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ABOUT THIS PUBLICATION

THIS REPORT REPRESENTS AN EFFORT TO PROVIDE AGENCY ADMINISTRATORS, MANAGERS AND SCIENTISTS WITH THE MOST TIMELY INFORMATION ABOUT AVAILABILITY AND CONTENT OF THE GULF BREEZE LABORATORY RESEARCH PROGRAM. FULL TEXT, A REPORT COPY OR A REPRINT CAN BE PROVIDED ON REQUEST TO: MS. SUSAN MEANS CML 904-932-5311 OR FTS 8-686-9011.

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HENRY F. ENOS

LABORATORY DIRECTOR

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BIBA, DIANE MARY. 1983. EFFECTS OF AFLATOXIN ON THE BROWN BULLHEAD ICTALURUS NEBULOSIS. M.S. THESIS. AUBURN UNIVERSITY, AUBURN, AL. 53P. (ERL,GB X357*).

BROWN BULLHEADS HAD RENAL LESIONS 25 DAYS AFTER A ONE-HOUR EXPOSURE TO 1.0 MGG/LITER AFLATOXIN B-1 (AFB) DURING THE FIFTH DAY OF EMBRYONIC DEVELOPMENT, INDICATING A SIMILARITY TO THE EFFECTS OF AFB REPORTED FOR RAINBOW TROUT. RENAL LESIONS WERE NOT FOUND IN BROWN BULLHEADS AFTER EMBRYO EXPOSURE TO 0.5 MG/LITER AFB. LIVER HISTOLOGY AND ULTRASTRUCTURE OF CONTROL BROWN BULLHEADS WERE SIMILAR TO CHANNEL CATFISH, ICTALURUS PUNCTATUS. NO LESIONS WERE OBSERVED IN BROWN BULLHEAD LIVERS EXAMINED 25 DAYS TO EIGHT MONTHS AFTER EMBRYO EXPOSURE TO 0.5 MG/LITER OR 1.0 MG/LITER AFB. THE LACK OF LIVER TUMOR INDUCTION EIGHT MONTHS AFTER EMBRYO EXPOSURE TO 0.5 MG/LITER AFB OR 1.0 MG/LITER AFB SUGGESTS THAT LONGER INDUCTION TIMES OR HIGHER DOSAGES OF AFB ARE REQUIRED FOR TUMORIGENICITY IN BROWN BULLHEADS. A BENZO(A)PYRENE (BAP) ASSAY INDICATED NO INDUCTION OF THE MIXED-FUNCTION OXIDASE (MFO) SYSTEM IN BROWN BULLHEAD MICROSOMES EIGHT MONTHS AFTER EMBRYO EXPOSURE TO 0.5 MG/LITER AFB. LESIONS WERE NOT OBERVED IN LIVERS OR TRUNK KIDNEYS OF BROWN BULLHEADS 25 DAYS AFTER A ONE-HOUR EXPOSURE DURING THE FIFTH DAY OF DEVELOPMENT TO AN ORGANIC CONCENTRATE OF EFFLUENT FROM THE SOUTH TUSKEGEE WATER POLLUTION CONTROL PLANT, MACON COUNTY, ALABAMA. AFTER THREE INTRAPERITONEAL INJECTIONS OF 1.7 MG/KG AFB AT 10-DAY INTERVALS, LIVERS OF BROWN BULLHEADS EXHIBITED LIMITED INDUCTION OF THE MFO SYSTEM AFTER A BAP METABOLISM ASSAY. THE MFO INDUCTION WAS PROBABLY RESTRICTED BY AFLATOXIN INHIBITION OF PROTEIN SYNTHESIS. INJECTION OF AFB CAUSED ACCUMULATION OF LIPOFUCHSIN AND HEMOSIDERIN WITHIN MACROPHAGE CENTERS IN THE LIVER, AND ULTRASTRUCTURALLY, MITOCHONDRIAL PYKNOSIS AND VESICULATION AND DEGRANULATION OF ROUGH ENDOPLASMIC RETICULUM OF HEPATOCYTES.

BOOKHOUT, C.G., R.J. MONROE, R.B. FORWARD, JR., AND J.D. COSTLOW, JR. 1984. EFFECTS OF SOLUBLE FRACTIONS OF DRILLING FLUIDS ON DEVELOPMENT OF CRABS, RHITHROPANOPEUS HARRISII AND CALLINECTES SAPIDUS. WATER AIR SOIL POLLUT. 21:183-197. (ERL,GB X374*).

THE MUD AQUEOUS FRACTION (MAP) AND SUSPENDED PARTICULATE PHASE (SPP) OF LOW-DENSITY LIGNOSULFONATE TYPE MUD WITH FERROCHROME ADDED WERE NONTOXIC TO LARVAE DURING THE COMPLETE LARVAL DEVELOPMENT OF RHITHROPANOPEUS HARRISII. FIVE PERCENT (5000 PPM, 0.5% V/V MUD IN WATER) MAP AND SPP WERE NOT TOXIC TO CALLINECTES SAPIDUS. SURVIVAL OF C. SAPIDUS LARVAE DECREASED AS CONCENTRATIONS OF MAF AND SPP INCREASED FROM 5% (5000 PPM, 0.5 V/V MUD IN WATER) TO 50% (50,000 PPM, 5% V/V MUD IN WATER). NO LARVAE REACHED THE 1ST CRAB STAGE IN 100% (100000 PPM, 10% V/V MUD IN WATER) MAF AND SPP. STATISTICAL ANALYSIS OF THE DATA ON SURVIVAL, MORTALITY, AND BEHAVIOR ARE PRESENTED. BLUE CRAB LARVAL BEHAVIOR IS AFFECTED BY EXPOSURE TO MAF AND SPP WITH THE GENERAL EFFECT BEING A DECLINE IN SWIMMING SPEED. A SIGNIFICANT REDUCTION WAS ONLY OBSERVED IN 100% MAF BUT WAS NOTICED IN 5, 25, 50, AND 100% SPP.

BORTHWICK, PATRICK W., RICHARD M. MONTGOMERY, JAMES R. CLARK, JAMES M. PATRICK, AND EMILE M. LORES. 1984. FIELD CONFIRMATION OF A LABORATORY-DERIVED HAZARD ASSESSMENT OF THE ACUTE TOXICITY OF FENTHION (BAYTEX) TO PINK SHRIMP, PENAEUS DUORARUM (ABSTRACT). PRESENTED AT THE EIGHTH SYMPOSIUM ON AQUATIC TOXICOLOGY, APRIL 15-17, 1984. (ERL,GB 494*).

FIELD STUDIES WERE CONDUCTED TO DETERMINE IF LABORATORY TOXICITY TEST PROTOCOLS, INCLUDING ASTM STANDARD PRACTICE METHODOLOGIES FOR PESTICIDE HAZARD ASSESSMENT, ACCURATELY PREDICT ENVIRONMENTAL RESPONSES (E.G., SHRIMP MORTALITY) UNDER FIELD CONDITIONS. TO EVALUATE THE APPLICABILITY AND PREDICTIVENESS OF LABORATORY DATA, FENTHION (BAYTEX, A MOSQUITO CONTROL AGENT) WAS APPLIED TO COASTAL JUNCUS MARSHES IN A SERIES OF TRUCK-MOUNTED ULTRA-LOW VOLUME (ULV) ADULTICIDE OPERATIONS AND A DIRECT APPLICATION OF FENTHION TO THE WATER AT THE LARVICIDE RATE. CAGED PINK SHRIMP (PENAEUS DUORARUM) WERE DEPLOYED IN FLOATING, COMPARTMENTED CAGES AT TWO FENTHION-SPRAYED SITES AND A CONTROL SITE. THE ANIMALS WERE OBSERVED FREQUENTLY OVER A 24-H PERIOD FOR POST-SPRAY MORTALITY. PERIODIC WATER SAMPLES WERE COLLECTED, PRESERVED, AND TRANSPORTED TO THE LABORATORY FOR GAS-CHROMATOGRAPHIC QUANTITATION TO CHARACTERIZE THE EXPOSURE CONCENTRATION REGIME AND FATE OF FENTHION AT THE CAGED-SHRIMP SITES. FIELD DATA WERE IN WHICH P. DUORARUM WAS EXPOSED TO FENTHION ACCORDING TO THE ASTM STANDARD PRACTICE FOR CONDUCTING ACUTE TOXICITY TESTS. ALSO, A PULSED-DOSE FLOWING WATER EXPOSURE OF P. DUORARUM, DESIGNED TO SIMULATE THE DIMINISHING POST-SPRAY FENTHION CONCENTRATIONS FOUND IN THE FIELD, PROVIDED ADDITIONAL LABORATORY EXPOSURE ASSESSMENT FOR PREDICITNG FIELD EFFECTS. RESULTS CONFIRMED OUR HYPOTHESIS THAT IF INITIAL FIELD CONCENTRATIONS WERE LOWER THAN THE NO-EFFECT CONCENTRATIONS (NEC) OBSERVED IN THE LABORATORY TESTS, WE WOULD NOT EXPECT FENTHION-INDUCED MORTALITY IN CAGED SHRIMP EXPOSED TO FIELD CONDITIONS. FURTHER, IF INITIAL CONCENTRATIONS IN THE FIELD EXCEEDED THE LABORATORY NEC, CAGED SHRIMP, MORTALITY WOULD OCCUR. A CONSERVATIVE ESTIMATE OF THE FIELD TOXICITY WAS ESTABLISHED USING THE LABORATORY ACUTE FLOW-THROUGH 96-H LC50 (95% CONFIDENCE INTERVAL) = 0.106 (0.092 TO 0.123) UG/L. HOWEVER, A MORE REFINED LABORATORY ESTIMATE OF FIELD EFFECT CONCENTRATIONS WAS OBTAINED FROM THE PULSE-DOSE TEST IN WHICH FENTHION WAS METERED INTO THE EXPOSURE SYSTEM FOR 2 H TO OBTAIN A SPECIFIED MAXIMUM CONCENTRATION, THEN THE SYSTEM WAS FLUSHED WITH UNCONTAMINATED SEAWATER TO YIELD A 6 TO 8 H EXPOSURE. A NEC OF LESS THAN EQUAL TO 1.0 UG/L WAS ESTABLISHED FOR THIS EXPOSURE REGIME. FROM THIS ARRAY OF LABORATORY TESTS AND FIELD TREATMENTS, WE CONCLUDE THAT LABORATORY TOXICITY TESTS DID PREDICT THE RANGE OF SAFE AND LETHAL EXPOSURE TO FENTHION FOR PINK SHRIMP IN FIELD APPLICATIONS.

BOURQUIN, AL W. 1984. BIODEGRADATION IN THE ESTUARINE-MARINE ENVIRONMENTS AND THE GENETICALLY ALTERED MICROBE. IN: GENETIC CONTROL OF ENVIRONMENTAL POLLUTANTS. GILBERT S. OMENN AND ALEXANDER HOLLAENDER, EDITORS, PLENUM PRESS, NEW YORK. PP. 97-115. (ERL,GB 497*).

MANY CHEMICALS ENTER THE MARINE AND ESTUARINE ENVIRONMENT THROUGH A VARIETY OF ROUTES. THESE ROUTES INCLUDE DUMPING, DIRECT APPLICATION, OUTFALLS, ACCIDENTAL SPILLS, AND LAND RUNOFF OR RAINFALL. SOME OF THESE COMPOUNDS ARE TOXIC TO THE BIOTA OR MAY BE CONVERTED TO TOXIC PRODUCTS IN NATURE. THE FATE AND ECOLOGICAL EFFECT OF THESE CHEMICALS IN ESTUARINE ENVIRONMENTS IS PART OF THE CONCERN OF THE EPA LABORATORY AT GULF BREEZE, FLORIDA. TOXICITY RESULTS WHEN AN ORGANISM IS EXPOSED TO A SUFFICIENT CONCENTRATION OF A COMPOUND. THEREFORE, FATE GREATLY INFLUENCES THE CUMULATIVE EFFECT OF A CHEMICAL IN THE BIOTA. TOXICITY EFFECTS CAN BE ATTENUATED BY DILUTION OF THE POLLUTANT BELOW ITS TOXIC THRESHOLD OR BY PHYSICALLY REMOVING IT INTO A PHASE (SEDIMENTS) WHERE THE CHEMICAL MAY NOT BE AVAILABLE TO INDIGENOUS ORGANISMS. NEITHER PROCESS ALTERS THE CHEMICAL STRUCTURE OF THE TOXICANT. CHEMICAL, PHOTOCHEMICAL AND SOME BIOLOGICAL PROCESSES BRING ABOUT CHANGES IN CHEMICAL STRUCTURE WHICH MAY OR MAY NOT ALTER THE TOXICITY OF THE CHEMICAL OR PRODUCT. WHEREAS, MICROBIAL DEGRADATION CAN PRODUCE MAJOR CHANGES IN THE CHEMICAL STRUCTURE OF THE INTRODUCED CHEMICAL, MINERALIZATION IS OFTEN THE END RESULT OF BACTERIAL AND FUNGAL ACTIVITIES. THE PURPOSES OF THIS PAPER ARE TO: 1) PROVIDE SELECTED EXAMPLES IN THE MARINE AND ESTUARINE ENVIRONMENTS OF KNOWN INTRODUCTIONS OF TOXIC CHEMICALS, 2) DESCRIBE HOW HABITAT DIFFERENCE AFFECT BIODEGRADATION POTENTIALS IN FRESHWATER, ESTUARINE, AND MARINE ENVIRONMENTS; 3) AND EXPRESS SOME APPLICATIONS AND CONCERNS FOR THE RELEASE OF GENETICALLY-ALTERED ORGANISMS INTO THE ENVIRONMENT.

BOURQUIN, AL W., P.H. PRITCHARD, AND H.L. FREDRICKSON. IN PREP. SEDIMENT-CORE LABORATORY TEST SYSTEM FOR ASSESSING THE FATE OF CHEMICALS IN THE AQUATIC ENVIRONMENT. APPL. ENVIRON. MICROBIOL. (ERL,GB 470).

AN AQUATIC BIODEGRADATION TEST SYSTEM, ECO-CORE, USING AN INTACT SEDIMENT-WATER CORE AND ITS ASSOCIATED MICROORGANISMS IN A STATIC LABORATORY SYSTEM IS DESCRIBED. THE EFFECTS OF THE SYSTEMS DESIGN ON THE FATE OF METHYL PARATHION (MP) WAS STUDIED. SEDIMENT-WATER CORES TAKEN DIRECTLY FROM THE ENVIRONMENT WERE GENERALLY SLOWER TO DEGRADE MP THAN CORES "STRUCTURED" WITH SEDIMENT AND WATER IN THE LABORATORY. DEGRADATION RATES WERE SLOWER WHEN SEDIMENT TO WATER RATIOS WERE INCREASED (WATER DECREASED) IN EITHER TYPE CORE. LABORATORY - AGED SYSTEMS WERE LESS MICROBIALLY REACTIVE THAN "FRESH" CORES WHEN 14-CO(SUBSCRIPT 2) AND DEGRADATION PRODUCTS OF 14-C-MP WERE MEASURED. THE TEST SYSTEM CAN BE USED TO MONITOR EFFECTS BY TOXIC POLLUTANTS ON MICROBIOLOGICAL ACTIVITIES. THE INHIBITION OF MP MINERALIZATION BY KEPONE IN NATURALLY AND ARTIFICIALLY CONTAMINATED SEDIMENTS IS DESCRIBED. THIS STUDY DESCRIBES A LABORATORY TECHNIQUE FOR OBTAINING FATE OF ORGANIC CHEMICALS IN A SYSTEM WHICH INTEGRATED ALL FATE PROCESSES AND CAN BE USED TO ASSESS THE IMPACT OF TOXIC POLLUTANTS ON THE METABOLIC INTEGRITY OF THE MICROBIOLOGICAL COMMUNITY.

BUTLER, PHILIP A. IN PRESS. SYNOPTIC REVIEW OF THE SOUTHERN OYSTER DRILL. J. SHELLFISH. RES. (ERL,GB 500).

THIS LITERATURE SEARCH IDENTIFIES A MAJORITY OF THE PUBLICATIONS IN THE PERIOD 1880-1980 WHICH ARE CONCERNED WITH THE MARINE GASTROPOD, THAIS HAEMASTOMA FLORIDANA (CONRAD, 1837). THE SNAIL IS AN ECONOMICALLY IMPORTANT OYSTER PREDATOR IN THE WESTERN ATLANTIC AND GULF OF MEXICO LITTORAL. MAJOR CONTRIBUTIONS OF EACH PAPER TO OUR KNOWLEDGE OF THE SNAIL'S BIOLOGY ARE BRIEFLY CATEGORIZED. HITHERTO UNPUBLISHED RESEARCH BY THE AUTHOR ON THE SNAIL'S BIOLOGY IS DOCUMENTED.

CLARK, JAMES R., DANIEL J. FISHER, AND JOHN P. CONNOLLY. 1983. EXPOSURE-DOSE-EFFECT TESTING WITH ESTUARINE FISHES (ABSTRACT). ESTUARIES. 6(3):330-331. (ERL,GB X459*).

A PHARMACOKINETIC MODEL OF CONTAMINANT UPTAKE AND CLEARANCE IS BEING APPLIED TO COMPUTE DOSES FOR FISH EXPOSED TO CONTAMINANTS THROUGH WATER. THE DOSE, COMPUTED AS A FUNCTION OF EXPOSURE CONCENTRATION, DURATION OF EXPOSURE, AND UPTAKE AND CLEARANCE RATES, IS USED TO INTERPRET THE LETHAL RESPONSES OF FISH EXPOSED TO VARIOUS CONTAMINANT CONCENTRATIONS. THE MODEL CAN BE USED TO COMPUTE A WHOLE-BODY BURDEN, A RESIDUE CONCENTRATION IN AN AFFECTED ORGAN OR TISSUE, OR AS A MEASURE OF EFFECT SUCH AS INHIBITION OF ACETYLCHOLINESTERASE ACTIVITY. THIS APPROACH HAS BEEN TESTED WITH EXPOSURE-EFFECT DATA (WHOLE-BODY BURDENS OF ZINC AND ACETYLCHOLINESTERASE INHIBITION BY GUTHION) TAKEN FROM THE LITERATURE, AND IS NOW BEING TESTED WITH OUR TISSUE-SPECIFIC EXPERIMENTAL DATA FROM SPOT (LEIOSTOMUS XANTHURUS) EXPOSED TO ENDRIN. DOSES CALCULATED IN THIS MANNER CAN BE CORRELATED WITH LETHAL RESPONSES FOLLOWING ACUTE EXPOSURES AND APPLIED TO CONTAMINANT EXPOSURE MODELS TO GENERATE AN "EFFECTS MODEL" FOR CHARACTERIZATION OF ACUTE RESPONSES OF FISH TO CONTAMINANT SPILLS, MULTIPLE EXPOSURES OR PULSE DOSE REGIMES, AND IMPLEMENTATION OF WATER QUALITY STANDARDS. RESIDUE DATA OR SPECIFIC DOSE-EFFECT MEASUREMENTS, WHEN CORRELATED WITH LETHAL RESPONSES, CAN BE COMPARED WITH MONITORING DATA TO ASSESS THE POTENTIAL FOR ACUTE EFFECTS OR TO ESTIMATE A RELATIVE MARGIN OF SAFETY.

CLEVELAND, MARY ELIZABETH. 1983. BIOTIC AND ABIOTIC FACTORS AFFECTING SORPTION OF TOXIC COMPOUNDS TO NATURAL SEDIMENTS. M.S. THESIS. UNIVERSITY OF WEST FLORIDA, PENSACOLA, FL. 95P. (ERL,GB 496*).

THE SORPTION OF RADIOLABELED KEPONE, DURSBAN, DIMILIN AND METHYL PARATHION (MPS) WAS OBSERVED IN STERILE AND NONSTERILE AQUATIC SEDIMENT SYSTEMS TO ADDRESS THREE ASSUMPTIONS IMPLICIT IN THE USE OF PARTITION COEFFICIENT AS A DESCRIPTOR OR EQUILIBRIUM ADSORPTION: (1) ADSORPTION KINETICS ARE RAPID AND THERFORE UNIMPORTANT TO FATE CONSIDERATIONS; (2) ADSORPTION EQUILIBRIUM IS INDEPENDENT OF INITIAL COMPOUND OR SOLIDS CONCENTRATIONS; AND (3) ADSORPTION IS REVERSIBLE. ADSORPTION WAS TWO-STEPPED. AN INITIAL RAPID PHASE ACCOUNTED FOR MOST OF THE TOTAL ADSORPTION, SUGGESTING THAT KINETICS ARE UNIMPORTANT TO EXPOSURE CONCENTRATION PREDICTIONS. AN INVERSE RELATIONSHIP BETWEEN PARTITION COEFFICIENT AND SEDIMENT CONCENTRATION WAS OBSERVED, INDICATING THAT A SINGLE PARTITION COEFFICIENT IS NOT ADEQUATE TO FATE CONSIDERATIONS. THE IRREVERSIBLE ADSORPTION OF MPS WAS ATTRIBUTED TO THE BIOLOGICALLY MEDIATED FORMATION OF BOUND RESIDUES. THE EXTENT OF THE BINDING PROCESS WAS AFFECTED BY SEDIMENT CONCENTRATION, TEMPERATURE, AND ANAEROBIC CONDITIONS BUT UNAFFECTED BY SALINITY. THIS STUDY DEMONSTRATED THAT EXPOSURE CONCENTRATION PREDICTIONS FOR RAPIDLY DEGRADED COMPOUNDS SHOULD INCLUDE THE BIOLOGICAL PROCESSES AFFECTING THEIR FATE.

CONKLIN, P.J., D. DRYSDALE, D.G. DOUGHTIE, K.R. RAO, J.P. KAKAREKA, T.R. GILBERT, AND R.F. SHOKES. 1983. COMPARATIVE TOXICITY OF DRILLING MUDS: ROLE OF CHROMIUM AND PETROLEUM HYDROCARBONS. MAR. ENVIRON. RES. 10(2):105-125. (ERL,GB X398*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB84-116359.

SAMPLES OF USED DRILLING MUDS COLLECTED DURING THE COURSE OF A SINGLE WELL DRILLING OPERATION EXHIBITED DIFFERENT DEGREES OF ACUTE TOXICITY TO SHEEPSHEAD MINNOWS AND GRASS SHRIMP. FOR MOLTING GRASS SHRIMP (PALAEMONETES PUGIO), THE 96-H LC50'S WERE 360 TO 14,560 PPM (UL/LITER); MANY OF THESE VALUES WERE CONSIDERABLY LOWER THAN THOSE REPORTED FROM PREVIOUS DRILLING MUD ASSAYS. HOWEVER, WHEN SOME OF THE MUDS USED IN THIS STUDY WERE TESTED ON SHEEPSHEAD MINNOWS (CYPRINODON VARIEGATUS) THE RESULTING 96-H LC50'S (6,300 TO 100,000 PPM) WERE WELL WITHIN THE RANGE OF PREVIOUSLY REPORTED VALUES. ALTHOUGH A NUMBER OF THE DRILLING MUD SAMPLES HAD RELATIVELY HIGH AMOUNTS OF CHROMIUM DUE TO THE ADDITION OF SODIUM CHROMATE, THERE WAS A LOW CORRELATION BETWEEN CHROMIUM CONCENTRATION AND TOXICITY. IN ONLY THREE DRILLING MUDS COULD CHROMIUM CONTENT ALONE ACCOUNT FOR THE OBSERVED TOXICITIES. FURTHERMORE, CHEMICAL /ANALYSIS REVEALED THE PRESENCE OF NO. 2 FUEL OIL-LIKE PETROLEUM HYDROCARBONS IN THE MUD SAMPLES. BASED ON THE RESULTS OF TOXICITY TESTS WITH NO. 2 FUEL OIL AND THE CONCENTRATIONS OF OIL PRESENT IN THE MUDS, THE TOXICITY OF THE MUD SAMPLES TO GRASS SHRIMP APPEARS TO BE LARGELY ATTRIBUTABLE TO THE PETROLEUM HYDROCARBON CONTENT.

CONKLIN, P. J., AND K. R. RAO. IN PREP. COMPARATIVE TOXICITY OF OFFSHORE AND OIL-ADDED DRILLING MUDS TO LARVAE OF THE GRASS SHRIMP, PALAEMONETES INTERMEDIUS. ARCH. ENVIRON. CONTAM. TOXICOL. (ERL,GB X471).

CONKLIN, PHILIP J., AND K. RANGA RAO. 1983. COMPARATIVE TOXICITY OF WASTE DRILLING FLUIDS TO A CRUSTACEAN (PALAEMONETES PUGIO) AND A FISH (CYPRINODON VARIEGATUS) (ABSTRACT). IN: PROCEEDINGS OF THE NINTH ANNUAL AQUATIC TOXICITY WORKSHOP: NOV. 1-5, 1982, CAN. TECH. REP. FISH. AQUAT. SCI. 1163. W. C. MCKAY, EDITOR, DEPT. OF FISHERIES AND OCEANS, OTTAWA, ONTARIO. PP. 205. (ERL,GB X476*).

THE ACUTE TOXICITY OF A SERIES OF 18 DRILLING FLUIDS (MUDS) FROM AN EXPLORATORY DRILLING OPERATION WAS EVALUATED IN TESTS USING 28-DAY OLD JUVENILE SHEEPSHEAD MINNOWS (CYPRINODON VARIEGATUS) AND GRASS SHRIMP (PALAEMONTES PUGIO.) GRASS SHRIMP THAT MOLTED DURING THE TESTS WERE ESPECIALLY SENSITIVE TO THE DRILLING MUDS; THE 96-HR LC50S (363 TO 14,565 PPM MUD BY VOLUME) ARE CONSIDERABLY LOWER THAN THE PREVIOUSLY REPORTED TOXICITY VALUES FOR DRILLING MUDS. SHEEPSHEAD MINNOWS WERE CONSIDERABLY LESS SENSITIVE TO THE MUDS THAN WERE GRASS SHRIMP. ALTHOUGH A NUMBER OF THE DRILLING MUDS CONTAINED RELATIVELY HIGH AMOUNTS OF CHROMIUM, IN MOST INSTANCES THE OBSERVED TOXICITIES DID NOT APPEAR TO BE ATTRIBUTABLE TO CHROMIUM ALONE. HOWEVER, THERE WAS A SIGNIFICANT CORRELATION BETWEEN THE AMOUNT OF OIL PRESENT IN THE MUDS AND THEIR TOXICITY TO GRASS SHRIMP.

CONNOLLY, JOHN P., MARY E. CLEVELAND, AND PARMELY H. PRITCHARD. IN PREP. VALIDITY OF PARTITION COEFFICIENT AS THE ADSORPTION DESCRIPTOR IN EXPOSURE CONCENTRATIONS PREDICTIONS: STUDIES WITH KEPONE AND METHYL PARATHION. WATER RES. (ERL,GB 415).

THIS WORK INVESTIGATES THREE MAJOR ASSUMPTIONS IMPLICIT IN THE USE OF PARTITION COEFFICIENT AS SOLE ADSORPTION DESCRIPTOR: (1) ADSORPTION KINETICS ARE UNIMPORTANT TO FATE AND TRANSPORT OF THE TOXIC CHEMICAL BECAUSE THEY ARE RAPID; (2) ADSORPTION IS A REVERSIBLE PROCESS; AND (3) EQUILIBRIUM CONDITIONS ARE INDEPENDENT OF THE INDIVIDUAL CONCENTRATIONS OF TOXIC CHEMICAL AND ADSORBING SOLID, DEPENDING ONLY ON THEIR RATIO. ADSORPTION OF KEPONE AND METHYL PARATHION WAS FOUND TO BE RAPID AND TWO-STEP, A FAST ADSORPTION FOR APPROXIMATELY 5 MIN. FOLLOWED BY A SLOWER ADSORPTION TO EQUILIBRIUM AT 1 TO 2 HR. KINETICS OF ADSORPTION INDICATED ADSORPTION RATE WAS CONTROLLED BY MASS TRANSPORT MECHANISMS. KINETICS OF METHYL PARATHION ADSORPTION WERE IDENTICAL FOR STERILE AND BIOLOGICALLY ACTIVE SYSTEMS TO THE POINT OF STERILE SYSTEM EQUILIBRIUM. CONTINUED DECREASE OF DISSOLVED 14C AND TOTAL MASS RECOVERY IN THE ACTIVE SYSTEM SUGGESTED DEGRADATION TO AN IRREVERSIBLY ADSORBED COMPOUND. THE RESULTS INDICATE THAT KINETICS CAN BE IGNORED FOR SMALL PARTICLE SIZE SEDIMENTS BUT THAT REVERSIBILITY OF ADSORPTION CANNOT BE ASSUMED. EQUILIBRIUM ADSORPTION OF BOTH COMPOUNDS AT CONSTANT SEDIMENT CONCENTRATION WAS DESCRIBED BY A LINEAR ISOTHERM. PARTITION COEFFICIENT WAS, HOWEVER, AN INVERSE FUNCTION OF SEDIMENT CONCENTRATION, DECREASING BY AS MUCH AS AN ORDER OF MAGNITUDE BETWEEN SEDIMENT CONCENTRATIONS REPRESENTATIVE OF SUSPENDED SEDIMENT AND SEDIMENT CONCENTRATIONS REPRESENTAIVE OF BED SEDIMENT. THEREFORE, A SINGLE PARTITION COEFFICIENT IS INADEQUATE FOR EXPOSURE CONCENTRATION PREDICTIONS.

CONNOLLY, JOHN P., AND RICHARD P. WINFIELD. IN PREP. WASTOX, A FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS, PART 1: EXPOSURE CONCENTRATION. (ERL,GB X392).

A COMPUTER PROGRAM WAS DEVELOPED FOR MODELING THE FATE OF TOXIC CHEMICALS THAT ARE DISCHARGED TO NATURAL WATER SYSTEMS. THE PROGRAM PERMITS THE USER TO MODEL THE WATER AND SEDIMENT TRANSPORT IN A NATURAL WATER SYSTEM AND THE MOVEMENT AND DECAY OF A CHEMICAL DISCHARGED TO THAT SYSTEM. EITHER THE EQUILIBRIUM DISTRIBUTION OF CHEMICAL CONTINUALLY DISCHARGED TO THE SYSTEM OR THE CONCENTRATIONS IN THE SYSTEM AS A FUNCTION OF TIME MAY BE COMPUTED. FROM ONE TO THREE TYPES OF SOLIDS MAY BE CONSIDERED. THE REACTION OF THE CHEMICAL AND ITS TRANSFER BETWEEN PHASES ARE COMPUTED FROM SPECIFIED CHARACTERISTICS OF THE CHEMICAL AND ENVIRONMENTAL PARAMETERS OF THE SYSTEM. THE PROCESSES CONSIDERED INCLUDE PHOTOLYSIS, HYDROLYSIS, BIODEGRADATION, VOLATILIZATION AND ADSORPTION. ADSORPTION TO THE SOLIDS TYPES INCLUDED IN THE MODEL IS DESCRIBED AS A LOCAL EQUILIBRIUM PROCESS DEFINED BY A PARTITION COEFFICIENT AND THE LOCAL SOLIDS CONCENTRATION. ALL OTHER PROCESSES ARE DEFINED IN TERMS OF REACTION RATES. WASTOX DOES NOT EXPLICITLY SPECIFY EACH OF THE TRANSPORT PROCESSES THAT MAY AFFECT THE CHEMICAL OR SOLIDS. TRANSPORT IS CONSIDERED EITHER AS AN ADVECTIVE PROCESS DEFINED BY A FLOW OR A MIXING PROCESS DEFINED BY A DISPERSION OR EXCHANGE. SPECIFICATION OF SEPARATE TRANSPORT PROCESSES IS MADE BY THE USER BY DEFINING UP TO NINE SETS OF FLOWS AND DISPERSIONS, TERMED FIELDS. EACH FIELD IS APPLIED TO EITHER DISSOLVED CHEMICAL OR ADSORBED CHEMICAL AND SOLIDS, OR BOTH. FOR EXAMPLE, DISPERSION WITHIN THE STATIONARY SEDIMENT IS LIMITED TO DISSOLVED CHEMICAL AND TO ACCOUNT FOR THIS A FIELD OF DISPERSIONS WOULD BE INPUTTED BY THE USER AND APPLIED ONLY TO THIS COMPONENT. THE USER OF SUCH A NON-SPECIFIC TRANSPORT STRUCTURE PERMITS CONSTRUCTION OF MODELS CONSISTENT WITH THE UNDERSTANDING OF THE PARTICULAR NATURAL WATER SYSTEM AND THE QUESTION BEING ADDRESSED. WASTOX IS SUFFICIENTLY GENERAL TO BE APPLIED TO ALL TYPES OF NATURAL SYSTEMS. IT HAS BEEN SUCCESSFULLY APPLIED TO THE JAMES RIVER ESTUARY, THE GREAT LAKES, AND THE USEPA EXPERIMENTAL STREAM CHANNELS AT MONTICELLO, MINNESOTA.

CONNOLLY, JOHN P. IN PREP. WASTOX, A FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS, PART 2: FOOD CHAIN. (ERL,GB X467).

THIS REPORT DESCRIBES A MATHEMATICAL MODELING FRAMEWORK FOR THE ANALYSIS OF TOXIC CHEMICALS IN AQUATIC BIOTA. THIS FRAMEWORK IS PART OF A BROADER FRAMEWORK FOR MODELING THE FATE OF TOXIC CHEMICALS IN NATURAL WATER SYSTEMS, ENTITLED WASTOX, AN ACRONYM FOR WATER QUALITY ANALYSIS SIMULATION FOR TOXICS. WASTOX IS COMPOSED OF AN EXPOSURE CONCENTRATION COMPONENT WHICH COMPUTES THE TIME-VARIABLE OR STEADY-STATE CONCENTRATIONS OF A TOXIC CHEMICAL IN THE WATER COLUMN AND BED OF A NATURAL WATER SYSTEM AS WELL AS THE FOOD CHAIN COMPONENT DESCRIBED IN THIS REPORT. THE FOOD CHAIN COMPONENT IS A GENERALIZED MODEL OF THE UPTAKE AND ELIMINATION OF TOXIC CHEMICALS BY AQUATIC ORGANISMS. IT IS A MASS BALANCE CALCULATION IN WHICH THE RATES OF UPTAKE AND ELIMINATION ARE RELATED TO THE BIOENERGETIC PARAMETERS OF THE SPECIES. A LINEAR FOOD CHAIN OR A FOOD WEB MAY BE SPECIFIED. CONCENTRATIONS ARE CALCULATED AS A FUNCTION OF TIME AND AGE FOR EACH SPECIES INCLUDED. EXPOSURE TO THE TOXIC CHEMICAL IN FOOD IS BASED ON A CONSUMPTION RATE AND PREDATOR-PREY RELATIONS THAT ARE SPECIFIED AS A FUNCTION OF AGE. EXPOSURE TO THE TOXIC CHEMICAL IN WATER IS FUNCTIONALLY RELATED TO THE RESPIRATION RATE. STEADY-STATE CONCENTRATIONS MAY ALSO BE CALCULATED. THE CONCENTRATIONS OF TOXICL CHEMICAL TO WHICH THE FOOD CHAIN IS EXPOSED MAY BE SPECIFIED BY THE USER OF THE MODEL OR MAY BE TAKEN DIRECTLY FROM THE VALUES CALCULATED BY THE EXPOSURE CONCENTRATION COMPONENT OF WASTOX. THUS THE FOOD CHAIN COMPONENT MAY BE EXECUTED AS A SEPARATE MODEL OR AS A POST-PROCESSOR TO THE EXPOSURE CONCENTRATION COMPONENT. MIGRATORY SPECIES, AS WELL AS NON-MIGRATORY SPECIES, MAY BE CONSIDERED. SEPARATE NON-MIGRATORY FOOD CHAINS MAY BE SPECIFIED AND THE MIGRATORY SPECIES IS EXPOSED SEQUENTIALLY TO EACH BASED ON ITS SEASONAL MOVEMENTS. THE MODEL MAY BE APPLIED TO ANY TYPE OF NATURAL WATER SYSTEM. IT HAS BEEN SUCCESSFULLY USED TO MODEL PCB IN THE LAKE MICHIGAN LAKE TROUT FOOD CHAIN AND THE SAGINAW BAY, LAKE HURON YELLOW PERCH FOOD CHAIN, AND KEPONE IN THE JAMES RIVER STRIPED BASS FOOD CHAIN.

CONNOR, SETH JOHN. 1983. EFFECTS OF DRILL MUD ON THE FREE AMINO ACID POOL OF ACROPORA CERVICORNIS. M.S. THESIS. TEXAS A&M UNIVERSITY, COLLEGE STATION, TX. 51P. (ERL,GB X466*).

FOUR SITU EXPERIMENTS WERE CONDUCTED TO TEST THE EFFECTS OF A USED DRILL MUD ON THE FREE AMINO ACID POOL OF ACROPORA CERVICORNIS. TWENTY-SIX HOUR EXPOSURES TO 19, 38, AND 76 PPM DRILL MUD CAUSED SIGNIFICANT REDUCTIONS IN TOTAL NINHYDRIN POSITIVE SUBSTANCES (NPS). TISSUE DEGRADATION AND ZOOXANTHELLAE LOSS WERE ASSOCIATED WITH THE LARGEST REDUCTIONS IN NPS AT THE 380 PPM MUD EXPOSURE LEVEL. EXPOSURES TO KAOLIN SOMETIMES PRODUCED SIGNIFICANT REDUCTIONS IN NPS. EIGHTEEN AMINO ACIDS WERE IDENTIFIED AS ELEMENTS OF THE FREE AMINO ACID (FAA) POOL: ASPARTATE, THREONINE, SERINE, GLUTAMATE/GLUTAMINE, GLYCINE, ALANINE, CITRULLINE, VALINE, METHIONINE, LEUCINE, TYROSINE, PHENYLALANINE, ORNITHINE, LYSINE, HISTIDINE, ARGININE, CYSTEIC ACID, AND PROLINE. OF THESE, THE FIRST SIX LISTED ACCOUNTED FOR OVER 90% OF THE FAA POOL. GLYCINE WAS THE MOST ABUNDANT. MUD EXPOSURES RESULTED IN SIGNIFICANTLY LOWER OR HIGHER LEVELS OF ASPARTATE, THREONINE, SERINE, GLUTAMATE/GLUTAMINE, GLYCINE, AND ALANINE. NO CLEAR CASE OF RECOVERY WAS NOTED FOR NPS OR FAA LEVELS.

COUCH, JOHN A., AND WILLIAM J. HARGIS. IN PREP. AQUATIC ANIMALS IN TOXICITY TESTING. J. AM. COLL. TOXICOL. (ERL,GB 501).

AQUATIC ANIMALS SERVE AS USEFUL MODELS FOR TOXICOLOGICAL EVALUATIONS THAT BRIDGE THE GAP BETWEEN REAL WORLD AND LABORATORY PROBLEMS. SELECTED AQUATIC ORGANISMS ARE ADAPTABLE TO LABORATORY EXPERIMENTATION IN AREAS SUCH AS TOXICITY TESTING AND CHRONIC SUBLETHAL RISKS EVALUATION INCLUDING PHENOMENA SUCH AS CARCINOGENESIS, MUTAGENESIS, AND TERATOGENESIS. GENERAL AND SPECIFIC EXAMPLES OF HOW AQUATIC ANIMALS ARE USEFUL TO TOXICOLOGISTS, AS WELL AS THEORETICAL BASES FOR THEIR USE, ARE DISCUSSED.

COUCH, JOHN A. IN PRESS. ATROPHY OF DIVERTICULAR EPITHELIUM AS AN INDICATOR OF ENVIRONMENTAL IRRITANTS IN THE OYSTER, CRASSOSTREA VIRGINICA (ABSTRACT). IN: PROCEEDINGS OF THE SECOND INTERNATIONAL SYMPOSIUM ON RESPONSES OF MARINE ORGANISMS TO POLLUTANTS, APRIL 27-29, 1983, WOODS HOLE OCEANOGRAPHIC INSTITUTION, WOODS HOLE, MA. (ERL,GB 493).

CERTAIN DISEASES OF FISHES AND SHELLFISHES FROM COASTAL POPULATIONS HAVE BEEN SUGGESTED TO BE RELATED TO, CAUSED BY, OR ENHANCED BY POLLUTANT ACTIVITY. CONSIDERABLE DATA HAVE BEEN PUBLISHED FROM WHICH INFERENCES HAVE BEEN MADE THAT FISHES AND SHELLFISHES INHABITATING CONTAMINATED WATERS ARE AT HIGHER DISEASE RISKS THAN THOSE IN CLEANER ENVIRONMENTS. PROSPECTIVE STUDIES OF ESTUARIES WITHOUT PRIOR KNOWLEDGE OF DISEASE PREVALENCE TO DETERMINE POSSIBLY PREVIOUSLY UNDETECTED FREQUENCIES AND RELATIONSHIPS OF DISEASES AND POLLUTANT RESIDUES IN FISHES AND SHELLFISHES HAVE BEEN RARE. THE PRESENT STUDY OF THREE NORTHERN GULF COAST ESTUARIES, PENSACOLA AND ESCAMBIA BAYS IN NORTHWEST FLORIDA, MOBILE BAY, ALABAMA, AND PASCAGOULA HARBOR IN MISSISSIPPI SOUND, MISSISSIPPI, WAS UNDERTAKEN IN AUGUST, 1978. THE SPECIFIC GOALS OF THIS PROSPECTICE STUDY WERE TO: 1) DETERMINE AND COMPARE RELATIVE CONTAMINATION OF SELECT POLLUTANTS OF SPECIFIC SITES IN AND AMONG THE THREE ESTUARINE AREAS, 2) DETERMINE FREQUENCIES OF KNOWN OR NEW DISEASES, INCLUDING NEOPLASMS, IN SHELLFISH (OYSTERS) AND FISHES AT THESE SITES AMONG THE ESTUARIES, AND 3) TO EXAMINE CRITICALLY ANY RELATIONSHIPS BETWEEN DISEASE FREQUENCY AND ASSESS THE ROLE OF POLLUTANT ACTIVITY IN INFLUENCING DISEASE PREVALENCES IN FISH AND SHELLFISH POPULATIONS IN COASTAL REGIONS CHARACTERIZED BY VARYING DEGREES OF HUMAN POLLUTANT ACTIVITY. DISEASE PREVALENCES IN OYSTERS WERE GENERALLY GREATER IN THE MORE POLLUTED ESTUARY (PASCAGOULA HARBOR). A SINGLE OYSTER DISORDER, DIGESTIVE GLAND EPITHEIAL ATROPHY, DEMONSTRATED A POSITIVE ASSOCIATION WITH RELATIVE CONTAMINATION BY BASE-NEUTRAL, ORGANIC POLLUTANT CHEMICALS. THIS DISORDER WAS CHARACTERIZED BY SEVERE REDUCTION IN EPITHELIAL IN DIGESTIVE GLAND TUBULES, WAS FOUND THROUGHOUT THE GLAND, AND OCCURRED IN CERTAIN CONTAMINATED SAMPLES AT ALMOST 100%. THIS CONDITION MAY PROVIDE AN INDICATOR WITH WHICH TO VICARIOUSLY DETECT THE PRESENCE OF CHEMICAL IRRITANTS IN THE OYSTER'S HABITAT.

COUCH, JOHN A., AND K. RANGA RAO, EDITORS. 1983. BIORATIONAL WORKSHOP, GULF BREEZE, FLORIDA, SEPTEMBER 15-17, 1982. EPA-600/X-83-054, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 64P.

THE GENERAL PURPOSE OF THE WORKSHOP WAS TO EVALUATE THE STATE-OF-THE-ART OF TESTING, AND THE SAFETY OF BIORATIONALS TO BIRDS, MAMMALS, AQUATIC ORGANISMS, PLANTS, AND INSECTS AND TO REVIEW THE PART OF SUBPART M OF THE GUIDELINES (GUIDELINES DOCUMENT FOR REGISTERING PESTICIDES IN THE U.S.: BIORATIONALS) DRAFTED BY THE ECOLOGICAL EFFECTS BRANCH, OFFICE OF PSTICIDES PROGRAMS (HED/OPP).

COUCH, JOHN A., AND ELSAYED ELNENAEY. IN PREP. COMPLEX CHROMATOPHOROMA IN A MARINE TELEOST FISH, FUNDULUS GRANDIS: MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS. (ERL,GB 286).

THREE SPECIMENS OF FUNDULUS GRANDIS, THE GULF KILLIFISH, HAD PIGMENTED TUMORS COMPRISED OF A CELL TYPE THAT HAD CHARACTERISTICS OF DIFFERENT PIGMENT CELL PHENOTYPES. THE FISH WERE FROM A MARICULTURE ATTEMPT ON THE GULF COAST OF ALABAMA USA, AND WERE OLDER LARGER SPECIMENS OF OVER 6,000 F. GRANDIS EXAMINED. A DETAILED LIGHT MICROSCOPY, ELECTRON MICROSCOPY, CHROMATOGRAPHIC, AND CELL CULTURE WAS CONDUCTED ON THE TUMORS FROM THREE FISH. THE TUMOR CELL POSSESSED PTERINOSOMES AS THE DOMINANT CYTOPLAMIC ORGANELLE, BUT ALSO HAD PREMELANOSOMES, MELANOSOMES, AND POSSIBLE REFLECTING PLATELETS. THE MAJOR PIGMENTS ISOLATED AND IDENTIFIED WERE PTERIDINE PIGMENTS. NO CAROTENOID PIGMENTS OR CAROTENOID VESTICLES WERE IDENTIFIED OR DETECTED. THE TUMORS WERE INVASIVE, REPLACED AND ISOLATED NORMAL MUSCLE TISSUES, BUT WERE NOT METASTATIC. ONE FISH WITH THE TUMORS BECAME MORIBUND WHILE HELD IN AQUARIUM, AND PRESENTED EVIDENCE THAT THE NEOPLASMS GREW AND INCREASED IN NUMBERS. THE CAUSES OF THE NEOPLASM IN FUNDULUS ARE UNKNOWN, BUT BOTH ENVIRONMENTAL AND GENETIC FACTORS MAY PLAY ROLES IN ITS GENESIS.

COUCH, JOHN A. 1983. DISEASES CAUSED BY PROTOZOA. IN: BIOLOGY OF CRUSTACEA: ECONOMIC ASPECTS: FISHERIES, CULTURE AND PATHOBIOLOGY, VOL. 6. ANTHONY J. PROVENZANO, EDITOR, ACADEMIC PRESS, NEW YORK, NY. PP. 79-111. (ERL,GB 380*).

CRUSTACEA SERVE AS HOSTS TO SYMBIOTIC, COMMENSAL, PARASITIC, AND PATHOGENIC REPRESENTATIVES OF ALL MAJOR TAXA OF PROTOZOA. STUDIES OF MICROSPORIDIAN EPIZOOTICS IN SHRIMP (VIOSCA, 1943; IVERSEN AND MANNING, 1959), CRAYFISH (PIXELL-GOODRICH, 1956), AND OTHER DECAPOD CRUSTACEA (PIXELL-GOODRICH, 1928; SPRAGUE, 1970A), AMOEBIC EPIZOOTICS IN CRABS (SPRAGUE ET AL., 1969; J.A. COUCH, UNPUBLISHED; NEWMAN AND WARD, 1973; JOHNSON, 1977), AND CILIATE PROTOZOAN OUTBREAKS IN SHRIMPS AND CRABS (COUCH, 1967A, 1978; OVERSTREET, 1973; LIGHTNER, 1975) DEMONSTRATE THE STRONG PERIODIC AND CHRONIC IMPACT OF PROTOZOA. MORTALITIES RANGING FROM 1 TO 100% IN NATURAL AND CAPTIVE POPULATIONS OF CRUSTACEA HAVE BEEN LINKED TO PROTOZOAN ETIOLOGIES. AS PATHOGENS OF CRUSTACEA, PROTOZOA HAVE BEEN MORE INTENSIVELY STUDIED THAN MOST VIRAL, BACTERIAL, FUNGAL, OR METAZOAN PATHOGENS. YET, THERE ARE HUGE GAPS IN OUR KNOWLEDGE CONCERNING LIFE-HISTORIES, MECHANISMS OF TRANSMISSION, AND PATHOGENESIS OF PROTOZOA ASSOCIATED DISEASES OF CRUSTACEA, EVEN IN THE CASES OF LONG-KNOWN RELATIONSHIPS. THIS REVIEW OF REPRESENTATIVE PROTOZOAN-CRUSTACEAN RELATIONSHIPS EMPHASIZED DISEASE-CAUSING PROTOZOA AND THE RELATED RESPONSES OF THEIR SPECIFIC CRUSTACEAN HOSTS. EXAMPLES OF ALL MAJOR TAXA OF PROTOZOA OCCURRING IN OR ON CRUSTACEA ARE EXAMINED. SURVEYS OF PROTOZOA KNOWN TO BE ASSOCIATED WITH DECAPOD CRUSTACEA HAVE BEEN DONE (SPRAGUE 1980A; SPRAGUE AND COUCH, 1971; COUCH AND MARTIN, 1982) BUT NOT FOR OTHER ORDERS OF CRUSTACEA. THE PREDOMINANT USE OF DECAPOD CRUSTACEA AS EXEMPLARY HOSTS REFLECTS THE SUBSTANTIAL DISEASE RESEARCH DONE ON THIS TAXON OF CRUSTACEA BECAUSE OF THEIR COMMERCIAL IMPORTANCE.

