scientific Information Center supplies copies of documents listed in this bibliography. Some of the documents are shown to be available from the National Technical Information Service, Springfield, Virginia 22151. PB numbers should be included with all orders. Other reports may be obtained from publishers or from local libraries on loan or in reproduction.

Copies of this bibliography can be purchased from the National Technical Information Service, Springfield, Virginia 22151 at \$3.00 each in paper copy or 95¢ in microfiche.



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, *TERTIARY TREATMENT, *FILTERS,	*WASTES, *DOMESTIC WASTES, *BIOCH	W70-09805
EMICAL OXYGEN DEM/ *ENVIRONMENT,	*WATER CONSERVATION, *SALINE WATE	W71-12765
R INTRUSION, *WATER/ *LOUISIANA,	*WATER DISTRICTS, *SALINE WATER I	W71-10939
TEXAS, *WATER POLLUTION CONTROL,	*WATER MANAGEMENT(APPLIED), *GROU	W71-07005
NDWATER, *WATER RESOU/ *REVIEWS,	*WATER MANAGEMENT(APPLIED), AQUIF	W70-02486
INTRUSION, *AQUIFERS, *FLORIDA,	*WATER MANAGEMENT(APPLIED), *CALI	W70-02492
LINE WATER INTRUSION, *AQUIFERS,	*WATER MANAGEMENT(APPLIED), *ARTI	W70-02488
INTRUSION, *AQUIFERS, *NEW YORK,	*WATER MANAGEMENT(APPLIED), *SALI	W70-02491
NE WATER INTRUSION, *INJECTION /	*WATER MANAGEMENT(APPLIED), *SALI	W70-02489
NE WATER INTRUSION, *AQUIFERS, /	*WATER MANAGEMENT(APPLIED), LEGAL	W70-02485
INTRUSION, *AQUIFERS, *FLORIDA,	*WATER POLLUTION, *SEEPAGE, *SURS	W70-08049
URFACE WATER/ *PERCOLATING WATER,	*WATER POLLUTION CONTROL, *SALT W	W70-05349
ATER INTRUSION, *WATER USERS, */	*WATER POLLUTION SOURCES, *WASTE	W70-05922
WATER DISPOSAL, / *HYDROGEOLOGY,	*WATER POLLUTION, STANDARDS, WATE	W70-04881
A, *LEGISLATION, *WATER QUALITY,	*WATER POLLUTION, WATER QUALITY C	W70-04886
A, *LEGISLATION, *WATER QUALITY,	*WATER POLLUTION CONTROL, SALINE	W70-05347
RELATIONSHIPS, *WASTE DISPOSAL,	*WATER POLLUTION, WATER WELLS, LA	W69-07017
INE WATER INTRUSION, *OIL WELLS,	*WATER POLLUTION EFFECTS, *OIL IN	W69-04170
SSIPPI, *SALINE WATER INTRUSION,	*WATER POLLUTION SOURCES, *MINE W	W71-00001
ASTES, *SALINE WATER INTRUSION, /	*WATER POLLUTION, *OIL WELLS, *SA	W71-01303
LINE WATER INTRU/ *SALINE WATER,	*WATER POLLUTION, *SALINE WATER I	W71-01028
NTRUSION, *WATER/ *PENNSYLVANIA,	*WATER POLLUTION EFFECTS, *RETURN	W71-08044
FLOW/ *WATER POLLUTION SOURCES,	*WATER POLLUTION SOURCES, *WATER	W71-08044
POLLUTION EFFECTS, *RETURN FLOW/		

N CONTR/ *WYOMING, *GROUNDWATER,	*WATER POLLUTION, *WATER POLLUTIO	W71-10446
N PROCEDURE, *SUBSURFACE WATERS,	*WATER POLLUTION CONTROL, *OIL IN	W71-10917
DISTRICTS, *SALINE WATE/ *TEXAS,	*WATER POLLUTION CONTROL, *WATER	W71-10939
OCK, *DAMAGES, WATER/ *OKLAHOMA,	*WATER POLLUTION EFFECTS, *LIVEST	W71-11936
*OKLAHOMA, *JUDICIAL DECISIONS,	*WATER POLLUTION, *SALINE WATER I	W71-11848
*OIL INDUSTRY, *WATER POLLUTION,	*WATER POLLUTION CONTROL, OIL, OI	W71-10073
AL DECISIONS, *ADJUDICATION PRO/	*WATER POLLUTION CONTROL, *JUDICI	W71-10904
N C/ *WASHINGTON, *OIL INDUSTRY,	*WATER POLLUTION, *WATER POLLUTIO	W71-10073
STRATIVE AGENCIES, *OIL/ *TEXAS,	*WATER POLLUTION CONTROL, *ADMINI	W71-10916
STRATIVE AGENCIES, */ *OKLAHOMA,	*WATER POLLUTION SOURCES, *ADMINI	W71-10965
*GROUNDWATER, *WATER POLLUTION,	*WATER POLLUTION CONTROL, POLLUTI	W71-10446
MA, *OIL IN/ *SUBSURFACE WATERS,	*WATER POLLUTION EFFECTS, *OKLAHO	W71-13883
VATION, *SALINE WATER INTRUSION,	*WATER POLLUTION CONTROL, SALINE	W71-12765
*SALINE WATER INTRUSION, *WATE/	*WATER POLLUTION SOURCES, *TEXAS,	W71-11970
NE WATER INTRUSION, *OIL WASTES,	*WATER POLLUTION CONTROL, SALINE	W71-13680
ODELS, *HUDSON RIVER, *NEW YORK,	*WATER POLLUTION EFFECTS, *PATH O	W71-13630
ERFACES, *OIL FIELDS, *OKLAHOMA,	*WATER POLLUTION SOURCES, OIL WAS	W71-11969
TION W/ *LOUISIANA, *OIL WASTES,	*WATER POLLUTION CONTROL, *IRRIGA	W71-12863
WATER, / *OKLAHOMA, *OIL WELLS,	*WATER POLLUTION EFFECTS, *SALINE	W71-11971
SURFACE WATERS, *TEXAS, *CHFMIC/	*WATER QUALITY, COASTAL PLAINS, *	W71-11354
STANDA/ *FLORIDA, *LEGISLATION,	*WATER QUALITY, *WATER POLLUTION,	W70-04881
WATER / *FLORIDA, *LEGISLATION,	*WATER QUALITY, *WATER POLLUTION,	W70-04886
UNDWATER, *CALIFORNIA, *OBSERVA/	*WATER QUALITY, *MONITORING, *GRO	W70-05170
R MANAGEMENT, LOS ANGELES COUNT/	*WATER QUALITY MANAGEMENT, AQUIFE	W70-02490
NGELES COUNTY(CALIF).:	*WATER QUALITY MANAGEMENT, *LOS A	W70-02491
E COUNTY(CALIF).:	*WATER QUALITY MANAGEMENT, *ORANG	W70-02489
, LONG ISLAND.:	*WATER RECLAMATION, NASSAU COUNTY	W68-01048
RECHARGE, *SANITARY ENGINEERING,	*WATER RESOURCES DEVELOPMENT, PIL	W68-01048
ORIDA, *ADMINISTRATIVE AGENCIES,	*WATER RESOURCES DEVELOPMENT, *ST	W70-00536
NAGEMENT(APPLIED), *GROUNDWATER,	*WATER RESOURCES DEVELOPMENT, *SA	W71-07005
S, *GROUNDWATER RECHARGE, *RETU/	*WATER REUSE, *IRRIGATION PROGRAM	W71-02287
RY TREATMENT, *FILTERS, *WASTE /	*WATER REUSE, *INJECTION, *TERTIA	W71-08124
GE, *SANIT/ *TERTIARY TREATMENT,	*WATER REUSE, *GROUNDWATER RECHAR	W68-01048
ICIAL RECHARGE, *RECHARGE WELLS,	*WATER REUSE, *NEW YORK, *SALINE	W70-04355
CONTROL, *SALT WATER INTRUSION,	*WATER USERS, *NEGOTIATIONS, WATE	W70-05349
INE WATER INTRUSION, *OIL WELLS,	*WATER WELLS, GROUNDWATER, SALINE	W71-03230
LUTION, *SALINE WATER INTRUSION,	*WATER WELLS, OIL INDUSTRY, PUBLI	W71-01028
SION, *DRILLING, POLLU/ *KANSAS,	*WATER WELLS, *SALINE WATER INTRU	W71-11728
*TEXAS, *SALINE WATER INTRUSION,	*WATER WELLS, FARMS, SALINE WATER	W71-11970
E WATER INTRUSION, *FRESH WATER,	*WAVES(WATER), *FOREBAYS, WATER Q	W69-03531
NTUCKY, *SALINE WATER INTRUSION,	*WELL REGULATIONS, LEGISLATION, D	W70-00394
TEMENT, WA/ *KANSAS, *OIL WELLS,	*WELL REGULATIONS, *POLLUTION ABA	W71-10440
INTRUSION, *WELL REGULATIONS, L/	*WELLS, *KENTUCKY, *SALINE WATER	W70-00394
NE WATER INTRUSION, *OIL FIELDS,	*WEST VIRGINIA, OIL WELLS, INJECT	W71-04368
NTRUSION, *GROUNDWATER MOVEMENT,	*WITHDRAWAL, *RADIOACTIVE DATING,	W71-01107
LLUTION, *WATER POLLUTION CONTR/	*WYOMING, *GROUNDWATER, *WATER PO	W71-10446



## BIBLIOGRAPHY



REPLENISHING THE AQUIFER WITH TREATED SEWAGE EFFLUENT,

GROUND WATER AGE, VOL 2, NO 8, PP 30-35, APR 1968. 6 P, 8 ILLUS.

DESCRIPTORS:

\*ARTIFICIAL RECHARGE, \*INJECTION WELLS, \*GROUNDWATER, NEW YORK, \*SEWAGE EFFLUENTS, TERTIARY TREATMENT, FILTERS, SPECIFIC CAPACITY, WELL SCREENS, \*RECHARGE WELLS, \*SALINE WATER INTRUSION, WELL CASINGS, STAINLESS STEEL, POTABLE WATER, AIR ENTRAINMENT, GASES, WATER REUSE, BARRIERS, WATER MANAGEMENT(APPLIED), WATER QUALITY CONTROL.

IDENTIFIERS:

DEGASIFIERS, EH OF WATER, PH OF WATER, FIBERGLASS CASINGS, SALT WATER BARRIER, AIR CLOGGING, WATER LEVEL MONITORING.

ABSTRACT:

TREATED SEWAGE FROM A RECENTLY COMPLETED TERTIARY-TREATMENT PLANT IS BEING USED EXPERIMENTALLY AT BAY PARK, N.Y., TO RECHARGE AQUIFERS ARTIFICIALLY. THE PURPOSE IS TO SEE IF A BARRIER CAN BE CREATED TO RETARD THE INTRUSION OF SALT WATER INTO THE HEAVILY PUMPED AQUIFERS. AFTER TREATMENT THE EFFLUENT WHICH MEETS POTABLE-WATER STANDARDS IS STORED IN A 50,000 GAL STORAGE TANK WHERE THE PH AND EH OF THE WATER IS ADJUSTED CHEMICALLY. THEN IT MOVES THROUGH A VACUUM DEGASIFIER TO REMOVE AIR AND OTHER GASES BEFORE IT IS PUMPED INTO THE INJECTION WELL. THE WELL IS A 36-IN. HOLE, 508 FT DEEP, WITH A 15-FT THICK CEMENT PLUG AT THE BOTTOM. IT CONTAINS 62 FT OF 16-IN. STAINLESS STEEL SCREEN ATTACHED TO 420 FT OF 18-IN. FIBERGLASS CASING. IN THE ANNULAR SPACE THE WELL HAS 2 3-IN. TREMIE PIPES FOR ADDING FILTER-PACK MATERIAL, A 4-IN. WATER INJECTION PIPE ENTERING THE CASING 192 FT BELOW THE SURFACE, AND A 5-IN. OBSERVATION WELL. AT A PUMPING RATE OF 1,000 GPM, THE SPECIFIC CAPACITY OF THE WELL IS 35 GPM/FT. INJECTION TESTS ARE AT 400 GPM (576,000 GPD). IF THE PROJECT IS FEASIBLE, SIMILAR WELLS WILL BE CONSTRUCTED ALONG 15 MI OF OCEAN FRONT AND ULTIMATELY 27 MGD OF TREATED SEWAGE WILL BE INJECTED.

FIELD 05F

ACCESSION NO. W68-00029

WATER CONSERVATION BY RECLAMATION AND RECHARGE,

DEPT. OF PUBLIC WORKS, NASSAU COUNTY, N. Y.; BURNS AND ROE, INC., ORADELL, N. J.

JOHN H. PETERS, AND JOHN L. ROSE.

ASCE PROC, J SAN ENG DIV, VOL 94, NO 6065, PP 625-639, AUG 1968. 15 P, 8 FIG, 3 TAB, 4 REF.

DESCRIPTORS:

\*TERTIARY TREATMENT, \*WATER REUSE, \*GROUNDWATER RECHARGE, \*SANITARY ENGINEERING, \*WATER RESOURCES DEVELOPMENT, PILOT PLANTS, MUNICIPAL WASTES, NEW YORK, GROUNDWATER BARRIERS, SALINE WATER INTRUSION, RECLAIMED WATER.

IDENTIFIERS:

\*WATER RECLAMATION, NASSAU COUNTY, LONG ISLAND.

ABSTRACT:

BECAUSE THE ONLY ECONOMICAL SOURCE OF WATER FOR NASSAU COUNTY, LONG ISLAND, NEW YORK, IS GROUNDWATER AND THE WITHDRAWAL RATE MAY EXCEED RECHARGE BY 1977, A STUDY WAS MADE OF THE FEASIBILITY AND DESIRABILITY OF RETURNING TREATED WASTEWATER TO THE GROUND. TOTAL PUMPAGE WAS 145 MGD IN 1960 AND IS PREDICTED TO BE 298 MGD IN THE YR 2010. THE AMOUNT PUMPED AND NOT RECHARGED WAS 62 MGD IN 1960 AND IS PREDICTED TO REACH 239 MGD IN 2010. NATURAL RECHARGE IS ESTIMATED TO BE 181 MGD AND SAFE YIELD 154 MGD. A LINE OF RECHARGE WELLS ACROSS SOUTHERN NASSAU COUNTY WOULD FORM A BARRIER TO SALT-WATER INTRUSION UNTIL THE DRAFT PROJECTED FOR 1987 IS REACHED. THE ADDITIONAL DIRECT INJECTION OF RECLAIMED WATER IN THE CENTER OF THE COUNTY WOULD MEET A PROJECTED DEFICIENCY OF 85 MGD IN 2010. PROCESSES FOR TERTIARY TREATMENT ARE DISCUSSED AND THE TEST INJECTION FACILITY OF NASSAU COUNTY IS DESCRIBED. UNIT COSTS FOR TERTIARY TREATMENT ARE TABULATED AND COMPARED WITH COSTS OF DEVELOPMENT OF NEW SURFACE SUPPLIES; IT IS FOUND THAT RECLAMATION IS USUALLY CHEAPER IN PLANTS RECLAIMING OVER 100 MGD. RECLAMATION AND RECHARGE ARE SHOWN TO BE TECHNICALLY FEASIBLE ON A PILOT-PLANT SCALE. (KNAPP-USGS)

FIELD 05D

ACCESSION NO. W68-01048

SALT-WATER ENCROACHMENT IN THE SOUTH EDISTO RIVER ESTUARY, SOUTH CAROLINA,

U. S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION, WASHINGTON, D. C.

T. RAY CUMMINGS.

U S GEOL SURV WATER-SUPPLY PAP 1586-I, 1968. 19 P, 12 FIG, 2 TAB, 11 REF.

DESCRIPTORS:

\*ENCROACHMENT, \*ESTUARIES, \*SOUTH CAROLINA, TIDAL EFFECTS,  
DISCHARGE(WATER), SALINE WATER INTRUSION, WATER QUALITY, WINDS,  
DISSOLVED SOLIDS.

IDENTIFIERS:

\*SOUTH EDISTO RIVER, \*SPECIFIC CONDUCTANCE.

ABSTRACT:

A STUDY OF SALT-WATER ENCROACHMENT IN THE SOUTH EDISTO RIVER, SOUTH CAROLINA, FOUND THAT CHEMICAL CHARACTERISTICS ARE ALTERED TO ABOUT 25 MI UPSTREAM FROM THE MOUTH. PRECISE CORRELATIONS OF DISCHARGE, TIDE, AND WEATHER, THE FACTORS AFFECTING DISTANCE OF THE SALT-WATER ENCROACHMENT, WITH SPECIFIC CHEMICAL CHARACTERISTICS ARE NOT POSSIBLE IN THE REPORT AREA. MEAN DISCHARGE, FLOW DURATION, HIGH TIDE FREQUENCY, RELATION OF SPECIFIC CONDUCTANCE TO DISCHARGE, FREQUENCY CURVES OF SPECIFIC CONDUCTANCE, RELATION OF DISSOLVED SOLIDS TO CONDUCTANCE, FREQUENCY CURVES FOR DISSOLVED SOLIDS AND CHLORIDES, AND WATER TEMPERATURES, ARE PRESENTED GRAPHICALLY. TABLES SHOW MAXIMUM AND MINIMUM VALUES OF DISSOLVED SOLIDS AND THE PHYSICAL PROPERTIES OF WATER AT 2 GAGING STATIONS. (KNAPP-USGS)

FIELD 02L

ACCESSION NO. W69-00104

DYNAMIC AND STATIC STUDIES OF SEAWATER INTRUSION,

HAWAII UNIV., HONOLULU.

L. STEPHEN LAU.

WATER RESOUR RES CENTER, UNIV HAWAII, TECH REP NO 3, FEB 1967. 31 P, 9 FIG,  
20 REF, 4 APPEND. DWRR PROJECT A-007-HI.

DESCRIPTORS:

SALINE WATER INTRUSION, HAWAII, GROUND WATER, BASALTS, AQUIFERS,  
DENSITY STRATIFICATION, GROUND WATER, SALINE WATER-FRESHWATER  
INTERFACES.

IDENTIFIERS:

GROUND WATER DISCHARGE, DENSITY DIFFUSION, GROUND WATER DISPERSION,  
GHYBEN-HERZBERG PRINCIPLE.

ABSTRACT:

A THEORETICAL EQUATION WAS ADAPTED AND MODIFIED FOR A WATER TABLE  
AQUIFER TO RELATE FRESH WATER FLOW TO THE SEA, GEOMETRY OF THE FRESH  
WATER-SEA WATER INTERFACE, AND AQUIFER CHARACTERISTICS UNDER DYNAMIC  
EQUILIBRIUM. VERIFICATION WAS OBTAINED IN LABORATORY EXPERIMENTS  
CONDUCTED IN A HYDRAULIC SAND MODEL. OTHER LABORATORY EXPERIMENTS  
REVEALED SPECIAL FLOW PATTERNS IN THE TRANSITIONAL ZONE OF THE FRESH  
WATER-SEA WATER INTERFACE. THE EXTENT AND THE VERTICAL DENSITY GRADIENT  
OF THE BRACKISH WATER IN THE TRANSITIONAL ZONE WERE EXAMINED FOR THEIR  
EFFECTS ON MODIFYING THE CONVENTIONAL GHYBEN-HERZBERG RATIO.  
GROUNDWATER DATA COLLECTED FROM A DEEP WELL ON OAHU, HAWAII, WAS  
DISCUSSED AS AN ILLUSTRATION.

FIELD 02L

ACCESSION NO. W69-00618

SALT-WATER INTRUSION EFFECT OF A FRESH-WATER CANAL,

GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF CIVIL ENGINEERING.

M. R. CARSTENS, AND GEORGE D. MAY.

WATER RESOUR CENTER, GA INST TECH, MAY 1967. 49 P, 6 FIG, 6 TAB, 5 REF, 1  
APPEND. QWRR PROJECT B-003-GA.

DESCRIPTORS:

\*AQUIFERS, \*SEEPAGE, FLOW, \*GROUNDWATER MOVEMENT, SOIL WATER MOVEMENT,  
CANALS, \*SALINE-FRESH WATER INTERFACES, \*GROUNDWATER BARRIERS, \*SALINE  
WATER INTRUSION, PERMEABILITY, WATER TABLE, FLOOD PLAINS, PORE  
PRESSURE, LAND RECLAMATION, FLOWNETS, SILTS, SATURATED FLOW, SATURATED  
SOILS, SUBSURFACE FLOW, LAPLACES EQUATION.

IDENTIFIERS:

CHAUCHY-RIEMANN EQUATION.

ABSTRACT:

THE EFFECTIVENESS OF A FRESH-WATER CANAL TO ACT AS A BARRIER TO  
SALT-WATER INTRUSION IN AREAS ADJACENT TO SALT-WATER BODIES IS ANALYZED  
AND DISCUSSED. RESULTS FOR A CONDITION IN WHICH THE FRESH-WATER SEEPAGE  
FROM THE LAND IS A SMALL FRACTION OF THE FRESH-WATER SEEPAGE FROM THE  
CANAL ARE PRESENTED. SOLUTIONS DISCUSSED SHOW THAT THE FRESH-WATER FLOW  
FROM A CANAL ACTS AS A DAM FORCING TO A LOWER ELEVATION THE INTERFACE  
BETWEEN THE SALT-WATER SATURATED SOIL AND THE FRESH-WATER SATURATED  
SOIL. LAPLACE'S EQUATION IN THE FRESH-WATER FLOW DOMAIN IS SOLVED FOR  
THE FLOW CONDITION WHICH INVOLVES A WATER TABLE AND A SECOND DENSITY  
INTERFACE BETWEEN THE FRESH WATER AND SALT WATER. SEEPAGE LOSSES FROM A  
FRESH-WATER CANAL WITH FINE-GRAINED SOILS WERE NOT FOUND TO BE  
EXCESSIVE. USE OF A FRESH-WATER CANAL FOR RECLAMATION OF SALT-WATER  
INTRUDED DELTAS FOR AGRICULTURAL PURPOSES ARE DISCUSSED.

FIELD 02L, 04A, 02G

ACCESSION NO. W69-00667

SEA WATER INTRUSION INTO A FRESH WATER FOREBAY DUE TO WAVE ACTION,

AGRICULTURAL RESEARCH SERVICE, FRESNO, CALIF. SOIL AND WATER CONSERVATION  
RESEARCH DIV.

KENNETH L. DYER, AND JEROLD J. BEHNKE.

J HYDROL, VOL 6, NO 1, PP 95-101, JAN 1968. 7 P, 3 FIG, 7 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*FRESH WATER, \*WAVES(WATER), \*FOREBAYS, WATER  
QUALITY, FLOW, UNDERFLOW, SEA WATER.

IDENTIFIERS:

\*FRESH-WATER FOREBAY, \*SALINAS RIVER LAGOON(CALIFORNIA).

ABSTRACT:

THE ADVERSE EFFECT OF SEA WATER ON WATER QUALITY OF THE SALINAS RIVER  
LAGOON NEAR CASTROVILLE, CALIFORNIA, WAS INVESTIGATED. BENCH LEVELS  
INDICATED THAT THE FOREBAY IS ABOVE MEAN SEA LEVEL; HOWEVER, ADDITIONAL  
INVESTIGATIONS SHOWED THAT WAVE ACTION MAINTAINS A WATER LEVEL BENEATH  
THE BEACH, WHICH IS ABOVE MEAN SEA LEVEL AND FOREBAY. TIDES, WAVE  
ACTION, AND DENSITY DIFFERENCES BETWEEN FRESH AND SALT WATER SHOULD BE  
CONSIDERED IN THE INTERPRETATION OF HYDRAULIC RELATIONSHIPS BETWEEN  
COASTAL LAGOONS AND THE SEA. WAVE ACTION PRODUCES A NET LANDWARD  
GRADIENT RESULTING IN UNDERFLOW FROM THE SEA INTO THE FOREBAY. THE  
QUANTITY OF SEA WATER ADDED TO THE LAGOON WAS CALCULATED FROM SALT  
BALANCE AND FROM GRADIENT-TRANSMISSIBILITY RELATIONSHIPS. THE AMOUNT OF  
SEA WATER UNDERFLOW CALCULATED BY THESE TWO INDEPENDENT METHODS WAS  
24.5 AND 25.1 ACRE-FT RESPECTIVELY. (LLAVERIAS-USGS)

FIELD 02L

ACCESSION NO. W69-03531



WARREN PETROLEUM CORP V LEE (ACTION TO RECOVER DAMAGES FOR POLLUTION OF CREEK).

234 F 2D 207-211 (5TH CIR 1956).

DESCRIPTORS:

\*MISSISSIPPI, \*SALINE WATER INTRUSION, \*WATER POLLUTION EFFECTS, \*OIL INDUSTRY, RIPARIAN RIGHTS, SALINE WATER, WATER STORAGE, FISH TOXINS, DOWNSTREAM BRINE DISPOSAL, FISHKILL, PATH OF POLLUTANTS, POLLUTANTS, SALINITY, WATER POLLUTION, LETHAL LIMIT, SALT TOLERANCE, SEEPAGE, WELLS, JUDICIAL DECISIONS, DAMAGES.

ABSTRACT:

DEFENDANT PETROLEUM COMPANY PURCHASED LAND, UPSTREAM FROM PLAINTIFF'S LAND, FOR UNDERGROUND STORAGE OF LIQUIFIED GAS. THE OPERATION CONSISTED OF DRILLING WELLS INTO AN UNDERLYING SALT DOME, PUMPING WATER IN TO CREATE CAVITIES, AND REMOVING THE WATER. THE WATER, WHICH HAD A HIGH SALT CONCENTRATION, WAS THEN STORED IN EARTHEN PITS. THE CONTROVERSY AROSE WHEN SOME OF THE STORED WATER BEGAN TO SEEP INTO THE CREEK THAT LED THROUGH PLAINTIFF'S PASTURE LAND. LIVESTOCK, WHICH DRANK FROM THE CREEK, BECAME ILL. SOME DIED AND PLAINTIFF SUSTAINED ADDITIONAL DAMAGES IN SELLING SICK CATTLE AT A LOSS. DEAD FISH AND BREEDING SALT MARSH MOSQUITOES CAUSED FURTHER ANNOYANCE. PLAINTIFF BROUGHT SUIT TO RECOVER DAMAGES AS A RESULT OF THE SALT POLLUTION ALLEGEDLY CAUSED BY DEFENDANT'S OPERATIONS. THE JURY RETURNED A VERDICT FOR THE PLAINTIFF AND AWARDED MONETARY DAMAGES. THE APPELLATE COURT AFFIRMED, HOLDING THAT EVIDENCE WAS SUFFICIENT FOR THE JURY TO FIND THAT THE SALT POISONING WAS A PROBABLE CAUSE OF THE DISORDER WHICH AFFECTED PLAINTIFF'S STOCK, AND THAT DEFENDANT'S OPERATIONS WERE THE PROBABLE SOURCE OF THE SALT. (WHEELER-FLA)

FIELD 05B

ACCESSION NO. W69-04170

DELAWARE RIVER MODEL STUDY REPORT NO. 2 - SALINITY TESTS OF EXISTING CHANNEL.

WATERWAYS EXPERIMENT STATION, U. S. ARMY CORPS OF ENGINEERS, TECHNICAL MEMO  
NO. 2-337, JUNE, 1954.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*DELAWARE RIVER, \*MODEL STUDIES, RESERVOIR  
CONSTRUCTION, CONSTRUCTION, RESERVOIR OPERATION, DISCHARGE(WATER),  
FRESH WATER, WATER TYPES, BODIES OF WATER, INTERSTATE RIVERS, RIVERS,  
RUNNING WATERS, STREAMS, SURFACE WATERS, MANAGEMENT, OPERATIONS.

ABSTRACT:

SALINITY INTRUSION IN THE DELAWARE ESTUARY IS REPORTED FOR EXISTING  
(1942) CHANNEL CONDITIONS. THE PURPOSES OF THESE STUDIES WERE TO  
DETERMINE: (1) THE EFFECTS OF EACH PRINCIPAL FACTOR KNOWN OR BELIEVED  
TO AFFECT THE NATURE AND EXTENT OF SALINITY INTRUSION IN THE ESTUARY,  
WITH A VIEW TOWARD ARRIVING AT A PROPER EXPLANATION FOR THE INCREASE IN  
EXTENT OF SALINITY INTRUSION THAT HAS OCCURRED IN THE PROTOTYPE SINCE  
ABOUT 1930; AND (2) THE EFFECTS OF THE PROPOSED INCODEL PLAN, INVOLVING  
RESERVOIR CONSTRUCTION AND OPERATION TO REGULATE THE FRESH-WATER  
DISCHARGE OF THE DELAWARE RIVER ABOVE TRENTON, ON SALINITIES THROUGHOUT  
THE ESTUARY AND ESPECIALLY IN THE CRITICAL REACH BETWEEN PHILADELPHIA  
AND THE DELAWARE-PENNSYLVANIA STATE LINE. DESCRIPTIONS OF THE PROTOTYPE  
AND THE MODEL AND APPURTENANCES, AND A BRIEF DISCUSSION OF THE  
HYDRAULIC AND SALINITY ADJUSTMENT AND VERIFICATION ARE INCLUDED IN THIS  
REPORT FOR THE CONVENIENCE OF THE READER. A SUFFICIENT NUMBER OF  
REPRESENTATIVE PLATES SHOWING THE AGREEMENT ATTAINED BETWEEN MODEL AND  
PROTOTYPE HYDRAULIC AND SALINITY PHENOMENA ARE INCLUDED HEREIN TO  
DEMONSTRATE THAT THE MODEL IS CAPABLE OF ACCURATELY REPRODUCING ALL  
PERTINENT PHENOMENA OF THE PROTOTYPE.

FIELD 02L

ACCESSION NO. W69-04466

USE OF MODELS IN RESOLVING TIDAL PROBLEMS,

WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.

HENRY B. SIMMONS.

ASCE PROC, J HYDRAUL DIV, VOL 95, NO HY1, PAP 6345, PP 125-146, JAN 1969. 22 P, 22 FIG, 9 REF.

DESCRIPTORS:

\*ESTUARIES, \*TIDAL EFFECTS, \*HYDRAULIC MODELS, SALINE WATER INTRUSION, RESERVOIR OPERATION, MODEL STUDIES, NAVIGATION, SEDIMENTATION, TIDES, WASTE DISPOSAL, PATH OF POLLUTANTS.

IDENTIFIERS:

DELAWARE ESTUARY.

ABSTRACT:

A COMPREHENSIVE HYDRAULIC MODEL OF THE DELAWARE ESTUARY IS DESCRIBED, ALONG WITH THE ADJUSTMENT AND VERIFICATION OF THE MODEL. ALSO DESCRIBED ARE A NUMBER OF USES MADE OF THE MODEL THAT WERE NOT CONTEMPLATED WHEN THE MODEL WAS DESIGNED AND CONSTRUCTED. THESE INCLUDE, BUT ARE NOT LIMITED TO, STUDIES OF FACTORS AFFECTING SALTWATER INTRUSION; DEFINITION OF FLUSHING CHARACTERISTICS OF THE ESTUARY; DESIGN ON NEW NAVIGATION FACILITIES; IMPROVED METHODS FOR WASTE DISPOSAL; THE NEED FOR REHABILITATING EXISTING DIKES; AND THE EFFECTS OF RESERVOIR OPERATION ON SALT WATER INTRUSION. (KNAPP-USGS)

FIELD 02L

ACCESSION NO. W69-04580

SALT-WATER ENCROACHMENT OF TERTIARY LIMESTONE ALONG COASTAL SOUTH CAROLINA,  
GEOLOGICAL SURVEY, COLUMBIA, S. C.

GEORGE E. SIPLE.

HYDROL OF FRACTURED ROCKS VOL 2, PROC DUBROVNIK SYMP (OCT 1965), INT ASS SCI  
HYDROL, PUB 74, PP 439-453, 1967. 15 P, 6 FIG, 16 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*LIMESTONES, \*GEOLOGY, \*SALINE WATER-FRESH  
WATER INTERFACE, \*SOUTH CAROLINA, AQUIFERS, STRATIGRAPHY, STRUCTURAL  
GEOLOGY, WATER CIRCULATION, HYDRAULIC GRADIENT, INFILTRATION, TERTIARY,  
PERMEABILITY, SEDIMENT DISTRIBUTION, SEA WATER, GEOCHEMISTRY, SEA  
LEVEL, ARTESIAN WELLS.

IDENTIFIERS:

SALT-WATER ENCROACHMENT.

ABSTRACT:

LIMESTONES AND CLASTIC SEDIMENTS OF COASTAL SOUTH CAROLINA,  
CHARACTERIZED BY THEIR HIGH-GRADE AQUIFERS, HAVE BEEN INVADDED DURING  
RECENT AND PAST GEOLOGIC EPOCHS BY SEA WATER. TO UNDERSTAND THE  
MAGNITUDE OF THIS ENCROACHMENT, THE AUTHOR CONDUCTED A DETAILED  
INVESTIGATION BY MEANS OF GEOLOGICAL, HYDROLOGICAL AND GEOCHEMICAL  
METHODS. THE STUDY SHOWS THAT THE UPPER ZONES OF EOCENE LIMESTONES,  
INCISED BY ESTUARIES DURING PLEISTOCENE AND RECENT TIME, AND THE  
SUB-SEA CONTACT OF EOCENE AND OLIGOCENE DEPOSITS ARE NOW SUBJECT TO  
CONSIDERABLE SALT-WATER ENCROACHMENT. THE MOST EXTENSIVE ENCROACHMENT  
OCCURS IN THE LIMESTONES OF TERTIARY AGE AND CLASTIC BEDS OF CRETACEOUS  
AGE. THE AQUIFERS LOCATED IN THESE BEDS HAVE FRESH-WATER HEADS RANGING  
FROM ALTITUDES OF -3M TO +49M AND MAXIMUM CHLORIDE CONCENTRATION OF  
ABOUT 8,500 PPM. (GABRIEL-USGS)

FIELD 02L, 02F

ACCESSION NO. W69-05473

MAGNOLIA PETROLEUM CO V WILLIAMS (PROOF OF WATER WELL CONTAMINATION FROM SALT WATER DISPOSAL PIT).

76 SO 2D 365-368 (MISS 1954).

DESCRIPTORS:

\*MISSISSIPPI, \*SALINE WATER INTRUSION, \*OIL WELLS, \*WATER POLLUTION, WATER WELLS, LAND TENURE, DAMAGES, SEEPAGE, RELATIVE RIGHTS, OIL INDUSTRY, JUDICIAL DECISIONS, SALINITY, WASTE DISPOSAL, DISPOSAL, WATER QUALITY, WATER POLLUTION SOURCES, WATER INJURY.