COUCH, JOHN A., W. PETER SCHOOR, LEE COURTNEY, AND WILL DAVIS. 1984. EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS OF NONHUMAN SPECIES-AQUATIC ANIMALS (ABSTRACT). IN: PROGRAM & ABSTRACTS THIRD NCI/EPA/NIOSH COLLABORATIVE WORKSHOP: PROGRESS ON JOINT ENVIRONMENTAL AND OCCUPATIONAL CANCER STUDIES, MARCH 22-23, 1984, BETHESDA, MD. U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. IV-2-3. (ERL,GB X475*).

AQUATIC SYSTEMS AND ORGANISMS HAVE BEEN UNDER BOTH LABORATORY AND FIELD STUDY IN ORDER TO DEVELOP INDICATOR, SCREENING, AND MODELING CAPABILITIES FOR DETECTION AND EVALUATION OF RISKS OF CARCINOGENS, MUTAGENS, AND TERATOGENS. STUDIES INCLUDE BOTH GULF BREEZE LABORATORY PROJECTS AND COMPLEMENTARY, EXTRAMURAL COOPERATIVE AGREEMENTS. DURING THE COURSE OF THE PROGRAM, SEVERAL ADVANCEMENTS HAVE BEEN MADE IN THE DEVELOPMENT OF LABORATORY AND FIELD CARCINOGEN ASSAY METHODS UTILIZING FISHES SUCH AS THE SHEEPSHEAD MINNOW (LIVER LESIONS VIA BENZIDINE AND AFLATOXIN EXPOSURES), RIVULUS MARMORATUS (LIVER LESIONS VIA AFLATOXIN EXPOSURE), MENIDIA PENINSULAE (LIVER TUMOR INDUCTION WITH AFLATOXIN EXPOSURE), THE RAINBOW TROUT [TUMOR INDUCTION WITH BENZO(A)PYRENE (B(A)P) AND METHYL AZOXYMETHANOL ACETATE EXPOSURES], AND FRESHWATER CATFISH (PAPILLOMATOUS-LIKE LESIONS VIA CHLORINATED EFFLUENT EXPOSURES). EMPHASIS HAS BEEN PLACED ON THE DEVELOPMENT AND UTILIZATION OF CRITICAL LIFE STAGE EXPOSURES (E.G., EMBRYO AND NEWLY HATCHED FRY EXPOSURES) IN ORDER TO EXPEDITE CARCINOGEN TESTS AND MINIMIZE TIME REQUIRED FOR DETECTABLE TUMOROGENIC RESPONSES. PRENEOPLASTIC HEPATIC LESION DEVELOPMENT IN MENIDIA NOTED AT 12 WEEKS AND FOLLOWED BY HEPATIC TUMORS AT 11 MONTHS, HAS SHOWN PROMISE FOR THIS SPECIES AND EXPOSURE METHOD. THE FIRST HEPATIC TUMORS INDUCED IN FISHES WITH POLYCYCLIC AROMATICS (E.G., B(A)P) RESULTED IN THE FURTHER ADVANCEMENT OF THE RAINBOW TROUT CARCINOGEN ASSAY SYSTEM. BIOCHEMICAL STUDIES INVOLVING METABOLISM OF PAH'S (E.G., PERYLENE) BY SKIN AND LIVER TISSUES OF THE TIGER SALAMANDER (AMBYSTOMA TIGRINUM) HAVE INDICATED INDUCTION OF ENZYME ACTIVITY (MFO SYSTEM), HOWEVER, EXPERIMENTAL PERYLENE EXPOSURES HAVE FAILED TO ELICIT CARCINOGENIC RESPONSES IN THIS SPECIES. ADVANCEMENTS HAVE BEEN MADE IN ELECTROPHORESIS AND SEROLOGICAL METHODOLOGY TO STUDY SERUM PROTEIN CHANGES AND HUMORAL IMMUNE RESPONSES IN NON-EXPOSED AND EXPOSED (E.G., BENZIDINE) FISHES (E.G., CYPRINODON VARIEGATUS). THESE ADVANCES HAVE SHOWN PROMISE IN DETECTION OF PHYSIOLOGICAL RESPONSES TO CARCINOGENIC EXPOSURE. FUTHERMORE, CONSIDERABLE FIELD MONITORING WORK ON MOLLUSKS AND CARCINOGENIC PAH'S ALONG THE COAST OF OREGON HAS REVEALED A POSITIVE CORRELATION BETWEEN PREVALENCE OF CELLULAR PROLIFERATION DISORDRS IN SHELLFISH AND HIGHER CONCENTRATIONS OF CERTAIN PAH'S IN NATURAL WATER. EMPHASIS IN BIOCHEMISTRY HAS BEEN DIRECTED MOSTLY TOWARD THE ELUCIDATION OF THE METABOLISM OF THE MIXED-FUNCTION OXIDASES IN MARINE ORGANISMS.

COUCH, JOHN A., W. PETER SCHOOR, WILL DAVIS, AND LEE COURTNEY. 1983. EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS ON NONHUMAN SPECIES (AQUATIC ANIMALS): FOURTH ANNUAL REPORT NCI/EPA COLLABORATIVE PROGRAM. EPA-600/9-83-005, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 46P.

AQUATIC SYSTEMS AND ORGANISMS ARE UNDER BOTH LABORATORY AND FIELD STUDY IN ORDER TO DEVELOP INDICATOR, SCREENING, AND MODELING CAPABILITIES FOR DETECTION AND EVALUATION OF RISKS OF CACINOGENS, MUTAGENS, AND TERATOGENS. STUDIES INCLUDE BOTH GULF BREEZE LABORATORY PROJECTS AND COMPLEMENTARY, EXTRAMURAL PROJECTS. IN THE FOURTH YEAR OF THE PROGRAM, SEVERAL ADVANCES WERE MADE IN THE DEVELOPMENT OF LABORATORY AND FIELD CARCINOGEN ASSAYS, UTILIZING FISHES SUCH AS THE SHEEPSHEAD MINNOW (LIVER LESIONS VIA AFLATOXIN EXPOSURES), AND FRESHWATER CAT FISH (PAPILLOMATOUS-LIKE LESIONS VIA CHLORINATED EFFLUENT EXPOSURES). EMPHASIS IS STILL PLACED ON THE DEVELOPMENT AND UTILIZATION OF CRITICAL LIFE STAGE EXPOSURES (E.G., EMBRYO AND NEWLY HATCHED FRY EXPOSURES) IN ORDER TO EXPEDITE CARCINOGEN TESTS AND MINIMIZE TIME REQUIRED FOR TUMOROGENIC RESPONSES. PRENEOPLASTIC HEPATIC LESION DEVELOPMENT IN MENIDIA AT 12 WEEKS SUGGESTS PROMISE FOR THIS SPECIES AND EXPOSURE METHOD. A NOVEL APPROACH HAS SHOWN THAT TIGER SALAMANDERS MAY BE GOOD BIOCHEMICAL AND HISTOLOGIC INDICATORS OF THE PRESENCE OF CERTAIN CARCINOGENS (POLYCYCLIC AROMATIC HYDROCARBONS - PAH'S). SKIN AND LIVER TISSUES OF THE SALAMANDERS REVEALED INDUCED ENZYME ACTIVITY (MFO SYSTEM) FOLLOWING EXPOSURE TO THE PAH, PERYLENE. CONSIDERABLE FIELD MONITORING WORK ON MOLLUSKS AND CARCINOGENIC PAH'S ALONG THE COAST OF OREGON HAS REVEALED A POSITIVE CORRELATION BETWEEN PREVALENCE OF CELLULAR PROLIFERATION DISORDERS IN SHELLFISH AND HIGHER CONCENTRATIONS OF CERTAIN PAH'S IN NATURAL WATER.

COUCH, J.A. 1984. HISTOPATHOLOGY AND ENLARGEMENT OF THE PITUITARY OF A TELEOST EXPOSED TO THE HERBICIDE TRIFLURALIN. J. FISH DISEASES. 7(2):157-163. (ERL,GB 438*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB84-175306.

PITUITARY GLANDS OF SHEEPSHEAD MINNOWS, CYPRINODON VARIEGATUS, EXPOSED FOR 19 MONTHS TO 1-5 UG/L TRIFLURALIN WERE SIGNIFICANTLY ENLARGED AND POSSESSED HISTOPATHOLOGIC CHARACTERISTICS (WHEN COMPARED TO GLANDS OF CONTROLS) SUCH AS PSEUDOCYSTS, CONGESTION OF BLOOD VESSELS AND EDEMA. MOST OF THE FISH WITH ENLARGED PITUITARIES ALSO HAD DIFFUSE VERTEBRAL HYPEROSTOSIS AND OTHER DYSPLASTIC VERTEBRAL CHANGES. SEVERAL SPECULATIVE MECHANISTIC PATHS ARE SUGGESTED FOR THE MODE OF EFFECT OF TRIFLURALIN ON THE VERTEBRAL AND PITUITARY TISSUES. STUDY OF THE FORM AND FUNCTION OF PITUITARY GLANDS OF TELEOSTS FROM NATURAL POPULATIONS MIGHT PROVIDE INDICATIONS OF CHRONIC PHYSIOLOGICAL STRESS, PARTICULARLY IN RELATION TO CHEMICAL POLLUTANT STRESS.

COUCH, J.A., S.M. MARTIN, G. TOMPKINS, AND J. KINNEY. 1984. SIMPLE SYSTEM FOR THE PRELIMINARY EVALUATION OF INFECTIVITY AND PATHOGENESIS OF INSECT VIRUS IN A NONTARGET ESTUARINE SHRIMP. J. INVERTEBR. PATHOL. 43(3):351-357. (ERL,GB 460).

BIOLOGICAL CONTROL AGENTS (BIORATIONALS) ARE INCREASINGLY IMPORTANT IN PEST CONTROL CONCEPTS. CERTAIN INSECT VIRUSES, PARTICULARLY THE BACULOVIRUSES (NUCLEAR POLYHEDROSIS VIRUSES), ARE CONSIDERED TO HAVE POTENTIAL AS BIOLOGICAL PESTICIDES, AND COULD BE USED WIDELY IN THE ENVIRONMENT. THEREFORE, TEST ANIMALS MUST BE SELECTED AND METHODS DEVELOPED TO EVALUATE THE SAFETY OF BIORATIONALS TO NON-TARGET SPECIES. A SIMPLE LABORATORY SYSTEM HAS BEEN DESIGNED AND TESTED TO DETERMINE RISKS OF INFECTIVITY AND PATHOGENICITY OF AN INSECT BACULOVIRUS, ORIGINALLY ISOLATED FROM THE ALFALFA LOOPER AUTOGRAPHA CAILFORNICA, TO A NON-TARGET ARTHROPOD, THE GRASS SHRIMP, PALAEMONETES VULGARIS, BY DIETARY EXPOSURE. THIS LABORATORY METHOD ALSO PERMITS TESTING OF OTHER MICROBIAL BIORATIONALS AGAINST NON-TARGET AQUATIC SPECIES, AND PROVIDES AND INEXPENSIVE, PROCEDURE OF SAFETY TESTING. RESULTS FROM THIS STUDY INDICATED THAT HISTOPATHOLOGICAL, ULTRASTRUCTURAL AND SEROLOGICAL METHODS USED PROVIDED NO EVIDENCE THAT EXPERIMENTAL EXPOSURE TO THE VIRUS CAUSED VIRAL INFECTION OR RELATED PATHOGENICITY IN THE GRASS SHRIMP.

COURTNEY, LEE A., AND JOHN A. COUCH. 1984. USEFULNESS OF CYPRINODON VARIEGATUS AND FUNDULUS GRANDIS IN CARCINOGENICITY TESTING: ADVANTAGES AND SPECIAL PROBLEMS. IN: USE OF SMALL FISH IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 83-96. (ERL,GB 442).

CYPRINODON VARIEGATUS AND FUNDULUS GRANDIS, TWO SPECIES OF CYPRINODONTID FISHES EXTENSIVELY STUDIED AND USED IN TOXICOLOGICAL AND BIOLOGICAL INVESTIGATIONS, ARE COMPARED AS LABORATORY TEST ANIMALS. THEIR ECOLOGY AND GENERAL BIOLOGY, AND SUITABILITY FOR VARIOUS TYPES OF EXPERIMENTATION ARE EXAMINED. A LABORATORY SYSTEM FOR EXPOSING CRITICAL LIFE STAGES (E.G., EMBRYOS, FRY, JUVENILES) OF THESE SPECIES TO SUSPECT CARCINOGENS IS DESCRIBED. A DISCUSSION OF THE USE, FINDINGS, AND POTENTIAL OF THESE SPECIES IN ONCOLOGICAL STUDIES AND CARCINOGEN ASSAYS IS PRESENTED, PARTICULARLY IN REGARD TO RESPONSES TO THREE KNOWN OR SUSPECT CARCINOGENIC CHEMICALS (E.G., TRIFLURALIN, BENZIDINE, AND AFLATOXIN). FINALLY, ADVANTAGES AND DISADVANTAGES OR SPECIAL PROBLEMS IN USING THE SPECIES AS CARCINOGEN TEST ANIMALS ARE REVIEWED.

CRAWFORD, RICHARD B. 1983. EFFECTS OF DRILLING FLUIDS ON EMBRYO DEVELOPMENT. EPA-600/3-83-021, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 30P.

TOXICITY OF USED DRILLING FLUIDS TO EMBRYO DEVELOPMENT WAS INVESTIGATED TO ASCERTAIN THE LIMITS OF SAFE USAGE OF THESE FLUIDS IN MARINE ENVIRONMENTS. EMBRYOS USED AS TEST SYSTEMS WERE OF THE TELEOST, FUNDULUS HETEROCLITUS, AND FOUR ECHINODERMS ECHINARACHNIUS PARMA, STRONGYLOCENTROTUS PURPURATUS, LYTECHINUS PICTUS, LYTECHINUS VARIEGATUS. THE DRILLING FLUIDS TESTED CAME FROM VARIOUS SOURCES; 24 DIFFERENT SAMPLES WERE EVALUATED. IN ADDITION, SEVERAL COMMERCIAL DRILLING FLUID COMPONENTS WERE EXAMINED IN THE TEST SYSTEMS INCLUDING A SYNTHETIC REFERENCE MUD. STUDIES DEMONSTRATED THAT NO SINGLE DRILLING FLUID IS "TYPICAL" AND THAT THE QUANTITATIVE EFFECTS OF EMBRYOS VARY CONSIDERABLY FROM ONE FLUID TO ANOTHER. SOME DRILLING FLUIDS ARE QUITE TOXIC TO ONE OR MORE OF THE EMBRYO SYSTEMS, REQUIRING DILUTIONS OF OVER 10(5) TO BECOME "SAFE". OTHERS ARE RELATIVELY INNOCUOUS, REQUIRING VERY LITTLE DILUTION TO ACHIEVE A CONCENTRATION IN WHICH EMBRYO DEVELOPMENT CAN PROCEED NORMALLY. ALSO, THE EFFECTS ON DEVELOPMENT SHOW VARIATION FROM ONE FLUID TO ANOTHER, THUS INDICATING THAT A VARIETY OF COMPONENTS OR COMPOUNDS ARE RESPONSIBLE FOR TOXIC MANIFESTATIONS.

CRAWFORD, RICHARD B. 1983. EFFECTS OF DRILLING FLUIDS ON EMBRYO DEVELOPMENT (PROJECT SUMMARY). EPA-600/S3-83-021, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 5P.

CRIPE, G.M., L.R. GOODMAN, AND D.J. HANSEN. IN PRESS. EFFECT OF CHRONIC EXPOSURE TO EPN AND TO GUTHION ON THE CRITICAL SWIMMING SPEED AND BRAIN ACETYLCHOLINESTERASE ACTIVITY OF CYPRINODON VARIEGATUS. AQUAT. TOXICOL. (ERL,GB 398).

SWIMMING PERFORMANCE OF THE SHEEPSHEAD MINNOW, CYPRINODON VARIEGATUS, WAS MEASURED IN A STAMINA TUNNEL AT THE END OF LIFE-CYCLE TOXICITY TESTS WITH THE ORGANOPHOSPHATE PESTICIDES, EPN AND GUTHION. SWIMMING STAMINA WAS AFFECTED BY 2.2 UG EPN/L, BUT NOT BY 0.88 UG EPN/L; THESE CONCENTRATIONS ARE ABOUT ONE HALF OF THOSE THAT SIGNIFICANTLY AFFECT SURVIVAL, GROWTH OR REPRODUCTION. FISH BRAIN ACETYCHOLINESTERASE (ACHE) ACTIVITY, ASSAYED BY THE PH-STAT METHOD, WAS INHIBITED 72% BY 0.88 UG EPN/L AND 83% BY 2.2 UG EPN/L. SWIMMING PERFORMANCE WAS NOT AFFECTED BY GUTHION CONCENTRATIONS UP TO 0.5 UG/L; THIS CONCENTRATION REDUCED SURVIVAL AND INHIBITED ACHE 78%.

CRIPE, C.R., P.H. PRITCHARD, M.E. WOODS, AND E.J. O'NEILL. IN PREP. FATE OF FENTHION IN SALT MARSH ENVIRONMENTS: FACTORS AFFECTING BIODEGRADATION RATES (ABSTRACT). TO BE PRESENTED AT THE MEETING OF THE SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, CRYSTAL CITY, MD, NOV. 4-11, 1984. (ERL,GB 512).

FENTHION (BAYTEX), AN ORGANOPHOSPHATE INSECTICIDE, IS FREQUENTLY USED IN SALT MARSH ENVIRONMENTS TO CONTROL ADULT AND LARVAL MOSQUITOES. LITTLE IS KNOWN ABOUT THE BIOTIC AND ABIOTIC FATE OF THIS CHEMICAL IN THESE ENVIRONMENTS. SHAKE-FLASK TESTS WERE THEREFORE USED TO STUDY RATES OF DEGRADATION AND THE ENVIRONMENTAL PARAMETERS AFFECTING THESE RATES. FLASKS CONTAINED WATER OR WATER-SEDIMENT SLURRIES FROM SALT MARSHES LOCATED ALONG THE NORTHWEST FLORIDA GULF COAST. SEDIMENTS CONSISTED OF LIGHT, FLOCCULENT, HIGHLY ORGANIC, DETRITUS (NO SAND). SEDIMENT CONCENTRATION IN EACH FLASK WAS 500 MG/1 DRY WEIGHT. STARTING CONCENTRATION OF FENTHION WAS 200 UG/1. DEGRADATION RATES WERE DETERMINED BY FOLLOWING THE LOSS OF FENTHION OVER TIME. SAMPLES FROM EACH FLASK WERE EXTRACTED WITH HEXANE AND THE AMOUNT OF FENTHION IN THE EXTRACTS WAS QUANTITATED USING GAS CHROMATOGRAPHY AND A NITROGEN-PHOSPHOROUS DETECTOR. FENTHION DISAPPEARANCE IN FLASKS CONTAINING WATER, FORMALIN-STERILIZED WATER, OR FORMALIN-STERILIZED SEDIMENT SLURRIES WAS SLOW (HALF-LIFE >20 DAYS). CHEMICAL HYDROLYSIS AND BIODEGRADATION IN WATER WERE THEREFORE NOT SIGNIFICANT. THE PRESENCE OF NONSTERILE SEDIMENT RESULTED IN A RAPID EXPONENTIAL DISAPPEARANCE OF FENTHION. HALF-LIVES, BASED ON A FIRST-ORDER DECAY MODEL, FOR SEDIMENT SLURRIES TAKEN FROM THREE DIFFERENT SALT MARSHES RANGED FROM 2.8 TO 3.9 DAYS. BIODEGRADATION RATES INCREASED WITH INCREASING SEDIMENT CONCENTRATION. RATES OF DEGRADATION IN SEDIMENT FLASKS WERE PROPORTIONAL TO PESTICIDE CONCENTRATION OVER A 1000-FOLD RANGE (0.2-200 UG/1). A 10 DEGREE C DROP IN INCUBATION TEMPERATURE DECREASED SEDIMENT BIODEGRADATION BY 2- TO 3-FOLD. ONE OF THE FIELD SITES WHICH WAS TO EVENTUALLY BE SPRAYED WITH THE PESTICIDE WAS INVESTIGATED FURTHER. SPATIAL VARIATIONS IN BIODEGRADATION WAS OBSERVED WITHIN THIS SITE; SEDIMENTS AT ONE END OF THE STUDY AREA DEGRADED THE TEST CHEMICAL ALMOST TWICE AS FAST AS SAMPLES TAKEN FROM THE MIDDLE AND OPPOSITE END OF THE SITE. SINCE THE WATER IN THE MARSH OVERLAPS INTO GRASS BEDS, THE EFFECT OF SPARTINA ALTERNAFLORA PLANTS WAS EXAMINED. WHOLE PLANTS, INCLUDING THE ROOTS, CAUSED VERY RAPID DISAPPEARANCE OF FENTHION. NO FENTHION WAS DETECTED IN PLANT TISSUE. ROOT PARTS IN THE FLASK ALSO GAVE A RAPID DISAPPEARANCE. OUTSIDE LEAVES WERE SOMEWHAT LESS ACTIVE AND INSIDE LEAVES DID NOT CAUSE A DECREASE IN FENTHION CONCENTRATION. FENTHION WOULD THEREFORE APPEAR TO BE NONPERSISTENT IN SALT MARSH ENVIRONMENTS DUE TO ITS RAPID BIODEGRADATION IN OR ON SEDIMENTS AND PLANTS. THIS FATE DATA WILL BE USEFUL FOR COMPARING LAB AND FIELD INFORMATION.

DAVIS, W.P., D.E. HOSS, G.I. SCOTT, AND P.F. SHERIDAN. IN PRESS. FISHERY RESOURCE IMPACTS FROM SPILLS OF OIL OR HAZARDOUS SUBSTANCES. (ERL,GB X376).

FISHERIES IS THE TRADITIONAL DESIGNATION FOR EXPLOITABLE AQUATIC ORGANISMS (PLANTS AND ANIMALS) IN FRESH, ESTUARINE AND MARINE WATERS. EXPLOITATION CONNOTES UTILIZATION OR ECONOMIC VALUE, BUT, IN TERMS OF SPECIES, FISHERIES ALSO INCLUDES ORGANISMS OF AESTHETIC OR GENETIC PRESERVATION VALUE (E.G., ENDANGERED SPECIES) AS WELL AS COMMERCIAL SPECIES. MAJOR ELEMENTS OF LIFE HISTORIES, FOOD WEBS, HABITATS AND MIGRATION ROUTES COMPRISE FISHERIES ECOLOGY. THESE ELEMENTS ARE ALSO INVOLVED IN FISHERIES RESOURCE ASSESSMENT. FISHERIES RESOURCE ASSESSMENT METHODS TYPICALLY APPLY REPRESENTATIVE PARAMETERS TO MODELS IN ORDER TO MAKE ESTIMATES OF POPULATION STRUCTURE, FECUNDITY, AND CALCULATED LEVELS OF SUSTAINABLE CATCH, HARVEST, RENEWAL, OR PRODUCTION. ALL HAITATS DISCUSSED IN THIS SYMPOSIUM, WITH PERHAPS THE EXCEPTION OF THE TUNDRA, ARE SPECIFIC FISHERY RESOURCES IN CONSIDERING CONTAMINATION EFFECTS OF SPILLAGES. OIL POLLUTION IS A POTENTIAL IMPACT TO FISHERIES RESOURCES FOR THREE REASONS (WARDLEY-SMITH, 1976): (1) THERE MAY BE A DIRECT (LETHAL OR SUBLETHAL) EFFECT TO FISHERIES STOCKS; (2) OIL MAY RENDER THE FISHERIES PRODUCTS UNACCEPTABLE TO THE CONSUMER; AND (3) FISHING OPERATIONS MAY BE DIRECTLY AFFECTED BY THE PRESENCE OF OIL. THESE REASONS MAY BE EXTENDED TO OTHER HAZARDOUS OR TOXIC MATERIALS. EXAMPLES HAVE BEEN DOCUMENTED FOR EACH OF THESE REASONS. HIGH MORTALITIES OCCURRED AMONGST OYSTERS IN THE ESTUARIES OF BRITTANY, FRANCE DURING THE 1978 AMOCO CADIZ SPILL. OYSTERS AND OTHER FISHERY RESOURCES ELSEWHERE HAVE ACQUIRED HYDROCARBON-TAINT FROM SPILLS OR SEEPAGES. THE VAST AREAS COVERED BY OIL RELEASED FROM THE IXTOC WELL BLOW-OUT NEAR CAMPECHE, GULF OF MEXICO IN 1979, CAUSED SHRIMPERS AND OTHER FISHERMEN TO CHANGE LOCATION OF THEIR OPERATIONS.

DAVIS, WILLIAM P., AND JAMES A. FAVA. 1983. INTERACTION OF AQUATIC ECOSYSTEM COMPONENTS WITH CHLORINATION: AN OVERVIEW. IN: WATER CHLORINATION: ENVIRONMENTAL IMPACT AND HEALTH EFFECTS, VOLUME 4. ROBERT L. JOLLEY, ET AL., EDITOR, ANN ARBOR SCIENCE PUBLISHERS, ANN ARBOR, MI. PP. 791-796. (ERL,GB X377*).

THE USE OF TOOLS SUCH AS DISINFECTANTS, OXIDANTS, OR BIOCIDES TO PROTECT PUBLIC HEALTH REMAINS HIGHLY DEBATABLE RELATIVE TO ENVIRONMENTAL ISSUES, RESEARCH, AND QUALITY OF LIFE. INCREASED PUBLIC AWARENESS IS EVIDENCED BY REGIONAL CONFERENCES (E.G., "CHLORINATION: BANE OR BENEFIT"), WHICH ADDRESS SPECIFIC STRESSED SYTEMS SUCH AS THE CHESAPEAKE BAY. THAT USE OF CHLORINATION PROVIDES BENEFITS TO MAN IS NOT AN ISSUE-THE QUESTIONS ARE HOW MUCH TO USE AND WHAT RISKS AND COSTS ARE INVOLVE. OVERZEALOUS CHLORINATION CAN CAUSE ECOLOGICAL DAMAGE AND DISFUNCTION OF ECOLOGY; CONTROL METHODS SUCH AS CRITERIA AND REGULATIONS ARE DEBATABLE AND UNDER CHALLENGE. OVER THE PAST SIX OR MORE YEARS, THE BASIC QUESTIONS ABOUT CHLORINATION HAVE NOT SIGNIFICANTLY CHANGED; HOWEVER, THE DETAILS AND DATA AVAILABLE TO US HAVE INCREASED IMMENSELY. TWO ONGOING ACTIVITIES SERVED AS THE MOTIVATING FORCE BEHIND BOTH FORMAL AND INFORMAL DISCUSSIONS IN THE SESSION "INTERACTION OF AQUATIC ECOSYSTEM COMPONENTS WITH CHLORINATION" AT THE FOURTH WATER CHLORINATION CONFERENCE. THESE WERE (1) THE RECOGNITION THAT IN SOME AREAS OF THE UNITED STATES, SERIOUS CONSIDERATION HAS BEEN GIVEN TO BANNING ALL CHLORINATION FOR DISINFECTION BECAUSE OF THE POTENTIAL FOR ECOLOGICAL DAMAGE; AND (2) MANY SCIENTSITS, REGULATORS, OR ENVIRONMENTAL MANAGERS FEEL THAT SUFFICIENT RESEARCH HAS NOW BEEN CONDUCTED TO JUSTIFY ELIMINATING FURTHER FUNDING OF CHLORINATION EFFECTS STUDIES. THIS PAPER EXAMINES THE SALIENT ASPECTS OF THE TOPICS DISCUSSED DURING THE CONFERENCE WITH THE HOPE OF ADDRESSING THE QUESTION: WHERE DO WE GO FROM HERE?

DAWE, CLYDE J, AND JOHN A COUCH. 1984. DEBATE: MOUSE VERSUS MINNOW: THE FUTURE OF FISH IN CARCINOGENICITY TESTING. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 223-235. (ERL,GB 472).

THE TEXT IS PART OF A DEBATE AND ADVOCATES THE USE OF SMALL FISH SPECIES AS LABORATORY TEST ORGANISMS IN DETECTING AND DETERMINING POTENCY AND ACTIVITY OF SUSPECTED CARCINOGENS. THE USEFULNESS OF FISH SPECIES IS COMPARED AND CONTRASTED WITH THE USEFULNESS OF THE MORE CONVENTIONAL ASSAY SPECIES, SUCH AS RODENTS.

DODGE, RICHARD E., AND ALINA SZMANT-FROELICH. IN PRESS. EFFECTS OF DRILLING FLUIDS ON REEF CORALS: A REVIEW. IN: WASTES IN THE OCEAN, VOLUME IV: ENERGY WASTES IN THE OCEAN. I.W. DUEDALL, EDITOR, JOHN WILEY & SONS, INC., NEW YORK, NY. (ERL,GB 480).

THIS CHAPTER REVIEWS RESEARCH ON THE EFFECTS OF DRILLING MUD ON CORAL REEF COMMUNITIES, CONCENTRATION ON THE MAJOR REEF FAUNA: THE REEF-BUILDING OR HERMATYPIC CORALS. DRILLING MUD IS AN EFFLUENT INTRODUCED TO THE MARINE ENVIRONMENT IN LARGE QUANTITES DURING A TYPICAL OFFSHORE DRILLING OPERATION. CONCERN OVER ITS POSSIBLE DETRIMENTAL EFFECTS, WHEN DRILLING ACTIVITIES ARE NEAR CORAL REEFS, HAS BEEN THE IMPETUS FOR THE WORK TO BE DISCUSSED. THE TOPIC IS OF RECENT ORIGIN; UNTIL 1977, THERE WERE NO LITERATURE REPORTS OF DRILLING MUD - CORAL STUDIES.

DODGE, RICHARD E., AND JUDITH C. LANG. 1983. ENVIRONMENTAL CORRELATES OF HERMATYPIC CORAL (MONTASTREA ANNULARIS) GROWTH ON THE EAST FLOWER GARDENS BANK, NORTHWEST GULF OF MEXICO. LIMNOL. OCEANOGR. 28(2):228-240. (ERL,GB X378*).

TIME SERIES OF ANNUAL LINEAR GROWTH INCREASMENTS FROM 12 MONTASTREA ANNULARIS (E. AND S.) HERMATYPIC CORALS COLLECTED AT THE EAST FLOWER GARDENS BANK REEF IN THE NORTHWESTERN GULF OF MEXICO HAVE A COMMON PATTERN. THIS IS BEST EXPRESSED IN AN INDEX MASTER CHRONOLOGY (AVERAGE BY YEAR OF THE ANNUAL PERCENTAGE DEVIATIONS FROM THE MEAN OF EACH CORAL). COMPARISONS WITH TIME SERIES OF ENVIRONMENTAL DATA INDICATE THAT CORAL EXTENSION RATES VARY POSITIVELY WITH SEASONAL (FEBRUARY THROUGH MAY - 4 MONTHS) SURFACE WATER TEMPERATURE AND NEGATIVELY WITH ANNUAL DISCHARGE OF THE ATCHAFALAYA RIVER. WE PROPOSE THE SECULAR VARIATIONS OF WATER TEMPERATURE AND OTHER PARAMETERS ARE THE MAJOR LONG-TERM CONTROLS OF CORAL GROWTH IN THE AREA. OUR DATA DO NOT SUPPORT THE VIEW THAT SINKING OF THE FLOWER GARDENS REEF, CAUSED BY CATASTROPHIC COLLAPSE OF THE UNDERLYING SUBSTRATE, HAS BEEN A PRIME INFLUENCE ON THE CORALS.

DOUGHTIE, DANIEL G., PHILIP J. CONKLIN, AND K. RANGA RAO. 1983. CUTICULAR LESIONS INDUCED IN GRASS SHRIMP EXPOSED TO HEXAVALENT CHROMIUM. J. INVERTEBR. PATHOL. 42(2):249-258. (ERL,GB X434*).

ADULT GRASS SHRIMP WERE EXPOSED TO FOUR CONCENTRATIONS (0.5, 1.0, 2.0, 4.0 PPM) OF HEXAVALENT CHROMIUM FOR 28 DAYS. AT THE END OF THE EXPOSURE PERIOD, OVER FIFTY PERCENT OF THE SURVIVING SHRIMP POSSESSED CUTICULAR LESIONS THAT HAD MANY OF THE GROSS CHARACTERISTICS OF "SHELL DISEASE". THESE LESIONS WERE USUALLY ASSOCIATED WITH ARTICULATIONS OF THE APPENDAGES AND ABDOMEN. FURTHERMORE, IT WAS FOUND THAT AT INCREASING LEVELS OF CHROMIUM EXPOSURE, THERE WAS A PROPORTIONATE INCREASE IN THE LOSS OF LIMBS SUCH THAT NEARLY 50% OF THE LIMBS WERE LOST IN GRASS SHRIMP EXPOSED TO THE HIGHEST TEST CONCENTRATION OF CHROMIUM. HISTOLOGICAL AND ULTRASTRUCTURAL EXAMINATION OF NUMEROUS LESIONS DEMONSTRATED A RANGE OF DEGENERATIVE FEATURES WITHIN THE SUBCUTICULAR EPITHELIUM THAT INCLUDED CYTOPLASMIC VACUOLIZATION, MITOCHONDRIAL SWELLING, CHROMATIN EMARGINATION AND THE PRESENCE OF UNUSUAL NUCLEAR INCLUSIONS THAT APPEAR TO INDICATE DIRECT CHROMIUM TOXICITY. ADDITIONALLY A MARKED RETARDATION IN NEW EPICUTICLE AND EXOCUTICLE FORMATION WAS OBSERVED IN VIABLE TISSUES ASSOCIATED WITH LESIONS IN LATE PREMOLT SHRIMP. IT IS PROPOSED THAT CHROMIUM INTERFERES WITH THE NORMAL FUNCTIONS OF SUBCUTICULAR EPITHELIUM, PARTICULARLY CUTICLE FORMATION, AND SUBSEQUENTLY CAUSES STRUCTURAL WEAKNESSES OR PERFORATIONS TO DEVELOP IN THE CUTICLE OF NEWLY MOLTED SHRIMP. BECAUSE OF THESE CHROMIUM-INDUCED EXOSKELETAL DEFICIENCIES, A VIADUCT FOR PATHOGENIC ORGANISMS (E.G., BACTERIA) AND DIRECT CHROMIUM INFLUX IS FORMED THAT PERPETUATES LESION DEVELOPMENT.

DOUGHTIE, DANIEL G., AND K. RANGA RAO. 1984. HISTOPATHOLOGICAL AND ULTRASTRUCTURAL CHANGES IN THE ANTENNAL GLAND, MIDGUT, HEPATOPANCREAS, AND GILL OF GRASS SHRIMP FOLLOWING EXPOSURE TO HEXAVALENT CHROMIUM. J. INVERTEBR. PATHOL. 43(1):89-108. (ERL,GB X400*).

GRASS SHRIMP, PALAEMONETES PUGIO, WERE EXPOSED FOR ONE MONTH TO SUBACUTE CONCENTRATIONS OF HEXAVALENT CHROMIUM (0.5, 1.0, 2.0, 4.0 PPM) AFTER WHICH THE GILLS, MIDGUT, HEPATOPANCREAS, AND ANTENNAL GLANDS WERE EXAMINED FOR HISTOPATHOLOGICAL AND ULTRASTRUCTURAL CHANGES. PATHOLOGICAL CHANGES WERE GREATEST IN THE ANTENNAL GLANDS, FOLLOWED BY HEPATOPANCREAS, GILLS, AND MIDGUT. SEVERE CHANGES OCCURRED IN SOME SHRIMP, EVEN AT 0.5 PPM CHROMIUM. CELLS OF ALL TISSUES FREQUENTLY HAD BOTH SWOLLEN MITOCHONDRIA AND ROUGH ENDOPLASMIC ETICULUM. SMALL, SPHERICAL OR RING-LIKE INTRANUCLEAR INCLUSIONS, POSSIBLE INDICATIVE OF CELLULAR HYPERACTIVITY OR MANIFESTIONS OF CHROMIUM AND/OR PROTEIN COMPLEXES, WERE MOST PREVALENT IN THE HEPATOPANCREAS AND ANTENNAL GLANDS BUT ALSO OCCURRED IN THE MIDGUT AND GILLS. OTHER MAJOR DEGENERATIVE CHANGES IN THE ANTENNAL GLANDS WERE RESTRICTED TO THE LABYRINTH AND INCLUDED DIMINUTION OF BASAL PLASMALEMMAL INFOLDINGS AND CYTOPLASMIC DENSITY, NUCLEAR HYPERTROPHY FOLLOWED BY WIDESPREAD NUCLEAR PYKNOSIS AND EPITHELIAL DESQUAMATION. IN SEVERELY ALTERED HEPATOPANCREAS HYPERTROPHY WAS INDICATED FOR THE BASAL LAMINAE, NUCLEI, POSSIBLE FOR THE NUCLEOLI. THERE WAS AN APPARENT REDUCTION IN MITOTIC EVENTS AND MANY OBSERVED MITOTIC NUCLEI WERE ABNORMAL. ABNORMAL MIDGUT HYPERTROPHY WAS PRESENT IN ONLY EIGHT OF TWENTY EXAMINED SHRIMP, EXPOSED TO 0.5 AND 1.0 PPM CHROMIUM. FURTHER, THE GILLS OF ONLY 10 OF THE 40 EXAMINED CHROMIUM-EXPOSED SHRIMP POSSESSED ABNORMAL FEATURES DETECTABLE WITH LIGHT MICROSCOPY. ULTRASTRUCTURAL ANALYSIS OF THE LATTER INDICATED AN INCREASE IN LYSOSOMES AND A DECREASE IN CYTOPLASMIC DENSITY. IN ADDITION, THERE WAS A PRONOUNCED DIMINUTION IN THE DEGREE OF LAMELLAR, SUBCUTICULAR PLASMALEMMAL INFOLDING. THIS LATTER FEATURE IS POSTULATED TO BE A MECHANISM FOR THE REGULATION OF CHROMIUM INFLUX. POSSIBLE EXPLANATIONS FOR MOST OBSERVED ALTERATIONS IN THE ABOVE TISSUES ARE PROPOSED.

DOUGHTIE, DANIEL G., AND K. RANGA RAO. 1983. ULTRASTRUCTURAL AND HISTOLOGICAL STUDY OF DEGENERATIVE CHANGES IN THE ANTENNAL GLANDS, HEPATOPANCREAS, AND MIDGUT OF GRASS SHRIMP EXPOSED TO TWO DITHIOCARBAMATE BIOCIDES. J. INVERTEBR. PATHOL. 41(3):281-299. (ERL,GB X395*).

HISTOLOGICAL AND ULTRASTRUCTURAL ALTERATIONS OBSERVED IN THE ANTENNAL GLANDS, HEPATOPANCREAS, AND MIDGUT OF GRASS SHRIMP EXPOSED TO EITHER A 50% POTASSIUM DIMETHYLDITHIOCARBAMATE BIOCIDE (BUSAN-85; 5-60 PPB) FOR 14 DAYS, OR TO A DIFFERENT BIOCIDE, COMPOSED OF 15% SODIUM DIMETHYLDITHIOCARBAMATE AND 15% SODIUM ETHYLENE BIODITHIOCARBAMATE (AQUATREAT DNM-30), FOR 3-4 DAYS (60-140 PPB) AND 28-35 DAYS (40-120 PPB), WERE COMPARED AND CONTRASTED WITH THE NORMAL MORPHOLOGICAL FEATURES IN CONTROL SHRIMP. ONLY THOSE EXPERIMENTAL SHRIMP THAT EXHIBITED VARIOUS DEGREES OF BRANCHIAL ABNORMALITY WERE EXAMINED. ALTHOUGH THE ALTERATIONS IN BUSAN-EXPOSED SHRIMP WERE GENERALLY MORE PRONOUNCED, THE ANTENNAL GLANDS OF 32 OUT 36 EXPERIMENTAL SHRIMP EXHIBITED ABNORMALITIES THAT WERE MANIFESTED PRIMARILY AS INCREASED SECRETORY ACTIVITY BY THE LABYRINTH CELLS. IN DITHIOCARBAMATE-EXPOSED SHRIMP WITH "BLACK GILLS," THE LABYRINTH EPITHELIUM EXHIBITED MODERATE NUCLEAR HYPERTROPHY, APPARENT CELL SLOUGHING, INTENSE SECRETORY ACTIVITY, AND OCCASIONAL MELANIZED LESIONS; ALTERATIONS IN THE ANTENNAL GLAND COELOMOSAC INCLUDED NUCLEAR PYKNOSIS, A GENERAL DETERIORATION OF PODOCYTE ORGANIZATION, AND AN UNUSUAL INCREASE IN HEMOLYMPH DENSITY ADJACENT TO AFFECTED TISSUES. ALTHOUGH THERE WAS AN APPARENT INCREASE IN MITOTIC ACTIVITY IN THE HEPATOPANCREATIC TUBULES OF SHRIMP EXPOSED TO AQUATREAT FOR 28-35 DAYS, DEGENERATIVE CHANGES WERE MOST FREQUENT AND EXTENSIVE IN THE HEPATOPANCREAS AND MIDGUT OF DITHIOCARBAMATE-EXPOSED SHRIMP WITH "BLACK GILLS." THESE OBSERVED CHANGES INCLUDED THE DIMINUTION OF THE BASAL MIDGUT AND HEPATOPANCREATIC FIXED PHAGOCYTES, DEVELOPMENT OF MITOCHONDRIAL INCLUSIONS AND MEGAMITOCHONDRIA, LOSS OF CYTOPLASMIC DENSITY, HEPATOPANCREATIC NUCLEAR PYKNOSIS, AND IRREVERSIBLE DEGENERATION OF HEPATOPANCREATIC TUBLUE APICES. THIS STUDY SUGGESTS THAT SOME OF THE OBSERVED ABNORMAL/PATHOLOGICAL CHANGES ARE THE INDIRECT CONSEQUENCE OF BRANCHIAL DEGENERATION. A NUMBER OF POSSIBLE DEFENSIVE REACTIONS TO DITHIOCARBAMATE POISONING, INCLUDING HETEROSTASIS, PHAGOCYTOSIS, ENCAPSULATION, AND THE POSSIBLE PARTICIPATION OF RESERVE INCLUSION CELLS ARE PROPOSED.

DOUGHTIE, DANIEL G., AND K. RANGA RAO. 1983. ULTRASTRUCTURAL AND HISTOLOGICAL STUDY OF DEGENERATIVE CHANGES LEADING TO BLACK GILLS IN GRASS SHRIMP EXPOSED TO A DITHIOCARBAMATE BIOCIDE. J. INVERTEBR. PATHOL. 41(1):33-50. (ERL,GB X384*).

PATHOLOGIC "MILKY" AND BROWN-BLACK GILLS OF GRASS SHRIMP, PALAEMONETES PUGIO, EXPOSED TO LOW LEVELS (5 TO 60 PPB) OF A 50% POTASSIUM-DIMETHYLDITHIOCARBAMATE BIOCIDE (BUSAN-85) FOR 14 DAYS WERE STUDIED USING LIGHT AND ELECTRON MICROSCOPY. IN SHRIMP EXPOSED TO 5 PPB BUSAN-85, A GRADATION OF DEGENERATIVE CHANGES COULD BE ASCERTAINED BOTH WITHIN THE GILLS OF INDIVIDUAL SHRIMP AND AMONG THE GILLS OF DIFFERENT SHRIMP. PRIMARY DEGENERATIVE CHANGES, FIRST EVIDENT IN THE APICAL EPITHELIUM OF THE LAMELLAR PLATES, INCLUDED: SWOLLEN MITOCHONDRIA, DILATED ROUGH ENDOPLASMIC RETICULUM, THE APPEARANCE OF A DENSE GRAINY MATERIAL WITHIN THE SUBCUTICULAR SPACES AND OF PARACRYSTALLINE ELEMENTS WITHIN THE EPITHELIAL CYTOPLASM, THE FORMATION OF AUTOPHAGOSOMES, AND A LOSS OF MEMBRANE CONTINUITY. GRANULAR HEMOCYTES MIGRATED INTO THE SUBCULTULAR SPACES AND APPEARED TO PHAGOCYTOSE THE GRAINY MATERIAL, WHILE OTHER HEMOCYTES PHAGOCYTOSED AND ENCAPSULATED THE PATHOLOGICAL EPITHELIUM. LATER, THE LAMELLAR TIPS BECAME CONGESTED WITH NUMEROUS INTERDIGITATING HEMOCYTES WHICH FORMED A "PLUG". A NEW EPITHELIUM, DERIVED PARTLY FROM MITOSIS OF BASAL LAMELLAR TISSUES, DEVELOPED SUBJACENT TO THE PLUG AND CONTRIBUTED TO THE FORMAION OF AN ABNORMAL AND SOMETIMES PERFORATED CUTICLE DURING PREMOLT. AT ECDYSIS, THE HEMOCYTE PLUGS IN THE APICAL REGION OF THE LAMELLA WERE SLOUGHED RESULTING IN MARKEDLY TRUNCATED AND SWOLLEN LAMELLAE. THIS PROCESS OF PATHOLOGICAL LAMELLAR REDUCTION APPEARS TO BE AN IMPORTANT DEFENSE MECHANISM IN RESPONSE TO BRANCHIAL TRAUMA CAUSED BY EXPOSURE TO ENVIRONMENTAL CONTAMINANTS.

DUKE, T.W., P.R. PARRISH, R.M. MONTGOMERY, S.D. MACAULEY, J.M. MACAULEY, AND G.M. CRIPE. 1984. ACUTE TOXICITY OF EIGHT LABORATORY-PREPARED GENERIC DRILLING FLUIDS TO MYSIDS (MYSIDOPSIS BAHIA). EPA-600/3-84-067, U.S ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 11P.
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ACUTE TOXICITY TESTS WERE CONDUCTED DURING AUGUST-SEPTEMBER 1983 WITH EIGHT LABORATORY-PREPARED GENERIC DRILLING FLUIDS (ALSO CALLED MUDS) AND MYSIDS (MYSIDOPSIS BAHIA) AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FLORIDA. TWO OF THE DRILLING FLUIDS WERE TESTED AT THE ENVIRONMENTAL RESEARCH LABORATORY, NARRAGANSETT, RHODE ISLAND, TO CONFIRM THE VALIDITY OF THE TESTS CONDUCTED AT GULF BREEZE. THE TEST MATERIAL WAS THE SUSPENDED PARTICULATE PHASE (SPP) OF EACH DRILLING FLUID. THE SPP WAS PREPARED BY MIXING VOLUMETRICALLY 1 PART DRILLING FLUID WITH 9 PARTS SEAWATER AND ALLOWING THE RESULTING SLURRY TO SETTLE FOR ONE HOUR. THE MATERIAL THAT REMAINED IN SUSPENSION WAS THE SPP. TOXICITY OF THE SPP OF THE DRILLING FLUIDS RANGED FROM A 96-HOUR LC50 (THE CONCENTRATION LETHAL TO 50% OF THE TEST ANIMALS AFTER 96 HOURS OF EXPOSURE) OF 2.7% FOR A KC1 POLYMER MUD TO 65.4% FOR A LIGHTLY TREATED LIGNOSULFONATE MUD. NO MEDIAN EFFECT (50% MORTALITY) WAS OBSERVED IN THREE DRILLING FLUIDS -- A NON-DISPERSED MUD, A SPUD MUD, AND A SEAWATER-FRESHWATER GEL MUD.