IDENTIFIERS:

\*PROXIMATE CAUSE, \*DISPOSAL PITS.

ABSTRACT:

PLAINTIFF BROUGHT THIS SUIT FOR DAMAGES CAUSED TO HIS WATER WELL BY BRINE WATER INTRUSION. PLAINTIFF MAINTAINED A WATER WELL FOR HUMAN AND ANIMAL CONSUMPTION. DEFENDANT MAINTAINED TWO OIL WELLS NEARBY. THE OIL WELLS PRODUCED TWELVE BARRELS OF SALT WATER EACH DAY WHICH WERE EMPTIED INTO A DISPOSAL PIT. OTHER SALT WATER DISPOSAL PITS WERE NEAR PLAINTIFF'S WELL. DEFENDANT HAD NO CONTROL OVER THESE OTHER WELLS. ANY SALT WATER CONTAMINATION WOULD HAVE BEEN DUE TO THE UNDERGROUND MOVEMENT OF LEAKAGE FROM THE DISPOSAL PITS. IN THE TRIAL COURT, PLAINTIFF RECOVERED \$1,250. DEFENDANT APPEALED ON THE GROUND THAT PROXIMATE CAUSE WAS NOT SHOWN. THE SUPREME COURT HELD NO RECOVERY WAS POSSIBLE WHERE SEVERAL CAUSES OF INJURY WERE POSSIBLE AND SOME COULD NOT BE ATTRIBUTED TO THE DEFENDANT. ANY JUDGMENT RENDERED WOULD BE BASED ON MERE CONJECTURE SINCE THE EVIDENCE WAS NOT CONCLUSIVE IN SHOWING THAT DEFENDANT'S PIT CONTAMINATED THE WELL. (HARRIS-FLA)

FIELD 06E, 05G

ACCESSION NO. W69-07017

NEW DEVELOPMENTS IN THE FIELD OF TIDAL HYDRAULICS,

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D. C.

JOSEPH M. CALDWELL.

ASCE PROC, J HYDRAUL DIV, VOL 95, NO HYI, PAP 6339, PP 1-8, JAN 1969. 8 P, 14 REF.

DESCRIPTORS:

\*ESTUARIES, \*TIDES, \*CURRENTS(WATER), \*REVIEWS, HYDRAULICS, SALINE WATER INTRUSION, TIDAL EFFECTS, WATER LEVEL FLUCTUATIONS, CHANNEL FLOW, BIBLIOGRAPHIES.

IDENTIFIERS:

TIDAL HYDRAULICS, TIDAL CURRENTS.

ABSTRACT:

THE RECENT ADVANCES IN TIDAL HYDRAULICS AND THE METHODS OF SOLVING TIDAL HYDRAULICS PROBLEMS ARE REVIEWED. THE PROBLEMS OF INLETS, CANALS, AND ESTUARIES (INCLUDING SALT WATER INTRUSION) ARE CONSIDERED AND THE BIBLIOGRAPHY GIVES A SELECTION OF THE MORE RECENT LITERATURE ON THESE SUBJECTS. THE ROLE OF THE HYDRAULIC MODEL AND THE COMPUTER IS DESCRIBED. THE STABILITY OF INLETS IS RELATED TO TIDAL RANGE AND INLET CROSS SECTION. NO ATTEMPT TO DEVELOP THE PROCEDURES FOR SOLVING TIDAL HYDRAULICS PROBLEMS IS MADE; THE RECENT, MEANINGFUL ADVANCES IN THIS AREA OF ENGINEERING ARE DISCUSSED AND THE LITERATURE WHERE MORE DETAILED DESCRIPTIONS CAN BE FOUND IS REVIEWED.

FIELD 02L

ACCESSION NO. W69-07396

SOME LEGAL AND ECONOMIC IMPLICATIONS OF SEA WATER INTRUSION--A CASE STUDY OF  
GROUND WATER MANAGEMENT,

CALIFORNIA UNIV., DAVIS. DEPT. OF AGRICULTURAL ECONOMICS; AND CALIFORNIA  
UNIV., DAVIS. WATER RESOURCES CENTER.

CHARLES V. MOORE, AND J. HERBERT SNYDER.

NATUR RESOURCES J, VOL 9, NO 3, P 401-419, JULY 1969. 19 P, 2 FIG, 1 TAB, 26  
REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*CALIFORNIA, \*LEGAL ASPECTS,  
\*ECONOMICS, SALINE WATER SYSTEMS, ARTIFICIAL RECHARGE, PUMPING,  
IRRIGATION WATER, CANALS, WATER RIGHTS, WATER LAW, SOCIAL ASPECTS,  
PROPERTY VALUES, WATER SUPPLY, WATER COSTS.

IDENTIFIERS:

\*SALINAS VALLEY(CALIF).

ABSTRACT:

THE SALINAS VALLEY, AN INTENSIVELY CULTIVATED COASTAL VALLEY ABOUT 130  
MI SOUTH OF SAN FRANCISCO, IS NOTED FOR ITS SUMMER VEGETABLE  
PRODUCTION. THE IRRIGATION WATER SUPPLY NECESSARY FOR INTENSIVE CROP  
PRODUCTION COMES FROM PUMPING AN UNDERGROUND BASIN RECHARGED BY  
PERCOLATION FROM THE SALINA RIVER WHICH FLOWS THROUGH THE VALLEY.  
DEGRADATION OF GROUNDWATER QUALITY BY SALTWATER INTRUSION HAS FORCED  
ABANDONMENT OF WELLS NEAR THE COAST. A GEOLOGICAL SURVEY OF MONTEREY  
BAY INDICATES THE PRESENCE OF SILT, SAND, AND GRAVEL. A GRAVELLY  
OUTCROP LOCATED IN SUBMARINE CANYON WALLS IS PROBABLY THE 180-FT  
AQUIFER. WHEN LEGAL ALTERNATIVES ARE ANALYZED WITHIN BOTH THE FRAMEWORK  
OF WELFARE ECONOMICS AND THE LEGAL SETTING OF PROPERTY RIGHTS, THE  
THREAT OF COURT ACTION BY THE INJURED PARTIES CAUSES A CHANGE AWAY FROM  
THE PRESENT STATUS QUO SOLUTION TO ONE WITH WHICH THE PUMPERS IN THE  
UNCONTAMINATED AREA WOULD BE BETTER OFF IF THEY CONTRIBUTED TO THE COST  
OF A FRESH WATER CANAL RATHER THAN SUFFER THE CONSEQUENCES AND COSTS OF  
HAVING THE COURTS ADJUDICATE GROUNDWATER DAMAGES. THE AGGREGATE PROFIT  
LEVEL OF THE ENTIRE PRESSURE AREA WOULD BE MAXIMIZED UNDER THIS  
SOLUTION. (KNAPP-USGS)

FIELD 02K, 05G, 06E

ACCESSION NO. W69-08768

WATER SALINITY PROBLEMS: APPROACHES TO LEGAL AND ENGINEERING SOLUTIONS,

BEARDSLEY, HUFSTEDLER AND KEMBLE, LOS ANGELES, CALIF.; AND COLORADO RIVER  
BOARD OF CALIFORNIA, LOS ANGELES.

BURTON J. GINDLER, AND MYRON B. HOLBURT.

NATUR RESOURCES J, VOL 9, NO 3, P 329-400, JULY 1969. 71 P, 4 FIG, 298 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*SALINITY, \*SALINE WATER SYSTEMS,  
\*DESALINATION, \*LEGAL ASPECTS, \*ECONOMICS, ARTIFICIAL RECHARGE,  
PUMPING, WATER RIGHTS, WATER LAW, SOCIAL ASPECTS, PROPERTY VALUES,  
COST-BENEFIT ANALYSIS, ARID LANDS.

IDENTIFIERS:

SALINITY CONTROL AGENCIES.

ABSTRACT:

SALINITY PROBLEMS IN THE ARID WESTERN U.S. AND BOTH LEGAL AND  
ENGINEERING APPROACHES TO THEIR SOLUTIONS ARE DISCUSSED FOR REFERENCE  
USE BY THE LEGAL PROFESSION. THE DETERMINATION OF DESIRABLE SALINITY  
LEVELS REQUIRES CONSIDERATION OF COMPLEX LEGAL, COST AND BENEFIT, AND  
ENGINEERING FACTORS. COSTS SHOULD RECOGNIZE VALID WATER RIGHTS. THE  
CALIFORNIA WATER PLAN IS USED TO ILLUSTRATE ECONOMIC, LEGAL, AND  
ENGINEERING EVALUATIONS OF SALINITY EFFECTS, CONTROL, AND TREATMENT.  
THE USE OF STATIC, DYNAMIC, AND RECHARGE SALINITY BARRIERS TO PREVENT  
SALINE WATER INTRUSION IS DISCUSSED. THE ORGANIZATION OF REGIONAL  
AGENCIES IS NECESSARY TO ADMINISTER MOST SALINITY CONTROL UNDERTAKINGS.  
(KNAPP-USGS)

FIELD 02K, 05G, 06E

ACCESSION NO. W69-08769



RICE HOPE PLANTATION V SOUTH CAROLINA PUBLIC SERV AUTHORITY (DAMAGE FROM SALT WATER INFILTRATION AS A TAKING).

59 SE 2D 132-146 (SC 1950).

DESCRIPTORS:

\*SOUTH CAROLINA, \*EMINENT DOMAIN, \*STREAMFLOW, \*ENCROACHMENT, SALINE WATER, DAMS, RIPARIAN RIGHTS, RIVERS, COMPENSATION, STATE GOVERNMENTS, FEDERAL GOVERNMENT, FEDERAL POWER ACT, LEGISLATION, WILDLIFE, HUNTING, FISHING, ADMINISTRATIVE AGENCIES, RIPARIAN LAND, FLOODING, SALINE WATER INTRUSION, LEGAL ASPECTS, DIVERSION, DAMAGES, REMEDIES.

ABSTRACT:

PLAINTIFF CORPORATION OWNED A LARGE TRACT OF LAND BORDERING ON TWO RIVERS. DEFENDANT PUBLIC SERVICE COMMISSION CONSTRUCTED A DAM ON ONE OF THE RIVERS ABOVE PLAINTIFF'S PROPERTY CAUSING A LARGE PART OF THE NORMAL FLOW OF THE FRESH WATER TO BE DIVERTED. SALT WATER FROM THE OCEAN INFILTRATED THE STREAMS AND CREEKS DECREASING THE PROPERTY VALUE. THE WATER OCCASIONALLY OVERFLOWED WHEN WATER WAS RELEASED THROUGH THE DAM ALLOWING SALINE WATER TO FLOOD THE LAND WHICH CAUSED DAMAGE. PLAINTIFF BROUGHT SUIT AND SOUGHT RECOVERY UNDER 4 THEORIES: (1) COMPENSATION FOR PROPERTY TAKEN; (2) A CAUSE OF ACTION IN TORT; (3) A CAUSE OF ACTION UNDER THE FEDERAL POWER ACT; AND (4) A CAUSE OF ACTION IN QUASI-CONTRACT. THE SUPREME COURT HELD THAT THE COMMISSION AS A PUBLIC CORPORATION WAS IMMUNE FROM SUITS EX DELICTO, THAT THE FEDERAL POWER ACT DID NOT IMPOSE UPON A LICENSEE A NEW LIABILITY ABOVE WHAT IT INHERENTLY HAD, THAT THERE WAS NO FACTUAL BASIS FOR PLAINTIFF'S ALLEGATION OF UNJUST ENRICHMENT AND THAT THERE WAS NO ACTION IN QUASI-CONTRACT. THE COURT FURTHER HELD THAT THE ONLY THEORY UNDER WHICH PLAINTIFF COULD RECOVER WAS JUST COMPENSATION FOR PROPERTY TAKEN. (HELWIG-FLA)

FIELD 06E, 02L

ACCESSION NO. W69-08776

AN INTERFACE PROBLEM WITH A SOURCE AND A SINK IN THE HEAVY FLUID,  
TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).

A. VERRUIJT.

J HYDROL, VOL 8, NO 2, P 197-206, JUNE 1969. 10 P, 3 FIG, 5 REF, APPEND.

DESCRIPTORS:

\*SALINE WATER-FRESHWATER INTERFACES, \*GROUNDWATER MOVEMENT, SALINE  
WATER INTRUSION, MODEL STUDIES, HYDRAULIC MODELS, MATHEMATICAL MODELS.

IDENTIFIERS:

HODOGRAPHS, HELE-SHAW MODELS.

ABSTRACT:

THE HODOGRAPH METHOD IS EXPLAINED AND USED TO SOLVE THE GROUNDWATER  
FLOW PROBLEM OF A SOURCE AND A SINK IN THE HEAVY FLUID OF A 2-FLUID  
SYSTEM, THE LIGHTER FLUID BEING STATIONARY. THE RESULTS OF THE  
CALCULATIONS HAVE BEEN VERIFIED EXPERIMENTALLY BY MEANS OF A TEST IN A  
HELE-SHAW MODEL. (KNAPP-USGS)

FIELD 02L, 07B, 02F

ACCESSION NO. W69-09668

SALTWATER INTRUSION IN THE UNITED STATES.

REP PREPARED BY TASK COMMITTEE ON SALTWATER INTRUSION OF COMM ON GROUNDWATER  
HYDROL OF THE HYDRAUL DIV, ASCE. ASCE PROC, J HYDRAUL DIV, VOL 95, NO HY5,  
PAP 6788, P 1651-1669, SEPT 1969. 19 P, 1 TAB, 7 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*GROUNDWATER MOVEMENT, \*GROUNDWATER, AQUIFERS,  
COASTS, PUMPING, RECHARGE, SEA WATER, SEEPAGE, WATER LEVELS, WATER  
POLLUTION SOURCES, WATER POLLUTION CONTROL.

IDENTIFIERS:

SALINE GROUNDWATER.

ABSTRACT:

THE OCCURRENCE OF SALINE GROUNDWATER IN THE U. S. IS DESCRIBED IN TERMS  
OF GEOLOGIC AND HYDROLOGIC CONDITIONS. THREE GENERAL MECHANISMS OF  
INTRUSION ARE CONSIDERED. THE EXTENT OF SALT WATER INTRUSION IS GIVEN  
USING A DETAILED LISTING OF EXAMPLES FROM THROUGHOUT THE UNITED STATES.  
STATEMENTS ARE INCLUDED REGARDING SOME OF THE AREAS WHERE MAJOR CONTROL  
EFFORTS ARE UNDERWAY. (KNAPP-USGS)

FIELD 02F, 02K, 02L

ACCESSION NO. W70-00211

OIL, GAS, AND SALT WATER WELLS.

KY REV STAT ANN SECS 353.150 TO 353.190 (1963).

DESCRIPTORS:

\*WELLS, \*KENTUCKY, \*SALINE WATER INTRUSION, \*WELL REGULATIONS,  
LEGISLATION, DAMAGES, LEGAL ASPECTS, OIL WELLS, SALTS, SALINE WATER,  
REGULATION.

ABSTRACT:

ANY PERSON IN POSSESSION OF ANY WELL IN WHICH OIL, GAS, OR SALT WATER  
IS FOUND SHALL, UNLESS THE PRODUCT IS USED, CLOSE THE WELL WITHIN A  
REASONABLE TIME. IF THE PERSON IN POSSESSION FAILS TO COMPLY, THE  
NEAREST OTHER POSSESSOR MAY ENTER AND CLOSE IT AND RECOVER COSTS FROM  
THE POSSESSOR. THE OWNER OR OCCUPANT OF ANY SALT OR SALTPETRE WORKS  
SHALL KEEP THE BRINE THAT IS DRAINED OFF ENCLOSED SO AS TO PREVENT  
ACCESS TO IT. WHEN SUCH WORKS ARE ABANDONED IT SHALL BE FILLED UP OR  
ENCLOSED BY THE OWNER OR POSSESSOR. IF THESE ACTIONS ARE NOT TAKEN AND  
INJURY TO ANOTHER'S STOCK RESULTS, THE PERSONS UNDER THE DUTY TO COMPLY  
SHALL BE JOINTLY AND SEVERALLY LIABLE FOR THE DAMAGES.  
(DARRAGH-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-00394

WATER LAW AND ADMINISTRATION--THE FLORIDA EXPERIENCE: CHAPTER 5 CONSUMPTIVE USE  
OF WATER: COMMON LAW RULES,

FLORIDA UNIV., GAINESVILLE. WATER RESOURCES RESEARCH CENTER.

F. MALONEY, S. PLAGER, AND F. BALDWIN.

UNIV OF FLORIDA PRESS, GAINESVILLE, CH 5, P 140-171, 1968. 6 FIG, 1 TABLE.

DESCRIPTORS:

\*FLORIDA, \*CONSUMPTIVE USE, \*GROUNDWATER, \*SURFACE WATERS, SURFACE  
RUNOFF, RIPARIAN RIGHTS, COMPETING USES, DOMESTIC WATER, LEGAL ASPECTS,  
MUNICIPAL WATER, REASONABLE USE, REMEDIES, WATER UTILIZATION,  
PERCOLATING WATER, AQUIFERS, HYDROGEOLOGY, GROUNDWATER BASINS,  
HYDROLOGIC CYCLE, OVERDRAFT, WELLS, SURFACE-GROUNDWATER RELATIONSHIPS,  
DAMAGES, WATER SUPPLY, SALINE WATER INTRUSION, UNDERGROUND STREAMS.

ABSTRACT:

GROUNDWATER FROM LIMESTONE AQUIFERS IS FLORIDA'S PRINCIPAL SOURCE OF  
WATER FOR CONSUMPTIVE USE. THE BASIC PROBLEMS OF GROUNDWATER MANAGEMENT  
ARE: (A) INTERFERENCE BETWEEN WELLS; (B) OVERDRAFT OF THE WATERBEARING  
BED OR AQUIFER; AND (C) CONTAMINATION. SALT-WATER INTRUSION IS PROBABLY  
FLORIDA'S GREATEST GROUNDWATER CONTAMINATION PROBLEM. GROUNDWATER HAS  
BEEN TRADITIONALLY CLASSIFIED INTO EITHER UNDERGROUND STREAMS OR  
PERCOLATING WATERS. THE SIGNIFICANCE OF THE DISTINCTIONS, HOWEVER, HAS  
BEEN REDUCED SINCE MOST JURISDICTIONS, INCLUDING FLORIDA, NOW BEGIN  
WITH THE PRESUMPTION THAT GROUNDWATER IS PERCOLATING. HOWEVER, LEGAL  
RIGHTS CONTINUE TO HINGE UPON WHETHER THE PROBLEMS OF PROOF AS TO THE  
EXISTENCE OF AN UNDERGROUND STREAM CAN BE OVERCOME. GENERALLY, THE  
RIGHTS GOVERNING SURFACE WATERCOURSES APPLY TO UNDERGROUND STREAMS,  
WHILE THE RIGHTS REGARDING PERCOLATING WATERS VARY ACCORDING TO WHETHER  
THE COMMON LAW OR REASONABLE USE RULE IS FOLLOWED. MANY COURTS HOLD  
THAT AS LONG AS THE USE IS BENEFICIAL AND REASONABLE, THE LANDOWNER MAY  
USE PERCOLATING WATER ON OVERLYING LAND EVEN IF SUCH USE INJURES  
ADJOINING OWNERS. FLORIDA, HOWEVER, SEEMINGLY APPLIES SURFACE WATER  
RIPARIAN DOCTRINE TO PERCOLATING WATERS. INJUNCTION IS USUALLY THE  
PREFERRED REMEDY RESPECTING GROUNDWATER INTERFERENCE. GENERAL RIPARIAN  
DOCTRINES ARE APPLICABLE TO SPRINGS AND DEFINED SURFACE WATERBODIES.  
WITH THE INCREASING USE OF SURFACE WATERS AS A SOURCE OF SUPPLY, THE  
TREND IS TO REFINE THE ABSOLUTE OWNERSHIP APPLICABLE TO SUCH WATERS.  
(SEE W70-00527). (WHEELER-FLORIDA)

FIELD 06E, 04B, 05G

ACCESSION NO. W70-00532

WATER LAW AND ADMINISTRATION--THE FLORIDA EXPERIENCE: CHAPTER 9 STATE  
ADMINISTRATION OF WATER RESOURCES IN FLORIDA,

FLORIDA UNIV., GAINESVILLE. WATER RESOURCES RESEARCH CENTER.

F. MALONEY, S. PLAGER, AND F. BALDWIN.

UNIV OF FLORIDA PRESS, GAINESVILLE, CH 9, P 258-286, 1968. 3 FIG.

DESCRIPTORS:

\*FLORIDA, \*ADMINISTRATIVE AGENCIES, \*WATER RESOURCES DEVELOPMENT,  
\*STATE GOVERNMENTS, LEGAL ASPECTS, CANALS, CHANNELS, FISHING, FISH  
MANAGEMENT, FISHERIES, SHORES, SHORE PROTECTION, BEACHES, FINANCING,  
GRANTS, ARTESIAN WELLS, SALINE WATER INTRUSION, GEOLOGY, BEDS,  
OWNERSHIP OF BEDS, FEDERAL GOVERNMENT, WATER POLLUTION, ADMINISTRATION,  
PLANNING.

ABSTRACT:

STATE ADMINISTRATION OF WATER RESOURCES IN FLORIDA IS PRIMARILY THE  
RESPONSIBILITY OF FOUR AGENCIES: (1) THE TRUSTEES OF THE INTERNAL  
IMPROVEMENT FUND (MANAGEMENT OF SUBMERGED LANDS); (2) THE AIR AND WATER  
POLLUTION CONTROL COMMISSION; (3) THE STATE BOARD OF CONSERVATION; AND  
(4) THE GAME AND FRESH WATER FISH COMMISSION. THE STATE BOARD OF  
CONSERVATION HAS A MULTITUDE OF FUNCTIONS AND CONTROLS THE BULK OF  
WATER RESOURCES ADMINISTRATIVE DECISIONS IN THE STATE. THE VARIOUS  
DIVISIONS WHICH COMPRISE THE BOARD OF CONSERVATION INCLUDE SURVEY AND  
MANAGEMENT, SALT WATER FISHERIES, GEOLOGY, WATER RESOURCES AND  
CONSERVATION, BEACHES AND SHORES, AND WATERWAYS DEVELOPMENT (CURRENTLY  
COORDINATING CONSTRUCTION OF THE CROSS-FLORIDA BARGE CANAL). THE  
STRUCTURES, PROBLEMS, POWERS, AND DUTIES OF EACH OF THESE DIVISIONS ARE  
FULLY EXAMINED. THE BOARD ALSO HAS THE RESPONSIBILITY OF COORDINATING  
AND SETTING PRIORITIES FOR PROPOSED PROJECTS OF ALL STATE AND LOCAL  
AGENCIES. TO EFFECT SUCH EVALUATION AND COORDINATION, AN ANNUAL  
CONFERENCE IS SCHEDULED AT WHICH ALL PROPOSED PROJECTS FOR WATER  
RESOURCES DEVELOPMENT ARE PRESENTED AND EVALUATED. THIS APPROACH  
ENABLES THE BOARD TO PRESENT A UNIFIED PROGRAM OF WATER RESOURCES  
DEVELOPMENT TO THE VARIOUS CONGRESSIONAL COMMITTEES TO REDUCE HARMFUL  
COMPETITION FOR FEDERAL FUNDS. (SEE W70-00527). (WHEELER-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W70-00536

MODEL SIMULATION OF SALINITY INTRUSION IN TIDAL ESTUARIES,

UNIVERSITY OF STRATHCLYDE, GLASGOW (SCOTLAND).

D. I. H. BARR.

THE ENGINEER, VOL 216, P 885-893, NOV 29, 1963. 6 FIG, 1 TAB, 31 REF.

DESCRIPTORS:

\*MODEL STUDIES, \*ESTUARIES, \*TIDES, \*SALINE WATER INTRUSION, FROUDE NUMBER, REYNOLDS NUMBER, THERMAL POLLUTION.

ABSTRACT:

THE PURPOSE OF THIS STUDY IS TO EXPLAIN CERTAIN ASPECTS OF MODEL SIMULATION OF NATURAL PHENOMENA. ONE OF THE ASPECTS STUDIED WAS THE EXAGGERATION OF THE VERTICAL SCALE AND WHY IT IS A THEORETICAL AS WELL AS A PRACTICAL NECESSITY. THEN, CONSIDERATION WAS GIVEN THE FURTHER COMPLICATION INVOLVED WHEN SIMULATION OF SALINITY INTRUSION IS REQUIRED IN TIDAL MODELS. BECAUSE THERE IS A LINK BETWEEN ALL MODEL EXPERIMENTS INVOLVING EXTENDED GRAVITATIONAL FLOW - FREE SURFACE OR INTERNAL AND STEADY STATE OR NON-STEADY STATE - AND IT IS PROPOSED THAT THE MOST APPROPRIATE PARAMETERS FOR THE CORRELATION AND COMPARISON OF RESULTS FROM DIFFERING EXAMPLES OF SUCH STUDIES ARE THE FROUDE-REYNOLDS NUMBER AND THE DENSIMETRIC FROUDE-REYNOLDS NUMBER. SOME CONCLUSIONS WERE: (A) THE CONGRUENCY DIAGRAM METHOD OF SCALING FOR HEAT DISSIPATION MODELS IS ESSENTIALLY A FACET OF THE WHOLE PROBLEM OF THE SCALING OF FREE SURFACE MODELS WHERE HEAD LOSS IS IMPORTANT. (B) NEED OF THE EXAGGERATION OF THE VERTICAL SCALE IN EXTENSION MODELS IS FUNDAMENTAL. EXAGGERATION WILL ALWAYS CAUSE SOME DISTORTION; THE WELL-MIXED TYPE OF INTRUSION IS IN MANY WAYS MORE AMENABLE TO THE MODEL STUDY APPROACH THAN THE POWER-STATION HEAT DISSIPATION PROBLEM. (GUERRERO-VANDERBILT)

FIELD 02L

ACCESSION NO. W70-01918

SALT-WATER ENCROACHMENT IN AQUIFERS OF THE BATON ROUGE AREA, LOUISIANA,  
GEOLOGICAL SURVEY, BATON ROUGE, LA.

J. R. ROLLO.

LOUISIANA DEPT CONSERV, GEOL SURV, AND DEPT PUBLIC WORKS WATER RESOURCES BULL  
NO 13, AUG 1969. 45 P, 4 FIG, 6 PLATE, 1 TAB, 9 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*LOUISIANA, \*SURVEYS, WATER  
QUALITY, HYDROGEOLOGY, DATA COLLECTIONS, HYDROLOGIC DATA, WATER LEVELS,  
GROUNDWATER MOVEMENT, COASTAL PLAINS.

IDENTIFIERS:

BATON ROUGE(LA).

ABSTRACT:

TEST WELLS DRILLED IN THE BATON ROUGE AREA HAVE DEFINED LARGE-SCALE  
FAULTING THAT CUTS ACROSS THE SOUTHERN PART OF THE AREA AND ACTS AS A  
HYDRAULIC BARRIER TO THE NORTHWARD MOVEMENT OF SALTY WATER. SALTY WATER  
HAS BEEN FOUND IN SEVERAL AQUIFERS NORTH OF THE FAULT, BUT THERE IS  
REASONABLE DOUBT THAT A SIGNIFICANT QUANTITY OF SALTY WATER HAS MOVED  
OR CAN MOVE ACROSS THE FAULT, EXCEPT IN THE '400-FOOT' SANDS. THE  
LOGICAL APPROACH TO ANY INTRUSION PROBLEM THAT CAN BE ENVISIONED SHOULD  
BE ONE OF CAUTIOUS WATCHFULNESS. UNTIL THE SALT-WATER FRONTS ACTUALLY  
REACH POINTS OF WITHDRAWAL, THEIR FLOW PATHS FROM THEIR KNOWN POSITIONS  
TO THE POINTS OF WITHDRAWAL ARE ONLY GENERALLY PREDICTABLE. WHEN THE  
SALTY WATER ACTUALLY ARRIVES, A METHOD OF CONTROL CAN BE INSTITUTED  
WITH THE CERTAINTY THAT THE GEOGRAPHICAL LOCATION IS CORRECT AND THE  
BENEFITS OF CONTROL CAN BE MEASURED. (KNAPP-USGS)

FIELD 02L, 04B

ACCESSION NO. W70-02094



SALT-WATER ENCROACHMENT INTO AQUIFERS.

PROCEEDINGS OF SYMP HELD AT LOUISIANA STATE UNIV, BATON ROUGE, MAY 4-5, 1967.  
LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE  
UNIVERSITY, OCT 1968. 192 P, 38 FIG, 15 TAB, 91 REF. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, HYDROGEOLOGY, WATER  
MANAGEMENT(APPLIED), NEW YORK, FLORIDA, CALIFORNIA, GROUNDWATER  
MOVEMENT, SURFACE-GROWNDWATER RELATIONSHIPS, WATER LAW, LEGAL ASPECTS,  
DRAINAGE, WITHDRAWAL, ADMINISTRATIVE AGENCIES.

IDENTIFIERS:

AQUIFER MANAGEMENT.

ABSTRACT:

A SYMPOSIUM RECORD CONTAINS DISCUSSIONS OF SALT WATER ENCROACHMENT INTO  
AQUIFERS IN FLORIDA, NEW YORK AND CALIFORNIA, MANAGEMENT OF AQUIFERS,  
ENCROACHMENT CONTROL, HYDROGEOLOGY, AND LEGAL ASPECTS OF ENCROACHMENT.  
EACH DISCUSSION CONSISTS OF A PAPER PRESENTED AS A PREPRINT, A SHORT  
INTRODUCTORY STATEMENT BY THE AUTHOR, AND DISCUSSION BY THE SYMPOSIUM  
PARTICIPANTS. (SEE ALSO W70-02485 THRU W70-02492). (KNAPP-USGS)

FIELD 02L, 03C, 04C, 04B

ACCESSION NO. W70-02484

COMBATING SALT-WATER ENCROACHMENT INTO THE BISCAYNE AQUIFER OF MIAMI, FLORIDA,  
DADE COUNTY ENGINEERING DEPT., MIAMI, FLA.

F. D. R. PARK.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE  
UNIVERSITY, P 31-56, OCT 1968. 26 P, 14 FIG, 2 TAB, 16 REF. OWRR PROJ NO  
A-004-LA.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*FLORIDA, \*WATER  
MANAGEMENT(APPLIED), LEGAL ASPECTS, WATER LAW, WATER CONSERVATION, LAND  
MANAGEMENT, DRAINAGE, WITHDRAWAL, ADMINISTRATIVE AGENCIES.

IDENTIFIERS:

WATER QUALITY MANAGEMENT.

ABSTRACT:

URBANIZATION OF DADE CO., FLORIDA AND ATTEMPTS TO DRAIN THE EVERGLADES  
HAVE LOWERED THE WATER TABLE. DURING PERIODS OF DROUGHT, THE CURRENT  
WITHDRAWAL RATE OF FRESH WATER ALLOWS SALT-WATER INTRUSION. RECHARGE  
FROM RAINFALL PERIODICALLY PUSHES SALT WATER TO THE SEA. IT IS  
DESIRABLE TO ARTIFICIALLY HOLD A HIGH WATER LEVEL TO OFFSET INTRUSION  
DURING DROUGHTS. SALINITY DAMS, PREVENTION OF FURTHER PRIMARY DRAINAGE,  
AND NAVIGATION CHANNELS ARE USED IN SALINITY CONTROL. LITTLE OPPOSITION  
HAS BEEN ENCOUNTERED IN ENFORCEMENT OF THE SALT BARRIER LINE ON PRIVATE  
LANDS. THE MAIN ENFORCEMENT DIFFICULTIES ARE CAUSED BY THE PUBLIC WORKS  
AND MOSQUITO CONTROL UNITS. COURT DECISIONS SUBORDINATE RIPARIAN RIGHTS  
TO THE PUBLIC NEED OF AN UNCONTAMINATED FRESH WATER SUPPLY. LESSER  
POLLUTION PROBLEMS ARISE FROM INDUSTRIAL AND DOMESTIC DISCHARGES. AN  
EFFECTIVE ANSWER LIES IN COUNTY-WIDE SEWAGE COLLECTION AND DISPOSAL.  
(SEE W70-02484). (KNAPP-USGS)

FIELD 02L, 04C

ACCESSION NO. W70-02485

SALT-WATER INTRUSION IN SOUTHEASTERN FLORIDA,

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT, WEST PALM BEACH, FLA.

ROBERT GRAFTON.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE UNIVERSITY, P 15-30, OCT 1968. 16 P, 1 FIG. DWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*FLORIDA, \*WATER MANAGEMENT(APPLIED), AQUIFERS, HYDROGEOLOGY, SURFACE-GROUNDWATER RELATIONSHIPS, WATER LAW, LEGAL ASPECTS, WATER CONSERVATION, LAND MANAGEMENT, DRAINAGE, WITHDRAWAL, ADMINISTRATIVE AGENCIES.

IDENTIFIERS:

WATER QUALITY MANAGEMENT.

ABSTRACT:

OVERDRAINAGE AS A RESULT OF URBANIZATION AND GEOLOGICAL CONDITIONS RESULTED IN SALT-WATER INTRUSION INTO SOUTHEASTERN FLORIDA. AFTER MASSIVE FLOOD DAMAGE IN 1957 AND 1958, THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT WAS ESTABLISHED TO ACQUIRE LANDS, REPRESENT LOCAL INTERESTS, RAISE FUNDS, AND OPERATE PROJECTS IN COOPERATION WITH THE FEDERAL GOVERNMENT TO PROMOTE FLOOD CONTROL AND WATER PRESERVATION. FURTHER LEGISLATION IS REQUIRED TO BROADEN THE SCOPE OF THE F.C. D., ESPECIALLY IN SALT-WATER INTRUSION. WITH THE EXCEPTION OF DADE AND BROWARD COUNTIES, LITTLE IS BEING ACCOMPLISHED BY COUNTIES UNDER THE GUIDANCE OF THE STATE BOARD OF CONSERVATION, DEPARTMENT OF WATER RESOURCES. INCREASED POPULATION IS ENDANGERING LANDS COMMITTED TO CONSERVATION AREAS. HOWEVER, ACTIVITIES BY SPECIAL AGENCIES AGAINST SALT-WATER INTRUSION IN SOUTHEASTERN FLORIDA CONTINUE TO GAIN MOMENTUM. (SEE W70-02484). (KNAPP-USGS)

FIELD 02L, 04C

ACCESSION NO. W70-02486

PROTECTING LONG ISLAND AQUIFERS AGAINST SALT-WATER INTRUSION,

NEW YORK STATE DEPT. OF CONSERVATION, ALBANY. DIV. OF WATER RESOURCES.