DUKE, THOMAS W., AND PATRICK R. PARRISH. IN PREP. IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT (ABSTRACT). TO BE PRESENTED AT THE FIFTH INTERNATIONAL OCEAN DISPOSAL SYMPOSIUM, SEPT. 10-14, 1984, CORVALLIS, OR. (ERL,GB 507).

DRILLING FLUIDS, ALSO CALLED MUDS, ARE ESSENTIAL TO DRILLING PROCESSES IN THE EXPLORATION AND PRODUCTION OF OIL AND GAS FROM THE U.S. OUTER CONTINENTAL SHELF (OCS). THESE FLUIDS ARE USUALLY DISCHARGED FROM DRILLING PLATFORMS INTO SURROUNDING WATERS OF THE OCS AND AS SUCH ARE REGULATED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT SYSTEM. THIS PAPER PRESENTS A SUMMARY OF RESEARCH FINDINGS FROM A PROGRAM CARRIED OUT BY THE EPA ENVIRONMENTAL RESEARCH LABORATORY OF GULF BREEZE, FLORIDA, TO EVALUATE THE POTENTIAL IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT. THE FINDINGS WERE DEVELOPED THROUGH COOPERATIVE EFFORTS OF SCIENTISTS FROM GOVERNMENT, ACADEMIA, AND INDUSTRY. RESULTS SHOW THAT DRILLING FLUIDS CAN BE TOXIC TO MARINE ORGANISMS AT CERTAIN CONCENTRATIONS AND EXPOSURE REGIMES. FUTHERMORE, THE FLUIDS CAN ADVERSELY AFFECT BENTHOS THROUGH PHYSICAL CONTACT BY BURYING OR ALTERING SUBSTRATE CONDITIONS.SEVERAL MARINE SPECIES WERE TESTED, INCLUDING CORALS (MONTASTREA ANNULARIS), LOBSTERS (HOMARUS AMERICANUS), MYSIDS (MYSIDOPSIS BAHIA), GRASS SHRIMP (PALAEMONETES INTERMEDIUS), AND CLAMS (MERCENARIA MERCENARIA). SUBLETHAL, AS WELL AS LETHAL, RESPONSES RESULTED FROM EXPOSURE TO VARIOUS DRILLING FLUIDS. FOR EXAMPLE, EXPOSURE OF THE LEGS OF LIVE LOBSTERS TO 10 PARTS PER MILLION (PPM) AND 100 PPM FOR 3 TO 5 MINUTES CAUSED DIMINISHED RESPONSE BY THE LOBSTERS TO FOOD ODORS BY 29% AND 44% RESPECTIVELY. THE CONCENTRATIONS CAUSING 50% MORTALITY (LC50'S) IN 96 H, FOR LARVAL LOBSTERS EXPOSED TO FIVE DRILLING FLUIDS, WERE FROM 74 PPM TO 500 PPM, AND SUBLETHAL EXPOSURES RESULTED IN ALTERATION OF NORMAL GROWTH AND RESPIRATION RATES. CORALS EXPOSED TO 100 PPM OF USED DRILLING FLUID DEMONSTRATED SIGNIFICANTLY REDUCED CALCIFICATION RATE, RESPIRATION RATE, AND GROSS PHOTOSYNTHESIS. WHEN MYSIDS, GRASS SHRIMP, AND CLAMS WERE SUBJECTED SEPARATELY TO USED FLUIDS, THE 96-H LC50'S VARIED FROM 25 TO >1,500 PPM. MORTALITY WAS SIGNIFICANTLY (0.05) CORRELATED WITH "DIESEL" OIL CONTENT OF THE USED FLUIDS. AN EXPERIMENTAL MACROBENTHIC COMMUNITY EXPOSED TO DRILLING FLUIDS EXHIBITED STRUCTURAL CHARACTERISTICS DIFFERENT FROM CONTROL COMMUNITIES. MODELS PREDICTING THE ENVIRONMENTAL CONCENTRATIONS OF DRILLING FLUIDS UNDER VARIOUS ENVIRONMENTAL CONDITIONS ARE DISCUSSED.

DUKE, THOMAS W. IN PRESS. INTRODUCTION: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 457).

IN SUMMARY, DISCUSSIONS AND PRESENTATIONS IN THE TOXICITY TEST SESSION INDICATED THAT MEASUREMENTS OF TOXICITY AT THE SINGLE, MULTISPECIES, COMMUNITY, AND SYSTEM LEVELS ARE USEFUL IN RANKING CHEMICALS BY THEIR TOXICITY AND IN HAZARD EVALUATIONS. HOWEVER, RELATING THE RESULTS OF THOSE TESTS DIRECTLY TO THE ENVIRONMENT IS ESPECIALLY RISKY WHEN: 1) THE MANNER IN WHICH LABORATORY ORGANISMS ARE EXPOSED TO POLLUTANTS DIFFER FROM EXPOSURE IN THE ENVIRONMENT; 2) LABORATORY TESTS DEAL WITH SINGLE CHEMICALS AND ORGANISMS ARE EXPOSED TO COMPLEX MIXTURES IN THE ENVIRONMENT AND; 3) CRITERIA FOR EFFECTS IN THE LABORATORY ARE NOT IMPORTANT FUNCTIONAL END-POINTS IN POPULATION AND SYSTEM DYNAMICS. THE DOMINANT THEME OF THIS CHAPTER IS THE NECESSITY FOR AN APPROPRIATE BALANCE BETWEEN LABORATORY AND FIELD STUDIES. THE NEED FOR THIS BALANCE IN EASILY ARTICULATED, BUT WILL REQUIRE CONCERTED EFFORT TO IMPLEMENT.

DUKE, THOMAS M. IN PRESS. POTENTIAL IMPACT OF DRILLING FLUIDS ON ESTUARINE PRODUCTIVITY. IN: PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON THE UTILIZATION OF COASTAL ECOSYSTEMS: PLANNING, POLLUTION, AND PRODUCTIVITY, NOV. 22-27, 1982, RIO GRANDE, BRAZIL. (ERL,GB 449).

THIS PAPER DISCUSSES THE POTENTIAL EFFECTS OF DRILLING FLUIDS ON SEMI-ENCLOSED BODIES OF WATER SUCH AS ESTUARIES. DRILLING FLUIDS HAVE BEEN DISCHARGED INTO OUTER CONTINENTAL SHELF WATERS FOR MANY YEARS BUT THERE IS SOME CONCERN OF POTENTIAL ECOLOGICAL IMPACT WHEN DRILLING FLUID ARE DISCHARGED NEAR CORAL REEFS OR IN BAYS AND ESTUARIES. THE CONCERN IS BASED ON POTENTIAL ADVERSE EFFECTS OF THE FLUIDS TO CORALS, SHELLFISH, FISH, GRASS BEDS AND GENERAL PRODUCTIVITY. POTENTIAL EFFECTS CAN BE EVALUATED THROUGH A HAZARD ASSESSMENT PROCESS THAT INVOLVES EFFECTS AND EXPOSURE MEASUREMENTS. A SUGGESTED HAZARD ASSESSMENT INVOLVING THE ADAPTIVE ENVIRONMENTAL ASSESSMENT APPROACH (AEA) IS PRESENTED. THE COMPONENTS OF THE AEA APPROACH ARE DESCRIBED AND EVALUATED. IN DEVELOPING THE HAZARD ASSESSMENT, A REVIEW IS MADE OF EXISTING EFFECTS DATA. A PRESENTATION IS MADE OF ISSUES OF CONCERN SUCH AS RESUSPENSION OF DRILLING FLUIDS IN SHALLOW, WIND-DRIVEN ESTUARIES, RESTRICTION OF LIGHT PENETRATION TO PRIMARY PRODUCERS BY SUSPENDED SEDIMENTS, CHANGES IN BENTHIC COMMUNITIES AND THEIR SUBSTRATES, AND DIRECT TOXICITY OF THE FLUIDS TO ORGANISMS.

DUKE, T.W. 1983. PROGRESS REPORT: DRILLING FLUID PROJECT. EPA-600/X-83-050, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 13P.

THE ACCUMULATION OF DATA FOR A HAZARD ASSESSMENT OF THE IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT IS PROGRESSING ON SCHEDULE. COOPERATIVE AGREEMENT AND CONTRACT PERSONNEL ARE PREPARING FINAL REPORTS OR SUBMITTING PEER-REVIEWED PUBLICATION IN LIEU OF FINAL REPORTS. INCLUDED IN THIS REPORT ARE PRELIMINARY FINDINGS FROM OUR LABORATORY AND THE EXTRAMURAL PROGRAM. THE DATA HAVE NOT BEEN PEER-REVIEWED AND ARE CONSIDERED IN DRAFT FORM. THE RESULTS OF THIS PROGRAM TO EVALUATE THE EFFECTS OF SPENT OR USED DRILLING FLUIDS ON SELECTED MARINE ORGANISMS WILL CONTRIBUTE NEEDED DATA TO A HAZARD ASSESSMENT OF DRILLING FLUIDS. SAMPLES OF THE DRILLING FLUIDS WERE PROVIDED BY THE PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION (PESA) AND WERE COLLECTED FROM OPERATING RIGS IN THE GULF OF MEXICO. SAMPLES WERE SPLIT BETWEEN THE AMERICAN PETROLEUM INSTITUTE (API) AND THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FLORIDA (ERL-GB). SAMPLES OF DRILLING FLUID WERE SUB-SAMPLED AT ERL-GB, AND DISTRIBUTED TO EXTRAMURAL CONTRACTORS AS INDICATED IN FIGURE 1. A VISUAL INSPECTION OF THE DATA INDICATED A RELATIONSHIP BETWEEN THE TOXICITY OF THE DRILLING FLUIDS AND THE CONCENTRATION OF NUMBER 2 FUEL OIL AS REPORTED BY THE NEW ENGLAND AQUARIUM. SPEARMAN RANK ORDER CORRELATIONS OF THE TOXICITIES OF THE TEST ORGANISMS AND FUEL OIL CONTENT OF THE MUD (TABLE 9) INDICATE A SIGNIFICANT CORRELATION BETWEEN THESE FACTORS, I.E., THE GREATER THE CONCENTRATION OF THE FUEL OIL THE HIGER THE TOXICITY (OR LOWER THE LC 50). WITH CRAWFORD'S DATA, THE GREATER THE DILUTION REQUIRED, THE HIGHER THE FUEL OIL CONTENT. THE STATUS OF THIS PROJECT IS AS FOLLOWS: (1) PRELIMINARY DATA TABLES HAVE BEEN PREPARED AND TRANSMITTED TO THIS LABORATORY. (2) DRS. RAO AND POWELL WILL SUBMIT MANUSCRIPTS TO PEER REVIEWED JOURNALS IN THE NEAR FUTURE. (3) DRS. SHOKES, CRAWFORD AND BAKER ARE PREPARING FINAL REPORTS. (4) I ANTICIPATE RECEIVING THE EXTRAMURAL CONTRIBUTIONS BY JULY 1 AND PLAN TO COMPLETE THE PEER-REVIEW PROCESS IN TIME TO MEET THE JANUARY 1 MILESTONE REPORT.

DUKE, THOMAS W., AND PATRICK R. PARRISH. 1984. RESULTS OF THE DRILLING FLUIDS RESEARCH PROGRAM SPONSORED BY THE GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY, 1976-1984, AND THEIR APPLICATION TO HAZARD ASSESSMENT. EPA-600/4-84-055, UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 94P.

THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FLORIDA, CARRIED OUT A RESEARCH PROGRAM FROM 1976-1984 TO EVALUATE THE POTENTIAL IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT. RESEARCH EFFORTS WERE ACCOMPLISHED MAINLY THROUGH COOPERATIVE AGREEMENTS WITH ACADEMIC INSTITUTIONS AND CONTRACTS WITH PRIVATE LABORATORIES; PROGRAM DIRECTION AND TOXICITY TESTING WITH USED AND GENERIC DRILLING FLUIDS WERE PROVIDED BY THE GULF BREEZE LABORATORY. RESULTS OF RESEARCH ACTIVITIES REPORTED FROM THIS RESEARCH PROGRAM SHOWED THAT DRILLING FLUIDS ARE TOXIC TO MARINE ANIMALS AT CERTAIN CONCENTRATIONS AND EXPOSURE REGIMES. FURTHER, DRILLING FLUIDS CAN ADVERSELY AFFECT ANIMALS, ESPECIALLY BENTHOS, THROUGH PHYSICAL CONTACT BY BURYING OR ALTERING SUBSTRATE COMPOSITION. THE FLUIDS, OR COMPONENTS OF THE FLUIDS, ALSO CAN EXERT EFFECTS BY DISRUPTING ESSENTIAL PHYSIOLOGICAL FUNCTIONS OF ORGANISMS. WHILE SOME COMPONENTS (PENTACHLOROPHENOL, FOR EXAMPLE) THAT ARE TOXIC ARE NO LONGER PERMITTED FOR FLUIDS RELEASED ON THE OCS, RESEARCH INDICATED THAT A "DIESEL" CONTAMINANT IS A TOXIC COMPONENT OF USED FLUIDS RECENTLY COLLECTED FROM THE GULF OF MEXICO. TESTS ALSO SHOWED THAT THE ADDITION OF #2 FUEL OIL (DIESEL) OR MINERAL OIL INCREASED THE TOXICITY OF LABORATORY-PREPARED DRILLING FLUIDS. MODELS DEVELOPED TO PREDICT THE IMPACT OF DRILLING FLUIDS ON OPEN, WELL-MIXED, AND RELATIVELY DEEP (>20 METERS) MARINE ENVIRONMENTS SUGGESTED THAT UNDER NORMAL OPERATING CONDITIONS MOST DETECTABLE ADVERSE EFFECTS SHOULD BE LIMITED TO WITHIN SEVERAL HUNDRED METERS OF THE POINT OF DISCHARGE. POSSIBLE EXCEPTIONS TO THIS GENERALIZATION COULD OCCUR WHEN DRILLING CONDITIONS DIFFER FROM NORMAL OR WHEN DRILLING RIGS ARE LOCATED NEAR SENSITIVE BIOLOGICAL AREAS, SUCH AS CORAL REEFS, OR IN POORLY FLUSHED AREAS. INCOMPLETE RESEARCH DATA WERE ACQUIRED IN SOME AREAS, AND FURTHER RESEARCH WOULD BE DESIRABLE IN OTHER AREAS. FOR EXAMPLE, MODELS DEVELOPED TO PREDICT THE FATE AND EFFECTS OF DRILLING FLUIDS SHOULD BE FIELD TESTED TO VALIDATE THE ASSUMPTIONS AND INPUTS INTO THE MODELS. SPECIAL EMPHASIS SHOULD BE PLACED ON DISCHARGES FROM MULTIPLE DEVELOPMENT RIGS. ALSO, DATA AND METHODOLOGY ARE NEEDED ON THE EFFECTS OF ADDITIVES, PARTICULARLY BIOCIDES AND CHEMICALS TO IMPROVE LUBRICITY, ON THE TOXICITY OF DRILLING FLUIDS. ADDITIONAL INFORMATION ON SUBLETHAL AND CHRONIC EFFECTS OF THE DRILLING FLUIDS ON SENSITIVE LIFE STAGES OF ORGANISMS, PARTICULARLY BENTHIC ORGANISMS, WOULD BE USEFUL IN PREPARING HAZARD ASSESSMENTS. ANOTHER AREA FOR FUTURE RESEARCH IS THE IMPACT OF DRILLING FLUIDS THAT CONTAIN DIESEL OIL, OR CHEMICALS USED IN PLACE OF DIESEL OIL, ON STRUCTURE AND FUNCTION OF BENTHIC COMMUNITIES.

DUKE, THOMAS W., AND PATRICK R. PARRISH. 1984. RESULTS OF THE DRILLING FLUIDS RESEARCH PROGRAM SPONSORED BY THE GULF BREEZE ENVIRONMENTAL RESEARCH LABORATORY, 1976-1984, AND THEIR APPLICATION TO HAZARD ASSESSMENT (PROJECT SUMMARY). EPA-600/S4-84-055, U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 10P.

DUKE, THOMAS W. IN PREP. TOXICITY OF "SPENT" DRILLING FLUIDS TO SELECTED MARINE ORGANISMS. IN: PROCEEDINGS OF THE MINERALS MANAGEMENT SERVICE INFORMATION TRANSFER MEETING, NOVEMBER, 1983, NEW ORLEANS, LA. (ERL,GB 498).

THE ENVIRONMENTAL RESEARCH LABORATORY AT GULF BREEZE, FLORIDA (ERL/GB), A PART OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), HAS CARRIED OUT A COOPERATIVE RESEARCH PROGRAM TO EVALUATE THE POTENTIAL IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT. THE PURPOSE OF THIS TALK IS TO PRESENT DATA OBTAINED BY PARTICIPANTS OF THIS PROGRAM ON THE EFFECT OF SPENT DRILLING FLUIDS FROM THE GULF OF MEXICO ON SELECTED MARINE ORGANISMS. DUPLICATE SAMPLES OF DRILLING FLUIDS WERE SUPPLIED TO EPA AND THE AMERICAN PETROLEUM INSTITUTE (API) BY THE PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION (PESA). SAMPLES WERE COLLECTED RANDOMLY FROM OPERATING RIGS IN THE GULF OF MEXICO AND AN EFFORT WAS MADE TO SELECT WELLS OF VARYING DEPTH AND GEOGRAPHICAL LOCATION. THE SAMPLES SENT TO ERL/GB WERE SUBSEQUENTLY USED FOR TESTING IN-HOUSE OR SUPPLIED TO EXTRAMURAL CONTRACTORS. CHEMICAL ANALYSES WERE PERFORMED BY SHOKES, SCIENCE APPLICATIONS INCORPORATED AND BARKER, NEW ENGLAND AQUARIA. BIOLOGICAL TESTING WITH MYSID SHRIMP, MYSIDOPSIS BAHIA BY ERL/GB; GRASS SHRIMP, PALAEMONETES PUGIO, BY RAO, UNIVERSITY OF WEST FLORIDA; CLAMS, MERCENARIA MERCENARIA, BY BARKER, NEW ENGLAND AQUARIA; MINNOWS, FUNDULUS HETEROCLITUS AND SAND DOLLARS INCLUDING ECHINARACHNIIS PARMA BY CRAWFORD, TRINITY COLLEGE; AND CORAL, ACROPORA CERVICORNIS BY POWELL, TEXAS A&M UNIVERSITY.

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE. 1984. ABSTRACTS AND INDEX TO PUBLICATIONS DEALING WITH PCP OR CRESOTE. U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 94P. (ERL,GB SR-109).

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1984. ERLGB PUBLICATIONS AND ABSTRACTS RELATED TO BIOTECHNOLOGY: I. MICROBIAL ECOLOGY, BIOCHEMISTRY AND GENETICS. U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 53P. (ERL,GB SR-110).

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1984. ERLGB PUBLICATIONS AND ABSTRACTS RELATED TO BIOTECHNOLOGY: II. BIORATIONAL, MICROBIAL AND BIOCHEMICAL CONTROL AGENTS. U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 10P. (ERL,GB SR-111).

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1984. GULF BREEZE LABORATORY PUBLICATIONS DEALING WITH PCB'S: INDEX AND ABSTRACTS. U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 56P. (ERL,GB SR-113).

THIS PUBLICATION LISTS TITLES, ABSTRACTS AND INDEXES ALL INHOUSE AND EXTRAMURAL PUBLICATIONS AND REPORTS ISSUED BY ERL GULF BREEZE LABORATORY DEALING WITH PCB'S. BOTH TOPICAL AND AUTHOR INDEXES ARE GIVEN.

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1984. INDEX AND ABSTRACTS TO PUBLICATIONS, THE EPA-NCI PROJECT: EFFECTS OF CARCINOGENS, MUTAGENS, AND TERATOGENS ON NON-HUMAN SPECIES (AQUATIC ANIMALS). U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 70P. (ERL,GB SR-101B).

THE NATIONAL CANCER INSTITUTE (NCI) FUNDED AN EPA STUDY ENTITLED: "EFFECTS OF CARCINOGENS, MUTAGENS AND TERATOGENS ON NON-HUMAN SPECIES (AQUATIC ANIMALS)" FROM 1978 TO 1982. ASSOCIATED WITH THIS EFFORT WERE DR. H. KRAYBILL (NCI) AND DR. JOHN COUCH (EPA), PRINCIPAL INVESTIGATOR AND PROJECT COORDINATOR. TO DATE, THE JOINT EFFORT HAS PRODUCED ABOUT 100 REPORTS, SYMPOSIA SECTIONS OR PUBLICATIONS IN THE PEER-REVIEWED, JOURNAL LITERATURE. CONTRIBUTIONS ARE LISTED, WITH ABSTRACTS (WHEN AVAILABLE) AND CROSS REFERENCED BY TITLE-KEY WORDS. ADDITIONALLY, AN AUTHOR INDEX IS PROVIDED.

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1984. INDEX AND ABSTRACTS TO PUBLICATIONS: THE EPA DRILLING FLUID HAZARD ASSESSMENT RESEARCH PROGRAM. U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 94P. (ERL,GB SR-112).

THIS VOLUME SUMMARIES RESULTS OF AN ONGOING RESEARCH PROGRAM. FROM 1976 TO THE PRESENT TIME, ERLGB CONDUCTED A RESEARCH PROGRAM TO EVALUATE THE POTENTIAL IMPACT OF DRILLING FLUIDS ON THE MARINE ENVIRONMENT. THE EXTRAMURAL PORTION OF THIS STUDY IS ESSENTIALLY COMPLETE; HOWEVER, THE IN-HOUSE REPORT IS CONTINUING. THE EFFORT WAS A COMPOSITE OF IN-HOUSE AND EXTRAMURAL ACTIVITIES, ADAPTIVE ENVIRONMENTAL ASSESSMENTS (AEA) AND A FINAL HAZARD ASSESSMENT EFFORT (IN AGENCY REVIEW). DR. NORMAN RICHARDS DIRECTED THE PROGRAM FROM 1976 TO 1981 WHEN DR. T. W. DUKE BECAME PROJECT LEADER. OVER THAT TIME PERIOD 100 REPORTS, PUBLICATIONS AND JOURNAL ARTICLES IN THE PEER-REVIEWED LITERATURE HAVE BEEN PRODUCED. THIS PUBLICATION LISTS THE TITLE, JOURNAL OR PLACE OF PUBLICATION AND, (WHEN AVAILABLE), AN ABSTRACT OF THE PUBLICATION CONTENT. ADDITIONALLY, AN AUTHOR INDEX AND A KEY WORD INDEX ARE PROVIDED.

ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 1983. PRELIMINARY REPORT: EFFECTS OF MOSQUITO CONTROL APPLICATIONS OF THE PESTICIDE FENTHION ON NONTARGET ESTUARINE ORGANISMS. U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 87P. (ERL,GB SR-105*).

THIS REPORT IS A SUMMARY OF FY83 RESEARCH RELATED TO THE ERL/GB PESTICIDE FIELD STUDY. THE ULTIMATE GOAL OF THE FIELD STUDY WAS TO EXAMINE AND VALIDATE HAZARD ASSESSMENT PROCEDURES WHICH ARE EMPLOYED IN PESTICIDE REGISTRATION. THE HAZARD ASSESSMENT PROCESS EMPLOYS "WORST CASE SCENARIOS" AND LABORATORY DATA IN PREDICTING THE POTENTIAL FOR ADVERSE ENVIRONENTAL IMPACT; THEREFORE, FIELD STUDIES OF PESTICIDES UNDER ACTUAL USE CONDITIONS ARE NECESSARY TO DETERMINE THE APPLICABILITY OF SUCH AN APPROACH. BY COMPARING EMPIRICAL RESULTS OF FIELD STUDIES WITH THE PREDICTIONS BASED ON LABORATORY DATA AND HAZARD ASSESSMENT PROTOCOLS, WE CAN EVALUATE THE UTILITY OF PREDICTING ENVIRONMENTAL EFFECTS FROM A GENERALIZED HAZARD ASSESSMENT SCHEME. ONCE WE HAVE IMPLEMENTED SUCCESSFUL FIELD STUDIES THAT ACCURATELY CHARACTERIZE ENVIRONMENTAL EXPOSURE REGIMENS AND RESPONSES OF NON-TARGET SPECIES, WE CAN THEN MOVE TO DIRECT TESTING FOR LAB-FIELD COMPARISONS AND VALIDATION OF HAZARD ASSESSMENT PROCEDURES. THE OBJECTIVES OF THE ERL//GB FY83 FIELD STUDY WERE TO OBTAIN EMPIRICAL DATA ON THE ENVIRONMENTAL CONCENTRATIONS OF PESTICIDES FOLLOWING ACTUAL USE APPLICATION, TO DETERMINE THE RESPONSE OF CAGED TEST ANIMALS IN THE FIELD, AND TO COMPARE THESE RESULTS WITH DATA FROM ROUTINE LABORATORY TOXICITY TESTS. THE ERL//GB STAFF STUDIED THE USE OF THE ORGANOPHOSPHATE PESTICIDE BAYTEX (MOBAY CO, TECHNICAL COMPOUND=FENTHION) IN CONTROLLING SALTMARSH MOSQUITOES. A REVIEW OF PUBLISHED DATA ON HE TOXICITY OF FENTHION IN LABORATORY TESTS AND FIELD STUDY ASSESSMENTS WAS INCLUDED IN THE ERL//GB RESEARCH PLAN (PREVIOUSLY SUBMITTED) AND WILL NOT BE REPEATED HERE. FENTHION IN USED EXTENSIVELY IN SOUTHWESTERN FLORIDA WHERE MARSHGRASS AND MANGROVE HABITATS PROVIDE PRIME BREEDING GROUNDS FOR MOSQUITOES. LABORATORY TESTS HAVE SHOWN THIS PESTICIDE TO BE ACUTELY TOXIC TO MARINE CRUSTACEANS IN CONCENTRATIONS WHICH MAY BE ENCOUNTERED IN NORMAL USE PATTERNS IF HAZARD ASSESSMENT PREDICTIONS ARE ACCURATE.

ERICKSON, S., E. DAVEY, M. MORGAN, AND A. SOPER. IN PRESS. EFFECTS OF LEAD ON GENERATION TIME AND 14C-UPTAKE IN ESTUARINE PHYTOPLANKTON. J. PHYCOL. (ERL,GB 109).

INHIBITION OF CELL DIVISION IN THALASSIOSIRA PSEUDONANA (CLONE 13-1) BY LEAD, AS CONTAINED IN PBCL2, WAS STUDIED IN CULTURES GROWN AT 20 DEGREES C IN PASTEURIZED, MEMBRANE-FILTERED (0.22 MM) SEAWATER OF 28 TO 33 G/L SALINITY TAKEN SEASONALLY FROM CHARLESTOWN INLET, WASHINGTON COUNTY, RHODE ISLAND. CONCENTRATIONS OF LEAD WERE FROM 25 TO 100 MG/L. EFFECTS ON GENERATION TIME AND 14C-UPTAKE OF NATURAL PHOSPHORUS AND ADDED NITROGEN, PHOSPHORUS, IRON AND MANGANESE WERE TESTED SINGLY AND IN COMBINATION. GENERATION TIME IN UNENRICHED SEAWATER RANGED FROM 10.2 TO 37.8 HR. LEAD INCREASED GENERATION TIME AND DECREASED 14C-UPTAKE. RESPONSES VARIED WITH ORIGIN OF WATER SAMPLES. GENERATION TIME WAS INCREASED 74% BY 100 MG/L, BUT THE INHIBITORY EFFECTS WERE ELIMINATED BY ADDITION OF 3.09 MG/L. INHIBITION OF CELL DIVISION APPEARS TO BE RELATED TO NUTRIENT LIMITATION CAUSED BY COMPLEXING OF LEAD WITH PHOSPHORUS, MAKING PHOSPHORUS UNAVAILABLE FOR ALGAL GROWTH.

ERICKSON, STANTON J. IN PREP. INHIBITION OF PHOTOSYNTHESIS IN ESTUARINE PHYTOPLANKTON BY MIXTURES OF COPPER AND PENTACHLOROPHENOL. BULL. ENVIRON. CONTAM. TOXICOL. (ERL,GB 463).

INHIBITORY EFFECTS OF COPPER AND PENTACHLOROPHENOL ON PHYTOPLANKTON WERE DETERMINED IN TWO SYSTEMS: (1) FLOWING SEAWATER (SALINITY 26-33 G/L, TEMPERATURE 17.5-26.5 DEGREES C, PH 8.0) AND UPTAKE OF 14-C BY NATURAL COMMUNITIES OF PHYTOPLANKTON AND (2) STATIC GROWTH TESTS IN WHICH POPULATIONS OF THE DIATOM THALASSIOSIRA PSEUDONANA WERE GROWN IN FILTERED (0.22 UM POROSITY) UNENRICHED SEAWATER (PH 8.0, TEMPERATURE 20 DEGREES C, SALINITY 26.0 G/L) UNDER 2700 LUX OF COOL-WHITE FLUORESCENT LIGHT. DIATOMS WERE THE DOMINANT ORGANISMS IN THE FLOWING TEST. CONCENTRATIONS OF THE TEST MATERIALS WERE: COPPER 20-160 UG/L, PENTACHLOROPHENOL 62.5-500 UG/L, SINGLY, AND IN COMBINATION. COPPER AND PENTACHLOROPHENOL WERE LESS INHIBITORY IN FLOWING SEAWATER THAN IN STATIC TESTS. COMBINATIONS THAT CONTAINED 20 TO 40 UG CU/L AND 62.5 TO 125 UG PENTACHLOROPHENOL/L WERE SYNERGISTIC (POTENTIATION). COMBINATIONS THAT CONTAINED 80 TO 160 UG CU/L AND 250 TO 500 UG PENTACHLOROPHENOL/L WERE ADDITIVE.

FEDERLE, THOMAS W., ROBERT J. LIVINGSTON, DUANE A. MEETER, AND DAVID C. WHITE. 1983. MODIFICATIONS OF ESTUARINE SEDIMENTARY MICROBIOTA BY EXCLUSION OF EPIBENTHIC PREDATORS. J. EXP. MAR. BIOL. ECOL. 73(1):81-94. (ERL,GB 467*).

THE ABILITY OF EPIBENTHIC PREDATORS (CRABS AND FISHES) TO INFLUENCE BIOMASS AND COMMUNITY STRUCTURE OF SEDIMENTARY MICROBIOTA WAS INVESTIGATED IN ST. GEORGE SOUND-APALACHICOLA BAY SYSTEM, FLORIDA, U.S.A. REPLICATE AREAS (4 M SQUARED) OF MUD-FLAT SEDIMENT WERE CAGED IN THE FIELD TO CONFINE AND EXCLUDE PREDATORS. UNCAGED AREAS WERE USED AS CONTROLS. THE MICROBIOTA (PROKARYOTES AND MICROEUKARYOTES) OF THE SEDIMENTS WAS CHARACTERIZED AT WEEKS 0, 2, AND 6 BY MEASURING CONCENTRATIONS OF PHOSPHOLIPID AND ANALYZING FATTY ACIDS OF THE MICROBIAL LIPIDS EXTRACTED FROM THE SEDIMENTS. DATA WERE ANALYZED USING ANALYSIS OF VARIANCE AND STEP-WISE DISCRIMINANT ANALYSIS. AFTER 2 WK, THE MICROBIOTA OF THE PREDATOR EXCLUSION TREATMENT WAS SIGNIFICANTLY DIFFERENT FROM THAT IN CONTROL AND PREDATOR INCLUSION TREATMENTS. AFTER 6 WK, THESE DIFFERENCES BECAME MORE PRONOUNCED. THERE WERE NO DEMONSTRABLE CAGING EFFECTS THAT COULD ACCOUNT FOR TREATMENT DIFFERENCES. RESULTS INDICATED THAT REMOVAL OF PREDATORS HAD A PROFOUND EFFECT ON MICROBIAL COMMMUNITIES IN ESTUARINE SEDIMENTS. THUS, THE TOP TROPHIC LEVEL (EPIBENTHIC PREDATORS) HAD AN IMPORTANT ROLE IN REGULATING THE STRUCTURE OF THE LOWEST TROPHIC LEVEL (THE MICROBIOTA).

FEDERLE, THOMAS W., MEREDITH A. HULLAR, ROBERT J. LIVINGSTON, DUANE A. MEETER, AND DAVID C. WHITE. 1983. SPATIAL DISTRIBUTION OF BIOCHEMICAL PARAMETERS INDICATING BIOMASS AND COMMUNITY COMPOSITION OF MICROBIAL ASSEMBLIES IN ESTUARINE MUD FLAT SEDIMENTS. APPL. ENVIRON. MICROBIOL. 45(1):58-63. (ERL,GB X371*).

THE SPATIAL DISTRIBUTION OF COMMUNITIES WAS EXAMINED IN ESTUARINE MUD FLAT SEDIMENTS BY THE BIOCHEMICAL ANALYSIS OF THE LIPIDS AND LIPID COMPONENTS EXTRACTED FROM THE SEDIMENTS. TOTAL PHOSPHOLIPID WAS USED AS A MEASURE OF TOTAL BIOMASS, AND FATTY ACIDS WERE USED AS INDICATORS OF COMMUNITY COMPOSITION. COMPARISONS WERE MADE AMONG 2- BY 2-M (LOCATION) AND 0.2- BY 0.2-M (CLUSTER) SAMPLING PLOTS BY USING A NESTED ANALYSIS OF VARIANCE TO DESIGN AN OPTIMAL SAMPLING STRATEGY TO DEFINE THE MICROBIAL CONTENT OF A LARGE, RELATIVELY HOMOGENOUS AREA. AT TWO OF THE THREE STATIONS, A 2- BY 2-M PLOT WAS REPRESENTATIVE OF THE STATION, BUT 0.2- BY 0.2-M AREAS WERE IN NO CASE REPRESENTATIVE OF THE STATION. THE BIOMASS MEASURED BY THE EXTRACTABLE PHOSPHOLIPID AND THE TOTAL LIPID PALMITIC ACID SHOWED EXCELLENT CORRELATION WITH THE FATTY ACID "SIGNATURES" CHARACTERISTIC OF BACTERIA, BUT SHOWED A LOWER CORRELATION WITH THE LONG-CHAIN POLYENOIC FATTY ACIDS CHARACTERISTIC OF THE MICROFAUNA.

FINDLAY, ROBERT H., AND DAVID C. WHITE. 1983. POLYMERIC BETA-HYDROXYALKANOATES FROM ENVIRONMENTAL SAMPLES AND BACILLUS MEGATERIUM. APPL. ENVIRON. MICROBIOL. 45(1):71-78. (ERL,GB X380*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB83-223727.

THE PROCARYOTIC ENDOGENOUS STORAGE POLYMER KNOWN AS POLY-BETA-HYDROXYBUTYRATE IS ACTUALLY A MIXED POLYMER OF SHORT-CHAIN BETA-HYDROXY FATTY ACIDS. A METHOD FOR THE QUANTITATIVE RECOVERY OF THIS MIXED POLYMER, CALLED POLY-BETA-HYDROXYALKANOATE (PHA), WITH ANALYSIS BY CAPILLARY GAS-LIQUID CHROMATOGRAPHY SHOWED THE PRESENCE OF AT LEAST 11 SHORT-CHAIN BETA-HYDROXY ACIDS IN POLYMERS EXTRACTED FROM MARINE SEDIMENTS. POLYMERS EXTRACTED FROM BACILLUS MEGATERIUM MONOCULTURES WERE ALSO A COMPLEX MIXTURE OF BETA-HYDROXY ACIDS WITH CHAIN LENGTHS BETWEEN FOUR AND EIGHT CARBONS. LYOPHILIZED SEDIMENTS WERE EXTRACTED IN A MODIFIED SOXHLET EXTRACTOR, AND THE POLYMER WAS PURIFIED WITH ETHANOL AND DIETHYL ETHER WASHES. THE PURIFIED POLYMER WAS TREATED WITH ETHANOL-CHLOROFORM-HYDROBCHLORIC ACID (8.5:2.5:1) FOR 4 H AT 100 DEGREES CELSIUS, A TREATMENT WHICH RESULTED IN THE FORMATION OF THE ETHYL ESTERS OF THE THE CONSTITUENT BETA-HYDROXY ACIDS. SUBSEQUENT ASSAY OF THE PRODUCTS BY GAS-LIQUID CHROMATOGRAPHY INDICATED EXCELLENT REPRODUCIBILITY AND SENSITIVITY (DETECTION LIMIT, 100 FMOL). DISTURBING SEDIMENTS MECHANICALLY OR ADDING NATURAL CHELATORS INCREASED ALL MAJOR PHA COMPONENTS RELATIVE TO THE BACTERIAL BIOAMSS. GARDENING OF SEDIMENTARY MICROBES BY CLYMENELLA SP., AN ANNELID WORM, INDUCED DECREASES IN PHA, WITH CHANGES IN THE RELATIVE PROPORTION OF COMPONENT BETA-HYDROXY ACIDS. THE CONCENTRATION OF PHA RELATIVE TO THE BACTERIAL BIOMASS CAN REFLECT THE RECENT METABOLIC STATUS OF THE MICROBIOTA.

FISHER, D.J., M.E. BENDER, AND M.H. ROBERTS. 1983. EFFECTS OF INGESTION OF KEPONE-CONTAMINATED FOOD BY JUVENILE BLUE CRABS (CALLINECTES SAPIDUS RATHBUN). AQUATIC TOXICOL. 4(3):219-234. (ERL,GB X401*).

TWO LONG-TERM (65-DAY) LABORATORY EXPERIMENTS WERE CONDUCTED TO INVESTIGATE LETHAL AND SUBLETHAL EFFECTS OF INGESTION OF KEPONE-CONTAMINATED FOOD BY JUVENILE BLUE CRABS (CALLINECTES SAPIDUS RATHBUN). FOOD WAS CONTAMINATED AT KEPONE LEVELS FOUND IN BLUE CRAB FOOD SOURCES IN THE JAMES RIVER IN VIRGINIA. THE LEVELS RANGED FROM NON-DETECTABLE (LESS THAN 0.02 UG/G) TO 2.5 UG/G. THE EXPERIMENTAL TEMPERATURE WAS 28 DEGREES CELSIUS DURING EXPERIMENT I AND 21 DEGREES CELSIUS DURING EXPERIMENT II. IN NEITHER EXPERIMENT WERE CRAB MORTALITIES STATISTICALLY DIFFERENT AT ANY DOSE TESTED. THIS INDICATES A 65-DAY LD(50) IN EXCESS OF 0.5 UG KEPONE/CRAB PER DAY, BASED ON A FEEDING RATE OF 0.2 G, OR 0.16 UG/G CRAB PER DAY BASED ON THE MEAN CRAB WET WEIGHT AT THE BEGINNING OF THE EXPERIMENTS. THE HIGHEST KEPONE DOSE TESTED IN BOTH EXPERIMENTS CAUSED SIGNIFICANT INCREASES IN CRAB METABOLIC RATES, AS MEASURED BY OXYGEN CONSUMPTION, AND CRAB EXCITABILITY DURING FEEDING. AT THE HIGHER TEMPERATURE OF EXPERIMENT I THERE WAS AN INVERSE RELATIONSHIP BETWEEN CARAPACE THICKNESS:WIDTH RATIOS AND INCREASING KEPONE DOSE. BIOMAGNIFICATION OF KEPONE BY CRABS TO A WHOLE BODY TISSUE CONCENTRATION GREATER THAN THAT IN THEIR FOOD OCCURRED AT THE HIGHEST TREATMENT LEVEL IN EXPERIMENT I. CRAB MOLTING FREQUENCY AND OVERALL GROWTH WERE NOT STATISTICALLY DIFFERENT AT ANY KEPONE TREATMENT IN EITHER EXPERIMENT.

GAETZ, CHARLES T., AND COLLARD B. SNEED. IN PRESS. LABORATORY CULTURE AND OBSERVATIONS ON THE REPRODUCTIVE BIOLOGY OF THE MARINE PELAGIC ISOPOD, IDOTEA METALLICA (CRUSTACEA; ISOPODA). MAR. BIOL. (ERL,GB 153).

LABORATORY CULTURE OF THE MARINE PELAGIC ISOPOD, IDOTEA METALLICA, IS DESCRIBED. I. METALLICA WAS REARED THROUGH MULTIPLE GENERATIONS AND OBSERVATIONS WERE MADE ON ITS REPRODUCTUVE BIOLOGY. THESE DATA ARE COMPARED WITH THOSE OBTAINED BY OTHERS FOR THIS AND RELATED SPECIES. FEMALE I. METALLICA ARE CAPABLE OF PRODUCING SEQUENTIAL BROODS IN THE LABORATORY WITHOUT PASSING THROUGH INTERVENING NON-REPRODUCTIVE INTERMOLT PERIODS. MEAN BROOD SIZE IS 33 AND THE MEAN PERIOD BETWEEN EGG FERTILIZATION AND JUVENILE RELEASE IS 16 TO 17 DAYS. JUVENILES EMERGE FROM THE MARSUPIUM 1.5 TO 2.0 MM IN LENGTH AND BEGIN FEEDING IMMEDIATELY. SEXUAL DIMORPHISM IS EVIDENT IN 25 TO 30 DAYS AT WHICH TIME ISOPODS ARE 6.0 TO 7.5 MM IN LENGTH. SEXUAL MATURITY IS ATTAINED WHEN ISOPODS REACH 10 TO 12 MM, RESULTING IN A GENERATION TIME OF 80 TO 85 DAYS.

GAETZ, CHARLES T., RICHARD MONTGOMERY, AND THOMAS W. DUKE. 1983. TOXICITY OF PHASIC COMPONENTS OF USED DRILLING FLUIDS TO THE MYSID MYSIDOPSIS (ABSTRACT). PRESENTED AT THE SETAC MEETING, NOV. 6, 1983, WASHINGTON, DC. (ERL,GB 483).

TO ASSESS THE TOXICITY OF "USED" DRILLING MUDS, STATIC ACUTE BIOASSAYS WERE CONDUCTED ON THE ESTUARINE MYSID SHRIMP, MYSIDOPSIS BAHIA, USING BOTH WHOLE DRILLING MUD AND THREE PHASES OF EACH MUD: A LIQUID PHASE WITH ALL PARTICULATE MATERIALS REMOVED, A SUSPENDED PARTICULATE PHASE COMPOSED OF SOLUBLE AND LIGHTER PARTICULATE FRACTIONS, AND A SOLID PHASE COMPOSED MAINLY OF DRILL CUTTINGS AND RAPIDLY SETTLING PARTICULATES. THE 11 DRILLING MUDS TESTED WERE OBTAINED FROM ACTIVE DRILLING PLATFORMS IN THE GULF OF MEXICO, U.S.A. AND REPRESENT SEVEN OF THE EIGHT GENERIC MUD TYPES DESCRIBED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY. THE LOWEST 96-HOUR LC50 VALUES FOR M. BAHIA WERE: WHOLE MUD, 26 UL/L; LIQUID PHASE, 23,300 UL/L; SUSPENDED PARTICULATE PHASE, 145 UL/L; SOLID PHASE, 1456 MG/L. THESE TOXICITY VALUES ARE BELIEVED TO BE DUE, TO A GREAT EXTENT, TO DIESEL OIL PRESENT IN THE MUDS. THE CORRELATION BETWEEN DIESEL CONTENT AND WHOLE MUD TOXICITIES WAS 0.72, FURTHERMORE, ONE OF THE MUDS SHOWED A SIGNIFICANT LOSS OF TOXICITY WITH TIME, PRESUMABLE FROM VOLATILIZATION OF THE AROMATIC FRACTIONS. WE SHOW THE DIFFICULTY IN PREDICTING TOXICITY OF MUDS BASED ON GENERIC CLASSIFICATION WHEN DIESEL IS PRESENT.

GILBERT, T.R. 1983. SURVEY OF THE TOXICITIES AND CHEMICAL COMPOSITIONS OF USED DRILLING MUDS: DATA SUMMARY, JANUARY 1, 1983 (UNPUBLISHED). 31P. (ERL,GB X465).

THE DATA PRESENTED IN THIS SUMMARY ARE THE RESULTS OF A ONE-YEAR STUDY OF THE TOXICITIES AND CHEMICAL COMPOSITIONS OF USED DRILLING FLUIDS. A MORE COMPLETE FINAL REPORT WILL BE SUBMITTED IN FEBRUARY 1983. THE SPECIFIC OBJECTIVES OF THIS PROJECT WERE TO DEVELOP A SENSITIVE SUBLETHAL LARVAL BIOASSAY TO TEST LIQUID PHASE AND SUSPENDED SOLID-PHASE DRILLING FLUID-SEAWATER MIXTURES AND TO DEVELOP A NOVEL SOLID-PHASE BIOASSAY BASED ON LARVAL SETTLING. MERCENARIA MERCENARIA LARVAE WAS USED AS THE TEST ORGANISM IN ALL THE EXPERIMENTS. IN ADDITION, CHEMICAL ANALYSIS WAS PERFORMED TO HELP ELUCIDATE THE COMPOSITION OF USED DRILLING FLUIDS AND HOPEFULLY TO IDENTIFY THE TOXIC COMPONENTS. THE PRESENTATION OF THE RESULTS IS DIVIDED INTO THREE SECTIONS. FIRST, THE RESULTS OF LIQUID AND SUSPENDED SOLID-PHASE BIOASSAYS ARE PRESENTED. SECOND, THE RESULTS OF CHEMICAL ANALYSES ARE GIVEN. IN THE SECTION THE CONCENTRATION AND CHEMICAL FORMS OF SEVERAL ELEMENTS IN THE DRILLING FLUID-SEAWATER MIXTURES ARE PRESENTED IN TABLE II THROUGH VI. THIS IS FOLLOWED BY BULK CHARACTERISTICS OF THE WHOLE DRILLING FLUID USED IN THESE STUDIES (TABLE VII). TABLES VIII AND IX CONTAIN DATA ON ORGANIC COMPONENTS IN THE WHOLE MUDS INCLUDING # 2 DIESEL FUEL CONTENT. THE THIRD AND FINAL SECTION OF THIS REPORT COVERS THE WORK DONE ON THE SOLID-PHASE BIOASSAY, USING LARVAL SETTLING.

GOODMAN, LARRY R., DOUGLAS P. MIDDAUGH, DAVID J. HANSEN, PEGGY K. HIGDON, AND GERALDINE M. CRIPE. 1983. EARLY LIFE-STAGE TOXICITY TEST WITH TIDEWATER SILVERSIDES (MENIDIA PENINSULAE) AND CHLORINE-PRODUCED OXIDANTS. ENVIRON. TOXICOL. CHEM. 2(3):337-342. (ERL,GB 466).

EARLY LIFE-STAGE TOXICITY TESTS (CONTINUOUS EXPOSURE FROM EMBRYONIC STAGE TO 3 WEEKS OR MORE INTO THE EXOGENOUS FEEDING STAGE) WITH NORTH AMERICAN MARINE FISHES HAVE BEEN CONDUCTED ALMOST EXCLUSIVELY WITH CYPRINODONTIDS. IN THIS REPORT, WE PRESENT METHODS FOR TESTING A REPRESENTATIVE OF ANOTHER FAMILY, ATHERINIDAE. EMBRYOS OF THE TIDEWATER SILVERSIDE MENIDIA PENINSULAE (GOODE AND BEAN) WERE OBTAINED BY A LABORATORY SPAWNING PROCEDURE THAT REQUIRED LIGHTING AND TIDAL (CURRENT) STIMULI. A 28-D TOXICITY TEST WITH CHLORINE-PRODUCED OXIDANTS (CPO) BEGAN WITH STAGE 21 AND 22 EMBRYOS (APPROXIMATELY 36 H OLD). AVERAGE MEASURED CPO CONCENTRATIONS IN EXPOSURE WATER WERE NONDETECTABLE (LESS THAN 0.01 MG/L) IN THE CONTROL AND IN THE TWO LOWEST EXPOSURE CONCENTRATIONS, AND 0.01, 0.04 AND 0.21 MG/L. SURVIVAL OF EMBRYOS TO HATCHING AVERAGED 99%, WITH NO SIGNIFICANT DIFFERENCE AMONG TREATMENTS. ALTHOUGH NO FISH SURVIVED EXPOSURE TO 0.21 MG CPO/L, SURVIVAL WAS GREATER THAN OR EQUAL TO 88% IN THE CONTROL AND THE FOUR OTHER CPO TREATMENTS. AVERAGE WET WEIGHTS OF INDIVIDUAL FISH RANGED FROM 11.7 MG IN 0.04 MG/L TO 13.2 MG IN 0.01 MG/L, WITH NO SIGNIFICANT DIFFERENCE AMONG TREATMENTS.