FRANCIS W. MONTANARI, AND WALTER G. WATERMAN.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE UNIVERSITY, P 59-87, OCT 1968. 29 P, 9 FIG, 2 TAB, 26 REF. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*NEW YORK, \*WATER MANAGEMENT(APPLIED), \*ARTIFICIAL RECHARGE, SALINE WATER-FRESHWATER INTERFACES, RECLAIMED WATER, WATER LAW, LEGISLATION, LEGAL ASPECTS, HYDROGEOLOGY, DESALINATION.

IDENTIFIERS:

WATER QUALITY MANAGEMENT.

ABSTRACT:

SALT WATER INTRUSION IN NEW YORK INVOLVES ONLY THE PERIMETER OF LONG ISLAND. THE PROBLEM IS COMPOUNDED BY DIRECT CONTACT BETWEEN THE AQUIFERS AND THE OCEAN. ALL LONG ISLAND GROUNDWATER COMES FROM INFILTRATION WITH APPROXIMATELY 50% ABSORPTION INTO THE AQUIFERS. SINCE 1933, LEGISLATION HAS BEEN ENACTED TO REGULATE THE GROUNDWATER EXTRACTION AND TO LICENSE WELL DRILLERS. THE MAIN CAUSES OF SALT-WATER INTRUSION ARE OVERPUMPAGE AND A REDUCTION IN AVAILABILITY OF RECHARGE WATER AS A RESULT OF URBANIZATION. PROJECTS UNDERTAKEN TO RELIEVE OVERPUMPAGE ARE: (1) RESERVOIRS TO COLLECT SURFACE WATER, (2) ACQUIRING PUMPING RIGHTS OF SPARSELY POPULATED AREAS, AND (3) CONSTRUCTION OF A DESALINATION PLANT. PLANS ARE UNDER WAY TO SALVAGE 97 MGD OF PRESENTLY WASTED SEWAGE WATER FOR INJECTION. PRESENTLY LONG ISLAND IS USING 15 ACRES OF RECHARGE BASINS WITH A CAPACITY OF 57 MILLION GALLONS. PRESENT EFFORTS, SUCH AS RECHARGING, ARE BEING OFFSET BY WASTEFUL SEWAGE DISCHARGE. (SEE W70-02484). (KNAPP-USGS)

FIELD 02L, 04C

ACCESSION NO. W70-02488

THE CHALLENGE OF WATER MANAGEMENT: ORANGE COUNTY WATER DISTRICT, CALIFORNIA,  
ORANGE COUNTY WATER DISTRICT, SANTA ANA, CALIF.

LANGDON W. OWEN.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE  
UNIVERSITY, P 105-125, OCT 1968. 21 P, 5 FIG, 2 TAB. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*WATER MANAGEMENT(APPLIED), \*SALINE WATER INTRUSION, \*AQUIFERS,  
\*CALIFORNIA, \*INJECTION WELLS, ARTIFICIAL RECHARGE, OBSERVATION WELLS,  
WATER REUSE, RECLAIMED WATER, GROUNDWATER BARRIERS, WATER QUALITY.

IDENTIFIERS:

\*WATER QUALITY MANAGEMENT, \*ORANGE COUNTY(CALIF).

ABSTRACT:

THE TECHNICAL ASPECTS OF EFFECTIVE BASIN MANAGEMENT OF ORANGE COUNTY,  
CALIFORNIA WATER SUPPLIES ARE DESCRIBED. RELIANCE HAS BEEN PLACED ON  
BOTH SURFACE WATER AND GROUNDWATER TO MEET COUNTY NEEDS. SURFACE WATER  
IS OBTAINED FROM THE COLORADO AND SANTA ANA RIVERS AND DIRECT  
PRECIPITATION. GROUNDWATER COMES FROM THE SOUTH COASTAL BASIN. FEASIBLE  
USE OF THESE SOURCES IS DEPENDENT ON SAFE WITHDRAWAL OF LARGE VOLUMES  
OF GROUNDWATER DURING PERIODS OF SURFACE WATER SHORTAGE AND THE ABILITY  
TO SINK LARGE QUANTITIES OF WATER INTO THE BASIN WHEN SURPLUS SURFACE  
WATER IS AVAILABLE. SALT-WATER INTRUSION WILL BE CONTROLLED BY A  
HYDRAULIC BARRIER OF INJECTION WELLS. THE MAJOR PROBLEM ENCOUNTERED IN  
INJECTING RECLAIMED AND SURFACE WATER IS THE QUALITY OF THE AVAILABLE  
WATER. BLENDING OF SURFACE WATER AND GROUNDWATER PROVIDES A DESIRABLE  
COMPOSITE WATER SOURCE. COMPUTER MODELS HAVE GREATLY FACILITATED  
WORKING KNOWLEDGE OF THE GROUNDWATER BASIN OPERATION. (SEE W70-02484).  
(KNAPP-USGS)

FIELD 02L, 03C

ACCESSION NO. W70-02489

THE HYDROGEOLOGIC SETTING IN LOS ANGELES COUNTY, CALIFORNIA,

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, CALIF., WATER CONSERVATION DIV.

CLINTON MILNE.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE UNIVERSITY, P 127-151, OCT 1968. 25 P, 8 FIG, 7 TAB, 11 REF. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*HYDROGEOLOGY, \*SALINE WATER INTRUSION, \*AQUIFERS, \*CALIFORNIA, \*ARTIFICIAL RECHARGE, WATER MANAGEMENT(APPLIED), GEOLOGY, INJECTION WELLS, DRAWDOWN, WATER RESOURCES DEVELOPMENT.

IDENTIFIERS:

\*WATER QUALITY MANAGEMENT, AQUIFER MANAGEMENT, LOS ANGELES COUNTY(CALIF).

ABSTRACT:

OVER 80% OF THE WATER LEVELS IN THE PRINCIPAL AQUIFERS UNDERLYING THE 470-SQUARE MILE COASTAL PLAIN AREA OF LOS ANGELES COUNTY, CALIFORNIA ARE BELOW SEA LEVEL. AS A RESULT, AQUIFERS OF PLEISTOCENE AGE, SITUATED AT DEPTHS DOWN TO 750 FEET IN THE CRITICAL AREAS, HAVE BEEN INTRUDED BY SEA WATER. THE VOLUME OF THIS INTRUSION IS ESTIMATED TO BE 700,000 ACRE FEET. ARTIFICIAL REPLENISHMENT IS ACCOMPLISHED BY THE SPREADING OF LOCAL STORM RUNOFF AND THE INJECTION OF BOTH IMPORTED COLORADO RIVER WATER AND RECLAIMED WATER. MANAGEMENT OF GROUNDWATER BASINS WILL MAINTAIN BELOW SEA LEVEL THE WATER TABLES UNDERLYING MOST OF THE COASTAL PLAIN. SEA-WATER INTRUSION WILL BE PREVENTED BY THE INJECTION OF FRESH WATER, WHICH WILL ALSO PROVIDE A MAJOR PORTION OF THE GROUNDWATER REPLENISHMENT. (SEE W70-02484). (KNAPP-USGS)

FIELD 02L, 04B

ACCESSION NO. W70-02490

THE AMELIORATION OR PREVENTION OF SALT-WATER INTRUSION IN AQUIFERS - EXPERIENCE  
IN LOS ANGELES COUNTY, CALIFORNIA,

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, CALIF.

ARTHUR E. BRUINGTON.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE  
UNIVERSITY, P 153-168, OCT 1968. 16 P, 1 FIG, 8 REF. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*WATER MANAGEMENT(APPLIED), \*SALINE WATER INTRUSION, \*INJECTION WELLS,  
\*CALIFORNIA, GROUNDWATER BARRIERS, ARTIFICIAL RECHARGE, AQUIFERS, WATER  
REUSE, CONSTRUCTION COSTS, OPERATING COSTS.

IDENTIFIERS:

\*WATER QUALITY MANAGEMENT, \*LOS ANGELES COUNTY(CALIF).

ABSTRACT:

UNDERGROUND STORAGE FROM WINTER STORMS IS USED IN LOS ANGELES COUNTY,  
CALIFORNIA WITH THE PRESSURE-RIDGE METHOD FOR RECHARGE OF THE AQUIFERS  
FOR DETERRING SALINE INTRUSION. A LINE OF INJECTION WELLS CREATE A  
PRESSURE FIELD MUCH LIKE A CONTINUOUS CURTAIN WALL. WATERLOGGING HAS  
BEEN CONTROLLED IN LOW AREAS BY SEAWARD EXTRACTION ALONG WITH  
PRESSURE-RIDGE INJECTION. INJECTED WATER MUST BE OF HIGH QUALITY TO  
PREVENT CLOGGING OF WELLS, INCREASE WELL LIFE, AND REDUCE WELL-CLEANING  
COSTS. OBSERVATION WELLS ARE NEEDED AT CRITICAL POINTS ALONG THE  
BARRIER LINE TO MONITOR THE GROUNDWATER ELEVATION. THE LOCATION OF THE  
BARRIER LINE HAS ALLOWED A CERTAIN AMOUNT OF SALT WATER TO BE CUT OFF,  
OR TRAPPED BEHIND THE BARRIER. THE COST OF INJECTED WATER FOR 1966,  
\$13.00 PER ACRE-FOOT DID NOT INCLUDE THE COST OF SUPPLY WATER,  
AMORTIZED CAPITAL OUTLAY PER WELL, PIPELINES, AND OTHER APPURTENANCES.  
THE UNCOMPLETED PRESSURE-RIDGE SYSTEM IS WORKING AS PLANNED. (SEE  
W70-02484). (KNAPP-USGS)

FIELD 02L, 04B

ACCESSION NO. W70-02491

LEGAL AND ECONOMIC ASPECTS OF SALT-WATER ENCROACHMENT INTO COASTAL AQUIFERS,

BOOKMAN AND EDMONSTON, GLENDALE, CALIF.

MAX BOOKMAN.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN 3, LOUISIANA STATE UNIVERSITY, P 169-192, OCT 1968. 24 P, 30 REF. OWRR PROJ NO A-004-LA.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*WATER MANAGEMENT(APPLIED),  
\*CALIFORNIA, \*LEGAL ASPECTS, COSTS, ECONOMICS, ADMINISTRATIVE AGENCIES,  
FLOOD CONTROL, ARTIFICIAL RECHARGE, WATER REUSE, WATER RIGHTS, WATER  
LAW.

IDENTIFIERS:

WATER QUALITY MANAGEMENT, LOS ANGELES COUNTY(CALIF).

ABSTRACT:

AN INTEGRAL PART OF SALT-WATER INTRUSION PREVENTION IS CONTROL AND REDUCTION OF GROUNDWATER PRODUCTION, WHICH, IN LOS ANGELES COUNTY, CALIFORNIA, REQUIRED COURT ACTION. LEGISLATIVE ACTION WAS ALSO NECESSARY TO EMPOWER LOCAL WATER DISTRICTS TO CONSTRUCT, OPERATE, AND FINANCE SALT-WATER PREVENTION FACILITIES. AT PRESENT, 70% OF THE WATER IS IMPORTED. IMPLEMENTATION OF CONTROLS WAS A 3-STEP PROCESS: (1) SHARING OF IMPORTED RIVER WATER WITH UPSTREAM OWNERS; (2) INJUNCTIONS AGAINST COASTAL AND CENTRAL BASIN PUMPERS; AND (3), ESTABLISHMENT OF A SALT-WATER BARRIER. BARRIER FINANCING CAME THROUGH ADVALOREM TAXES AND DISTRICT GENERAL FUNDS. OTHER LEGISLATION PROVIDED FOR FINANCING ENFORCEMENT. SALT-WATER PREVENTION IN THE WEST COAST BASIN IS ADMINISTERED BY 6 STATE AND LOCAL AGENCIES AND ONE CITIZENS' ASSOCIATION. THIS ARRANGEMENT HAS PROVED SUCCESSFUL AND ECONOMICAL. THE CONTROL OF PUMPING AND REDUCTION OF GROUNDWATER USE BY PRICING IS NOT SUFFICIENT TO HALT SALT-WATER INTRUSION. COURT ACTIONS AND THEIR CONSEQUENCES ARE AN IMPORTANT ECONOMIC FACTOR. (SEE W70-02484).  
(KNAPP-USGS)

FIELD 02L, 06E

ACCESSION NO. W70-02492



WATER QUALITY IN INDUSTRIAL AREAS: PROFILE OF A RIVER,

NEW YORK UNIV., N.Y. INST. OF ENVIRONMENTAL MEDICINE; AND ENVIRONMENTAL PROTECTION ADMINISTRATION OF NEW YORK CITY.

GWYNETH P. HOWELLS, THEODORE J. KNIEPE, AND MERRIL EISENBUD.

ENVIRON SCI AND TECHNOL, VOL 4, NO 1, P 26-35, JAN 1970. 10 P, 5 FIG, 2 PHOTO, 1 TAB, 6 REF.

DESCRIPTORS:

EUTROPHICATION, \*ESTUARIES, \*HUDSON RIVER, STREAMFLOW, TIDAL EFFECTS, NUTRIENTS, WATER POLLUTION, THERMAL POLLUTION, WATER UTILIZATION, CURRENTS(WATER), SALINE WATER INTRUSION, ESTUARINE ENVIRONMENT.

IDENTIFIERS:

HUDSON RIVER ESTUARY.

ABSTRACT:

THE ECOLOGY AND WATER QUALITY OF THE LOWER HUDSON RIVER WERE STUDIED TO LEARN THE EFFECTS OF VARIABLE FRESH WATER FLOW, TIDES, AND INDUSTRIAL DEVELOPMENT ON THE DISTRIBUTION OF INORGANIC POLLUTANTS, NUTRIENTS, PESTICIDES, AND HEAT IN THE ESTUARY. CHANGES THAT MIGHT BE EXPECTED FROM INCREASED USE ARE: AN INCREASING NUTRIENT LOAD FROM DOMESTIC SEWAGE AND SOME INDUSTRIAL PROCESSES, AN INCREASING HEAT LOAD, AND AN INCREASED DEMAND FOR INDUSTRIAL AND DOMESTIC WATER. POTENTIAL EUTROPHIC NUISANCE SPECIES OF ALGAE ARE PRESENT IN THE RIVER, AND THE SHORES ARE POPULATED BY ANIMALS INDICATIVE OF SEWAGE POLLUTION. YET, SERIOUS FOULING AND DEOXYGENATION HAVE SO FAR BEEN AVOIDED FOR MOST OF THE RIVER. HEAT ADDITIONS TO THE AQUATIC ENVIRONMENT ARE A MAJOR CONCERN. IN THE HUDSON, THE VOLUME OF TIDAL FLOW CAN BE UTILIZED TO DISPERSE SUCH HEAT; AT THE SAME TIME, IT IS CLEAR THAT THE CAPACITY OF THE RIVER AS A HEAT SINK IS SEVERELY LIMITED DURING THE PEAK SUMMER DEMAND BY A LOW NET FLOW AND HIGH AMBIENT AIR TEMPERATURES. THE EFFECTS OF WATER EXTRACTION FOR ANY PURPOSE ON THE PRESENT HYDROLOGICAL PATTERN IN THE RIVER REMAIN LARGELY UNKNOWN. IT SEEMS PROBABLE THAT THE EXTENT AND DURATION OF SALT WATER INTRUSION UP THE RIVER WILL INCREASE.  
(KNAPP-USGS)

FIELD 05C, 05B

ACCESSION NO. W70-02493

SALTWATER INTRUSION IN THE UNITED STATES,

AMERICAN SOCIETY OF CIVIL ENGINEERS, NEW YORK. HYDRAULICS DIV.

C. B. SHERWOOD, A. E. BRUINGTON, AND W. J. DRESCHER.

PROC AMER SOC CIV ENG, J HYDRAUL DIV, VOL 95, NO HY5, P 1651-1669, SEPT 1969.  
19 P, 1 TAB, 7 REF, APPEND.

DESCRIPTORS:

\*ENCROACHMENT, \*SALINE WATER INTRUSION, GROUNDWATER, SALT WATER BARRIERS, UNITED STATES, \*SALINE WATER, AQUIFERS, INJECTION WELLS, SALINE WATER-FRESHWATER INTERFACES, GROUNDWATER GEOLOGY, BRINE DISPOSAL, UNDERGROUND WATER STORAGE, \*SALINITY, \*SEA WATER, CONTAMINATION, BRINES, WATER WELLS, FRESH WATER.

ABSTRACT:

SALT-WATER INTRUSION INTO FRESH GROUNDWATER FORMATIONS IS ALMOST ALWAYS THE INADVERTENT RESULT OF SOME ACTIVITY OF MAN WORKING TO IMPROVE HIS ENVIRONMENT. THREE GENERAL MECHANISMS BY WHICH INTRUSION OCCURS ARE: (1) THE REVERSAL OR REDUCTION OF GROUNDWATER GRADIENTS, ALLOWING HEAVIER SALINE WATER TO MOVE INTO AN UNDERGROUND AREA WHERE ONLY FRESH WATER EXISTED BEFORE; (2) THE ACCIDENTAL OR INADVERTENT DESTRUCTION OF NATURAL BARRIERS THAT FORMERLY PREVENTED MOVEMENT OF SALT WATERS OR SEPARATED BODIES OF FRESH AND SALT WATER; AND (3) THE ACCIDENTAL OR INADVERTENT RESULT OF DISPOSING OF WASTE SALINE WATER. THE OCCURRENCE OF SALINE WATER IS DESCRIBED IN TERMS OF GEOLOGIC AND HYDROLOGIC CONDITIONS. THE EXTENT OF SALT-WATER INTRUSION IS GIVEN USING A LISTING OF 68 EXAMPLES FROM THROUGHOUT THE UNITED STATES. STATEMENTS ARE INCLUDED REGARDING SOME AREAS WHERE MAJOR CONTROL EFFORTS ARE UNDERWAY. (USBR)

FIELD 04C, 02L

ACCESSION NO. W70-02940

ARTIFICIAL-RECHARGE EXPERIMENTS UTILIZING RENOVATED SEWAGE-PLANT EFFLUENT - A  
FEASIBILITY STUDY AT BAY PARK, NEW YORK, U.S.A.,

GEOLOGICAL SURVEY, MINEOLA, N.Y.

PHILIP COHEN, AND C. N. DURFOR.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH  
19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY,  
PUBLICATION NO 72, P 193-199, 1967. 7 P, 4 FIG, 3 REF.

DESCRIPTORS:

\*ARTIFICIAL RECHARGE, \*RECHARGE WELLS, \*WATER REUSE, \*NEW YORK, \*SALINE  
WATER INTRUSION, ON-SITE TESTS, TERTIARY TREATMENT, FILTERS,  
GROUNDWATER MOVEMENT, INJECTION WELLS, OBSERVATION WELLS, COSTS.

IDENTIFIERS:

LONG ISLAND(NY), BARRIER INJECTION WELLS.

ABSTRACT:

THE U.S. GEOLOGICAL SURVEY, IN COOPERATION WITH THE NASSAU COUNTY  
DEPARTMENT OF PUBLIC WORKS, IS CONDUCTING A SERIES OF  
ARTIFICIAL-RECHARGE EXPERIMENTS ON LONG ISLAND, NEW YORK TO OBTAIN  
SCIENTIFIC AND ECONOMIC DATA NEEDED TO EVALUATE THE FEASIBILITY OF  
INJECTING HIGHLY TREATED SEWAGE-PLANT EFFLUENT INTO A PROPOSED NETWORK  
OF 'BARRIER' INJECTION WELLS THAT ARE INTENDED TO PREVENT OR RETARD THE  
LANDWARD MOVEMENT OF SALTY WATER FROM THE ATLANTIC OCEAN INTO MAJOR  
AQUIFERS. TERTIARY SEWAGE TREATMENT WAS DEVELOPED TO PRODUCE AN  
EFFLUENT THAT MEETS REQUIREMENTS COMMONLY ACCEPTED FOR POTABILITY. AN  
EXPERIMENTAL INJECTION WELL AND INJECTION PLANT HAVE BEEN COMPLETED.  
REMOTE SENSING DOWNHOLE GEOCHEMICAL PROBES PERMIT THE MEASUREMENT OF  
WATER-QUALITY AND HYDRAULIC-HEAD CHANGES AT SEVERAL POINTS WITHIN THE  
INJECTION WELL AND THE FILTERPACK. (KNAPP-USGS)

FIELD 05D, 04B

ACCESSION NO. W70-04355

USE OF AIR TO INFLUENCE GROUNDWATER MOVEMENT,

DAMES AND MOORE, SAN FRANCISCO, CALIF.

GEORGE D. ROBERTS.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH 19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY, PUBLICATION NO 72, P 390-398, 1967. 9 P, 4 FIG, 5 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*COASTS, \*GROUNDWATER BARRIERS, GROUNDWATER MOVEMENT, WATER MANAGEMENT(APPLIED), AERATION, SATURATION, UNSATURATED FLOW.

IDENTIFIERS:

\*SALINE WATER BARRIERS, AIR BARRIERS, SALINE WATER INTRUSION CONTROL.

ABSTRACT:

AIR MAY BE UTILIZED AS A BARRIER TO THE MIGRATION OF SALINE, OR OTHER CONTAMINATED WATERS, WHERE THE PROPER PERMEABILITY AND GEOLOGIC STRUCTURE CONDITIONS ARE PRESENT. THE ADVANTAGES OF AN AIR BARRIER ARE: THE AVAILABILITY OF AIR, WHICH ELIMINATES THE NEED FOR PIPELINES OR OTHER MEANS OF WATER CONVEYANCE TO INJECTION WELLS; THE EASE OF MAINTAINING THE AIR BARRIER; AND THE COMPARATIVELY LOW COST OF THE OPERATIONS. THE GREAT VARIETY OF TOPOGRAPHY, STRATIGRAPHY, STRUCTURAL CONDITIONS, PERMEABILITY, AND THE DEPTH AT WHICH THE BARRIER IS TO BE INSTALLED AND MAINTAINED WILL ALL HAVE IMPORTANT EFFECTS UPON THE DESIGN AND OPERATION OF SUCH AN INSTALLATION. THE WELL-DEVELOPED TECHNIQUES EMPLOYED TO REPRESSURIZE OIL AND GAS FIELDS, AS WELL AS THOSE FOR THE STORAGE OF 'OFF-PEAK' NATURAL GAS IN NATURAL UNDERGROUND RESERVOIRS FROM TRANSMISSION LINES, ARE REVIEWED. ALL WHO HAVE BEEN AFFLICTED WITH AN AIR-LOCKED WELL WILL ATTEST TO THE EFFECTIVENESS OF AIR IN DECREASING THE PERMEABILITY. SOME LABORATORY DATA ARE PRESENTED WHICH INDICATE THE EFFECTIVENESS OF AIR UNDER VARYING PRESSURES AND PERMEABILITY. (KNAPP-USGS)

FIELD 02F, 02L

ACCESSION NO. W70-04358

EFFECT OF PULSE RECHARGE ON THE ZONE OF DIFFUSION IN THE BISCAYNE AQUIFER,  
GEOLOGICAL SURVEY, MIAMI, FLA. WATER RESOURCES DIV.

F. A. KOHOUT, AND HOWARD KLEIN.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH  
19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY,  
PUBLICATION NO 72, P 252-270, 1967. 19 P, 14 FIG, 8 REF.

DESCRIPTORS:

\*RECHARGE, \*SALINE WATER INTRUSION, \*GROUNDWATER MOVEMENT, \*AQUIFERS,  
\*FLORIDA, WATER QUALITY, WATER YIELD, DISCHARGE(WATER), HYDRAULIC  
GRADIENT, WATER STORAGE, PERMIABILITY, TRANSMISSIVITY, INFILTRATION.

IDENTIFIERS:

MIAMI(FLA), BISCAYNE AQUIFER.

ABSTRACT:

IN THE BISCAYNE AQUIFER OF THE MIAMI AREA, FLORIDA, THE SALT FRONT IS  
DYNAMICALLY STABLE AT A POSITION AS MUCH AS 8 MILES SEAWARD OF THAT  
COMPUTED ACCORDING TO THE GHYBEN-HERZBERG PRINCIPLE. WHEN THE  
FRESH-WATER HEAD IS LOW, SEA WATER FLOWS INLAND INTO THE DEEP PART OF  
THE AQUIFER, MOVES UPWARD, AND FLOWS BACK TO THE SEA THROUGH THE UPPER  
PART. THE CYCLE LIMITS THE EXTENT TO WHICH SEA WATER INVADES THE  
AQUIFER. DURING PERIODS OF HEAVY RAINFALL LARGE QUANTITIES OF FRESH  
WATER ARE STORED BELOW SEA LEVEL, WHILE DEEP SALINE WATER IS DRIVEN  
SEAWARD UNDER STEEP SEAWARD HYDRAULIC GRADIENT. THE EFFECTS OF THESE  
HEAVY PULSES OF RECHARGE ARE DEMONSTRATED BY BIWEEKLY MAPPINGS OF THE  
ISOCHLOR PATTERN AFTER A 13-INCH RAINFALL. THE FLOW DIAGRAMS SHOW THAT  
FORCEFUL EXPULSION OF SALT WATER AFTER HEAVY RAINS RESULTS IN MORE  
EFFICIENT RECHARGE THAN DISCHARGE BECAUSE FRESH WATER IS INJECTED INTO  
STORAGE THROUGHOUT THE FULL AQUIFER THICKNESS, WHEREAS DURING THE  
SUBSEQUENT SALINE INTRUSION, FRESH WATER IS DISCHARGED THROUGH ONLY  
ABOUT 1/3 OF THE AQUIFER THICKNESS. (KNAPP-USGS)

FIELD 02F, 02L

ACCESSION NO. W70-04606

A FRESH-WATER CANAL AS A BARRIER TO SALT-WATER INTRUSION,

ALBERTA UNIV., EDMONTON; AND GEORGIA INST. OF TECH., ATLANTA. SCHOOL OF CIVIL ENGINEERING.

SRISAKDI CHARONMAN, M. R. CARSTENS, AND GEORGE D. MAY.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH 19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY, PUBLICATION NO 72, P 374-382, 1967. 9 P, 4 FIG, 2 TAB, 6 REF. OWRR PROJECT B-003-GA.

DESCRIPTORS:

\*ARTIFICIAL RECHARGE, \*SALINE WATER INTRUSION, \*GROUNDWATER BARRIERS, \*CANAL SEEPAGE, GROUNDWATER MOVEMENT, SALINE WATER-FRESHWATER INTERFACES, AQUIFERS, COASTS, CANALS, DELTAS.

IDENTIFIERS:

SALINE WATER BARRIERS.

ABSTRACT:

THE SEEPAGE FLOW PATTERN IS DETERMINED FOR FLOW FROM A FRESH-WATER CANAL WHICH PARALLELS THE SEA. NUMERICAL RESULTS ARE PRESENTED FOR CASES IN WHICH THE FRESH-WATER SEEPAGE FROM THE LAND IS A SMALL FRACTION OF THE FRESH-WATER SEEPAGE FROM THE CANAL. IN OTHER WORDS, THE FRESH-WATER FLOW FROM THE CANAL ACTS AS A DAM FORCING THE INTERFACE BETWEEN THE SEA WATER AND THE FRESH WATER DOWN TO A LOWER ELEVATION. THE SOLUTION OF LAPLACE'S EQUATION IS OBTAINED BY NUMERICAL METHODS FOR THIS FLOW SITUATION WITH THE BOUNDARY CONDITIONS INVOLVING A WATER TABLE AND A DENSITY INTERFACE. THE POSSIBILITY OF USING A FRESH-WATER CANAL FOR AGRICULTURAL RECLAMATION OF SEA-WATER INTRUDED DELTAS AND MARSHES IS DISCUSSED. (KNAPP-USGS)

FIELD 04B, 02L

ACCESSION NO. W70-04610

DRAINAGE OF A SALINE-WATER AQUIFER RECHARGED BY FRESH WATER,

WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING AND COLORADO STATE UNIV.,  
FORT COLLINS. DEPT. OF CIVIL ENGINEERING.

D. E. L. MAASLAND, AND M. W. BITTINGER.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH  
19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY,  
PUBLICATION NO 72, P 350-359, 1967. 10 P, 5 FIG.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*RECHARGE, \*HYDRAULIC MODELS, MODEL  
STUDIES, GROUNDWATER MOVEMENT, PERMEABILITY, SALINE WATER-FRESHWATER  
INTERFACES, DRAINAGE, WATER YIELD, MIXING, SALINITY.

IDENTIFIERS:

\*HELE-SHAW MODELS.

ABSTRACT:

THE EFFLUENT FROM DRAINS IN A SALINE WATER AQUIFER RECHARGED WITH FRESH  
WATER IS A MIXTURE OF SALT AND FRESH WATER. A HELE-SHAW MODEL STUDY WAS  
CONDUCTED TO DETERMINE THE RATE OF QUALITY CHANGE OF DRAIN EFFLUENT FOR  
VARIOUS CONDITIONS OF DRAIN SPACING, THICKNESS OF AQUIFER,  
PERMEABILITY, AND RECHARGE RATE. A UNIFORM AQUIFER, A LAYERED AQUIFER  
(TOP LAYER 12 TIMES AS PERMEABLE AS THE BOTTOM), AND A LAYERED AQUIFER  
(BOTTOM LAYER 6 TIMES AS PERMEABLE AS THE TOP) WAS STUDIED. RESULTS ARE  
PRESENTED IN THE FORM OF DIMENSIONLESS CHARTS, CONTAINING SUCH  
VARIABLES AS DRAIN SPACING, THICKNESS OF AQUIFER, PERMEABILITY,  
RECHARGE RATE, AND POROSITY. THE CHARTS ARE USED TO PREDICT THE SALT  
CONCENTRATION OF THE DRAIN EFFLUENT AT ANY TIME FOR VARIOUS MAGNITUDES  
OF THE VARIABLES. (KNAPP-USGS)

FIELD 04B, 02L

ACCESSION NO. W70-04612

SALT WATER ENCROACHMENT IN THE COASTAL PLAIN OF ISRAEL,

MINISTRY OF AGRICULTURE, JERUSALEM (ISRAEL). HYDROLOGICAL SERVICE.

S. SCHMORAK.

ARTIFICIAL RECHARGE AND MANAGEMENT OF AQUIFERS, SYMPOSIUM OF HAIFA (MARCH 19-26, 1967), INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY, PUBLICATION NO 72, P 305-318, 1967. 14 P, 9 FIG, 4 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*SALINE WATER-FRESHWATER INTERFACES, OBSERVATION WELLS, MONITORING, LOGGING(RECORDING), GROUNDWATER MOVEMENT, ARID LANDS, ELECTRICAL WELL LOGGING, WATER LEVELS, RECHARGE, DISCHARGE(WATER), AQUIFERS.

IDENTIFIERS:

\*ISRAEL.

ABSTRACT:

FIELD INVESTIGATIONS HAVE BEEN CARRIED OUT BY THE HYDROLOGICAL SERVICE SINCE 1954 IN THREE ROWS OF SPECIALLY CONSTRUCTED INTERFACE WELLS IN THE PLIO-PLEISTOCENE AQUIFER ALONG THE MEDITERRANEAN COAST OF ISRAEL. THE PURPOSE OF THE INVESTIGATIONS WAS TO FIND THE EXACT LOCATION OF THE INTERFACE, TO FOLLOW UP ITS MOVEMENT AND TO ASCERTAIN THE VELOCITY OF THE PROPAGATION INLAND IN ORDER TO ENABLE A RATIONAL EXPLOITATION OF THE AQUIFER. METHODS OF CHEMICAL LOGGING HAVE BEEN DEVELOPED AND INSTRUMENTS BUILT FOR MEASURING OF ELECTRICAL CONDUCTIVITY AND TEMPERATURE IN SITU AND FOR RECORDING OF THE INTERFACE MOVEMENT. THE TIDAL MOVEMENT OF THE WATER LEVEL AND THE CORRESPONDING MOVEMENT OF THE INTERFACE IS BEING AUTOMATICALLY RECORDED. THE VELOCITY OF SALT WATER ENCROACHMENT WAS FOUND TO BE APPROXIMATELY 20-70 M PER YEAR. THE HORIZONTAL BOUNDARY OF THE SALT WATER (TOE OF INTERFACE) HAS BEEN FOUND TO BE 0.2-1.6 KM FROM THE SEA (EXCEPT IN THE TEL-AVIV REGION WHERE DISTANCE IS MORE THAN 2 KM). (KNAPP-USGS)

FIELD 02L, 04B

ACCESSION NO. W70-04613



REPORT OF THE SELECT COMMITTEE ON WATER RESOURCES (FLORIDA'S WATER PROBLEMS).

FLORIDA HOUSE OF REPRESENTATIVES, TALLAHASSEE, FLORIDA, OCT 1, 1964. 24 P,  
APPEND.

DESCRIPTORS:

\*FLORIDA, \*LEGISLATION, \*WATER QUALITY, \*WATER POLLUTION, STANDARDS,  
WATER QUALITY CONTROL, WATER POLLUTION SOURCES, ADMINISTRATIVE  
AGENCIES, INDUSTRIAL WASTES, SEWAGE, SEWAGE TREATMENT, NAVIGATION,  
CANALS, RECREATION, SALINE WATER INTRUSION, PERMITS, COASTS, FLOODING,  
FLOOD PLAINS, DRILLING, DETERGENTS, DRAINAGE DISTRICTS, WELLS, WATER  
STORAGE.

ABSTRACT:

THE SELECT COMMITTEE ON WATER RESOURCES CONDUCTED MEETINGS AT VARIOUS  
LOCATIONS AROUND THE STATE IN ORDER TO FAMILIARIZE ITS MEMBERS WITH  
FLORIDA'S MANY WATER PROBLEMS. THE PROBLEMS UNDER CONSIDERATION  
INCLUDED: (1) INDUSTRIAL POLLUTION; (2) DOMESTIC POLLUTION; (3) DEPOSIT  
OF FOREIGN MATTER IN PUBLIC WATERS; (4) SALT WATER INTRUSION; (5)  
IDENTIFICATION AND DESIGNATION OF FLOODPLAIN AREAS; (6) FINANCING  
ACQUISITION OF WATER STORAGE LANDS; (7) LICENSING OF WELL DRILLERS; (8)  
HARD DETERGENTS; AND (9) CODIFICATION OF DRAINAGE LAWS. THE INTEREST  
GENERATED AT THE HEARINGS CENTERED AROUND THE GENERAL TOPICS OF  
POLLUTION ABATEMENT AND ENFORCEMENT AND IMPLEMENTATION OF EXISTING  
LAWS. THE COMMITTEE MADE VARIOUS RECOMMENDATIONS IN EACH OF THESE AREAS  
AND PROPOSED LEGISLATION TO CARRY OUT THE RECOMMENDATIONS. THE  
COMMITTEE ALSO SUGGESTED THAT FURTHER RESEARCH BE AUTHORIZED EITHER BY  
A SPECIAL STUDY GROUP OR BY AN INTERIM COMMITTEE TO REPORT TO THE NEXT  
LEGISLATURE. (SEE ALSO W70-04882 THRU W70-04886). (DEARING-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-04881

REPORT OF THE SELECT COMMITTEE ON WATER RESOURCES (FOREIGN MATTER AND SALT  
WATER INTRUSION IN PUBLIC WATERS).