GOODMAN, L.R., D.J. HANSEN, D.P. MIDDAUGH, G.M. CRIPE, AND J.C. MOORE. IN PRESS. METHOD FOR EARLY LIFE-STAGE TOXICITY TESTS USING THREE ATHERINID FISHES AND RESULTS WITH CHLORPYRIFOS. IN: AQUATIC TOXICOLOGY AND HAZARD ASSESSMENT, ASTM SEVENTH SYMPOSIUM ON AQUATIC TOXICOLOGY. AMERICAN SOCIETY FOR TESTING AND MATERIALS, PHILADELPHIA, PA. (ERL,GB 476).

WE HAVE DEVELOPED METHODS FOR OBTAINING EMBRYOS AND CONDUCTING EARLY LIFE-STAGE TOXICITY TESTS (CONTINUOUS EXPOSURE FROM THE EMBRYONIC STAGE TO APPROXIMATELY THREE WEEKS OR MORE INTO THE EXOGENOUS FEEDING STAGE) WITH THREE ESTUARINE SPECIES OF ATHERINID FISHES. EARLY LIFE-STAGE TESTS WERE CONDUCTED FOR 28-D WITH MENIDIA BERYLLINA, M. MENIDIA, AND M. PENINSULAE AND THE INSECTICIDE CHLORPYRIFOS. RESPONSES OF THE THREE SPECIES WERE VERY SIMILAR: UPPER CHRONIC VALUES ("EFFECT" CONCENTRATIONS) RANGED FROM 0.48 TO 1.8 UG CHLORPYRIFOS/L AND LOWER CHRONIC ("NO EFFECT" CONCENTRATIONS) RANGED FROM 0.28 TO 0.75 UG/L. CHLORPYRIFOS EXPOSURE DID NOT AFFECT SURVIVAL OF EMBRYOS TO HATCHING WHICH AVERAGED 91 TO 93% FOR EACH SPECIES. IN TREATMENTS IN WHICH NO ADVERSE EFFECTS WERE OBSERVED, COMBINED SURVIVAL OF M. MENIDIA EMBRYOS AND HATCHED FISHES AVERAGED 51% AND FISH WEIGHTS AVERAGED 23MG; FOR M. PENINSULAE, 69% AND 13.6 MG; AND FOR M. BERYLLINA, 81% AND 8.7 MG. BIOCONCENTRATION FACTORS (CONCENTRATION IN WHOLE BODY/AVERAGE MEASURED CONCENTRATION IN WATER) AVERAGED 220 FOR M. BERYLLINA, 460 FOR M. PENINSULAE, AND PROBABLY LESS THAN 420 FOR M. MENIDIA. FROM THESE THREE SPECIES, TOXICOLOGISTS MAY SELECT AN ATLANTIC OR GULF COAST SPECIES THAT OCCURS IN EITHER HIGH OR LOW SALINITY.

GRIZZLE, J.M, AND PAUL MELIUS. IN PREP. CAUSES OF PAPILLOMAS ON FISH EXPOSED TO CHLORINATED SEWAGE EFFLUENT. UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. (ERL,GB X373).

THIS RESEARCH WAS INITIATED TO DETERMINE THE CAUSE OF ORAL PAPILLOMAS IN BLACK BULLHEADS (ICTALURUS MELAS) FROM THE FINAL OXIDATION POND OF THE TUSKEGEE, ALABAMA, SEWAGE TREATMENT PLANT. THE WATER IN THIS POND WAS CHLORINATED EFFLUENT FROM THE SEWAGE TREATMENT PLANT. THE PRESENCE OF A CARCINOGENIC AND MUTAGENIC CHEMICAL IN THE EFFLUENT OF A SEWAGE TREATMENT PLANT WAS INDICATED BY PAPILLOMAS DEVELOPING ON CAGED BLACK BULLHEADS, GLUCURONOSYLTRANSFERASE INDUCTION IN CAGED CHANNEL CATFISH, AND AMES-TEST MUTAGENICITY OF WATER EXTRACT. UNLIKE PREVIOUSLY STUDIED FISH PAPILLOMAS, VIRUS-LIKE PARTICLES WERE NOT PRESENT IN THE TUMOR CELLS. ALTHOUGH MUTAGENIC AND CARCINOGENIC CHEMICALS HAVE NOT BEEN IDENTIFIED IN THE WASTEWATER, CHLORINE IS IMPLICATED AS A FACTOR CONTRIBUTING TO THE INDUCTION OF THE PAPILLOMAS BECAUSE THE PREVALENCE OF PAPILLOMAS ON WILD BLACK BULLHEADS EXPOSED TO THE EFFLUENT DECREASED FROM 73% TO 23% AFTER THE CHLORINATION RATE WAS REDUCED. THIS REPORT WAS SUBMITTED IN FULFILLMENT OF GRANT NO. LCR809336010 BY AUBURN UNIVERSITY UNDER THE SPONSORSHIP OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY. THIS REPORT COVERS THE PERIOD FROM 12 OCTOBER 1981 TO 11 OCTOBER 1983, AND WORK WAS COMPLETED AS OF 11 OCTOBER 1983.

HANSEN, DAVID J., LARRY R. GOODMAN, JAMES C. MOORE, AND PEGGY K. HIGDON. 1983. EFFECTS OF THE SYNTHETIC PYRETHROIDS AC 222, 705, PERMETHRIN, AND FENVALERATE ON SHEEPSHEAD MINNOWS IN EARLY LIFE-STAGE TOXICITY TESTS. ENVIRON. TOXICOL. AND CHEM. 2(2):251-258. (ERL,GB 462).

SHEEPSHEAD MINNOWS (CYPRINODON VARIEGATUS) WERE EXPOSED TO THE SYNTHETIC PYRETHROID INSECTICIDES AC 222, 705, FENVALERATE AND PERMETHRIN FOR 28 DAYS IN EARLY LIFE STAGE TOXICITY TESTS. AC 222, 705 WAS 370 TIMES MORE TOXIC THAN PERMETHRIN AND 30 TIMES MORE TOXIC THAN FENVALERATE WITH SURVIVAL AND SIZE OF NEWLY HATCHED FISH BEING THE MOST SENSITIVE MEASURE OF EFFECT. AC 222, 705 REDUCED SURVIVAL OF HATCHED FISH 0.61 UG/L AND AVERAGE WEIGHT AT 0.06 UG NO EFFECTS WERE DETECTED AT 0.03 UG/L. TWO OF THE AC 222, 705 CONCENTRATIONS THAT DIMINISHED WEIGHTS, 0.06 AND 0.12 UG/L, WERE BELOW OUR LIMITS OF CHEMICAL DETECTION, 0.15 UG/L. PERMETHRIN REDUCED SURVIVAL OF HATCHED FISH AT 22 UG/L; NO EFFECTS WERE DETECTED AT 10 UG/L. FENVALERATE REDUCED SURVIVAL OF HATCHED FISH ARE 3.9 UG/L AND BOTH WEIGHT AND LENGTH AT 2.2 UG/L; NO EFFECTS WERE DETECTED AT 0.56 UG/L. PERMETHRIN REDUCED SURVIVAL OF HATCHED FISH AT 22 UG/L AND NO EFFECTS WERE DETECTED AT 10 UG/L. THE QUOTIENT OF THE 96-HR LC50 DIVIDED BY THE NO-EFFECT CONCENTRATION WAS 0.8 FOR PERMETHRIN, 9 FOR FENVALERATE AND 37 FOR AC 222, 705. THE MEAN BIOCONCENTRATION FACTORS, CONCENTRATIONS MEASURED IN WHOLE FISH DIVIDED BY CONCENTRATIONS MEASURED IN EXPOSURE WATER, WERE 480 FOR PERMETHRIN AND 570 FOR FEVALERATE; AC 222, 705 WAS NOT DETECTED IN FISH THAT SURVIVED THE EXPOSURE.

HANSEN, DAVID J., AND GERALDINE M. CRIPE. 1984. INTERLABORATORY COMPARISON OF THE EARLY LIFE-STAGE TOXICITY TEST USING THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS). EPA-600/X-84-081, UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 49P.

FIVE CONTRACT LABORATORIES AND TWO EPA LABORATORIES PARTICIPATED IN AN INTERLABORATORY STUDY OF THE EARLY LIFE-STAGE TOXICITY TEST (ASTM DRAFT NO. 3, FEBRUARY 1980) WITH THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS); USING ENDOSULFAN AND PENTACHLOROBENZENE AS TEST COMPOUNDS. EACH LABORATORY CONDUCTED TWO TESTS WITH EACH CHEMICAL. TESTS BEGAN WITH 24-HOUR-OLD EMBRYOS, CONTINUED THROUGH EMBRYONIC DEVELOPMENT, HATCHING AND GROWTH OF FISH TO THE JUVENILE STAGE AND WERE TERMINATED AFTER 28 DAYS. ANALYSIS OF VARIANCE AND DUNCAN'S MULTIPLE RANGE TEST WERE USED TO DETECT TOXICANT EFFECTS ON SURVIVAL OF EMBRYOS AND HATCHED FISH AND EFFECTS ON LENGTHS AND WEIGHTS OF SURVIVING FISH. RULES WERE DEVELOPED FOR JUDGING ACCEPTABILITY OF TEST RESULTS FOR SELECTING THE ESTIMATED MATC LIMITS (UPPER AND LOWER CHRONIC VALUES) WERE EMPLOYED. ALTHOUGH THE VARIABILITY OF THE ESTIMATED MATC LIMITS WAS SOMEWHAT GREATER BETWEEN THAN WITHIN LABORATORIES, WE FEEL THAT RESULTS FROM THIS TEST ARE REASONABLY REPRODUCIBLE. HOWEVER, ANALYSES OF THE REPRODUCABILITY OF THIS TEST WERE COMPLICATED BECAUSE AN ESTIMATED MATC IS A RANGE OF VALUES. THEREFORE, THE GEOMETRIC MEAN OF THE UPPER AND LOWER MATC VALUES (CHRONIC VALUE) FOR EACH TEST WERE USED IN THIS ANALYSIS. RATIOS OF THE HIGH DIVIDED BY THE LOW CHRONIC VALUE FROM ACCEPTABLE DUPLICATE TESTS WERE GENERALLY REPRODUCIBLE. RATIOS FOR EIGHT OF NINE TESTS RANGED FROM 1.04 TO 1.99; AVERAGE RATIO FOR NINE TESTS 1.98, COEFFICIENT OF VARIATION 0.80. VARIABILITY OF CHRONIC VALUES ACROSS ALL LABORATORIES WAS GENERALLY REPRODUCIBLE WITHIN A FACTOR OF TWO. CHRONIC VALUES FROM ACCEPTABLE TESTS RANGED 0.60 UG/L (COEFFICIENT OF VARIATION 0.73) FOR ENDOSULFAN AND 82 UG/L (COEFFICIENT OF VARIATION 0.54) FOR PENTACHLOROBENZENE. NEITHER SURVIVAL NOR WEIGHT WERE CONSISTENTLY THE ENDPOINT MOST SENSITIVE IN TESTS WITH EITHER CHEMICAL. WE CONCLUDE THAT RESULTS FROM THE EARLY LIFE-STAGE TOXICITY TEST USING SHEEPSHEAD MINNOWS ARE REASONABLE REPRODUCIBLE WITHIN AND BETWEEN LABORATORIES. SIMILARITY OF RESULTS IS PARTICULARLY GOOD, CONSIDERING THE DIFFICULTY OF THE TEST, ONLY TWO OF SEVEN LABORATORIES HAD PREVIOUSLY CONDUCTED THIS TEST WITH THIS SPECIES, THAT EMBRYOS WERE OBTAINED FROM FISH FROM NEW ENGLAND TO THE GULF OF MEXICO AND THAT TEST WATER WAS FROM ATLANTIC, PACIFIC AND GULF COASTS. VARIATION IN THIS TOXICITY TEST WAS SIMILAR TO INTERLABORATORY VARIATION IN OTHER TOXICITY AND BIOACCUMULATION TESTS USING MARINE SPECIES. ACCEPTABILITY OF RESPONSES OF CONTROL EMBRYOS AND FISH, REPRODUCIBILITY OF MEASURED EXPOSURE CONCENTRATIONS, AND CONSISTENCY OF PROCEDURES USED TO SELECT ESTIMATED MATC LIMITS ARE IMPORTANT FACTORS IN IMPROVING PRECISION OF TEST RESULTS.

HANSEN, DAVID J. IN PREP. UTILITY OF TOXICITY TESTS TO MEASURE EFFECTS OF SUBSTANCES ON MARINE ORGANISMS. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 456*).

DISCUSSIONS IN THIS PAPER WILL EMPHASIZE ACUTE, EARLY LIFE-STAGE, LIFE CYCLE AND COMMUNITY TOXICITY TESTS WITH MARINE (ESTUARINE OR OCEANIC) SPECIES AS CONDUCTED AT THE U.S. EPA ENVIRONMENTAL RESEARCH LABORATORY AT GULF BREEZE, FLORIDA. THESE TESTS ARE EMPHASIZED BECAUSE OF THEIR IMPORTANCE IN THE HAZARD EVALUATION PROCESS, AS DISCUSSED IN WORKSHOP PROCEEDINGS BY CAIRNS ET AL. (1978) AND DICKSON ET AL. (1979). INDIVIDUAL PAPERS PUBLISHED IN THE PROCEEDINGS OF THESE TWO WORKSHOPS DETAIL HAZARD EVALUATION TECHNIQUES USED BY THE AMERICAN INSTITUTE OF BIOLOGICAL SCIENCE, AMERICAN SOCIETY FOR TESTING AND MATERIALS, MONSANTO COMPANY, U.S. ENVIRONMENTAL PROTECTION AGENCY AND BY JAPANESE AND FRENCH SCIENTISTS. IN ADDITION, TESTING REQUIREMENTS FOR EFFECTS ASSESSMENTS HAVE BEEN RECENTLY IDENTIFIED FOR DEVELOPMENTAL OF WATER QUALITY CRITERIA BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY (1980A) AND THE U.S. ARMY (PEARSON AND GLENNON, 1979).

HAYES, MILES O., ERICH R. GUNDLACH, GEOFFREY I. SCOTT, R. CRAIG SHIPP, JACQUELINE MICHEL, KENNETH FINKELSTEIN, AND WILLIAM P. DAVIS. IN PREP. PECK SLIP OIL SPILL: A PRELIMINARY REPORT. J. ROBINSON, EDITOR, U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, CO. (ERL,GB X429).

HENDRICKS, JERRY D., THEODORE R. MEYERS, AND DENNIS W. SHELTON. 1984. HISTOLOGICAL PROGRESSION OF HEPATIC NEOPLASIA IN RAINBOW TROUT (SALMO GAIRDNERI). IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 321-336. (ERL,GB X353*).

THE HISTOLOGICAL PROGRESSION OF HEPATIC NEOPLASIA HAS NOT BEEN AS SYSTEMATICALLY STUDIED IN RAINBOW TROUT AS IT HAS BEEN IN RODENTS. TWO PUTATIVE PRENEOPLASTIC LESIONS HAVE BEEN IDENTIFIED, THE EOSINOPHILIC FOCUS AND BASOPHILIC FOCUS, BUT WHETHER THESE CORRESPOND TO SIMILAR LESIONS IN RODENT LIVERS IS NOT KNOWN. PRENEOPLASTIC LIVER LESIONS IN RODENTS HAVE BEEN EXTENSIVELY CHARACTERIZED HISTOCHEMICALLY, BUT ADAPTATION OF THESE TECHNIQUES TO TROUT LIVERS HAS NOT ALWAYS BEEN SUCCESSFUL. EOSINOPHILIC FOCI CONSIST OF HYPERTROPHIED CELLS, ENLARGED ATYPICAL NUCLEI, AND DENSE GLYCOGEN-FREE CYTOPLASM. MITOTIC FIGURES ARE ALSO OCCASIONALLY SEEN. USUALLY, THESE FOCI HAVE BEEN INFILTRATED AND AT LEAST PARTIALLY DESTROYED BY INFLAMMATORY CELLS, LARGELY LYMPHOCYTES. IN SOME LIVER SECTIONS, EOSINOPHILIC FOCI ARE INTACT AND OCCASIONALLY AN EOSINOPHILIC-BASOPHILIC TRANSFORMATION CAN BE SEEN. HOWEVER, MOST OFTEN BASOPHILIC FOCI APPEAR INDEPENDENTLY, SURROUNDED BY NORMAL HEPTATOCYTES, WITH NO INDICATION OF A PRIOR EOSINOPHILIC STAGE. THE CELLS OF BASOPHILIC FOCI ARE SIMILAR TO THOSE OF CARCINOMAS: INTENSELY BASOPHILIC, MITOTICALLY ACTIVE, DEVOID OF GLYOGEN, AND GROUPED INTO CORDS SEVERAL CELLS IN THICKNESS. THESE NODULES MAY APPROPRIATELY BE REFERRED TO AS CARCINOMAS IN SITU, BECAUSE THE ONLY DISTINGUISHING CHARACTEREISTIC IS THE SIZE OF THE LESION. ATTEMPTS AT DIFFERENTIATION BETWEEN BENIGN AND MALIGNANT LIVER LESIONS APPEAR ARBITRARY. WE BELIEVE THE BEST CLASSIFICATION OF THE NEOPLASTIC LIVER LESION IN TROUT IS A HEPATOCELLULAR CARCINOMA BECAUSE THE POTENTIAL FOR MALIGNANT BEHAVIOR ALWAYS EXISTS AND, WITH SUFFICIENT TIME, CAN OFTEN BE HISTOLOGICALLY DEMONSTRATED. WE HAVE ALSO DESCRIBED OUR EXPERIENCE WITH THE CHARACTERISTICS OF OTHER LIVER LESIONS ASSOCIATED WITH HEPATOCARCINOGENESIS.

HENDRICKS, JERRY D., THEODORE R. MEYERS, JOHN L. CASTEEL, JOSEPH E. NIXON, PATRICIA M. LOVELAND, AND GEORGE S BAILEY. 1984. RAINBOW TROUT EMBRYOS: ADVANTAGES AND LIMITATIONS FOR CARCINOGENESIS RESEARCH. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 129-137. (ERL,GB X279*).

RAINBOW TROUT EMBROYS ARE SENSITIVE TO THE INITIATION OF NEOPLASMS IN VARIOUS TISSUES BY BRIEF EXPOSURES TO SOLUTIONS OF WATER-SOLUBLE CARCINOGENS. THIS CHARACTERISTIC WAS FIRST DEMONSTRATED WITH THE SPARINGLY SOLUBLE LIVER CARCINOGEN, AFLATOXIN B1(AFB1). A 30-MINUTE EXPOSURE OF 21-DAY-OLD EMBRYOS (EMBRYOS HATCH IN 24-25 DAYS AT 12 DEGREES C) TO A 0.5 PPM AQUEOUS SOLUTION OF AFB1 WILL RESULT IN APPROXIMATELY 65% OF THE SURVIVORS HAVING AT LEAST 1 LIVER TUMOR, 1 YEAR AFTER TREATMENT. THQ EMBRYOS ARE RESPONSIVE TO BOTH AFB1 DOSE AND THE LENGTH OF EXPOSURE AND BECOME INCREASINGLY SENSITIVE WITH INCREASED EMBRYONIC AGE. WE HAVE USED RAINBOW TROUT EMBRYOS TO DEMONSTRATE THE HEPATOCARCINOGENICITY OF OTHER AFLATOXIN METABOLITES AND PRECURSORS: AFLATOXICOL, AFLATOXIN G1, VERSICOLORIN A, AND STERIGNATOCYSTIN. IN ADDITION TO MYCOTOXINS, TROUT EMBRYOS ARE SENSITIVE TO SEVERAL NITROSAMINE HEPATOCARCINOGENS INCLUDING: DIMETHYLNITROSAMINE, DIETHYLNITROSAMINE, NITROSOPYRROLIDINE, AND 2,6-DIMETHYLNITROSOMORPHOLINE. HOWEVER, WITH THE HIGHLY WATER-SOLUBLE NITROSAMINES, LONGER EXPOSURE TIMES (UP TO 24 HR) ARE REQUIRED. IT IS GENERALLY ACCEPTED THAT EACH OF THE ABOVE-NAMED CARCINOGENS REQUIRES METABOLIC ACTIVITATION TO THE ULTIMATE CARCINOGENIC FORM. THIS PROVIDES INDIRECT EVIDENCE THAT THE TROUT EMBRYO IS CAPABLE OF CYTOCHROME P-450-MEDIATED METABOLISM. FINALLY, TROUT EMBRYOS ARE SENSITIVE TO THE DIRECT-ACTING CARCINOGEN, N-METHYL-N'NITRO-N-NITROSOGUANIDINE. THIS COMPOUND PRODUCES TUMORS OF THE LIVER, STOMACH, KIDNEY, AND SWIM BLADDER, AND A PRONOUNCED FEMALE-TO-MALE SEX REVERSAL. RESULTS TO DATE HAVE SHOWN THAT THE TROUT EMBRYO IS A SENSITIVE, CONVENIENT, AND ECONOMICAL WHOLE ANIMAL MODEL SYSTEM WITH MANY DISTINCT ADVANTAGES FOR CARCINOGEN TESTING AND RESEARCH. THE MAJOR LIMITATION HAS BEEN THE DIFFICULTY WITH EXPOSURE OF THE EMBRYOS TO ADEQUATE DOSES OF HIGHLY WATER-INSOLUBLE COMPOUNDS. ALTERNATE EXPOSURE TECHNIQUES WILL BE REQUIRED FOR ALLEVIATION OF THIS PROBLEM.

HINTON, DAVID E., AND JOHN A. COUCH. IN PRESS. PATHOBIOLOGICAL MEASURES OF MARINE POLLUTION EFFECTS. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 475).

THE INTENT OF THIS REVIEW IS TO DISCUSS THE MAJOR CATEGORIES OF PATHOBIOLOGICAL RESEARCH AND TO PRESENT STRENGTHS AND WEAKNESSES OF EACH. WHERE APPROPRIATE, EXAMPLES FROM THE AQUATIC TOXICOLOGY LITERATURE ARE CITED. FINALLY, THE APPLICATION OF THE PATHOBIOLOGIC APPROACH TO FIELD STUDIES AND THE IMPORTANCE OF FINDINGS IN AQUATIC SPECIES TO OTHER SPECIES INCLUDING MAN IS DISCUSSED.

KENDALL, J.J., E.N. POWELL, S.J. CONNOR, AND T.J. BRIGHT. 1983. EFFECTS OF DRILLING FLUIDS (MUDS) AND TURBIDITY ON THE GROWTH AND METABOLIC STATE OF THE CORAL ACROPORA CERVICORNIS, WITH COMMENTS ON METHODS OF NORMALIZATION FOR CORAL DATA. BULL. MAR. SCI. 33(2):336-352. (ERL,GB X396).

THE EFFECTS OF A USED DRILLING MUD ON CORAL HEALTH HAVE BEEN EXAMINED BY MONITORING CHANGES IN CALCIFICATION RATE, SOLUBLE TISSUE PROTEIN CONCENTRATION AND TOTAL NINHYDRIN POSITIVE SUBSTANCE (NPS) CONCENTRATION IN THE CORAL ACROPORA CERVICORNIS. EXPOSURE TO A USED DRILLING MUD REDUCED CALCIFICATION RATE IN GROWING TIPS BY 62%, 83% AND 88% AT 25 PPM, 50 PPM AND 100 PPM (V/V), RESPECTIVELY AFTER A 24-H EXPOSURE PERIOD. SOLUBLE TISSUE PROTEIN CONCENTRATION DROPPED SIGNIFICANTLY IN THE GROWING TIP AFTER 24 H EXPOSURE TO A SOLUTION OF 25-, 50-, 100- AND 500-PPM DRILLING MUD FOR 24 H. EQUIVALENT CONCENTRATIONS OF KAOLIN (TO PRODUCE TURBIDITY) CAUSED NO DROP IN BPS OR PROTEIN CONCENTRATION AND A MUCH LOWER DROP IN CALCIFICATION RATE SUGGESTING THAT THE TOXIC EFFECTS OBSERVED FOR THE DRILLING MUD USED WERE NOT CAUSED BY AN INCREASE IN TURBIDITY ALONE. THE SIGNIFICANT DROP IN PROTEIN CONCENTRATION SUGGESTS THAT THE USE OF PROTEIN OR OTHER TISSUE COMPONENTS FOR NORMALIZATION IN CORALS MAY NOT BE JUSTIFIED IN SOME CASES AND SHOULD BE VIEWED WITH CAUTION.

KENDALL, JAMES JOSEPH. 1983. EFFECTS OF DRILLING FLUIDS (MUDS) AND TURBIDITY ON THE METABOLIC STATE OF THE CORAL ACROPORA CERVICORNIS: CALCIFICATION RATE AND PROTEIN CONCENTRATION. PH.D. DISSERTATION. TEXAS A&M UNIVERSITY, COLLEGE STATION, TX. 110P. (ERL,GB X430).

THE EFFECTS OF TEN USED DRILLING MUDS ON CORAL HEALTH HAVE BEEN EXAMINED BY MONITORING CHANGES IN CALCIFICATION RATE AND SOLUBLE TISSUE PROTEIN IN THE CORAL ACROPORA CERVICORNIS. EXPOSURE TO 25-PPM (V/V) OF ONE MUD FOR 24 H REDUCED CALCIFICATION RATE IN THE GROWING TIPS BY AS MUCH AS 63%. SOLUBLE TISSUE PROTEIN CONCENTRATION DROPPED SIGNIFICANTLY IN THE GROWING TIP AFTER 24 H EXPOSURE TO A SOLUTION OF 25-, 50-, 100-, AND 500-PPM OF THE SAME MUD. EXTENSIVE ZOOXANTHELLAE LOSS WAS VISIBLY OBSERVED AFTER EXPOSURE TO THE 500-PPM SOLUTION. EQUIVALENT CONCENTRATIONS OF KAOLIN (TO PRODUCE TURBIDITY) CAUSED A MUCH LOWER DROP IN CALCIFICATION RATE SUGGESTING THAT THE TOXIC EFFECTS OF THE DRILLING MUD USED WERE NOT CAUSED BY AN INCREASE IN TURBIDITY ALONE. THE SIGNIFICANT DROP IN PROTEIN CONCENTRATION SUGGESTS THAT THE USE OF PROTEIN OR OTHER TISSUE COMPONENTS FOR NORMALIZATION IN CORALS MAY NOT BE JUSTIFIED IN SOME CASES AND SHOULD BE VIEWED WITH CAUTION. IN RECOVERY EXPERIMENTS, CORALS WERE EXPOSED TO DRILLING MUDS (AND KAOLIN) FOR 24 H; SOME WERE ALLOWED TO RECOVER IN CLEAN SEAWATER FOR 48 H. AFTER THE 24 H EXPOSURE, CALCIFICATION RATES WERE SIGNIFICANTLY LESS THAN THOSE OF CONTROLS. AFTER A 48-H RECOVERY PERIOD, CALCIFICATION RATES RETURNED TO CONTROL LEVELS FOR CORALS EXPOSED TO KAOLIN AND SOME OF THE DRILLING MUDS BUT WERE STILL SIGNIFICATLY BELOW CONTROLS FOR OTHER MUDS. THE RESULTS INDICATE THAT THE CAPACITY FOR RECOVERY AFTER EXPOSURE CANNOT BE PREDICTED FROM THE RESULTS OF EXPERIMENTS ON EXPOSURE ONLY. RECOVERY CAPACITY MUST BE INDEPENDENTLY VERIFIED FOR ALL STUDIES ON THE EFFECTS OF SHORT-TERM EXPOSURE TO DRILLING MUDS.

LIVINGSTON, ROBERT J, AND DUANE A MEETER. IN PRESS. CORRESPONDENCE OF LABORATORY AND FIELD RESULTS: WHAT ARE THE CRITERIA FOR VERIFICATION?. ENVIRON. TOXICOL. CHEM. (ERL,GB X479).

VERIFICATION OF LABORATORY BIOASSAY RESULTS IN THE FIELD IS A COMPLEX PROCESS WHICH IS CURRENTLY BEING TESTED IN A RANGE OF FRESHWATER AND MARINE HABITATS BY THE FLORIDA STATE UNIVERSITY AQUATIC STUDY TEAM. VERIFICATION STUDIES RANGE FROM SINGLE-SPECIES BIOASSAYS TO MULTISPECIES MICROCOSMS OF SOFT-SEDIMENT BENTHIC MACROINVERTEBRATES. THE BASIC QUESTION INVOLVES WHETHER LABORATORY RESULTS CAN BE REASONABLY EXTRAPOLATED TO FIELD CONDITIONS. THE CHIEF FACTORS WHICH COMPLICATE DIRECT EXTRAPOLATION INCLUDE PHYSICAL-CHEMICAL HABITAT FEATURES, REPRODUCTING AND RECRUITMENT OF POPULATIONS, IMMIGRATION-EMIGRATION, PREDATION, AND COMPETITION. A BASIC VERIFICATION APPROACH IS TO MEASURE THE FIELD RESPONSE OF NATURAL POPULATIONS ALONG AN ESTABLISHED GRADIENT OF CONTAMINATION OR DISTURBANCE AND COMPARE SUCH EFFECTS WITH A SERIES OF BIOASSAYS USING BOTH INDIGENOUS AND STANDARD TEST ORGANISMS. STATISTICAL MODELS ARE BEING DEVELOPED TO TEST THE COMPARABILITY OF LABORATORY AND FIELD DATA IN THE ESTIMATION OF THE EFFECTS OF TOXIC SUBSTANCES ON NATURAL AQUATIC SYSTEMS.

LORES, E.M., J.C. MOORE, J. KNIGHT, J. FORESTER, AND J. CLARK. IN PREP. DETERMINATION OF FENTHION RESIDUES IN SAMPLES OF MARIME BIOTA AND SEAWATER FROM LABORATORY EXPOSURES AND FIELD APPLICATIONS. J. CHROMATOGR. SCI. (ERL,GB 052).

A METHOD FOR MEASURING FENTHION IN SAMPLES FROM THE ESTUARINE ENVIRONMENT IS DESCRIBED. THE METHOD WAS APPLIED TO SAMPLES FROM FIELD APPLICATIONS OF FENTHION TO CONTROL SALTMARSH MOSQUITOS. THE METHOD OFFERS AN IMPROVEMENT IN THE SILICA GEL CLEANUP OF THOMPSON ET AL. 1977, AND YIELDS GREATER THAN 85% RECOVERY OF FENTHION FROM WATER, PLANT, FISH AND SHRIMP TISSUES. GAS-LIQUID CHROMATOGRAPHY WITH THERMIONIC DETECTION WAS USED TO QUANTIFY FENTHION RESIDUES AS LOW AS 0.010 MICRO-GRAM/L IN SEAWATER AND 0.010 MICRO-GRAM/GRAM IN BIOTA. CONCENTRATION OF FENTHION RESIDUES RANGED FROM NONDETECTABLE TO 0.68 MICRO-GRAM/L IN SALTWATER SAMPLES COLLECTED AFTER TRUCK-MOUNTED ULTRA-LOW-VOLUME (ULV) OR AERIAL SPRAYING TO CONTROL SALT-MARSH MOSQUITOS.

LORES, EMILE M., AND JAMES C. MOORE. 1984. QUANTITATIVE RECOVERY OF SEVERAL ORGANOPHOSPHORUS PESTICIDE RESIDUES FROM ENVIRONMENTAL SAMPLES WITH SILICA GEL CLEANUP (ABSTRACT). IN: ABSTRACTS PRESENTED AT THE 1984 PITTSBURGH CONFERENCE AND EXPOSITION ON ANALYTICAL CHEMISTRY AND APPLIED SPECTROSCOPY, MARCH 5-9, 1984, ATLANTIC CITY, NJ. PP. 989. (ERL,GB 492).

THE USE OF ORGANOPHOSPHORUS PESTICIDES AS SUBSTITUTES FOR ORGANOCHLORINE PESTICIDES IS INCREASING. FREQUENTLY, METHODS FOR ANALYZING ORGANOPHOSPHORUS PESTICIDES IN ENVIRONMENTAL SAMPLES DO NOT YIELD QUANTITATIVE RECOVERY DUE TO LOSSES ON CLEANUP COLUMNS. INCREASING USE OF THESE COMPOUNDS MAKES THEIR ANALYSIS MORE IMPORTANT AND BETTER CLEANUP TECHNIQUES ARE NEEDED. THIS PAPER DESCRIBES A NEW SILICA GEL CLEANUP THAT PROVIDES QUANTITATIVE RECOVERY FOR SEVERAL ORGANOPHOSPHORUS PESTICIDES THAT HAVE BEEN DIFFICULT TO RECOVER IN THE PAST. A CONDITIONING WASH OF 1% ACETIC ACID IN HEXANE PRIOR TO THE INTRODUCTION OF THE SAMPLE ON THE COLUMN RESULTS IN INCREASED STABILITY OF ORGANOSPHOSPHORUS PESTICIDES ON THE COLUMN AND HIGHER RECOVERIES. INITIALLY, THIS CONDITIONING WASH WAS FOUND TO INCREASE THE RECOVERY OF FENTHION, THEN BEING USED IN A FIELD STUDY. FURTHER INVESTIGATION REVEALED THAT THE CONDITIONING WASH IMPROVED THE RECOVERY OF SEVERAL OTHER ORGANOPHOSPHATES. TABLE I SHOWS THE PERCENTAGE RECOVERIES OF SEVERAL PESTICIDES BY THIS METHOD AND THE PUBLISHED RECOVERIES BY THE METHOD OF THOMPSON ET AL. THIS COMPARISON DEMONSTRATES THE EFFECTIVENESS OF OUR METHOD AND THE KIND OF IMPROVEMENTS THAT WE BELIEVE CAN BE EXPECTED WITH OTHER ORGANOPHOSPHATES THAT ARE DIFFICULT TO RECOVER FROM SILICA GEL CLEANUP COLUMNS. ACID CONDITIONING ALSO IMPROVED THE RECOVERY OF FENTHION FROM FLORISIL AND ALUMINA, BUT THESE PROCEDURES NEED ADDITIONAL INVESTIGATION. THE APPLICABILITY OF THIS CLEANUP METHOD TO SEVERAL ORGANOPHOSPHORUS PESTICIDES HAS BEEN DEMONSTRATED. THE METHOD HAS BEEN USED ON A VARIETY OF ENVIRONMENTAL SUBSTRATES TAKEN AFTER ACTUAL FIELD USE OF FENTHION (LORES ET AL., 1983). WE BELIEVE THAT THIS METHOD WILL BE USEFUL FOR MANY OTHER ORGANOPHORPHORUS PESTICIDES THAT HAVE BEEN DIFFICULT TO RECOVER IN THE PAST.

LOWRY, ANDREE F., AND SUSAN M. MEANS. 1984. COMPUTERIZED LIBRARY SYSTEMS. UNITED STATES. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 73P. (ERL,GB SR-114).

A DIRECTORY OF COMPUTERIZED SYSTEMS CURRENTLY USED BY THE LIBRARY. CONTENTS: (1) INTRODUCTION (2) ERLGB CONTRIBUTION SYSTEM (3) THESAURUS (4) SENTENCE RANKING (5) LIBRARY HOLDINGS SYSTEM (6) REPRINT SYSTEM (7) SPECIALIZED BIBLIOGRAPHY SYSTEM (8) SLIDE COLLECTION SYSTEM (9) LABORATORY NOTEBOOK SYSTEM (10) LITERATURE SEARCH SYSTEM.

MARTIN, BILLY J., RUDOLPH D. ELLENDER, SUSAN A. HILLEBERT, AND MITCHELL M GUESS. 1984. PRIMARY CELL CULTURES FROM THE TELEOST, CYPRINODON VARIEGATUS: CULTURE ESTABLISMENT AND APPLICATION IN CARCINOGEN EXPOSURE STUDIES. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 175-178. (ERL,GB X260).

METHODS WERE DEVELOPED FOR ASEPTIC MAINTENANCE OF CYPRINODON VARIEGATUS FRY FOR EXTENDED PERIODS. PRELIMINARY STUDIES INDICATED THAT UNDER OPTIMUM CONDITIONS STERILE EMBRYOS DEVELOP NORMALLY FOR A SUFFICIENT TIME TO FUNCTION AS CARCINOGEN/TERATOGEN ASSAY SYSTEMS. AN EMBRYO-PRIMARY CELL CULTURE TECHNIQUE WAS DEVELOPED THAT INCORPORATES, IN A SINGLE SYSTEM, CERTAIN CHARACTERISTICS OF BOTH INTACT EMBRYOS AND PRIMARY CELL CULTURES, ALLOWING SIMULTANEOUS OBSERVATION OF THE EFFECTS OF CARCINOGENS ON THE WHOLE ORGANISM AND PRIMARY CELL MONOLAYERS. THE EFFECTIVE USE OF THESE SYSTEMS PROVIDES THE OPPORTUNITY TO STUDY THE EFFECTS OF CARCINOGENS ON TELEOSTS AT THE CELLULAR AND ORGANISMIC LEVEL.

MCKENNEY, CHARLES L., JR. IN PRESS. ASSOCIATIONS BETWEEN PHYSIOLOGICAL ALTERATIONS AND POPULATION CHANGES IN AN ESTUARINE MYSID DURING CHRONIC EXPOSURE TO A PESTICIDE. IN: PHYSIOLOGICAL EFFECTS OF MARINE POLLUTANT STRESS. F.J. VERNBERG, A. CALABRESE, F.P. THURBERG, AND W.B. VERNBURG,EDITORS, UNIVERSITY OF SOUTH CAROLINA PRESS, COLUMBIA, SC. (ERL,GB 495).

A NUMBER OF VITAL LIFE PROCESSES OF AN ESTUARINE MYSID (MYSIDOPSIS BAHIA) WERE EXAMINED THROUGHOUT ITS LIFE CYCLE DURING EXPOSURE TO THE THIOCARBAMATE HERBICIDE, THIOBENCARB. INITIAL EXPOSURE OF JUVENILE MYSIDS TO THIOBENCARB RESULTED IN ELEVATED RESPIRATION RATES. CONCENTRATION OF THIOBENCARB THAT PRODUCED SIGNIFICANT REDUCTIONS IN POPULATION SURVIVAL THROUGH A COMPLETE LIFE CYCLE (IN APPROXIMATELY 24 DAYS) SIGNIFICANTLY STIMULATED RESPIRATION RATES OF JUVENILES AFTER ONLY 4 DAYS OF EXPOSURE. INCREASED METABOLIC DEMANDS WITH SUBLETHAL THIOBENCARB EXPOSURE REDUCED THE AMOUNT OF ASSIMILATED ENERGY AVAILABLE FOR PRODUCTION OF NEW TISSUE BY JUVENILE MYSIDS, RESULTING IN RETARDED JUVENILE GROWTH RATES. HIGHER O:N RATIOS DURING THE MATURATION OF THIOBENCARB-EXPOSED MYSIDS SUGGEST A GREATER RELIANCE ON THE MORE ENERGY-RICH LIPID SUBSTRATES IN ORDER TO SUPPORT THE ELEVATED RATES OF OXIDATIVE METABOLISM, RESULTING IN LESS LIPID MATERIAL BEING AVAILABLE FOR GAMETE PRODUCTION.

MCKENNEY, C. L., JR., AND D. B. HAMAKER. IN PRESS. EFFECTS OF FENVALERATE ON LARVAL DEVELOPMENT OF PALAEMONETES PUGIO (HOLTHIUS) AND ON LARVAL METABOLISM DURING OSMOTIC STRESS. AQUAT. TOXICOL. (NY). (ERL,GB 502).

LARVAE OF THE ESTUARINE GRASS SHRIMP, PALAEMONETES PUGIO, WERE REARED IN THE LABORATORY FROM HATCH THROUGH METAMORPHOSIS UNDER OPTIMAL SALINITY CONDITIONS (20 0/00) IN A RANGE OF LETHAL AND SUBLETHAL CONCENTRATIONS OF THE PYRETHROID INSECTICIDE, FENVALERATE. A NOMINAL CONCENTRATION OF 3.2 NG FENVALERATE/L SIGNIFICANTLY REDUCED THE PERCENTAGE OF LARVAE THAT COMPLETED METAMORPHOSIS. OXYGEN CONSUMPTION RATES WERE SIGNIFICANTLY HIGHER FOR LARVAE EXPOSED TO THIS LETHAL CONCENTRATION FOR 24 HR. EXPOSURE TO A SUBLETHAL CONCENTRATION OF 1.6 NG FENVALERATE/L PROLONGED THE DURATION OF COMPLETE LARVAL DEVELOPMENT. AFTER 8-DAY EXPOSURE TO FENVALERATE, OXYGEN CONSUPTION RATES WERE ELEVATED WHEN LARVAE WERE EXPOSED ACUTELY TO HYPO-OSMOTIC STRESS (10 0/00 S). METABOLIC RESPONSES OF PREMETAMORPHIC LARVAE TO HYPERSOMOTIC STRESS (30 0/00 S) WERE ALSO MODIFIED BY SUBLETHAL FENVALERATE EXPOSURE. ALTERATIONS IN METABLIC-SALINITY PATTERNS OF LARVAL GRASS SHRIMP DEVELOPING UNDER SUBLETHAL CONCENTRATIONS OF FENVALERATE SUGGEST REDUCTION IN THE ECOLOGICAL FITNESS DURING THIS LIFE STAGE BY LIMITING CAPACITY OF LARVAL SHRIMP TO ADAPT TO THE FLUCTUATING SALINITY CONDITIONS OF ESTUARINE WATERS.

MCKENNEY, CHARLES L. 1983. PHYSIOLOGICAL RESPONSES OF MYSIDOPSIS BAHIA EXPOSED THROUGH AN ENTIRE LIFE CYCLE TO AN ORGANIC TOXICANT (ABSTRACT). PRESENTED AT THE BIOLOGICAL PROCESSES SESSION OF THE 4TH INTERNATIONAL OCEAN DISPOSAL SYMPOSIUM IN PLYMOUTH, ENGLAND, APRIL 11-18,. (ERL,GB 455*).

IN ORDER TO GAIN AN UNDERSTANDING OF THE MECHANISMS OF TOXICITY OF ORGANIC COMPOUNDS TO MARINE CRUSTACEANS AND TO MORE COMPLETELY REALIZE THE POTENTIAL IMPACT OF THIS CLASS OF TOXICANT ON CRUSTACEAN POPULATIONS, VITAL LIFE PROCESSES OF A MARINE CRUSTACEAN WERE EXAMINED DURING EXPOSURE TO AN ORGANIC HERBICIDE THROUGH THE ORGANISM'S ENTIRE LIFE CYCLE. MOREOVER, AN UNDERSTANDING OF THE CORRELATIONS BETWEEN ALTERED PHYSIOLOGICAL PERFORMANCE AND LONG-TERM DISRUPTIONS IN ECOLOGICAL FITNESS OF THESE ORGANISMS MAY PROVIDE "TOOLS" BY WHICH LONG-TERM CHANGES IN POPULATIONS COULD BE PREDICTED BY SHORT-TERM MEASUREMENTS OF PHYSIOLOGICAL FUNCTIONS. THE GULF OF MEXICO MYSID, MYSIDOPSIS BAHIA, WAS EXPOSED TO A RANGE OF CONCENTRATIONS OF THE ORGANIC HERBICIDE, THIOBENCARB, IN A FLOWING SEAWATER EXPOSURE SYSTEM.

MCMULLEN, DENNIS M., AND DOUGLAS P. MIDDAUGH. IN PRESS. EFFECT OF TEMPERATURE AND FOOD DENSITY ON SURVIVAL AND GROWTH OF LARVAL MENIDIA PENINSULAE (PISCES: ATHERINIDAE). ESTUARIES. (ERL,GB 489).

DAY OF HATCH TIDEWATER SILVERSIDES, MENIDIA PENINSULAE, WERE STOCKED AT 5 FISH PER LITER IN 3 L OF SEAWATER AT 30 DEGREES/00 AND RAISED FOR 16 DAYS AT 20 DEGREES, 25 DEGREES AND 30 DEGREES CELSIUS. FOOD ORGANISMS (BRANCHIONUS SP. OR ARTEMIA NAUPLII) WERE MAINTAINED AT 500, 1,000, 5,000 OR 10,000 FOOD ORGANISMS/L. THE INFLUENCE OF FOOD DENSITY ON GROWTH OF LARVAL M. PENINSULAE WAS TEMPERATURE DEPENDENT. AT 20 DEGREES CELSIUS THERE WAS NO DIFFERENCE IN FINAL SIZE OF FISH BASED ON FOOD DENSITITES. AT 25 DEGREES CELSIUS, THERE WAS AN INCREASE IN FINAL BODY SIZE AS FOOD DENSITY INCREASED FROM 500 TO 5,000/L. AT 30 DEGREES CELSIUS, THERE WAS AN INCREASE IN FINAL SIZE AS FOOD DENSITY INCREASED FROM 1,000 TO 5,000/L. THERE WERE NO SIGNIFICANT DIFFERENCES IN SURVIVAL BETWEEN FOOD DENSITIES IN TESTS AT 20 DEGREES, 25 DEGREES, OR 30 DEGREES CELSIUS. HOWEVER, FOR ANY GIVEN TEMPERATURE AND FOOD DENSITY, DIFFERENTIAL SURVIVAL PATTERNS WERE SIGNFICANT IN EXPLAINING VARIANCE IN FINAL SIZE BETWEEN REPLICATES. OPTIMAL CULTURE CONDITIONS FOR LARVAL M. PENINSULAE WERE DETERMINED TO BE 5,000 FOOD ORGANISMS/L AT 25 DEGREES CELSIUS.

MEADOR, C. BRENT, ROBERT L. MIDDLEBROOKS, AND BILLY J. MARTIN. 1984. SEROLOGIC ALTERATIONS IN CARCINOGEN-EXPOSED TELEOSTS: PROCEDURES FOR PREPARATION AND ANALYSIS OF SAMPLES FROM SMALL FISH. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 211-216. (ERL,GB X261*).

TO STUDY THE EFFECTS OF ENVIRONMENTAL CARCINOGENS ON THE IMMUNE SYSTEM OF CYPRINODON VARIEGATUS, WE HAD TO MINIATURIZE OR MODIFY STANDARD IMMUNOLOGICAL PROCEDURES, DUE TO THE SMALL SIZE OF THE FISH. MODIFICATIONS IN STANDARD BLEEDING PROCEDURES ALLOWED COLLECTION OF SUFFICIENT SERUM TO PERFORM MOST SEROLOGICAL PROCEDURES. SERUM ELECTROPHORESIS SHOWED CONSIDERABLE VARIATON BETWEEN EXPOSED AND UNEXPOSED FISH AS DID QUALITATIVE IMMUNOELECTROPHORESIS TECHNIQUES. A BACTERIOPHAGE NEUTRALIZATION PROCEDURE WAS SUCCESSFULLY ADAPTED FOR USE WITH THE C. VARIEGATUS SYSTEM TO MEASURE ANTIVIRAL ANTIBODIES. THE PRESENCE OF ANTIBODY-FORMING CELLS IN SPLEEN SUSPENSIONS FROM FISH IMMUNIZED WITH HUMAN TYPE O ERYTHROCYTES WAS DEMONSTRATED BY A MODIFIED IMMUNE ROSETTE PROCEDURE. A CAPILLARY TUBE PROCEDURE WAS DEVELOPED FOR SEPARATION OF LEUCOCYTES FOM ERYTHROCYTES IN BLOOD DEVELOPED FOR SEPARATION OF LEUCOCYTES FROM ERYTHROCYTES IN BLOOD FROM C. VARIEGATUS.

MEANS, SUSAN, RUSS RYDER, AND ANDREE LOWRY. 1984. LIBRARY SYSTEM USER'S MANUAL. U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 53P. (ERL,GB SR-108).

THE LIBRARY OF THE ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FLORIDA FUNCTIONS AS AN INFORMATION PROCESSING UNIT FOR THE SCIENTIFIC AND ADMINISTRATIVE STAFF OF THE LABORATORY. IT IS A REPOSITORY FOR CONVENTIONAL RESEARCH MATERIALS AS WELL AS SUCH ITEMS AS THE IN-PRESS MANUSCRIPTS AND PUBLISHED REPORTS OF THE STAFF, THE SCIENTIFIC NOTEBOOKS, AND THE LABORATORY SLIDE COLLECTION. THE LIBRARY IS THE PRIMARY MEANS BY WHICH INFORMATION FROM THESE MATERIALS IS ACCESSED; ITS ON-LINE LIBRARY SYSTEM IS THE BASIS FOR ALL ACCESS AND RETRIEVAL OF INFORMATION. THE LIBRARY SYSTEM IS AN APPLICATION OF THE EPALIT TEXT DATA MANAGEMENT COMPUTER SYSTEM, WHICH WAS DEVELOPED FOR THE LABORATORY BY COMPUTER SCIENCES CORPORATION. THE EPALIT SYSTEM PRESERVES TEXT IN COMPUTER STORAGE IN SUCH A WAY THAT IT CAN BE EASILY RETRIEVED AND VIEWED. BECAUSE LIBRARY RECORDS ARE PREDOMINANTLY TEXTUAL RATHER THAN NUMERICAL, EPALIT PROVIDES THE IDEAL MEDIUM IN WHICH TO AUTOMATE MANY OF THE LIBRARY'S FUNCTIONS. USING EPALIT ALLOWS THE LIBRARY SYSTEM TO STORE LARGE AMOUNTS OF DATA AND THEN RAPIDLY ANALYZE, RETRIEVE, AND REPORT INFORMATION BASED ON PREDETERMINED SEARCH CRITERIA. THE SYSTEM ENSURES THE AVAILABILITY AND EFFECTIVE UTILIZATION OF ALL LIBRARY RESOURCES BECAUSE OF MAXIMUM RETRIEVABILITY. THIS MANUAL PROVIDES EXPLANATIONS, INSTRUCTIONS, AND ILLUSTRATIONS FOR THE ON-LINE CHARACTERISTICS OF THE LIBRARY SYSTEM.

MELIUS, PAUL. 1984. COMPARATIVE BENZO(A)PYRENE METABOLITE PATTERNS IN FISH AND RODENTS. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 387-390. (ERL,GB X365*).

BENZO(A)PYRENE IS CONVERTED TO 3-HYDROXYBENZO(A)-PYRENE, 9-HYDROXYBENZO(A)PYRENE, 4,5-BENZO(A)PYRENE-DIHYDRODIOL, 7,8-BENZO(A)PYRENEDIHYDRODIOL, 9,10-BENZO(A)-PYRENEDIHYDRODIOL AND BENZO(A)PYRENE QUINONES BY POST MITOCHONDRIAL SUPERNATANT OR MICROSOMES IN SUCH FISH AS THE RAINBOW TROUT FLOUNDER, SALMON, MULLET, LITTLE SKATE, FUNDULUS GRANDIS AND SEA CATFISH. IT IS ALSO NOW WELL-ESTABLISHED THAT MANY FISH CONVERT BENZO(A)PYRENE TO POTENT MUTAGENIC METABOLITES AS HAS BEEN DEMONSTATED USING THE AMES TEST, ESPECIALLY WHEN THE FISH ARE INDUCED WITH AROCLOR OR 3-METHYLCHOLANTHRENE, THE METABOLITE PATTERNS OBTAINED AT DIFFERENT SUBSTRATE CONCENTRATION LEVELS INDICATE THAT THE METABOLISM IS MORE COMPLEX AT LOW CONCENTRATIONS WHERE RECYCLING OF METABOLITES IS PRODUCED IN THE IN VITRO SYSTEM.

MEYERS, T.R., AND J.D. HENDRICKS. 1983. HISTOPATHOLOGY OF FOUR SPONTANEOUS NEOPLASMS IN THREE SPECIES OF SALMONID FISHES. J. FISH DIS. 6(5):481-499. (ERL,GB X358*).

GROSS AND HISTOLOGICAL DESCRIPTIONS OF FOUR DIFFERENT SPONTANEOUS NEOPLASMS IN THREE SPECIES OF SALMONID FISHES ARE PROVIDED: THYMIC LYMPHOMA AND DERMAL FIBROSARCOMA, RESPECTIVELY, IN TWO ARTIFICIALLY REARED SOCKEYE SALMON, ONCORHYNCHUS NERKA (WALBAUM), RENAL PAPILLIFEROUS CYSTADENOMA IN A WILD CAUGHT CHINOOK SALMON, O. TSHAWYTSCHA (WALBAUM); CAPILLARY HAEMANGIOMA OF THE DERMIS IN AN ARTIFICIALLY REARED RAINBOW TROUT, SALMO GAIRDNERI RICHARDSON. THE FREQUENCY OF OCCURRENCE OF THESE AND RELATED TUMOUR TYPES, AS REPORTED IN THE LITERATURE, ARE COMPARED IN SALMONID AND NON-SALMONID FISH.

MEYERS, THEODORE R., AND JERRY D. HENDRICKS. 1984. LIMITED EPIZOOTIC OF NEUROBLASTOMA IN COHO SALMON REARED IN CHLORINATED-DECHLORINATED WATER. J. NAT. CANCER INST. 72(2):299-310. (ERL,GB X468*).

DURING THE 1976-77 BROOD YEAR, APPROXIMATELY 12 CASES OF NEUROBLASTOMA WERE OBSERVED IN A CAPTIVE GROUP OF 100,000 FINGERLING COHO SALMON (ONCORHYNCHUS KISUTCH) REARED IN A COMMERCIAL HATCHERY. THE TUMORS WERE LARGE, OCCURRING IN THE SKELETAL MUSCLE NEAR THE DORSAL FIN CAUSING CONSPICUOUS BULGING OF THE OVERLYING INTEGUMENT. TUMORS EXAMINED FROM 3 FISH EACH CONSISTED OF NEUROBLASTS IN TRABECULAR PATTERNS INTERSPERSED BY GLIAL FIBRILLAR MATERIAL AND LINEAR CAVITIES RESEMBLING CENTRAL NEURAL CANALS LINED BY EPENDYMA-LIKE CELLS. GANGLION-LIKE CELLS ALSO WERE APPARENT MORPHOLOGICALLY AND BY SPECIAL STAIN. CANCER OF THE TUMOR WAS CHARACTERIZED BY AN ABUNDANCE OF MITOTIC FIGURES WITH OCCASIONAL ABNORMAL DIVISIONS, LOCAL INVASION OF NORMAL TISSUES, AND POTENTIALLY METASTATIC TUMOR CELL AGGREGATES IN ORGAN VASCULATURE. THE ETIOLOGY OF THIS TUMOR MAY HAVE BEEN RELATED TO MUTAGENIC-CARCINOGENIC HALOGENATED COMPOUNDS POSSIBLE FORMED IN THE HATCHERY WATER SUPPLY DURING CONTINUOUS CHLORINATION OF INCOMING RIVER WATER

MIDDAUGH, DOUGLAS P., H.W. KOHL, AND L.E. BURNETT. 1983. CONCURRENT MEASUREMENT OF INTERTIDAL ENVIRONMENTAL VARIABLES AND EMBRYO SURVIVAL FOR THE CALIFORNIA GRUNION, LEURESTHES TENUIS AND ATLANTIC SILVERSIDE, MENIDIA MENIDIA (PISCES: ARTHERINIDAE). CALIF. FISH GAME. 69(2):89-96. (ERL,GB 221).

CONCURRENT DAILY MEASUREMENTS OF ENVIRONMENTAL VARIABLES AND EMBRYO SURVIVAL WERE MADE FOR TWO ATHERINID FISHES, THE CALIFORNIA GRUNION, LEURESTHES TENUIS, OBSERVED AT BLACKS BEACH, LA JOLLA, CALIFORNIA; AND THE ATLANTIC SILVERSIDE, MENIDIA MENIDIA, OBSERVED AT THE POINT OF PINES, EDISTO ISLAND, SOUTH CAROLINA. MEASUREMENTS WERE MADE DURING APRIL 1980. BOTH SPECIES SPAWNED IN THE UPPER INTERTIDAL ZONE ON HIGH TIDE. L. TENUIS EGGS WERE DEPOSITED APPROXIMATELY 4 CM BELOW THE BEACH SURFACE DURING NIGHTTIME. SUBSEQUENT SAND DEPOSITION BURIED EMBRYOS TO A DEPTH OF APPROXIMATELY 8 CM WHERE THEY WERE PROTECTED FROM THERMAL AND DESICCATION STRESSES. DAILY SURVIVAL OF INCUBATING EMBRYOS AVERAGED 97%. M. MENIDIA UTILIZED THREE SPAWNING SUBSTRATES: 1) ABANDONED CRAB BURROWS, 2) DETRITAL MATS, AND 3) THE STEMS AND PRIMARY LEAVES OF CORDGRASS, SPARTINA ALTERNIFLORA. THESE SUBSTRATES PROVIDED EMBRYOS WITH VARYING DEGREES OF PROTECTION FROM THERMAL AND DESICCATION STRESSES. DAILY SURVIVAL OF EMBRYOS LOCATED 15 CM DEEP IN ABANDONED CRAB BURROWS AVERAGED 88%. SURVIVAL WAS LESS, 76% AT THE ENTRANCE. DAILY SURVIVAL AVERAGED 94% AT THE SURFACE OF DETRITAL MATS AND AT THE AXIS OF STEMS AND PRIMARY LEAVES OF CORDGRASS. SURVIVAL WAS LOWER AT OTHER LOCATIONS ON THESE SUBSTRATES.

MIDDAUGH, D.P., M.J. HEMMER, AND YARA LAMADRID-ROSE. IN PREP. LABORATORY SPAWNING OF THE INLAND SILVERSIDE, MENIDIA BERYLLINA, AND TIDEWATER SILVERSIDE, MENIDIA PENINSULAE WITH NOTES ON SURVIVAL AND GROWTH. ENVIRON. BIOL. FISHES. (ERL,GB 508).

SPAWNING PATTERNS OF INLAND SILVERSIDES, MENIDIA BERYLLINA, AND TIDEWATER SILVERSIDES, MENIDIA PENINSULAE, WERE EXAMINED IN THE LABORATORY UNDER SEVERAL COMBINATIONS OF "TIDAL" AND DIEL LIGHT CYCLE CUES. M. BERYLLINA SHOWED A HIGH FREQUENCY OF SPAWNING THROUGHOUT THE DAY WHEN HELD UNDER CONSTANT CONDITIONS (24L: OD, CURRENT VELOCITY 8 CM/SEC) AND WHEN "TIDAL" AND DIEL LIGHT CYCLES WERE PRESENTED SINGLY OR IN COMBINATION. IN CONTRAST, M. PENINSULAE DEMONSTRATED A HIGH FREQUENCY OF SPAWNING ONLY WHEN PRESENTED A COMBINATION OF "TIDAL" AND DIEL LIGHT CYCLE CUES AND SPAWNED PREDOMINANTLY AT NIGHT. MENIDIA BERYLLINA EMBRYOS WERE EURYHALINE. HATCHING RANGED FROM 73 TO 78% AT SALINITIES AT 5, 15 AND 30 0/00. SURVIVAL AND GROWTH OF LARVAL M. BERYLLINA FROM THE DAY OF HATCHING THROUGH 16 DAYS OLD WAS OPTIMAL AT 15 0/00. ALTHOUGH SURVIVAL OF M. PENINSULAE LARVAE WAS OPTIMAL AT 30 0/00, NO TREND WAS APPARENT IN GROWTH OF LARVAE HELD FOR 16 DAYS AT 5, 15, OR 30 0/00 SALINITY.

MIDDAUGH, DOUGLAS P., R.G. DOMEY, AND G.I. SCOTT. IN PREP. REPRODUCTIVE RHYTHMICITY IN THE ATLANTIC SILVERSIDE, MENIDIA MENIDIA, (PISCES: ATHERINIDAE). TRANS. AM. FISH. SOC. (ERL,GB 491).

THE REPRODUCTIVE PERIODICITY OF THE ATLANTIC SILVERSIDE MENIDIA MENIDIA WAS STUDIED AT TWO LOCATIONS ON THE NORTH EDISTO RIVER ESTUARY IN SOUTH CAROLINA DURING MARCH - JULY OF 1976-1978. SPAWNING RUNS OCCURRED IN THE UPPER INTERTIDAL ZONE AND COINCIDED PRECISELY WITH DAYTIME HIGH TIDES. TIME-SERIES ANALYSIS OF DAILY CHANGES IN THE INTENSITY OF SPAWNING RUNS REVEALED A FORTNIGHTLY REPRODUCTIVE PERIODICITY AND INDICATED THAT THE OBSERVED REPRODUCTIVE RHYTHMICITY IN ATLANTIC SILVERSIDES MAY BE MEDIATED BY A HIGH TIDE-SUNRISE CUE THAT ALSO OCCURS AT FORTNIGHTLY INTERVALS. DURING THE 1976 AND 1977 REPRODUCTIVE SEASONS, THERE WERE HIGHLY SIGNIFICANT CORRELATIONS (P LESS THAN 0.01) AMONG THE MALE GONADAL INDEX, THE FEMALE GONADAL INDEX, AND THE OCCURRENCE OF INTERMEDIATE, MATURING AND HYDRATED-EGG STAGES OF SEXUAL DEVELOPMENT IN FEMALES. THE PERCENTAGE OF FEMALES WITH HYDRATED EGGS WAS GREATEST ON DAYS WHEN A HIGH TIDE OCCURRED WITHIN 1 HOUR AFTER SUNRISE.

MIDDAUGH, DOUGLAS P., AND MICHAEL J. HEMMER. 1984. SPAWNING OF THE TIDEWATER SILVERSIDE, MENIDIA PENINSULAE (GOODE AND BEAN), IN RESPONSE TO TIDAL AND LIGHTING SCHEDULES IN THE LABORATORY. ESTUARIES. 7(2):139-148. (ERL,GB 441).

TIDEWATER SILVERSIDE, MENIDIA PENINSULAE (GOODE AND BEAN) WERE MAINTAINED IN 1.3 M DIAMETER HOLDING TANKS IN IDENTICAL LABORATORY RECIRCULATING SYSTEMS. DURING TWO WEEKS UNDER CONSTANT CONDITIONS (A CURRENT VELOCITY OF 8 CM S -1/1 AND CONTINOUS ILLUMINATION, 24 L:O D) THERE WAS A LOW RELATIVE FREQUENCY OF ARRHYTHMIC SPAWNING. IN THE SUBSEQUENT TWO-WEEK PERIOD, FISH IN ONE PAIR OF TANKS WERE MAINTAINED UNDER THE SINGULAR INFLUENCE OF TWICE DAILY DECREASES IN CURRENT VELOCITY FROM 8 TO 0 CM S -1/1 AT 0600-0700 AND 1800-1900, UNDER CONTINOUS ILLUMINATION. THE RELATIVE FREQUENCY OF SPAWNING REMAINED LOW AND THERE WAS NO EVIDENCE OF A DAILY SPAWNING RHYTHM. HOWEVER, THE MEAN NUMBER OF EGGS PER SPAWN INCREASED SUBSTANTIALLY. FISH IN THE SECOND HOLDING SYSTEM WERE SUBJECTED TO DIEL LIGHT CYCLE OF 13 L:11 D WITH A CONSTANT CURRENT VELOCITY OF 8 CM S -1/1 FOR TWO WEEKS. THE RELATIVE FREQUENCY OF SPAWNING REMAINED LOW AND THERE WAS NO INDICATION OF SPAWNING RHYTHMICITY; MOREOVER, THERE WAS ONLY A SLIGHT INCREASE IN THE MEAN NUMBER OF EGGS PER SPAWN. DURING THE THIRD TWO-WEEK PERIOD, FISH IN THE FIRST PAIR OF TANKS WERE PROVIDED A 13 L:11 D DIEL LIGHT CYCLE, IN CONJUNCTION WITH PREEXISTING TWICE DAILY DECREASES IN CURRENT VELOCITY; THOSE IN THE SECOND PAIR OF TANKS WERE PROVIDED TWICE DAILY DECREASES IN CURRENT VELOCITY IN CONJUNCTION WITH THE PREEXISTING 13 L:11 D LIGHT CYCLE. UNDER THE COMBINED INFLUENCE OF DECREASES IN CURRENT VELOCITY AND A DIEL LIGHT CYCLE, THERE WAS A MARKED INCREASE IN THE RELATIVE FREQUENCY OF SPAWNING IN BOTH PAIRS OF TANKS. FISH MANIFESTED A DISCERNIBLE SPAWNING PERIODICITY, SPAWNS TYPICALLY OCCURRED BETWEEN 1800 AND 2400; THE MEAN NUMBER OF EGGS PER SPAWN ALSO INCREASED. WHEN FISH WERE RETURNED TO CONSTANT CONDITIONS, CURRENT VELOCITY 8 CM S -1/1 AND 24 L:0 D FOR TWO WEEKS, THE FREQUENCY OF SPAWNING DECREASED AND THERE WAS NO INDICATION OF A SPAWNING PERIODICITY. RESULTS OF ANOTHER EXPERIMENT (DECREASED CURRENT VELOCITIES AT 1200-1300 AND 2400-0100 WITH 13 L:11 D LIGHT CYCLE) INDICATED GRADUAL EXPRESSION OF A TIDAL SPAWNING RHYTHM DURING NIGHTTIME, 2000-0359. OUR LABORATORY RESULTS INDICATE THAT M. PENINSULAE IS PREDOMINANTLY A NOCTURNAL SPAWNER AND THAT SPAWNING COINCIDES WITH DECREASED CURRENT VELOCITIES.

MIDDAUGH, DOUGLAS P., AND TORU TAKITA. 1983. TIDAL AND DIURNAL SPAWNING CUES IN THE ATLANTIC SILVERSIDE, MENIDIA MENIDIA. ENVIRON. BIOL. FISH. 8(2):97-104. (ERL,GB 150).

FIELD AND LABORATORY OBSERVATIONS REVEALED TIDAL AND DIURNAL CUES FOR SPAWNING IN THE ATLANTIC SILVERSIDE, MENIDIA MENIDIA. IN THE FIELD, SPAWNING RUNS BEGAN NEAR THE TIME OF DAYTIME HIGH TIDES AT FLOOD TIDE VELOCITIES RANGING FROM 3 TO 16, X 11 CM SEC -1. SPAWNING RUNS ENDED AT EBB TIDE VELOCITIES RANGING FROM 5 TO 22, X 17 CM SEC -1. IN THE LABORATORY M. MENIDIA WERE REARED FROM EMBRYOS TO SEXUAL MATURITY IN 10 MONTHS (APRIL 1979 TO JANUARY 1980). DURING THIS TIME, APPROXIMATELY 50 FISH WERE HELD IN EACH OF TWO, 1 M DIAMETER TANKS. A PUMP WAS USED TO MAINTAIN A CONSTANT CURRENT VELOCITY OF 8 CM SEC -1 IN THE HOLDING TANKS. WATER TEMPERATURE RANGED FROM 16 TO 25 DEGREES C , THE SALINITY WAS 30 PLUS OR MINUS 2 PPT. FISH WERE FED TETRA-MIN FLAKE FOOD AND ARTEMIA NAUPLII EACH DAY. DURING JANUARY 1980, THE SEAWATER CIRCULATION PUMP WAS TURNED OFF TWICE DAILY FOR ONE HOUR, 1200 TO 1300 AND 2400 TO 0100. CURRENT VELOCITIES DECREASED FROM 8 CM SEC -1 TO 0.0 CM SEC -1 DURING THESE PERIODS. M. MENIDIA HELD UNDER A 24 H LIGHT: O H DARL (24L:OD) PHOTOPERIOD SPAWNED FROM 1200 TO 1300 AND 2400 TO 0100 IN RESPONSE TO DECREASED CURRENT VELOCITIES. MODIFICATION OF THE PHOTOPERIOD TO 14L:10D (WITH THE CIRCULATING PUMP TURNED OFF FROM 1200 TO 1300 AND 2400 AND 0100) RESULTED IN SPAWNING BETWEEN 0500 AND 0600 IN RESPONSE TO "LIGHTS-ON" AND AT 1200 TO 1300 IN RESPONSE TO DECREASED CURRENT VELOCITIES. NO SPAWNING OCCURRED WHEN CURRENT VELOCITIES DECREASED TO 0.0 CM SEC -1 BETWEEN 0400 AND 0100 DURING DARKNESS.

MIX, MICHAEL C. 1983. CARCINOGENS AND NEOPLASIA IN INDIGENOUS POPULATIONS OF AQUATIC ORGANISMS: PROJECT SUMMARY (UNPUBLISHED). 3P. (ERL,GB X389).

SEVERAL SEPARATE STUDIES WERE CONDUCTED TO EXTEND RESULTS OBTAINED FROM PREVIOUS EPA-SPONSORED RESEARCH. INDIGENOUS BIVALVE-MOLLUSCS, BOTH FRESHWATER AND MARINE SPECIES, WERE EMPLOYED AS BIOMONITORS TO MEASURE BASELINE LEVELS OF ARSENIC, CADMIUM AND NICKEL IN AQUATIC SYSTEMS. RESULTS OF PREVIOUS STUDIES HAVE SHOWN THAT CLAMS, MUSSELS AND OYSTERS CONCENTRATE POLYNUCLEAR AROMATIC HYDROCARBONS (PAH) IN THEIR TISSUES. THEREFORE, EFFORTS WERE MADE TO DEVELOP SIMPLE METHODS THAT COULD BE USED TO ROUTINELY MEASURE PAH IN SEAWATER. FUTURE STUDIES WILL BE DIRECTED TOWARDS DETERMINING RELATIONSHIPS BETWEEN AMBIENT SEAWATER AND SHELLFISH TISSUE CONCENTRATIONS OF PAH. A MAJOR EFFORT WAS MADE TO ASSESS THE IMPORTANCE OF FOREST FIRES AND SLASH BURNING AS SOURCES OF PAH IN AQUATIC SYSTEMS. MOST BAYS AND ESTUARIES ALONG THE OREGON COAST HAVE WATERSHEDS IN WHICH SUCH FIRES ARE COMMON AND TRANSPORT OF PAH AWAY FROM BURNED SITES VIA WATER RUNOFF OR ATMOSPHERIC DEPOSITION MAY CONTRIBUTE TO THE PAH LOAD IN ADJACENT AQUATIC SYSTEMS. TWO SYSTEMS WERE DEVELOPED FOR TESTING POSSIBLE MUTAGENIC AND/OR TERATOGENIC EFFECTS OF ENVIRONMENTAL LEVELS OF PAH IN THE LABORATORY. THE FIRST IS A BIOASSAY SYSTEM IN WHICH CULTURED EGGS AND EMBRYOS OF THE GOOSENECK BARNACLE, POLLICIPES POLYMERUS, CAN BE EXPOSED TO NG QUANTITIES OF CONTAMINANTS OF INTEREST. SEVERAL PARAMETERS, INCLUDING ABNORMAL LARVAL DEVELOPMENT, CAN BE USED TO EVALUATE EXPOSURE EFFECTS. THE SECOND SYSTEM, EMPLOYING MAMMALIAN CELL CULTURES, WAS DESIGNED TO MEASURE THE INFLUENCE OF SIMULATED SUNLIGHT (290 NM)--IRRADIATED PAH ON CELL SURVIVAL AND THE REDUCTION OF SISTER CHROMATID EXCHANGES. STUDIES ARE ALSO MADE TO DETERMINE WHETHER OR NOT VIRUSES ARE ASSOCIATED WITH THE NEOPLASTIC DISORDERS OF MUSSELS, MYTILUS EDULIS, FROM YAQUINA BAY, OREGON. POSITIVE AND CONTROL MUSSELS WERE SUBJECTED TO NUMEROUS METHODS; NONE REVEALED THE PRESENCE OF AN RNA TUMOR VIRUS. DATA ON THE PREVALENCE OF NEOPLASTIC DISORDERS IN M. EDULIS WERE SUBJECTED TO EXTENSIVE STATISTICAL ANALYSES IN ORDER TO FORMULATE CONCLUSIONS ABOUT THE OCCURRENCE, PREVALENCE AND SEASONALITY OF THESE DISORDERS.

MIX, MICHAEL C., AND RANDY L. SCHAFFER. 1983. CONCENTRATIONS OF UNSUBSTITUTED POLYCYCLIC AROMATIC HYDROCARBONS IN SOFTSHELL CLAMS FROM COOS BAY, OREGON, USA. MAR. POLLUT. BULL. 14(3):94-97. (ERL,GB X388).

CONCENTRATIONS OF BENZO(A)PYRENE (BAP) WERE MEASURED IN SUBPOPULATIONS OF SOFTSHELL CLAMS, MYA ARENARIA, FROM FOUR INTERTIDAL SITES IN COOS BAY FROM JUNE 1976 TO JUNE 1978. SUBSEQUENTLY, CONCENTRATIONS OF 15 UNSUBSTITUTED POLYNUCLEAR AROMATIC HYDROCARBONS (PNAH) WERE DETERMINED IN TWO SUBPOPULATIONS FROM SEPTEMBER 1978 TO AUGUST 1979. THERE WERE SIGNIFICANT DIFFERENCES BETWEEN BAP CONCENTRATIONS IN CLAMS FROM THE FOUR SITES. FOR THE TWO-YEAR PERIOD, THEY WERE HIGHEST IN CLAMS INHABITING AREAS ADJACENT TO THE INDUSTRIALIZED BAYFRONT AND LOWEST IN CLAMS INHABITING MORE REMOTE AREAS. THERE WERE NO SIGNIFICANT SEASONAL VARIATIONS IN BAP CONCENTRATIONS DURING THIS PERIOD. DURING THE 1978-79 STUDY, THE AVERAGE TOTAL PNAH CONCENTRATION IN CLAMS FROM THE BAYFRONT AREA WAS 555.1 UG KG(-1) COMPARED TO 76.3 UG KG(-1) FOR CLAMS FROM A MORE REMOTE ENVIRONMENT. IN GENERAL, PNAH CONCENTRATIONS WERE LOWEST IN THE FALL-WINTER AND HIGHEST DURING THE SPRING-SUMMER.

MIX, MICHAEL C., AND RANDY L. SCHAFFER. 1983. CONCENTRATIONS OF UNSUBSTITUTED POLYNUCLEAR AROMATIC HYDROCARBONS IN BAY MUSSELS (MYTILUS EDULIS) FROM OREGON, USA. MAR. ENVIRON. RES. 9(4):193-209. (ERL,GB X397).

CONCENTRATION OF FIFTEEN UNSUBSTITUTED POLYNUCLEAR AROMATIC HYDROCARBONS (PNAH) WERE MEASURED IN MYTILUS EDULIS FROM TWO SITES IN YAQUINA BAY, OREGON, USA, DURING 1979-1980. THERE WERE SIGNIFICANT DIFFERENCES IN PNAH LEVELS BETWEEN THE TWO POPULATIONS. THE AVERAGE TOTAL CONCENTRATION IN MUSSELS INHABITING THE MORE INDUSTRIALIZED BAYFRONT WAS 986 X 2 UG/KG COMPARED WITH 273 X 9 UG/KG IN MUSSELS FROM A MORE REMOTE SITE ACROSS THE BAY. SUBSTANTIAL DIFFERENCES WERE FOUND IN THE CONCENTRATIONS OF DIFFERENT PNAH IN M. EDULIS EXAMINED DURING THIS STUDY. THE SMALLER, MORE WATER SOLUBLE, COMPOUNDS WERE CONCENTRATED TO ONE OR TWO ORDERS OF MAGNITUDE ABOVE THE LARGER, LESS SOLUBLE PNAH.

MIX, M.C. 1983. HAEMIC NEOPLASMS OF BAY MUSSELS, MYTILUS EDULIS, FROM OREGON: OCCURRENCE, PREVALENCE, SEASONALITY, AND HISTOPATHOLOGICAL PROGRESSION. J. FISH DIS. 6(3):239-248. (ERL,GB X379).

THE OCCURRENCE, PREVALENCE, SEASONALITY AND HISTOPATHOLOGICAL PROGRESSION OF A CELLULAR DISORDER, THOUGHT TO BE A HAEMIC NEOPLASM, WERE STUDIED IN SUBPOPULATIONS OF MYTILUS EDULIS INHABITING DIFFERENT SITES IN YAQUINA BAY, OREGON, FROM 1976-1981. THERE WERE SIGNIFICANT DIFFERENCES IN THE OCCURRENCE OF THE DISORDER THAT WERE RELATED TO GEOGRAPHICAL LOCATION. IN THE SUBPOPULATION WITH THE HIGHEST LEVELS OF THE DISEASE, THE PREVALENCE RATES RANGED FROM 0 TO 20% WITH A 5-YEAR MEAN OF 9.8%. THERE WAS A STATISTICIALLY SIGNIFICANT RELATIONSHIP BETWEEN PREVALENCE AND SEASON. DURING THE 5-YEAR STUDY PERIOD, THERE WAS A CONSISTENT PATTERN CHARACTERIZED BY HIGHEST PREVALENCES DURING JANUARY TO MARCH FOLLOWED BY A PERIOD OF DECLINE TO LOWER LEVELS DURING THE SUMMER AND EARLY AUTUMN, AFTER WHICH THERE WAS AN INCREASE. DATA ANALYSES REVEALED THAT THERE WAS NO SEASONAL HISTOPATHOLOGICAL PROGRESSION OF THE DISORDER. NUMBERS OF STAGE 1 (EARLY), 2, 3 AND 4 (ADVANCED) CASES WERE NOT RELATED TO SEASON BUT OCCURRED IN A RANDOM MANNER THROUGHOUT THE ENTIRE YEAR.

MIX, MICHAEL C. 1983. STUDIES ON POLYNUCLEAR AROMATIC HYDROCARBONS AND METALS IN MOLLUSCS (ABSTRACT). IN: WORKSHOP ON SUBLETHAL EFFECTS OF STRESS ON MARINE ORGANISMS, MARCH 30-31, 1982, ASILOMAR, PACIFIC GROVE, CALIFORNIA. MICHAEL MARTIN AND FLORENCE HARRISON, EDITORS, CONF-8203110, NTIS, SPRINGFIELD, VA. PP. 55. (ERL,GB X283*).

DURING THE PAST 5 YEARS, OUR RESEARCH HAS FOCUSED ON MEASURING LEVELS OF 15 UNSUBSTITUTED POLYNUCLEAR AROMATIC HYDROCARBONS (PNAH) AND CERTAIN METALS IN BIVALVE MOLLUSCS FROM INDIGENOUS POPULATIONS THAT INHABIT OREGON ESTUARIES. THE PRIMARY OBJECTIVES OF SOME OF THE MAJOR STUDIES WERE TO: (1) MEASURE CONCENTRATIONS OF PNAH AND METALS IN SHELL FISH FROM DIFFERENT LOCATIONS FOR AN EXTENDED PERIOD OF TIME IN ORDER TO ESTABLISH A DEPENDABLE BASELINE, (2) DETERMINE WHETHER OR NOT PNAH CONCENTRATIONS IN MOLLUSCS REFLECT THE DEGREE OF ENVIRONMENTAL CONTAMINATION, (3) EVALUATE SEASONAL VARIATIONS IN PNAH AND METAL CONCENTRATIONS IN MOLLUSCS, (4) DETERMINE WHETHER OR NOT THERE WERE STATISTICAL CORRELATIONS BETWEEN THE PRESENCE OF CELLULAR PROLIFERATIVE DISORDERS IN SUBPOPULATIONS OF MUSSELS (MYTILUS EDULIS) AND PNAH CONCENTRATIONS IN THEIR TISSUES, AND (5) DETERMINE WHETHER OR NOT CERTAIN STATISTICAL RELATIONSHIPS COULD BE USED FOR PREDICTIVE PURPOSES IN DETERMINING AND EVALUATING PNAH CONCENTRATIONS IN INDIGENOUS SHELLFISH. OUR DATA SUGGEST THAT A TWO OR THREE YEAR PERIOD IS REQUIRED TO ESTABLISH BASELINE LEVELS OF PNAH IN SHELLFISH. THERE WERE SIGNIFICANT CORRELATIONS BETWEEN PNAH CONCENTRATIONS IN MUSSELS, THE OCCURRENCE OF CELLULAR DISORDERS AND THE QUALITY OF THE ENVIRONMENT THEY INHABIT. THERE WERE SIGNIFICANT SEASONAL VARIATIONS IN BOTH PNAH AND METAL CONCENTRATIONS IN M. EDULIS. FINALLY, THE DATA FROM OUR STUDIES INDICATE THAT IT MAY BE POSSIBLE TO IDENTIFY SITE-SPECIFIC VARIABLES (INDIVIDUAL PNAH OR METALS) THAT CAN BE USED FOR ASSESSING PNAH CONCENTRATION IN THE ENVIRONMENT.

MONTI, CAROL A., ELLEN J. O'NEILL, PARMELY H. PRITCHARD, AL W. BOURQUIN, AND DONALD G. AHEARN. IN PREP. MODELING THE MOVEMENT OF KEPONE (CHLORDECONE) ACROSS AN UNDISTURBED SEDIMENT-WATER INTERFACE IN LABORATORY SYSTEMS. ENVIRON. SCI. TECHNOL. (ERL,GB 487).

LABORATORY TEST SYSTEMS, SUCH AS FLASKS AND MICROCOSMS, ARE FREQUENTLY USED TO EXAMINE THE INTERACTIONS BETWEEN POLLUTANTS AND SEDIMENT. WE STUDIED THE DISTRIBUTION OF RADIOLABELED KEPONE DISSOLVED IN CONTINUOUSLY FLOWING SEAWATER AND ADDED TO A SEDIMENT-WATER MICROCOSM. THE SEDIMENT WAS FRACTIONATED INTO LAYERS AND THE SORBED KEPONE CONCENTRATIONS WERE MEASURED TO DETERMINE TOXICANT PENETRATION INTO THE SEDIMENT. THE DATA WERE USED TO TEST WHETHER A MATHEMATICAL MODEL BASED ON INDEPENDENT FLASK STUDIES OF THE PROCESSES AFFECTING THE FATE OF KEPONE COULD ACCURATELY PREDICT THE DISTRIBUTION OF THE TOXICANT IN THE MICROCOSM SEDIMENT AND WATER. THE MODEL ACCURATELY DESCRIBED THE OBSERVED KEPONE DISTRIBUTION. MICROCOSMS, BY SIMULATING THE COMPLEXITY OF NATURAL ENVIRONMENTS, PROVIDED A USEFUL TOOL FOR EVALUATING THE ACCURACY OF MATHEMATICAL PREDICTIONS CONCERNING THE DISTRIBUTION OF A TOXICANT IN AQUATIC SYSTEMS.

MONTI, C., E. O'NEILL, D. AHEARN, P. PRITCHARD, AND A. BOURQUIN. 1983. MODELING THE MOVEMENT OF KEPONE ACROSS AN UNDISTURBED SEDIMENT-WATER INTERFACE IN LABORATORY SYSTEMS (ABSTRACT). PRESENTED AT THE SETAC MEETING, NOV. 6, 1983, WASHINGTON, DC. (ERL,GB 482).

THE PRESENCE OF SEDIMENTS IN AQUATIC ENVIRONMENTS HAS AN IMPORTANT EFFECT ON THE FATE OF MANY POLLUTING CHEMICALS. SIMPLE LABORATORY TEST SYSTEMS, SUCH AS SHAKE FLASKS, FREQUENTLY USED TO EXAMINE THE INTERACTION BETWEEN POLLUTANTS AND SEDIMENT. BECAUSE SHAKE FLASKS DO NOT INCORPORATE THE INHERENT COMPLEXITIES OF THE INTACT SEDIMENT-WATER INTERFACE, WE ALSO USED MICROCOSM SYSTEMS HAVING WATER OVERLYING SEDIMENT TO STUDY THE TRANSPORT OF TOXIC CHEMICALS. RADIOLABELED KEPONE WAS CHOSEN AS THE TEST COMPOUND BECAUSE OF ITS RESISTANCE TO DEGRADATION, LOW VOLATILITY AND EASE OF ANALYSIS. SHAKEN FLASKS CONTAINING FORMALIN STERILIZED SEDIMENT AND WATER WERE USED TO OBTAIN PARTITION VALUES FOR KEPONE. IN ADDITION, KEPONE WAS ADDED IN CONTINUOUSLY FLOWING SEAWATER TO FOUR IDENTICAL MICROCOSMS, EACH CONTAINING FORMALIN STERILIZED SEDIMENT AND WATER. EACH MICROCOSM RECEIVED KEPONE FOR DIFFERENT PERIODS OF TIME, RANGING FOR 100 TO 1200 HOURS. AT THE END OF EACH EXPOSURE PERIOD, THE MICROCOSM WAS DISASSEMBLED AND THE SEDIMENT WAS FRACTIONATED INTO LAYERS. THE SORBED KEPONE CONCENTRATION, ORGANIC CONTENT AND POROSITY WERE DETERMINED IN EACH LAYER. A MATHEMATICAL MODEL, UTILIZING A PARTITION COEFFICIENT DERIVED FROM THE FLASK STUDY, WAS USED TO SIMULATE KEPONE DISTRIBUTION OBSERVED IN THE MICROCOSMS. THE MODELS WAS CALIBRATED TO THE TOTAL SORBED KEPONE OF EACH MICROCOSMS TO QUANTIFY THE TRANSPORT RATE OF KEPONE ACROSS THE SEDIMENT-WATER INTERFACE. SIMULATION OF THE MICROCOSM RESULTS COULD NOT BE OBTAINED USING A CONSTANT TRANSPORT RATE. SIMULATION WAS OBTAINED USING A CALCULATED TRANSPORT RATE WHICH DECREASED WITH EXPOSURE TIME. USING THIS DECREASING TRANSPORT RATE THE MODEL PREDICTED THE SORBED TOXICANT DISTRIBUTION WITH DEPTH. THE DECREASE IN TRANSPORT RATE COULD HAVE BEEN CAUSED BY SEDIMENT COMPACTION, HOWEVER, NO MEASURABLE CHANGES OCCURRED IN POROSITY. THE RESULTS SHOW THAT PARTITION COEFFICIENT AND TRANSPORT RATES WERE SUFFICIENT TO DESCRIBE THE DISTRIBUTION OF KEPONE IN THE MICROCOSM SEDIMENT. SHAKE FLASK TESTS ARE ADEQUATE TO QUANTIFY SOME FATE PROCESSES SUCH AS PARTITION COEFFICIENT BUT ARE NOT SUFFICIENT TO DESCRIBE POLLUTANT MOMENT AND DISTRIBUTION. THIS STUDY DEMONSTRATES THE IMPORTANCE OF MEASURING THE TRANSPORT ACROSS THE SEDIMENT-WATER INTERFACE IF THE POLLUTANT FATE IS TO BE ADEQUATELY MODELED.

MOORE, JAMES C., DAVID J. HANSEN, RICHARD L. GARNAS, AND LARRY R. GOODMAN. IN PREP. SAND FILTRATION/ACTIVATED CARBON TREATMENT SYSTEM FOR REMOVING PESTICIDE RESIDUES FROM A MARINE TOXICOLOGY LABORATORY EFFLUENT. WATER RES. (ERL,GB 481).

FLOW-THROUGH TOXICITY TESTS USING MARINE ORGANISMS CAN GENERATE LARGE VOLUMES OF CONTAMINATED SEA WATER EFFLUENT WHICH SHOULD BE TREATED TO REMOVE THE CONTAMINANTS BEFORE DISCHARGE INTO THE ENVIRONMENT. WE HAVE DEVELOPED A SAND FILTRATION/ACTIVATED CARBON TREATMENT SYSTEM THAT REMOVES A DIVERSITY OF ORGANOPHOSPHATE, ORGANOCHLORINE AND PYRETHROID PESTICIDE RESIDUES FROM THESE EFFLUENTS. THE SAND FILTER REMOVES FROM 60 TO 97% OF THE CHEMICALS BY CONTINUOUSLY FILTERING SUSPENDED PARTICULATES AND ASSOCIATED CHEMICALS AS WELL AS BY FACILITATING PARTITIONING OF CHEMICALS FROM WATER TO ORGANIC MATERIAL IN THE SAND FILTER. FOLLOWING SAND FILTRATION, EFFLUENT WATER SLOWLY PERCOLATES THROUGH GRANULAR ACTIVATED CARBON. OVERALL, REMOVAL EFFICIENCIES EXCEED 90%. THE ORGANIC MATERIAL AND ASSOCIATED CHEMICALS ARE BACKWASHED FROM THE SAND WEEKLY, SEPARATED AND CONCENTRATED BY GRAVITY, AND PACKAGED FOR DISPOSAL. THIS SYSTEM HAS BEEN OPERATING EFFICIENTLY FOR OVER TWO YEARS, PROCESSING A MONTHLY AVERAGE OF 200,000 LITERS OF SEA WATER CONTAMINATED WITH 0.10 TO 100 UG OF PESTICIDES LITER(-1). INITIAL CONSTRUCTION COST WAS $16,300.00.

MUELLER, L.H., W. GILLIAM, A.W. BOURQUIN, AND P.H. PRITCHARD. IN PREP. FATE OF FENTHION IN SALT MARSH ENVIRONMENTS: RESULTS FROM A FIELD APPLICATION (ABSTRACT). TO BE PRESENTED AT THE MEETING OF THE SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY, CRYSTAL CITY, MD, NOV. 4-11, 1984. (ERL,GB 510).

THE ENVIRONMENTAL RELEVANCE OF LABORATORY DATA CAN, THEORETICALLY, BE ASSESSED BY EXAMINING THE FATE OF A CHEMICAL IN THE FIELD. THE EFFORT INVOLVED IN SUCH AN ASSESSMENT IS OFTEN UNDERESTIMATED, NOT ONLY BECAUSE OF THE LOGISTICAL AND CLIMATIC PROBLEMS ASSOCIATED WITH WORKING IN THE FIELD, BUT BECAUSE OF INSUFFICIENT INFORMATION NECESSARY TO PROPERLY INTERPRET FIELD RESULTS. THE COMMON USE OF THE ORGANOPHOSPHATE INSECTICIDE, FENTHION, IN SALT MARSH ENVIRONMENTS TO CONTROL MOSQUITO POPULATIONS GAVE US THE OPPORTUNITY TO ASSESS THE FATE OF THIS CHEMICAL UNDER CONDITIONS SIMILAR TO THOSE ACTUALLY USED TO KILL MOSQUITO LARVAE AND COMPARE THE RESULTS WITH LABORATORY DATA. FENTHION WAS APPLIED TO A FLORIDA GULF COAST SALT MARSH BY SPRAYING THE WATER SURFACE AND ALLOWING NATURAL MIXING TO DISTRIBUTE THE CHEMICAL WITHIN THE SALT MARSH SYSTEM. THE FIELD SITE CONSISTED OF A LONG, NARROW WATER BODY OF APPROXIMATELY .5 HECTARES SURROUNDED ON ALL SIDES BY JUNCUS ROEMERIANUS GRASS FLATS WHICH FLOODED PERIODICALLY, DEPENDING ON THE TIDAL FLUX. A NARROW PASSAGE, NORMALLY CONNECTING THE MARSH WITH SANTA ROSA SOUND, WAS TEMPORARILY SEALED DURING THE PESTICIDE APPLICATION. RHODAMINE WT, A FLUORESCENT DYE WHICH DOES NOT SORB TO SEDIMENTS OR PHOTOLYZE, WAS ADDED SIMULTANEOUSLY WITH THE FENTHION TO MEASURE LOSSES DUE TO DILUTION. CONCENTRATIONS OF DYE AND FENTHION, AFTER AN INITIAL 12-HOUR EQUILIBRIUM MIXING TIME, WERE 50 MICROGRAM/1 AND 25 MICROGRAM/1, RESPECTIVELY. CONCENTRATIONS OF BOTH CHEMICALS, AS MEASURED AT FIVE SAMPLING SITES, DECREASED EXPONENTIALLY WITH TIME, THE FENTHION DISAPPEARING MORE RAPIDLY THAN THE DYE. THE HALF-LIFE FOR FENTHION, EXCLUDING LOSSES DUE TO DILUTION, WAS ESTIMATED AT 25 HOURS. THESE RATES WERE FASTER THAN THOSE OBSERVED IN MICROCOSM STUDIES. PHOTOLYSIS MAY HAVE BEEN PARTLY RESPONSIBLE FOR THIS DIFFERENCE. A SECOND DOSING WITH THE PESTICIDE, WHEN THE WATER TEMPERATURE WAS 4-5 DEGREES C LOWER, RESULTED IN LOWER BIODEGRADATION RATES, SIMILAR TO THOSE PREDICTED IN LABORATORY STUDIES. PLEXIGLAS BOXES WERE PLACED IN THE MARSH TO ISOLATE A SECTION OF WATER AND SEDIMENT, AND REDUCE LOSSES DUE TO DILUTION. THESE BOXES INDICATED LOSS RATES SIMILAR TO THOSE NONDILUTIONAL LOSS RATES OBSERVED IN THE MAIN WATER BODY. SIGNIFICANT FENTHION AND DYE CONCENTRATIONS WERE DETECTED IN THE SEDIMENTS. DIFFUSION RATES (INCLUDING BIOTURBATION) DERIVED FROM MICROCOSM STUDIES WERE SUFFICIENT TO ACCOUNT FOR THE AMOUNT OF FENTHION DETECTED IN THE SALT MARSH SEDIMENT. OUR RESULTS INDICATE THAT DATA FROM MICROCOSMS WAS ESSENTIAL FOR INTERPRETATION OF FIELD DATA, BUT WAS NOT QUANTITATIVELY SIMILAR TO RESULTS IN THE FIELD. FURTHER EFFORTS ARE NEEDED TO ACCURATELY ESTABLISH THE METHODS FOR APPLYING LABORATORY DATA TO THE FIELD.

NEW ENGLAND AQUARIUM, BOSTON, MA. 1984. SURVEY OF THE TOXICITY AND CHEMICAL COMPOSITION OF USED DRILLING MUDS. EPA-600/X-84-083, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 109P.