FLORIDA HOUSE OF REPRESENTATIVES, TALLAHASSEE, FLORIDA, OCT 1, 1964, P 12-15.

DESCRIPTORS:

\*FLORIDA, \*DOMESTIC WASTES, \*SALINE WATER INTRUSION, \*LEGISLATION,  
NAVIGATION, RECREATION, NAVIGABLE WATERS, VESSELS, WATER SKIING,  
COASTS, WATER PRESSURE, DRAINAGE, BAYS, CANALS, RIVERS, DAMS, TIDAL  
WATERS, WATER WELLS, RAINFALL, WATER SUPPLY, ADMINISTRATIVE AGENCIES,  
SPILLWAYS, PERMITS, CONSTRUCTION, PUBLIC HEALTH.

IDENTIFIERS:

\*SALINE BARRIER LINES.

ABSTRACT:

NAVIGATION AND RECREATIONAL USES OF PUBLIC WATERS HAVE SUFFERED FROM  
DEPOSITS OF FOREIGN MATTER IN THE WATERS. SUNKEN VESSELS AND OTHER  
DEBRIS ARE UNSIGHTLY AND DANGEROUS TO SPORTSMEN AND RECREATIONISTS. THE  
COMMITTEE RECOMMENDS THAT LEGISLATION BE PASSED PROHIBITING SUCH  
DEPOSIT OF ANY FOREIGN MATTER INTO PUBLIC WATERS. A FURTHER PROBLEM  
AFFECTING WATER SUPPLIES IN COASTAL AREAS IS THE INTRUSION OF SALT  
WATER. THE PRIMARY FACTORS CONTRIBUTING TO THIS INTRUSION ARE: (1) LOSS  
OF FRESH WATER PRESSURE THROUGH INCREASED DEMANDS OF MUNICIPALITIES,  
AGRICULTURE, AND INDUSTRY; (2) EXCESSIVE DRAINAGE; (3) LACK OF  
PROTECTIVE WORKS AGAINST TIDEWATERS IN BAYS, CANALS, AND RIVERS; (4)  
IMPROPER LOCATION OF WATER WELLS; AND (5) HIGHLY VARIABLE ANNUAL  
RAINFALL WITH INSUFFICIENT SURFACE STORAGE DURING DROUGHTS. ONE METHOD  
OF REDUCING THIS INTRUSION REQUIRES THE ESTABLISHING OF SALT BARRIER  
LINES ALONG COASTAL AREAS. NO CANALS OR STREAMS COULD BE CONSTRUCTED OR  
ENLARGED INLAND FROM THIS LINE UNLESS STRUCTURES ARE INSTALLED TO  
PREVENT SALT WATER FROM MOVING INLAND. THE COMMITTEE RECOMMENDS THAT  
THE BOARD OF CONSERVATION BE REQUIRED TO ESTABLISH THESE LINES AND THAT  
PERMITS BE REQUIRED BEFORE ANY CANAL CAN BE CONSTRUCTED OR ANY STREAM  
ENLARGED WHICH WOULD DISCHARGE INTO TIDAL WATERS. (SEE W70-04881).  
(DEARING-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-04883

REPORT OF THE SELECT COMMITTEE ON WATER RESOURCES (PROPOSED STATUTES).

FLORIDA HOUSE OF REPRESENTATIVES, TALLAHASSEE, FLORIDA, OCT 1, 1964, APPENDIX.

DESCRIPTORS:

\*FLORIDA, \*LEGISLATION, \*WATER QUALITY, \*WATER POLLUTION, WATER QUALITY CONTROL, STANDARDS, WATER POLLUTION SOURCES, ADMINISTRATIVE AGENCIES, INDUSTRIAL WASTES, SEWAGE, SEWAGE TREATMENT, NAVIGATION, RECREATION, SALINE WATER INTRUSION, PERMITS, CANALS, COASTS, FLOODING, FLOOD PLAINS, DRILLING, DETERGENTS, DRAINAGE DISTRICTS, WELLS, WATER STORAGE.

ABSTRACT:

BASED ON THE FOREGOING STUDY, THE COMMITTEE RECOMMENDS ENACTMENT OF LEGISLATION TO: (1) AUTHORIZE THE CONSERVATION BOARD TO ESTABLISH AND ENFORCE WATER QUALITY STANDARDS AND TO MAKE IT UNLAWFUL TO DISCHARGE ANY POLLUTANTS INTO STATE WATERS IN VIOLATION OF THE WATER QUALITY STANDARDS; (2) REPEAL LOCAL LEGISLATION GIVING IMMUNITY TO INDUSTRIAL POLLUTERS INCONSISTENT WITH THE PROPOSED WATER QUALITY CONTROL; (3) PROHIBIT THE DISCHARGE OF UNTREATED SEWAGE INTO STATE WATERS; (4) PROHIBIT SUCH DISCHARGE OF FOREIGN MATTER INTO STATE WATERS AS INTERFERES WITH NAVIGATION AND MAXIMUM RECREATIONAL USE OF PUBLIC WATERS; (5) AUTHORIZE THE CONSERVATION BOARD TO ESTABLISH A STATE-WIDE SALT WATER BARRIER LINE, AND REQUIRE PERMITS FOR CANAL CONSTRUCTION OR ENLARGEMENT OF NATURAL WATERCOURSES IN COASTAL AREAS; (6) AUTHORIZE THE CONSERVATION BOARD TO IDENTIFY AND DESIGNATE THOSE AREAS SUBJECT TO PERIODIC FLOODING AND CONSIDERED TO BE FLOODPLAIN, SWAMP, OR OVERFLOW LANDS; (7) REQUIRE THE LICENSING OF WELL DRILLERS, AND AUTHORIZE THE CONSERVATION BOARD TO ADOPT DRILLING REGULATIONS; (8) PROHIBIT THE SALE, USE, MANUFACTURE, OR POSSESSION OF HARD DETERGENTS IN FLORIDA; (9) REVISE DRAINAGE DISTRICT LEGISLATION; AND (10) APPROPRIATE FUNDS FOR WATER STORAGE LANDS ESPECIALLY IN THE UPPER ST. JOHNS RIVER AND GREEN SWAMP PROJECTS. (SEE W70-04881) (DEARING-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-04886

EVALUATION OF WATER-QUALITY MONITORING IN THE ORANGE COUNTY WATER DISTRICT,  
CALIFORNIA,

GEOLOGICAL SURVEY, MENLO PARK, CALIF.

JOE A. MORELAND, AND JOHN A. SINGER.

GEOLOGICAL SURVEY OPEN-FILE REPORT, 1969. 27 P, 5 FIG, 3 TAB, 12 REF.

DESCRIPTORS:

\*WATER QUALITY, \*MONITORING, \*GROUNDWATER, \*CALIFORNIA, \*OBSERVATION  
WELLS, NETWORKS, DATA COLLECTIONS, WATER ANALYSIS, SALINE WATER  
INTRUSION, WATER POLLUTION SOURCES, PATH OF POLLUTANTS, IRRIGATION  
WATER, MUNICIPAL WATER.

IDENTIFIERS:

ORANGE COUNTY(CALIF).

ABSTRACT:

WATER SAMPLES FOR CHEMICAL ANALYSIS ARE COLLECTED PERIODICALLY FROM 272  
WELLS IN THE ORANGE COUNTY, CALIFORNIA WATER DISTRICT BY 16 AGENCIES.  
MANY OTHER WELLS ARE SAMPLED AT INFREQUENT INTERVALS BY THESE AND OTHER  
AGENCIES. THE EFFICIENCY AND COMPLETENESS OF THE ENTIRE NETWORK ARE  
EVALUATED, AND CHANGES IN STANDARDS FOR THE NETWORK ARE SUGGESTED.  
COMPLETE CHEMICAL ANALYSIS OF A WATER SAMPLE IS NOT ALWAYS NECESSARY.  
SELECTIVE ANALYSES SUGGESTED FOR OBTAINING SPECIFIC TYPES OF DATA  
INCLUDE: (1) CHLORIDE DETERMINATION AND ELECTRICAL CONDUCTIVITY  
MEASUREMENTS ON SAMPLES FROM AQUIFERS SUSCEPTIBLE TO INTRUSION OF SEA  
WATER; (2) SULFATE, BICARBONATE, AND NITRATE DETERMINATIONS ON SAMPLES  
FROM AQUIFERS UNDERLYING THE FOREBAY AREA; AND (3) SODIUM, SULFATE,  
CHLORIDE, AND BORON DETERMINATIONS AND ELECTRICAL CONDUCTIVITY  
MEASUREMENTS ON SAMPLES FROM AQUIFERS USED AS A SOURCE OF IRRIGATION  
WATER. (KNAPP-USGS)

FIELD 07A, 02K, 05A

ACCESSION NO. W70-05170

POLLUTION OF GROUNDWATER.

IN U CAL DAVIS L REV, LEGAL CONTROL OF WATER POLLUTION, P 141-165, 1969. 24 P.

DESCRIPTORS:

\*GROUNDWATER, \*SURFACE-GROUNDWATER RELATIONSHIPS, \*WASTE DISPOSAL, \*WATER POLLUTION CONTROL, SALINE WATER INTRUSION, WATER DEMAND, GROUNDWATER BASINS, WATER POLLUTION SOURCES, WASTE STORAGE, CESSPOOLS, SEWAGE EFFLUENTS, LANDFILLS, SEEPAGE, GROUNDWATER MOVEMENT, GROUNDWATER RECHARGE, ACQUIFERS, BASE FLOW, WATER PURIFICATION, WITHDRAWAL, LEGAL ASPECTS, PRIOR APPROPRIATION, STANDARDS, LEGISLATION.

IDENTIFIERS:

\*GROUNDWATER POLLUTION.

ABSTRACT:

GROUNDWATER POLLUTION PRESENTS A UNIQUE SET OF PROBLEMS. THE TRAVEL OF SUCH POLLUTION AND THE ARCHAIC LEGAL DOCTRINES WHICH GOVERN GROUNDWATER COMPLICATE THE SITUATION. WASTE DISPOSAL AND SALINITY ARE THE TWO MAJOR SOURCES OF GROUNDWATER POLLUTION. MAJOR WASTE DISPOSAL METHODS RESULTING IN GROUNDWATER CONTAMINATION INCLUDE: (1) IMPOUNDMENTS AND LAGOONS; (2) SEPTIC TANKS AND CESSPOOLS; (3) LANDFILLS; (4) SURFACE WATER WASTE DISPOSAL; AND (5) DISPOSAL WELLS. SALINITY IN GROUNDWATER MAY COME FROM SEA WATER INTRUSION RESULTING FROM EXCESSIVE WITHDRAWALS FROM COASTAL ACQUIFERS, OR FROM IRRIGATION, WHICH EVENTUALLY LEACHES OUT SALTS IN THE SOIL AND CARRIES THEM DOWN TO GROUNDWATER ACQUIFERS. THE MOVEMENT OF POLLUTED GROUNDWATER MAKES IT DIFFICULT TO TRACE THE POLLUTANT TO ITS SOURCE AND TO SET MEANINGFUL WASTE DISPOSAL STANDARDS. NATURAL GROUNDWATER PURIFICATION PROCESSES (FILTRATION, ABSORPTION, DEGRADATION, AND DILUTION) SHOULD NOT BE RELIED ON FOR PROTECTION FROM CONTAMINATION. ARCHAIC LEGAL DOCTRINES, FLOWING FROM THE ABSOLUTE DOMINION RULE, HAMPER THE EFFECTIVENESS OF CONTROL PROGRAMS. INTENSIVE RESEARCH ON POLLUTION TRAVEL IS NEEDED, AND THE KNOWLEDGE APPLIED TO SETTING DISPOSAL STANDARDS. A RE-EVALUATION OF CURRENT WATER-RIGHTS DOCTRINE IS NECESSARY, AND WORKABLE MEANS OF CONTROLLING WITHDRAWAL FROM ACQUIFERS TO PREVENT SALINE INTRUSIONS MUST BE DEVELOPED. (SEE W70-05342). (CALDWELL-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-05347

SAN JOAQUIN DELTA: IS NEGOTIATION A SOLUTION.

IN U CAL DAVIS L REV, LEGAL CONTROL OF WATER POLLUTION, P 209-263, 1969, 54 P.

DESCRIPTORS:

\*WATER POLLUTION CONTROL, \*SALT WATER INTRUSION, \*WATER USERS, \*NEGOTIATIONS, WATER DISTRIBUTION(APPLIED), CONSUMPTIVE USE, WITHDRAWAL, AGRICULTURAL CHEMICALS, IRRIGATION PRACTICES, ECONOMICS, LAND USE, LEGISLATION, JUDICIAL DECISIONS, ACQUIFER CHARACTERISTICS, INFLOW, WATER QUALITY CONTROL, WATER UTILIZATION, IMPAIRED WATER QUALITY, WATER POLLUTION EFFECTS, BARRIERS, WATER DEMAND, ADMINISTRATIVE AGENCIES, DIVERSION LOSSES, DIVERSION STRUCTURES, CALIFORNIA.

ABSTRACT:

THE SAN JOAQUIN DELTA IS A RICH FARMING AREA BETWEEN SAN FRANCISCO AND SACRAMENTO WHOSE WATERSHED COVERS ONE-THIRD OF CALIFORNIA. FOR MANY YEARS, SALINE WATER INTRUSION HAS BEEN THE MAJOR POLLUTION THREAT. EXPORT AGENCIES (FEDERAL AND STATE) WHOSE PROJECTS TRANSPORT WATER AROUND THE DELTA ARE THE LARGEST WATER CONSUMERS. AGRICULTURAL, MUNICIPAL, AND INDUSTRIAL CONSUMERS ALSO DEplete THE WATER SUPPLY. CONFLICT RESULTS FROM THESE GROUPS' DIVISIVE INTERESTS. WATER QUALITY DEGRADATION AFFECTS ALL USERS, ESPECIALLY THE EXPORT AGENCIES AND AGRICULTURAL USERS. RELEASE OF WATERS FROM UPSTREAM DAMS HAS IN RECENT YEARS PROVIDED A 'STOP-GAP' MEANS OF CONTROL, BUT OTHER MEANS OF INCREASING THE WATER SUPPLY ARE BEING PROPOSED. NEGOTIATION AMONG COMPETING USERS HAS BEEN A FAIRLY EFFECTIVE MEANS OF ARRIVING AT SOLUTIONS TO THE PROBLEM, BUT IS QUESTIONED WHETHER THIS PROCESS CAN OBTAIN OPTIMAL ALLOCATION OF WATER RESOURCES. THE EXTREME DIVERSITY OF INTERESTS AND THE QUESTION OF WHETHER NEGOTIATED SOLUTIONS WILL FULFILL PUBLIC NEEDS ARE CAUSES FOR PESSIMISM. A SET OF ACCEPTIBLE WATER CRITERIA IS A PROBABLE RESULT OF NEGOTIATION. WATERSHED AND COUNTY PROTECTION STATUTES, THE DEVELOPMENT OF A STATEWIDE WATER PLAN AND RECOGNITION BY THE COURTS OF THE COMPLEX NATURE OF THE PROBLEM MAY HAVE A BENEFICIAL EFFECT ON ATTEMPTS TO CONTROL THE POLLUTION. (SEE W70-05342). (CALDWELL-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W70-05349

POTABLE WATER AVAILABILITY ON LONG OCEANIC ISLANDS,

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF BIOLOGICAL AND AGRICULTURAL  
ENGINEERING.

EUGENE WALLACE ROCHESTER, JR.

AVAILABLE FROM THE CLEARINGHOUSE AS PB-191 068, \$3.00 IN PAPER COPY, \$0.65 IN  
MICROFICHE. PHD THESIS, 1970. 66 P, 7 TAB, 14 FIG, 30 REF, 4 APPEND. OWRR  
PROJECT NO. B-006-NC.

DESCRIPTORS:

\*ISLANDS, \*POTABLE WATER, \*INFILTRATION, \*SALINE WATER, FRESHWATER  
INTERFACES, SALINE WATER INTRUSION, INTERFACES, \*PUMPING, INDUCED  
INFILTRATION, BOUNDARIES(SURFACES), FREE SURFACES, FLOW RATES.

ABSTRACT:

LABORATORY EXPERIMENTS WERE CONDUCTED TO PREDICT MAXIMUM SAFE PUMPING  
RATES THAT CAN BE OBTAINED FOR VARIOUS SOIL AND RAINFALL CONDITIONS ON  
LONG OCEANIC ISLANDS. PARTICULAR EMPHASIS WAS GIVEN TO OBTAINING  
POTABLE WATER ON THE BARRIER ISLANDS OF NORTH CAROLINA. A HELE-SHAW  
MODEL WAS DESIGNED AND BUILT TO REPRESENT A CROSS SECTION OF A LONG  
OCEANIC ISLAND. THE TWO FLUIDS WHICH SIMULATED FRESH WATER AND SALT  
WATER WERE OBTAINED BY ADDING A VISCOSITY-INCREASING AGENT TO WATER.  
THE DENSITY OF ONE BATCH WAS INCREASED BY ADDING SALT AND SUGAR. THE  
'FRESH WATER' WAS ADDED ALONG THE TOP OF THE FRESH-WATER LENS IN THE  
MODEL AT CYCLIC TIME INTERVALS. FLUID WAS PUMPED FROM THE FRESH-WATER  
LENS THROUGH ONE OF THREE GALLERIES. TWO OF THE GALLERIES WERE LOCATED  
BELOW MEAN SEA LEVEL, AND ONE WAS LOCATED AT MEAN SEA LEVEL. DURING A  
TEST, PUMPING FROM A GALLERY WAS INITIATED AT A LOW RATE AND WAS  
CONTINUED AT THAT RATE UNTIL EQUILIBRIUM OF THE INTERFACE WAS OBTAINED.  
THE PUMPING RATE WAS INCREASED IN INCREMENTS ALLOWING EQUILIBRIUM TO BE  
REACHED AT EACH INCREMENT UNTIL THE MAXIMUM CONTINUOUS RATE WAS  
OBTAINED. PUMPING STOPPED WHEN THE FREE SURFACE WAS PULLED TO THE TOP  
OF THE GALLERY OR WHEN SALT WATER WAS PUMPED INTO THE GALLERY.  
LOCATIONS OF THE FREE SURFACE AND INTERFACE WERE RECORDED FOR EACH  
PUMPING RATE AND WERE PRESENTED GRAPHICALLY IN DIMENSIONLESS FORM. THE  
MAXIMUM PUMPING RATE WAS PRESENTED AS A FUNCTION OF INFILTRATION AND  
ISLAND CHARACTERISTICS. THE MATHEMATICAL BOUNDARY CONDITIONS AND FLOW  
EQUATION FOR THE TWO-DIMENSIONAL FLOW PROBLEM WERE ALSO PRESENTED.

FIELD 02L, 05G, 02G

ACCESSION NO. W70-05646

INJECTION OF RECLAIMED WASTEWATER INTO CONFINED AQUIFERS,

TOUPS ENGINEERING, INC., SANTA ANA, CALIF.; AND ORANGE COUNTY WATER DISTRICT,  
SANTA ANA, CALIF.

G. M. WESNER, AND D. C. BAIER.

JOURNAL AMERICAN WATER WORKS ASSOCIATION, VOL 62, NO 3, P 203-210, MARCH  
1970. 8 P, 6 FIG, 7 TAB, 19 REF.

DESCRIPTORS:

\*RECLAIMED WATER, \*INJECTION WELLS, \*ARTIFICIAL RECHARGE, \*SALINE WATER  
INTRUSION, \*CALIFORNIA, WATER REUSE, ODOR, TASTE, WATER QUALITY, WATER  
POLLUTION CONTROL, MONITORING, ON-SITE TESTS, AQUIFERS, GROUNDWATER  
MOVEMENT.

IDENTIFIERS:

SALINE WATER BARRIER WELLS, ORANGE COUNTY(CALIF).

ABSTRACT:

THE ORANGE COUNTY WATER DISTRICT, CALIFORNIA HAS CONDUCTED RESEARCH IN  
WASTEWATER RECLAMATION AND SUBSURFACE INJECTION SINCE JULY, 1965. THE  
FIRST PHASE OF THE WORK WAS INTENDED TO DETERMINE THE FEASIBILITY OF  
TREATING AND INJECTING SECONDARY EFFLUENT. THE SECOND PHASE HAS THE  
FOLLOWING OBJECTIVES: (1) DETERMINE THE HYDRAULIC CHARACTERISTICS OF  
THE PROPOSED INJECTION BARRIER SYSTEM OF MULTI-POINT INJECTION WELLS;  
(2) DETERMINE THE LONG-TERM FATE OF RECLAIMED WASTEWATER IN THE  
INJECTION SYSTEM; (3) DETERMINE THE FEASIBILITY OF UTILIZING WASTEWATER  
FOR A BARRIER; AND (4) DETERMINE THE CHEMICAL COMPOSITION OF BLENDED  
RECLAIMED WATER AND DEEP GROUNDWATER. THE MULTIPLE CASING INJECTION  
WELLS HAVE PERFORMED VERY SATISFACTORILY. THE TREATED TRICKLING FILTER  
EFFLUENT IS INJECTABLE AND WOULD NOT CAUSE EXCESSIVE WELL CLOGGING.  
COLIFORM BACTERIA HAVE APPEARED SPORADICALLY 100 FT FROM THE INJECTION  
WELL, AND HAVE NOT BEEN FOUND AT 245 FT. MANY CHEMICAL CONSTITUENTS DO  
NOT MOVE CONSERVATIVELY IN THE INJECTED WATER. HARDNESS AND ALKALINITY  
INCREASE; AMMONIA AND OTHER OXYGEN-DEMANDING MATERIALS ARE  
SIGNIFICANTLY REDUCED BY TRAVEL IN THE CONFINED AQUIFER. THE ODOR AND  
TASTE WHICH PERSIST IN THE INJECTED RECLAIMED WATER IS PROBABLY THE  
MOST SERIOUS DETERRENT TO UTILIZING THIS SOURCE FOR INJECTION IN A  
BARRIER SYSTEM. (KNAPP-USGS)

FIELD 05D, 04B

ACCESSION NO. W70-05880



HYDROGEOLOGIC INFORMATION ON THE GLORIETA SANDSTONE AND THE OGALLALA FORMATION  
IN THE OKLAHOMA PANHANDLE AND ADJOINING AREAS AS RELATED TO UNDERGROUND WASTE  
DISPOSAL,

GEOLOGICAL SURVEY, WASHINGTON, D.C.

JAMES H. IRWIN, AND ROBERT B. MORTON.

REPORT AVAILABLE FREE ON APPLICATION TO U S GEOLOGICAL SURVEY, WASHINGTON, D  
C 20242. GEOLOGICAL SURVEY CIRCULAR 630, 1969. 26 P, 4 FIG, 4 PLATE, 2 TAB,  
43 REF.

DESCRIPTORS:

\*HYDROGEOLOGY, \*WATER POLLUTION SOURCES, \*WASTE WATER DISPOSAL,  
\*INJECTION WELLS, \*LEAKAGE, TEXAS, OKLAHOMA, UNDERGROUND, GROUNDWATER  
MOVEMENT, SEEPAGE, AQUIFERS, BRINES, SALINE WATER, SALINE WATER  
INTRUSION.

IDENTIFIERS:

GLORIETA SANDSTONE, OGALLALA FORMATION.

ABSTRACT:

THE OKLAHOMA PANHANDLE AND ADJACENT AREAS IN TEXAS, KANSAS, COLORADO,  
AND NEW MEXICO HAVE SUPPLIES OF FRESH WATER AND OF OIL AND GAS. THE  
OGALLALA AND, IN PLACES, CRETACEOUS ROCKS PRODUCE FRESH WATER THROUGH  
APPROXIMATELY 9,000 IRRIGATION AND PUBLIC-SUPPLY WELLS AND A LARGE  
NUMBER OF OTHER WELLS. DISPOSAL OF OIL-FIELD BRINE AND OTHER WASTES  
INTO THE GLORIETA SANDSTONE IS OF CONCERN BECAUSE OF THE POSSIBILITY OF  
POLLUTION OF THE OVERLYING FRESH-WATER AQUIFERS, PARTICULARLY THE  
OGALLALA FORMATION. PERMITS FOR 147 DISPOSAL WELLS INTO THE GLORIETA  
HAVE BEEN ISSUED IN THIS AREA. IN THE REPORT AREA, THE GLORIETA  
SANDSTONE LIES AT DEPTHS RANGING FROM ABOUT 500 TO 1,600 FEET BELOW THE  
BASE OF THE OGALLALA FORMATION. THE ROCKS BETWEEN THOSE TWO FORMATIONS  
ARE RELATIVELY IMPERMEABLE BUT SOLUTION HAS RESULTED IN COLLAPSE IN  
SOME PLACES, RESULTING IN INCREASED VERTICAL PERMEABILITY. THIS MIGHT  
RESULT IN MOVEMENT OF BRINE UNDER HYDROSTATIC HEAD FROM THE GLORIETA  
SANDSTONE INTO OVERLYING FRESH-WATER AQUIFERS. (KNAPP-USGS)

FIELD 04B, 05E

ACCESSION NO. W70-05922

RELATION OF SEA WATER TO FRESH WATER IN CARBONATE ROCKS IN COASTAL AREAS, WITH  
SPECIAL REFERENCE TO FLORIDA, U.S.A., AND CEPHALONIA (KEPHALLINIA), GREECE,

GEOLOGICAL SURVEY, WASHINGTON, D.C.

V. T. STRINGFIELD, AND H. E. LEGRAND.

JOURNAL OF HYDROLOGY, VOL 9, NO 4, P 387-404, DECEMBER 1969. 18 P, 9 FIG, 18  
REF.

DESCRIPTORS:

\*GROUNDWATER MOVEMENT, \*SALINE WATER INTRUSION, \*KARST, \*FLORIDA,  
AQUIFERS, SALINITY, SEA WATER, SALINE WATER SYSTEMS, SINKS, SPRINGS,  
LAKES, DENSITY, WATER CIRCULATION, HYDROGEOLOGY.

IDENTIFIERS:

CEPHALONIA(GREECE).

ABSTRACT:

THE PRINCIPLES CONTROLLING THE EQUILIBRIUM BETWEEN THE DENSER SALTY  
WATER AND THE LIGHTER FRESH WATER IN COASTAL AQUIFERS APPLY TO  
CARBONATE AS WELL AS SAND SYSTEMS. HOWEVER, UNDER CERTAIN EQUILIBRIUM  
CONDITIONS OF FRESH AND SALT WATER IN PARTS OF SOME CARBONATE AQUIFERS  
UNUSUAL HYDROLOGIC PHENOMENA RESULT. HYDROLOGIC CONDITIONS AT TARPON  
SPRINGS, FLORIDA, AND CEPHALONIA, GREECE, INCLUDE DEEP VERTICAL  
OPENINGS AS SINKHOLES THROUGH A RELATIVELY IMPERVIOUS PART OF THE  
AQUIFER SYSTEM. IN BOTH CASES THE TOPS OF THE SINKHOLES OR NATURAL  
WELLS ARE EXPOSED TO SEA WATER. AT TARPON SPRINGS THE DYNAMIC  
EQUILIBRIUM BETWEEN SALT WATER AND FRESH WATER FLUCTUATES SO THAT THE  
FLOW OF SALT WATER FROM THE SPRING TO A LAKE 2 MILES AWAY IS SOMETIMES  
REVERSED. AT CEPHALONIA, THE HEAD OF FRESH WATER DOES NOT EXCEED THE  
HEAD OF SALTY WATER IN THE SINKHOLES; THE FLOW OF SEA WATER INTO THE  
AQUIFER, AIDED BY A SHALLOW CHANNEL FROM THE SEA, IS CONTINUOUS, AND  
THE WATER LEVEL IN THE SINKHOLE IS CONTINUOUSLY DEPRESSED BELOW SEA  
LEVEL. BOTH CASES REPRESENT A PARTIALLY CONFINED U-TUBE SYSTEM WHERE  
WATER AT THE SEAWARD, SINKHOLE END IS DENSER THAN AT THE OTHER END AND  
WHERE A LOW FRESH-WATER HEAD IS LESS THAN THE SALT-WATER HEAD.  
(KNAPP-USGS)

FIELD 02F, 02L

ACCESSION NO. W70-07906

JOLDERSMA V MUSKEGON DEVELOPMENT CO (POLLUTION OF WATER SUPPLY BY OIL WELL ON ADJOINING LAND).

286 MICH 520, 282 NW 229-231 (1938).

DESCRIPTORS:

\*MICHIGAN, \*OIL WASTES, \*PATH OF POLLUTANTS, \*SALINE WATER INTRUSION, WATER POLLUTION, IMPAIRED WATER QUALITY, POLLUTANTS, INDUSTRIAL WASTES, GROUNDWATER, WATER POLLUTION EFFECTS, LEGAL ASPECTS, JUDICIAL DECISIONS, GROUNDWATER MOVEMENT, PERCOLATING WATER, SUBSURFACE WATERS, DIFFUSION, GRAVITATIONAL WATER, SALTS, SALINE SOILS, WASTE STORAGE, OIL INDUSTRY, OIL FIELDS, OIL.

ABSTRACT:

PLAINTIFFS OWNED A 10 ACRE TRACT OF FARMLAND ON WHICH THEY RAISED CELERY. DEFENDANTS OPERATED AN OIL WELL ON ADJOINING LAND AND DISPOSED OF SALT WATER AND OTHER DRILLING REFUSE BY DEPOSITING IT INTO A PIT. PLAINTIFFS BROUGHT ACTION FOR DAMAGES ALLEGING THAT SALT DEPOSITS WHICH APPEARED IN THEIR LAND AND WATER SUPPLY, AND WHICH RENDERED PLAINTIFFS' FARM USELESS FOR RAISING CROPS, CAME FROM DEFENDANTS' PIT. THE COURT FOUND FOR DEFENDANT, HOLDING INSUFFICIENT PLAINTIFFS' EVIDENCE THAT THE SALT DEPOSITED ON THEIR LAND WAS DUE TO A SUBTERRANEAN FLOW OF PERCOLATING WATERS CONTAINING SALT FROM DEFENDANTS' PIT. THE COURT NOTED THE EXISTENCE OF OTHER WELLS IN THE VICINITY AND CONCLUDED THAT IT WAS IMPOSSIBLE TO DETERMINE THAT THE DIRECTION OF UNDERGROUND FLOW LED FROM THE AREA OF THE DEFENDANTS' PIT TO PLAINTIFFS' LAND. (HUBENER-FLORIDA)

FIELD 05G

ACCESSION NO. W70-08026

LIABILITY FOR POLLUTION OF SUBTERRANEAN WATERS.

38 ALR2D 1265-1306 (1954).

DESCRIPTORS:

\*PERCOLATING WATER, \*WATER POLLUTION, \*SEEPAGE, \*SUBSURFACE WATERS, PRIOR APPROPRIATION, GROUNDWATER, UNDERGROUND STREAMS, SUBSURFACE RUNOFF, REASONABLE USE, DAMAGES, SURFACE RUNOFF, GASOLINE, WATER POLLUTION SOURCES, MINE WATER, OIL WASTES, CESSPOOLS, SEWAGE DISPOSAL, DOMESTIC WASTES, FARM WASTES, MUNICIPAL WASTES, NATURAL GAS, SALINE WATER INTRUSION, JUDICIAL DECISIONS, LEGAL ASPECTS, MINE ACIDS, DEEP PERCOLATION, WATER POLLUTION CONTROL.

IDENTIFIERS:

CEMETERIES.

ABSTRACT:

CONSIDERED HEREIN IS THE LIABILITY IN DAMAGES FOR, OR THE ENJOINING OF, THE POLLUTION OF SUBTERRANEAN WATERS. A DEFINITIONAL SECTION EXPLAINS THE TERMS USED IN THE ANNOTATION. VARIOUS ASPECTS OF THE RIGHTS AND LIABILITIES OF PARTIES WHO POLLUTE SUBTERRANEAN OR PERCOLATING WATERS FORM THE BULK OF THIS WORK. MAJOR CASES IN VARIOUS JURISDICTIONS ARE CITED AS AUTHORITY FOR THE PROPOSITIONS PRESENTED IN THE BODY OF THE TEXT. GENERALLY, THE AREAS CONSIDERED ARE: (1) LIABILITY FOR THE POLLUTION OF WATERS WHETHER PERCOLATING OR IN SUBTERRANEAN STREAMS; (2) THE RIGHT TO ENJOIN THE CONTINUANCE OF AN EXISTING OR A POSSIBLE FUTURE POLLUTION; (3) WHETHER LIABILITY EXISTS UNDER A CHARGE OF NEGLIGENCE OR NUISANCE; (4) THE SOURCES OF POLLUTION OF SUBTERRANEAN WATERS INCLUDING REFINERIES, CESSPOOLS, PRIVIES, OIL AND GAS WORKS, SALINE INTRUSION, MUNICIPAL WASTES, MANURE, DEAD ANIMALS AND THE LIKE; AND (5) INJUNCTIONS AGAINST THE ESTABLISHMENT OF CEMETERIES IF POLLUTION IS LIKELY TO RESULT. A DISTINCTION IS MADE BETWEEN THE AMERICAN RULE OF REASONABLE USE AND THE ENGLISH RULE OF ABSOLUTE OWNERSHIP. (SEE ALSO W70-08050 AND W70-08051). (BARNETT-FLORIDA)

FIELD 05G

ACCESSION NO. W70-08049

A NUMERICAL TECHNIQUE FOR CALCULATING THE TRANSIENT POSITION OF THE SALTWATER FRONT,

GEOLOGICAL SURVEY, WASHINGTON, D.C.

GEORGE F. PINDER, AND HILTON H. COOPER, JR.