CHEMICAL CHARACTERIZATION AND TOXICITY OF OIL DRILLING FLUIDS WERE INVESTIGATED BY EDGERTON RESEARCH LABORATORY FROM OCT. 1, 1979 TO AUG., 1983 AS PART OF A COMPREHENSIVE RESEARCH PROGRAM SPONSORED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY TO DETERMINE FATE AND EFFECTS OF SUCH FLUIDS IN THE MARINE ENVIRONMENT. DRILLING MUDS USED WERE SUPPLIED BY EPA, THE PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION, AND THE AMERICAN PETROLEUM INSTITUTE. THE DRILLING MUDS WERE DESIGNATED "MAY 15," "MAY 29," "SEPT. 4," "EXXON," "GILSON," "MOBILE BAY," "JAY FIELD," AND "PESA." INVESTIGATIONS DURING THE FIRST YEAR CENTERED ON THE CHEMICAL COMPOSITION AND ACUTE TOXICITY OF DRILLING MUDS, AND THE EFFECTS OF DRILLING MUDS ON RECRUITMENT OF BENTHIC ORGANISMS. IN THE SECOND YEAR, STUDIES FOCUSED ON TOXICITY TESTING WITH PLANKTONIC COPEPODS, CHEMICAL CHARACTIERIZATION OF TOXICITY TEST PHASES, BIOACCUMULATION STUDIES, AND EFFECTS OF MUDS ON LARVAL AND ADULT BENTHIC ORGANISMS. INVESTIGATIONS DURING THE THIRD AND FOURTH YEAR EXAMINED SUBLETHAL EFFECTS OF DRILLING FLUIDS ON CLAM LARVAE, TRACE METAL AND ORGANIC CONSTITUENTS IN BOTH DRILLING FLUIDS AND TOXICITY TEST-PHASES, AND PRELIMINARY DEVELOPMENT OF A DRILLING FLUID SOLID PHASE TOXICITY TEST. TOXIC COMPONENTS OF USED DRILLING MUDS TESTED WERE PRESENT AS DISSOLVED COMPONENTS OR ASSOCIATED WITH VERY SLOWLY SETTLING PARTICLES. SOME USED DRILLING MUDS CONTAINED LIPOPHILIC FRACTIONS THAT WERE SIMILAR TO HYDROCARBONS FOUND IN #2 FUEL OIL IN THE LIQUID FRACTION AND SUSPENDED PARTICULATES FRACTION AND CONTAINED #2 FUEL OIL IN WHOLE MUDS. MUDS THAT CONTAINED THOSE COMPONENTS WERE MORE TOXIC THAN THOSE THAT DID NOT. JUVENILE COPEPODS (ACARTIA TONSA) WERE NOT MORE SENSITIVE TO TOXIC DRILLING MUD SOLUTIONS THAN ADULTS OF THIS SPECIES. IN GENERAL, CANCER IRRORATUS LARVAE APPEARED TO EXHIBIT TOXICITY RESPONSES TO DRILLING MUDS THAT WERE SIMILAR TO COPEPODS TESTED. ARRESTED SHELL DEVELOPMENT INDUCED BY EXPOSURE TO DRILLING MUDS APPEARED TO BE A SENSITIVE INDICATOR OF STRESS IN BIVALVE LARVAE. TOTAL CHROMIUM CONCENTRATION SHOWED NO CORRELATION TO TOXICITY IN DRILLING MUDS THAT WERE TESTED; HOWEVER, THE HIGHEST CONCENTRATIONS OF CR(VI), THE MOST BIOLOGICALLY TOXIC FORM OF CHROMIUM, OCCURRED IN TEST PHASES THAT EXHIBITED THE GREATEST TOXICITY TO MERCENARIA MERCENARIA LARVAE. THE MUDS DESIGNATED "MAY 15" AND "SEPT. 4" APPEARED TO BE RELATIVELY NON-TOXIC TO PSEUDOPLEURONECTES AMERICANUS AND TO MENIDIA MENIDIA, ALTHOUGH THE "MAY 15" MUD WAS TOXIC TO NEOMYSIS AMERICANA AND TO ACARTIA TONSA. A STUDY OF EFFECTS OF DRILLING MUD ON INVERTEBRATE RECOLONIZATION OF DEFAUNATED SEDIMENT SHOWED THAT RECOLONIZATION DECREASED IN DRILLING MUD LAYERED ON TOP OF SEDIMENT WHEN MUDS WERE MIXED WITH SEDIMENTS. CAPITELLA CAPITATA WAS MUCH MORE NUMEROUS IN RECOLONIZATION SEDIMENTS THAT CONTAINED DRILLING MUD. TEST RESULTS SHOWED THAT METHODS USED TO PREPARE DRILLING MUD TEST MEDIA AFFECT THE APPARENT TOXICITY OF THE MUDS.

O'NEIL, ELLEN J., CAROL A. MONTI, PARMELY H. PRITCHARD, AL W. BOURQUIN, AND DONALD G. AHEARN. IN PREP. EFFECTS OF LUGWORMS AND SEAGRASS ON KEPONE (CHLORDECONE) DISTRIBUTION IN COMPLEX LABORATORY SYSTEMS. ENVIRON. SCI. TECHNOL. (ERL,GB 488).

LABORATORY SYSTEMS NEED TO INCORPORATE COMPLEX PROCESSES, SUCH AS BIOTURBATION AND PLANT SORPTION, TO PREDICT THE FATE OF A TOXICANT IN AN AQUATIC ENVIRONMENT. TWO EXPERIMENTS WERE DESIGNED TO STUDY THE INFLUENCE OF LUGWORMS (ARENICOLA CRISTATA) AND SEAGRASS (THALASSIA TESTUDINUM) ON KEPONE DISTRIBUTION IN SEDIMENT-WATER MICROCOSMS. RADIOLABELLED KEPONE WAS INTRODUCED INTO THESE CONTINUOUS-FLOW SYSTEMS, AND THE DISSOLVED AND SORBED CONCENTRATIONS WERE QUANTIFIED. LUGWORM ACTIVITY DECREASED THE KEPONE CONCENTRATION IN THE WATER AND INCREASED THE CONCENTRATION SORBED TO SEDIMENT. SEAGRASSES SLIGHTLY AFFECTED TOXICANT DISTRIBUTION BY DELAYING THE DISSOLVED CONCENTRATION EQUILIBRIUM. THE FATE OF KEPONE WAS INFLUENCED BY MORE COMPLEX PROCESSES THAN CAN BE CONSIDERED IN SIMPLE LABORATORY TESTS. SUCH PROCESSES MUST BE STUDIED IN MICROCOSMS TO ADEQUATELY PREDICT TOXICANT DISTRIBUTION IN NATURAL ECOSYSTEMS.

O'NEILL, E., C. MONTI, P. PRITCHARD, AND A. BOURQUIN. 1983. EFFECTS OF LUGWORMS AND SEAGRASS ON KEPONE DISTRIBUTION IN COMPLEX LABORATORY SYSTEMS (ABSTRACT). PRESENTED AT THE SETAC MEETING, NOV. 6, 1983, WASHINGTON, DC. (ERL,GB 484).

THE FATE OF MANY TOXIC CHEMICALS IN AQUATIC ENVIRONMENTS IS AFFECTED BY THEIR INTERACTION WITH SEDIMENT. TWO BIOTIC FACTORS WHICH COULD AFFECT THE DEGREE OF SEDIMENT INTERACTION ARE BIOTURBATING BENTHIC INVERTEBRATES AND THE PRESENCE OF VASCULAR AQUATIC PLANTS. THE EFFECTS OF THESE FACTORS ON FATE PROCESSES CAN BEST BE OBSERVED IN LABORATORY SYSTEMS WHICH SIMULATE THE COMPLEXITY OF NATURAL ENVIRONMENTS. EXPERIMENTS WERE CONDUCTED FOR THE PURPOSE OF STUDYING THE INFLUENCE OF LUGWORMS (ARENICOLA CRISTATA) AND SEAGRASSES (THALASSIA TESTUDINUM) ON POLLUTANT DISTRIBUTION IN ESTUARINE SEDIMENT-WATER SYSTEMS. KEPONE WAS CHOSEN AS THE TEST CHEMICAL BECAUSE ITS RESISTANCE TO DEGRADATION AND LOW VOLATILITY ENABLED A SIMPLIFIED ANALYSIS OF ITS TRANSPORT AND DISTRIBUTION. RADIOLABELED C(14) KEPONE WAS INTRODUCED CONTINUOUSLY INTO DUPLICATE GLASS VESSELS CONSISTING OF WATER OVERLYING A SEDIMENT BED CONTAINING LUGWORMS OR PLANTS. CHANGES IN THE DISSOLVED KEPONE CONCENTRATIONS WERE MONITORED DAILY FOR 16 DAYS. AT THE TERMINATION OF THE EXPERIMENTS, THE SEDIMENT WAS FRACTIONATED INTO LAYERS, AND RADIOACTIVITY ASSOCIATED WITH INTERSTITIAL WATER, SEDIMENT, LUGWORMS, AND SEAGRASSES (LEAVES, RHIZOMES, AND ROOTS) WAS MEASURED TO DETERMINE KEPONE DISTIBUTION. LUGWORM ACTIVITY SIGNIFICANTLY DECREASED THE KEPONE CONCENTRATION IN THE WATER AND INCREASED THE CONCENTRAION AND DEPTH OF KEPONE IN SEDIMENT. KEPONE BIOACCUMULATION IN THE WORMS WAS A MINOR FACTOR IN THE FINAL DISTRIBUTION. PLANT LEAF SURFACES SORBED KEPONE, BUT ONLY SLIGHTLY AFFECTED OVERALL TOXICANT DISTRIBUTION IN THE SYSTEMS. OUR RESULTS SUGGEST THAT BIOTURBATION MAY BE AN IMPORTANT PROCESS AFFECTING THE FATE OF POLLUTANTS IN SEDIMENT-WATER SYSTEMS. FURTHER QUANTITATIVE STUDIES ON THE EFFECTS OF BIOTURBATION MUST BE UNDERTAKEN TO ADEQUATELY PREDICT TOXICANT DISTRIBUTION IN NATURAL ECOSYSTEMS.

O'NEILL, E.J., C.R. CRIPE, L.H. MUELLER, AND P.H. PRITCHARD. IN PREP. FATE OF FENTHION IN SALT MARSH ENVIRONMENTS: TRANSPORT AND BIODEGRADATION IN MICROCOSMS (ABSTRACT). (ERL,GB 511).

FENTHION (BAYTEX), AN ORGANOPHOSPHATE INSECTICIDE, IS COMMONLY APPLIED TO SALT MARSH ENVIRONMENTS TO CONTROL MOSQUITO POPULATIONS. OTHER THAN DILUTION, BIODEGRADATION IS THE PRINCIPAL FATE PROCESS RESPONSIBLE FOR REDUCING EXPOSURE TO NONTARGET ORGANISMS. PREVIOUS STUDIES CONDUCTED IN OUR LABORATORY HAVE SHOWN THAT BIODEGRADATION OCCURS ONLY IN THE PRESENCE OF SEDIMENT. WE EXAMINED THE FATE OF FENTHION IN MICROCOSMS TO DEFINE THE INTERACTION BETWEEN SEDIMENT AND BIODEGRADATION IN THE FIELD. MICROCOSMS SIMULATED THE UNDISTURBED SEDIMENT BED OF A SALT MARSH AND THE AREAS CONTAINING JUNCUS ROEMERIANUS GRASS. INTACT SEDIMENT CORES, BOTH WITH AND WITHOUT JUNCUS, WERE REMOVED FROM THE SALT MARSH AND PLACED IN MICROCOSM VESSELS. SEDIMENT WAS THEN COVERED WITH SITE WATER EQUALING THE WATER DEPTH AT THE FIELD SITE. FENTHION AT A CONCENTRATION OF 200 MICROGRAM/1 WAS ADDED TO THE WATER. THE DISAPPEARANCE OF FENTHION WAS FOLLOWED BY EXTRACTING SUBSAMPLES WITH HEXANE AND QUANTITATING FENTHION BY GAS CHROMATOGRAPHY. TRITIATED WATER WAS ALSO ADDED TO THE MICROCOSMS TO MEASURE DIFFUSION RATES INTO SEDIMENTS. FENTHION DISAPPEARED EXPONENTIALLY FROM THE WATER COLUMN; A HALF-LIFE OF 42.3 HOURS WAS CALCULATED BASED ON FIRST-ORDER DECAY. DISAPPEARANCE OF FENTHION IN FORMALIN-STERILIZED MICROCOSMS HAD A HALF-LIFE OF 99.0 HOURS AND IN MICROCOSMS WITH PLANTS, DISAPPEARANCE WAS SLIGHTLY FASTER (HALF-LIFE OF 29.7 HOURS) WITHOUT PLANTS. AT THE END OF THE INCUBATION PERIODS, SEDIMENT CORES TAKEN FROM THE MICROCOSMS WERE FRACTIONATED, AND THE CONCENTRATION OF FENTHION AND TRITIUM IN EACH 1.0 CM SEGMENT WAS DETERMINED. FENTHION AND TRITIUM WERE FOUND AT GREATER DEPTHS IN NONSTERILE SYSTEMS THAN PREDICTED BY DIFFUSION AND SORPTION, POSSIBLY BECAUSE OF BIOTRUBATION. FENTHION APPEARED TO BE BIODEGRADED IN THE UPPER SEDIMENT LAYERS, BUT NOT IN THE LOWER LAYERS. DEGRADATION, HOWEVER, WAS MUCH SLOWER THAN PREDICTED FROM STANDARD SHAKE FLASK TESTS. DISTRIBUTION OF FENTHION IN SEDIMENT WAS NOT APPRECIABLY DIFFERENT BETWEEN MICROCOSMS WITH AND WITHOUT PLANTS. OUR RESULTS EMPHASIZE THE IMPORTANCE OF PROPERLY ASSESSING DIFFUSION RATES TO ACURATELY PREDICT FATE IN SEDIMENT-WATER MICROCOSMS. DIFFERENCES WERE ALSO OBSERVED BETWEEN BIODEGRADATION INFORMATION DERIVED FROM COMPLEX SYSTEMS VERSUS SIMPLE SYSTEMS.

PARKER, JEFFREY H., JANET S. NICKELS, ROBERT F. MARTZ, MICHAEL J. GEHRON, NORMAN L. RICHARDS, AND DAVID C. WHITE. 1984. EFFECT OF WELL-DRILLING FLUIDS ON THE PHYSIOLOGICAL STATUS AND MICROBIAL INFECTION OF THE REEF BUILDING CORAL MONTASTREA ANNULARIS. ARCH. ENVIRON. CONTAM. TOXICOL. 13(1):113-118. (ERL,GB X382).

THE REEF BUILDING CORAL MONTASTREA ANNULARUS WAS EXPOSED CONTINUOUSLY TO SUSPENSIONS OF OIL AND GAS-WELL DRILLING FLUIDS AT CONCENTRATIONS OF 0.1 ML LITER(-1), 0.01 ML LITER(-1), AND 0.0001 ML LITER(-1) IN FLOWING SEAWATER AT THE U.S. NAVAL STAGE I PLATFORM (30 DEGREES 7.5' N, 85 DEGREES 46.3' W). AFTER 6 WEEKS EXPOSURE, CORAL FRAGMENTS OF 12 TO 65 CM(2) SURFACE AREA WERE BROKEN OFF, RINSED IN SEAWATER, AND EXTRACTED IN A ONE-PHASE CHLOROFORM-METHANOL-BUFFER AND RETURNED TO THE LABORATORY. IN THE LABORATORY, THE EXTRACTION WAS COMPLETED AND THE PHASES SEPARATED. THE LIPIDS WERE FRACTIONATED USING SILICIC ACID AND THIN LAYER CHROMATOGRAPHY. TOTAL PHOSPHOLIPID, TRIGLYCERIDE GLYCEROL, TOTAL EXTRACTABLE FATTY ACIDS, TRIGLYCERIDE FATTY ACIDS AS WELL AS THE ESTER FATTY ALCOHOLS SHOWED NO CONSISTENT CHANGES WITH EXPOSURE TO THE DRILLING FLUIDS. CHANGES IN FREE AMINO ACID CONCENTRATIONS WERE EXTRACTED AS WELL AS SIGNIFICANT DECREASES IN THE RECOVERABLE DIACYL PHOSPHOLIPID. SIGNIFICANT INCREASES IN PLASMALOGEN PHOSPHOLIPIDS APPEARED WITH EXPOSURE. INCREASES IN PLASMALOGEN PHOSPHOLIPIDS ARE CONSISTENT WITH INFECTION BY ANAEROBIC FERMENTING BACTERIA WHICH CAN INDICATE DISEASE. THIS EVIDENCE SUGGESTS THAT BIOCHEMICAL INDICATORS OF INFECTION WITH ANAEROBIC BACTERIA MAY BE USEFUL AS SENSITIVE MARKERS FOR POLLUTION-INDUCED CHANGES IN REEF BUILDING CORALS AND THUS FOR MONITORING THE HEALTH OF CORAL REEFS.

PATTON, JOHN S., AND JOHN A. COUCH. IN PRESS. CAN TISSUE ANOMALIES THAT OCCUR IN MARINE FISH IMPLICATE SPECIFIC POLLUTANT CHEMICALS?. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 474).

THE ADVANTAGE OF USING TISSUE ABNORMALITIES IN WILD FISH AS A MEASURE OF FISH HEALTH IS THAT THE ABNORMALITY, UNLIKE SENSITIVE BIOCHEMICAL ANOMALIES, CANNOT BE SAID TO HAVE OCCURRED DURING CAPTURE OR TRANSPORT TO THE LAB. IT USUALLY TAKES HOURS, DAYS, WEEKS, AND SOMETIMES EVEN MONTHS FOR ABNORMAL TISSUE PATHOLOGIES TO DEVELOP. THE RESEARCHER CAN BE CONFIDENT THAT SOME FACTOR IN THE FIELD CAUSED THE ABNORMALITY. WHEN AN ABNORMAL FISH IS CAPTURED, LOGICAL QUESTIONS APPEAR AT FOUR DIFFERENT LEVELS: 1) WHAT IS THE STRUCTURE OF MORPHOLOGY OF THE ABNORMALITY? MANY SCHOLARLY ARTICLES BY HISTOPATHOLOGISTS DESCRIBE IN DETAIL TISSUE ANOMALIES OBSERVED IN FIELD SPECIMENS. AT THIS LEVEL THE FOCUS IS ON THE PATHOLOGY ITSELF. 2) WHAT IS THE INCIDENCE OF THE PATHOLOGY IN THE POPULATION? HOW MANY ARE AFFLICTED, OLD OR YOUNG, MALE OR FEMALE? HERE THE FOCUS IS ON THE SPECIES POPULATION. 3) CAN THE INCIDENCE OF A FISH DISEASE BE LINKED TO ENVIRONMENTAL POLLUTION? HERE THE FOCUS IS ON CORRELATING PATHOLOGY WITH POLLUTION. 4) WHAT FACTOR OR FACTORS (CHEMICAL, PHYSICAL, AND/OR BIOLOGICAL) CAUSED THE PATHOLOGY IN THE POLLUTED WATERS? THIS IS PROBABLY THE MOST DIFFICULT QUESTION TO ANSWER AND THE SUBJECT OF THIS PAPER. ANSWERS TO THE FIRST THREE QUESTIONS MUST BE FOUND BEFORE ATTEMPTS CAN BE MADE AT ANSWERING THE FOURTH. IF A SPECIFIC FISH DISEASE CAN BE LINKED TO A SPECIFIC XENOBIOTIC, THEN A ANOTHER TIER OF QUESTIONS ARISES. 5) WHAT IS THE SIGNIFICANCE OF THIS TO HUMAN HEALTH AND WELL BEING? IS A FOOD SOURCE DIMINISHED, ARE HUMANS INGESTING FISH CONTAINING TOXIC CHEMICALS? WHAT IS THE AESTHETIC/ECONOMIC COST VERSUS THE INDUSTRIAL/ECONOMIC GAIN OF HAVING CONTINUED POLLUTION? ANSWERS TO THESE QUESTIONS ARE BEYOND THE SCOPE OF THIS PAPER. THIS PAPER WILL FOCUS ON THE QUESTION - ARE THERE POLLUTANT SPECIFIC PATHOLOGIES IN MARINE FISH?

PIZZA, JOHN C., AND JOSEPH M. O'CONNOR. 1983. PCB DYNAMICS IN HUDSON RIVER STRIPED BASS. II. ACCUMULATION FROM DIETARY SOURCES. AQUAT. TOXICOL. 3(4):313-327. (ERL,GB 096).

YOUNG-OF-YEAR STRIPED BASS WERE ADMINISTERED KNOWN DOSES OF C(14)-LABELED AROCLOR 1254 IN NATURAL FOOD (GAMMARUS TIGRINUS) BY GAVAGE. PCB ACCUMULATION FOR THE GUT AND ELIMINATION FROM THE WHOLE-BODY WERE DETERMINED EMPIRICALLY FOR SINGLE-DOSE AND MUTLIPLE-DOSE STUDIES. THE DATA HAVE BEEN APPLIED TO MODELS DESCRIBING ABSORPTION SITE KINETICS AND FLUCTUATIONS IN WHOLE-BODY BURDEN AT 'STEADY SITE'. THOSE VARIABLES CRITICAL OF THE CALCULATION AND UNDERSTANDING OF BIOACCUMULATION FACTORS, NAMELY GROWTH, METABOLIC RATE, AND DOSE, ARE DISCUSSED IN THE CONTEXT OF THE KINETIC MODEL RESULTS.

PIZZA, JOHN C. 1983. PHARMACOKINETICS AND DISTRIBUTION OF DIETARY POLYCHLORINATED BIPHENYLS (PCBS) IN HUDSON RIVER STRIPED BASS, MORONE SAXATILIS. PH.D. DISSERTATION. NEW YORK UNIVERSITY. 109P. (ERL,GB X478).

THIS WORK DESCRIBES THE DIETARY ACCUMULATION OF AROCLOR 1254 BY YOUNG-OF-YEAR HUDSON RIVER STRIPED BASS (MORONE SAXATILIS). THE FISH RECEIVED 14C-PCB IN LIVE DIET. THE FOOD ORGANISM, GAMMARUS TIGRINUS, WAS RADIOLABELED BY 24 HR STATIC EXPOSURE AT 10 UG/L.

POWELL, E.N., J.J. KENDALL, S.J. CONNER, C.E. ZASTROW, AND T.J. BRIGHT. IN PRESS. EFFECT OF EIGHT OUTER CONTINENTAL SHELF DRILLING MUDS ON THE CALCIFICATION RATE AND FREE AMINO ACID POOL OF THE CORAL ACROPORA CERVICORNIS. BULL. ENVIRON. CONTAM. TOXICOL. (ERL,GB X477).

POWELL, E.N., S.J. CONNOR, J.J. KENDALL, C.E. ZASTROW, AND T.J. BRIGHT. 1984. RECOVERY BY THE CORAL ACROPORA CERVICORNIS AFTER DRILLING MUD EXPOSURE. THE FREE AMINO ACID POOL. ARCH. ENVIRON. CONTAM. TOXICOL. 13(2):243-258. (ERL,GB X462*).

CORALS WERE EXPOSED TO DRILLING MUD FOR 24 HR AND THEN ALLOWED TO RECOVER FOR 48 HR IN CLEAN SEAWATER. DEPENDING ON THE CONCENTRATION AND THE MUD USED, EXPOSURE PRODUCED EITHER AN INCREASE OR DECREASE IN FREE AMINO ACID (FAA) POOL SIZE. ASPARTATE WAS AFFECTED TO A GREATER DEGREE THAN OTHER AMINO ACIDS. NO CLEAR INSTANCE OF RECOVERY COULD BE ASCERTAINED AFTER 48 HR IN CLEAN SEAWATER. IN SEVERAL CASES, CORALS, APPARENTLY UNAFFECTED BY A 24 HR EXPOSURE, NEVERTHELESS SUFFERED SIGNIFICANT CHANGES IN THE FAA POOL DURING THE 48 HR RECOVERY PERIOD. THUS, THE DEGREE OF TOXICITY OF THE DRILLING MUD COULD NOT BE ACCURATELY PREDICTED FROM THE 24 HR EXPOSURE DATA. IN MANY CASES, THE CHOICE OF NORMALIZING PARAMETER DETERMINED WHETHER TWO SETS OF DATA WERE SIGNIFICANTLY DIFFERENT OR NOT ACCURATE EFFECTS ASSESSMENT DEPENDS ON A COMPARISON OF NORMALIZATION TO CONFIRM STATISTICAL RESULTS.

PRITCHARD, P., J. CONNOLLY, T. MAZIARZ, E. CLEVELAND, R. CRIPE, AND A.W. BOURQUIN. IN PREP. APPLICATION OF MICROCOSM STUDIES TO VERIFY CHEMICAL FATE ASSESSMENTS; COMPARISONS OF THE FATE OF METHYL PARATHION IN SEDIMENT-WATER SYSTEMS. WATER RES. (ERL,GB 453).

THIS PAPER REPORTS ON THE FATE OF AN ORGANOPHOSPHATE PESTICIDE, METHYL PARATHION, IN A SALT MARSH MICROCOSM AS A REPRESENTATION OF THE 'STATE-OF-THE-WHOLE' AND ATTEMPTS TO DEMONSTRATE THE EFFICACY OF DATA FROM SIMPLE LABORATORY TESTS, USING A MATHEMATICAL MODEL TO DESCRIBE THIS FATE. TESTING THE ADEQUACY OF THIS DESCRIPTION WILL REPRESENT AN INITIAL EXERCISE IN DETERMING IF A SYSTEM-CENTERED APPROACH TO EXPOSURE ASSESSMENT IS REALLY NECESSARY.

PRITCHARD, P.H. 1984. FATE AND EFFECTS OF POLLUTANTS: FATE OF ENVIRONMENTAL POLLUTANTS. J. WATER POLLUT. CONTROL FED. 56(6):718-725. (ERL,GB 514).

PRITCHARD, P.H., C.R. CRIPE, W.W. WALKER, J.C. SPAIN, AND A.W. BOURQUIN. IN PREP. FATE OF METHYL PARATHION IN WATER AND SEDIMENT TEST SYSTEMS FROM FRESHWATER AND ESTUARINE SITES. APPL. ENVIRON. MICROBIOL. (ERL,GB 513).

VARIATIONS IN THE DEGRADATION RATE OF METHYL PARATHION IN A SHAKE-FLASK TEST WERE DETERMINED UNDER BIOTIC AND ABIOTIC CONDITIONS, USING WATER AND SEDIMENT/WATER SUSPENSIONS OBTAINED FROM THIRTEEN SAMPLING SITES IN TWO GULF COAST ESTUARIES. VARIABILITY IN DEGRADATION RATES AT TWO SITES, RANGE POINT, FL, AND DAVIS BAYOU, MS, WAS ASSESSED OVER A THREE-YEAR PERIOD. STATISTICAL ANALYSIS OF THE RATES INDICATED THAT BIOLOGICAL DEGRADATION OF METHYL PARATHION IN THE PRESENCE OF SEDIMENT WAS THE MOST IMPORTANT DETERMINANT AND THAT BIOLOGICAL DEGRADATION ASSOCIATED WITH WATER AND ABIOTIC SEDIMENT-ENHANCED DEGRADATION WAS INSIGNIFICANT. BIODEGRADATION RATES IN THE PRESENCE OF SEDIMENT WERE SIGNIFICANTLY DIFFERENT BETWEEN THE TWO PRIMARY SITES, WITH THE RANGE POINT MEAN RATE APPROXIMATELY FIVE-FOLD GREATER THAN THE DAVIS BAYOU MEAN RATE. ONLY TWO OF THE OTHER SITES EXHIBITED A DEGRADATION RATE SIMILAR TO RANGE POINT; ALL OTHER SITES HAD RATES APPROXIMATELY THE SAME AS DAVIS BAYOU. COLONY-FORMING UNITS DID NOT CORRELATE WITH WATER OR SEDIMENT-ASSOCIATED BIODEGRADATION RATES. NO SEASONAL DIFFERENCES IN DEGRADATION RATES EXISTED AT EITHER OF THE PRIMARY SITES FOR ANY TREATMENT. THE RESULTS REVEAL GEOGRAPHIC VARIATIONS IN DEGRADATION RATES AND THUS INDICATE THE NECESSITY FOR STUDYING SITE-SPECIFIC DEGRADATION RATES FOR TOXIC COMPOUNDS. THE RESULTS SUGGEST THAT A VARIATION IN BIODEGRADATION RATES MAY NOT BE AS HIGH AS EXPECTED (BASED ON THE HETEROGENEITY OF MICROBIAL COMMUNITIES) AND, AT LEAST FOR METHYL PARATHION IN SEDIMENTS, ALL RATES CAN BE SUBDIVIDED INTO A MINIMUM OF TWO GROUPINGS.

PRITCHARD, P.H., AND A.W. BOURQUIN. IN PRESS. MICROBIAL TOXICITY STUDIES. IN: FUNDAMENTALS OF AQUATIC TOXICOLOGY: METHODS AND APPLICATIONS. GARY RAND AND S.R. PETROCELLI, EDITORS, PERGAMON PRESS, INC., ELMSFORD, NY. (ERL,GB 471).

THIS CHAPTER CITES EXAMPLES OF THE COMMON METHODS USED TO DETERMINE THE TOXICITY OF CHEMICALS TO BACTERIA. IT COVERS ONLY THE MOST COMMON METHODS, PARTICULARLY THOSE THAT ARE EASY TO PERFORM. NUMEROUS LITERATURE CITATIONS HAVE BEEN INCLUDED TO HELP ILLUSTRATE HOW A METHOD IS USED AND WHERE ITS ADVANTAGES AND DISADVANTAGES LIE. THE INFORMATION PRESENTED HERE IS NOT A COMPLETE SURVEY, BUT RATHER AN AID TO UNDERSTANDING OF CURRENT METHODS USED IN THE FIELD OF MICROBIAL TOXICOLOGY. TOXICITY OF CHEMICALS TO BACTERIA IS DISCUSSED RELATIVE TO THE ORGANISMS GROWTH AND METABOLISM. EXAMPLES ARE GIVEN OF METHODS INVOLVING HETEROTROPHIC ACTIVITY, GEOCHEMICAL CYCLING, AND DECOMPOSITION PROCESSES. IN ADDITION, APPLICATION OF TOXICITY STUDIES TO UNIQUE BACTERIAL PROCESSES AND HABITATS ARE DISCUSSED.

PRITCHARD, P.H., AND C.R. CRIPE. IN PREP. MICROCOSM SYSTEM TO MODEL THE FATE AND EFFECTS OF P-CRESOL AND OTHER POLLUTANTS IN LOTIC STREAM ECOSYSTEMS. LIMNOL. OCEANOGR. (ERL,GB 469).

A TANK-TYPE MICROCOSM WAS DESIGNED TO SIMULATE THE RIFFLE AND POOL AREAS OF A LOTIC ECOSYSTEM. CONDITIONS OF NATURAL TURBULENCE AND PHYSICAL INTEGRITY WERE PRESERVED. WATER COLUMN MIXING WAS OPTIMIZED. INTACT SECTIONS OF THE STREAM INCLUDING ASSOCIATED PERIPHYTON, MACROPHYTES AND INVERTEBRATES WERE TRANSPORTED TO MICROCOSMS USING TRAYS. CALIBRATION OF THE MICROCOSM'S BEHAVIOR WITH THE FIELD IS DEMONSTRATED WITH STUDIES INVOLVING THE FATE AND EFFECT OF A TOXICANT, P-CRESOL.

PRITCHARD, P.H., AND A.W. BOURQUIN. IN PREP. PERSPECTIVE ON THE ROLE OF MICROCOSMS IN ENVIRONMENTAL FATE AND EFFECTS ASSESSMENTS. IN: PROCEEDINGS OF CONFERENCE ON MEANINGFUL MEASURES OF MARINE POLLUTION EFFECTS, APRIL 26-29, 1982, PENSACOLA BEACH, FL. U.S. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION. (ERL,GB 468).

THIS PAPER ATTEMPTS TO ILLUSTRATE HOW MICROCOSM STUDIES INTERFACE WITH BOTH WASTE ASSIMILATIVE CAPACITY DETERMINATIONS (REGARDLESS OF THE APPROACH TAKEN OR ENDPOINTS SELECTED) AND OTHER LESS QUANTITATIVE TYPES OF ASSESSMENTS.

PRITCHARD, P.H., AND A.W. BOURQUIN. 1984. USE OF MICROCOSMS FOR EVALUATION OF INTERACTONS BETWEEN POLLUTANTS AND MICROORGANISMS. IN: ADVANCES IN MICROBIAL ECOLOGY, VOLUME.7. C. C. MARSHALL, EDITOR, PLENUM PRESS, NEW YORK, NY. PP. 133-215. (ERL,GB 477*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB83-217802.

MICROCOSMS OR MODERN ECOSYSTEM STUDIES ARE DESCRIBED AND EVALUATED AS TOOLS TO ASSESS THE RESPONSE OF A MICROBIAL COMMUNITY TO A POLLUTANT RELEASED IN THE ENVIRONMENT. PRECAUTIONS AND POTENTIALS ARE DISCUSSED REGARDING THE POTENTIIAL ROLE OF MICROCOSMS IN RISK ASSESSMENT OF ENVIRONMENTAL HAZARDS, AND THEIR CAPABILITY TO PREDICT THE FATE AND EFFECTS OF ORGANIC COMPOUNDS IN AQUATIC ENVIRONMENTS.

PRITCHARD, P.H., C.R. CRIPE, A.W. BOURQUIN, AND W.W. WALKER. IN PREP. VARIABILITY OF BIODEGRADATION RATES OF PESTICIDES IN WATER/SEDIMENT SYSTEMS. TO BE PRESENTED AT THE 5TH ANNUAL SETAC MEETING, NOV. 4-7, 1984, ARLINGTON, VA. (ERL,GB 515).

THREE HERBICIDES, TWO FUNGICIDES, FIVE ORGANOPHORPHORUS INSECTICIDES, AND ONE MITICIDE (ACARCIDE) WERE CHARACTERIZED WITH RESPECT TO DEGRADATION RATE UNDER BIOTIC AND ABIOTIC CONDITIONS IN ESTUARINE WATER AND SEDIMENT/WATER SYSTEMS USING A SIMPLE SHAKE-FLASK TEST. DECAY RATES FOR EACH CHEMICAL COULD GENERALLY BE DESCRIBED BY A FIRST-ORDER MODEL. THE DEGRADATION OF METHYL PARATHION, HOELON, BRAVO, BOLSTAR, FENTHION, AND BOLERO WAS BIOLOGICALLY MEDIATED. THE FASTEST BIODEGRADATION RATES OCCURRED WHEN SEDIMENT WAS PRESENT. THE DEGRADATION OF TRIFLURALIN, DURSBAN, PHORATE, EPN, AND PENTACHLORONITROBENZENE WERE PRIMARILY BY ABIOTIC MEANS. RELATIVE TO THE OTHER TEST MATERIALS, PHORATE AND HOELON DEGRADED RAPIDLY; DURSBAN WAS THE MOST PERSISTENT; AND EPN, BRAVO, PENTACHLORONITROBENZENE, TRIFLURALIN, AND BOLSTAR REFLECTED INTERMEDIATE DEGRADATION RATES. VARIABILITY IN RATES FROM REPLICATE FLASKS SUGGESTED THAT A DIFFERENCE IN RATE WITHIN TREATMENTS (STERILE/ACTIVE, WITH AND WITHOUT SEDIMENTS) OF A FACTOR OF TWO OR LESS WAS PROBABLY NOT SIGNIFICANT. DEGRADATION RATES OF METHYL PARATHION IN SHAKE-FLASK TESTS WERE DETERMINED USING WATER AND SEDIMENT OBTAINED FROM THIRTEEN SAMPLING SITES TO EXAMINE SITE-SPECIFIC VARIABILITY. VARIABILITY IN DEGRADATION RATES AT TWO SITES (RANGE POINT, FL, AND DAVIS BAYOU, MS) WAS ASSESSED OVER A THREE-YEAR PERIOD. STATISTICAL ANALYSIS OF THE RATES INDICATED THAT BIOLOGICAL DEGRADATION OF METHYL PARATHION IN THE PRESENCE OF SEDIMENT WAS THE MOST IMPORTANT DETERMINANT AND THAT BIOLOGICAL DEGRADATION ASSOCIATED WITH WATER AND ABIOTIC SEDIMENT-ENHANCED DEGRADATION WAS INSIGNIFICANT. BIODEGRADATION RATES IN THE PRESENCE OF SEDIMENT WERE SIGNIFICANTLY DIFFERENT BETWEEN THE TWO PRIMARY SITES, WITH THE RANGE POINT MEAN RATE APPROXIMATELY FIVEFOLD GREATER THAN THE DAVIS BAYOU MEAN RATE. ONLY TWO OF THE OTHER SITES EXHIBITED A DEGRADATION RATE SIMILAR TO RANGE POINT; ALL OTHER SITES HAD RATES APPROXIMATELY THE SAME AS DAVIS BAYOU. COLONY-FORMING UNITS DID NOT CORRELATE WITH WATER OR SEDIMENT-ASSOCIATED BIODEGRADATION RATES. NO SEASONAL DIFFERENCES IN DEGRADATION RATES EXISTED AT EITHER OF THE PRIMARY SITES FOR ANY TREATMENT. THE RESULTS REVEAL GEOGRAPHIC VARIATIONS IN DEGRADATION RATES AND THUS INDICATE THE NECESSITY FOR STUDYING SITE-SPECIFIC DEGRADATION RATES FOR TOXIC COMPOUNDS. THIS SUGGESTS THAT A VARIATION IN BIODEGRADATION RATES MAY NOT BE AS HIGH AS EXPECTED (BASED ON THE HETEROGENEITY OF MICROBIAL COMMUNITIES) AND, AT LEAST FOR METHYL PARATHION IN SEDIMENTS, ALL RATES CAN BE SUBDIVIDED INTO A MINIMUM OF TWO GROUPINGS.

PRONI, JOHN R. 1983. FINAL REPORT ON THE FLOWER GARDENS BANK DRILLING FLUIDS PROJECT (UNPUBLISHED). 13P. (ERL,GB X175*).

THE FLOWER GARDNES BANK PROJECT, A JOINT ENDEAVOR OF THE ENVIRONMENTAL PROTECTION AGENCY (EPA) AND THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) WAS UNDERTAKEN WITH THE PRINCIPAL OBJECTIVE OF DETERMINING WHETHER OR NOT DRILLING FLUIDS RELEASED TO THE OCEAN IN DRILLING OIL WELLS COULD OR COULD NOT REACH A PORTION OF THE FLOWER GARDEN BANKS UPON WHICH GROW CORALS OF A SPECIFIC TYPE OR TYPES. A SECOND PRINCIPAL OBJECTIVE WAS TO DETERMINE IF DRILLING FLUIDS OR COMPONENTS OF DRILLING FLUIDS COULD REACH THE CORALS WHAT EXPECTED CONCENTRATIONS MIGHT BE ATTAINED. THE PROJECT WAS ENVISIONED TO BE FIVE YEARS IN DURATION AND POSSIBLY LONGER. HOWEVER, AFTER TWO YEARS OF OPERATION FUNDS WERE ABRUPTLY CUT-OFF. A RELATIVELY MODEST AMOUNT OF FUNDING WAS THEN PROVIDED FOR SALVAGING THAT WORK WHICH HAD BEEN DONE AND FOR WINDING THE PROJECT DOWN. ONE KEY ELEMENT IN THIS PROJECT WAS THE PROVISION OF DISCHARGES OF DRILLING FLUIDS INTO THE OCEAN. PROVISION OF THESE DISCHARGES WHICH WAS NOT UNDER THE CONTROL OF EITHER THE EPA OR NOAA PROVED TO BE QUITE DIFFICULT. THERE WERE SEVERAL REASONS FOR THE DIFFICULTIES. OIL COMPANIES WERE NOT CERTAIN WHEN A PARTICULAR WELL WAS TO DISCHARGE; ADVANCE NOTICE FOR A DISCHARGE FOR A GIVEN WELL WAS AT BEST TENS OF HOURS. THIS ADVANCE DISCHARGE NOTICE TIME IS INCOMPATIBLE WITH SHIP SCHEDULING WHICH MUST BE DONE WEEKS IF NOT MONTHS OR EVEN YEARS IN ADVANCE. THIS PROBLEM OF WELL DISCHARGE WAS HIGHLIGHTED WHEN ON ONE OCCASION A NOAA SHIP, THE RESEARCHER, SPENT FOUR WEEKS IN GULF OF MEXICO, AT A COST TO NOAA OF $15,000 A DAY, WITHOUT OBTAINING AN OPPORTUNITY TO STUDY A SINGLE DISCHARGE. THREE COOPERATIVE DISCHARGES WERE OBTAINED DURING THE LIMITED EXTENT OF THE PROJECT. IN ORDER TO SATISFY THE OBJECTIVES OF THIS PROJECT STATED IN THE INTRODUCTORY PARAGRAPH A RELIABLE MEANS OF DETECTING AND TRACKING DRILLING FLUIDS DISCHARGED INTO THE OCEAN NEEDED TO BE DEVELOPED. CHEMICAL, PARTICULATE ANALYSIS AND ACOUSTICAL TECHNIQUES WERE DEVELOPED AND EMPLOYED. ALSO TO SATISFY THE OBJECTIVES AN UNDERSTANDING OF THE PATHWAYS BY WHICH DRILLING FLUIDS COULD REACH THE BANKS WAS REQUIRED; THIS IMPLIED THE NEED FOR HYDROGRAPHIC AND ACOUSTICAL MEASUREMENTS. THE CHEMICAL PROGRAM WAS HEADED BY DR. JOHN H. TREFRY OF THE FLORIDA INSTITUTE OF TECHNOLOGY WHILE THE ACOUSTICS, HYDROGRAPHY AND OVERALL ANALYSIS OF THE DATA WAS DONE BY DR. JOHN R. PRONI OF NOAA. MANY ADDITIONAL SUB-GOALS AND QUESTIONS APPEARED DURING THE COURSE OF THIS PROJECT AS IT WAS REALIZED HOW LITTLE WAS UNDERSTOOD ABOUT DRILLING FLUID DISPERSAL. ONE OF THESE SUB-GOALS WAS DETERMINING WHETHER OR NOT WATER COLUMN STRUCTURE COULD INFLUENCE THE TRANSPORT OF DRILLING FLUIDS AND IN PARTICULAR DID HORIZONTAL DENSITY STRATA EXIST WHICH MIGHT SERVE AS CONDUITS FOR PORTION OF THE DISCHARGE PLUME TO THE CORALS? WE SHALL SEE PRESENTLY THAT SIGNIFICANT RESULTS WERE OBTAINED DESPITE THE SEVERE CURTAILMENT OF THE PROJECT.

RAO, K. RANGA, AND DANIEL G. DOUGHTIE. IN PRESS. HISTOPATHOLOGICAL CHANGES IN GRASS SHRIMP EXPOSED TO CHROMIUM, PENTACHLOROPHENOL, AND DITHIOCARBAMATES. IN: RESPONSES OF MARINE ANIMALS TO POLLUTANTS. J. HEATH AND J. STEGEMAN, EDITORS, ELSEVIER/APPLIED SCIENCE PUBLISHERS. (ERL,GB X435).

THIS REPORT DEALS WITH THE HISTOPATHOLOGICAL/ULTRASTRUCTURAL CHANGES IN VARIOUS TISSUES OF GRASS SHRIMP PALAEMONETES PUGIO) EXPOSED TO HEXAVALENT AQUATREAT DNM-30 (15% SODIUM DIMETHYL DITHIOCARBAMATE PLUS 15% DISODIUM ETHYLENE BISDITHIOCARBAMATE) AND BUSAN-85 (50% POTASSIUM DIMETHYL DITHIOCARBAMATE). THE PATHOLOGICAL ALTERATIONS INDUCED BY DITHIOCARBAMATES AND PCP WERE MOST SEVERE AND FIRST EVIDENT IN THE GILLS OF THE BIOCIDES TESTED, THE DITHIOCARBAMATES CAUSED THE MOST EXTENSIVE BRANCHIAL DAMAGE--THE SO CALLED BLACK GILL SYNDROME, INVOLVING EARLY MELANIZATION AND EVENTUAL LAMELLAR TRUNCATION. HEXAVALENT CHROMIUM, ON THE OTHER HAND, DID NOT INDUCE MARKED CHANGES IN THE GILLS, BUT IT CAUSED INVASIVE MELANIZED CUTICULAR LESIONS (PARTICULARLY AT THE ARTICULATIONS OF THE PEREIOPODS, PLEOPODS, AND ABDOMINAL SEGMENTS). ADDITIONALLY CHROMIUM CAUSED APPARENT LABYRINTH HYPOACTIVITY IN THE ANTENNAL GLANDS, WHEREAS THE DITHIOCARBAMATES SEEMED TO INDUCE LABYRINTH HYPERACTIVITY. HEPATOPANCREATIC HISTOPATHOLOGY WAS MORE SEVERE IN SHRIMP EXPOSED TO CHROMIUM AND PCP THAN IN DITHIOCARBAMATE-EXPOSED SHRIMP. THE APPARENT MITOTIC ACTIVITY IN THE HEPATOPANCREAS WAS INCREASED IN AQUATREAT-EXPOSED SHRIMP AND SUPPRESSED IN CHROMIUM-EXPOSED SHRIMP; MANY MITOTIC FIGURES IN THE LATTER CASE WERE ABNORMAL. ALL FOUR COMPOUNDS CAUSED VARYING DEGREES OF MIDGUT EPITHELIAL HYPERTROPHY, CYTOPLASMIC VACUOLIZATION, AND DIMINUTION OF BASAL TUBULAR ENDOPLASMIC RETICULUM, BUT ONLY PCP CAUSED WIDESPREAD RUPTURE OF MIDGUT EPTITHELIAL CELL APICES. ADDITIONAL NOTABLE ULTRASTRUCTURAL ANOMALIES INCLUDED: MITOCHONDRIAL COMPARTMENTALIZATION IN PCP-EXPOSED SHRIMP; MITOCHONDRIAL FUSION IN DITHIOCARBAMATE-EXPOSED SHRIMP. THESE PATHOLOGICAL CHANGES POINT TO DIFFERENCES IN THE MECHANISMS OF POLLUTANT TOXICITY AND INDICATE THEIR POTENTIAL USE IN THE BIOLOGICAL MONITORING OF AQUATIC POLLUTANTS.

RAO, K. R., AND P. J. CONKLIN. IN PRESS. MOLT-RELATED SUSCEPTIBILITY AND REGENERATIVE LIMB GROWTH AS SENSITIVE INDICATORS OF AQUATIC POLLUTANT TOXICITY TO CRUSTACEANS. IN: PROCEEDINGS INDO-U.S. CONFERENCE ON LIFE HISTORIES OF BENTHIC MARINE INVERTEBRATES. (ERL,GB X472).

RAO, K. R., P. J. CONKLIN, AND D. G. DOUGHTIE. IN PRESS. PHYSIOLOGICAL AND HISTOPATHOLOGICAL EVALUATION OF THE TOXICITY OF HEXAVALENT CHROMIUM TO THE GRASS SHRIMP PALAEMONETES PUGIO. IN: POLLUTION AND PHYSIOLOGY OF MARINE ANIMALS. F.J.VERNBERG, A. CALABRESE, F.P. THURBER, AND W.B. VERNBERG, EDITORS, UNIVERSITY OF SOUTH CAROLINA PRESS. (ERL,GB X473).

REISH, DONALD J., PHILIP S. OSHIDA, FRANK G. WILKES, ALAN J. MEARNS, THOMAS C. GINN, AND ROBERT SCOTT CARR. 1984. FATE AND EFFECTS OF POLLUTANTS: EFFECTS ON SALTWATER ORGANISMS. J. WATER POLLUT. CONTROL FED. 56(6):758-780. (ERL,GB 414).

REISH, DONALD J., GILL G. GEESEY, FRANK G. WILKES, PHILLIP S. OSHIDA, ALAN J. MEARNS, STEVEN S. ROSSI, AND THOMAS C. GINN. 1983. MARINE AND ESTUARINE POLLUTION. J. WATER POLLUT. CONTROL FED. 55(6):767-787. (ERL,GB 464).

THE SYMPOSIUM PROCEEDINGS ON THE USE AND PROTECTION OF SAN FRANCISCO BAY WERE PUBLISHED. SPECIAL CONSIDERATIONS WERE GIVEN TO WASTE DISPOSAL PROBLEMS IN THE BAY, SHIPPING, AND PROTECTION OF THE SHORELINE. THE BIENNIAL REPORT OF THE SOUTHERN CALIFORNIA COASTAL RESEARCH PROJECT INCLUDED DISCUSSIONS OF THE CONTAMINANTS IN THESE COASTAL WATERS, TOXICOLOGICAL STUDIES ESPECIALLY DEALING WITH DETOXIFICATION, AND BENTHIC POPULATIONS. THE U.S. DEPARTMENT OF COMMERCE PUBLISHED FIVE ANNOTATED BIBLIOGRAPHIES ON THE TOXIC EFFECTS OF PESTICIDES ON NON-TARGET ORGANISMS, INCLUDING MARINE SPECIES. PAPERS ON THE MAJOR COASTAL POLLUTION PROBLEMS ADDRESSED DURING THE DECADE WERE EDITED BY DUKE. EACH PAPER DESCRIBED ISSUES, THEIR SIGNIFANCE, STATE OF THE KNOWLEDGE, PROGRESS THROUGH THE DECADE, AND RESEARCH NEEDS FOR THE FUTURE.