WATER RESOURCES RESEARCH, VOL 6, NO 3, P 875-882, JUNE 1970. 8 P, 5 FIG, 14 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*MATHEMATICAL MODELS, \*NUMERICAL ANALYSIS, GROUNDWATER MOVEMENT, SALINE WATER-FRESHWATER INTERFACES, UNSTEADY FLOW, MIXING, DIFFUSION, PERMEABILITY, VISCOSITY.

IDENTIFIERS:

SALTWATER FRONT(AQUIFERS).

ABSTRACT:

THE MOVEMENT OF THE SALTWATER FRONT IN COASTAL AQUIFERS, INCLUDING THE EFFECT OF DISPERSION, CAN BE DETERMINED BY USING NUMERICAL METHODS. THE METHOD OF CHARACTERISTICS IS USED TO SOLVE THE SOLUTE TRANSPORT EQUATION, AND THE ALTERNATING DIRECTION ITERATIVE PROCEDURE IS USED TO SOLVE THE GROUNDWATER FLOW EQUATION FOR THE TWO-DIMENSIONAL PROBLEM. THIS APPROACH PERMITS THE TREATMENT OF TRANSIENT FLOW IN NONHOMOGENEOUS AQUIFERS WITH IRREGULAR GEOMETRY. (KNAPP-USGS)

FIELD 02L, 02F

ACCESSION NO. W70-09196

STUDY ON SALT WATER INTRUSION INTO GROUNDWATER - PART 1. GEOHYDROLOGIC  
CONDITIONS OF LAVA AQUIFER(JAPANESE),

INDUSTRIAL SCIENCE AND TECHNOLOGY AGENCY, KAWASAKI (JAPAN). GEOLOGICAL SURVEY.

TOSHIO MURASHITA, AND KAZUO KISHI.

BULLETIN OF GEOLOGICAL SURVEY OF JAPAN, VOL 18, NO 6, P 1(379)-14(392), JUNE  
1967. 14 P, 10 FIG, 5 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, GROUNDWATER MOVEMENT, PUMPING,  
WITHDRAWAL, ARTESIAN WELLS, LAVA, SANDS, FISSURES(GEOLOGY),  
TRANSMISSIVITY.

IDENTIFIERS:

JAPAN, FUJI.

ABSTRACT:

IN MANY COASTAL AREAS OF JAPAN AQUIFERS HAVE BEEN CONTAMINATED WITH  
SALT WATER BECAUSE THE SEAWARD FLOW OF GROUNDWATER HAS DECREASED. THE  
GREATEST SALT-WATER CONTAMINATION IS IN THE COASTAL AREA ALONG SURUGA  
BAY. THE CONTAMINATION FIRST BEGAN IN THE VICINITY OF TAGO-NO-URA IN  
1960, AND NEXT ON THE REACHES OF NUMA RIVER IN 1965. THE CONTAMINATED  
AREA IN 1966 IS TEN SQUARE KILOMETERS IN TOTAL. THE PUMPING ARTESIAN  
AQUIFER IS THE FUJI LAVA BEDS, WHICH HAS MANY FISSURES AND CAVES, AND  
IS VERY PERMEABLE. EVIDENCE OF THE INDUSTRIAL WELL FIELD INDICATES THAT  
THE INTERFACE BETWEEN THE FRESH WATER AND SALT WATER RECEDED BECAUSE  
RAINFALL WAS HEAVY AND NEW WELLS WERE NO LONGER DEVELOPED IN 1966.  
CONTAMINATION CONTINUES ON THE REACHES OF NUMA RIVER, BECAUSE THE  
PUMPAGE CONTINUES TO INCREASE. (SEE ALSO W70-09733). (KNAPP-USGS)

FIELD 02F, 04B, 02L

ACCESSION NO. W70-09732

TURBULENT DIFFUSION OF THE VERTICALLY UPWARD JET,

OSAKA UNIV. (JAPAN). DEPT. OF CIVIL ENGINEERING.

AKIRA MUROTA, AND KOUJI MURAOKA.

FRENCH RESUME. PROCEEDINGS 12TH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, SEPT 11-14, 1967, COLORADO STATE UNIV, FORT COLLINS, VOL 4 (PT 1-MICROTURBULENT DIFFUSION AND DISPERSION), PAPER D7, P 60-70, 1967. 11 P, 10 FIG, 12 REF.

DESCRIPTORS:

\*JETS, \*MIXING, \*DISPERSION, DIFFUSION, TURBULENCE, TURBULENT FLOW, VELOCITY, BUBBLES, SALINE WATER INTRUSION, ESTUARIES, WATER POLLUTION CONTROL.

IDENTIFIERS:

VERTICAL JETS.

ABSTRACT:

A WATER-CURTAIN FORMED IN A STREAM BY A SERIES OF VERTICAL JETS FROM BOTTOM TO SURFACE MAY BE USED AS A BARRIER FOR THE CONTROL OF SALINITY INTRUSION IN TIDAL REACHES OF RIVERS. MIXING OF FREE JETS IN UNBOUNDED SPACE IS ANALYZED FOR CASES OF TWO AND THREE DIMENSIONAL JETS. WHEN THE STILL WATER DEPTH IS LARGER THAN 20 TIMES THE REPRESENTATIVE LENGTH OF INJECTION NOZZLES, VELOCITY DECREASING ALONG THE JET AXIS IS QUITE SIMILAR TO THAT OF FREE JETS EXCEPT IN A STAGNANT REGION. DISTRIBUTIONS OF VERTICAL VELOCITY IN THE MIXING REGION ARE GIVEN BY TOLLMIE'S THEORY. THE PROPORTIONAL CONSTANT FOR VERTICAL JETS IS ABOUT 3 TIMES LARGER THAN THAT OF FREE JETS; THUS NOMINAL BOUNDARIES OF VERTICAL JETS ARE MORE WIDELY SPREAD THAN THOSE OF FREE JETS. (KNAPP-USGS)

FIELD 02E, 02L, 08B

ACCESSION NO. W70-09739

FEDERAL PROGRAMS STUDY WASTES FROM RAW AGRICULTURAL PRODUCTS,

AGRICULTURAL RESEARCH SERVICE, WASHINGTON, D.C.

SAM R. HOOVER.

INDUSTRIAL WASTES, VOL 116, NO 11, NOVEMBER 1969, P 22-25. 2 TAB, 4 REF.

DESCRIPTORS:

\*ENVIRONMENT, \*WASTES, \*DOMESTIC WASTES, \*BIOCHEMICAL OXYGEN DEMAND,  
\*SOLID WASTES, BY-PRODUCTS, TERTIARY TREATMENT, INCINERATION, WATER  
POLLUTION.

IDENTIFIERS:

\*POPULATION EQUIVALENT, \*AGRICULTURAL PROCESSING WASTES, MOLASSES, LAND  
DISPOSAL, FOOD PROCESSING PLANTS, SALT WATER INTRUSION.

ABSTRACT:

THE DIRECT AND INDIRECT EFFECTS OF AGRICULTURAL WASTES ON POLLUTION OF  
THE ENVIRONMENT ARE DISCUSSED. ATTEMPTS MADE BY VARIOUS AGENCIES TO  
ASSESS THE MAGNITUDE OF THE PROBLEM ARE OUTLINED. VARIOUS METHODS BY  
WHICH POLLUTION FROM AGRICULTURAL PRODUCTS CAN BE MINIMIZED INCLUDE  
FOOD PROCESSING METHODS, METHODS OF HARVESTING, IMPROVED METHODS OF  
PEELING VEGETABLES, EFFICIENT SEPARATION AND REMOVAL OF SOLID WASTES  
FROM PROCESSING STREAM, NEW PROCESSING METHODS AND RECOVERY OF  
BY-PRODUCTS. SOME OF THE EFFECTS OF CONTROLLING POLLUTION ARE ALSO  
MENTIONED. OUT OF THE VARIOUS RECOMMENDATIONS MADE TO IMPROVE CONTROL  
OF AGRICULTURAL POLLUTION THE BROAD AND SPECIFIC AREAS WHERE RESEARCH  
NEEDS TO BE DONE ARE ALSO POINTED OUT. THE MAIN PURPOSE OF THE RESEARCH  
WILL BE TO KNOW TO WHAT EXTENT THE IMPROVED METHODS CAN MINIMIZE  
POLLUTION FROM AGRICULTURAL WASTES. FINALLY THE RESEARCH PROGRAMS  
UNDERTAKEN BY THE VARIOUS FEDERAL AGENCIES TO CONTROL POLLUTION ARISING  
OUT OF WASTES FROM AGRICULTURAL PRODUCTS ARE PRESENTED.  
(RADHAKRISHNAN-TEXAS)

FIELD 05D, 05G

ACCESSION NO. W70-09805



ANALYSIS TECHNIQUES FOR HOUSTON SHIP CHANNEL,

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF CIVIL ENGINEERING.

ROY W. HANN, JR.

ASCE PROCEEDINGS, JOURNAL OF THE WATERWAYS AND HARBORS DIVISION, VOL 96, NO  
WW 2, PAPER 7258, P 171-180, MAY 1970. 10 P, 9 FIG, 1 REF.

DESCRIPTORS:

\*PATH OF POLLUTANTS, ESTUARIES, \*BAYS, \*CURRENTS(WATER), \*TIDES, WATER  
POLLUTION SOURCES, SALINE WATER INTRUSION, STRATIFIED FLOW,  
STRATIFICATION, WATER QUALITY, HYDRAULIC MODELS, COMPUTER MODELS,  
DISPERSION, SURVEYS, SAMPLING.

IDENTIFIERS:

HOUSTON SHIP CHANNEL(TEXAS).

ABSTRACT:

THE ENVIRONMENTAL POLLUTION PROBLEMS OF THE HOUSTON SHIP CHANNEL ARE  
DEFINED AND THE BROAD PROGRAM TO PROVIDE ANALYTICAL MANAGEMENT TOOLS IS  
PRESENTED. METHODOLOGY IS PRESENTED FOR THE EVALUATION OF THE TIDAL  
MASS WATER MOVEMENT AND FOR THE EVALUATION OF THE DENSITY CURRENT  
COUPLE WHICH IS SUPERIMPOSED ON THE TIDAL MASS MOVEMENT. DEGREE OF  
STRATIFICATION IS DEFINED AND ITS VALUE DISCUSSED. THE BASIC PHILOSOPHY  
OF THE STEADY MODEL WITH PROVISIONS FOR STRATIFIED ANALYSIS PRESENTED  
AND PRELIMINARY RESULTS ARE DISPLAYED. THE FIELD PROGRAM BEING CARRIED  
OUT BY TEXAS A AND M UNIVERSITY TO PROVIDE DATA FOR THE VERIFICATION OF  
THE PRESENTED METHODS AND FOR MORE ELABORATE METHODS YET TO BE  
DEVELOPED IS OUTLINED. (KNAPP-USGS)

FIELD 05B, 06A

ACCESSION NO. W70-10266

A STUDY OF GROUNDWATER POLLUTION BY SALT.

FIFTH INTERNATIONAL WATER POLLUTION RESEARCH CONFERENCE, SAN FRANCISCO, JULY 26-AUGUST 1, 1970. PREPRINT, PAPER I-34. 13 P.

DESCRIPTORS:

\*WATER POLLUTION SOURCES, \*MINE WASTES, \*SALINE WATER INTRUSION,  
\*AQUIFERS, \*ALLUVIAL CHANNELS, SALTS, SALINE WATER.

IDENTIFIERS:

FRANCE, RHINE VALLEY, ALSACE.

ABSTRACT:

POLLUTION BY BRINES OF A GROUNDWATER IN THE EASTERN PART OF FRANCE IS DESCRIBED. THE ORIGIN AND INTENSITY OF THE PHENOMENON, THE MEASUREMENT PROGRAM, AND THE THEORETICAL SCHEMES WHICH HAVE BEEN USED TO ANALYZE AND TO PREDICT THE DEVELOPMENT OF THE POLLUTION ARE DISCUSSED. THE STUDY WAS LIMITED TO THE RHINE'S ALLUVIAL AQUIFER IN ALSACE, A PROVINCE OF NORTHEASTERN FRANCE. ITS AREA IS OVER 5000 SQUARE KILOMETERS AND ITS THICKNESS VARIES BETWEEN 0 AND MORE THAN 200 METERS. THE BEDS CONSIST OF HIGHLY PERMEABLE QUATERNARY ALLUVIAL DEPOSITS (PERMEABILITY ABOUT 0.001 M/SEC) LYING ON AN OLIGOCENE MARL SUBSTRATUM WHICH IS, IN PLACES, ALSO COVERED BY A PLIOCENE STRATUM OF SANDY CLAY. AN INCREASE OF THE SODIUM CHLORIDE CONTENT OF THE GROUNDWATER HAS BEEN NOTICED, AND IT IS ASCRIBED TO THE PRESENCE OF IMPORTANT POTASH MINE-WORKINGS IN THE SOUTHERN PART OF THE DISTRICT. (KNAPP-USGS)

FIELD 05B, 02K

ACCESSION NO. W71-00001

NOTES ON THE POSITION OF A PHOSPHATE ZONE AND ITS RELATION TO GROUNDWATER IN  
COASTAL GEORGIA,

GEOLOGICAL SURVEY, RICHMOND, VA.

ROBERT L. WAIT.

CHAPTER C FOR SALE BY THE SUPERINTENDENT OF DOCUMENTS, US GOVERNMENT PRINTING  
OFFICE, WASHINGTON, DC, 20402 - PRICE \$3.25. IN: GEOLOGICAL SURVEY RESEARCH  
1970, CHAPTER C: GEOLOGICAL SURVEY PROFESSIONAL PAPER 700-C, P C202, 1970.  
4 P, 2 FIG, 5 REF.

DESCRIPTORS:

\*AQUIFERS, \*AQUICLUDES, \*SALINE WATER INTRUSION, \*MINING, \*RADIOACTIVE  
WELL LOGGING, BOREHOLE GEOPHYSICS, SUBSURFACE MAPPING, SUBSURFACE  
INVESTIGATIONS, WATER POLLUTION SOURCES, CLAYS, PHOSPHATES, MINE  
DRAINAGE.

IDENTIFIERS:

GLYNN COUNTY(GA), PHOSPHATE MINING.

ABSTRACT:

OF FOUR INFLECTION POINTS THAT OCCUR ON GAMMA-RADIATION LOGS FROM THE  
COASTAL AREA OF GEORGIA, THREE ARE RADIATION PEAKS MARKING PHOSPHATE  
ZONES IN THE EOCENE TO MIDDLE AND LOWER MIOCENE ROCKS. POINT A OCCURS  
IN A SAND AT THE BASE OF A SILTY CLAY CONFINING BED THAT LIES ABOVE AND  
PROTECTS THE PRINCIPAL ARTESIAN AQUIFER FROM SEA-WATER INTRUSION.  
INFLECTION POINT D OCCURS AT THE CONTACT OF THE OLIGOCENE AND UPPER  
EOCENE LIMESTONES. MINING OF THE PHOSPHATE ZONE MARKED BY POINT A WOULD  
BREACH THE SILTY CLAY CONFINING BED ABOVE THE PRINCIPAL ARTESIAN  
AQUIFER AND WOULD ALLOW INTRUSION OF SEA WATER INTO IT. SUCH SEA-WATER  
INTRUSION WOULD DESTROY THE GROUNDWATER RESOURCES OVER A WIDE AREA OF  
ONE OF THE NATION'S LARGEST ARTESIAN AQUIFERS AND WOULD HAVE DIRE  
ECONOMIC CONSEQUENCES FOR THIS AREA. (KNAPP-USGS)

FIELD 02F, 02L, 05B

ACCESSION NO. W71-00178

SCHLICHTKRULL V MELLON-POLLOCK OIL CO (ILLNESS CAUSED BY POLLUTION OF WELL).

301 PA 560, 152 A 832-834 (1930).

DESCRIPTORS:

\*PENNSYLVANIA, \*WATER POLLUTION, \*SALINE WATER INTRUSION, \*WATER WELLS, OIL INDUSTRY, PUBLIC HEALTH, OIL WELLS, DRILLING, OIL FIELDS, SALINE WATER, SALINE WATER-FRESHWATER INTERFACES, WELLS, WELL CASINGS, GROUNDWATER, WATER SUPPLY, PERCOLATING WATER, SUBSURFACE WATERS, JUDICIAL DECISIONS, LEGAL ASPECTS, ADJUDICATION PROCEDURE.

ABSTRACT:

PLAINTIFF LANDOWNER BROUGHT SUIT FOR DAMAGES AGAINST DEFENDANT OIL COMPANY. DEFENDANT HAD DRILLED AN OIL WELL AND THEREBY CAUSED SALT TO ACCUMULATE IN PLAINTIFF'S WATER WELL. PLAINTIFF'S WIFE BECAME ILL AND PLAINTIFF CLAIMED THE ILLNESS WAS CAUSED BY THE SALT IN THE WATER. THE SUPREME COURT OF PENNSYLVANIA, REVERSING THE TRIAL COURT'S DECISION FOR PLAINTIFF, RULED THAT BEFORE AN ACTION FOR NEGLIGENCE IN DRILLING AN OIL WELL WOULD LIE, DANGER TO PUBLIC HEALTH MUST HAVE BEEN FORESEEABLE. PLAINTIFF HAD NOT MET THE BURDEN OF PROOF REQUISITE TO SUCH AN ACTION. (BARKER-FLORIDA)

FIELD 06E, 05C

ACCESSION NO. W71-01028

CARBON-14 AGES RELATED TO OCCURRENCE OF SALT WATER,

GEOLOGICAL SURVEY, WASHINGTON, D.C.

WILLIAM BACK, BRUCE B. HANSHAW, AND RUBIN MEYER.

ASCE PROCEEDINGS, JOURNAL OF THE HYDRAULICS DIVISION, VOL 96, NO HY11, PAPER 7702, P 2325-2336, NOVEMBER 1970. 12 P, 8 FIG, 2 TAB, 12 REF. GRANT ARD-5839-EN.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*GROUNDWATER MOVEMENT, \*WITHDRAWAL, \*RADIOACTIVE DATING, SOUTH CAROLINA, CARBON RADIOISOTOPES, TRACERS, CHLORIDES, HYDROGEOLOGY, RECHARGE, PUMPING, WATER RESOURCES DEVELOPMENT.

IDENTIFIERS:

\*HILTON HEAD ISLAND(SC).

ABSTRACT:

UNDER NATIVE CONDITIONS IN HILTON HEAD ISLAND, S. C., THE ORIGINAL REGIONAL FLOW PATH WAS GENERALLY FROM THE SOUTH END TO THE NORTH END OF THE ISLAND. AT THE SOUTH END, THE FRESH WATER (LESS THAN 35 MG PER 1 CHLORIDE CONTENT) IS OLDER THAN 22,000 YR. IN THE CENTRAL AND HIGHER PART OF THE ISLAND, THE AGE OF THE FRESH WATER RANGES FROM ABOUT 2,000 YR TO 12,000 YR. THIS AGE RANGE IS INTERPRETED TO MEAN THAT WITH A LOWERING OF REGIONAL HEAD, OWING TO HEAVY PUMPING IN THE SAVANNAH, GA., AREA, REGIONAL FLOW HAS REVERSED, AND RECHARGE IS BEING INDUCED INTO THE AQUIFER IN THIS AREA. IN THE CENTRAL PART OF THE ISLAND, THE DEEPER CONTAMINATED ZONE (CHLORIDE CONTENT ABOUT 1,500 MG PER 1) HAS AN AGE OF ABOUT 26,000 YR B.P. IN THE NORTHERN PART OF THE AREA, WATER OF THE SAME CHLORIDE CONTENT HAS AN AGE OF ABOUT 7,000 YR B.P. IN THIS STUDY, THEREFORE, RADIOCARBON CONCENTRATIONS SHOW: (1) THE EFFECTS OF REVERSAL OF FLOW; (2) THE AREA OF RESULTANT RECHARGE; (3) THE AREA OF MODERN OCEAN-WATER ENCROACHMENT; AND (4) THE AREA OF CONTAMINATION BY SALINE FORMATION WATER. (KNAPP-USGS)

FIELD 02L, 02F

ACCESSION NO. W71-01107

MANHATTAN OIL CO V MOSBY (LIABILITY FOR POLLUTING STREAM BY ESCAPE OF SALT WATER FROM OIL WELL).

72 F2D 840-847 (8TH CIR 1934).

DESCRIPTORS:

\*SALINE WATER, \*WATER POLLUTION, \*OIL WELLS, \*SALINE WATER INTRUSION, WATER POLLUTION SOURCES, WELL REGULATIONS, WELLS, SALINE WATER-FRESHWATER INTERFACES, KANSAS, JUDICIAL DECISIONS, STREAMS, ENCROACHMENT, FRESH WATER, WATER UTILIZATION, IMPAIRED WATER QUALITY, POLLUTANTS, POLLUTANT IDENTIFICATION, LEGISLATION, WATER POLLUTION CONTROL, WATER POLLUTION EFFECTS, LEGAL ASPECTS.

ABSTRACT:

IN AN ACTION FOR DAMAGES, PLAINTIFF CONTENDED THAT DEFENDANT OIL DRILLING COMPANY POLLUTED A STREAM RUNNING THROUGH PLAINTIFF'S RANCH BY ALLOWING SALT WATER TO ESCAPE FROM AN EMBANKMENT AT DEFENDANT'S OIL WELL SITE. PLAINTIFF CONTENDED THAT SUCH POLLUTION IMPAIRED THE WATER FOR STOCK PURPOSES. DEFENDANT CONTENDED THAT PLAINTIFF HAD FAILED TO ALLEGE NEGLIGENCE AND THUS WAS PRECLUDED FROM RECOVERING. THE COURT HELD THAT A KANSAS STATUTE IMPOSED ABSOLUTE LIABILITY UPON CONTROLLERS OF OIL WELLS WHO ALLOW SALT WATER TO ESCAPE FROM AN OIL WELL SITE. THE COURT RULED THAT THE FACT THAT THE SALT WATER HAD ESCAPED WAS A BREACH OF DEFENDANT'S ABSOLUTE DUTY NOTWITHSTANDING A SHOWING OF NEGLIGENCE. DEFENDANT WAS THUS HELD LIABLE FOR DAMAGES CAUSED BY THE POLLUTION OF THE STREAM. (SNOW-FLORIDA)

FIELD 06E, 05B, 05C

ACCESSION NO. W71-01303

THE ENCROACHMENT OF THE SALT WATER IN KOITO RIVER MOUTH RESERVOIR,

CHIBA PREFECTURE INDUSTRIAL WATER DEPT. (JAPAN); AND MITSUI CONSULTANTS CO., LTD., TOKYO (JAPAN).

TATSUYA IKEDA, AND YASUO MIYAKE.

FRENCH RESUME. IN: PROCEEDINGS 13TH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, KYOTO, JAPAN, AUGUST 31-SEPTEMBER 5, 1969, VOL 4 (SUBJECT D), SCIENCE COUNCIL OF JAPAN, KYOTO, P 103-110, 1969. 8 P, 6 FIG, 2 TAB.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*RESERVOIRS, \*COMPUTER PROGRAMS, \*GROUNDWATER MOVEMENT, CANAL SEEPAGE, RESERVOIR LEAKAGE, LAND RECLAMATION, DRAINAGE, LEACHING, SALINE SOILS, WETLANDS.

IDENTIFIERS:

JAPAN, KOITO RIVER, KOITO RESERVOIR.

ABSTRACT:

A COMPUTER PROGRAM IS PRESENTED TO CALCULATE SEEPAGE OF SALINE WATER FROM A RECLAIMED SALT MARSH INTO A FRESHWATER RESERVOIR. THE CALCULATION IS ILLUSTRATED BY THE EXAMPLE OF THE KOITO RIVER RESERVOIR, JAPAN, WHICH WAS CONSTRUCTED IN A COASTAL EXCAVATION FROM WHICH RECLAMATION DIKE MATERIALS WERE TAKEN. (KNAPP-USGS)

FIELD 02L, 07C

ACCESSION NO. W71-01942

PUMPING FROM A SHALLOW WATER AQUIFER IN A COASTAL REGION,

ASIAN INST. OF TECH., BANGKOK (THAILAND). DEPT. OF HYDRAULIC ENGINEERING.

NORBERT L. ACKERMANN, AND HUNG TAO SHEN.

FRENCH RESUME. IN: PROCEEDINGS 13TH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, KYOTO, JAPAN, AUGUST 31-SEPTEMBER 5, 1969, VOL 4 (SUBJECT D), SCIENCE COUNCIL OF JAPAN, KYOTO, P 67-75, 1969. 9 P, 2 FIG, 1 REF.

DESCRIPTORS:

\*GROUNDWATER MOVEMENT, \*SALINE WATER-FRESHWATER INTERFACES, \*SALINE WATER INTRUSION, AQUIFERS, BEACHES, MIXING, WITHDRAWAL, WATER LEVELS, MATHEMATICAL STUDIES.

IDENTIFIERS:

COASTAL AQUIFERS, UPCONING.

ABSTRACT:

A TWO DIMENSIONAL STUDY WAS MADE OF THE FLOW CONDITIONS PRODUCED BY THE PUMPING OF WATER FROM A FRESH WATER AQUIFER WHICH WAS BOUNDED ON ITS LOWER SURFACE BY A STATIONARY FLUID OF HIGHER DENSITY (SALT WATER) AND BOUNDED ON ITS UPPER SURFACE BY A HORIZONTAL PLANE HAVING A CONSTANT PIEZOMETRIC HEAD. THE WITHDRAWAL OF THE FRESH WATER WAS PRODUCED BY CONTINUOUS PUMPING FROM A SERIES OF LINE SINKS OR DRAINS SPACED AT PERIODIC INTERVALS IN THE FRESH WATER REGION. THE PUMPING PRODUCED UPCONING OF THE INTERFACE IN THE VICINITY OF THE LINE SINK AND GENERAL RISING OF THE LEVEL OF THE FRESHWATER-SALTWATER BOUNDARY WHEN COMPARED TO CONDITIONS WHICH WOULD EXIST IN THE ABSENCE OF PUMPING OR AT DECREASED PUMPING RATES. THE RESULT OF THE MATHEMATICAL ANALYSIS DESCRIBING THE FLOW CONDITIONS IS PRESENTED GRAPHICALLY IN DIMENSIONLESS FORM. (KNAPP-USGS)

FIELD 02L, 04B

ACCESSION NO. W71-01944



TRANSIENT CHARACTERISTICS OF SALT-WATER WEDGE,

SAITAMA UNIV., URAWA (JAPAN). DEPT. OF FOUNDATION ENGINEERING.

SUKEYUKI SHIMA.

FRENCH SUMMARY. IN: PROCEEDINGS 13TH CONGRESS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, KYOTO, JAPAN, AUGUST 31-SEPTEMBER 5, 1969, VOL 4 (SUBJECT D), SCIENCE COUNCIL OF JAPAN, KYOTO, P 433-440, 1969. 8 P, 5 FIG, 4 REF.

DESCRIPTORS:

\*GROUNDWATER MOVEMENT, \*SALINE WATER, \*FLOW CHARACTERISTICS, \*AQUIFERS, BEACHES, MATHEMATICAL STUDIES, EQUATIONS, THEORETICAL ANALYSIS, \*SALINE WATER INTRUSION, SALINE WATER-FRESHWATER INTERFACES.

IDENTIFIERS:

\*SALT-WATER WEDGE, COASTAL AQUIFERS.

ABSTRACT:

TRANSITIONAL CHARACTERISTICS OF SALT-WATER WEDGES IN UNCONFINED AQUIFERS ARE INVESTIGATED WITH SPECIAL CONSIDERATION TO THE EFFECTS OF CHANGES IN FRESH-WATER DEPTH AT COASTAL LINE, AND DEFORMATIONS OF THE SHAPE OF MOVING INTERFACES. THEORETICAL TREATMENTS CONCERNING WEDGE INTRUSION, WHEN A BARRIER IS ABRUPTLY REMOVED, ARE MADE. THE RESULTS ARE COMPARED TO THE EXPERIMENTAL DATA, AND A FAIR AGREEMENT BETWEEN THEORY AND EXPERIMENT ARE OBTAINED. (WOODARD-USGS)

FIELD 02F, 02L

ACCESSION NO. W71-02262

CITY OF SAN DIEGO WATER RECLAMATION STUDY FOR BALBOA PARK AND MISSION BAY PARK.

BOYLE ENGINEERING, SAN DIEGO, CALIFORNIA.

REPORT TO CITY OF SAN DIEGO, CALIFORNIA, MARCH 1963. 250 P, 40 FIG, 50 TAB, 52 REF.

DESCRIPTORS:

\*WATER REUSE, \*IRRIGATION PROGRAMS, \*GROUNDWATER RECHARGE, \*RETURN FLOW, \*IRRIGATION WATER, PARKS, CALIFORNIA, RECLAIMED WATER, WATER SPREADING, ARTIFICIAL RECHARGE, SALINE WATER INTRUSION, IRRIGATION ENGINEERING, IRRIGATION SYSTEMS, WATER SUPPLY.

IDENTIFIERS:

\*SAN DIEGO.

ABSTRACT:

BENEFITS ARE INDICATED THAT WOULD RESULT FROM THE CONSERVATIVE RE-USE OF A PORTION OF SAN DIEGO'S SEWAGE, CURRENTLY WASTED TO THE OCEAN; AND PRESENTS ALTERNATIVE PLANS FOR THE IMPLEMENTATION OF A PROJECT THAT WOULD SUPPLY THE IRRIGATION WATER REQUIREMENTS OF BALBOA PARK AND MISSION BAY PARK. EACH OF SEVERAL ALTERNATIVE PLANS IS ECONOMICALLY FEASIBLE AND IT IS IN THE BEST INTERESTS OF THE CITY TO ACTIVELY ENTER THE FIELD OF WATER RECLAMATION. IT IS RECOMMENDED THAT: (1) THE CITY PURSUE A PLAN OF ACTION LEADING TO THE DESIGN, CONSTRUCTION AND OPERATION OF A WATER RECLAMATION SYSTEM WITH ADEQUATE CAPACITY TO SERVE THE IRRIGATION REQUIREMENTS OF BOTH BALBOA PARK AND MISSION BAY PARK; (2) AREAS OWNED BY THE CITY IN THE VICINITY OF THE DESIGNATED WATER RECLAMATION PLANT SITES SHOULD BE TENTATIVELY SET ASIDE FOR WATER RECLAMATION PURPOSES; AND (3) THE CITY SHOULD REEVALUATE THE POTENTIAL VALUE OF GROUND WATER RECHARGE USING RECLAIMED WATER IN MISSION VALLEY, WITH THE POSSIBILITY OF REACTIVATING THE CITY'S MISSION VALLEY WELL FIELD AS A SUPPLEMENTAL POTABLE WATER SUPPLY. SAN DIEGO PRESENTLY IMPORTS UP TO 96 PERCENT OF ITS ANNUAL WATER REQUIREMENTS FROM THE COLORADO RIVER. THE CALIFORNIA WATER PLAN INCLUDES PROVISIONS FOR FURNISHING WATER TO SAN DIEGO FROM NORTHERN CALIFORNIA; HOWEVER, THE COST WILL BE FROM THREE TO FIVE TIMES THE PRESENT COST OF IMPORTED WATER. (POERTNER)

FIELD 05D, 03C

ACCESSION NO. W71-02287

SCHLICHTRULL V MELLON-POLLOCK OIL CO (NEGLIGENT DRILLING OF OIL WELL ALLEGED TO HAVE CAUSED SALINE WATER INTRUSION).

301 PA 553, 152 A 829-831 (1930).

DESCRIPTORS:

\*PENNSYLVANIA, \*SALINE WATER INTRUSION, \*OIL WELLS, \*WATER WELLS, GROUNDWATER, SALINE WATER-FRESH WATER INTERFACES, MIXING, PENETRATION, DRILL HOLES, GROUNDWATER MOVEMENT, DAMAGES, LEGAL ASPECTS, COMPENSATION, BRINES, WATER SUPPLY, BOUNDARIES(SURFACES), WELL CASINGS, SALINE WATER, WELLS, SEEPAGE, DAMAGES, REMEDIES.

ABSTRACT:

PLAINTIFF FARMOWNER SUED DEFENDANT OIL WELL LESSEE FOR DAMAGES CAUSED BY POLLUTION OF PLAINTIFF'S WELL. DEFENDANT HAD ENCOUNTERED SALT WATER IN DRILLING, AND BECAUSE DEFENDANT HAD FAILED TO DRIVE CASINGS TO PREVENT INTRUSION OF THE SALT WATER INTO THE FRESH WATER STRATA LYING ABOVE, THE SALT WATER SEEPED INTO PLAINTIFF'S WELL. THE COURT NOTED THAT WITHOUT NEGLIGENCE NO LIABILITY INURES FOR INTERFERENCE WITH SUBTERRANEAN WATERS. HOWEVER, DEFENDANT WAS LIABLE BECAUSE IT HAD FAILED TO EXERCISE DUE CARE. DEFENDANT ASSERTED THAT THE OIL WELL WAS TO BE ABANDONED IN SIX MONTHS AND THAT, THEREFORE, THE INJURY WAS TEMPORARY. PLAINTIFF ASSERTED THAT THE INJURY WAS PERMANENT, SINCE DEFENDANT HAD NOT PROVEN THAT PLUGGING THE WELL WOULD PREVENT SALT WATER INTRUSION OR RESTORE THE PROPERTY TO ITS ORIGINAL CONDITION. HOLDING THAT THE INJURY WAS PERMANENT, THE COURT AFFIRMED THE TRIAL COURT'S MEASURE OF DAMAGES BASED UPON THE DIMINUTION IN MARKET VALUE OF PLAINTIFF'S TRACT. (HART-FLORIDA)

FIELD 06E, 05B

ACCESSION NO. W71-03230

MODEL STUDIES OF SALT WATER INTRUSION,

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF CIVIL ENGINEERING.

ABDEL-AZIS I. KASHEF.

WATER RESOURCES BULLETIN, VOL 6, NO 6, P 944-967, NOVEMBER-DECEMBER 1970. 24 P, 14 FIG, 10 TAB, 31 REF. OWRR PROJECT A-007-NC(6).

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*GROUNDWATER MOVEMENT, \*HYDRAULIC MODELS, MODEL STUDIES, POROUS MEDIA, VISCOSITY, HYDRODYNAMICS, HYDRAULIC SIMILITUDE, SOIL WATER MOVEMENT, LABORATORY TESTS, SALINE WATER-FRESHWATER INTERFACES, STEADY FLOW, UNSTEADY FLOW.

IDENTIFIERS:

\*HELE-SHAW MODELS.

ABSTRACT:

MODEL STUDIES ARE USED TO VERIFY THEORIES IN GROUNDWATER FLOW SYSTEMS. IN COMPLEX CASES, THE MODEL STUDIES MAY BE EXTREMELY USEFUL ESPECIALLY WHEN A THEORETICAL RIGOROUS ANALYSIS DOES NOT EXIST. THE MODELS CANNOT BE CONSIDERED ENTIRELY SATISFACTORY DUE TO THE SEVERAL DRAWBACKS IN EACH TYPE IN ADDITION TO THE NORMAL HUMAN ERRORS IN EXPERIMENTATION. THIS PAPER IS CONCERNED WITH VISCOUS FLOW MODELS. A BRIEF SUMMARY OF THE OTHER TYPES OF MODELS, WHICH MAY BE POSSIBLY BE USED IN CONNECTION WITH SALT WATER INTRUSION PROBLEMS, IS ALSO GIVEN. GRAVITY FLOW SYSTEMS ARE ANALOGOUS TO SOME PHASES OF SALT INTRUSION PROBLEMS. PROBLEMS IN OIL FIELDS BEAR GENERAL SIMILARITIES TO SEA WATER INTRUSION ZONES. IN OIL FIELDS, GAS CYCLING STUDIES GIVE VALUABLE INFORMATION TO SEA WATER PROBLEMS. MODEL STUDIES ARE USED BY HYDRAULIC ENGINEERS, GEOLOGISTS, PETROLEUM ENGINEERS, PHYSICISTS, FOUNDATION ENGINEERS AND SEVERAL OTHER PROFESSIONAL GROUPS. (KNAPP-USGS)

FIELD 02L, 02F

ACCESSION NO. W71-03316

SALTY GROUNDWATER IN THE POCATALICO RIVER BASIN,

GEOLOGICAL SURVEY, MORGANTOWN, W.VA.

GEORGE L. BAIN.

WEST VIRGINIA GEOLOGICAL AND ECONOMIC SURVEY CIRCULAR SERIES, NO 11, OCTOBER 1, 1970. 31 P, 8 FIG, 8 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*OIL FIELDS, \*WEST VIRGINIA, OIL WELLS, INJECTION WELLS, BRINES, SALINE WATER, WASTE WATER DISPOSAL, WATER POLLUTION SOURCES, PATH OF POLLUTANTS, WATER QUALITY, GROUNDWATER, SURFACE WATERS.

IDENTIFIERS:

\*OIL-FIELD BRINES.

ABSTRACT:

IN THE POCATALICO RIVER BASIN OF WEST VIRGINIA, EXCESSIVE SALT CONCENTRATION IN STREAMS AND IN SHALLOW GROUNDWATER HAS BEEN A PROBLEM FOR SOME TIME. THE RECENT USE OF HYDRAULIC-FRACTURING TECHNIQUES TO IMPROVE THE PERMEABILITY OF THE AREA'S OIL-PRODUCING ROCKS HAS CAUSED INCREASED DRILLING. MUCH SALT BRINE, AS MUCH AS 80 BBLs OF BRINE FOR ONE BBL OF OIL, IS GENERALLY PRODUCED WITH THIS OIL, CREATING A BRINE STORAGE AND DISPOSAL PROBLEM. A NUMBER OF BRINE-DISPOSAL WELLS HAVE BEEN DRILLED FOR RE-INJECTION OF THE OIL-FIELD BRINES INTO THE 'INJUN SAND' AND THE SHALLOWER 'SALT SANDS' (POTTSVILLE GROUP). SALT BRINE, OIL, OR GAS ARE PRESENT EVERYWHERE IN THE SALT SANDS. THERE IS SUFFICIENT NATURAL HYDRAULIC HEAD (PRESSURE) ON BRINE IN THE SALT SANDS TO CONTAMINATE OVERLYING FRESH-WATER HORIZONS UNLESS ALL WELLS TAPPING THE SALT SANDS ARE PERMANENTLY AND PROPERLY CASED INTO THE SALT SANDS IN THIS AREA. (KNAPP-USGS)

FIELD 05B, 02K

ACCESSION NO. W71-04368

NUMERICAL SIMULATION OF DISPERSION IN GROUNDWATER AQUIFERS,

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING; AND  
COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.

DONALD LEE REDDELL, AND DANIEL K. SUNADA.

COLORADO STATE UNIVERSITY HYDROLOGY PAPER NO 41, JUNE 1970. 79 P, 35 FIG, 1  
TAB, 96 REF, 8 APPEND. OWRR PROJECT A-001-COLO(8).

DESCRIPTORS:

\*SIMULATION ANALYSIS, \*DISPERSION, \*GROUNDWATER MOVEMENT, \*NUMERICAL  
ANALYSIS, MIXING, COMPUTER PROGRAMS, COMPUTER MODELS, MATHEMATICAL  
MODELS, SALINE WATER INTRUSION, AQUIFERS, POROUS MEDIA, DIFFUSION,  
CONVECTION, DIFFUSIVITY.

IDENTIFIERS:

LONGITUDINAL DISPERSION.

ABSTRACT:

A FLOW EQUATION FOR A MIXTURE OF MISCIBLE FLUIDS WAS DERIVED BY  
COMBINING THE LAW OF CONSERVATION OF MASS, DARCY'S LAW, AND AN EQUATION  
OF STATE DESCRIBING THE PRESSURE-VOLUME-TEMPERATURE-CONCENTRATION  
RELATIONSHIP. THE RESULT IS AN EQUATION INVOLVING TWO DEPENDENT  
VARIABLES, PRESSURE AND CONCENTRATION. A RELATIONSHIP FOR DETERMINING  
CONCENTRATION WAS DERIVED BY EXPRESSING A CONTINUITY EQUATION FOR THE  
DISPERSED TRACER. AN IMPLICIT NUMERICAL TECHNIQUE WAS USED TO SOLVE THE  
FLOW EQUATION FOR PRESSURE, AND THE METHOD OF CHARACTERISTICS WITH A  
TENSOR TRANSFORMATION WAS USED TO SOLVE THE CONVECTIVE-DISPERSION  
EQUATION. THE RESULTS FROM THE FLOW EQUATION WERE USED IN SOLVING THE  
CONVECTIVE-DISPERSION EQUATION AND THE RESULTS FROM THE  
CONVECTIVE-DISPERSION EQUATION WERE THEN USED TO RESOLVE THE FLOW  
EQUATION. THE COMPUTER SIMULATOR SUCCESSFULLY SOLVED THE LONGITUDINAL  
DISPERSION PROBLEM AND THE LONGITUDINAL AND LATERAL DISPERSION PROBLEM.  
USING THE TENSOR TRANSFORMATION, PROBLEMS OF LONGITUDINAL AND LATERAL  
DISPERSION WERE SUCCESSFULLY SOLVED IN A ROTATED COORDINATE SYSTEM. THE  
COMPUTER SIMULATOR WAS USED TO SOLVE THE SALT-WATER INTRUSION PROBLEM.  
THE NUMERICAL RESULTS FOR THE FRESH WATER HEAD IN THE AQUIFER CLOSELY  
MATCHED THOSE OBTAINED ANALYTICALLY. (SEE W70-04051) (KNAPP-USGS)

FIELD 06A, 05B, 02F

ACCESSION NO. W71-04559

STATUS OF SALT-WATER ENCROACHMENT IN 1969 IN SOUTHERN NASSAU AND SOUTHEASTERN  
QUEENS COUNTIES, LONG ISLAND, NEW YORK,

GEOLOGICAL SURVEY, MINEOLA, N.Y.

PHILIP COHEN, AND G. E. KIMMEL.

FOR SALE BY SUPERINTENDENT OF DOCUMENTS, US GOVERNMENT PRINTING OFFICE,  
WASHINGTON, DC 20402 - PRICE \$3.75. GEOLOGICAL SURVEY RESEARCH 1970,  
CHAPTER D, PROFESSIONAL PAPER 700-D, P D281-D286, 1970. 6 P, 2 FIG, 4 TAB,  
13 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*NEW YORK, WITHDRAWAL, PATH OF  
POLLUTANTS, WATER BALANCE, SEA WATER, WATER LEVELS, HYDROGEOLOGY,  
HYDROLOGIC DATA, DATA COLLECTIONS, MONITORING, WATER QUALITY.

IDENTIFIERS:

\*LONG ISLAND(NY).

ABSTRACT:

CHLORIDE DATA OBTAINED FROM 'OUTPOST' WELLS AND OTHER WELLS IN SOUTHERN  
NASSAU AND SOUTHEASTERN QUEENS COUNTIES, LONG ISLAND, N.Y., INDICATE  
THAT LANDWARD MOVEMENT OF A DEEP WEDGE OF SALTY GROUNDWATER IN THE AREA  
HAS BEEN MINIMAL FROM 1960 TO 1969. SIGNIFICANT CHANGES IN CHLORIDE  
CONTENT WERE NOTED IN ONLY 3 OF 30 OUTPOST WELLS. CHLORIDE CONTENT OF  
WATER FROM A WELL IN SOUTHEASTERN QUEENS COUNTY INCREASED FROM 34 MG/L  
IN 1960 TO 112 MG/L IN 1969, AS A RESULT OF INTENSIVE GROUNDWATER  
WITHDRAWALS IN THAT COUNTY; CHLORIDE CONTENT IN TWO WELLS IN NASSAU  
COUNTY INCREASED FROM 8,520 TO 11,000 MG/L AND FROM 2,000 TO 8,110 MG/L  
DURING THE SAME PERIOD. THESE INCREASES RESULTED FROM LOCAL HEAVY  
PUMPING NEAR THE ZONE OF DIFFUSION. NO INCREASE IN CHLORIDE CONTENT WAS  
NOTED IN WATER FROM THE LLOYD AQUIFER, EXCEPT WHERE LEAKY CASINGS  
PERMITTED DOWNWARD FLOW OF SALTY WATER. (KNAPP-USGS)

FIELD 02L, 05B, 04B

ACCESSION NO. W71-04976

GEOHYDROLOGY OF THE SHALLOW AQUIFERS OF BATON ROUGE, LOUISIANA,

LOUISIANA STATE UNIV., BATON ROUGE. WATER RESOURCES RESEARCH INST.

CHARLES G. SMITH, JR.

LOUISIANA WATER RESOURCES RESEARCH INSTITUTE BULLETIN GT-4, LOUISIANA STATE UNIVERSITY, OCTOBER 1969. 31 P, 14 FIG, 1 TAB, 19 REF. OWRR PROJECTS A-004-LA (4) AND B-002-LA (2).

DESCRIPTORS:

\*HYDROGEOLOGY, \*AQUIFERS, \*GROUNDWATER, \*SALINE WATER INTRUSION, \*LOUISIANA, WATER POLLUTION SOURCES, AQUIFER CHARACTERISTICS, PUMPING, WATER YIELD, WATER QUALITY, HYDROLOGIC DATA, HYDROLOGY, WATER WELLS, CHEMICAL ANALYSIS, CHLORIDES, INDUSTRIAL WATER, DRAWDOWN, GROUNDWATER RECHARGE.

IDENTIFIERS:

\*BATON ROUGE(LA).

ABSTRACT:

THE GEOHYDROLOGY OF THE 10 MAJOR AQUIFERS IN THE BATON ROUGE, LOUISIANA AREA WAS STUDIED IN ORDER TO DETERMINE THE THREAT OF SALT-WATER INTRUSION TO INDUSTRIAL WATER SUPPLIES. THE '400-FT' AND '600-FT' SANDS FURNISH 22% OF THE ANNUAL GROUNDWATER WITHDRAWAL FROM THE AQUIFERS. SALT WATER HAS BEEN ADVANCING NORTHWARD TOWARD THE INDUSTRIAL CENTER IN THE '600-FT' SAND AS A RESULT OF HYDRAULIC GRADIENTS CREATED BY INDUSTRIAL GROUNDWATER PUMPAGE. THREE MILES SOUTH OF THIS AREA, THE BATON ROUGE FAULT OBSTRUCTS THE FLOW OF WATER FROM THE SOUTH SIDE OF THE FAULT. APPARENTLY THE SALT WATER INTRUDING THE INDUSTRIAL WELLS WAS TRAPPED IN THE '600-FT' SAND NORTH OF THE FAULT AND AN UNKNOWN DISTANCE WEST OF THE MISSISSIPPI RIVER. THE '400-600 FT' AQUIFER COMPLEX WAS NOT AFFECTED TO ANY EXTENT BY THE DENHAM SPRINGS FAULT IMMEDIATELY NORTH OF THE CITY. LOCAL PINCHOUTS OF THE TWO AQUIFERS OBSTRUCT FLOW NORTH AND SOUTHWEST OF THE INDUSTRIAL AREA. THE MISSISSIPPI RIVER INDIRECTLY REPLENISHES THE '400-600 FT' COMPLEX WEST OF THE RIVER THROUGH THE 'UNIVERSITY SAND.' REMOVAL OF THE SALT WATER NORTH OF THE FAULT WILL RESULT IN NATURAL REPLENISHMENT WITH FRESH WATER. (WOODARD-USGS)

FIELD 02F, 05B

ACCESSION NO. W71-06505



ON THE MANAGEMENT OF GROUNDWATER IN COASTAL AQUIFERS,

NORTH CAROLINA STATE UNIV., RALEIGH. DEPT. OF CIVIL ENGINEERING.

ABDEL-AZIZ I. KASHEF.

GROUNDWATER, VOL 9, NO 2, P 12-20, MARCH-APRIL 1971. 9 P, 56 REF.

DESCRIPTORS:

\*REVIEWS, \*WATER MANAGEMENT(APPLIED), \*GROUNDWATER, \*WATER RESOURCES  
DEVELOPMENT, \*SALINE WATER INTRUSION, WITHDRAWAL, DRAWDOWN, SEA WATER,  
COASTS, AQUIFERS.

IDENTIFIERS:

COASTAL AQUIFERS.

ABSTRACT:

GROUNDWATER MANAGEMENT IN COASTAL AQUIFERS IS AN IMPORTANT PHASE IN  
WATER RESOURCES ESPECIALLY IN THE OPERATION OF EXISTING COASTAL WELLS  
OR IN PLANNING NEW COASTAL WELL FIELDS. BASIC RESEARCH TO EVALUATE  
PROPERLY THE VARIOUS ELEMENTS OF SOUND MANAGEMENT SHOULD NOT BE  
OVERLOOKED. BASIC RESEARCH IS STILL NEEDED TO STUDY THE ROOTS OF THE  
PROBLEM. AQUIFERS SHOULD BE STUDIED AS HYDROGEOLOGIC UNITS FOR THE  
BENEFIT OF ALL INTERESTED PARTIES. ECONOMIC AND LEGAL DECISIONS HAVE TO  
BE MADE TO ESTABLISH PRIORITIES AND ALLOTMENTS. EXTENSIVE BASIC  
RESEARCH IS NEEDED IN SALT-WATER ENCROACHMENT. EXTENSIVE RESEARCH IS  
NEEDED TO SOLVE MANY OF THE WATER RECHARGE AND LEAKAGE PROBLEMS.  
(KNAPP-USGS)

FIELD 04B, 02F, 02L

ACCESSION NO. W71-07005

THE EFFECTS OF RETURN IRRIGATION WATER ON THE BASAL LENS IN KAHUKU PLANTATION,  
OAHU AND PIONEER MILL AND HAWAIIAN COMMERCIAL AND SUGAR COMPANY PLANTATIONS  
ON MAUI,

HAWAII UNIV., HONOLULU.

PEDRO A. TENORIO.

M. S. THESIS, HAWAII UNIVERSITY, AUG 1970. 176 P, 66 FIG, 7 TAB, 54 REF,  
APPEND. PROJECT B-012-HI (2).

DESCRIPTORS:

\*WATER POLLUTION SOURCES, \*WATER POLLUTION EFFECTS, \*RETURN FLOW,  
\*SALINE WATER INTRUSION, \*HAWAII, IRRIGATION WATER, WATER CHEMISTRY,  
SOLUTES, NITRATES, SALINITY, WITHDRAWAL, GROUNDWATER, GROUNDWATER  
MOVEMENT, LEACHING, INFILTRATION, WATER QUALITY.

IDENTIFIERS:

OAHU(HAWAII), MAUI(HAWAII).

ABSTRACT:

THE EFFECTS OF IRRIGATION RETURN WATER ON THE QUALITY OF THE BASAL  
GROUNDWATER BODIES WERE IDENTIFIED AND DESCRIBED IN 3 AREAS ON THE  
ISLANDS OF OAHU AND MAUI. PRESENTLY, ALL THREE AREAS ARE PLANTED WITH  
SUGARCANE. LEACHING OF FERTILIZER COMPONENTS, PRINCIPALLY NITRATE AND  
SULFATE, INTO THE BASAL AQUIFER OCCURS AS A RESULT OF IRRIGATION WATER  
APPLICATION OVER THE FIELDS. EXCESSIVE WITHDRAWALS OF THE BASAL WATER  
IN SIMPLE GHYBEN-HERZBERG LENS ACCELERATES SALINE WATER INTRUSION. ALL  
OF THE IRRIGATION WATER SOURCES FROM THE THREE AREAS ARE SUITABLE FOR  
THE IRRIGATION OF SUGARCANE CROP. (KNAPP-USGS)

FIELD 05C, 05B

ACCESSION NO. W71-08044

RECLAMATION OF WASTE WATER FOR WELL INJECTION,

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, CALIF.; AND CALIFORNIA INST. OF TECH., PASADENA, W. M. KECK LAB. OF ENVIRONMENTAL HEALTH ENGINEERING.

JOHN K. MITCHELL, AND WILLIAM R. SAMPLES.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, CALIFORNIA, FEB 1967. 250 P, 32 FIG, 57 TAB, 14 REF. PARTIALLY SUPPORTED BY A RESEARCH GRANT BY THE US PUBLIC HEALTH SERVICE.

DESCRIPTORS:

\*WATER REUSE, \*INJECTION, \*TERTIARY TREATMENT, \*FILTERS, \*WASTE WATER TREATMENT, \*RECHARGE WELLS, INJECTION WELLS, CALIFORNIA, GROUNDWATER, SALINE WATER INTRUSION, WATER PURIFICATION, SEWAGE TREATMENT, WATER SUPPLY, RECLAIMED WATER, ON-SITE INVESTIGATIONS.

IDENTIFIERS:

\*LOS ANGELES, HYPERION PLANT.

ABSTRACT:

THE LOS ANGELES FLOOD CONTROL DISTRICT REPORTS ITS INVESTIGATION OF HIGH-RATE TREATMENT FACILITIES TO POLISH STANDARD-RATE ACTIVATED SLUDGE EFFLUENT TO MAKE IT SUITABLE FOR USE AS A WATER SUPPLY FOR RECHARGE THROUGH INJECTION WELLS. PREVIOUS TESTING BY THE DISTRICT USING SLOW SAND FILTRATION FOR HYPERION EFFLUENT INDICATED THAT A SATISFACTORY WATER COULD BE PROVIDED. DUE TO THE UNAVAILABLE LARGE LAND AREA REQUIRED BY THIS SYSTEM, THE PRESENT TEST WAS UNDERTAKEN TO DEMONSTRATE THE POTENTIAL OF HIGH RATE FILTRATION. THE INVESTIGATION CONDUCTED AT THE CITY OF LOS ANGELES HYPERION TREATMENT PLANT HAD THREE BASIC PHASES. FIRST WAS TERTIARY TREATMENT TO POLISH THE STANDARD RATE ACTIVATED SLUDGE EFFLUENT. THE FACILITIES USED FOR THIS CONSISTED OF PARALLEL OPERATION OF A RAPID SAND FILTER, PRESSURE SAND FILTER, AND A DIATOMACEOUS EARTH FILTER. SECOND, THE POLISHED WATER FROM ONE OF THE FILTERS WAS STORED IN A RESERVOIR AND THEN RECHARGED INTO A TEST SITE INJECTION WELL. THIRD, OBSERVATION WELLS WERE USED TO MONITOR THE WATER QUALITY AS IT MOVED THROUGH THE UNDERGROUND AQUIFER. EITHER RAPID SAND FILTRATION WITH PRETREATMENT OR DIATOMACEOUS EARTH FILTRATION CAN BE USED TO PRODUCE WATER FROM HYPERION SECONDARY EFFLUENT WHICH IS ACCEPTABLE FOR INJECTION. THE ESTIMATED COST IS \$24 PER ACRE-FOOT. FURTHER TESTING OF WATER RECLAMATION AND INJECTION, ON A LARGER SCALE, IS RECOMMENDED. IT IS SUGGESTED THAT THE DISTRICT COOPERATE WITH OTHER AGENCIES TO MAKE RECLAIMED WATER AVAILABLE FOR OPERATION OF THE FRESH WATER BARRIERS WHICH ARE MAINTAINED TO PREVENT SEA WATER INTRUSION. (POERTNER)

FIELD 050, 048

ACCESSION NO. W71-08124

SEA-WATER INTRUSION: BOLSA-SUNSET AREA, ORANGE COUNTY,

CALIFORNIA DEPT. STATE OF WATER RESOURCES, SACRAMENTO.

JOHN R. CUMMINGS, AND CHESTER A. CARVILLE.

CALIFORNIA DEPARTMENT OF WATER RESOURCES BULLETIN NO 63-2, JAN 1968. 167 P,  
14 FIG, 14 PLATE, 16 TAB, 42 REF.

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*AQUIFERS, \*CALIFORNIA, GROUNDWATER MOVEMENT,  
PATH OF POLLUTANTS, WITHDRAWAL, CHLORIDES, SALINITY, SEA WATER, CONNATE  
WATER, AQUICLUDES, FAULTS(GEOLOGY), HYDROGEOLOGY, RECHARGE.

IDENTIFIERS:

\*ORANGE COUNTY(CALIF).

ABSTRACT:

THE BOLSA-SUNSET AREA, A 6.8-MILE-LONG STRIP OF ALLUVIAL-TIDAL FLATS  
AND LOW STRUCTURAL HILLS AND MESAS, COMPRISES 55% OF THE PACIFIC  
SHORELINE OF THE 330-SQUARE-MILE COASTAL PLAIN OF ORANGE COUNTY,  
CALIFORNIA. FRESH CONFINED GROUNDWATERS CONTAINING LESS THAN 50 PPM  
CHLORIDE OCCUR IN MODERATELY TO HIGHLY PERMEABLE EARLY RECENT,  
PLEISTOCENE, AND UPPER PLIOCENE SAND AND GRAVEL AQUIFERS LANDWARD OF  
THE ACTIVE NEWPORT-INGLEWOOD FAULT. THE FAULT, LOCATED 3,000 TO 5,500  
FEET INLAND FROM AND APPROXIMATELY PARALLEL TO THE COAST, FORMS A  
VARIABLE WATERTIGHT HYDRAULIC BARRIER ACROSS THE AREA, EXCEPT IN LATE  
RECENT DEPOSITS. PUMPING OF FRESH GROUNDWATER IN EXCESS OF RECHARGE  
CAUSED A 1945-57 DECLINE OF INLAND PIEZOMETRIC LEVELS TO ELEVATIONS OF  
30 AND 50 FEET BELOW SEA LEVEL IN THE UPPER AQUIFERS AND IN THE MAIN  
AQUIFER, RESPECTIVELY. INLAND AND DOWNWARD HEAD DIFFERENTIALS CAUSED  
INTRUSION OF SALINE GROUNDWATERS THROUGH PERMEABLE PORTIONS OF THE  
FAULT BARRIER AND THROUGH DISCONTINUITIES IN THE UPPER AQUICLUDE.  
ARTIFICIAL RECHARGE TO THE BASIN FOREBAY AND A PARTIAL REDUCTION IN  
PUMPING CAUSED A RECOVERY OF PIEZOMETRIC LEVELS DURING 1959-65.  
FRESHWATER HEADS REACHED SEA LEVEL IN LATE 1964 AND SEASONAL ARTESIAN  
FLOW HAS EXISTED SINCE. ION CONCENTRATIONS OF GROUNDWATERS DEGRADED BY  
SEA WATER INTRUSION, OIL FIELD BRINES AND SEMIPERCHED WATER HAVE  
DECREASED FROM PEAK LIMITS REACHED IN 1961-62. INTRUSION AND BRINE  
WEDGES HAVE RETREATED OR HAVE BECOME STABILIZED. (KNAPP-USGS)

FIELD 05B, 02F

ACCESSION NO. W71-08527

HYDROLOGY OF THE PAMLICO ESTUARY IN THE STATE OF NORTH CAROLINA,  
PRINCETON UNIV., N.J. DEPT. OF CIVIL AND GEOLOGICAL ENGINEERING.  
ROGER J. M. DE WIEST.

IN: HYDROLOGY OF DELTAS, VOL 2, PROCEEDINGS OF THE BUCHAREST SYMPOSIUM, MAY 6-14, 1969: INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY-UNESCO CO-EDITION, P 375-385, 1970. 11 P, 3 FIG, 2 TAB, 7 REF. (ALSO PUBLISHED IN IASH PUBLICATION NO 91, 1970).

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*SURFACE-GROUNDWATER RELATIONSHIPS, \*INDUCED INFILTRATION, \*HYDROGEOLOGY, \*NORTH CAROLINA, WATER QUALITY, DRAWDOWN, LIMESTONES, ESTUARIES, MINING, MINE DRAINAGE, MINE WATER.

IDENTIFIERS:

\*PAMLICO ESTUARY(NC).

ABSTRACT:

THE OPEN PIT MINING OF LARGE PHOSPHATE DEPOSITS ALONG THE PAMLICO RIVER ESTUARY IN BEAUFORT COUNTY, NORTH CAROLINA, REQUIRES PUMPING WATER FROM AN UNDERLYING AQUIFER, THE CASTLE HAYNE FORMATION, AT THE RATE OF ABOUT 65 MILLION GALLONS PER DAY. BECAUSE OF SEAWATER ENCROACHMENT IN ESTUARIES, THE WATER IN THE PAMLICO ESTUARY IS OFTEN BRACKISH, SOMETIMES RUNNING FROM ABOUT 6,000 TO 8,000 PPM OF CHLORIDE. UNDER NORMAL CIRCUMSTANCES THE ESTUARY IS FRESHENED NOTABLY BY THE SEEPAGE OF GROUNDWATER. DRAWDOWN OF THE PIEZOMETRIC LEVEL OF THE AQUIFER AT THE SITE OF THE PHOSPHATE MINE MIGHT REVERSE THE HYDRAULIC GRADIENT AND CHANGE THE UPWARD LEAKAGE INTO DOWNWARD LEAKAGE, WITH A RESULTING CONTAMINATION OF THE CASTLE HAYNE AQUIFER BY BRACKISH WATER FROM THE ESTUARY. THE EXTENT TO WHICH SUCH CONTAMINATION WOULD OCCUR, WHETHER IT WOULD BE LOCALIZED AND LIMITED TO THE SITE OF THE MINE OR WHETHER IT WOULD SPREAD AND RADIATE FROM THE CENTER OF PUMPING WAS DETERMINED BY MEANS OF A STUDY OF THE HYDROLOGIC RELATIONSHIPS BETWEEN SURFACE WATER AND GROUNDWATER. (KNAPP-USGS)

FIELD 02L, 02F

ACCESSION NO. W71-10050

CONSERVATION COMMITTEE TO PREVENT POLLUTION OF WATERS BY OIL INDUSTRY.

REVISED CODE OF WASHINGTON ANN SECS 78.52.020, 78.52.160 (1962).

DESCRIPTORS:

\*WASHINGTON, \*OIL INDUSTRY, \*WATER POLLUTION, \*WATER POLLUTION CONTROL, OIL, OIL WELLS, OIL WASTES, SALINE WATER INTRUSION, WATER POLLUTION SOURCES, LEGAL ASPECTS, WATER LAW, LEGISLATION, ADMINISTRATIVE AGENCIES, ADMINISTRATION.

ABSTRACT:

AN OIL AND GAS CONSERVATION COMMITTEE IS CREATED BY THIS ACT. THE AUTHORITY OF THIS COMMITTEE WITH RESPECT TO WATER POLLUTION CONTROL INCLUDES: (1) REQUIRING THAT DRILLING, CASING, OPERATING AND PLUGGING OF OIL AND GAS WELLS BE DONE SO AS TO PREVENT POLLUTION OF FRESH WATER SUPPLIES BY OIL, GAS, OR SALT WATER; AND (2) REQUIRING SURETY BONDS TO INSURE THE SEALING OF EACH DRY OR ABANDONED WELL. (MADSEN-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-10073

WHITE V EDGERLY PETROLEUM CO (POLLUTION OF RICE CROP BY SALINE WATER FROM OIL WELL).

4 LA APP 20-22 (1925).

DESCRIPTORS:

\*LOUISIANA, \*SALINE WATER, \*SALINE WATER INTRUSION, \*RICE, OIL WELLS, OIL INDUSTRY, OIL WASTES, WATER POLLUTION SOURCES, DAMAGES, FARMS, AGRICULTURE, WATER POLLUTION EFFECTS.

ABSTRACT:

PLAINTIFF FARMOWNER SUED DEFENDANT PETROLEUM COMPANY FOR DAMAGES CAUSED BY SALT WATER IN A BAYOU ADJACENT TO HIS FARM. PLAINTIFF PLANTED A RICE CROP AND PUMPED WATER FROM THE BAYOU FOR IRRIGATION. THE WATER IN THE BAYOU HAD BEEN CONTAMINATED WITH SALT WATER FROM DEFENDANT'S OIL WELL, AND PLAINTIFF'S RICE CROP WAS DESTROYED. DEFENDANT CONTENDED ON APPEAL THAT THE EVIDENCE WAS INSUFFICIENT TO SHOW THAT IT WAS RESPONSIBLE FOR PLAINTIFF'S LOSS. HOWEVER, THE LOUISIANA COURT OF APPEALS AFFIRMED, HOLDING THAT THE EVIDENCE AMPLY SUPPORTED THE LOWER COURT'S VERDICT FOR PLAINTIFF. (HART-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-10205

REGULATION OF OIL AND GAS WELLS.

KANSAS STATUTES ANN SECS 55-115 THRU 55-142 (1964).

DESCRIPTORS:

\*KANSAS, \*OIL WELLS, \*WELL REGULATIONS, \*POLLUTION ABATEMENT, WATER POLLUTION SOURCES, LEGISLATION, LEGAL ASPECTS, CASINGS, DRILLING, REGULATION, SALINE WATER INTRUSION, SUBSURFACE WATERS, WELL PERMITS, INJECTION WELLS, RECHARGE WELLS, ROTARY DRILLING, CONSERVATION, NATURAL RESOURCES, WATER POLLUTION CONTROL.

ABSTRACT:

ANY OIL OR GAS WELL OPERATOR MUST CASE OR PLUG HIS WELL SO AS TO PREVENT: (1) WATER INTRUSION INTO OIL OR GAS-BEARING ROCK, (2) SALT OR MINERAL WATER INTRUSION INTO WATER SUITABLE FOR DOMESTIC USE, AND (3) SALT WATER, OIL, OR OTHER REFUSE FROM ESCAPING BY OVERFLOW OR SEEPAGE. REGULATIONS FOR DRILLING AND ABANDONMENT OF CERTAIN HOLES AND WELLS TO PREVENT POLLUTION OF NATURAL RESOURCES ARE SPECIFIED. A LICENSE IS REQUIRED TO ENGAGE IN THE BUSINESS OF DRILLING SEISMIC OR CORE HOLES OR PLUGGING WELLS. THE PROCEDURES FOR OBTAINING A LICENSE AS WELL AS THE GROUNDS FOR SUSPENDING OR REVOKING A LICENSE ARE SET OUT. THE CORPORATION COMMISSION IS AUTHORIZED TO ASSESS THE COSTS OF ENFORCING CERTAIN PROVISIONS OF THE ACT. IN ABANDONING A WELL, ALL OPERATING STRUCTURES MUST BE REMOVED AS A MATTER OF PUBLIC POLICY. BEFORE USING SECONDARY RECOVERY METHODS OF WATER FLOODING OR REPRESSURING, AN OPERATOR MUST HAVE HIS APPLICATION APPROVED. REGULATIONS DESIGNED TO PREVENT POLLUTION OF FRESH WATER ARE ESTABLISHED FOR THE ABANDONMENT OF WELLS DRILLED WITH CABLE TOOLS OR ROTARY EQUIPMENT. INVESTIGATION AND PLUGGING OF ABANDONED WELLS LIKELY TO CAUSE POLLUTION IS AUTHORIZED. (GALLAGHER-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-10440



POLLUTION OF UNDERGROUND WATER.

WYOMING STATUTES SECS 41-121, 41-126 (1959).

DESCRIPTORS:

\*WYOMING, \*GROUNDWATER, \*WATER POLLUTION, \*WATER POLLUTION CONTROL, POLLUTION ABATEMENT, SUBSURFACE WATERS, PERCOLATING WATER, UNDERGROUND, WELLS, SALINE WATER INTRUSION, WATER POLLUTION SOURCES, MINERALOGY, INDUSTRIAL WASTES, MUNICIPAL WASTES, SEWAGE, WATER QUALITY CONTROL, WATER POLLUTION TREATMENT, ADMINISTRATIVE AGENCIES, LEGISLATION, PUBLIC HEALTH, REGULATION, LEGAL ASPECTS, ADMINISTRATION.

ABSTRACT:

AN ACT RELATING TO UNDERGROUND WATER PROVIDES THAT POLLUTION OF UNDERGROUND WATER MEANS ANY IMPAIRMENT OF THE NATURAL QUALITY OF SUCH WATER, HOWEVER CAUSED, INCLUDING IMPAIRMENT BY SALINES, MINERALS, INDUSTRIAL WASTES, DOMESTIC WASTES, OR SEWAGE. UNDERGROUND WATER REFERS TO ANY WATER BENEATH THE SURFACE OF THE LAND OR THE BED OF ANY STREAM, LAKE, OR OTHER BODY OF SURFACE WATER. IN THE ADMINISTRATION AND ENFORCEMENT OF THIS ACT THE STATE ENGINEER IS AUTHORIZED TO REQUIRE THE ABATEMENT OF ANY CONDITION, OR THE SEALING OF ANY WELL, RESPONSIBLE FOR ADMITTING POLLUTING MATERIALS INTO AN UNDERGROUND WATER SUPPLY, AND IS FURTHER AUTHORIZED TO PERFORM NECESSARY DUTIES RELATING TO INVESTIGATION, REGULATION, AND CONSTRUCTION OF WELLS IN ORDER TO CONSERVE THE STATE'S UNDERGROUND WATER RESOURCES. (SMILJANICH-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-10446

MAGNITUDE OF INTERFACIAL SHEAR IN EXCHANGE FLOW,

WATERLOOPKUNDIG LABORATORIUM, DELFT (NETHERLANDS).