RICHARDSON, LEONARD B., DENNIS T. BURTON, RONALD M. BLOCK, AND ANN M. STAVOLA. 1983. LETHAL AND SUBLETHAL EXPOSURE AND RECOVERY EFFECTS OF OZONE-PRODUCED OXIDANTS ON ADULT WHITE PERCH (MORONE GMELIN). WATER RES. 17(2):205-213. (ERL,GB X370*).
AVAIL. FROM NTIS, SPRINGFIELD, VA: PB83-223644.

ADULT WHITE PERCH (MORONE AMERICANA), ACCLIMATED TO 15 DEGREES CELSIUS, WERE EXPOSED TO A SERIES OF OZONE-PRODUCED OXIDANT (OPO) CONCENTRATIONS FOR 96 H USING CONTINUOUS FLOW BIOASSAY TECHNIQUES. TOXICITY DATA WERE ANALYZED USING BOTH RESPONSE SURFACE MODELING AND STANDARD PROBIT REGRESSION. WHITE PERCH WERE ALSO EXPOSED TO A SERIES OF NEAR AND SUBLETHAL OPO CONCENTRATIONS, SELECTED FROM THE ACUTE TOXICITY STUDY, FOR 96 H AND THEN PLACED IN CLEAN NON-OZONATED WATER FOR 14 DAYS. BLOOD PH, HEMATOCRIT AND GILL HISTOPATHOLOGY WERE ANALYZED DURING EXPOSURE AT 24, 48 AND 96 H AND AFTER 4 DAYS IN THE RECOVERY PERIOD. BLOOD PH AND HEMATOCRIT LEVELS WERE ANALYZED STATISTICALLY USING STANDARD ANOVA AND MULTIPLE RANGE TESTS. HIISTOPATHOLOGICAL EFFECTS WERE EXAMINED USING BOTH LIGHT MICROSCOPY AND SCANNING ELECTRON MICROSCOPY. THE 24-, 48 AND 96-H LC50'S WERE 0.38, 0.26 AND 0.20 MG OPO 1(-1), RESPECTIVELY. BLOOD PH WAS SIGNIFICANTLY REDUCED AT CONCENTRATIONS GREATER THAN OR EQUAL TO 0.15 MG OPO 1(-1) BUT NOT AT 0.10 MG 1(-1) OR LOWER CONCENTRATIONS. HEMATOCRIT SIGNIFICANTLY INCREASED AT CONCENTRATIONS GREATER THAN OR EQUAL TO 0.10 MG OPO 1(-1). HISTOPATHOLOGICAL EXAMINATION REVEALED MINIMAL EFFECTS ON GILL TISSUE AT 0.01 MG OPO 1(-1), MODERATE EPITHELIAL SLOUGHING AND HEAVY MUCUS PRODUCTION AT 0.05 MG OPO 1(-1) AND EXTREME TISSUE DAMAGE AT CONCENTRATIONS GREATER THAN OR EQUAL TO 0.10 MG 1(-1). RESULTS FROM BOTH THE ACUTE TOXICITY AND THE EXPOSURE AND RECOVERY STUDY WERE COMPARED WITH THE EFFECTS OF CHLORINE-PRODUCED OXIDANTS (CPO) OBTAINED FROM THE LITERATURE. BOTH OPO AND CPO APPEAR TO HAVE SIMILAR EFFECTS ON ADULT WHITE PERCH.

RUBINSTEIN, N.I., E. LORES, AND N.R. GREGORY. 1983. ACCUMULATION OF PCB, MERCURY AND CADMIUM BY NEREIS VIRENS, MERCENARIA MERCENARIA AND PALAEMONETES PUGIO FROM CONTAMINATED HARBOR SEDIMENTS. AQUAT. TOXICOL. (AMST.). 3(3):249-260. (ERL,GB 452).

ACCUMULATION OF POLYCHLORINATED BIPHENYLS (PCBS), MERCURY, AND CADMIUM BY SANDWORMS (NEREIS VIRENS), HARD CLAMS (MERCENARIA MERCENARIA) AND GRASS SHRIMP (PALAEMONETES PUGIO) EXPOSED TO CONTAMINATED SEDIMENTS FROM FOUR SITES IN NEW YORK HARBOR WAS STUDIED FOR A 100-DAY PERIOD. OF THE THREE CONTAMINANTS MONITORED, ONLY PCBS WERE FOUND TO BIOACCUMULATE ABOVE BACKGROUND (CONTROL) CONCENTRATIONS. SMALL INCREASES IN PCB BODY BURDEN WERE DETECTED IN M. MERCENARIA AND P. PUGIO, WHEREAS HIGHER CONCENTRATIONS WERE MEASURED IN N. VIRENS. UPTAKE WAS AFFECTED BY THE ORGANIC CONTENT OF THE SEDIMENT. BIOACCUMULATION FACTORS (CONCENTRATION IN TISSUE/CONCENTRATION IN SEDIMENT) FOR N. VIRENS RANGED FROM 1.59 IN A LOW ORGANIC SEDIMENT TO 0.15 IN A HIGH ORGANIC SEDIMENT. RESULTS FROM THIS STUDY SUPPORT THE CONTENTION THAT SEDIMENT CONCENTRATION ALONE DOES NOT REFLECT BIOAVAILABILITY AND THAT TOXICITY TESTS (BIOASSAYS) AND FIELD MONITORING REMAIN THE MOST DIRECT METHOD FOR ESTIMATING BIOACCUMULATION POTENTIAL OF SEDIMENT-BOUND CONTAMINANTS.

RUBINSTEIN, N. I., W. T. GILLIAM, AND N. R. GREGORY. IN PRESS. DIETARY ACCUMULATION OF PCBS FROM A CONTAMINATED SEDIMENT SOURCE BY A DEMERSAL FISH SPECIES (LEIOSTOMUS XANTHURUS). AQUATIC TOXICOLOGY. (ERL,GB 485).

ACCUMULATION AND DIETARY TRANSFER OF PCBS FROM CONTAMINATED HARBOR SEDIMENTS WAS STUDIED IN A LABORATORY FOOD CHAIN CONSISTING OF SEDIMENTS, POLYCHAETES AND A PREDATORY FISH. RESULTS INDICATE THAT CONTAMINATED SEDIMENTS CAN SERVE AS A SOURCE OF PCBS FOR UPTAKE AND TROPHIC TRANSFER IN MARINE SYSTEMS. FISH EXPOSED TO PCB CONTAMINATED SEDIMENTS AND FED A DAILY DIET OF POLYCHAETES FROM THE SAME SEDIMENT ACCUMULATED MORE THAN TWICE THE PCB WHOLE BODY RESIDUES THAN FISH EXPOSED TO THE SAME SEDIMENT BUT FED UNCONTAMINATED POLYCHAETES. FOLLOWING 20 DAYS OF FEEDING THE DIETARY CONTRIBUTION OF PCBS ACCOUNTED FOR 53& OF THE TOTAL BODY BURDEN MEASURED IN FISH AND THIS PERCENTAGE APPEARED TO BE INCREASING.

RUBINSTEIN, N.I., W.T. GILLIAM, AND N.R. GREGORY. 1983. EVALUATION OF THREE FISH SPECIES AS BIOASSAY ORGANISMS FOR DREDGED MATERIAL TESTING. EPA-600/X-83-062, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 22P.

THE OBJECTIVE OF THIS STUDY WAS TO EVALUATE SEVERAL MARINE FISH SPECIES IN TERMS OF THEIR ACUTE SENSITIVITY TO MODERATELY CONTAMINATED SEDIMENTS AND THEIR POTENTIAL FOR BIOACCUMULATION OF POLYCHLORINATED BIPHENYL (PCB), A UBIQUITOUS ORGANIC CONTAMINANT. SEELYE ET AL. (1982) HAVE PREVIOUSLY EXAMINED ACCUMULATION OF CONTAMINANTS RELEASED FROM DREDGED SEDIMENTS IN A FRESHWATER FISH SPECIES (PERCA FLAVESCENS). CONSIDERATIONS FOR BIOASSAY SPECIES SELECTION: A RATIONALE TO AID IN SELECTION OF APPROPRIATE BIOASSAY ORGANISMS WAS DEVELOPED BY SHUBA ET AL. (1981). THEIR LIST OF SELECTION FACTORS INCLUDE: 1). THE ORGANISM IS FOUND AT, OR IS RELATED TO, SPECIES AT THE DISPOSAL SITE; 2). THE ORGANISM IS READILY AVAILABLE THROUGHOUT THE YEAR, EITHER THROUGH FIELD COLLECTION OR PURCHASING; 3). A TOXICOLOGICAL DATA BASE EXISTS FOR THE SPECIES; 4). THE ORGANISM CAN BE MAINTAINED IN A HEALTH CONDITION IN THE LABORATORY; 5). THE ORGANISM IS CULTURABLE IN THE LABORATORY; 6). THE ORGANISM OCCURS OVER A WIDE GEOGRAPHIC AREA; AND 7). THE ORGANISM IS ECONOMICALLY OR ECOLOGICALLY IMPORTANT OR BOTH. ADDITIONAL FACTORS THAT APPLY TO SPECIES SELECTED FOR BIOACCUMULATION STUDIES ARE: THE ORGANISM SHOULD ACCUMULATE THE POLLUTANT WITHOUT EXCESSIVE MORTALITY AT CONCENTRATIONS FOUND IN THE ENVIRONMENT AND THE ORGANISM SHOULD BE OF ADEQUATE SIZE FOR TISSUE ANALYSIS (D.J.H. PHILLIPS, 1980). THREE SPECIES THAT MEET THE SELECTION CRITERIA ARE THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS), THE KILLIFISH (FUNDULUS SIMILIS) AND THE ATLANTIC SILVERSIDE (MENIDIA MENIDIA. THESE SPECIES WERE SELECTED FOR STUDY AND TESTED WITH DREDGED MATERIAL TAKEN FROM NEW YORK HARBOR. IT WAS OUR INTENTION TO EVALUATE THESE ORGANISMS FROM THE PERSPECTIVE OF A CONTRACTING LABORATORY REQUIRED TO USE STANDARD METHODS AND TO APPLY RECOMMENDED PROCEDURES FOR DREDGED MATERIAL EVALUATION (EPA/CE, 1977).

SCHATTEN, GERALD, CALVIN SIMERLY, AND HEIDE SCHATTEN. IN PRESS. EFFECTS OF BARIUM SULFATE ON SEA URCHIN FERTILIZATION AND EARLY DEVELOPMENT. IN: WASTES IN THE OCEAN, VOLUME 3. JOHN WILEY & SONS, INC., NEW YORK, NY. (ERL,GB X427).

FERTILIZATION AND DEVELOPMENT OF SEA URCHINS OFFER AN UNRIVALED SYSTEM TO STUDY THE CELLULAR CONSEQUENCES OF EXOGENOUS IONS. AT FERTILIZATION, A VARIETY OF EVENTS OCCUR, INCLUDING THE ACROSOME REACTION OF THE SPERM, THE CORTICAL REACTION OF THE EGG, SPERM INCORPORATION, THE UNION OF THE SPERM AND EGG NUCLEI WITHIN THE EGG CYTOPLASM, BIOELECTRIC CHANGES, THE ESTABLISHMENT OF THE BLOCK TO POLYSPERMY AND THE ACTIVATION OF THE METABOLISM OF THE FERTILIZED EGG. THESE EVENTS REQUIRE A COMPLEX REPERTOIRE OF ENZYMATIC AND STRUCTURAL CHANGES IN CELLULAR BEHAVIOR AND ARE REGULATED BY IONIC FLUXES, PARTICULARLY BY CHANGES IN INTRACELLULAR CALCIUM CONCENTRATION. BARIUM, A DIVALENT CATION, MIGHT BE EXPECTED TO MIMIC CALCIUM IN THIS MARINE SYSTEM AND TO INTERFERE WITH THE CELLULAR AND DEVELOPMENTAL EVENTS NORMALLY REGULATED BY CALCIUM FLUXES. GAMETES FROM THE GULF COAST SEA URCHINS LYTECHINUS VARIEGATUS AND ARBACIA PUNCTULATA WERE STUDIED BY LIGHT, ELECTRON AND TIME-LASPE VIDEO MICROSCOPY TO EVALUATE THE INTERFERENCE BY BARIUM SULFATE WITH NORMAL FERTILIZATION AND DEVELOPMENT. IN BARIUM SULFATE CONCENTRATIONS ABOVE 1 MILLIMOLAR, ALL THE NORMAL EVENTS AT FERTILIZATION WERE DRASTICALLY REDUCED; AT 10 MILLIMOLAR BARIUM SULFATE, ZERO PERCENT FERTILIZATION AND DEVELOPMENT WERE NOTED. THESE RESULTS INDICATE THAT HIGH CONCENTRATIONS (GREATER THAN 1 MMOL) OF BARIUM SULFATE CAN INTERFERE WITH NORMAL FERTILIZATION AND DEVELOPMENT OF SEA URCHINS AT SITES THAT ARE USUALLY REGULATED BY CALCIUM IONS.

SCHIMMEL, STEVEN C., RICHARD L. GARNAS, JAMES M. PATRICK, JR., AND JAMES C. MOORE. 1983. ACUTE TOXICITY, BIOCONCENTRATION, AND PERSISTENCE OF AC 222, 705, BENTHIOCARB, CHLORPYRIFOS, FENVALERATE, METHYL PARATHION, AND PERMETHRIN IN THE ESTUARINE ENVIRONMENT. J. AGRIC. FOOD CHEM. 31(1):104-113. (ERL,GB 186).

SIX PESTICIDES WERE EVALUATED IN LABORATORY STUDIES TO DETERMINE: ACUTE (96-H) TOXICITY, OCTANOL/WATER PARTITION COEFFICIENTS (LOG P), SOLUBILITY, AND PERSISTENCE IN SEAWATER. IN ADDITION, THREE OF THE SIX PESTICIDES (SYNTHETIC PYRETHROIDS) WERE TESTED USING THE EASTERN OYSTER (CRASSOSTREA VIRGINICA) IN LONG-TERM (28 DAYS) TESTS TO DETERMINE THEIR RESPECTIVE BIOCONCENTRATION FACTORS (BCF). ACUTE TOXICITY TESTS PROVIDED THE FOLLOWING DECREASING ORDER OF TOXICITY TO ESTUARINE CRUSTACEANS AND FISHES: AC 222, 705; FENVALERATE, PERMETHRIN, CHLORPYRIFOS, METHYL PARATHION, AND BENTHIOCARB. THE ESTUARINE MYSID (MYSIDOPSIS BAHIA) WAS CONSISTENTLY THE MOST SENSITIVE SPECIES, WITH LC50 VALUES AS LOW AS 0.008 MG/L. THE SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS) WAS GENERALLY THE LEAST SENSITIVE (RANGE OF LC50 VALUES = 1.1 TO 1,370 MG/L). LOG P VALUES AND PESTICIDE HALF-LIVES IN SEDIMENT-WATER SYSTEMS WERE INVERSELY RELATED TO SOLUBILITY IN SEAWATER. THE FOLLOWING ARE THE INCREASING ORDER OF LOG P VALUES (RANGE, 1.8 TO 6.5) AND PESTICIDE HALF-LIVES (RANGE, 1.2 TO 34 DAYS) AND DECREASING ORDER OF SOLUBILITY (RANGE, 1000 TO 24 MG/L): METHYL PARATHION, BENTHIOCARB, CHLORPYRIFOS, AC222, 705, FENVALERATE, AND PERMETHRIN. THE STEADY-STATE BCFS OF THE THREE SYNTHETIC PYRETHROIDS WERE: 1,900 FOR PERMETHRIN: 2,300 FOR AC 222, 705: 4,700 FOR FENVALERATE. AFTER TERMINATION OF THE EXPOSURE, EACH INSECTICIDE WAS DEPURATED BY OYSTERS TO NON-DETECTABLE CONCENTRATIONS WITHIN ONE WEEK.

SCHOOR, W. PETER, ELSAYED ELNENAEY, AND BARRIE TAN. IN PREP. BENZO(A)PYRENE METABOLISM IN 3-METHYCHOLANTHRENE-TREATED SEA CATFISH. (ERL,GB 384).

THE LIVER MICROSOMAL FRACTIONS OF 3-METHYLCHOLANTHRENE-TREATED SEA CATFISH WERE INCUBATED WITH BENZO(A)PYRENE AND THE RESULTING METABOLITES IDENTIFIED USING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY. USING TWO DIFFERENT TEMPERATURES FOR THE METABOLIC REACTIONS, IT WAS FOUND THAT TWICE THE AMOUNT OF METABOLITES WERE OBTAINED AT 37 DEGREES CELSIUS AS COMPARED TO 25 DEGREES CELSIUS. THE METABOLITES IDENTIFIED WERE (T)-9,10-DIHYDROXY-9,10-DIHYDRO-BENZO(A)PYRENE, 7,8-DIHYDRO-BENZO(A)PYRENE-7,8-OXIDE, (T)-7,8-DIHYDROXY-7,8-DIHYDRO-BENZO(A)PYRENE, 4,5-DIHYDRO-BENZO(A)PRENE-4,5-OXIDE, 1,6-,6,12-,3,6-BENZO(A)PYRENE QUINONES, 5-,6-,9-,7-,1- AND 3-HYDROXY-BENZO(A)PYRENE.

SCHOOR, W. PETER. 1984. BENZO[A]PYRENE METABOLISM IN MARINE FISH AND SOME ANALYTICAL ASPECTS OF ITS METABOLITES. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 391-396. (ERL,GB 454).

IN INTERSPECIES COMPARISONS OF BENZO[A]PYRENE METABOLISM, STANDARDIZED PROCEDURES IN THE ANALYSIS OF THE METABOLITES MUST BE ESTABLISHED. TECHNICAL PROBLEMS ARISING IN METABOLITE ANALYSIS ARE DISCUSSED, AND DATA ARE PRESENTED SHOWING THE ACTIVITIES OF THE MIXED FUNCTION OXYGENASE AND TRANSFERASE SYSTEMS IN PHENOBARBITAL- AND 3-METHYLCHOLANTHRENE-INDUCED MULLET AND KILLIFISH.

SCHOOR, W. PETER, AND CHARLES L. MCKENNEY. 1983. DETERMINATION OF FENVALERATE IN FLOWING-SEAWATER EXPOSURE STUDIES. BULL. ENVIRON. CONTAM. TOXICOL. 30(1):84-92. (ERL,GB 434).

FENVALERATE (PYDRIN)2 IS A PYRETHROID WHICH WHEN PRESENT IN THE WATER AT LOW CONCENTRATIONS APPEARS TO BE HIGHLY TOXIC TO CRUSTACEANS, REPORTED 96-H LC-50 VALUES ARE 0.14 UG/L FOR LOBSTER (HOMARUS AMERICANUS) AND 0.04 UG/L FOR SHRIMP (CALLINECTES SEPTEMSPINOSA) IN STATIC TESTS (MCLEESE ET AL. 1980) AND 0.002 UG/L FOR GRASS SHRIMP LARVAE (PALAEMONETES PUGIO) IN FLOW-THROUGH TESTS (TYLER MCKENNEY, PERS. COMM.). SINCE THE 0.002 UG/L VALUE WAS BASED ON NOMINAL RATHER THAN MEASURED CONCENTRATIONS, AND ESTABLISHED METHODS WERE NOT SENSITIVE ENOUGH, (BUCK ET AL. 1980; CHAPMANN HARRIS 1978; HILL 1981; LEE ET AL. 1978; PAPADOPOULOU-MOURKIDOU ET AL. 1980; WSZOLEK ET AL. 1980; HORIBA ET AL. 1980A,B; HORIBA ET AL. 1980), A METHOD FOR THE ANALYSIS OF FENVALERATE AT LOW CONCENTRATIONS IN SEAWATER WAS DEVELOPED. FENVALERATE HAS TWO CENTERS OF CHIRALITY AND THEREFORE EXISTS AS A MIXTURE OF FOUR STEREOISOMERS, TWO OF WHICH ARE DIASTEREOISOMERS, THE OTHER TWO ARE THE CORRESPONDING ENANTIOMERS.

SCHOOR, W. PETER, AND MEERA SRIVASTAVA. 1983. EFFECTS OF TRICHLOROPROPENE OXIDE ON THE METABOLISM OF BENZO(A)PYRENE BY 3-METHYLCHOLANTHRENE- AND PHENOBARBITAL-TREATED MULLET (MUGIL CEPHALUS), A MARINE FISH (ABSTRACT). IN: PROGRAM AND ABSTRACTS OF FIRST INTERNATIONAL SYMPOSIUM ON FOREIGN COMPOUND METABOLISM, OCT. 30 THRU NOVEMBER 4, 1983, WEST PALM BEACH, FLORIDA. (ERL,GB 490).

MARINE FISH, MULLET (MUGIL CEPHALUS), WERE TREATED WITH 3-METHYLCHOLANTHRENE (3-MC) AND PHENOBARBITAL (PB) BY INTRAPERITONEAL INJECTION, AND THE EFFECTS OF TRICHLOROPROPENE OXIDE (TCPO), AN INHIBITOR OF EPOXIDE HYDRATASE ACTIVITY, ON THE METABOLISM OF BENZO(A)PYRENE (BAP) BY ISOLATED LIVER MICROSOMES WERE EVALUATED. THE MOST SINGIFICANT EFFECT FOUND WAS AN INCREASE IN THE OXIDATION OF BAP AT THE BAY REGION (POSITION 9 AND 10) IN FISH WHICH WERE PRETREATED WITH 3-MC AND PB. NO SIGNIFICANT DIFFERENCES WERE FOUND IN THE METABOLIC PATTERNS OF 3-MC- AND PB-TREATED FISH. WHEN METABOLITE PATTERNS OF THE DIHYDRODIOLS IN THE PRESENCE AND ABSENCE OF TCPO WERE COMPARED, THE PREDICTED SHIFTS WERE OBSERVED IN CONTROL AS WELL AS 3-MC- AND PB-TREATED ANIMALS. COMPARISON OF METABOLITE PATTERNS IN THE PRESENCE OF TCPO SHOWED DISTINCT DIFFERENCES BETWEEN CONTROL AND 3-MC- AND PB-TREATED ANIMALS. NO SIGNIFICANT DIFFERENCE IN METABOLITE PATTERNS WERE FOUND BETWEEN 3-MC- AND PB-TREATED ANIMALS IN EITHER PRESENCE OR ABSENCE OF TCPO. COMPARISON TO MAMMALIAN DATA SHOWED THE INDUCTION-RELATED METABOLITE PATTERN IN FISH TO BE VERY SIMILAR TO THAT FOUND IN RATS.

SCHOOR, W. PETER, AND MEERA SRIVASTAVA. 1983. INDUCTION OF MFO IN MULLET LIVER MICROSOMES: EFFECT OF NADPH ON BENZO(A)PYRENE METABOLITE DISTRIBUTION AT 25 DEGREES AND 37 DEGREES (ABSTRACT). PRESENTED AT THE SECOND INTERNATIONAL SYMPOSIUM ON POLLUTANT RESPONSE IN MARINE ORGANISMS, APRIL 27-29, 1983, WOODS HOLE, MA. (ERL,GB 166*).

MIXED-FUNCTION OXYGENASE ACTIVITIES IN MULLET (MUGIL CEPHALUS) WERE INDUCED WITH 3-METHYLCHOLANTHRENE AND PHENOBARBITAL (PB) ADMINISTERED INTRAPERITONEALLY TWICE OVER A THIRTY-DAY PERIOD. CONTROL AND INDUCED MFO ACTIVITIES WERE STUDIED AT 25 DEGREES AND 37 DEGREES CELSIUS USING 0.1 - 4.0 MM NADPH. INCREASES IN NADPH CONCENTRATIONS IN ACTIVITY DETERMINATIONS OF CONTROL MULLET MFO AT BOTH TEMPERATURES SHOWED CORRESPONDING ACTIVITY INCREASES AND RATHER BROAD ACTIVITY OPTIMA. NO SIGNIFICANT CHANGES IN THE METABOLITE COMPOSITION WERE OBSERVED. MFO ACTIVITIES INDUCED BY 3-MC AND CONDUCTED AT 37 DEGREES CELSIUS SHOWED INCREASES OF ALL METABOLITES EXCEPT THE 4,5-EPOXIDE AND 5-PHENOL WITH INCREASING NADPH CONCENTRATIONS. NO SUCH INCREASES WERE FOUND AT 25 DEGREES CELSIUS. INCREASES IN THE INDIVIDUAL METABOLITES WERE DISPROPORTIONATELY HIGHER AT 37 DEGREES CELSIUS AND HIGH NADPH CONCENTRATIONS WHEN COMPARED AT 25 DEGREES CELSIUS. SIMILAR TRENDS WERE FOUND WITH THE PB INDUCED MFO ACTIVITIES. THE DATA INDICATE THAT WITH REGARD TO COMPARATIVE INDUCTION, PHYSIOLOGICAL TEMPERATURE RANGES MAY MAKE COMPARISON OF ACTIVITIES DIFFICULT BETWEEN WARM- AND COLD-BLOODED SPECIES. PRELIMINARY DATA AT LOWER TEMPERATURES INDICATE THAT THE ANOMALIES OF MFO ACTIVITY IN THE MULLET OCCUR AT 37 DEGREES C RATHER THAN AT THE LOWER TEMPERATURES.

SCHOOR, W.P., AND M. SRIVASTAVA. IN PRESS. POSITION-SPECIFIC INDUCTION OF BENZO(A)PYRENE METABOLISM BY 3-METHLCHOLANTHRENE AND PHENOBARBITAL IN MULLET (MUGIL CEPHALUS). COMP. PHYSIOL. BIOCHEM. (ERL,GB 499).

1. MULLET (MUGIL CEPHALUS), A MARINE FISH, WERE TREATED WITH 3-METHYLCHOLANTHRENE AND PHENOBARBITAL BY INTRAPERITONEAL INJECTION, AND THE EFFECTS ON THE METABOLISM OF BENZO(A)PYRENE BY ISOLATED LIVER MICROSOMES WERE EVALUATED. 2. THE MOST SIGNIFICANT EFFECT FOUND IN TREATED FISH WAS AN INCREASE IN THE OXIDATION OF BENZO(A)PYRENE AT THE BAY REGION. A POSITION-SPECIFIC INCREASE WHICH WAS NOT REFLECTED IN AN INCREASE IN THE TOTAL ACTIVITY. 3. COMPARISON OF METABOLITE PATTERNS OF THE DIHYDRODIOLS OF BENZO(A)PYRENE IN THE PRESENCE AND ABSENCE OF TRICHLOROPROPENE OXIDE SHOWED THE PREDICTED INHIBITIONS WERE OBSERVED IN CONTROL AS WELL AS TREATED ANIMALS. 4. NO SIGNIFICANT DIFFERENCES IN METABOLITE PATTERNS WERE FOUND BETWEEN THE 3-METHYLCHOLANTHRENE- AND PHENOBARBITAL-TREATED FISH IN EITHER PRESENCE OR ABSENCE OF TRICHLOROPROPENE OXIDE. 5. COMPARISON IS MADE TO PUBLISHED DATA ON SIMILAR POSITION- SPECIFIC EFFECTS OBSERVED IN RATS.

SCHULTZ, R. JACK, AND MARY E SCHULTZ. 1984. CHARACTERISTICS OF A FISH COLONY OF POECILIOPSIS AND ITS USE IN CARCINOGENICITY STUDIES WITH 7,12-DIMETHYLBENZ[A]ANTHRACENE AND DIETHYLNITROSAMINE. IN: USE OF SMALL FISH SPECIES IN CARCINOGENICITY TESTING, NATL. CANCER INST. MONOGR. 65. KAREN L. HOOVER, EDITOR, U.S. NATIONAL CANCER INSTITUTE, BETHESDA, MD. PP. 5-13. (ERL,GB X311).

THE VIVIPAROUS FISH POECILIOPSIS FROM NORTH-WESTERN MEXICO IS CHARACTERIZED ACCORDING TO ITS POTENTIAL IN CANCER RESEARCH. A COLONY OF THESE FISHES STARTED IN 1961 INCLUDES INBRED STRAINS OF P. LUCIDA (M61-9, M61-31, M61-35, AND S68-4), P. MONACHA (S68-4 AND S68-5), AND P. VIRIOSA (M65-23), WHICH HAVE BEEN DEMONSTRATED BY ECLECTROPHORESIS AND TISSUE GRAFT ANALYSIS TO BE HOMOZYGOUS. ALL-FEMALE SPECIES OF HYBRID ORIGIN ARE REPRESENTED BY 12 CLONES WHICH, ALTHOUGH HIGHLY HETEROZYGOUS, ARE GENETICALLY IDENTICAL OR ISOGENIC AND READILY ACCEPT WITHIN-CLONE TISSUE TRANSPLANTS. TWO STUDIES ARE CITED IN WHICH HEPATIC TUMORS WERE CHEMICALLY INDUCED. IN ONE, LIVER NEOPLASMS WERE INDUCED IN P. LUCIDA AND P. MONACHA BY REPEATED SHORT-TERM EXPOSURES TO AN AQUEOUS SUSPENSION OF 5 PPM 7,12-DIMETHYLBENZ[A]ANTHRACENE. IN THE OTHER, DOSE RESPONSES TO THE CARCINOGEN DIETHYLNITROSAMINE (DENA) WERE COMPARED AMONG 4 INBRED STRAINS, 3 HYBRIDS FROM CROSSES BETWEEN INBRED STRAINS, AND 2 WILD STOCKS OF P. LUCIDA. THE INCIDENCE OF HEPATIC TUMORS GRADUALLY INCREASED FROM 0 TO 93% DEPENDING ON THE CONCENTRATION OF THE COMPOUND AND THE NUMBER OF EXPOSURES, BUT NO SIGNIFICANT DIFFERENCE WAS FOUND AMONG THE INBRED STRAINS, THEIR HYBRIDS, OR THE WILD STOCKS. HEPATIC TUMORS, INITIALLY INDUCED WITH DENA HAVE BEEN SUCCESSFULLY TRANSPLANTED INTO THE MUSCLE TISSUE AND ABDOMINAL CAVITY OF MEMBERS OF THE SAME STRAIN.

SCIENCE APPLICATIONS, INC., LA JOLLA, CA. 1984. DRILL MUD ASSESSMENT CHEMICAL ANALYSIS REFERENCE VOLUME. EPA-600/3-84-048, U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 265P.

THIS REPORT PRESENTS CONCENTRATIONS OF SPECIFIC METALS AND HYDROCARBONS IN ELEVEN DRILLING FLUIDS (MUDS) TAKEN FROM OPERATING GAS AND OIL RIGS IN THE GULF OF MEXICO. EACH DRILLING FLUID WAS ANALYZED CHEMICALLY FOR HEAVY METAL AND HYDROCARBON CONTENT IN THREE DISTINCT PHASES: (1) THE BULK OR WHOLE MUD, (2) A SUSPENDED PHASE DERIVED FROM THE BULK MUD SAMPLE, AND (3) A "DISSOLVED" OR LIQUID PHASE. ALIQUOTS OF BULK MUDS WERE REMOVED FOR BARIUM ANALYSES BY INSTRUMENTAL NEUTRON ACTIVATION AND FOR ANALYSIS FOR IRON, ALUMINUM, LEAD, ZINC, CADMIUM, COPPER, STRONTIUM, AND CALCIUM BY ATOMIC ABSORPTION ANALYSIS. ANALYSIS OF THE SUSPENDED PARTICULATE AND LIQUID PHASES WAS SIMILAR. THE AROMATIC AND ALIPHATIC CONTENT OF THE THREE PHASES WERE DETERMINED BY EXTRACTION AND THE FRACTIONATION BY COLUMN CHROMATOGRAPHY. THE ANALYSIS FOR EACH OF THE 11 DRILLING FLUIDS IS PRESENTED IN FOUR PARTS: A. DRILLING FLUID CONCENTRATIONS, B. WHOLE DRILLING FLUID ORGANIC CONCENTRATIONS, C. PARTICULATE PHASE ORGANIC CONCENTRATIONS, D. "DISSOLVED" PHASE ORGANIC CONCENTRATIONS.

SCIENCE APPLICATIONS, INC., LA JOLLA, CA. 1984. DRILL MUD ASSESSMENT CHEMICAL ANALYSIS REFERENCE VOLUME (PROJECT SUMMARY). EPA-600/S3-84-048, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 2P.

SCOTT, GEOFFREY I., DOUGLAS P. MIDDAUGH, AND SCOTT KLINGENSMITH. 1983. BIOCONCENTRATION OF BROMOFORM BY AMERICAN OYSTER, CRASSOSTREA VIRGINICA (G.) EXPOSED TO CHLORINATED AND DECHLORINATED SEAWATER, WITH NOTES ON SURVIVAL AND FEEDING. IN: WATER CHLORINATION: ENVIRONMENTAL IMPACT AND HEALTH EFFECTS, VOL. 4. ROBERT L. JOLLEY, ET AL., EDITOR, ANN ARBOR SCIENCE PUBLISHERS, ANN ARBOR, MI. PP. 1029-1037. (ERL,GB 429*).

CHLORINE ADDED TO SEAWATER REACTS WITH ORGANIC PRECURSORS TO FORM NUMEROUS OXIDATION PRODUCTS INCLUDING BROMOFORM. WHILE SEVERAL STUDIES HAVE EXAMINED THE TOXICOLOGICAL, BEHAVIORAL AND PHYSIOLOGICAL RESPONSES OF BIVALVE MOLLUSCS TO CONTINUOUS CHLORINATION, IN MOST INSTANCES, ONLY ACTIVE OXIDANTS WERE MEASURED; THE POTENTIAL EFFECTS OF EXPOSURE TO, OR BIOCONCENTRATION OF, BROMOFORM WERE NOT CONSIDERED. NOTABLE EXCEPTIONS INCLUDE STUDIES BY GIBSON ET AL. (7), IN WHICH BIOCONCENTRATION OF BROMOFORM BY SEVERAL MARINE ORGANISMS WAS EXAMINED, AND SCOTT ET AL. (8), IN WHICH BROMOFORM, GENERATED DURING CHLORINATION OF SEAWATER, WAS BIOCONCENTRATED BY AMERICAN OYSTER, CRASSOSTREA VIRGINICA. RECENTLY, ROBERTS DETERMINED THE RESPONSE OF AMERICAN OYSTERS TO CHLORINATED SEAWATER AND SEAWATER DECHLORINATED WITH SODIUM THIOSULFATE. DETOXIFICATION OF CHLORINE-PRODUCED OXIDANTS (CPO) WAS APPARENTLY ACHIEVED BY DECHLORINATION, HOWEVER, THE POTENTIAL FOR BIOCONCENTRATION OF BROMOFORM WAS NOT DETERMINED. THE OBJECTIVES OF OUR STUDY WERE: (1) TO DETERMINE THE RATE OF BROMOFORM PRODUCTION IN CHLORINATED SEAWATER: (2) TO ASSESS THE SURVIVAL AND FEEDING RESPONSE OF OYSTERS EXPOSED TO CHLORINATED SEAWATER CONTAINING ACTIVE OXIDANTS BROMOFORM, AND OTHER CHLORINATED ORGANICS, AND TO DECHLORINATED SEAWATER CONTAINING BROMOFORM PLUS OTHER CHLORINATED ORGANICS; AND (3) TO DETERMINE THE POTENTIAL FOR BIOCONCENTRATION OF BROMOFORM IN OYSTERS EXPOSED TO CHLORINATED AND DECHLORINATED SEAWATER.

SHIREMAN, JEROME V., WILLIAM T. HALLER, DOUGLAS E. COLLE, CURTIS E. WATKINS, DOUGLAS F. DURANT, AND DANIEL E. CANFIELD. 1983. ECOLOGICAL IMPACT OF INTEGRATED CHEMICAL AND BIOLOGICAL AQUATIC WEED CONTROL. EPA-600/3-83-098, CENTER OF AQUATIC WEEDS, INSTITUTE OF FOOD & AGRICULTURAL SCIENCE, UNIVERSITY OF FLORIDA, GAINESVILLE, FL. 333P.

THIS STUDY WAS INITIATED TO PROVIDE QUANTITATIVE INFORMATION ON THE INFLUENCE OF VARIOUS LEVELS OF AQUATIC PLANTS AND THE IMPACT OF CHEMICAL AND BIOLOGICAL (GRASS CARP) MANAGEMENT TECHNIQUESQUES COULD BE INTEGRATED TO PROVIDQUES ON THE AQUATIC ENVIRONMENT. THE STUDY CONSIST OF 3 SEPARATE PROJECTS. ORANGE LAKE, A LARGE LAKE WITH AND ABUNDANCE OF MACROPHYTES, WAS STUDIED TO DETERMINE WHAT THE EFFECT OF NATURALLY OCCURRING FLUCTUATIONS IN VEGETATION ARE AND WHAT EFFECT DIFFERENT VEGETATION TYPES MAY HAVE ON THE AQUATIC ENVIRONMENT. LAKE PEARL, A SMALL LAKE WITH AN ABUNDANCE OF HYDRILLA WAS STUDIED TO DETERMINE IF CHEMICAL AND BIOLOGICAL CONTROL TECHNIQUES COULD BE INTEGRATED TO PROVIDE LONG-TERM VEGETATION MANAGEMENT WITHOUT REMOVING ALL VEGETATION. THE IMPACT OF INTEGRATED MANAGEMENT ON THE AQUATIC ENVIRONMENT WAS ALSO STUDIED. FINALLY, POND STUDIES WERE CONDUCTED TO DETERMINE THE ENVIRONMENTAL IMPACT OF DIFFERENT AQUATIC PLANT MANAGEMENT TECHNIQUES AT DIFFERENT LEVELS OF WEED MANAGEMENT.

SHIREMAN, J.V., W.T. HALLER, D.E. COLLE, C.E. WATKINS, II, D.F. DURANT, AND D.E. CANFIELD. 1983. ECOLOGICAL IMPACT OF INTEGRATED CHEMICAL AND BIOLOGICAL AQUATIC WEED CONTROL: PROJECT SUMMARY. EPA-600/S3-83-098, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 4P.

THE FINAL REPORT SUMMARIZED HEREIN PRESENTS RESULTS OF A FOUR-YEAR STUDY OF THE ECOLOGICAL IMPACTS OF CHEMICAL, BIOLOGICAL, AND INTEGRATED METHODS OF AQUATIC WEED CONTROL. BIOLOGICAL AND WATER QUALITY CHANGES OCCURRED AS ABUNDANCE OF MACROPHYTIC VEGETATION WAS ALTERED BY NATURAL FACTORS OR MANAGEMENT PRACTICES. MACROPHYTE ABUNDANCE STRONGLY INFLUENCED THE STRUCTURE OF COMMUNITIES, AND IT WAS CONCLUDED THAT ENVIRONMENTAL EFFECTS OF PLANT MANAGEMENT PROGRAMS ARE DETERMINED MORE BY THE AMOUNT OF VEGETATION CONTROLLED THAN BY MANAGEMENT TECHNIQUE. ALSO, CHANGES IN LAKE HYDROLOGY AND RATES OF NUTRIENT LOADING APPEAR TO BE MORE IMPORTANT AS DETERMINANTS OF LAKE WATER QUALITY THAN MACROPHYTES. RESEARCH NEEDS FOR EVALUATION OF EFFECTS OF WEED CONTROL ON AQUATIC SYSTEMS ARE IDENTIFIED.

SOMERVILLE, C.C., L.C. BUTLER, T.J. LEE, A. W. BOURQUIN, AND J.C. SPAIN. 1983. DEGRADATION OF JET FUEL HYDROCARBONS BY AQUATIC MICROBIAL COMMUNITIES (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY 1983. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 284. (ERL,GB 458*).

A MIXTURE OF FIFTEEN HYDROCARBONS REPRESENTATIVE OF THOSE IN DISTILLATE JET FUELS WAS USED TO DETERMINE WHETHER DEGRADATION BY NATURAL MICROBIAL COMMUNITIES COULD AFFECT THE PERSISTENCE OF SUCH FUELS RELEASED INTO AQUATIC ENVIRONMENTS. THE MIXTURE INCLUDED HEXANE, CYCLOHEXANE, N-HEPTANE, METHYLCYCLOHEXANE, TOLUENE, N-OCTANE, ETHYLCYCLOHEXANE, P-XYLENE, CUMENE, 1,3,5-TRIMETHYLBENZENE, INDAN, NAPHTHALENE, 2-METHYLNAPHTHALENE, N-TETRADECANE, AND 2,3-DIMETHYLNAPTHTHALENE. THE MIXTURE WAS INCUBATED WITH WATER OR WATER AND SEDIMENT SUSPENSIONS COLLECTED AT ESTUARINE AND FRESHWATER SITES. DISAPPEARANCE OF HYDRBOCARBONS WAS MEASURED BY CAPILLARY COLUMN GAS CHROMATOGRAPHY. CONTROL FLASKS WERE STERILIZED WITH HGCL(2) TO ESTIMATE LOSSES DUE TO VOLATILIZATION. C(6)-C(9) COMPOUNDS VOLATILIZED QUICKLY. INDAN, NAPTHTHALENE, AND 2-METHYLNAPHTHALENE WERE MUCH LESS VOLATILE AND WERE BIODEGRADED RAPIDLY AFTER AND INITIAL 24H LAG PERIOD. THE PRESENCE OF SEDIMENT AND ITS ASSOCIATED MICROFLORA STIMULATED BIODEGRADATION. ASSAYS OF TOTAL HETEROTROPHS AND HYDROCARBONOCLASTIC BACTERIA INDICATED AND INITIAL TOXICITY OF THE FUEL MIXTURE FOLLOWED BY A STIMULATION OF HYDROCARBON-DEGRADING BACTERIA.

SOMERVILLE, C.C., T.J. LEE, AND J.C. SPAIN. 1984. FATE AND TOXICITY OF RJ-5 HIGH DENSITY MISSILE FUEL IN AQUATIC TEST SYSTEMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE AMERICAN SOCIETY FOR MICROBIOLOGY, 1984. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHINGTON, DC. PP. 213. (ERL,GB X439).

THE FATE AND TOXICITY OF THE SYNTHETIC, HIGH DENSITY FUEL, JR-5, WAS STUDIED IN QUIESCENT FLASK TESTS WITH NATURAL MICROBIAL COMMUNITIES FROM PENSACOLA BAY. THE FUEL WAS INCUBATED WITH WATER OR WATER-SEDIMENT SUSPENSIONS, EXTRACTED WITH CARBON DISULFIDE, AND ANALYZED BY CAPILLARY-COLUMN GAS CHROMATOGRAPHY. THE MAJOR COMPONENTS OF THE FUEL, THE NORBORNADIENE DIMERS, WERE RESISTANT TO MICROBIAL DEGRADATION AND PHYSICAL WEATHERING DURING THE 2000 H TEST PERIOD AT SALINITIES RANGING FROM 0-15 PARTS PER THOUSAND. MICRO-EMULSIONS OF THE FUEL WERE ASSAYED FOR EFFECTS ON THE MINERALIZATION OF GLUCOSE BY AQUATIC BACTERIA, SURVIVAL OF THE BACTERIA, AND TOXICITY TO THE CRUSTACEAN MYSIDOPSIS BAHIA. MINERALIZATION OF GLUCOSE BY MICROBIAL COMMUNITIES WAS INHIBITED ONLY AT EXTREMELY HIGH FUEL CONCENTRATIONS (5000 MG/L; LOWER CONCENTRATIONS (50-500 MG/L) STIMULATED MINERALIZATION. RJ-5 DID NOT SIGNIFICANTLY AFFECT MICROBIAL POPULATION SIZE AS MEASURED BY ACRIDINE ORANGE DIRECT COUNTING OR BY MPN TECHNIQUES. THE FUEL WAS TOXIC TO MYSIDOPSIS BAHIA IN STATIC, 96 H ACUTE TOXICITY TESTS (LC50 0.16 MG/L). BECAUSE RJ-5 IS MORE DENSE THAT WATER, HAS A HIGH AFFINITY FOR SEDIMENT, RESISTS WEATHERING, AND IS TOXIC TO BENTHIC ORGANISMS, IT COULD CAUSE SERIOUS PROBLEMS IF ACCIDENTLY RELEASED INTO AN AQUATIC ENVIRONMENT.

SPAIN, JIM C., AND P.A. VAN VELD. 1983. ADAPTATION OF NATURAL MICROBIAL COMMUNITIES TO DEGRADATION OF XENOBIOTIC COMPOUNDS: EFFECTS OF CONCENTRATION, INOCULUM, AND CHEMICAL STRUCTURE. APPL. ENVIRON. MICROBIOL. 45(2):428-435. (ERL,GB 440*).

ADAPTION OF MICROBIAL POPULATIONS TO DEGRADE XENOBIOTIC COMPOUNDS FASTER AFTER EXPOSURE TO THE COMPOUND WAS STUDIED IN ECO-CORES. RADIOLABELED TEST COMPOUNDS WERE ADDED TO CORES THAT CONTAINED NATURAL WATER AND SEDIMENT. ADAPTATION WAS DETECTED BY COMPARING MINERALIZATION RATES OR DISAPPEARANCE OF PARENT COMPOUND IN PRE-EXPOSED AND UNEXPOSED CORES. MICROBIAL POPULATIONS IN PRE-EXPOSED CORES FROM A NUMBER OF FRESHWATER SAMPLING SITES ADAPTED TO DEGRADE P-NITROPHENOL FASTER; POPULATIONS FROM ESTUARINE OR MARINE SITES DID NOT SHOW ANY INCREASE IN RATES OF DEGRADATION AS A RESULT OF PRE-EXPOSURE. ADAPTATION WAS MAXIMAL AFTER TWO WEEKS AND NOT DETECTABLE AFTER SIX WEEKS. A THRESHOLD CONCENTRATION OF 10 PPB WAS NOTED, BELOW WHICH NO ADAPTATION WAS DETECTED. WITH CONCENTRATIONS OF 20 TO 100 PPB, THE BIODEGRADATION RATES IN PRE-EXPOSED CORES WERE MUCH HIGHER THAN IN CONTROL CORES AND WERE PROPORTIONAL TO RESPIKE CONCENTRATION. IN ADDITION, TRIFLURALIN, 2,4-DICHLOROPHENOXYACETIC ACID (2,4-D) AND P-CRESOL WERE TESTED TO DETERMINE WHETHER PRE-EXPOSURE AFFECTED SUBSEQUENT BIODEGRADATION. MICROBIAL POPULATIONS DID NOT ADAPT TO TRIFLURALIN. ADAPTATION TO 2,4-D WAS SIMILAR TO THAT WITH NITOPHENOL. P-CRESOL WAS MINERALIZED RAPIDLY IN BOTH PRE-EXPOSURE AND UNEXPOSED POPULATIONS.

SPAIN, J.C,, P.A. VAN VELD, C.A. MONTI, P.H. PRITCHARD, AND C.R. CRIPE. IN PRESS. COMPARISON OF P-NITROPHENOL BIODEGRADATION IN FIELD AND LABORATORY TEST SYSTEMS. APPL. ENVIRON. MICROBIOL. (ERL,GB 506).