G. ABRAHAM, AND W. D. EYSINK.

TEXT IN ENGLISH AND FRENCH. JOURNAL OF HYDRAULIC RESEARCH, VOL 9, NO 2, P 125-151, 1971. 27 P, 17 FIG, 2 TAB, 13 REF.

DESCRIPTORS:

\*STRATIFIED FLOW, \*SALINE WATER INTRUSION, \*LOCKS, \*INTERFACES, \*SHEAR DRAG, FLOW RESISTANCE, SALINE WATER-FRESHWATER INTERFACES, SHEAR, HYDRAULIC MODELS, MODEL STUDIES, VISCOSITY, REYNOLDS NUMBER.

IDENTIFIERS:

INTERFACIAL SHEAR.

ABSTRACT:

IN STRATIFIED FLOWS THE INTERFACIAL SHEAR CAN BE EXPRESSED AS A FUNCTION OF THE RELATIVE VELOCITY BETWEEN BOTH LAYERS (SQUARED), THE MEAN DENSITY OF FLUIDS INVOLVED, AND THE DIMENSIONLESS INTERFACIAL SHEAR STRESS COEFFICIENT. THIS HOLDS BOTH FOR ANALYTICAL SOLUTIONS AS WELL AS FOR SOLUTIONS BY MEANS OF A HYDRAULIC MODEL. FOR INSTANCE ANALYTICAL EXPRESSIONS FOR THE LENGTH OF AN ARRESTED SALT WEDGE SHOW THE LENGTH OF THE WEDGE TO BE INVERSELY PROPORTIONAL TO THE MAGNITUDE OF THE INTERFACIAL SHEAR STRESS COEFFICIENT. THE SCALE TO BE SELECTED FOR A HYDRAULIC MODEL OF AN ARRESTED SALT WEDGE DEPENDS UPON THE RATIO OF THE INTERFACIAL SHEAR STRESS COEFFICIENT IN MODEL AND PROTOTYPE. IN THIS PAPER AN EXPERIMENTAL RELATIONSHIP BETWEEN THE INTERFACIAL SHEAR STRESS COEFFICIENT AND THE REYNOLDS NUMBER IS GIVEN FOR THE CASE OF LOCK EXCHANGE FLOWS. THIS RELATIONSHIP IS OBTAINED FROM AN ANALYSIS OF EXPERIMENTAL DATA FROM EXPERIMENTS PERFORMED BY THE DELFT HYDRAULICS LABORATORY. (KNAPP-USGS)

FIELD 08B, 02L

ACCESSION NO. W71-10469

LIABILITY FOR POLLUTION OF SURFACE AND UNDERGROUND WATERS,

JOHN D. KNODELL, JR.

ROCKY MOUNTAIN MINERAL LAW INSTITUTE, VOL 12, P 33-99, 1967, 67 P, 273 REF.

DESCRIPTORS:

\*WATER POLLUTION CONTROL, \*JUDICIAL DECISIONS, \*ADJUDICATION PROCEDURE, \*POLLUTION ABATEMENT, SURFACE WATERS, SUBSURFACE WATERS, WATER QUALITY CONTROL, LEGISLATION, ADMINISTRATIVE AGENCIES, REGULATION, WATER POLLUTION EFFECTS, INDUSTRIAL WASTES, CHEMICAL WASTES, OIL WASTES, SALINE WATER INTRUSION, PERCOLATING WATER, WATER LAW, LEGAL ASPECTS, RISKS, RIPARIAN RIGHTS, PRIOR APPROPRIATION, DAMAGES, RELATIVE RIGHTS, INSTITUTIONAL CONSTRAINTS, NON-STRUCTURAL ALTERNATIVES.

ABSTRACT:

THE DEVELOPMENT OF LIABILITY FOR THE POLLUTION OF SURFACE AND UNDERGROUND WATER IS EXAMINED IN THIS ARTICLE. THE THEORIES OF LIABILITY DISCUSSED INCLUDE: (1) THE DOCTRINE OF ABSOLUTE LIABILITY, (2) NEGLIGENCE, (3) ABSOLUTE LIABILITY OR NEGLIGENCE PER SE IMPOSED BY STATUTE OR REGULATORY RULE, (4) NUISANCE, AND (5) THE RIPARIAN OR APPROPRIATIVE RIGHT TO UNIMPAIRED WATER QUALITY. LIABILITY FOR THE POLLUTION OF SUBTERRANEAN WATER IS LESS CLEAR THAN THAT FOR SURFACE WATER BECAUSE, UNDER THE COMMON LAW, THE RIGHT TO CONSUME UNDERGROUND WATER GIVES THE RIGHT TO POLLUTE. MOREOVER, THE POLLUTION OF UNDERGROUND STREAMS HAS BEEN ARTIFICIALLY DISTINGUISHED FROM POLLUTION BY PERCOLATION. TO IMPOSE LIABILITY ON MULTIPLE POLLUTERS NOT ACTING IN CONCERT, SOME STATES STATUTORILY IMPOSE JOINT LIABILITY UPON EACH POLLUTER. DEFENSES UTILIZED BY POLLUTERS INCLUDE: (1) LACK OF CAUSATION, (2) PLAINTIFF'S STATUS AS A TRESPASSER, AND (3) A CONTRACTUAL RIGHT TO POLLUTE. THE AUTHOR ALSO CONSIDERS: (1) STATUTES OF LIMITATIONS, (2) CONTRIBUTORY FAULT, (3) THE RELIEF TO WHICH A PLAINTIFF IS ENTITLED, AND (4) FUTURE TRENDS IN POLLUTION LAW AS EVIDENCED BY FEDERAL AND STATE STATUTES AND TRENDS IN COURT DECISIONS. (REES-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W71-10904

THE RAILROAD COMMISSION LOOKS AT POLLUTION,

JIM C. LANGDON.

SOUTH TEXAS LAW JOURNAL, VOL 8, P 179-187 (1966). 8 P, 10 REF.

DESCRIPTORS:

\*TEXAS, \*WATER POLLUTION CONTROL, \*ADMINISTRATIVE AGENCIES, \*OIL INDUSTRY, OIL WELLS, POLLUTION ABATEMENT, WATER POLLUTION, IMPAIRED WATER QUALITY, STANDARDS, WASTES, WATER CONSERVATION, WATER QUALITY ACT, REGULATION, SALINE WATER, WATER POLLUTION SOURCES, SALINE WATER INTRUSION, GROUNDWATER, WELL REGULATIONS, OIL FIELDS, OIL WASTES, SECONDARY RECOVERY(OIL), FEDERAL GOVERNMENT, LEGISLATION.

ABSTRACT:

POLLUTION ABATEMENT IS EXAMINED IN THIS ARTICLE IN RELATION TO THE OIL AND GAS INDUSTRY OF TEXAS. STATE REGULATION OF THE INDUSTRY IS TRACED FROM ITS BEGINNINGS IN 1899. EMPHASIS IS PLACED UPON THE TEXAS RAILROAD COMMISSION'S ROLE IN POLLUTION CONTROL. THE FEDERAL ROLE IN THIS AREA IS LIKEWISE DISCUSSED WITH EMPHASIS UPON THE FEDERAL WATER POLLUTION CONTROL ACT AND THE WATER QUALITY ACT OF 1965. JURISDICTIONAL DIFFICULTIES BETWEEN THE RAILROAD COMMISSION AND THE TEXAS WATER POLLUTION CONTROL BOARD OVER OIL AND GAS REGULATION ARE TRACED TO THEIR PRESENT STATUS WHICH FINDS COMPLETE CONTROL IN THE COMMISSION. POLICY GUIDELINES FOR FUTURE COMMISSION ACTIONS ARE SET FORTH ALONG WITH SPECIFIC OPERATIONAL GUIDELINES IN SUCH AREAS AS: DRILLING AND COMPLETION OPERATIONS, PLUGGING AND ABANDONMENT OPERATIONS, SURFACE DISPOSAL OF PRODUCED OIL FIELD WATERS, SUBSURFACE DISPOSAL OF PRODUCED OIL FIELD WASTES, AND SECONDARY RECOVERY AND PRESSURE MAINTENANCE PROJECTS. FINALLY, VARIOUS POTENTIAL LEGAL PROBLEMS IN THE FIELD OF POLLUTION ABATEMENT BY THE COMMISSION ARE SET OUT FOR CONSIDERATION. (HORWITZ-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W71-10916

THE TRIAL OF A WATER POLLUTION CASE (LIABILITY FOR POLLUTION OF SUBTERRANEAN WATERS),

EARL R. ALLISON, AND DWIGHT R. MANN.

BAYLOR LAW REVIEW, VOL 13, P 199-224 (1961). 26 P, 76 REF.

DESCRIPTORS:

\*ADJUDICATION PROCEDURE, \*SUBSURFACE WATERS, \*WATER POLLUTION CONTROL, \*OIL INDUSTRY, TEXAS, LEGAL ASPECTS, JUDICIAL DECISIONS, SALINE WATER INTRUSION, WATER LAW, WATER RIGHTS, COMPETING USES, CIVIL LAW, LEGISLATION, WATER POLLUTION, POLLUTION ABATEMENT, WELLS, OIL WELLS, DRILLING, GROUNDWATER, LEASES, REGULATION.

ABSTRACT:

PROBLEMS AND DUTIES RELATING TO THE POLLUTION OF SUBTERRANEAN WATER BY AN OIL OPERATOR ARE EXAMINED IN THIS ARTICLE WITH PARTICULAR REGARD TO THE PRACTICAL, AS WELL AS THE LEGAL, ASPECTS OF THE PROBLEM. TEXAS CASES DEVELOPING THE DOCTRINES WHICH IMPOSE LEGAL LIABILITY UPON OIL PRODUCERS FOR SUCH POLLUTION ARE PUT FORTH AND DEAL WITH BOTH ADJACENT LANDOWNERS AND LESSEE-LESSOR SUITS. THE EFFECT OF RULE 20 OF THE TEXAS RAILROAD COMMISSION IN LIABILITY OF OIL PRODUCERS FOR SUBTERRANEAN WATER POLLUTION IS ALSO CONSIDERED. THE TWO PRINCIPAL DEFENSES AVAILABLE IN SUCH ACTIONS, LIMITATIONS AND INCURRED RISK, ARE ANALYZED AND CONSIDERED IN RELATION TO NOT ONLY TEXAS CASES BUT THOSE OF OTHER STATES AS WELL. THE VARIOUS PRACTICAL STEPS TO BE FOLLOWED IN ORDER TO DETERMINE IF THE INJURED PARTY HAS A CAUSE OF ACTION ARE ALSO EXAMINED. (HORWITZ-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W71-10917

SALE OR DISPOSAL OF SALT WATER FOR POLLUTION CONTROL.

TEXAS CIVIL STATUTES ANN ART 7621F (SUPP 1970).

DESCRIPTORS:

\*TEXAS, \*WATER POLLUTION CONTROL, \*WATER DISTRICTS, \*SALINE WATER INTRUSION, SALINE WATER, FINANCING, LEGISLATION, LEGAL ASPECTS, WATER LAW, ADMINISTRATION, ADMINISTRATIVE AGENCIES, WATER POLLUTION, WATER POLLUTION SOURCES, GOVERNMENT FINANCE, STATE GOVERNMENTS, COSTS, PIPELINES, PIPES, PIPING SYSTEMS(MECHANICAL), PUMPS, POLLUTION ABATEMENT, SALINE WATER-FRESHWATER INTERFACES, CONTRACTS.

ABSTRACT:

ANY WATER POWER CONTROL DISTRICT IS AUTHORIZED TO CONTRACT FOR THE SALE OR DISPOSAL OF SALT WATER WHEN NECESSARY FOR POLLUTION CONTROL PURPOSES. IF IT IS NECESSARY TO GUARANTEE A CONSTANT FLOW OF WATER IN ORDER TO EFFECT THE SALE OR DISPOSAL OF SALT WATER, FRESH WATER MAY BE SOLD OR DISPOSED OF TO THE EXTENT NECESSARY TO ACHIEVE POLLUTION CONTROL. WATER POWER CONTROL DISTRICTS ARE AUTHORIZED TO ISSUE REVENUE BONDS, WITHOUT AN ELECTION, FOR THE CONSTRUCTION AND ACQUISITION OF PIPE LINES, PUMPS, AND ALL FACILITIES NECESSARY FOR THE SALE OR DISPOSAL OF SALT WATER FOR POLLUTION CONTROL. DETAILS AND REQUIREMENTS FOR THE ISSUANCE OF SUCH BONDS ARE SET FORTH. WATER POWER CONTROL DISTRICTS ARE AUTHORIZED TO ACCEPT ANY POLLUTION CONTROL WORKS OR FACILITIES PROVIDED BY NON-PROFIT CORPORATIONS THROUGH THE ISSUANCE OF BONDS. (ROBINSON-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-10939

ENFORCEMENT OF WATER POLLUTION LAWS IN OKLAHOMA.

OKLAHOMA LAW REVIEW, VOL 22, NO 3, P 317-345 (1969). 29 P, 180 REF.

DESCRIPTORS:

\*OKLAHOMA, \*WATER POLLUTION SOURCES, \*ADMINISTRATIVE AGENCIES, \*POLLUTION ABATEMENT, WATERCOURSES(LEGAL), SURFACE WATERS, GROUNDWATER, WATER SUPPLY, WATER REUSE, WATER SOURCES, INDUSTRIAL WASTES, FARM WASTES, SEWAGE, WASTE DISPOSAL, WASTE TREATMENT, WATER USERS, WATER QUALITY, STANDARDS, WILDLIFE CONSERVATION, OIL INDUSTRY, SALINE WATER INTRUSION, TOXINS, SEDIMENTS, ON-SITE INVESTIGATIONS, HYDROLOGIC CYCLE.

ABSTRACT:

THE ARTICLE EXAMINES FIRST THE FACTORS DETERMINING THE NATURE AND EXTENT OF WATER POLLUTION: (1) THE CHARACTER OF THE STATE'S WATER RESOURCES, THEIR QUALITY, QUANTITY, AND AVAILABILITY; AND (2) THE CAUSES OF WATER POLLUTION CATEGORIZED INTO THE PETROLEUM AND OTHER INDUSTRIES, AGRICULTURE, AND MUNICIPAL WASTES. THE SECOND SECTION OF THE ARTICLE EXAMINES WATER POLLUTION LAW AS IMPLEMENTED BY CASE LAW, LEGISLATION, OR REGULATORY AGENCIES' RULES. PRIVATE REMEDIES ARE DISCUSSED IN REGARD TO: (1) INJURIES TO LAND AND CHATTELS; (2) NATURE OF DEFENDANT'S ACT; (3) NATURE OF RECOVERY; (4) PLAINTIFF'S STANDING; (5) DEFENSES; (6) INJURY TO WATER USE RIGHTS; AND (7) STATUTE OF LIMITATIONS. THE GROWTH OF A COMPREHENSIVE STATE ADMINISTRATIVE PROGRAM IS EXPLAINED. THERE ARE SIX AGENCIES WHICH ADMINISTER THIS PROGRAM: (1) THE POLLUTION CONTROL COORDINATING BOARD HAS VARIOUS COORDINATING FUNCTIONS; (2) THE WATER RESOURCES BOARD PERFORMS INDUSTRY PLANT INSPECTIONS; (3) THE CORPORATION COMMISSION REGULATES THE PETROLEUM INDUSTRY'S ACTIVITIES; (4) THE HEALTH DEPARTMENT REGULATES THE WATER SUPPLY AND SEWAGE DISPOSAL; (5) THE DEPARTMENT OF AGRICULTURE REGULATES PESTICIDES, AND (6) THE DEPARTMENT OF WILDLIFE CONSERVATION. (REES-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W71-10965

RECONNAISSANCE OF THE CHEMICAL QUALITY OF SURFACE WATERS OF THE COASTAL BASINS  
OF TEXAS,

GEOLOGICAL SURVEY, AUSTIN, TEX.

J. F. BLAKEY, AND H. L. KUNZE.

TEXAS WATER DEVELOPMENT BOARD REPORT 130, JUNE 1971. 49 P, 15 FIG, 10 TAB, 37  
REF.

DESCRIPTORS:

\*WATER QUALITY, COASTAL PLAINS, \*SURFACE WATERS, \*TEXAS, \*CHEMICAL  
ANALYSIS, STREAMS, RIVER BASINS, WATER CHEMISTRY, HYDROLOGIC DATA, DATA  
COLLECTIONS, REVIEWS, GEOLOGY, WATER POLLUTION, WATER SUPPLY, OILY  
WATER, SALINE WATER INTRUSION, STREAMFLOW, FLOW RATES.

IDENTIFIERS:

\*TEXAS COASTAL BASINS.

ABSTRACT:

THE EIGHT COASTAL BASINS IN TEXAS HAVE COMBINED DRAINAGE AREA OF MORE  
THAN 19,000 SQUARE MILES AND INCLUDE ALL OF THE 370 MILES OF THE COAST  
EXCEPT FOR A FEW MILES ACROSS THE MOUTHS OF THE MAJOR RIVERS. MOST OF  
THE COASTAL REGION IS A SMOOTH, FEATURELESS, DEPOSITIONAL PLAIN WITH  
ALTITUDES GENERALLY LESS THAN 200 FEET ABOVE MEAN SEA LEVEL. THE  
ACTIVITIES OF MAN ARE AFFECTING THE CHEMICAL QUALITY OF SURFACE WATERS  
IN THE COASTAL BASINS. LOW FLOWS IN MANY OF THE STREAMS ARE BEING  
DEGRADED TO SOME DEGREE BY OIL FIELD AND OTHER INDUSTRIAL WASTES AND BY  
IRRIGATION-RETURN FLOWS. SURFACE WATERS OF THE COASTAL BASINS ARE  
GENERALLY OF GOOD CHEMICAL QUALITY, AND IN STREAMS RECEIVING LITTLE OR  
NO MAN-MADE WASTES, THE DISSOLVED-SOLIDS CONCENTRATIONS ARE GENERALLY  
LESS THAN 250 MILLIGRAMS PER LITER. RECENT REGULATIONS OF THE RAILROAD  
COMMISSION OF TEXAS SHOULD REDUCE THE AMOUNT OF OIL-FIELD BRINES  
REACHING SURFACE-WATER COURSES. (WOODARD-USGS)

FIELD 02L, 02K, 07C, 05A

ACCESSION NO. W71-11354



REISERER V MURFIN (SALINE WATER INTRUSION OF FRESH WATER WELLS FROM OIL DRILLING OPERATIONS).

331 P2D 313-316 (KAN 1958).

DESCRIPTORS:

\*KANSAS, \*WATER WELLS, \*SALINE WATER INTRUSION, \*DRILLING, POLLUTION ABATEMENT, JUDICIAL DECISIONS, LEGAL ASPECTS, WATER POLLUTION, WATER POLLUTION SOURCES, WATER POLLUTION EFFECTS, WATER POLLUTION CONTROL, STATE GOVERNMENTS, STATE JURISDICTION, LEGISLATION, REGULATION, OIL WELLS, OIL WASTES, SALINE WATER, RELATIVE RIGHTS, WATER RIGHTS, REMEDIES.

ABSTRACT:

PLAINTIFF LANDOWNER SOUGHT TO RECOVER DAMAGES FOR POLLUTION OF FRESH WATER WELLS BY DRILLING OPERATIONS OF DEFENDANT OIL DRILLING COMPANY. PLAINTIFF OWNED LAND UPON WHICH TWO FRESH WATER WELLS SUPPLIED WATER FOR STOCK AND DOMESTIC CONSUMPTION. SHORTLY AFTER DEFENDANT STARTED OIL DRILLING OPERATIONS AND AS A RESULT OF THE PRESENCE OF SALT, SALT WATER, AND OTHER MINERALS THE QUALITY OF PLAINTIFF'S WELL WATER DETERIORATED UNTIL IT WAS NO LONGER SUITABLE FOR ITS PREVIOUS DOMESTIC AND LIVESTOCK USAGE. PLAINTIFF CLAIMED THAT THE POLLUTION WAS THE RESULT OF DEFENDANT'S DRILLING AND RELIED UPON STATUTORY PROVISIONS TO OBTAIN RELIEF. DEFENDANT APPEALED FROM THE TRIAL COURT'S ORDER OVERRULING ITS DEMURRER ON THE GROUNDS THAT PLAINTIFF'S RECOVERY WAS NOT BASED ON ANY DEFINITE LEGAL THEORY, PLAINTIFF ALLEGED NO NEGLIGENCE, AND PLAINTIFF ALLEGED NO CASUAL CONNECTION BETWEEN THE ESCAPE OF SALT WATER AND THE WELL POLLUTION. THE SUPREME COURT OF KANSAS AFFIRMED THE TRIAL COURT'S ORDER, STATING THAT PLAINTIFF'S ACTION WAS ESTABLISHED BY STATUTE AND THEREFORE DID NOT REQUIRE ALLEGATION OF NEGLIGENCE AND THAT A SUFFICIENT CAUSAL CONNECTION WAS ESTABLISHED TO WITHSTAND THE GENERAL DEMURRER. (HORWITZ-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11728

OHIO OIL CO V ELLIOT (ASSESSMENT OF DAMAGES TO LIVESTOCK PERMANENTLY AND TEMPORARILY INJURED BY SALT WATER POLLUTION FROM OIL WELLS).

254 F2D 832-836 (10TH CIR 1958).

DESCRIPTORS:

\*OKLAHOMA, \*SALINE WATER INTRUSION, \*LIVESTOCK, \*DAMAGES, WATER POLLUTION SOURCES, OIL INDUSTRY, OIL WELLS, SALINE WATER-FRESHWATER INTERFACES, SEEPAGE, STREAM POLLUTION, WATERCOURSES(LEGAL), WATER LAW, RIPARIAN RIGHTS, WATER RIGHTS, LEGAL ASPECTS, JUDICIAL DECISIONS, REMEDIES, MORTALITY, WATER POLLUTION EFFECTS, WATER USERS, LEGISLATION, STATUTES, WATER UTILIZATION, DOMESTIC WATER, POLLUTANT IDENTIFICATION, ON-SITE INVESTIGATIONS.

ABSTRACT:

PLAINTIFF BROUGHT AN ACTION AGAINST DEFENDANT OPERATING AN OIL AND GAS LEASE, FOR DAMAGES TO HIS LIVESTOCK FROM SALT WATER POLLUTION OF A STREAM. AN OKLAHOMA STATUTE IMPOSES LIABILITY PER SE FOR DAMAGES RESULTING FROM SALINE WATER INTRUSION. THE UNITED STATES DISTRICT COURT FOR THE WESTERN DISTRICT OF OKLAHOMA DIRECTED A VERDICT FOR PLAINTIFF. UPON APPEAL, THE TENTH CIRCUIT COURT OF APPEALS MODIFIED DAMAGES. FOR PERMANENT INJURY THE MEASURE OF DAMAGES UNDER OKLAHOMA LAW IS THE DIFFERENCE BETWEEN THE REASONABLE MARKET VALUE OF THE LIVESTOCK IMMEDIATELY BEFORE AND AFTER THE INJURY, BUT DAMAGES COULD NOT BE AWARDED FOR TEMPORARY INJURY TO THE LIVESTOCK IN THE ABSENCE OF A SHOWING OF SPECIAL CARE OR EXPENDITURES NECESSARY TO RESTORE THE LIVESTOCK TO THEIR FORMER CONDITION OF HEALTH. THE AWARD OF \$2000 FOR TEMPORARY INJURY WAS STRICKEN FROM THE JUDGMENT. (REES-FLORIDA)

FIELD 06E, 05C

ACCESSION NO. W71-11824

GULF OIL CORP V HUGHES (POLLUTION OF WATER WELL FROM OIL COMPANY OPERATIONS).

371 P2D 81-85 (OKLA 1962).

DESCRIPTORS:

\*OKLAHOMA, \*JUDICIAL DECISIONS, \*WATER POLLUTION, \*SALINE WATER INTRUSION, LEGAL ASPECTS, STATE GOVERNMENTS, PUBLIC RIGHTS, WATER RIGHTS, STATE JURISDICTION, POLLUTION ABATEMENT, WATER POLLUTION EFFECTS, WELLS, WATER WELLS, WATER POLLUTION SOURCES, OIL INDUSTRY, OIL WASTES, OIL-WATER INTERFACES, OIL WELLS, OILY WATER, SALINE WATER.

ABSTRACT:

PLAINTIFFS SOUGHT DAMAGES SUSTAINED TO THEIR LAND FROM POLLUTION OF A WATER WELL BY DEFENDANT OIL COMPANY'S SEARCHING OPERATIONS. DEFENDANT WAS CONDUCTING OIL OPERATIONS ON LAND ADJACENT TO THAT OF PLAINTIFFS, SUCH OPERATION COMMONLY KNOWN AS A WATERFLOOD PROJECT. AS A PART OF THIS PROJECT THE DEFENDANT CAUSED SALT WATER TO BE PUMPED INTO AN INJECT WELL UNDER PRESSURE, AND AS A RESULT THEREOF SALT WATER WAS FORCED THROUGH MORE POROUS ROCK AND EARTH FORMATIONS INTO THE STREAMS OF WATER AND WATER WELLS ON PLAINTIFF'S PROPERTY, RENDERING SUCH FRESH WATER UNFIT FOR DOMESTIC USE. PLAINTIFFS RECEIVED \$6,000 DAMAGES AT THE TRIAL LEVEL AND THE SUPREME COURT OF OKLAHOMA AFFIRMED, REJECTING DEFENDANT'S CLAIM THAT ACTUAL NEGLIGENCE HAD TO BE PROVEN FOR RECOVERY. THE COURT HELD THAT PLAINTIFFS WERE ENTITLED TO DAMAGES ON THE THEORY OF PRIVATE NUISANCE AND WERE NOT REQUIRED TO SHOW NEGLIGENCE ON THE PART OF THE OIL COMPANY. WHEN AN OIL COMPANY CONDUCTS WATERFLOODING OPERATIONS FOR RECOVERY OF OIL THE COMMON LAW RULE OF NEGLIGENCE DOES NOT OBTAIN. CONSTITUTIONAL PROVISIONS HAVE INTERVENED TO PROTECT A PROPERTY OWNER AGAINST LOSSES RESULTING FROM THE USE OF NEARBY PROPERTY. (HORWITZ-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11848

POWELL BRISCOE, INC V PETERS (INJUNCTIVE RELIEF AGAINST OIL AND GAS LESSEE).

269 P2D 787-791 (OKLA 1954).

DESCRIPTORS:

\*OKLAHOMA, \*SALINE WATER INTRUSION, \*REMEDIES, \*OIL FIELDS, WATER POLLUTION, OIL WELLS, SALINE WATER, OIL WASTES, LEASES, SEEPAGE, PERMEABILITY, FRESH WATER, PONDS, WASTE DISPOSAL, WATER POLLUTION EFFECTS, JUDICIAL DECISIONS, LEGAL ASPECTS, OIL INDUSTRY, POLLUTION ABATEMENT, ADJUDICATION PROCEDURE, SALINITY, VEGETATION.

IDENTIFIERS:

INJUNCTION(PROHIBITORY).

ABSTRACT:

PLAINTIFFS SOUGHT A PERMANENT INJUNCTION RESTRAINING DEFENDANT OIL AND GAS LESSEES UPON PLAINTIFFS' LAND FROM USING AN EARTHEN PIT FOR IMPOUNDING SALT WATER PRODUCED IN THE OPERATION OF SEVERAL OIL WELLS. PLAINTIFFS ALLEGED THE BRINE WOULD SEEP FROM THE TANK INTO THE SOIL DESTROYING VEGETATION AND POLLUTING FRESH WATER AND WOULD, THEREBY, CONSTITUTE A PRIVATE NUISANCE. THE INJUNCTION WAS AWARDED UPON FINDINGS THAT ADDITIONAL WELLS WOULD PROBABLY BE DRILLED AND THAT THE OUTPUT OF ONE WELL ALREADY PRODUCING SALT WATER WOULD PROBABLY INCREASE. THE SUPREME COURT OF OKLAHOMA REVERSED AND HELD THAT: (1) WHERE AN OIL LEASE IS OPERATED IN AN ORDINARY WAY WITH CUSTOMARY PRECAUTIONS, INCIDENTAL ANNOYANCES OFFER NO GROUNDS FOR AN INJUNCTION; (2) AN INJUNCTION WILL NOT ISSUE TO PROTECT A RIGHT NOT IN ESSE AND WHICH MAY NEVER ARISE OR TO RESTRAIN ACTS THAT DO NOT CONSTITUTE A CAUSE OF ACTION; (3) WHEN INJURY CAN BE FULLY COMPENSATED IN MONEY DAMAGES AND DEFENDANTS ARE WHOLLY SOLVENT, A PERMANENT INJUNCTION SHOULD NOT BE GRANTED. THE JUDGMENT FOR PLAINTIFFS WAS REVERSED ON GROUNDS THAT THE TRIAL COURT'S FINDINGS WERE SPECULATIVE AND NOT SUSTAINED BY THE EVIDENCE. (REES-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11930

SUN OIL CO V HOKE (OIL LESSEE'S DUTY TO PREVENT POLLUTION).

169 P2D 753-759 (OKLA 1946).

DESCRIPTORS:

\*OKLAHOMA, \*WATER POLLUTION EFFECTS, \*LIVESTOCK, \*DAMAGES, WATER POLLUTION, SALINE WATER, WATER POLLUTION SOURCES, OIL WELLS, OIL WASTES, SALINE WATER INTRUSION, PONDS, FRESH WATER, TOXICITY, POISONS, MORTALITY, SETTLING BASINS, LEAKAGE, SEEPAGE, WASTE DISPOSAL, LEASES, JUDICIAL DECISIONS, LEGAL ASPECTS, OIL FIELDS, OIL INDUSTRY, LAND TENURE.

ABSTRACT:

PLAINTIFF AGRICULTURAL TENANT SOUGHT TO RECOVER DAMAGES FROM DEFENDANT OIL COMPANY FOR THE DEATH AND INJURY OF HIS LIVESTOCK AFTER THEY DRANK SALT WATER THAT HAD ESCAPED FROM DEFENDANT'S OIL WELL. PLAINTIFF CONTENDED DEFENDANT HAD NEGLIGENTLY ALLOWED OIL AND SALT WATER TO ESCAPE AND FLOW OVER THE LAND INTO PLAINTIFF'S POND. DEFENDANT DENIED NEGLIGENCE AND CONTENDED THAT PLAINTIFF HAD FAILED TO STATE A CAUSE OF ACTION AND HAD ALSO FAILED TO PROVE DAMAGES. THE SUPREME COURT OF OKLAHOMA AFFIRMED JUDGMENT FOR PLAINTIFF AND HELD THAT AN OIL AND GAS LESSEE OWES A DUTY TO THE HOLDER OF A GRAZING LEASE ON THE SAME LAND NOT TO PERMIT THE ESCAPE OF DELETERIOUS SUBSTANCES SO AS TO POISON AND POLLUTE WATER TO WHICH LIVESTOCK HAS ACCESS. THE COURT RULED THAT EVIDENCE THAT PLAINTIFF LOST BOTH LIVESTOCK AND SHEEP AND THAT HIS REMAINING LIVESTOCK DEPRECIATED IN VALUE TOGETHER WITH COMPETENT TESTIMONY THAT THE CAUSE OF SUCH LOSSES WAS DEFENDANT'S BREACH OF DUTY WAS SUFFICIENT PROOF OF DAMAGE. THE COURT DETERMINED THE PROPER MEASURE OF DAMAGES FOR INJURIES TO LIVESTOCK FROM DRINKING POLLUTED WATER TO BE THE DIFFERENCE BETWEEN THE REASONABLE MARKET VALUE IMMEDIATELY PRIOR TO AND SUBSEQUENT TO THE INJURY. (REES-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11936

CITIES SERVICE OIL CO V BILLEN (PERMISSIVE POLLUTION OF UNDERGROUND WATERS).

347 P2D 637-640 (OKLA 1959).

DESCRIPTORS:

\*SALINE WATER-FRESH WATER INTERFACES, \*OIL FIELDS, \*OKLAHOMA, \*WATER POLLUTION SOURCES, OIL WASTES, WATER SUPPLY, WATER POLLUTION, OIL INDUSTRY, SUBSURFACE DRAINAGE, GEOLOGIC FORMATIONS, OILY WATER, GROUNDWATER, LEGAL ASPECTS, JUDICIAL DECISIONS, WATER WELLS, SALINE WATER INTRUSION, SALINITY, DAMAGES, ADJUDICATION PROCEDURE.

ABSTRACT:

PLAINTIFF LANDOWNERS BROUGHT AN ACTION AGAINST DEFENDANT OIL COMPANY AND OTHERS TO RECOVER ACTUAL AND PUNITIVE DAMAGES FOR THE SALT WATER POLLUTION OF FRESH WATER FORMATIONS UNDERLYING PLAINTIFFS' LAND. DEFENDANTS HAD STORED SALT WATER IN A POND WHICH EXTENDED OVER THE WATER FORMATION WHICH RAN UNDER PLAINTIFFS' LAND. PLAINTIFFS CONTENDED THAT DEFENDANTS' ACTIONS CONSTITUTED A NUISANCE. DEFENDANTS CONTENDED ANY POLLUTION OF PLAINTIFFS' FRESH WATER SUPPLY WAS PERMISSIVE DUE TO A RELEASE BY WHICH THE PLAINTIFFS' GRANTOR HAD GIVEN DEFENDANTS A SALT WATER EASEMENT. AFTER A VERDICT FOR PLAINTIFFS, DEFENDANTS APPEALED THE TRIAL JUDGE'S INSTRUCTIONS TO THE JURY RELATING TO THE ISSUE OF PERMISSIVE POLLUTION AND THE PURPORTED RELEASE. THE SUPREME COURT OF OKLAHOMA HELD THAT IN AN ACTION AGAINST AN OIL COMPANY FOR SALT WATER POLLUTION OF FRESH WATER FORMATIONS UNDERLYING A PLAINTIFF'S LAND, FAIR INSTRUCTIONS MAY BE GIVEN AS TO PERMISSIVE POLLUTION WHERE THE EVIDENCE JUSTIFIES SUCH INSTRUCTIONS. THE JUDGMENT FOR PLAINTIFFS WAS AFFIRMED ON GROUNDS THE EVIDENCE REASONABLY TENDED TO PROVE THE FACTS OF THE CASE. (GALLAGHER-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11969

GEOCHEMICAL SURVEYS V DIETZ (DAMAGES FOR WELL POLLUTION THROUGH NEGLIGENT DISPOSAL OF SALT WATER).

340 SW2D 114-121 (CIV APP TEX 1960).

DESCRIPTORS:

\*WATER POLLUTION SOURCES, \*TEXAS, \*SALINE WATER INTRUSION, \*WATER WELLS, FARMS, SALINE WATER, SETTLING BASINS, WATER POLLUTION EFFECTS, SEEPAGE, PERCOLATION, OIL WELLS, OIL WASTES, EXPLORATION, SOIL WATER MOVEMENT, SUBSURFACE FLOW, HYDROLOGY, LIMESTONES, POROSITY, DAMAGES, JUDICIAL DECISIONS, LEGAL ASPECTS, WATER POLLUTION, OIL INDUSTRY, OIL FIELDS.

ABSTRACT:

PLAINTIFF OWNERS OF FARMLAND SOUGHT PERMANENT DAMAGES FROM DEFENDANT PARTNERSHIP FOR THE POLLUTION OF A WATER WELL BY SALINE WATER THAT PERCOLATED THROUGH POROUS LIMESTONE. PLAINTIFFS CONTENDED DEFENDANT HAD BEEN NEGLIGENT IN DISPOSING OF SALINE WATER IN SETTLING BASINS WHILE EXPLORING UNDER OIL AND GAS LEASES. DEFENDANT'S DRILLING OPERATIONS BEGAN IN 1956; PLAINTIFFS FIRST DISCOVERED THE POLLUTION IN 1958. UPON APPEAL, DEFENDANT CONTENDED THAT A TWO-YEAR STATUTE OF LIMITATIONS BARRED PLAINTIFFS' RECOVERY AND THAT ITS CONDUCT WAS NOT THE PROXIMATE CAUSE OF THE POLLUTION. THE COURT OF CIVIL APPEALS OF TEXAS HELD THAT: (1) DEFENDANT'S DISPOSAL OF SALINE WATER INTO OPEN PITS WAS LAWFUL AND DID NOT CONSTITUTE AN INVASION OF PLAINTIFFS' PROPERTY; (2) PLAINTIFFS WERE INJURED BY THE SUBSEQUENT POLLUTION OF THEIR WELL AT WHICH TIME A CAUSE OF ACTION AROSE; AND (3) DEFENDANT'S PLEA OF LIMITATION WAS NOT WELL FOUNDED BECAUSE THE ACTUAL POLLUTION OF THE WELL OCCURRED WITHIN THE STATUTE OF LIMITATIONS. THE COURT RULED THAT THE TESTIMONY OF AN EXPERT HYDROLOGIST, AS TO THE CAUSAL RELATIONSHIP BETWEEN THE DISPOSAL METHODS OF DEFENDANT AND THE POLLUTION OF PLAINTIFFS' WELL, ESTABLISHED DEFENDANT'S NEGLIGENCE AS THE PROXIMATE CAUSE OF PLAINTIFFS' INJURY. THE JUDGMENT FOR PLAINTIFF WAS AFFIRMED. (REES-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11970

SUNRAY MID-CONTINENT OIL CO V TISDALE (WATER POLLUTION FROM THE NEGLIGENT PLUGGING OF AN OIL WELL).

366 P2D 614-616 (OKLA 1961).

DESCRIPTORS:

\*OKLAHOMA, \*OIL WELLS, \*WATER POLLUTION EFFECTS, \*SALINE WATER, EXPLORATION, OIL WASTES, WATER WELLS, SALINE WATER INTRUSION, WATER SUPPLY, WATER SOURCES, WATER UTILIZATION, SOIL CONTAMINATION, SUBSURFACE INVESTIGATIONS, SOIL TYPES, SANDS, DAMAGES, JUDICIAL DECISIONS, LEGAL ASPECTS, OIL INDUSTRY, SECONDARY RECOVERY(OIL).

ABSTRACT:

PLAINTIFF BROUGHT AN ACTION AGAINST DEFENDANT OIL COMPANY FOR THE POLLUTION OF THE FRESH WATER STRATUM UNDERLYING HIS LAND. DEFENDANT HAD DRILLED AN EXPLORATORY WELL NEAR A WATER WELL ON PLAINTIFF'S PROPERTY. TEN MONTHS LATER THE WELL WATER BECAME SALTY AND UNFIT FOR DOMESTIC USE. SOIL INVESTIGATIONS REVEALED THAT IF THE OIL WELL HAD BEEN PROPERLY PLUGGED, SALT WATER WOULD NOT HAVE ESCAPED. THE DEFENDANT APPEALED A JUDGEMENT FOR THE PLAINTIFF TO THE SUPREME COURT OF OKLAHOMA. THE COURT HELD THAT THE QUESTION OF WHETHER AN OIL-WELL OPERATOR WAS NEGLIGENT IN PLUGGING AN EXPLORATORY WELL AND WHETHER SUCH NEGLIGENCE IS THE PROXIMATE CAUSE OF SALT WATER POLLUTION IS A JURY QUESTION. THE COURT ALSO RULED THAT HYPOTHETICAL QUESTIONS BASED ON FACTS WHICH A JURY WOULD BE JUSTIFIED IN FINDING TO BE ESTABLISHED BY THE EVIDENCE ARE NOT IMPROPER, EVEN THOUGH NOT STATED IN THE EXACT TERMS SHOWN BY THE EVIDENCE. JUDGEMENT FOR THE PLAINTIFF WAS AFFIRMED ON GROUNDS THAT THERE WAS SUFFICIENT EVIDENCE TO SUSTAIN THE VERDICT AND JUDGMENT ON APPEAL. (REES-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-11971



DYNAMICS OF THE TRANSITION ZONE BETWEEN FRESH AND SALT WATERS IN COASTAL  
AQUIFERS,

CALIFORNIA UNIV., BERKELEY. COLL. OF ENGINEERING.

AVDHESH KUMAR TYAGI.

PHD THESIS, CALIFORNIA UNIVERSITY GRADUATE SCHOOL, 1970. 168 P, 35 FIG, 19  
TAB, 83 REF. OWRR PROJECT B-041-CAL (2).

DESCRIPTORS:

\*SALINE WATER INTRUSION, \*SALINE WATER-FRESHWATER INTERFACES,  
\*HYDROGEOLOGY, \*AQUIFERS, \*MATHEMATICAL MODELS, NUMERICAL ANALYSIS,  
WITHDRAWAL, VISCOSITY, DENSITY, DISPERSION, DIFFUSION, TIDES, TIDAL  
EFFECTS, AQUIFER CHARACTERISTICS, RECHARGE, DISCHARGE(WATER).

IDENTIFIERS:

\*COASTAL AQUIFERS.

ABSTRACT:

INTRUSION, DISPERSION, AND THE FRESH-SALT WATER INTERFACE IN COASTAL  
AQUIFERS WERE STUDIED. THE SUBJECT WAS TREATED BOTH AS A HYDROLOGIC  
PHENOMENON AND AS A PHENOMENON OF DISPERSION BY TIDAL FLUCTUATION NEAR  
THE COASTLINE. MATHEMATICAL MODELS INCLUDING THE DENSITY AND VISCOSITY  
EFFECTS WERE DEVELOPED AND GRAPHICALLY REPRESENTED. THESE MODELS, WHEN  
COMPARED WITH THE MODELS NEGLECTING THE VISCOSITY EFFECT, SHOWED THAT  
THE VISCOSITY DIFFERENCE AFFECTS THE MOVEMENT OF INTERFACE GREATLY IN  
THE OVERDRAFT REGIME AS COMPARED TO RECHARGE FLOW CONDITION. A SHARP  
INTERFACE BETWEEN THE SALT AND FRESH WATERS DOES NOT EXIST, BECAUSE  
THEY ARE MISCIBLE. THUS, A TRANSITION ZONE IS CAUSED BY THE MOVEMENT OF  
THE INTERFACE BECAUSE OF VARYING HYDROLOGIC CONDITIONS AND TIDAL  
OSCILLATIONS. SINCE MOST RELATIONSHIPS WERE PLOTTED ON DIMENSIONLESS  
GRAPHS, THIS UNIFIED MODEL WILL SIMULATE AND PREDICT THE MOVEMENT OF A  
FRESH-SALT WATER TRANSITION ZONE UNDER DIFFERENT FIELD CONDITIONS IN  
ANY AQUIFER. (KNAPP-USGS)

FIELD 02F, 02L

ACCESSION NO. W71-12367

SALT WATER AND WASTE DISPOSAL WELLS: STATE REGULATIONS AND GEOLOGICAL PROBLEMS,  
LOUISIANA GEOLOGICAL SURVEY, BATON ROUGE.

L. W. HOUGH.

LOUISIANA GEOLOGICAL SURVEY, BATON ROUGE, LA. (REV. OCTOBER 1968). 13 P, 2  
FIG, 2 REF.

DESCRIPTORS:

\*LOUISIANA, \*WATER CONSERVATION, \*SALINE WATER INTRUSION, \*WATER  
POLLUTION CONTROL, SALINE WATER, REGULATION, POLLUTION ABATEMENT, STATE  
GOVERNMENTS, STATE JURISDICTION, ADMINISTRATION, ADMINISTRATIVE  
AGENCIES, PERMITS, STANDARDS, SUPERVISORY CONTROL(POWER), OIL INDUSTRY,  
OIL WASTES, OIL WELLS, WATER POLLUTION SOURCES, WASTE DISPOSAL,  
DEEP-WELL PUMPING, WATER QUALITY.

ABSTRACT:

THE LOUISIANA DEPARTMENT OF CONSERVATION HAS THE RESPONSIBILITY OF  
PROTECTING FRESH WATER SANDS FROM CONTAMINATION BY OIL, GAS, AND SALT  
WATER. THE COMMISSIONER OF CONSERVATION IS GIVEN AUTHORITY TO MAKE  
RULES AND REGULATIONS TO: (1) REQUIRE DRILLING, CASING, AND PLUGGING OF  
WELLS TO BE DONE SO AS TO PREVENT THE ESCAPE OF OIL OR GAS FROM ONE  
STRATUM TO ANOTHER; (2) PREVENT THE POLLUTION OF FRESH WATER SUPPLIES  
BY OIL GAS, OR SALT WATER; (3) PREVENT THE INTRUSION OF WATER INTO OIL  
OR GAS STRATA; AND (4) REQUIRE REASONABLE BOND AS SECURITY FOR THE  
PERFORMANCE OF THE DUTY TO PLUG EACH DRY OR ABANDONED WELL. PERMITS  
MUST BE SECURED BEFORE DISPOSING OF SALT WATER UNDERGROUND. THE  
DEPARTMENT REQUIRES THAT SALT WATER BE INJECTED INTO SAND WHICH CARRIES  
SALT WATER AND THAT NO FRESH WATER BE DISPLACED THEREBY. THE BOARD OF  
HEALTH HAS AUTHORITY OVER THE DISPOSAL OF SEWAGE AND OTHER WASTE  
MATERIAL. PERMITS FOR UNDERGROUND DISPOSAL OF SEWAGE AND INDUSTRIAL  
WASTES MUST BE OBTAINED FROM BOTH THE BOARD OF HEALTH AND THE  
DEPARTMENT OF CONSERVATION. APPROVAL PROCEDURES FOR ALL PERMITS ARE  
INCLUDED. (HORWITZ-FLORIDA)

FIELD 05G, 06E, 04B

ACCESSION NO. W71-12765

DRAINAGE OF OIL, SALT WATER, ETC. INTO NATURAL DRAIN PROHIBITED; PENALTIES.

LOUISIANA REV. STAT. SEC. 38:216 (1968).

DESCRIPTORS:

\*LOUISIANA, \*OIL WASTES, \*WATER POLLUTION CONTROL, \*IRRIGATION WATER, LEGISLATION, ADMINISTRATIVE AGENCIES, STANDARDS, STATE GOVERNMENTS, STATE JURISDICTION, WATER POLLUTION, WATER QUALITY, WATER QUALITY CONTROL, OIL, OIL INDUSTRY, SALINE WATER, SALINE WATER INTRUSION, LEGAL ASPECTS, WATER POLLUTION SOURCES, REMEDIES, DRAINAGE PRACTICES, DRAINAGE EFFECTS, WASTE DISPOSAL.

ABSTRACT:

NO PERSON SHALL WILLFULLY DRAIN ANY OIL, SALT WATER, OR OTHER NOXIOUS OR POISONOUS SUBSTANCES OR GASES FROM ANY PUMPS, RESERVOIR, WELLS, OR OIL FIELDS INTO ANY NATURAL STREAM OR DRAIN FROM WHICH WATER IS TAKEN FOR IRRIGATIONAL PURPOSES. THERE ARE, HOWEVER, TWO EXCEPTIONS TO THIS PROHIBITION. SUCH ACTIVITY MAY BE EXEMPTED IF AUTHORIZED UNDER A PERMIT ISSUED BY THE STREAM CONTROL COMMISSION. DISCHARGING WASTES INTO WATER THAT IS CONSIDERED TO BE UNFIT FOR IRRIGATION. VIOLATIONS ARE PUNISHABLE BY FINES OF NOT LESS THAN \$100 NOR MORE THAN \$2000 OR IMPRISONMENT FOR NOT LESS THAN 30 NOR MORE THAN 90 DAYS. EACH DAY OF VIOLATION CONSTITUTES A SEPARATE OFFENSE. (HORWITZ-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-12863

PLANT NUTRIENTS AND THE ESTUARY MECHANISM IN THE DUWAMISH RIVER ESTUARY,  
SEATTLE, WASHINGTON,

GEOLOGICAL SURVEY, TACOMA, WASH.

L. J. TILLEY, AND W. A. DAWSON.

GPO, WASHINGTON, DC 20402 - PRICE \$2.75. GEOLOGICAL SURVEY RESEARCH 1971,  
CHAPTER C, PROFESSIONAL PAPER 750-C, P C185-C191, 1971. 4 FIG, 4 TAB, 5 REF.

DESCRIPTORS:

\*ESTUARIES, \*NUTRIENTS, \*PATH OF POLLUTANTS, \*WASHINGTON, \*SALINE WATER  
INTRUSION, STRATIFIED FLOW, SALINITY, DENSITY STRATIFICATION, WASTE  
WATER DISPOSAL, AMMONIA, SEDIMENTATION, WASHINGTON.

IDENTIFIERS:

\*DUWAMISH ESTUARY(WASH), SEATTLE(WASH).

ABSTRACT:

THE DUWAMISH RIVER ESTUARY, WASHINGTON, TRAPS PLANT NUTRIENTS IN THE  
WATER OF ITS ALT WEDGE. ANALYSES OF INPUT AND OUTPUT OF NUTRIENT  
CONCENTRATIONS IN THE ESTUARY SHOW A NEARLY TWOFOLD INCREASE IN  
CONCENTRATIONS OF NUTRIENTS IN THE SALT WEDGE. THE INCREASE CONSISTS OF  
NUTRIENTS TRANSFERRED FROM THE OUTFLOWING RIVER WATE IN AMOUNTS WHICH  
BARELY AFFECT RIVER-WATER CONCENTRATIONS. (KNAPP-USGS)

FIELD 02L, 05B

ACCESSION NO. W71-13459

WENDTLANDT V. NATIONAL CO-OPERATIVE REFINERY ASS'N (SALT WATER INTRUSION  
RESULTING FROM OIL DRILLING OPERATIONS).

215 P. 2D 209-215 (KAN. 1950).

DESCRIPTORS:

\*KANSAS, \*SALINE WATER INTRUSION, \*OIL WASTES, \*REMEDIES, WATER  
POLLUTION, JUDICIAL DECISIONS, RELATIVE RIGHTS, LEGAL ASPECTS, STATE  
GOVERNMENTS, STATE JURISDICTION, OIL INDUSTRY, SALINE WATER, SUBSURFACE  
WATERS, GROUNDWATER, PERCOLATING WATERS, DRILLING, OIL WELLS, WATER  
SUPPLY, FARMS, WATER POLLUTION EFFECTS, WATER POLLUTION SOURCES,  
DAMAGES.

ABSTRACT:

PLAINTIFF LANDOWNER SOUGHT TO RECOVER ACTUAL AND PUNITIVE DAMAGES FOR  
PERMANENT INJURY TO HER LAND CAUSED BY SALT WATER FROM DEFENDANT'S OIL  
DRILLING OPERATIONS. DEFENDANT OPERATED SEVERAL OIL WELLS ON  
PLAINTIFF'S LAND PURSUANT TO A LEASE ARRANGEMENT. THE OIL WELLS  
PRODUCED OVER 5000 BARRELS OF SALT WATER PER MONTH. DEFENDANT DISPOSED  
OF THIS BY PUMPING IT INTO A LARGE PIT WITH A CAPACITY OF 3,500  
BARRELS. DEFENDANT KNEW THE SALT WATER WAS SEEPING INTO THE SOIL, YET  
TOOK NO CORRECTIVE ACTION. PORTIONS OF PLAINTIFF'S LAND BECAME POLLUTED  
BY SALT WATER AND USELESS FOR AGRICULTURAL PURPOSES. PLAINTIFF ALLEGED  
THAT THE VALUE OF HER LAND HAD BEEN PERMANENTLY DECREASED BY \$6000.  
PLAINTIFF WAS AWARDED \$1092 IN PERMANENT DAMAGES AND \$5000 IN PUNITIVE  
DAMAGES. DEFENDANT APPEALED, CONTENDING THAT THE EVIDENCE WAS  
INSUFFICIENT TO WARRANT PUNITIVE DAMAGES. THE SUPREME COURT TO KANSAS  
AFFIRMED THE JUDGMENT ON CONDITION THAT THE PUNITIVE DAMAGES BE REDUCED  
TO \$2500. THE COURT HELD THAT PUNITIVE DAMAGES ARE PERMISSIBLE WHERE A  
DEFENDANT INTENTIONALLY EMPTIES SALT WATER ON A PLAINTIFF'S LAND,  
KNOWING IT WOULD CAUSE SERIOUS DAMAGE. (HORWITZ-FLORIDA)

FIELD 06E, 05B

ACCESSION NO. W71-13521

LOUISIANA COASTAL COMMISSION.

LOUISIANA REVISED CODE SECS 34:2251 THRU 34:2253.1 (1971 SUPP.).

DESCRIPTORS:

\*LOUISIANA, \*ADMINISTRATIVE AGENCIES, \*TREATMENT FACILITIES,  
\*NAVIGATION, WATER POLLUTION CONTROL, WATER POLLUTION, WATER QUALITY,  
WATER QUALITY CONTROL, TAXES, WASTE WATER(POLLUTION), SALINE WATER  
INTRUSION, CHANNELS, WATER SUPPLY, SALT WATER-FRESHWATER INTERFACES,  
STATE GOVERNMENTS, FLOODS, DRAINAGE, INDUSTRIAL WASTES, DOMESTIC  
WASTES, LOCKS, CANALS, LEVEES, BARRIERS, ENCROACHMENT, ESTUARIES.

ABSTRACT:

THE LOUISIANA COASTAL COMMISSION IS AN EIGHTEEN MEMBER BOARD EMPOWERED TO PLAN, ESTABLISH, CONSTRUCT, OPERATE, AND MAINTAIN: (1) A SYSTEM OF NAVIGATION CHANNELS, INCLUDING LOCKS; (2) A FRESH WATER SUPPLY SYSTEM; (3) DOMESTIC AND INDUSTRIAL WATER CONTROLS TO PREVENT POLLUTION; (4) LEVEES AND BARRIERS TO PREVENT SALT WATER INTRUSION; AND (5) A DRAINAGE SYSTEM TO PREVENT FLOODING. THE COMMISSION HAS EMINENT DOMAIN POWERS AND ALL POWERS OF A CORPORATION. THE LOUISIANA COASTAL COMMISSION ADVISORY COMMITTEE, WITH NINE MEMBERS, PARTICIPATES IN THE COMMISSION'S EXECUTIVE MEETINGS IN AN ADVISORY CAPACITY, WITHOUT VOTING POWERS. UPON TWO-THIRDS APPROVAL OF ITS MEMBERSHIP, THE COMMISSION IS AUTHORIZED TO LEVY AD VALOREM TAXES NOT EXCEEDING 20 MILLS, SUBJECT TO APPROVAL BY A MAJORITY OF FREEHOLDERS IN THE AFFECTED AREA. (HART-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-13562

WATER QUALITY ANALYSIS FOR THE NEW YORK HARBOR COMPLEX,

MANHATTAN COLL., BRONX, N.Y. DEPT. OF CIVIL ENGINEERING.

D. J. O' CONNOR.

IN: WATER POLLUTION IN THE GREATER NEW YORK AREA - SYMPOSIUM, GORDON AND  
BREACH, NEW YORK, N.Y., P 121-144, 1970. 12 FIG, 2 TAB, 1 REF.

DESCRIPTORS:

\*MATHEMATICAL MODELS, \*HUDSON RIVER, \*NEW YORK, \*WATER POLLUTION  
EFFECTS, \*PATH OF POLLUTANTS, WATER POLLUTION CONTROL, FORECASTING,  
STREAMFLOW, TIDES, ESTUARIES, HYDRAULICS, SALINE WATER INTRUSION.

IDENTIFIERS:

\*NEW YORK HARBOR.

ABSTRACT:

A MATHEMATICAL MODEL OF THE NEW YORK HARBOR COMPLEX INCLUDES THE  
GEOMORPHOLOGICAL HYDRAULIC, AND TIDAL FACTORS OF THE WATERWAYS, AND THE  
PHYSICAL, CHEMICAL, AND BIOLOGICAL CHARACTERISTICS OF THE WASTE-WATERS.  
A COMPARISON OF RESULTS OBTAINED USING THE MODEL WITH MEASUREMENTS  
RECORDED OVER THE PAST FEW DECADES SHOWS THAT THE CALCULATIONS AND  
MEASUREMENTS AGREE QUITE WELL. THE VERIFIED MODEL HAS BEEN USED TO  
PREDICT THE EFFECTS ON WATER QUALITY OF PROPOSED NEW WATER TREATMENT  
FACILITIES. THE EFFECT OF FRESH WATER FLOW FROM THE HUDSON RIVER DOES  
NOT APPEAR TO BE SIGNIFICANT DURING THE SUMMER AND EARLY FALL SEASONS,  
AT LEAST WITH RESPECT TO THE CONCENTRATION OF DISSOLVED OXYGEN AND  
OXYGEN-DEMANDING MATERIAL. THE INFLUENCE OF A SINGLE TREATMENT FACILITY  
ON WATER QUALITY IS RELATIVELY SMALL AND MAY BE OBSCURED BY THE  
VARIABILITY OF OTHER FACTORS. THE IMPROVEMENT IN WATER QUALITY IS  
APPARENT WHEN THE COMBINED EFFECT OF A NUMBER OF FACILITIES IS  
CONSIDERED. (SEE ALSO W71-13624) (KNAPP-USGS)

FIELD 05B, 06A, 05G

ACCESSION NO. W71-13630

PREVENTING THE POLLUTION OF FRESH WATER BY OIL, GAS, AND SALT WATER.

LOUISIANA STATE DEPT OF CONSERVATION, BATON ROUGE.

STATEWIDE ORDER NO. 29-B, OCTOBER 1967 AMENDMENT. 3 P.

DESCRIPTORS:

\*LOUISIANA, \*SALINE WATER INTRUSION, \*OIL WASTES, \*WATER POLLUTION CONTROL, SALINE WATER, REGULATION, POLLUTION ABATEMENT, STATE GOVERNMENTS, STATE JURISDICTION, ADMINISTRATION, ADMINISTRATIVE AGENCIES, PERMITS, STANDARDS, SUPERVISORY CONTROL(POWER), OIL INDUSTRY, OIL WELLS, WATER POLLUTION SOURCES, WATER POLLUTION EFFECTS, WASTE DISPOSAL, DEEP-WELL PUMPING, WATER QUALITY, WATER QUALITY CONTROL.

ABSTRACT:

THE COMMISSIONER OF CONSERVATION ISSUED THE FOLLOWING FINDINGS: (1) THE POLLUTION OF FRESH WATER SUPPLIES BY OIL, GAS, OR SALT WATER IS NOT IN THE PUBLIC INTEREST AND SHOULD BE PREVENTED; (2) THE CONSERVATION COMMISSION HAS THE RESPONSIBILITY AND AUTHORITY TO PREVENT SUCH POLLUTION AND SHOULD PROMULGATE UNIFORM RULES TO ACCOMPLISH THIS DUTY; AND (3) GOOD CONSERVATION PRACTICES CAN BE SERVED THROUGH A CAREFULLY ADMINISTERED SYSTEM OF APPROVING APPLICATIONS FOR PERMITS. THEREFORE, IT IS ORDERED THAT NO OIL FIELD WASTE SHALL BE DISPOSED OF INTO ANY STREAM OR OTHER BODY OF WATER OR INTO ANY DITCH OR SURFACE DRAINAGE DEPRESSION LEADING TO ANY BODY OF WATER. SUCH WASTE SHALL BE RETAINED FOR PROPER TREATMENT. PRODUCED SALT WATER SHALL BE DISPOSED OF ONLY INTO: (1) SUBSURFACE FORMATIONS NOT PRODUCTIVE OF HYDROCARBONS; (2) PITS APPROVED FOR SUCH PURPOSE BY THE COMMISSIONER; OR (3) BRACKISH WATERS, TIDAL WATERS, OR WATERS UNSUITABLE FOR HUMAN CONSUMPTION OR AGRICULTURAL PURPOSES. REGULATIONS PRESCRIBE WHEN THE COMMISSIONER MAY ISSUE A PERMIT, WITHOUT A PUBLIC HEARING, FOR THE DISPOSAL OF SALT WATER BY INJECTION INTO SUBSURFACE FORMATIONS. PROVISIONS FOR THE INSPECTION OF ALL PERMIT HOLDERS AND EXCEPTIONS TO THE ORDER ARE SET FORTH. (HORWITZ-FLORIDA)

FIELD 05G, 06E

ACCESSION NO. W71-13680



AUGUSTINE V HINNEN (LIABILITY OF OIL LESSEE FOR SALINE POLLUTION OF WATER  
SUPPLY ON ADJACENT LANDS).

443 P.2D 354-360 (KAN. 1968).

DESCRIPTORS:

\*KANSAS, \*SALINE WATER INTRUSION, \*INJECTION WELLS, \*DAMAGES, OIL  
WASTES, OIL FIELDS, OIL INDUSTRY, WATER POLLUTION, WATER POLLUTION  
SOURCES, WATER POLLUTION EFFECTS, WATER SUPPLY, SALINE WATER-FRESHWATER  
INTERFACES, BRINE DISPOSAL, DRILLING FLUIDS, OIL WELLS, BYPRODUCTS,  
WASTE DISPOSAL, WASTE WATER DISPOSAL, WELL PERMITS, WELL REGULATIONS,  
ADMINISTRATIVE AGENCIES, SUBSURFACE RUNOFF, WATER WELLS, CATTLE, FARMS,  
LEASES.

ABSTRACT:

PLAINTIFF CATTLE RANCHER SUED DEFENDANT OIL AND GAS LESSEE FOR ACTUAL  
AND PUNITIVE DAMAGES FOR SALINE POLLUTION OF PLAINTIFF'S WATER SUPPLY.  
DEFENDANT INSTALLED AN INJECTION WELL FOR DISPOSAL OF SALT WATER FROM  
ITS DRILLING OPERATION ON ITS LEASEHOLD ADJACENT TO PLAINTIFF'S TRACT.  
DEFENDANT OBTAINED A PERMIT FOR THE WELL FROM A STATE COMMISSION,  
ALTHOUGH THE DATA SUBMITTED FOR THE PERMIT WAS INACCURATE. A BRADEN  
HEAD WAS INSTALLED ON THE WELL TO PREVENT SALT WATER FORM PIPE LEAKS  
FROM RISING TO THE SURFACE. THE SALINE WATER INTRUDED INTO PLAINTIFF'S  
WATER SUPPLY AND INJURED HIS FARMING OPERATIONS AND HIS CATTLE. AT  
TRIAL, PLAINTIFF WAS AWARDED \$12,651 ACTUAL DAMAGES AND \$18,000  
PUNITIVE DAMAGES. THE KANSAS SUPREME COURT UPHELD THE AWARD FOR ACTUAL  
DAMAGES, AND DETERMINED THAT PLAINTIFF'S ACTION WAS NOT BARRED BY THE  
STATUTE OF LIMITATIONS. THE COURT OBSERVED THAT PUNITIVE DAMAGES ARE  
ALLOWABLE WHEN A DEFENDANT'S CONDUCT SHOWED A RECKLESS INDIFFERENCE AND  
DISREGARD OF THE RIGHTS OF OTHERS. DEFENDANT'S VIOLATION OF LAW  
RELATING TO ESCAPE OF SALT WATER WAS NOT FOUND SUFFICIENT TO SUBJECT  
HIM TO PUNITIVE DAMAGES. NO OTHER ACTIONS WERE PROVEN TENDING TO SHOW A  
RECKLESS DISREGARD OF PLAINTIFF'S RIGHTS, AND THE COURT REVERSED THE  
AWARD OF PUNITIVE DAMAGES. (HART-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-13816

CITIES SERVICE OIL CO V. MERRITT (DAMAGES FOR THE POLLUTION OF SUBTERRANEAN WATERS).

332 P2D 677-688 (OKLA. 1958).

DESCRIPTORS:

\*SUBSURFACE WATERS, \*WATER POLLUTION EFFECTS, \*OKLAHOMA, \*OIL INDUSTRY, OIL WELLS, OIL WASTES, SALINE WATER INTRUSION, CREEKS, POTABLE WATER, DAMAGES, JUDICIAL DECISIONS, LEGAL ASPECTS, WATER POLLUTION, WATER WELLS, REMEDIES, ADJUDICATION PROCEDURE.

ABSTRACT:

PLAINTIFF LANDOWNER SUED DEFENDANT PETROLEUM COMPANIES FOR ACTUAL AND PUNITIVE DAMAGES RESULTING FROM THE SALT WATER POLLUTION OF SUBTERRANEAN WATERS UNDERLYING PLAINTIFF'S WATER WELLS. THE WELLS BECAME PERMANENTLY UNPOTABLE. DEFENDANTS ALLEGED ERROR BY THE TRIAL COURT IN: (1) NOT REQUIRING PLAINTIFF TO PROVE NEGLIGENCE, (2) AWARDING EXCESSIVE ACTUAL DAMAGES, AND (3) AWARDING PUNITIVE DAMAGES IMPROPERLY. THE SUPREME COURT OF OKLAHOMA HELD THAT: (1) THE BASIS OF LIABILITY FOR INJURY TO PROPERTY BY OIL POLLUTION AND SALT WATER INTRUSION IS EITHER NEGLIGENCE OR NUISANCE, (2) LIABILITY FOR A NUISANCE DOES NOT REQUIRE PROOF OF NEGLIGENCE SINCE NEGLIGENCE IS NOT AN ESSENTIAL ELEMENT OF A CAUSE OF ACTION FOR NUISANCE, (3) OIL COMPANIES WHICH ARE JOINT TORTFEASORS ARE EACH ACCOUNTABLE FOR THE ENTIRE AMOUNT OF DAMAGES. THE COURT RULED THAT PLAINTIFF WAS ENTITLED TO DAMAGES MEASURED BY THE DIFFERENCE IN LAND VALUE PRIOR TO AND JUST AFTER THE INJURY. PLAINTIFF WAS HELD ENTITLED TO REIMBURSEMENT FOR EMERGENCY EXPENDITURES MADE TO MINIMIZE DAMAGES. PUNITIVE DAMAGES WERE HELD ALLOWABLE BECAUSE DEFENDANTS HAD INTENTIONALLY PERMITTED SALT WATER TO ESCAPE INTO NEARBY CREEKS. THE PUNITIVE DAMAGES AWARDED, HOWEVER, WERE HELD TO BE EXCESSIVE. (REES-FLORIDA)

FIELD 06E, 05G

ACCESSION NO. W71-13883

CRAWFORD V YEATTS (SALT WATER POLLUTION OF FARMLANDS FROM OIL DRILLING OPERATIONS).

395 SW2D 413-419 (CIV APP TEX 1965).

DESCRIPTORS:

\*TEXAS, \*SALINE WATER INTRUSION, \*DAMAGES, \*REMEDIES, WATER POLLUTION, LEGAL ASPECTS, JUDICIAL DECISIONS, STATE GOVERNMENTS, STATE JURISDICTION, POLLUTION ABATEMENT, WATER POLLUTION CONTROL, WATER POLLUTION SOURCES, SALINE WATER, OIL INDUSTRY, DRILLING, WATER LAW, RELATIVE RIGHTS, WATER QUALITY, OIL FIELDS, FARMS, GROUNDWATER.

ABSTRACT:

PLAINTIFF LANDOWNER SOUGHT TO RECOVER DAMAGES FOR INJURY TO HIS FARMLANDS CAUSED BY DEFENDANT OIL LEASE OPERATOR. DEFENDANT DISPOSED OF SALT WATER, PRODUCED AS A BY-PRODUCT OF ITS OIL DRILLING, BY THE USE OF A SURFACE EVAPORATION PIT. THE SALT WATER ENTERED THE GROUND THROUGH THE POROUS AREAS IN THE PIT AND POLLUTED PLAINTIFF'S FRESH GROUNDWATER SUPPLY. THE TRIAL COURT AWARDED PLAINTIFF A JUDGMENT OF \$17,064 FOR PERMANENT DAMAGES TO THE FARM. ON APPEAL PLAINTIFF CONTENTED THAT DEFENDANT NEGLIGENTLY DISPOSED OF THE SALT WATER AND THAT SUCH NEGLIGENCE WAS THE PROXIMATE CAUSE OF THE INJURY. DEFENDANT CONTENTED THAT THE ACTION WAS BARRED BY THE STATUTE OF LIMITATIONS, THAT THERE WAS INSUFFICIENT EVIDENCE TO ESTABLISH NEGLIGENCE, AND THAT THE DAMAGES WERE EXCESSIVE. THE TEXAS COURT OF CIVIL APPEALS AFFIRMED THE JUDGMENT, HOLDING THAT THE STATUTE OF LIMITATIONS DID NOT BEGIN TO RUN UNTIL PLAINTIFF DISCOVERED OR SHOULD HAVE DISCOVERED THE SALT WATER DAMAGE TO THE LAND AND THAT PLAINTIFF PRODUCED AMPLE EVIDENCE TO SUPPORT THE FINDING OF NEGLIGENCE AND THE AMOUNT OF DAMAGES THROUGH THE USE OF LAY AND EXPERT WITNESSES. (HORWITZ-FLORIDA)

FIELD 06E, 05B

ACCESSION NO. W71-13899



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