LABORATORY TEST SYSTEMS PROVIDE THE MOST PRACTICAL MEANS TO OBTAIN DATA THAT CAN BE USED TO PREDICT THE BIODEGRADATION AND FATE OF ORGANIC POLLUTANTS. MORE ACCURATE PREDICTIONS COULD BE MADE IF FATE TESTS COULD BE CONDUCTED IN THE FIELD FOR EACH CHEMICAL UNDER CONSIDERATION. SUCH STUDIES HAVE OFTEN BEEN CONDUCTED FOR THE APPLICATION OF PESTICIDES TO SOIL, BUT CONSTRAINTS OF TIME AND EXPENSE DO NOT PERMIT STUDIES TO BE CARRIED OUT ROUTINELY IN AQUATIC HABITATS. THE MOST PRACTICAL ALTERNATIVE IS TO CONDUCT A FEW FIELD TESTS WITH SELECTED CHEMICALS AND COMPARE THE RESULTS WITH THOSE FROM LABORATORY TESTS TO ASSESS THE RELEVANCE AND UTILITY OF THE LABORATORY DATA. WHEN THE STRENGTHS AND WEAKNESSES OF THE TEST SYSTEMS ARE UNDERSTOOD, THE DEGREE OF CONFIDENCE WITH WHICH LABORATORY DATA CAN BE EXTRAPOLATED CAN BE EVALUATED. WE HAVE USED SEVERAL TYPES OF BIODEGRADATION TEST SYSTEMS, INCLUDING SHAKE FLASKS, ECO-CORES, AND MICROCOSMS, TO STUDY THE DEGRADATION OF P-NITROPHENOL (PNP) IN THE LABORATORY. P-NITROPHENOL WAS CHOSEN AS AN EXAMPLE OF NITROAROMATIC COMPOUNDS WIDELY USED IN THE MANUFACTURE OF DYES, EXPLOSIVES, AND PESTICIDES. SUCH COMPOUNDS ARE RELEASED INTO THE ENVIRONMENT DURING THE HYDROLYSIS OF SEVERAL ORGANOPHOSPHOROUS PESTICIDES, SUCH AS PARATHION. IN LABORATORY STUDIES WITH INTACT SEDIMENT/WATER CORES, MICROBIAL COMMUNITIES DEGRADED NITROPHENOL AFTER A LAG PERIOD OF SEVERAL DAYS. THE LENGTH OF THE LAG PERIOD WAS VARIABLE, HOWEVER, AND NO BIODEGRADATION OCCURRED FOR WEEKS IN CORES FROM ESTUARINE, MARINE OR SOME FRESHWATER SITES. THE INCLUSION OF SEDIMENT ALSO AFFECTS THE BIODEGRADATION, AND A SIGNIFICANT AMOUNT OF THE NITROPHENOL BECAME ASSOCIATED WITH SEDIMENT EVEN IN STERILE CONTROLS. THE PURPOSE OF OUR STUDY WAS TO COMPARE THE BIODEGRADATION OF P-NITROPHENOL AND CONCOMITANT RESPONSES OF AQUATIC MICROBIAL COMMUNITIES IN LABORATORY TEST SYSTEMS WITH THOSE IN THE FIELD. WE PREPARED LABORATORY TEST SYSTEMS WITH SAMPLES FROM A FRESHWATER POND, THEN TREATED THE LABORATORY SYSTEMS AND THE POND SIMULTANEOUSLY WITH THE TEST COMPOUND SO THAT DIRECT COMPARISONS COULD BE MADE.

SPAIN, J.C., C.C. SOMERVILLE, T.J. LEE, L.C. BUTLER, AND A.W. BOURQUIN. 1983. DEGRADATION OF JET FUEL HYDROCARBONS BY AQUATIC MICROBIAL COMMUNITIES: AN INTERIM REPORT 23 OCTOBER 1981 TO 30 SEPTEMBER 1982. EPA-600/X-83-059, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 205P.

A MODEL FUEL MIXTURE OF FIFTEEN HYDROCARBONS REPRESENTATIVE OF THOSE DISTILLATE JET FUELS WAS USED TO DETERMINE WHETHER DEGRANDATION BY NATURAL MICROBIAL COMMUNITIES COULD AFFECT THE PERSISTENCE OF SUCH FUELS RELEASED IN AQUATIC ENVIRONMENTS. THE MIXTURE INCLUDED HEXANE, CYCLOHEXANE, N-HEPTANE, METHYLCYCLOHEXANE, TOLUENE, N-OCTANE, ETHYLCYCLOHEXANE, P-XYLENE, CUMENE, TRIMETHYLBENZENE, INDAN NAPHTHALENE, N-TETRADECANE, 2,3-DIMETHYLNAPHTHALENE. THE WATER SOLUBLE FRACTION OF THE MODEL FUEL WAS INCUBATED IN SHAKE FLASKS WITH WATER OR WATER AND SEDIMENT SUSPENSIONS COLLECTED AT ESTUARINE AND FRESHWATER SITES. SURFACES FILMS OF THE MODEL MIXTURE WERE STUDIED UNDER QUIESENT INCUBATION. THE DISAPPEARANCE OF HYDROCARBONS WAS MEASURED BY CAPILLARY COLUMN GAS CHROMATOGRAPHY. CONTROL FLASKS WERE STERILIZED WITH HGCL(2) TO ESTIMATE LOSSES DUE TO ABIOTIC PROCESSES. C(6)-C(9) COMPOUNDS VOLATILIZED QUICKLY. INDAN, NAPHTHALENE, AND 2-METHYLNAPHTHALENE WERE MUCH LESS VOLATILE AND WERE BIODEGRADED FROM SOLUTION AFTER AND INTIAL 24H LAG PERIOD. THE PRESENCE OF SEDIMENT ASSOCIATED MICROFLORA STMULATED DEGRADATION. BIODEGRADATION WAS NOT AN IMPORTANT FATE PROCESS OF THE MODEL FUEL COMPONENTS IN THE QUIESCENT TEST. ASSAYS OF TOTAL HETERTROPHS AD HYDROCARONOCLASTIC BACTERIA INDICATED AN INITIAL TOXICITY OF THE FUEL MIXTURE FOLLOWED BY A STIMULATION OF HYDROCARBON-DEGRADING BACTERIA. FATE TESTS WERE REPEATED WITH PETROLEUM-DERIVED JP-4. THE SOLUBLE COMPONENTS OF JP-4 VOLATILIZED TOO RAPIDLY FOR BIODEGRADATION TO OCCUR. SEDIMENTATION DRAMATICALLY AFFECTED THE FATE OF FUEL COMPONENTS WHEN MIXING OF THE HYDROCARBON AND SEDIMENT LAYERS STUDIED. SEDIMENT ASSOCIATED COMPOUNDS WERE MORE RESISTANT TO VOLATILIZATION AND MICROBIAL ATTACK. SUBSTITUTED BENZENES AND N-ALKANES WERE RADILY BIODEGRADED WHEN NOT LIMITED BY EVAPORATION AND SEDIMENTATION. JP-4 DID NOT PROVE TOXIC TO THE MICROBIAL COMMUNITIES OF THE TEST SYSTEMS, BUT DID STIMULATE THE REPLICATON OF HYDRCARBONOCLASTIC BACTERIA.

SRIVASTAVA, M., AND W.P. SCHOOR. 1983. EFFECT OF 2,3-OXIDE-3,3,3-TRICHLOROPROPANE ON BAP METABOLISM IN MULLET (ABSTRACT). IN: APPLICATION OF BIOLOGICAL MARKERS TO CARCINOGEN TESTING. HARRY A. MILMAN AND STEWART SELL, EDITORS, PLENUM PRESS, NEW YORK. PP. 503. (ERL,GB X469).

EFFECT OF 2,3-OXIDE-3,3,3-TRICHLOROPROPANE (TCPO), A POTENT INHIBITOR OF EPOXIDE HYDRASE, ON LIVER MICROSOMES PREPARED FROM CONTROL, 3MC AND PB INDUCED MULLET HAS BEEN INVESTIGATED. HPLC COUPLED WITH FLUORESCENCE AND UV DETECTORS WAS USED TO SEPARATE AND IDENTIFY THE VARIOUS METABOLITES OF BAP. TCPO INHIBITED THE FORMATION OF 9,10-DIHYDRODIOL AND 7,8-DIHYDRODIOL BY ALMOST 100%. THE 4,5-DIHYDRODIOL WAS INHIBITED BY 60% FOR CONTROL AND 80% FOR BOTH 3MC AND PB INDUCED MULLET. IN THE PRESENCE OF TCPO, BAP IS PRIMARILY METABOLIZED TO PHENOLS AND QUINONES. ALTHOUGH THE PROFILES OF BAP METABOLISM WERE SIMILAR IN ALL TESTED CASES, THEIR PROPORTIONS WERE SUBSTANTIALLY ALTERED. THE TOTAL OXIDATION OF BAP IS INHIBITED BY 25% IN CONTROL MULLET AND 60% IN 3MC AND PB INDUCED MULLET. WHILE THE FORMATION OF METABOLITES OXIDIZED AT THE 4,5 AND 2,3 POSITIONS INCREASED BY A FACTOR OF 2 IN THE TCPO TREATED CONTROL MULLET, THE OXIDATION AT THE 7,8 AND 9,10 POSITIONS WAS INCREASED BY 5-FOLD IN THE 3MC AND PB INDUCED TCPO TREATED MULLET. THESE RESULTS SUGGEST THAT AS THE METABOLISM AT THE K-REGION INCREASES IN TCPO TREATED CONTROL MULLET, THE INDUCTION OF ENZYMES BY 3MC AND PB SHIFTS THE METABOLIC ROUTE TOWARDS THE BAY REGION IN THE PRESENCE OF TCPO.

SULLIVAN, TIMOTHY J., AND MICHAEL C. MIX. 1983. PYROLYTIC DEPOSITION OF POLYNUCLEAR AROMATIC HYDROCARBONS DUE TO SLASH BURNING ON CLEAR-CUT SITES. BULL. ENVIRON. CONTAM. TOXICOL. 31(2):208-215. (ERL,GB X445).

THE OBJECTIVES OF THIS RESEARCH WERE TO IDENTIFY QUALITATIVELY AND QUANTITATIVELY THE DEPOSITION, PERSISTENCE AND FATE OF SELECTED UNSUBSTITUTED PNAH COMPOUNDS ON BURNED CLEAR-CUT SITES IN OREGON. THE PRESENT PAPER PRESENTS DATA ON THE INITIAL DEPOSITION OF PNAH AFTER SLASH BURNING. A SUBSEQUENT PAPER WILL CONSIDER THE FATE AND PERSISTENCE OF THE PNAH PRODUCED.

SULLIVAN, TIMOTHY J., AND MICHAEL C. MIX. 1983. SIMPLE AND INEXPENSIVE METHOD FOR MEASURING INTEGRATED LIGHT ENERGY. ENVIRON. SCI. TECHNOL. 17(2):127-128. (ERL,GB X461).

THE OZALID TECHNIQUE IS A SIMPLE AND INEXPENSIVE METHOD FOR MEASURING INTEGRATED SUNLIGHT ENERGY IN THE FIELD FOR PERIODS UP TO A MAXIMUM OF 1 DAY. THIS PAPER DESCRIBES A MODIFICATION OF THE OZALID TECHNIQUE THAT MAKES IT SUITABLE FOR LONG-TERM LIGHT MEASUREMENTS. DATA FROM THE MODIFIED OZALID METER WERE CALIBRATED AGAINST AN EPLEY PRECISION SPECTRO PYRANOMETER, YIELDING A STRONG POSITIVE CORRELATION (R(SQUARED) = 0.97).

SZMANT-FROELICH, ALINA. 1983. PHYSIOLOGICAL EFFECTS OF DRILLING MUDS ON REEF CORALS. EPA-600/3-83-013, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 54P.

PIECES OF CORAL FROM TWO SPECIES, MONTASTREA ANNULARIS AND ACROPORA CERVICORNIS, WERE EXPOSED IN THE LABORATORY TO CONCENTRATIONS OF 0, 1, 10, AND 100 PPM DRILLING MUD FOR PERIODS TWO DAYS TO SEVEN WEEKS. SEVERAL PHYSIOLOGICAL FUNCTIONS OF THE CORAL ANIMAL (CALCIFICATION RATE, RESPIRATION RATE) AND OF THEIR ZOOXANTHELLAE (PHOTOSYNTHESIS RATE, NUTRIENT UPTAKE RATE) WERE MONITORED AT REGULAR INTERVALS DURING THE EXPOSURE PERIODS. IN ADDITION, BIOMASS PARAMETERS (TISSUE NITROGEN, ZOOXANTHELLAE CELL DENSITY, CHLOROPHYLL CONTENT) WERE MEASURED AT TWO-WEEK INTERVALS FOR THE LONGER EXPOSURE EXPERIMENT, AND AT THE END OF EACH EXPERIMENT FOR THE SHORTER EXPOSURES. INITIAL LONG-TERM EXPOSURES OF PIECES OF MONTASTREA ANNULARIS TO A SERIES OF DRILL MUDS (DESIGNATED JX-2 THROUGH JX-7) COLLECTED FROM A JAY OIL-FIELD WELL SHOWED A SIGNIFICANT DETRIMENTAL EFFECT ON CALCIFICATION, RESPIRATION, AND NO(3) UPTAKE RATES DURING THE FOURTH WEEK OF EXPOSURE TO 100 PPM DRILL MUD. PHOTOSYNTHESIS AND NH(4) UPTAKE RATES WERE AFFECTED ALSO DURING THE FIFTH WEEK OF EXPOSURE. NORMAL FEEDING BEHAVIOR WAS ABSENT FROM THESE CORALS WHEN TESTED DURING THE SIXTH AND SEVENTH WEEKS OF EXPOSURE. SEVERAL 100 PPM CORALS DIED DURING THE FIFTH AND SIXTH WEEKS.

SZMANT-FROELICH, ALINA. 1983. PHYSIOLOGICAL EFFECTS OF DRILLING MUDS ON REEF CORALS (PROJECT SUMMARY). EPA-600/S3-83-013, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 19P.

TAGATZ, M.E., C.H. DEANS, J.C. MOORE, AND G.R. PLAIA. 1983. ALTERATIONS IN COMPOSITION OF FIELD- AND LABORATORY-DEVELOPED ESTUARINE BENTHIC COMMUNITIES EXPOSED TO DI-N-BUTYL PHTHALATE. AQUAT. TOXICOL. (AMST.). 3(3):239-248. (ERL,GB 451).

MACROBENTHIC ANIMAL COMMUNITIES DEVELOPED IN SAND-FILLED AQUARIA IN THE LABORATORY AND IN THE FIELD WERE EXPOSED TO THREE CONCENTRATIONS OF THE PLASTICIZER, DI-N-BUTYL PHATHALATE (DBP), AND EFFECTS ON COMMUNITY STRUCTURE WERE ASSESSED. LABORATORY COMMUNITIES WERE COLONIZED BY PLANKTONIC LARVAE IN UNFILTERED SEA WATER; FIELD COMMUNITIES, BY NATURALLY OCCURRING ANIMALS. AFTER 8 WK OF COLONIZATION, LABORATORY AND FIELD COMMUNITIES (REMOVED TO THE LABORATORY) WERE EXPOSED TO DBP FOR 2 WK. THE NUMBERS OF INDIVIDUALS AND SPECIES OF ANIMALS IN AQUARIA RECEIVING 3.7MG DBP/L (LABORATORY-COLONIZED) OR 3.8 MG DBP/L (FIELD-COLONIZED) WERE SIGNIFICANTLY LESS THAN THOSE IN CONTROL AQUARIA OR IN AQUARIA THAT RECEIVED LOWER CONCENTRATIONS OF THE PLASTICIZER. AFFECTED PHYLA IN LABORATORY OR FIELD FAUNAL ASSEMBLAGES WERE CHORDATES, MOLLUSKS, ARTHROPODS, AND ANNELIDS. AMPHIPODS, COROPHIUM ACHERUSICUM, COLLECTED ONLY FROM LABORATORY COMMUNITIES, ALSO WERE SIGNIFICANTLY FEWER IN COMMUNITIES EXPOSED TO 0.34 MG DBP/L. DENSITY OF INDIVIDUALS AND NUMBERS OF SPECIES WERE NOT AFFECTED BY 0.04 MG DBP/L.

TAGATZ, MARLIN E., AND CHRISTINE H. DEANS. 1983. COMPARISON OF FIELD- AND LABORATORY-DEVELOPED ESTUARINE BENTHIC COMMUNITIES FOR TOXICANT-EXPOSURE STUDIES. WATER AIR SOIL POLLUT. 20(2):199-209. (ERL,GB 439).

THE STRUCTURES OF MACROBENTHIC COMMUNITIES THAT COLONIZED SAND-FILLED BOXES WERE COMPARED TO LEARN IF LABORATORY-DEVELOPED ASSEMBLAGES OF ANIMALS USED IN TOXICITY STUDIES REALISTICALLY SIMULATE THOSE IN NATURE. LABORATORY BOXES WERE COLONIZED FOR EIGHT WEEKS IN SPRING AND FALL BY PLANKTONIC LARVAE FROM CONTINUOUSLY-SUPPLIED UNFILTERED SEAWATER; FIELD BOXES, BY NATURALLY-OCCURRING ESTUARINE ANIMALS. LABORATORY COMMUNITIES HAD LARGER NUMBERS, BUT FEWER SPECIES THAN FIELD COMMUNITIES. ONE-FOURTH OF THE SPECIES FOUND IN FIELD BOXES ALSO OCCURRED IN LABORATORY BOXES. SPECIES DENSITY, DIVERSITY, AND DOMINANCE WERE SIMILAR IN BOTH ENVIRONMENTS IN FALL, BUT DIFFERED IN SPRING. THE DEGREE OF SIMILARITY OF LABORATORY ASSEMBLAGES OF BENTHIC ANIMALS TO THE HIGHLY VARIABLE ASSEMBLAGES IN THE FIELD INDICATES APPLICABILITY OF LABORATORY TOXICITY STUDIES TO NATURE.

TAGATZ, M.E., C.H. DEANS, G.R. PLAIA, AND J.D. POOL. 1983. IMPACT ON AND RECOVERY OF EXPERIMENTAL MACROBENTHIC COMMUNITIES EXPOSED TO PENTACHLOROPHENOL. NORTHEAST GULF SCI. 6(2):131-136. (ERL,GB 443).

RECOVERY OF MACROBENTHIC ANIMAL COMMUNITIES WAS DETERMINED 7 WEEKS AFTER A 5-WEEK EXPOSURE TO 55 UG/L PENTACHLOROPHENOL. THE COMMUNITIES DEVELOPED FROM PLANKTONIC LARVAE IN AQUARIA CONTAINING CLEAN SAND AND CONTINUOUSLY FLOWING ESTUARINE WATER. SIGNIFICANTLY FEWER (ALPHA=0.05) INDIVIDUALS AND SPECIES OCCURRED IN CONTAMINATED AQUARIA THAN IN CONTROL AQUARIA IMMEDIATELY AFTER EXPOSURE TO PENTACHLOROPHENOL. NUMBERS OF ARTHROPODS, CHORDATES, ECHINODERMS, AND MOLLUSKS WERE DECREASED; ANNELIDS AND COELENTERATES WERE NOT AFFECTED. SEVEN WEEKS AFTER EXPOSURE WAS DISCONTINUED, AND WITH CONTINUED INPUT OF ESTUARINE WATER, THE COMMUNITIES SHOWED VARIOUS DEGREES OF RECOVERY, CARRY-OVER EFFECTS, AND CHANGES UNRELATED TO EXPOSURE. EXCEPT FOR ANNELIDS THAT WERE MORE ABUNDANT IN THE CONTROL, AVERAGE DENSITY OF ANIMALS AND NUMBERS OF SPECIES PER PHYLUM IN PREVIOUSLY CONTAMINATED AQUARIA DID NOT SIGNIFICANTLY DIFFER FROM THOSE IN CONTROL AQUARIA. HOWEVER, THE MOLLUSK THAT WAS DOMINANT AT 5 WEEKS AND REDUCED IN CONTAMINATED AQUARIA DID NOT RECOVER AT 12 WEEKS. IN ADDITION, CHANGES IN RELATIVE ABUNDANCE OF SPECIES AND PHYLA BETWEEN THE TWO PERIODS OCCURRED IN BOTH CONTROL AND CONTAMINATED AQUARIA.

TAGATZ, MARLIN E., GAYLE R. PLAIA, AND CHRISTINE H. DEANS. IN PREP. RESPONSES OF MACROBENTHOS COLONIZING ESTUARINE SEDIMENTS CONTAMINATED WITH DRILLING MUD CONTAINING DIESEL OIL. MAR. BIOL. (BERL.). (ERL,GB 505).

BOXES FILLED WITH CLEAN SAND OR CLEAN SAND WITH A 2-CM OVERLAY OF MIXTURES OF SAND WITH BARITE OR DRILLING MUD WERE PLACED IN SANTA ROSA SOUND, FLORIDA, TO DETERMINE THE EFFECTS OF A USED LIME DRILLING-MUD ON FIELD-COLONIZED MACROBENTHIC COMMUNITIES. EFFECT OF THE DRILLING MUD ON COMMUNITY STRUCTURE WAS GREATER THAN THAT OF ITS BARITE COMPONENT AFTER COLONIZATION FOR 8 WEEKS. BARITE CAUSES CHANGES IN TEXTURE OF THE SEDIMENT AND THEREBY RECRUITMENT. THE AVERAGE NUMBERS OF ANIMALS AND SPECIES IN BOXES CONTAINING 1:10 AND 1:3 MIXTURES OF MUD TO SAND WERE SIGNIFICANTLY LESS THAN THOSE IN CONTROL BOXES AND MOST OF THE BARITE/SAND MIXTURES. THE SHANNON-WEAVER INDEX OF DIVERSITY, SIMPSON'S INDEX OF DOMINANCE, AND THE BRAY-CURTIS DISSIMILARITY INDEX DIFFERED ONLY FOR 1:3 MUD/SAND COMMUNITIES. TOXIC EFFECTS OF THE LIME DRILLING MUD WERE ATTRIBUTED TO A DIESEL FUEL OIL COMPONENT (3.98 MG/G OF MUD).

TAGATZ, MARLIN E. 1983. TOXICITY OF CREOSOTE TO BENTHIC COMMUNITIES. ENVIRON. TOXICOL. CHEM. 2(4):441-450. (ERL,GB 486).

MACROBENTHIC ANIMAL COMMUNITIES THAT COLONIZED UNCONTAMINATED AND CREOSOTE-CONTAMINATED SAND (177, 844, AND 4420 UG/G, NOMINAL) DURING 8 WEEKS WERE COMPARED TO ASSESS EFFECTS OF MARINE-GRADE CREOSOTE ON COMMUNITY STRUCTURE. AQUARIA WERE COLONIZED IN THE LABORATORY BY PLANKTONIC LARVAE ENTRAINED IN CONTINUOUSLY SUPPLIED UNFILTERED SEAWATER AND IN THE FIELD BY ANIMALS THAT OCCURRED NATURALLY. INDIVIDUALS AND SPECIES IN AQUARIA THAT CONTAINED 844 AND 4420 UG CREOSOTE/G WERE SIGNIFICANTLY FEWER (ALPHA=0.05) THAN THOSE IN THE CONTROL. ABUNDANCE OF ANIMALS IN FIELD-COLONIZED COMMUNITIES CONTAMINATED WITH 177 UG/G, BUT NOT IN LABORATORY-COLONIZED COMMUNITIES, ALSO WAS LESS THAN THAT IN THE CONTROL. THE LOWEST CONCENTRATION AT EITHER SITE THAT AFFECTED NUMBERS OF INDIVIDUALS OR SPECIES WAS 844 UG/G FOR MOLLUSKS AND 177 UG/G FOR ECHINODERMS, ANNELIDS, AND ARTHROPODS. THE SHANNON-WEAVER INDEX OF DIVERSITY, SIMPSON'S INDEX OF DOMINANCE, AND THE BRAY-CURTIS DISSIMILARITY INDEX DIFFERENCES WERE GREATER WITH EACH INCREASE IN CREOSOTE CONCENTRATION. RAREFACTION INDICES OF DIVERSITY INDICATED THAT THE DISTRIBUTION OF INDIVIDUALS WITHIN SPECIES WAS ABOUT THE SAME FOR LABORATORY AND FIELD ASSEMBLAGES OF ANIMALS. INITIAL MEASURED CONCENTRATIONS OF CREOSOTE IN SAND (MID-RANGE CONCENTRATION) DECREASED BY 30% IN THE LABORATORY AND BY 42% IN THE FIELD AT THE END OF THE EIGHT-WEEK TEST.

TAKITA, TORU, DOUGLAS P. MIDDAUGH, AND JOHN M. DEAN. IN PREP. PREDATION OF SPAWNING ATLANTIC SILVERSIDES, MENIDIA MENIDIA, BY WADING BIRDS AND AQUATIC PREDATORS. ENVIRON. BIOL. FISH. (ERL,GB 465).

PREDATION OF ATLANTIC SILVERSIDES WAS OBSERVED DURING SPAWNING RUNS IN THE INTERTIDAL ZONE OF THE NORTH EDISTO RIVER ESTUARY, SOUTH CAROLINA. SNOWY EGRETS, EGRETTA THULA, AND GREAT EGRETS, CASMERODIUS ALBUS, WERE THE DOMINANT AVIAN PREDATORS. SNOWY EGRETS OFTEN CAUGHT M. MENIDIA WHILE MAKING FREQUENT LOW FLIGHTS, AND ALSO WHILE WADING AT THE WATER'S EDGE. INDIVIDUAL SNOWY EGRETS REMAINED UNSATIATED AFTER CONSUMING UP TO 21 M. MENIDIA. GREAT EGRETS ALWAYS STRUCK AT M. MENIDIA FROM A STANDING POSITION. ONE INDIVIDUAL WAS SATIATED AFTER CONSUMING 114 M. MENIDIA IN APPROXIMATELY 90 MINUTES. INTRASPECIFIC DISTURBANCES WERE OFTEN OBSERVED IN BOTH SNOWY AND GREAT EGRETS. INTRASPECIFIC INTERACTION DID NOT PRESENT A SERIOUS PROBLEM TO THE SUBORDINATE SPECIES, SNOWY EGRET.

VAN VELD, P.A., AND J.C. SPAIN. 1983. BIODEGRADATION OF METHYLPARATHION, P-NITROPHENOL, AND P-CRESOL IN THREE TYPES OF LABORATORY TEST SYSTEMS (ABSTRACT). IN: ABSTRACTS OF THE ANNUAL MEETING OF THE MAERICAMERICAN SOCEITYIETY FOR MICRONBIOLOGY, 1983. AMERICAN SOCIETY FOR MICROBIOLOGY, WASHIGNGTON, DC. PP. 266. (ERL,GB 459*).

THREE TYPES OF LABORATORY TEST SYSTEM WERE USED TO MEASURE THE BIODEGRADATION OF METHYL PARATHION (MP), P-NITROPHENOL (PNP), AND P-CRESOL TO ASSESS THE EFFECT OF SYSTEM DESIGN ON THE DEGRADATION AND FATE OF SUCH COMPOUNDS. SHAKE FLASKS CONTAINING WATER OR WATER/SEDIMENT SLURRIES AND INTACT CORES WITH WATER AND SEDIMENT WERE PREPARED WITH ESTUARINE WATER AND SEDIMENT. RADIOLABELED TEST COMPOUNDS (200 UG/L) WERE ADDED TO EACH TEST SYSTEM AND DISAPPEARANCE OF THE PARENT COMPOUNDS WAS MEASURED BY HIGH-PRESSURE LIQUID CHROMATOGRAPHY OR GAS-LIQUID CHROMATOGRAPHY. DEGRADATION OF MP AND PNP WAS FASTEST IN ECOCORES AND SLOWEST IN WATER FLASKS. IN MOST CASES, DEGRADATION OF PNP IN FLASKS WAS NEGLIGIBLE. P-CRESOL DISAPPEARED RAPIDLY IN ALL SYSTEMS AFTER A VARIABLE LAG PERIOD. THE RESULTS SUGGEST THAT FOR SOME COMPOUNDS THAT CAN BE TRANSFORMED BY REDUCTIVE AS WELL AS OXIDATIVE PATHWAYS, DEGRADATION MAY BE FASTER IN SYSTEMS WITH UNDISTURBED SEDIMENTS. FOR P-CRESOL THE PRESENCE OF SEDIMENT IN THE TEST SYSTEM SEEMS TO BE LESS IMPORTANT.

VAN VELD, P.A., AND J.C. SPAIN. 1983. DEGRADATION OF SELECTED XENOBIOTIC COMPOUNDS IN THREE TYPES OF AQUATIC TEST SYSTEMS. CHEMOSPHERE. 12(9/10):1291-1305. (ERL,GB 478).

THE BIODEGRADATION RATES OF P-NITROPHENOL, METHYL PARATHION AND P-CRESOL WERE COMPARED IN TEST SYSTEMS COMPOSED OF SEDIMENT AND WATER COLLECTED FROM VARIOUS ESTUARINE SITES. P-NITROPHENOL AND METHYL PARATHION DEGRADATION WAS FASTEST IN INTACT SEDIMENT/WATER CORES FOLLOWED BY SEDIMENT-WATER SHAKE FLASKS AND SLOWEST IN WATER SHAKE FLASKS. P-CRESOL DEGRADED RAPIDLY IN ALL TEST SYSTEMS. THE APPLICABLILITY OF A FIRST-ORDER KINETIC MODEL TO DESCRIBE THE DEGRADATION OF THESE COMPOUNDS WAS EXAMINED.

WALKER, W. W., C. R. CRIPE, P. H. PRITCHARD, AND A. W. BOURQUIN. IN PRESS. BIOLOGICAL AND ABIOTIC DEGRADATION RATES OF XENOBIOTIC CHEMICALS IN IN VITRO ESTUARINE AND SEDIMENT/WATER SYSTEMS. J. AGRIC. FOOD CHEM. (ERL,GB 504).

THREE HERBICIDES, TWO FUNGICIDES, FOUR ORGANOPHORPHORUS INSECTICIDES, AND ONE MITICIDE (ACARICIDE) WERE CHARACTERIZED WITH RESPECT TO DEGRADATION RATE IN ESTUARINE WATER AND SEDIMENT/WATER SYSTEMS USING A SIMPLE SHAKE FLASK TEST. DECAY RATES FOR EACH CHEMICAL COULD GENERALLY BE DESCRIBED BY A FIRST ORDER MODEL. THE DEGRADATION OF HOELON, BRAVO, BOLSTAR, FENTHION, AND BOLERO WAS BIOLOGICALLY MEDIATED. THE FASTEST BIODEGRADATION RATES OCCURRED WHEN SEDIMENT WAS PRESENT. THE DEGRADATION OF TRIFLURALIN, DURSBAN, PHORATE, EPN AND PENTACHLORONITROBENZENE WERE PRIMARILY BY ABIOTIC MEANS. RELATIVE TO THE OTHER TEST MATERIALS, PHORATE REFLECTED INTERMEDIATE DEGRADATION RATES. VARIABILITY IN RATES FROM REPLICATE FLASKS SUGGESTED THAT A DIFFERENCE IN RATE WITHIN TREATMENTS (STERILE/ACTIVE, WITH AND WITHOUT SEDIMENTS) OF A FACTOR OF TWO OR LESS WAS PROBABLY NOT SIGNIFICANT.

WALKER, WILLIAM W., C.R. CRIPE, P.H. PRITCHARD, AND A.W. BOURQUIN. IN PREP. DI-N-BUTYLPHTHALATE DEGRADATION IN ESTUARINE AND FRESHWATER SITES. CHEMOSPHERE. (ERL,GB 509).

BIOTIC AND ABIOTIC DEGRADATION OF DI-N-BUTYLPHTHALATE (DBP) IN WATER AND SEDIMENT/WATER SYSTEMS FROM SIX DIFFERENT SITES WAS INVESTIGATED UNDER LABORATORY CONDITIONS. WATER AND UNDERLYING SEDIMENT WERE COLLECTED FROM FRESHWATER AND ESTUARINE SITES IN FLORIDA, MISSISSIPPI, AND LOUISIANA, AMENDED WITH DBP, AND INCUBATED UNDER CONDITIONS OF CONSTANT TEMPERATURE AND PH. FORMALIN-STERILIZED SYSTEMS FROM EACH SITE WERE INCLUDED TO EVALUATE ABIOTIC DEGRADATION. DBP DISAPPEARANCE WAS RAPID IN ALL MICROBIALLY ACTIVE SYSTEMS AND SUBSTANTIALLY REDUCED IN THE PRESENCE OF FORMALIN. IN BIOLOGICALLY-ACTIVE SYSTEMS ACTUAL TIME TO HALF THE STARTING CONCENTRATION RANGED FROM 1.0 TO 4,8 DAYS IN SEDIMENT/WATER MIXTURES AND FROM 1.7 TO 13.1 DAYS IN WATER ALONE. ADAPTATION OF MICROBIAL POPULATIONS TO DEGRADE DBP WAS INDICATED IN SIX OF THE NINE EVALUATIONS CONDUCTED. THE PRESENCE OF SEDIMENT SIGNIFICANTLY INCREASED BIODEGRADATION RATES IN FIVE OF THE SIX SITES.

WALSH, GERALD E. 1983. CELL DEATH AND INHIBITION OF POPULATION GROWTH OF MARINE UNICELLULAR ALGAE BY PESTICIDES. AQUAT. TOXICOL. (AMST.). 3(3):209-214. (ERL,GB 430).

THE MARINE DIATOM, SKELETONEMA COSTATUM, WAS EXPOSED TO THE PESTICIDES HEXACLOROCYCLOPENTADIENE, EPN, CHLORPYRIFOS, CARBONPHENOTHION, AND ATRAZINE AND EXAMINED FOR DEATH OF CELLS WITH EVANS BLUE, A MORTAL STAIN. ALL PESTICIDES CAUSED DEATH OF CELLS, BUT SIGNIFICANTLY MORTALITY OCCURRED AT CONCENTRATIONS GREATER THAN THE EC50. THE INSECTICIDE, AMDRO, DID NOT KILL THE MARINE ALGAE S. COSTATUM, THALASSIOSIRA PSEUDONANA, ISOCHRYSIS GALBANA, CHLORELLA SP., OR DUNALIELLA TERTIOLECTA. HOWEVER, AMDRO WAS VERY INHIBITORY TO ALGAL POPULATION GROWTH AT LOW CONCENTRATIONS, I.E., EC50'S AT 48 HOURS WERE BETWEEN 0.14 PPB FOR T. PSEUDONANA AND 10.3 PPB FOR D. TERTIOLECTA. EC50'S WERE LOWEST AFTER 48 HOURS OF EXPOSURE IN TESTS CONDUCTED FOR 96 HOURS. BY 96 HOURS AFTER EXPOSURE, MAXIMUM GROWTH RATES RECOMMENDED THAT, BECAUSE OF PROBLEMS ASSOCIATED WITH THE FATE OF TOXICANTS, ALGAL LABORATORY TOXICITY TESTS BE CONDUCTED FOR 48 TO 72 HOURS INSTEAD OF THE USUAL 96 HOURS LONGER.

WALSH, GERALD E., AND RICHARD L. GARNAS. 1983. DETERMINATION OF BIOACTIVITY OF CHEMICAL FRACTIONS OF LIQUID WASTES USING FRESHWATER AND SALTWATER ALGAE AND CRUSTACEANS. ENVIRON. SCI. TECHNOL. 17(3):180-182. (ERL,GB 450).

COMPLEX WASTES FROM INDUSTRIAL AND MUNICIPAL OUTFALLS WERE FRACTIONATED CHEMICALLY AND TESTED FOR TOXOCITIY WITH FRESH AND SALTWATER ALGAE AND CRUSTACEANS. THE ORGANIC FRACTION OF EACH WASTE WAS SUBFRACTIONATED INTO ACID-, BASE-, AND NEUTRAL-EXTRACTABLE PORTIONS, AND THE INORGANIC FRACTION WAS SUBFRACTIONATED INTO ITS ANION AND CATION COMPONENTS. ALL WASTES AFFECTED GROWTH OF THE ALGAE SKELETONEMA COSTATUM (SALTWATER) AND MONORAPHIDIUM CAPRICORNUTUM (FRESHWATER). USUALLY, BIOACTIVITY WAS LIMITED TO ONE OR TWO SUBFRACTIONS. IN SOME CASES, ALGAL GROWTH WAS STIMULATED BY A FRACTION OR SUBFRACTION, WHEREAS STIMULATION WAS NOT DETECTED IN WHOLE WASTE. IT IS SUGGESTED THAT FRACTIONATION MUST BE DONE IN ORDER TO ESTIMATE THE FULL POTENTIAL IMPACT OF COMPLEX WASTES ON AQUATIC SYSTEMS. THE METHOD CAN ALSO BE USED TO IDENTIFY TOXIC FACTORS BEFORE APPLICATION OF CONTROL TECHNOLOGY.

WALSH, GERALD E. 1983. EFFECTS OF TOXICANTS ON PLANKTON. IN: HEALTH ASPECTS OF CHEMICAL SAFETY: ENVIRONMENTAL TOXICOLOGY. WORLD HEALTH ORGANIZATION, COPENHAGEN, DENMARK. PP. 117-167. (ERL,GB 448*). AVAIL. FROM NTIS, SPRINGFIELD, VA: PB83-117044.

EFFECTS OF HEAVY METALS, PESTICIDES, AND INDUSTRIAL AND MUNICIPAL WASTES ON PLANKTON IN THE FIELD AND LABORATORY ARE REVIEWED. BOTH HOLOPLANKTON AND MEROPLANKTON ARE DISCUSSED. IN MANY CASES, MEROPLANKTONIC STAGES OF BENTHIC SPECIES ARE MORE SENSITIVE THAN ADULTS ALTHOUGH DEATH OR DEPRESSION OF PHYSIOLOGICAL ACTIVITIES ARE OFTEN USED AS CRITERIA FOR EFFECTS OF POLLUTANTS WITH ALGAE AND ANIMALS, ALGAE MAY BE USED TO DETECT EFFECTS OF GROWTH STIMULANTS.

WALSH, G.E. 1984. FINAL REPORT ON EFFECT OF FENTHION ON SELECTED ESTUARINE SPECIES RELATED TO FIELD STUDY. EPA-600/X-84-082, U.S. ENVIRONMENTAL PROTECTION AGENCY. ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 5P.

EFFECTS OF A MOSQUITO ADULTICIDE, FENTHION (O-O-DIMETHYL O-[3-METHYL-4-METHYLTHIO-PHENYL]PHOSPHOROTHIOATE), ON ESTUARINE ORGANISMS WERE DETERMINED IN A SERIES OF ACUTE TESTS WITH FIVE ESTUARINE SPECIES: CYPRINODON VARIEGATUS (SHEEPSHEAD MINNOW), MENIDIA BERYLLINA (INLAND SILVERSIDE), MYSIDOPSIS BAHIA (MYSID SHRIMP), PALEOMONETES PUGIO (GRASS SHRIMP) AND PENAEUS DURORAUM (PINK SHRIMP). THE ACUTE TESTS WERE CONDUCTED TO PROVIDE A LABORATORY TOXICITY DATA BASE FOR A FIELD EVALUATION OF LABORATORY TEST METHODS. LC50 VALUES (CALCULATED CONCENTRATIONS LETHAL TO 50% OF THE TEST ORGANISMS) WERE USED TO DETERMINE THE MORE SENSITIVE ORGANISMS AND THE RANGE OF CONCENTRATIONS AT WHICH THESE COMMON TEST ORGANISMS MIGHT BE AFFECTED. LC50 VALUES ARE REPORTED IN MICROGRAMS OF FENTHION IN 1.0L OF SEAWATER (PPB) AFTER 24, 48, 72, AND 96 H EXPOSURE.

WALSH, GERALD E. 1983. REPORT ON SPECIES TESTED AND PRELIMINARY FINDINGS. EPA-600/X-84-078, U.S. ENVIRONMENTAL PROTECTION AGENCY, ENVIRONMENTAL RESEARCH LABORATORY, GULF BREEZE, FL. 6P.

RESEARCH FOR THE PAST YEAR HAS BEEN DEVOTED TO A SEARCH FOR NEW, SENSITIVE ESTUARINE ORGANISMS FOR USE IN TOXICITY AND UPTAKE STUDIES WITH PESTICIDES AND TOXIC SUBSTANCES. A REVIEW OF THE FAUNA OF THE GULF BREEZE AREA WAS MADE AND SEVERAL SPECIES WERE CHOSEN FOR TESTING. SINCE THE MAIN EFFORT OF FUTURE TESTING WILL BE ON RESPONSES OF EGGS AND LARVAE TO POLLUTANTS IN WATER AND SEDIMENT, SPECIES WITH PELAGIC LARVAE THAT SETTLE ON THE BOTTOM BEFORE COMPLETE METAMORPHOSIS WERE CHOSEN. THIS YEAR, EMPHASIS WAS PLACED ON DEVELOPMENT OF TECHNIQUES FOR REARING AND EXPOSURE OF EGGS AND LARVAE OF THE LUGWORM, ARENICOLA CRISTATA. INITIAL STUDIES WERE DONE ON AMPHIPOXUS, BRANCHIOSTOMA CARIBBAEUM, AND THE MOLE CRAB, EMERITA TALPOIDA. A SMALL EFFORT WAS DEVOTED TO STUDY OF THE SENSITIVITY OF ARM REGNERATION IN THE BENTHIC BRITTLE STAR, OPHIODERMA BREVISPINA, TO A TOXIC SUBSTANCE. STUDIES WERE DONE WITH AN ORGANOTIN COMPOUND AND THE ALGAE, SKELETONEMA COSTATUM AND THALASSIOSIRA PSEUDONANA, IN ORDER TO COMPARE ALGAL AND ANIMAL RESPONSES.

WHITE, DAVID C., JANET S. NICKELS, MICHAEL J. GEHRON, JEFFREY H. PARKER, ROBERT F. MARTZ, AND NORMAN L. RICHARDS. IN PREP. BIOCHEMICAL MEASURES OF CORAL METABOLIC ACTIVITY, NUTRITIONAL STATUS AND MICROBIAL INFECTION WITH EXPOSURE TO OIL AND GAS WELL DRILLING FLUIDS. (ERL,GB X394).

THE REEF BUILDING CORAL MONTASTREA ANNULARUS WAS EXPOSED CONTINUOUSLY TO SUSPENSIONS OF OIL AND GAS-WELL DRILLING FLUIDS AT CONCENTRATIONS OF 0.1 ML LITER (-1), 0.01 ML LITER (-1), AND 0.001 ML LITER (-1) IN FLOWING SEAWATER AT THE U.S. NAVAL STAGE I PLATFORM (30 DEGREES 7.5 ' N, 85 DEGREES 46.3' W). AFTER 6 WEEKS EXPOSURE, CORAL FRAGMENTS OF 30 TO 60 CM SQUARED SURFACE AREA WERE BROKEN OFF, RINSED IN SEAWATER, AND EXTRACTED IN A ONE-PHASE CHLOROFORM-METHANOL SEAWATER EXTRACT AND RETURNED TO THE LABORATORY. IN THE LABORATORY, THE EXTRACTION WAS COMPLETED AND THE LIPIDS WERE ANALYZED FOR THEIR PHOSPHOLIPID CONTENT, ALKYL FATTY ACID COMPOSITION, AND NEUTRAL LIPID TRIGLYCERIDE GLYCEROL. THE AQUEOUS PHASE WAS ANALYZED FOR FREE AMINO ACID COMPOSITION. BIOCHEMICAL EVIDENCE OF STRESS WAS REFLECTED IN THE CESSATION OF GROWTH AS MEASURED IN DEPRESSED DIACYL PHOSPHOLIPID. DETAILED ANALYSIS OF THE ACYL FATTY ACID COMPOSITION BY CAPILLARY GAS CHROMATOGRAPHY SHOWED CHANGES IN POLYENOIC FATTY ACIDS SUGGESTING POSSIBLE CHANGES IN THE METABOLISM OF THE FATTY ACIDS INDUCED BY THE EXPOSURE TO THE DRILLING FLUIDS. THERE WAS NO SIGNIFICANT EFFECT ON THE LEVEL OF TRIGLYCERIDE GLYCEROL. THE CORAL ALSO SHOWED INCREASED LEVELS OF THE FREE ASPARTIC ACID AND A DOSE-RESPONSE RELATED DECREASE IN THE FREE GLUTAMIC ACID WITH EXPOSURE. THIS EVIDENCE SUGGESTS THAT BIOCHEMICAL ANALYSIS OF METABOLIC ACTIVITY AND NUTRITIONAL STATUS MAY BE USEFUL AS MARKERS FOR POLLUTION INDUCED CHANGES IN REEF BUILDING CORALS AND THUS FOR MONITORING CORAL REEFS.

WIERNICKI, C. 1984. ASSIMILATION EFFICIENCY BY PROCAMBARUS CLARKII FED ELODEA (EGERA DENSA) AND ITS PRODUCTS OF DECOMPOSITION. AQUACULTURE. 36(3):203-215. (ERL,GB X372*).

ELODEA CUT INTO TWO INITIAL PARTICLE SIZES (2.0 CM SECTIONS AND 3.0 MM(2) FRAGMENTS) UNDERWENT MICROBIAL DECOMPOSITION FOR PERIODS OF 0, 15, 33, AND 45 DAYS, AND THEN WAS FED TO FOUR SIZE CLASSES OF CRAYFISH (2.0, 3.5, 5.0, AND 9.0 CM). ASSIMILATION EFFICIENCY WAS DETERMINED BY CONOVER'S METHOD. ALL FOUR SIZE CLASSES OF CRAYFISH ASSIMILATED 15-DAY DETRITUS MORE EFFICIENTLY THAN 0-DAY DETRITUS. TWO-CM CRAYFISH ASSIMILATED 33-DAY DETRITUS MORE EFFICIENTLY THAN 15- OR 0-DAY DETRITUS. IN ALL OTHER CASES, ASSIMILATION EFFICIENCY WAS REDUCED. RADIOTRACER TECHNIQUES UTILIZING 14C WERE USED TO DETERMINE THE PERCENTAGE OF CARBON ASSIMILATED IN THE FORM OF PLANT FRAGMENTS COMPARED WITH THE PERCENTAGE ASSIMILATED IN THE FORM OF MICROORGANISMS. RESULTS INDICATE AN INVERSE RELATIONSHIP BETWEEN CRAYFISH SIZE AND THE PERCENTAGE OF CARBON ASSIMILATED IN THE FORM OF MICROORGANISMS.

YINGST, J. Y., AND D. C. RHOADS. IN PRESS. STRUCTURE OF SOFT-BOTTOM BENTHIC COMMUNITIES IN THE VICINITY OF THE TEXAS FLOWER GARDEN BANKS GULF OF MEXICO. ESTUARINE COASTAL SHELF SCI. (ERL,GB 503).

BIOLOGICAL AND SEDIMENTOLOGICAL SAMPLES WERE OBTAINED IN JUNE 1980 FROM BOX CORES TAKEN IN 100-200 METERS OF WATER ON SANDY-MUD SEDIMENTS NEAR THE EAST AND WEST FLOWER GARDEN BANK (FGH) REEFS, ON THE TEXAS-LOUISIANA CONTINENTAL SHELF. THE OBJECTIVE WAS TO OBTAIN NEEDED AND UNKNOWN BASELINE INFORMATION ABOUT SEDIMENTARY PARAMETERS AND ORGANISMS OF THE FGB ENVIRONMENT TO ALLOW INFERENCES TO BE MADE ABOUT THE POTENTIAL EFFECTS OF PHYSICAL DISTURBANCES OF THE SEAFLOOR ON THE INDIGENOUS BENTHOS. BOTH MICROBIAL ATP AND BACTERIAL BIOMASS ARE LOWER THAN REPORTED FOR GEORGIA BIGHT SHELF, BRAZIL-AMAZON RIVER SHELF, CAP BLANC, WEST AFRICAN SHELF, WESTERN COAST OF NORWAY, AND LONG ISLAND SOUND. BACTERIAL COUNTS ARE COMPARABLE TO THE AMAZON RIVER SHELF AND LOWER THAN THOSE RECORDED FOR THE EAST CHINA SEA. MODERATE TO LOW STANDING STOCKS OF BENTHOS FURTHER SUGGEST THAT THIS AREA OF THE GULF OF MEXICO IS A RELATIVELY OLIGOTHROPHIC SYSTEM FOR INFAUNAL BENTHIS CONSUMERS. THE GREATEST POTENTIAL DELETERIOUS PHYSICAL DISTURBANCE TO THE FGB SYSTEM IS AN INFLUX OF DRILLING MUDS FROM NEARBY OIL DRILLING OPERATIONS. HIGHER ORDER SUCCESSIONAL STAGES ARE IN GENERAL ADVERSELY AFFECTED TO A GREATER EXTENT THAN PIONEERING STAGES BY PHYSICAL DISTURBANCE. IN THE TEXAS-LOUISIANA SHELF REGION, DILUTION OF AN ALREADY OLIGOTROPHIC SYSTEM BY INERT BARIUM SULPHATE WOULD BE EXPECTED TO RESULT IN EVEN LOWER STANDING STOCKS OF PIONEERING INVERTEBRATES THAN MIGHT OTHERWISE OCCUR.